DECLARATION STATEMENT - RECORD OF DECISION

Wellsville-Andover Landfill Inactive Hazardous Waste Site
Towns of Wellsville and Andover, Allegany County, New York
Site No. 9-02-004
Funding Source: 1986 Environmental Quality Bond Act

Statement of Purpose and Basis

This Record of Decision presents the selected remedial action for the Wellsville-Andover 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 (40 CFR 300).

This decision is based upon the Administrative Record of the New York State Department of Environmental Conservation (NYSDEC) for the Wellsville-Andover 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.

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 Record of Decision, may present 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 site and the criteria identified for the evaluation of alternatives, the NYSDEC has selected a remedy to consolidate and cover wastes at the site, upgrade the leachate collection system, provide treatment for domestic water where necessary, and monitoring. The current intention is to treat collected water off-site prior to disposal but some or all of the collected water may be treated on-site if this is determined to be more cost effective during the design of the remedy.

The major elements of the selected remedy include:

- A **remedial design** program to verify the components of the conceptual design and provide the details necessary for the construction, operation and maintenance, and monitoring of the remedial program. Uncertainties identified during the RI/FS will be resolved.
- **Consolidation** of the northwest area into the south/south-central area.

- o **Capping** the areas that contain wastes with an engineered cover that minimizes the infiltration of water into the wastes thereby minimizing the production of leachate. The cover system will include a passive landfill gas venting system.

- o **Upgrade of the leachate collection system** to prevent the continuation of uncontrolled releases of leachate to the environment. The current intention is for collected leachate to be transported off-site for treatment and disposal. Further evaluation during remedial design may result in changes to the way in which leachate is ultimately disposed.

- o Point-of-use **treatment of domestic water** where necessary.

- o **Repair or replacement of bridges/culverts** along Duffy Hollow Road as necessary to allow passage of heavy equipment to the site to carry out the remedy.

- o The practicability of implementing an **off-site groundwater containment/treatment** system will be evaluated after construction of the cover/leachate system.

- o **Long-term operation and maintenance** of the remedy including monitoring of groundwater and residential water. Residential water will be monitored quarterly during the first two years, and semi-annually for the next three years. After five years, the need for monitoring the private water supplies will be reevaluated.

New York State Department of Health Acceptance

The New York State Department of Health concurs with the remedial action 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 employ treatment that reduces toxicity, mobility, or volume as a principal element.

March 23, 1994
Date

Ann Hill DeBarbieri
Deputy Commissioner
Office of Environmental Remediation
New York State Department of Environmental Conservation

TABLE OF CONTENTS

Glossary of Acronyms

CERCLA:	Comprehensive Environmental Response, Compensation and Liability Act
DCA:	Dichloroethane
DCE:	Dichloroethene
ECL:	Environmental Conservation Law
HBA:	Habitat Based Assessment
LCS:	Leachate Collection System
NA:	Not Available
NCP:	National Contingency Plan
ND:	Not Detected
NIOSH	National Institute for Occupational Safety and Health
NYCRR:	N.Y. Codes, Rules, and Regulations
NYSDEC:	N.Y. State Department of Environmental Conservation
NYSDOH:	N.Y. State Department of Health
O&M:	Operation and Maintenance
ppb:	parts per billion
ppm:	parts per million
PRAP:	Proposed Remedial Action Plan
REL	Recommended Exposure Limit
RI/FS:	Remedial Investigation and Feasibility Study
ROD:	Record of Decision
SCG:	Standards, Criteria, and Guidance
SPDES:	State Pollution Discharge Elimination System
TCE:	Trichloroethene
TWA	Time-Weighted Average
VC:	Vinyl Chloride
VOC:	Volatile Organic Compound

Notice

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RECORD OF DECISION
WELLSVILLE-ANDOVER LANDFILL SITE
SITE ID NO. 902004

1.0 INTRODUCTION

The New York State Department of Environmental Conservation (NYSDEC), in consultation with the New York State Department of Health (NYSDOH), has selected a remedial program for the Wellsville-Andover Landfill site. The remedy consists of consolidating and placing a final cover over wastes, upgrading the existing leachate collection system, providing domestic water treatment where necessary, and monitoring.

The NYSDEC has selected this action to mitigate potentially harmful effects to the public and environment caused by uncontrolled releases of leachate and the off-site migration of contaminated groundwater. Presently, the Wellsville-Andover Landfill has minimal cover, which allows water to infiltrate the wastes, producing leachate. Leachate is contaminated water formed by percolation of stormwater or groundwater through the wastes.

Although a leachate collection system (LCS) exists at the site, it is not sufficient to capture the amount of leachate generated, especially during the wet seasons. It has been estimated that approximately half of the leachate produced annually escapes the LCS. Some of this leachate flows onto adjacent properties and into nearby streams. An impermeable cover will prevent human or animal contact with contaminants and will minimize the amount of leachate produced. Where necessary, water treatment or alternate sources of water will be provided to local residents whose source of potable water has been contaminated.

This Record of Decision defines and selects a remedy for the site and discusses the rationale for this selection. The NYSDEC has carefully considered all of the comments submitted during the public comment period prior to the issuance of this Document.

2.0 SITE LOCATION AND DESCRIPTION

The Wellsville-Andover Landfill is a 120 acre site consisting of approximately 40 acres of municipal/industrial landfill. The site is located in a sparsely populated, rural area on Snyder Road in the Towns of Wellsville and Andover in Allegany County, New York. The site is situated on a hillside (160 feet of relief) in the Appalachian Highlands, approximately 9 miles south of the Southern Tier Expressway (Route 17). Duffy Hollow Creek, a class C stream, is located 1500 feet east of the site. The NYSDEC classifies streams according to potential use. A Class C stream is considered suitable for fishing and fish propagation but not drinking or swimming. An unnamed tributary (Class C) of Duffy Hollow Creek runs along the west side of the site and converges with Duffy Hollow Creek 3000 feet southeast of the site. The Duffy Hollow Creek empties into Dyke Creek at State Highway 417, which then flows into the Genesee River (See Figure 1).

3.0 SITE HISTORY AND ENFORCEMENT STATUS

The Wellsville-Andover Landfill site is owned by the Village of Wellsville and was utilized by the Villages and Towns of Wellsville and Andover and various industries between 1964 and 1983.

More than 300 tons of hazardous and industrial wastes were deposited at the site, including solvents such as trichloroethylene (trichloroethene) sludge; methylene chloride; plastics and polyester scraps; sodium cyanide salts; chromium and zinc chromate paints; cutting and lubricating oils; lead carbonate; talc pumice; and detergents.

The site consists of four unlined fill areas (see Figure 2). The site received municipal, industrial, and hazardous wastes. The south, southcentral, and northwestern sections were operated between 1964 and 1978. The northeastern section received wastes between 1978 and 1983. The depth of fill varies across the site from approximately 4.5 feet to 16 feet.

3.1 Previous Investigations

The following is a summary of the investigations completed at the Wellsville-Andover Landfill site. The major investigative activity conducted at an inactive hazardous waste site is a Remedial Investigation/Feasibility Study (RI/FS). During the RI, the nature and extent of contamination at the site is determined. This information is then used during the FS to determine an appropriate remedial action that effectively eliminates the threat posed by the site.

1. Phase I Investigation - June 1983, Engineering-Science, Inc. in association with Dames & Moore: The NYSDEC contracted with Engineering Science to perform a Phase I Study. During this investigation, all available data, records, and information collected from a site inspection were reviewed and evaluated to determine the adequacy of the existing information for calculation of a Hazard Ranking System (HRS) score. It was determined that additional information was necessary to complete the HRS score and should be collected during a Phase II Investigation.

2. Phase II Investigation - December 1986, Malcolm Pirnie: Under an Order On Consent (legal agreement) with the NYSDEC, signed in October 1985, the Village of Wellsville completed a Phase II Investigation. The Phase II Investigation included a literature review, air survey, completion of eight exploratory soil borings to define subsurface conditions, installation of 4 monitoring wells in the overburden just south of the site, and sampling and analysis of leachate, groundwater, six residential water supplies, surface water, and sediments.

3. In January 1991, after the potentially responsible parties for the site declined to complete the investigation and remediation, a decision was made to complete the RI/FS using funds from the 1986 Environmental Quality Bond Act as part of the State Superfund program. In February 1991, the NYSDEC contracted with Ecology and Environment, Inc. to conduct the RI/FS.

4. Phase I RI - May 1992, Ecology and Environment, Inc.: The NYSDEC conducted a Phase I RI, which included: 1) the development of a base map; 2) a geophysical survey (non-intrusive subsurface investigation); 3) installation of soil borings and monitoring wells for sampling and analysis of subsurface soils and groundwater; 4) determination of the physical properties of the subsurface soil and hydrogeologic (groundwater) conditions; 5) excavation of test pits to investigate unusual areas detected during the geophysical survey (possible drum burial sites); 6) sampling and analysis of surface water and sediment samples from Duffy Hollow Creek and its unnamed tributary; 7) sampling and analysis of residential wells and springs in the vicinity of the site; 8)

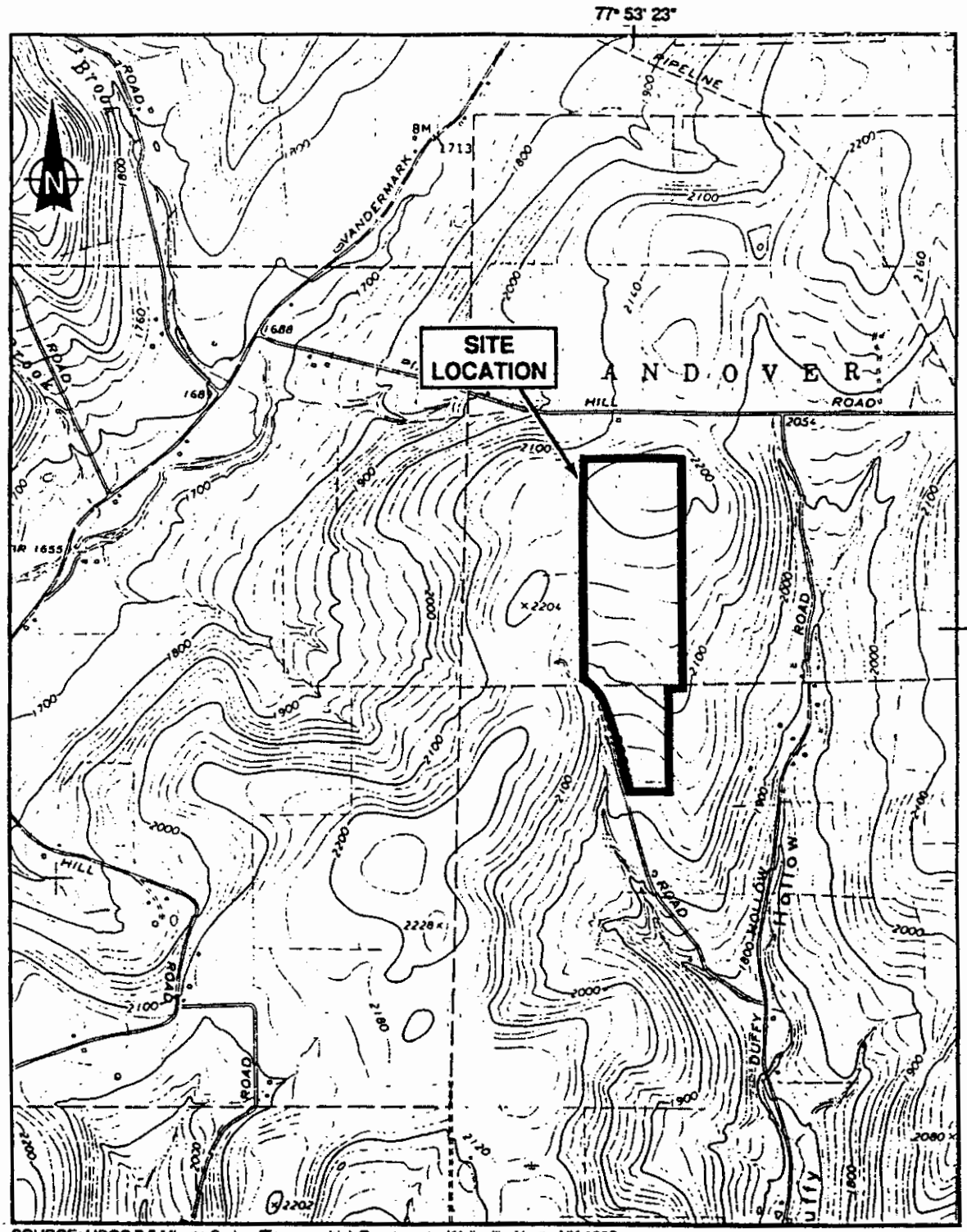
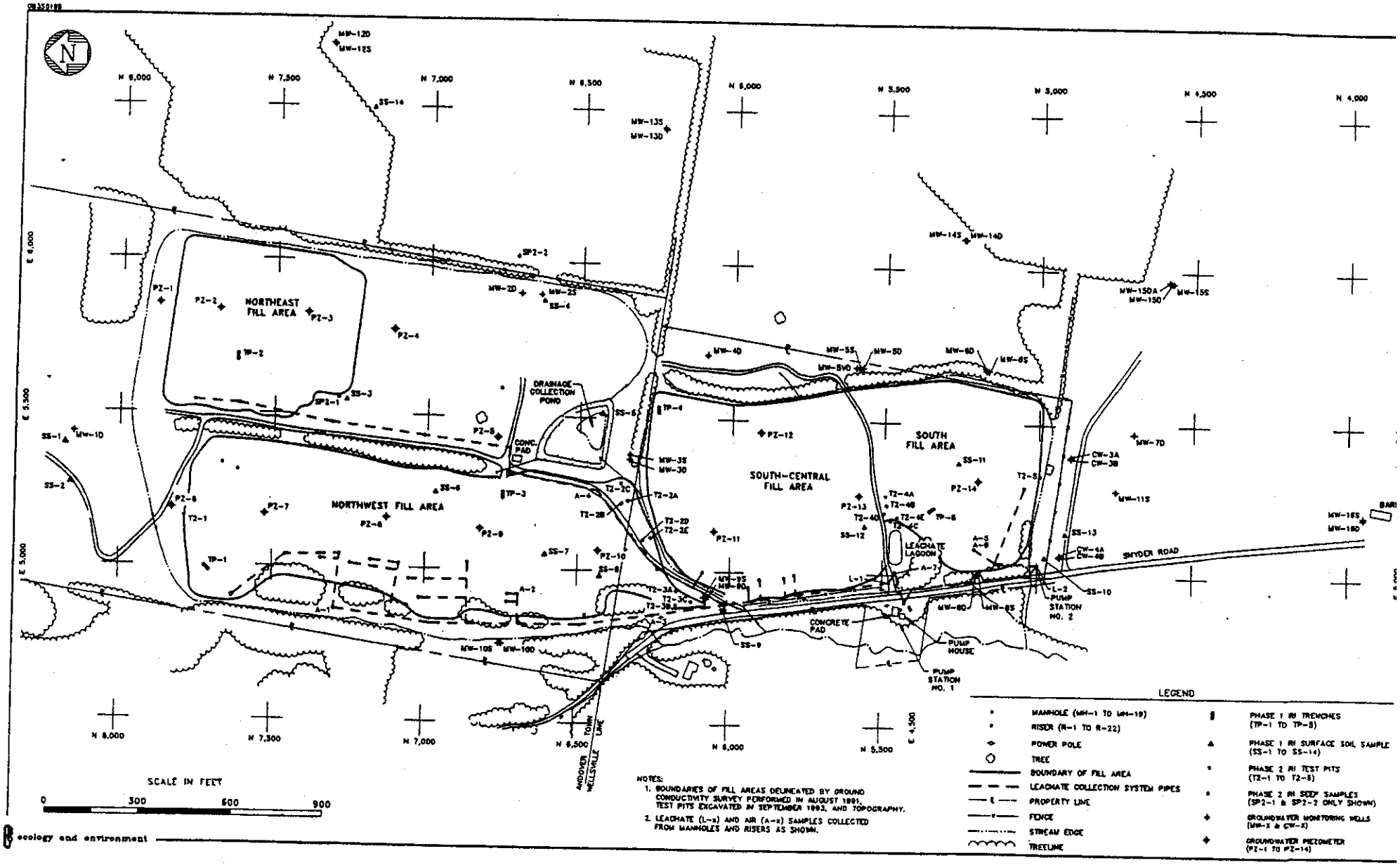


Figure 1
SITE LOCATION MAP, WELLSVILLE-ANDOVER LANDFILL



NOTES:
1. BOUNDARIES OF FILL AREAS DELINEATED BY GROUND CONDUCTIVITY SURVEY PERFORMED IN AUGUST 1991. TEST PITS EXCAVATED IN SEPTEMBER 1993, AND TOPOGRAPHY.
2. LEACHATE (L-x) AND AIR (A-x) SAMPLES COLLECTED FROM MANHOLES AND RISERS AS SHOWN.

ecology and environment

Figure 2 MONITORING WELL AND SAMPLING LOCATIONS

sampling and analysis of on-site and off-site surface soils, leachate, and air in the leachate collection system.

5. The Phase II RI - June 1993. This investigation included a residential well survey, installation of off-site monitoring wells to determine the extent of the groundwater contamination, installation of piezometers on-site to study the groundwater in the fill areas, sampling and analysis of groundwater, residential water supplies, surface water and sediments, a perimeter soil gas survey, and excavation of test pits to verify the limits of the landfill detected during the geophysical survey.

3.2 Enforcement Status

Potentially Responsible Parties (PRPs) are those who may be legally liable for the site. This includes past and present owners and operators, waste generators who disposed of waste at the site, and waste haulers who hauled waste to the site.

In October 1985, the Village of Wellsville signed an Order on Consent with the NYSDEC to conduct a Phase II Investigation. A number of PRPs were later requested by the NYSDEC to perform the RI/FS, and all declined. The PRPs will again be contacted to assume responsibility for the remedial program. If an agreement cannot be reached with the PRPs, the NYSDEC will complete the design and construction of the remedy under the State Superfund. The PRPs are subject to legal actions by the State for recovery of all response costs the State has incurred.

4.0 SUMMARY OF SITE CHARACTERISTICS

4.1 Site Geology and Hydrology

The overburden at the site consists primarily of a gravelly, silty loam, ranging from 10 to 64 feet in depth. Bedrock formations consist of weathered and highly fractured (vertically and horizontally) shale, siltstone, and sandstone.

Site surface water generally drains to the southwest, following the topography of the site. Perched water exists at and around the site and is evidenced by the numerous springs on-site and off-site. The site groundwater flow is predominantly to the south-southeast. A groundwater divide appears to exist along the eastern side of the site. A groundwater divide is a line on the water table from which the water table slopes downward, on each side of the line, in a direction away from the line. At the Wellsville-Andover Landfill Site, groundwater east of the divide flows in an easterly direction. No leachate collection system exists east of the divide, therefore, there is potential for contaminants in groundwater to migrate off-site in an easterly direction.

4.2 Media Specific Characteristics

Analytical data obtained from the investigations were compared to Standards, Criteria, and Guidance (SCGs). SCGs are the various laws, regulations, and policies that apply or are relevant to groundwater, surface water, soil, sediments, and air. Regulatory standards exist for groundwater, surface water and air. For the evaluation and interpretation of analytical

results for soil and sediments, NYSDEC cleanup guidelines, background conditions, and risk-based remediation criteria are used to develop remediation goals.

Based upon the results of the RI in comparison to the SCGs, certain areas and environmental media (e.g. groundwater and soils) of the site may require remediation.

The five classes of media sampled during past investigative activities at the site are groundwater, surface water, sediments, surface soils, and subsurface soils. All of the media show some degree of contamination. Selected results of the organic and inorganic analyses are summarized below. Concentration ranges of the chemicals detected are shown in Table 1 and are expressed in terms of parts per billion (ppb) or parts per million (ppm). For comparison purposes, standards, criteria, or benchmark background values for the contaminants are given for each medium. When available, site background levels are also given. The benchmark background values for inorganics in soils are the upper 90th percentile of concentrations found in eastern U.S. soils (Shacklette and Boerngen, U.S. Department of the Interior, 1984). Other benchmark background values presented are concentrations found in rural soils (ATSDR, U.S. Public Health Service, 1989).

Of the contaminants detected, the chemicals of potential concern are 1,1-dichloroethane (1,1-DCA), 1,1-dichloroethene (1,1-DCE), 1,2-dichloroethene (1,2-DCE), toluene, trichloroethene (TCE), and vinyl chloride (VC). The EPA classifies 1,1-DCA and 1,1-DCE as Group C carcinogens, which are possible carcinogens based on limited evidence of carcinogenicity in animals and an absence of human data. Toluene and 1,2-DCE are classified as Group D carcinogens, which show inadequate animal evidence of carcinogenicity. TCE is a Group B2 carcinogen, which is a probable human carcinogen based on a combination of sufficient evidence for animals and inadequate data for humans. The EPA classifies VC as a Group A carcinogen, which is a human carcinogen based on sufficient evidence from epidemiological studies.

Section 5.1 of this document describes the types of human exposures that may present added health risks to persons at or around the site. A more detailed discussion of the health risks can be seen in the RI Report, Section 5.0, Human Health Risk Evaluation.

Soil

Results of sampling and analysis of site surface soils indicate the presence of polycyclic aromatic hydrocarbons (PAHs) such as benzo(b)fluoranthene, and metals such as iron, manganese, and lead.

Results of sampling and analysis of off-site subsurface soils showed slight elevations of lead, TCE, 1,2-DCE, and vinyl chloride.

Waste

The site contains approximately 700,000 cubic yards of waste. For comparison purposes, one dump truck has a capacity of 5-10 cubic yards. Both test pits and trenches were dug into the waste across the site to obtain samples and search for drums or other source materials. The primary contaminants found in the waste include acetone, total 1,2-DCE, ethylbenzene, toluene, TCE, total xylenes, PAHs, and lead.

Table 1: Summary of Contaminants Detected in Various Media

Surface Soils

Chemical	Concentration Range, ppm		Benchmark Backgrnd Values (ppm)	Freq. of Exceed	Site Backgrnd Levels (ppm)
	Minimum	Maximum			
Benzo(b)fluoranthene	0.034	0.14	0.020-0.030	2/14	ND
Chrysene	0.04	0.05	0.038	3/14	ND
Phenanthrene	0.041	0.047	0.03	3/14	ND
Fluoranthene	0.042	0.185	0.003-0.040	3/14	ND
Iron	23800	283000	54100	3/14	24,900-27,400
Manganese	235	4540	1450	2/14	1,260-1,170
Lead	13.2	56.1	33	2/14	17.3-17.5

Off-site Subsurface Soils

Chemical	Concentration Range, ppm		Benchmark Backgrnd Values (ppm)	Freq. of Exeed.	Site Backgrnd Levels (ppm)
	Minimum	Maximum			
Arsenic	1.3	17.9	16	3/19	2.9-6.8
Lead	6.6	45.3	33	2/19	6.6-18.4
Iron	14700	45200	54100	0/19	32,900-43,700
Manganese	431	1750	1450	2/19	431-1,750
Trichloroethene	0.013	0.022	NA	NA	ND
1,2-DCE	0.061	0.087	NA	NA	ND
Vinyl Chloride	0.007	0.021	NA	NA	ND

Waste/Soil			
Chemical	**Concentration Range, ppm**		**Benchmark Background Values (ppm)**
	Minimum	**Maximum**	
Acetone	0.23	4.5	NA
1,2-DCE	0.021	3.9	NA
Ethylbenzene	0.031	33	NA
Toluene	0.011	3.2	NA
Trichloroethene	0.073	5.3	NA
Total Xylenes	0.051	1.7	NA
4,4'-DDD	0.043	0.12	NA
Lead	15.3	86.9	NA

Groundwater (on-site and off-site)					
Chemical	**Concentration Range, ppb**		**Class GA Standards (ppb)**	**Freq. of Exceed.**	**Site Backgrnd Levels (ppb)**
	Minimum	**Maximum**			
Trichloroethene	1	1200	5	16/52	ND
1,2-DCE	3	5600	5	18/52	ND
Vinyl Chloride	45	2100	2	14/52	ND
1,1-DCA	6	11	5	3/52	ND
1,1-DCE	3	12	5	5/52	ND
Toluene	2	9	5	5/52	ND
Chromium	5	110	50	4/49	11.6
Lead	1.2	125	25	5/49	ND

Residential Water Supplies with Significant Contaminant Concentrations			
Chemical	**Concentration Range, ppb**		**NYSDOH Maximum Contaminant Levels (ppb)**
	Minimum	**Maximum**	
Trichloroethene	2.9	34	5
1,2-DCE	10	150	5
Iron	534	1300	300
Manganese	510	2120	300
Sodium	31600	93900	NA

Surface Water					
Chemical	**Concentration Range, ppb**		**NYSDEC Class C SW Standards (ppb)**	**Freq. of Exceed**	**Site Backgrnd Levels (ppb)**
	Minimum	**Maximum**			
Aluminum	119	874	100	6/7	307
Lead	1.1	4.9	1.48-1.90 (sample specific)	4/7	1.7
Iron	130	3840	300	5/7	3840

Sediments					
Chemical	**Concentration Range, ppm**		**Sediment Criteria (ppm)**	**Freq. of Exceed**	**Site Backgrnd Levels (ppm)**
	Minimum	**Maximum**			
Arsenic	4.9	14.3	5	7/7	10.9
Iron	16.6	43200	24000	7/7	43200
Manganese	0.59	2440	428	7/7	2400
Nickel	0.024	40.1	22	7/7	33.4

Air Within Leachate Collection System			
Chemical	**Concentration Range, ppb**		**NIOSH REL (ppb)**
	Minimum	**Maximum**	
Vinyl Chloride	11	12000	lowest reliably detectable concentration
Ethylbenzene	19	21000	100000
1,2-DCE	2	87000	200000
1,1-DCA	4	1700	100000
Trichloroethene	2	390	25000
Benzene	113	240	100
Toluene	3	8600	100000

Leachate			
Chemical	**Concentration Range, ppb**		**Class C SW Stnds (ppb)**
	Minimum	**Maximum**	
Iron	529	165000	300
Lead	27.2*	47.9	34.6*/25.6 (sample specific)
Aluminum	203	27600	100
Cobolt	5.3	111	5
Trichloroethene	2	14	11
Vinyl Chloride	18	670	NA
1,2 DCE	2	8300	NA
Ethylbenzene	37	950	NA

Groundwater

Results of the sampling and analysis of groundwater in the vicinity of the site indicate the presence of TCE, 1,2-DCE, vinyl chloride, 1,1-DCA, 1,1-DCE, chromium, and lead. Contaminated groundwater extends off-site primarily to the south southeast for approximately 1000 feet. Off-site, the primary contaminants are TCE and 1,2-DCE.

Residential Wells/Springs

Data obtained from the sampling and analysis of twelve nearby private water supplies has shown contamination by site-related volatile organic compounds at one residence south southeast of the site. Until very recently, this residence has been occupied only seasonally. Some of the contaminants were detected at concentrations which exceeded drinking water standards at the time of sampling. The concentration of contaminants in the spring at the seasonal residence have varied over time from 150 ppb of 1,2-DCE in the spring in 1984 to 14 ppb of TCE in May 1989. In August 1991, the seasonal resident developed a new water supply location approximately 300 feet downhill from the original location. This new spring was sampled in October 1991 and in the summer of 1993 and contained 3 and 6 ppb of TCE respectively. The current drinking water standard (set in 1989) for TCE and 1,2-DCE in public water supplies is 5 ppb. Steps have been taken to provide an alternate source of water to this residence. TCE (21 ppb) was also detected in a spring at another seasonal residence south of the site during the Phase II Investigation. The water was not used for drinking and the residence is currently unoccupied.

Elevated concentrations of sodium, iron, and/or manganese have been detected in several private water supplies near the site. Since these metals occur naturally and the concentrations are quite variable, it is difficult to be certain that these elevated levels are due to contamination at the site. There is no drinking water standard for sodium in public water supplies, but the NYSDOH recommends that individuals on a moderately restricted sodium diet should not drink water containing more than 270 ppm of sodium. Individuals on a severely restricted sodium diet should not drink water containing more than 20 ppm of sodium.

The NYSDOH drinking water standard for iron and manganese in public water supplies is 300 ppb. If both iron and manganese are present, the total concentration should not exceed 500 ppb. The standards for iron and manganese are based on aesthetic properties, such as taste and fixture staining. However, one recent study of long-term exposure (lifetime) to naturally occurring manganese in drinking water showed that elevated levels could affect the central nervous system.

Surface Water and Sediments

Data obtained from the sampling and analysis of surface water and sediments in Duffy Hollow Creek and its unnamed tributary show no significant differences between samples taken upstream or downstream from the site. However, it is very likely that surface water serves as a transport mechanism for site contaminants when leachate from the site overflows into the Creek.

Landfill Leachate

It has been estimated that an average of 49,000 gallons of leachate are produced daily at the site (19 million gallons per year). Leachate samples obtained from several locations in the leachate collection system (LCS) were analyzed and found to contain primarily vinyl chloride, 1,2-DCE, TCE, ethylbenzene, aluminum, cobalt, iron, and lead. Since most of the leachate that escapes the LCS flows into the nearby creeks, Class C surface water standards are given in Table 1 for comparison purposes. At this time, there are no standards for vinyl chloride, 1,2-DCE, or ethylbenzene in Class C surface water.

5.0 SUMMARY OF SITE RISKS

Included in the RI/FS process is the evaluation of the human health and environmental risks posed by the contamination at the site. This information is then used in the identification of potential remedial alternatives and the selection of a remedy. The components of the health risk evaluation include a review of the site environmental setting; identification of site-related chemicals of concern, identification of potential and completed exposure pathways; an evaluation of the toxicity of the contaminants of concern; and an evaluation of the impacts of the site upon the environment.

5.1 Summary of Human Exposure Pathways

An exposure pathway is the process by which an individual comes into contact with a contaminant. The five elements of an exposure pathway are the source of contamination, environmental media and transport mechanisms, the point of exposure, the route of exposure, and receptor population. These elements link the contaminant source to the receptor population. The elements of an exposure pathway may be based on past, present, or future events.

Completed pathways which may exist at the site include:

- ingestion (drinking or eating) by nearby residents of contaminated groundwater obtained from their private water supplies;
- dermal absorption (contact with skin) of contaminants by residents from groundwater through bathing, showering, swimming, etc.;
- inhalation (breathing) of volatile contaminants (contaminants that can vaporize) by residents through the use of contaminated groundwater from private water supplies during showering, dishwashing, etc. and from indoor or outdoor air contaminated by landfill gas;
- exposure to contaminants in leachate overflows; and
- inhalation by site visitors of ambient air contaminated by landfill gas.

The most significant of the potential exposure pathways at the site appears to be the use of groundwater downgradient from the site as a source of drinking water. Also of concern is the potential for contact with contaminated leachate released from seeps or overflows of the leachate collection system.

5.2 Summary of Environmental Exposure Pathways

Contaminated media at the Wellsville-Andover Landfill site may lead to significant exposure to plants and wildlife.

Completed environmental exposure pathways at the site include:

- ingestion of contaminants in vegetation, surface soils, and in leachate at seeps and at the leachate holding pond by wildlife;
- dermal absorption of contaminants via leachate and soils by wildlife;
- inhalation of contaminants in ambient air from landfill gas and contaminated dust at the site by wildlife;
- uptake of contaminants by plants via contaminated groundwater, soil, and leachate.

6.0 REMEDIATION GOALS

Goals for this action have been established through the remedy selection process outlined in the State regulation 6NYCRR Part 375-1.10. The primary goals of this action are to minimize leachate production, control and manage leachate produced, control landfill gas, consolidate the waste to reduce the size of the landfill, reduce the potential for surface contact with wastes and contaminated soils, monitor the spread of contaminated groundwater off-site, and provide an alternate source of drinking water for residents whose water supply has been compromised by site-related contaminants.

At a minimum, this action will mitigate significant threats to the public health and to the environment by:

- reducing the production of leachate within the fill mass;
- eliminating the threat to surface waters by eliminating any future contaminated surface run-off from the contaminated soils on site;
- eliminate the potential for direct human or animal contact with the contaminated soils on site;
- mitigate the impacts of contaminated groundwater to the environment;
- mitigate, to the extent practicable, migration of contaminants in the landfill to groundwater; and
- control soil gas derived from the landfill.

7.0 DESCRIPTION OF THE REMEDIAL ALTERNATIVES

Potential remedial alternatives for the Wellsville-Andover Landfill site were identified, screened, and evaluated in a Feasibility Study. This evaluation is presented in the report entitled "Feasibility Study Report, Wellsville-Andover Landfill Site," prepared by Ecology and Environment Engineering, P.C. for the NYSDEC. A summary of the detailed analysis follows.

7.1: Description of Alternatives

The proposed action is intended to address the contaminated surface soils on the landfill, the reduction and control of leachate at the site, the reduction in the size of the landfill, and the contamination of off-site groundwater.

Alternative 1. No Further Action

Present Worth: $2,000,000
Capital Costs: $ 0
Annual O&M: $ 130,000
Time to Implement: 0 months

The no further action alternative is evaluated as a procedural requirement and as a basis for comparison. It requires continued monitoring and off-site disposal of currently collectable leachate only, allowing the site to remain in an unremediated state. This is an unacceptable alternative, as the site would remain in its present condition. Human health and the environment would not be adequately protected because uncontrolled leachate releases would continue contaminating groundwater and surface water, on-site wastes would continue to be a source of groundwater contamination, and contaminated water supplies would not be addressed.

Alternative 2. Limited Consolidation + Capping + Passive Landfill Gas Collection + Upgrade of Leachate Collection System + Off-site Disposal of Leachate + Treatment of Domestic Water + Monitoring

Present Worth: $ 18,851,000
Capital Cost: $ 16,719,000
Annual O&M: $ 155,000
Time to Construct: 12 months

Alternative 2, referred to as Alternative A in the Feasibility Study Report, consists primarily of capping the site as it now exists, increasing the capacity and efficiency of the leachate collection system, and installing home water treatment units for residents whose water supply has become contaminated by site-related compounds.

Three caps would be installed to cover the northeast, northwest, and south/south-central areas. A limited amount of consolidation would occur in each area to shape the areas and obtain the necessary final grades to promote proper precipitation run-off. Various cap designs have been evaluated during the feasibility study but all would serve to minimize the amount of water that percolates into the wastes to create leachate. Additional minor modifications may be made during the actual design process. Leachate collection trenches would be

installed in and around the waste cells. Collected leachate would be transported off-site, most likely to the Wellsville water treatment plant where it currently is treated, for disposal.

Due to the nature of the soils in the area, it may not be practicable to contain and treat downgradient groundwater. To address the threat to downgradient residents who use groundwater as a source of domestic water, home treatment units would be installed to treat water if it becomes contaminated. It is believed that the combination of an impermeable cover over the wastes along with improved leachate collection will make natural attenuation of groundwater contamination possible. The degree of attenuation that would occur is difficult to estimate with any certainty. It would likely take many years to reduce the level of contamination to below groundwater standards. Periodic groundwater and residential water sampling/analysis would be performed to monitor the changes to the aquifer created by this remedy.

After construction, the air at the site perimeter would be monitored to determine if the passive landfill gas venting system was adequate or whether treatment by flaring of the landfill gases would be necessary. It is assumed that flaring would not be necessary. Costs for flaring are not included in the cost estimate.

Surface water controls (e.g. ditches, dikes, and retention ponds) would be included in this alternative to minimize erosion and infiltration of the cap and to reduce the downstream impact of the increased runoff caused by the installation of the caps.

Periodic inspections of the caps and the leachate collection system would be performed and required maintenance would be included. For cost comparison purposes, inspection and maintenance activities were calculated on a 30 year basis.

During the RI/FS, the NYSDEC has learned that the Duffy Hollow Bridge, located on Duffy Hollow Road and owned by the Town of Wellsville, is in a deteriorated condition. In addition, this bridge has a posted weight limit which is insufficient to allow access to the site with heavy equipment needed during the implementation of the proposed remedial action. Therefore, the reinforcement or replacement of the Duffy Hollow Bridge or development of an alternate route is included in this action. The most feasible solution would be determined during the design phase of the proposed action. Due to the uncertainties involved, cost estimates for replacement of the bridge (other bridges/culverts may also need to be replaced) and point-of-use water treatment have not been included.

Alternative 3. Extensive Consolidation + Capping + Passive Landfill Gas Collection + Upgrade of Leachate Collection System + Off-site Disposal of Leachate + Treatment of Domestic Water + Monitoring

Present Worth:	$ 16,442,000
Capital Cost:	$ 14,456,000
Annual O&M:	$ 144,255
Time to Construct:	12 months

Alternative 3 differs from Alternative 2 in that Alternative 3 includes the consolidation of the northwest fill area into the south/south-central area.

The advantage of moving the contents of the northwest area into the southern area is that the final size of the site would be minimized and wastes currently below the water table would be moved above the water table. Minimizing the size of the site reduces the cost of installing the covers and reduces long-term operation and maintenance requirements for the site. Moving wastes out of the saturated zone would significantly reduce the amount of leachate produced which subsequently reduces the off-site movement of contaminants in groundwater.

As discussed above, there is a significant amount of uncertainty about the practicability of containing and treating off-site groundwater. There is a possibility that the installation and operation of an upgradient groundwater diversion system and/or a downgradient collection system would improve off-site groundwater quality and lessen the chance of further degradation of groundwater that can be used as a source of potable water. If impermeable covers and improved leachate collection systems are installed, the local hydrology will change. Under this alternative, an evaluation of the practicability of installing an off-site groundwater collection and treatment system would be evaluated.

The selected remedy includes a variation on this alternative in that the geocomposite cover for the southern area will be replaced with a geomembrane cover. This change is based upon a conclusion that the use of a composite cover in the southern area would not be cost effective.

8.0 SUMMARY OF THE COMPARATIVE ANALYSIS OF THE ALTERNATIVES

The criteria used to compare the potential remedial alternatives are described below and defined in the State regulation that directs the remediation of inactive hazardous waste sites. For each of the criteria, a brief description is provided followed by an evaluation of the alternatives against that criterion. A detailed discussion of the evaluation criteria and comparative analysis is contained in the Feasibility Study.

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

1. 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 would not be protective of human health and the environment because wastes would not be contained by an adequate cover, uncontrolled releases of leachate would continue, and the site would continue to be a source of contamination to groundwater used as drinking water.

Alternatives 2 and 3 would both be protective but Alternative 3 would provide a greater degree of protectiveness. This results from minimizing leachate production by the consolidation of wastes and offers the potential for addressing off-site groundwater. Both Alternatives 2 and 3 address providing domestic water treatment where needed. These alternatives would eliminate pathways affecting humans and the environment related directly to exposure to leachate, contaminated landfill surface runoff, on-site contaminated surface soils, exposed wastes, landfill gases, and contaminated dust at the site.

2. 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.

Alternative 1, the No Further Action alternative, would not comply with the requirements to place a final cover over the site and manage the production and release of leachate. It would also not address remedial goals for soil or groundwater.

Alternatives 2 and 3 would comply with these requirements except for attaining SCGs for off-site groundwater. It is possible that attaining off-site groundwater SCGS are not practicable but the information needed to make this evaluation will not be fully available until after the covers and leachate system are constructed. The site closure would be conducted in accordance with the landfill closure requirements of 6NYCRR Part 360 and 6NYCRR Part 373.

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

The potential short-term adverse impacts of Alternative 3, (and to a much lesser degree, Alternative 2) on the community, workers, and environment include 1) exposure to site contaminants which volatilize during waste.consolidation and other activities which disturb the fill, 2) potential dermal contact with wastes, leachate, and contaminated soils, 3) incidental ingestion of contaminants by site workers, 4) inhalation of contaminated dust during various construction activities, and 5) odor problems. Both alternatives would also present hindered access to residences north of Duffy Hollow Bridge during bridge construction.

Of these adverse impacts, exposure of the workers to site contaminants during construction is the most significant. These impacts can be minimized by the implementation of an appropriate health and safety program during construction activities. Measures can be taken to minimize exposure to volatilized contaminants and to control fugitive dust. An alternate route would be established for all residents north of the Duffy Hollow bridge.

Short-term effectiveness is high since implementation of the proposed action would immediately reduce leachate production and control and manage any leachate produced. The duration of the construction phase is expected to be approximately 12 months.

The "No Further Action" Alternative provides no short-term effectiveness and the existing impacts would continue.

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.

Covering the landfill would greatly reduce the production of leachate. The leachate collection system and management program would minimize the risk of exposure of humans and the environment to contaminants through the leachate and contaminated site soils. A gas venting/collection system would minimize the effects of landfill gas on humans and the environment. The risk posed by contaminated groundwater would be addressed to the extent practicable by Alternative 3. Although containment is not considered "permanent," Alternative 3 would provide the greatest degree of permanence practicable for this site. Although wastes will remain at the site, the controls provided by the remedy will minimize the remaining risks by preventing contact with wastes and collecting leachate produced. Existing off-site groundwater contamination that threatens local water supplies will be monitored to determine if the number of residential water treatment units needs to be expanded.

Alternative 1 provides no long-term effectiveness or permanence.

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 would not reduce the toxicity, mobility, volume of contaminants. Alternatives 2 and 3 would reduce the mobility of contaminants significantly by containing them. The volume and toxicity of the wastes would not be reduced.

6. Implementability. The technical and administrative feasibility of implementing each alternative is evaluated. Technically, this includes the difficulties associated with construction, the reliability of the technology, and the ability to monitor the effectiveness of the remedy. Administratively, the availability of the necessary personnel and material is evaluated along with potential difficulties in obtaining special permits, access for construction, etc.

The only difficulty associated with construction activities is site access, based on the condition of the Duffy Hollow Bridge. The proposed action, however, would include replacement, reinforcement of the bridge, or construction of an alternate route to resolve this problem.

The "No Further Action" alternative is easily implemented but is not capable of resolving the leachate or groundwater problem.

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.

Of the two alternatives that meet the threshold selection criteria, Alternative 3 is projected to have a lower cost.

The information needed for evaluating the "modifying criterion" of Community Acceptance is obtained by the NYSDEC during the public comment period for the proposed remedy.

8. Community Acceptance - Concerns of the community regarding the RI/FS reports and the Proposed Remedial Action Plan (PRAP) have been evaluated. A "Responsiveness Summary"

has been prepared that describes public comments received and the Department's response to the concerns raised. The Responsiveness Summary is included in this document as Exhibit A. In general, the community supports the selected remedy. The main concerns expressed center around the need for increasing the number of residences to have water treatment and the cost of the remedy.

9.0 SELECTED REMEDY

The remedy selected for the site was developed in accordance with the New York State Environmental Conservation Law (ECL) and is not inconsistent with the National Oil and Hazardous Substances Pollution Contingency Plan ("NCP") of March 8, 1990 (40 CFR 300).

Based upon the results of the investigative studies conducted at the Wellsville-Andover Landfill site and the evaluation presented in Section 7 of this report, the NYSDEC has selected a modified version of Alternative 3, which includes extensive consolidation, capping, leachate management, point of use water treatment, and monitoring. The modification to Alternative 3 is that the cover for the South/Central Area will contain a geomembrane barrier in place of a geocomposite cover (see Section 9.1 below).

Compared to Alternative 2, Alternative 3 will provide a greater degree of overall protection to human health and the environment and will address all of the significant SCGs. The main concerns regarding implementation of Alternative 3 include the greater possibility for volatilization of contaminants and release of odors during the extensive consolidation.

The estimated present worth cost to implement the proposed remedy is $13,628,000. The cost to construct the remedy is $11,642,000 and the estimated annual operation and maintenance cost is $144,255. Since the costs for domestic water treatment will rise and fall over time as a function of need, costs for this aspect of the remedy have not been included. Uncertainties regarding the extent of work needed to repair the bridges/culverts along Duffy Hollow Road, costs have not been included for this work. Assuming that one bridge and one culvert will need to be replaced, it may cost approximately $250,000 to complete that work.

The elements of the proposed remedy are as follows:

1. **Consolidation** of the northwest area into the south/south-central area.

2. **Capping** the areas that contain wastes with an engineered cover that minimizes the infiltration of water into the wastes thereby minimizing the production of leachate. The cover system will include a passive landfill gas venting system.

3. **Upgrade of the leachate collection system** to prevent the continuation of uncontrolled releases of leachate to the environment. The current intention is for collected leachate to be transported off-site for treatment and disposal. Further evaluation during remedial design may result in changes to the way in which leachate is ultimately disposed.

4. Point-of-use **treatment of domestic water** where necessary.

5. The practicability of implementing an **off-site groundwater containment/treatment** system will be evaluated after construction of the cover/leachate system.

6. **Repair or replacement of bridges/culverts** along Duffy Hollow Road as necessary to allow passage of heavy equipment to the site to carry out the remedy.

7. **Long-term operation and maintenance** of the remedy including monitoring of groundwater and residential water. Residential water will be monitored quarterly during the first two years, and semi-annually for the next three years. After five years, the need for monitoring the private water supplies will be reevaluated.

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

9.1 Documentation of Significant Changes:

As a result of further evaluation and comments received, the selected remedy differs from the proposed remedy in that the cover design for the south-southcentral area will include a geomembrane barrier and not a geocomposite cover. A geocomposite cover consists of a combination of clay and a geomembrane whereas the selected cover will not have the clay component. The selected geomembrane will be upgraded from 20 mil HDPE to 60 mil HDPE to reflect the absence of the 24 inch clay layer. This will simplify construction, reduce the final height of the site, and reduce costs (savings of approximately $2 million) while not significantly reducing the overall effectiveness of the remedy.

10.0 HIGHLIGHTS OF COMMUNITY PARTICIPATION

Citizen Participation (CP) Activities were implemented to provide concerned citizens and organizations with opportunities to learn about and comment upon the investigations and studies pertaining to the Wellsville-Andover Landfill site. All major reports were placed in a document repository in the vicinity of the site and made available for public review. A public contact list was developed and used to distribute fact sheets and meeting announcements.

In September 1993, the Department issued a proposal addressing the final cover and upgrade of the leachate collection system. At that time, the intention was to proceed with the on-site portion of the overall remedial program for the site and address off-site issues after additional information became available. This process was intended to save several months in the process needed to design and construct the on-site portion of the remedy. On October 14, 1993, a public meeting was held at the David A. Howe Library in Wellsville, New York to describe a Proposed Accelerated Remedial Action Plan. Prior to the meeting, an invitation/fact sheet was mailed to those persons on the contact list. The public comment period extended from September 24, 1993 until October 22, 1993. In response to a request from the Village of Wellsville, the decision to proceed with the accelerated cover/leachate program was postponed so that the Village could have more time to evaluate the proposal. During that time, the RI/FS was completed and a comprehensive proposal to remediate the site was released for public comment between February 3 and March 7, 1994. A public meeting was held on February 16, 1994 at the Village of Wellsville Municipal Building to receive comment.

Inquiries and comments (written and verbal) were received and responded to throughout the course of the project from citizens, elected officials and special interest groups. Comments received regarding the Proposed Remedial Action Plan have been addressed and are documented in the Responsiveness Summary (Exhibit A).

EXHIBIT A
RESPONSIVENESS SUMMARY
Wellsville-Andover Landfill Site
Allegany County
9-02-004

This document summarizes the comments and questions received by the New York State Department of Environmental Conservation (NYSDEC) regarding the Proposed Remedial Action Plan (PRAP) for the subject site. A public comment period was held between February 3, 1994 and March 7, 1994 to receive comments on the proposal. A public meeting was held on February 16, 1994 at the Village of Wellsville Municipal Building to present the results of the investigations performed at the site and to describe the PRAP. The information below summarizes the comments and questions received and the Department's responses to those comments.

DESCRIPTION OF THE SELECTED REMEDY

The major elements of the selected remedy include:

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

- **Consolidation** of the northwest area into the south/south-central area.

- **Capping** the areas that contain wastes with an engineered cover that minimizes the infiltration of water into the wastes thereby minimizing the production of leachate. The cover system will include a passive landfill gas venting system.

- **Upgrade of the leachate collection system** to prevent the continuation of uncontrolled releases of leachate to the environment. The current intention is for collected leachate to be transported off-site for treatment and disposal. Further evaluation during remedial design may result in changes to the way in which leachate is ultimately disposed.

- **Repair or replacement of bridges/culverts** along Duffy Hollow Road as necessary to allow passage of heavy equipment to the site to carry out the remedy.

- Point-of-use **treatment of domestic water** where necessary.

- The practicability of implementing an **off-site groundwater containment/treatment** system will be evaluated after construction of the cover/leachate system.

- **Long-term operation and maintenance** of the remedy including monitoring of groundwater and residential water. Residential water will be monitored quarterly during the first two years, and semi-annually for the next three years. After five years, the need for monitoring the private water supplies will be reevaluated.

The information given below is summarized from the February 16, 1994 public meeting and letters received during the comment period. The issues raised have been grouped into the following categories:

I. Questions/Comments Raised During the Public Meeting
   - A. Issues Regarding the Remedy
   - B. Issues Regarding Health Effects
   - C. Issues Regarding Other Alternatives
   - D. Issues Regarding Site Conditions

II. Letters Received During the Comment Period
   - E. Letter dated February 16, 1994 from S. Goetschius, Wellsville Village Mayor
   - F. Letter dated March 3, 1994 from T. B. Taylor, Wellsville, NY
   - G. Letter dated February 14, 1994 from F. Kelley, Jr., Wellsville, NY

I. QUESTIONS/COMMENTS RAISED DURING THE PUBLIC MEETING

A. Issues Regarding the Remedy

A.1 **Issue:** What will happen with the off-site plume of groundwater contamination?

Response: After the cover has been installed and the leachate collection system has been improved, the source of contaminants to the off-site plume will essentially be eliminated. There should also be a moderate decrease in the level of the water table at the site which will reduce the tendency for the off-site plume to expand. During the design of the remedy and after the construction of the final cover and leachate collection system, a determination will be made as to the practicability of trying to capture the off-site plume to prevent any further spread and to hasten the decrease in concentrations that will occur naturally. If practicable, a collection system will be installed off-site to accomplish this goal. If it is not practicable to capture the off-site plume, it will slowly expand and become somewhat diluted. In any event, the extent of the plume will be monitored to determine if other water supplies are threatened.

A.2 **Issue:** How will the water table in the northwest area be lowered during waste consolidation?

Response: This will be evaluated in detail during the remedial design phase but conceptually, the excavation can be scheduled to occur during periods of low water. If necessary, the water table can be artificially lowered by the use of pumped well points.

A.3 **Issue:** The remedy should not preclude the use of the area above the landfill by the local airplane club.

Response: All reasonable steps will be taken to prevent interference with the club.

A.4 **Issue:** Concerns were raised about the proposal to treat collected leachate at a local water treatment plant. Since the leachate contains inorganics as well as organics, the leachate requires tertiary treatment. Without tertiary treatment, the leachate should be

discharged directly into the river. The Wellsville treatment plant should not be used for this purpose because treating this leachate may ruin the plant. On-site treatment should be considered more seriously.

Response: The presence of traditional contaminants (e.g. BOD, COD, etc.) in the leachate as well as contaminants from hazardous waste disposal make it necessary to treat the leachate before it can be released to surface water. Before a decision is made regarding where the collected leachate will be treated, an evaluation must be completed showing that the proposed facility can accept and treat the leachate without causing any exceedances of the performance standards set in their operating permit. Although the leachate has been treated for many years at the Wellsville treatment plant, it is possible that a more suitable facility may be found. It is necessary to consider that the concentrations of contaminants in the leachate may increase after closure of the site due to a lack of dilution. Due to the large capital and operation and maintenance costs associated with constructing and running an on-site treatment plant, it was determined that it would be more cost effective to treat and dispose of the leachate off-site. This decision will be reexamined during the design phase and changed if new information indicates a more suitable approach.

A.5 **Issue:** Given the large number of springs in the area, won't groundwater continue to flow into the wastes and create leachate?

Response: During the investigations, a large number of water level indication points (piezometers) were installed. The data indicates that except for wastes in the northwest area, the wastes lie above the water table. The remedy calls for the wastes in the northwest area to be excavated and placed on top of the wastes in the southern area to avoid this problem. After the final impermeable covers have been installed, the existing buffer between the bottom of the wastes and the water table will increase. Also, collection pipes will be installed beneath the wastes. These measures will minimize the potential for future leachate generation.

A.6 **Issue:** What is the cost of providing water treatment to the nearby residences?

Response: Costs vary depending upon the contaminants to be treated and the volume of water. Costs range from a few hundred dollars per year to $5000 per year for whole-house units that require significant maintenance.

A.7 **Issue:** There is a series of bridges/culverts along the access road to the site. Will heavy vehicles be able to use the access road?

Response: As discussed in the PRAP, it will be necessary to upgrade at least one bridge to allow for access to the site by heavy equipment. The best method for doing this will be determined during the design of the remedy.

A.8 **Issue:** Will the added weight of consolidated wastes in the southern area squeeze out more contaminants?

Response: Contaminants leach from the waste into groundwater by the movement of water from the infiltration of precipitation or horizontal movement of groundwater through the waste. Once the cover system is installed and the wastes are moved out

of the groundwater, the leaching mechanism will essentially be removed. The added weight will not be a factor.

A.9 **Issue:** How do you know that leachate won't go under the collection system?

Response: The remedy calls for leachate collection pipes to installed underneath the wastes to prevent this problem.

A.10 **Issue:** How will the residents be protected during the consolidation of wastes?

Response: Because the existing cover soils on the site are permeable, the wastes tend to be moist to wet. It is anticipated that excavated wastes will need to be dewatered before they are consolidated into the southern area. Because they are moist, the potential for dust generation is low. In some cases, if dry wastes are excavated, they will be kept moist by spraying during handling to minimize dust generation. Field instruments will be used to determine if vapors are released from the wastes that could pose a threat and if so, additional measures will be taken. This may include using special foams similar to fire-fighting foams to prevent the escape of vapors.

B. **Issues Regarding Health Effects:**

B.1 **Issue:** Concerns were raised that the testing of residential water supplies is not adequate to determine if their water is safe to drink and use. Although the State's criteria for providing water may not be met, there are indications such as odor and the presence of high levels of metals such as iron and manganese that their water is contaminated. How can they feel safe if they know that the potential for contamination is so strong?

Response: A great deal of sampling and analysis of groundwater samples around the site has occurred that allows us to know what contaminants to look for in the water supplies of the residents around the site. All of the residents around the site whose water may be impacted has been tested at least once. Since groundwater conditions change slowly, it is not necessary to continuously test the water. The basic criteria used by the State to decide if treating water or providing an alternate water source is appropriate are that the presence of contamination attributable to a hazardous waste site has been confirmed and that the contamination presents a health threat. In some cases at this site, although site related contaminants have been found, they do not cause adverse health effects or they are present in concentrations that are below those that have been determined to present possible effects. Because of the discomfort that this can create, the remedy calls for quarterly monitoring to ensure that adequate data is available for determining if groundwater contamination from the site may be threatening a residential water supply. The selected remedy calls for providing point of use water treatment when the general conditions discussed above are met. It should also be noted that the drinking water standards are set based upon long-term (lifetime) consumption and that short-term exposure to low levels would not be expected to result in adverse effects.

B.2 **Issue:** Some of the residents who received copies of the results of the testing of their water requested assistance in interpreting the data.

Response: Representatives of the NYSDOH present at the meeting met with the residents and addressed their questions. The NYSDOH is always available to make sure that these questions may be addressed.

B.3 **Issue:** A resident adjacent to the landfill has cattle that have been exposed to leachate. He asked if the meat from the cattle is safe to eat.

Response: An adequate response to those question was not available at the time this summary was completed. Appropriate specialists will be asked for their advice which will be given to the questioner when available.

B.4 **Issue:** How often will residential water be tested and who will do the testing?

Response: The remedy calls for quarterly monitoring for the first two years and semi-annually for the next three years. At that time, the frequency of monitoring will be reevaluated. The testing will be completed by NYSDEC or NYSDOH with possible assistance from the Allegany County Health Department.

C. **Issues Regarding Alternative Remedies:**

C.1 **Issue:** Leaving the wastes at the site will only prolong the problem. The site has no liner system making it possible for wastes to escape. The wastes should be excavated and removed from the site.

Response: Although theoretically possible, to remove all wastes from the site would be a very difficult and costly task. The site contains approximately 700,000 cubic yards of wastes which cannot be easily segregated into hazardous and non-hazardous waste. A conservative estimate that includes the costs for excavation, analysis, transportation, and disposal in a regulated landfill(s) would be approximately $150 per cubic yard. This would place the total cost in excess of $100,000,000. It is likely that a significant portion of this would need to be financed by State taxpayers. Since the selected remedy is protective of human health and the environment, taking the extraordinary step of removing all wastes from the site is not justifiable.

C.2 **Issue:** Shouldn't the landfill be dug up to separate the toxic from the non-toxic materials?

Response: During the Remedial Investigation, significant efforts were made to determine if there may be areas of the landfill that contain hazardous wastes that could be segregated from the other wastes. This work included a magnetometry survey to look for buried tanks or drums, completion of test pits and trenches, and evaluation of the various soil borings and groundwater data in the fill areas. The results of this work showed that no "hot spots" could be identified that would lend itself to waste segregation.

C.3 **Issue:** Will the geomembranes in the cover be compatible with the wastes?

Response: Unlike a liner that is continuously exposed to contaminants in leachate, the geomembrane in the cover does not come into contact with the wastes. A gas venting

layer will prevent significant contact with vapors or gases. Even so, the material proposed for the cover (HDPE) is compatible with the wastes present in the landfill.

C.4 **Issue:** Was on-site incineration considered?

Response: Incineration was considered in the early phases of the feasibility study but was screened out due to the volume of waste involved, capacity problems, material handling problems, and cost.

C.5 **Issue:** The Village of Wellsville made an extensive presentation at the public meeting regarding their evaluation of the PRAP.

Response: These comments were given in a letter to the Department which is addressed in Section E below.

D. <u>Issues Regarding Site Conditions:</u>

D.1 **Issue:** Were background wells installed some distance, say 10 miles, from the site to determine what natural groundwater conditions are like?

Response: A background well (MW-1D) was installed and sampled at the site on various occasions. Although not miles from the site, the location is upgradient of the areas of contamination provides the best indication of what water quality at the site would be like in the absence of wastes.

D.2 **Issue:** Where has all the leachate released over the years from the site gone? The impacts of the overland flow of leachate needs more attention.

Response: Leachate released from the site generally empties into the unnamed tributary to Duffy Hollow Creek along Snyder Road, proceeds into Duffy Hollow Creek which empties in Dyke Creek which empties into the Genesee River. There are some indications that Duffy Hollow Creek recharges groundwater at the bottom of the hill from the site in the area where it empties into Dyke Creek. The amount of water that the stream loses in this way depends upon the flow rate in the creek and the degree of saturation of the ground beneath the creek. It is very likely that by the time leachate has travelled down the hill from the site, all of the volatile contaminants have been stripped from the water.

D.3 **Issue:** Does the Town of Andover have anything to do with the conditions at the site?

Response: Wastes from the Town of Andover were disposed at the site.

D.4 **Issue:** A comment was made that the site is not causing serious effects to human health or the environment and that there is no need for urgency to address the situation.

Response: This comment was vigorously debated by another member of the audience. The Department asserts that the site presents a significant threat to human health and the environment and that direct action is needed to address that threat. The Department further asserts that its schedule for addressing the site is appropriate.

II. WRITTEN COMMENTS RECEIVED DURING THE COMMENT PERIOD

E. Letter Dated February 16, 1994 from Mayor S. C. Goetschius, Village of Wellsville:

E.1 **Issue:** "The Proposed Remedial Action Plan is extremely vague on the specifics of the remediation. Many very critical issues, particularly groundwater remediation, have not been fully developed in the State's feasibility study and have been left for the design phase.

Response: The lack of engineering details in the PRAP occurs for two reasons. First, the PRAP is a document written for the general public and as such, it is not appropriate to include details beyond what is needed to understand and respond to the proposal. Secondly, it is not appropriate to spend the time or money necessary determining the details of the concept while it is still a proposal. Once selected, the details of the remedy can then be determined. Regarding the groundwater portion of the remedy, additional information is needed before a final decision about the practicability of a groundwater collection program can be determined. Since the hydrology of the site will change after the cover is installed and the leachate collection system is improved, it would be imprudent to make a decision based upon the existing information.

E.2 **Issue:** To date, the New York State Department of Environmental Conservation has spent an estimated $1.7 Million of the Remedial Investigation/Feasibility Study activities, yet still lacks sufficient data to provide the technical justification for the necessity of their selected remedial alternative. The Village of Wellsville originally developed and presented for the State's use a workplan for RI/FS activities that would have cost the Village $400,000 to implement.

Response: It is incorrect that the NYSDEC has spent $1.7 on the RI/FS. To date, the Department has incurred slightly over $800,000 in contractual costs to perform the investigations at the site, the majority of which is for "fixed" costs such as drilling and analytical services. Since 1983, the Department has incurred personal service costs of approximately $200,000. The Department has also set aside approximately $600,000 to carry out the design of the remedy but these costs have not yet been incurred. The total cost summary is approximately $1.6 million. It would not have been possible to obtain enough information to adequately characterize the site and make remedial decisions for $400,000. Regarding justifying the remedy, the presence of site related contamination at the site, in groundwater, and in leachate is beyond question. Private water supplies have already been contaminated, complete exposure pathways exist, and the obvious need to close the site in accordance with the appropriate regulations exists.

E.3 **Issue:** The State did not adhere to its own guidelines for evaluating remedial alternatives in the Feasibility Study. The State's Technical and Administrative Guidance Memorandum (TAGM) No. HWR-90-4030 presents seven criteria for evaluating all technically feasible remedial alternatives. Those criteria are: (i) short-term effectiveness; (ii) long term effectiveness and permanence; (iii) reduction of toxicity, mobility or volume; (iv) implementability; (v) compliance with New York State Standards, Criteria and Guidance (SCGs); (vi) overall protection of human health and environment: (vii) cost.

Instead, it appears that the State used a single criterion -- compliance with SCGs -- as its sole basis for selecting the recommended RCRA-guidance cover system it proposes.

Response: Section 7.2 (Evaluation of the Remedial Alternatives, pages 8-11) of the PRAP clearly addresses all criteria including the criterion of Community Acceptance. Section 4.3 of the FS Report (Comparative Analysis of Alternatives) also addresses all criteria.

E.4 **Issue:** NYSDEC's PRAP does not address the immediate need to provide a clean water source to the residents whose supplies have been impacted by the landfill, nor does it address the immediate need for improved leachate management at the site. The State's PRAP calls for design in 1994 and construction in 1995, but neglects the issue of inadequate leachate storage capacity at the Wellsville Waste Water Treatment Plant.

Response: Sections 7.1, 7.2, and 8 of the PRAP all specifically address the need to provide point of use water treatment. Where necessary, the Department has already taken action to provide residents with water treatment. Options to accelerate the upgrade of the leachate management system will be evaluated at the beginning of the design phase.

E.5 **Issue:** The Village is concerned about the groundwater impacts from the site and their potential effect on the public. It is indisputable that action must be taken to ensure a safe water supply for residences affected by the landfill, and that those measures should be implemented as the earliest possible time, independent of any additional studies of the groundwater conditions at the site.

Response: As discussed above, steps have already been taken to provide water treatment to residents where the data indicates that site related contamination has resulted in exceedances of health based drinking water standards. As discussed in Response E.1, it would be improper to make a final decision about what, if anything, can be done to control the off-site plume based upon the existing information because implementing the remedy will change the site hydrology in ways that cannot be accurately predicted. An improperly designed and operated collection system could result in the inadvertent elimination of the water supply of downgradient residents due to the topography and hydrogeology of the area.

E.6 **Issue:** The types or number of residential "point-of-use" treatment systems which may be constructed is not discussed in the PRAP.

Response: The types of treatment systems are not specified because they vary depending upon the types of contaminants to be removed. The number of systems has not been specified because that may change over time.

E.7 **Issue:** The Village of Wellsville has proposed modifications to the remedy. The changes include 1) consolidate the northeast as well as the northwest area into the southern area to minimize the production of leachate and reduce O&M costs; 2) modify the cover in the southern area from a composite clay/geomembrane cover to geomembrane barrier alone to save money without significantly lowering performance; and 3) accelerate the leachate collection system upgrade.

Response: The remedy does not include consolidating the northeast area for the following reasons: 1) Unlike the northwest area, the wastes in the northeast area are above the water table. The only other source of water for leachate production is the infiltration of precipitation which will be addressed by the impermeable cover. 2) The wastes are much deeper in the northeast area than in the northwest making their removal more difficult and costly. 3) The records and data indicate that the wastes in the northeast area are not as likely to generate hazardous constituents as wastes in other areas. Although these factors lead to a conceptual design that does not include consolidation of this area, the issue will be reexamined during the detailed design of the remedy.

The efficacy of a composite versus single component barrier layer in the cover system has been reexamined. As a result, the selected remedy includes the use of a single component barrier layer (60 mil HDPE) instead of a geocomposite barrier. It is agreed that in this case, the use of a single component barrier is appropriate.

During the initial phase of the design process, the NYSDEC will determine if upgrading the leachate management system can be placed on a fast track without introducing inefficiencies that would not be offset by added benefits. Generally, lower construction costs can be realized if projects are offered as a single package rather than in pieces. In all cases, providing adequate protection of human health and the environment is the primary consideration.

E.8 **Issue:** PRAP Page 4: Estimate of Waste Volume - The estimated 700,000 cubic yards of waste contained at the site is based on an extremely limited number of piezometers installed in the landfill area. Additional borings to better delineate the waste and fill volumes and to more accurately design the grading plan for the consolidated South/South-Central Area are necessary.

Response: As discussed in E.1 above, it would be very costly and time consuming to obtain all the data necessary to complete the full scale design of every alternative under consideration. It is inappropriate to obtain this level of detail until a decision has been made as to which alternative to implement. Therefore, any additional information needed to complete the design of the selected remedy will be obtained during the pre-design investigation stage.

E.9 **Issue:** PRAP Page 7: Section 7.1 - The statement, "Various cap designs have been evaluated during the feasibility study..." is misleading. While the FS report screened three types of NYS regulatory standard covers for the Northeast Area on the basis of cost (assuming equal effectiveness), the cover for the consolidated South/South-Central Area was selected on the basis of conforming with NYS guidance alone; no alternative consolidation/cover systems were fully evaluated with respect to all seven FS criteria for this area.

Response: Again, the PRAP is designed to present a conceptual proposal. It is not intended to provide the level of review contemplated by the comment. The components of the cover in the southern area will be reviewed during the design phase and may be modified as a result of that review.

E.10 **Issue:** PRAP Page 8 - The PRAP states that Alternative 3 includes a provision for the containment/treatment of off-site groundwater. This should be re-worded to indicate that the proposed budget for Alternative 3 includes a provision for additional groundwater remediation activities, as no specific plan for direct clean-up of this media has been prepared; hence, there is no basis for the $500,000 estimate.

Response: As discussed in E.1, it is not possible to develop a specific plan for an off-site groundwater collection system at this time due to the uncertainties about how the hydrology will react to the cover systems and improved leachate collection system. A cost estimate based upon the use of horizontal drilling techniques to minimized the drawdown of downgradient groundwater was included in the PRAP to make the overall project cost estimate more realistic. Since this estimate is approximate and it is uncertain if groundwater remediation is practicable, it has been deleted from the ROD.

E.11 **Issue:** PRAP Page 9 - Compliance with New York State Standards, Criteria and Guidance (SCGs) is stated to be a "threshold" criterion which must be satisfied for an alternative to be considered for selection. However, 6NYCRR 375-1.10 (c)(1)(i) permits waivers from this requirement in cases where "the program will obtain a level of performance that is equivalent to that required by the standard or criterion through the use of another method or approach." The Village believes that its alternative cover system meets the requirements for this waiver, or, in fact, exceeds the performance of the state's proposed alternative, and is therefore in compliance with the regulations.

Response: It is agreed that the alternative cover system will be adequate. The ROD reflects this change.

E.12 **Issue:** PRAP Page 11: Section 8 - The PRAP contains no discussion of the basis for selecting off-site treatment of the raw leachate at the Wellsville Waste Water Treatment Plant. A detailed evaluation of leachate treatment alternatives should be performed to determine the feasibility of on-site and/or off-site leachate treatment.

Response: The feasibility study concluded that after consolidation and covering, the amount of leachate produced by the site would be less than the amount of leachate currently being managed by the local treatment plant. Since the composition of the post-closure leachate will change due to the lack of extra dilution, an evaluation will be made during design to determine the most suitable method for treatment and disposal of the leachate.

E.13 **Issue:** Groundwater Hydrogeology - Certain technical points regarding the interpretation of site hydrogeologic data related to leachate collection and off-site groundwater collection were presented.

Response: This information will be taken into consideration during the design of the remedy.

F. <u>Letter Dated March 3, 1994 from T. B. Taylor, Wellsville, NY:</u>

F.1 **Issue:** The issue of how to treat collected leachate has not been adequately addressed. Some of the contaminants in the leachate (principally inorganics) require tertiary

treatment to be removed which is not provided at the local treatment plant. Not including tertiary treatment is in effect disposal by dilution.

Response: It is agreed that the design process must include an evaluation of the options available for treating the leachate that will be generated after closure of the site.

F.2 **Issue:** Although the principal objectives of the proposed remedial action seem to be reduction and containment of the leachate flowing from the landfill area, no estimates are made, for each alternative examined, of the comparative degrees of containment and ultimate peak and annual flow rates of collected and uncollected leachate.

Response: Although not presented in the PRAP, computer modelling was performed during the feasibility study to estimate the amount of leachate that would be generated under the different alternatives. Although the abilities of the alternatives to contain leachate would be similar, waste consolidation results in a lowering of the amount of leachate produced. As discussed above (E.7), the Department's opinion is that the costs and difficulties with consolidating the northeast area are not outweighed by the potential benefits, mainly a further lowering of the amount of leachate produced.

F.3 **Issue:** It is not evident from the analysis presented in the PRAP that reducing the rate of leachate production by moving some of the waste from a site fed by springs to a drier site, and installing expensive covers over the waste areas will actually reduce the rate of flow of toxic substances from the site. Lower leachate flow rates may correspond to higher concentrations of troublesome contaminants in cases where greater flows of rainfall or groundwater into the area simply dilute the contaminants in the leachate. In other words the rate of dissolving of substances in the landfill may not depend much on the rate of flow of water through the solid waste, above some minimum flow rate. Such issues are not dealt with at all in the PRAP.

Response: It is true that the "strength" of the leachate collected after closure will likely increase due to a lack of extra dilution. It is believed that closure of the site will in fact reduce the transport of contaminants from the site by reducing the flow of water through the wastes. This reflects the understanding that flow rates through the wastes are relatively low and that the dissolving of contaminants (partitioning) occurs under conditions of equilibrium. Therefore, by reducing the number of pore volume exchanges, the total rate of contaminant transport is reduced.

F.4 **Issue:** There is insufficient consideration of alternatives for channelling leachate from the filled areas, transporting collected leachate (e.g. by pipe vs. by truck), and providing storage sufficient to deal with maximum rainfall over extended periods without overflow (e.g. tanks vs. lined covered or uncovered ponds).

Response: These issues will be examined during the design phase.

F.5 **Issue:** The PRAP does not give any attention to what may have been done to assess alternatives in other areas (e.g. Steuben Co.) with similar problems, since all specifics apply only to the Wellsville-Andover situation. Given the great complexity and uncertainties in dealing effectively with active or abandoned landfills, it is surprising not to see any references to successes or failures of remediation efforts elsewhere.

Response: Although not discussed in the PRAP, each remedial decision made by the Department undergoes internal peer and management review. The comparisons suggested are made during these reviews.

F.6 **Issue:** There is no attempt to assess alternatives (including capital and operating costs) for providing acceptable sources of clean water for households whose sources have been or will be polluted by the landfill outflow now and in the future.

Response: Because of a determination that extending the public water system to the area of the site is not practicable or necessary, point of use water treatment was selected. Since the treatment needs are case specific, alternative solutions are considered on a case-by-case basis. Evaluating these issues in the PRAP was not deemed significant to the overall decisions needed to be made.

G. <u>Letter Dated February 14, 1994 from F. Kelley, Jr., Wellsville, NY:</u>

G.1 **Issue:** Where has the estimated annual 15,000,000 gallons of uncollected leachate gone for the past 30 years?

Response: See Response D.2.

G.2 **Issue:** When the Sinclair site was found, the Village of Wellsville immediately requested a new water supply intake upgradient from the site. The Village statement at the time was that it was necessary to ensure protection of public health. The Village got a new water intake and considerable moneys to eliminate the "potential." I ask that the same consideration be given to the residents on Duffy Hollow Road.

Response: As discussed in B.1 above, the concern of the residents who live in the vicinity of the site but whose water does not show significant contamination is understandable. Clearly it is important for the State to be consistent in its decisions about providing treatment or alternate water supplies. The general action criteria of 1) determining if water quality problems are site related and 2) determining if adverse health effects may occur are used as the basis for that consistency. The Department strives to ensure that its responsibility to be consistent adequately reflects its mandate to make decisions that are protective of human health and the environment. In the case of the Sinclair site, water samples at the intake of the water system showed contamination related to the site. Therefore, the threat was more than "potential."

G.3 **Issue:** What process at the Village waste water treatment plant removes the organic and inorganic components of the leachate? Is this treatment by dilution or is there some magic process taking place at the plant? Is a portion of the leachate contaminants being discharged into the Genesee River?

Response: As discussed is Response A.4, the leachate requires treatment for conventional as well as site related contaminants. Although the Village plant does not provide tertiary treatment, secondary treatment will reduce both organic and inorganic (which partitions into sludge) loadings. As discussed in F.1, additional consideration of the options for treating and disposing of leachate will be evaluated during design.

G.4 **Issue:** How can the report state that leachate has only moved 1,000 feet off site. I find that it is a known that leachate flowed freely down the complete length of Duffy Creek for over 10 years, at the rate of an estimated 15,000,000 gallons, with no collection at all. What impact to public health has occurred or will occur from this?

Response: The conclusion of the PRAP was that the off-site groundwater plume extends approximately 1000 feet to the south-southeast. It also concludes that leachate enters into and moves down the creeks. Information is not available to meaningfully determine if there have been adverse health effects from exposures that may have occurred in the past. Current data indicates that the water supply at two residences contain site related contaminants at levels that are at or slightly above levels considered safe for long-term consumption. The selected remedy will contain contaminants to the extent practicable and will provide water treatment where necessary.

G.5 **Issue:** Where has the State Health Department discussed the potential health impacts to the residents from the heavy metals?

Response: Letters were sent in February 1994 to all residents whose water was sampled. In cases where site related contamination that could result in adverse health effects was noted, this was explained in the letters. Other specific health related issues should be addressed directly to the NYSDOH (Ms. Lani Rafferty, NYSDOH, 800-458-1158).

G.6 **Issue:** What assurances do we the residents have, that as already shown by the report, that our water supplies will not become contaminated to the "non-potable" level at any given time? Besides, who wants to drink water with known leachate in it regardless of the amount?

Response: See Response B.1.

G.7 **Issue:** The monitoring wells were installed improperly. To use these wells to determine water table surfaces is improper due to the fact they are being pulled from the ground each time it freezes and thaws.

Response: Since the grout columns around the well risers extend well below the frost line, the potential for frost heaves is not that great. However, wells used for water level measurements will be inspected and re-surveyed if they appear to have undergone frost heaving.

The Following Comments Pertain to the RI Report.

G.8 **Issue:** Page 1-9, Table 1-1 - Where are the metals analysis from the Fanton and Kelley Wells?

Response: See Table 4-30, page 4-119.

G.9 **Issue:** Was any comparison made between 1984 and the latest analysis?

Response: Not explicitly but the information is in the data tables.

G.10 **Issue:** Page 2-10 - Is the Cuba Formation really above the Wellsville? I believe this is an error.

Response: According to "Correlation of Silurian and Devonian Rocks in New York State," by L. Rickard, New York State Museum and Science Service Map and Chart Series No. 24, 1975, the Cuba Formation is younger than the Wellsville and therefore above the Wellsville.

G.11 **Issue:** Page 4-27 - Why wasn't this analysis related to the residents?

Response: This information addresses the range of metals concentrations found in on-site groundwater and as such was not considered of interest significant enough to the residents to highlight in the PRAP or in fact sheets.

G.12 **Issue:** Pages 4-29 & 4-30 - Explain sodium levels and compare to leachate.

Response: Sodium was found in leachate at concentrations from 12 to 72 parts per million. In monitoring wells and water supplies, sodium was found in even greater ranges, including locations that are not impacted by leachate releases. The implication is that sodium is not a good indicator of the presence of site-related contamination.

G.13 **Issue:** Page 5-15 - States "Most important potential exposure pathway appears to be the use of contaminated ground water downgradient... as a source of drinking water." Then why haven't all downgradient residents been provided water supplies? This is the easiest way to eliminate the potential.

Response: Where site related contamination may cause adverse health effects, point of use treatment will be provided. See also Response B.1.

G.14 **Issue:** Page 7-9 - Why can't leachate be found at the end of Duffy Creek when it states eventually everything discharges into Duffy Creek?

Response: This section addresses the movement of groundwater, not leachate.

The Following Comments Pertain to the Feasibility Study

G.15 **Issue:** Pages 2-11 - How did the HELP model use infiltration of water from underground? Where are these HELP runs? What storm event was used, 25 year-50 year?

Response: As discussed on page 2-12, leachate production caused by groundwater contact with wastes was evaluated for the northwest area under Alternative A only since in Alternative B, no wastes would be in contact with groundwater. The print-outs of the runs are retained by the Department's consultant. The HELP model is run using monthly average rainfall data and not a particular storm event.

G.16 **Issue:** Table 2-7 shows 0 gallons leachate production due to groundwater in the South cell. The piezometric surface drawing shows a hydraulic head into the waste in that cell. That means there has to be water coming into that cell. Besides everybody knows that cell was built on springs. Groundwater comes to the surface within 200 feet of

that cell in the south corner. The report states discharge is in the southeast corner of the landfill.

Response: The piezometric data indicates that the water table in the south areas is below the bottom of the wastes.

EXHIBIT B
ADMINISTRATIVE RECORD
Wellsville-Andover Landfill Site
Allegany County
9-02-004

e administrative record consists of information upon which the Department bases its cision on selection of site remedy. The following documents and correspondence have been luded as part of the current administrative record. An asterisk indicates that a copy of the cument has been placed in the repository at the David A. Howe Library.

* Remedial Investigation Report prepared by Ecology and Environment in December 1993.

* Feasibility Study Report prepared by Ecology and Environment in January 1994.

* Responsiveness Summary (attached to Record of Decision).

* Proposed Remedial Action Plan prepared by the NYSDEC dated January 1994.

.* Phase I Investigation prepared by Engineering-Science, Inc. in association with Dames and Moore in June 1983.

.* Phase II Investigation prepared by Malcolm Pirnie in December 1986.

Leachate Investigation Report prepared by Ecology and Environment, Inc. in July 1992.

.* RI/FS Work Plan prepared by Ecology and Environment, Inc. in July 1991.

.* RI/FS Quality Assurance Project Plan prepared by Ecology and Environment, Inc. in June 1991.

).* Amended RI/FS Work Plan prepared by Ecology and Environment, Inc. in December 1991.

1. USEPA Guidance for Conducting Remedial Investigations and Feasibility studies Under Cercla: Interim Final, October 1988.

2. Phase I RI Data Validation Report prepared by Chemworld Environmental, Inc. in January 1992.

3.* RI/FS Health and Safety Plan prepared by Ecology and Environment, Inc. in June 1991.

'4.* Phase II RI Work Plan prepared by Ecology and Environment, Inc. in May 1993.

15. Phased/Interim Remedial Alternatives report prepared by Ecology and Environment, Inc. in June 1991.

16. Letter dated April 27, 1992 from Christopher P. Allen to Robert Chaffee.

17. Letter dated April 7, 1992 from Fred C. Kelley to Marcia E. Ladiana.

18. Letter dated January 13, 1991 from Lani Rafferty to Fred Kelley.

19. Letter dated January 13, 1991 from Lani Rafferty to William Cornell.

20. Letter dated January 13, 1991 from Lani Rafferty to Robert Fanton.

21. Letter dated April 23, 1990 from Ronald Tramontano, P.E. to Michael J. O'Toole, P.E.

22. Letter dated July 6, 1990 from Lani Rafferty to Tom Vickerson.

23. Letter dated August 25, 1989 from Albert Vossler, P.E. to Daniel LaDue.

24. Letter dated March 20, 1991 from Thomas J. Vickerson to Daniel LaDue.

25. Order on Consent between the Village of Wellsville and NYSDEC, signed in October 1985.

26. NYSDEC Division of Water Technical and Operations Guidance Series 1.1.1, October 1993.