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PHASED/INTERIM REMEDIAL ALERNATIVES REPORT WELLSVILLE-ANDOVER LANDFILL SITE TOWNS OF WELLSVILLE AND ANDOVER ALLEGANY COUNTY, NEW YORK SITE NUMBER 9-02-004

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Prepared for:

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1. INTRODUCTION

The remedial investigation/feasibility study (RI/FS) process for Class 2 sites requires the identification of feasible technologies that are screened and organized into various remedial alternatives. For source-control options at Class 2, non-RCRA-regulated landfills, this process may be simplified and accelerated due to their generally large size and composition. These landfills typically contain substantial quantities of municipal solid waste (MSW) mixed with smaller quantities of hazardous waste. While a complete RI/FS is warranted at these sites to determine the full extent of contamination and to identify any risks posed to human health and/or the environment, certain remedial measures can be evaluated very early in the RI/FS process for possible implementation. These evaluations are based on historic data, early treatability tests, risk assessment, or technology-based results with a bias for initiating appropriate remedial measures.

Using the available background data and data obtained during Phase I of the RI, the need for a Phased or Interim Remedial Action (PIRA) was evaluated based on significant problems or issues involving the site and surrounding areas. The following questions were posed in an attempt to identify problems or issues relevant to the site:

- Does a threat to human health and the environment exist;
- Is there an identified source; and
- How can the threat be reduced or eliminated?

Once a problem was identified, a list of interim objectives was developed aimed at correcting or reducing the problems, and a list of specific alternatives was developed to meet these objectives. The alternatives consist of technologies deemed applicable to Class 2, non-RCRA MSW landfills, and typically include placement of a final cover, installation of a leachate collection system, and treatment of collected leachate.

In the case of the Wellsville-Andover Landfill, the latter two options are already partially in place. Other actions that were considered at an early stage of this investigation were the reduction of both groundwater and surface water flow into the landfill. Specific actions that were identified in the RI/FS Work Plan for potential development of PIRAs are:

- Phased placement of a final cover or repair of the existing surface-water exclusion systems; ← (trench)
- Improving or increasing leachate storage capacity; (more holding tanks)
- Improving operation and maintenance procedures for the leachate collection system; ✓
- Installing a groundwater cutoff wall on the northern edge of the landfill; and same?
- Improving the surface water cutoff ditch on the northern edge of the landfill.

This report evaluates the need for a PIRA at the Wellsville-Andover Landfill based on a review of historical data and conditions identified in the Phase I RI. It then evaluates interim remedial alternatives and presents conclusions and recommendations based on these evaluations.

2. EXISTING CONDITIONS

2.1 SITE DESCRIPTION

The Wellsville-Andover Landfill (Site Number 902004) is located on Snyder Road (formerly Gorman Road) in the township of Wellsville, a sparsely populated, rural area of Allegany County (see Figure 2-1). The site measures approximately 4,000 feet north to south by 1,500 feet east to west for a total area of approximately 120 acres. The northernmost portion of the site, consisting of approximately 35 acres, has not been used for waste deposition. The landfill is located on a hillside with nearly 180 feet of relief from north to south. Duffy Hollow Creek, a Class D stream, is located approximately 1,500 feet east of the site, and an unnamed tributary located west of Snyder Road converges with Duffy Hollow Creek approximately 3,000 feet southeast of the site. Man-made containment ditches flow along portions of the north and east sides of the landfill. These ditches are designed to prevent off-site surface drainage from entering the site.

85 acres landfill

2.2 SITE HISTORY

The Wellsville-Andover Landfill was operated by the Village of Wellsville from 1964 to 1983. The site consists of four fill areas (see Figure 2-2). The south, south-central, and northwest fill areas accepted both municipal and industrial waste from 1964 to 1978. The northeast fill area, open from 1978 to 1983, accepted only municipal waste. As detailed in NYSDEC's 1983 Phase I Investigation Report, more than 300 tons of hazardous and industrial wastes are estimated to have been placed in the landfill, including trichloroethene (TCE) sludge, methylene chloride, plastics, polyester scraps, pumice, detergents, lead carbonate, sodium cyanide salt, cutting oils, chromium and zinc chromate paints, solvents, coolants, and lubricating oils.

Only the northeast fill area had a leachate collection system installed prior to waste deposition. However, no liner was installed prior to waste deposition in any of the fill areas. The three older fill areas were in operation prior to current regulatory requirements for the design and operation of landfills, and no accurate documentation of the location or construction of cells in these areas was recorded. The available information suggests that the trench method of landfill operation was used, and that the depth of waste varies but probably is less than 14 feet below ground surface.

According to the Phase II Superfund Investigation Report (Malcolm Pirnie 1986), the Village of Wellsville installed a leachate collection system (LCS) along the west side and central portion of the site in 1985 to curtail the off-site migration of leachate (see Figure 2-2). The system consists of a series of perforated 6-inch polyvinyl chloride (PVC) pipes in trenches backfilled with No. 2 round stone. The pipes were installed at depths of approximately 9 to 14 feet, which is below the estimated depth of the fill material. The layout of the system was based on the assumed direction of local groundwater flow, which is from north to southwest in the central and western portion of the landfill. Two main lines run along the west and south sides of the site. The west leg branches and is connected to the LCS installed in the northeast fill area in 1978. Lateral lines with vertical risers at the terminal ends were extended from the main lines into areas displaying visible leachate seeps. Leachate collected in the northern and central portions of the landfill flows by gravity to a pair of 10,000-gallon holding tanks adjacent to Pump Station No. 1 (PS-1) (see Figure 2-2). Leachate from the southern fill area flows by gravity to Pump Station No. 2 (PS-2), which consists of a cistern with a submersible pump. PS-2, which does not presently operate, is designed to pump to holding tanks at PS-1. Currently, leachate collected from the southern fill area overflows from PS-2 and flows along the ground surface to a roadside ditch. An 80,000-gallon lagoon located within the confines of the site near PS-1 is designed to store excess leachate generated at the site. The lagoon is unlined and overflows during wet weather periods.

Leachate Collection (Pumping) Operations

Daily operations at the site were observed during a visit by E & E personnel. The following description of those operations as well as the flow diagram shown in Figure 2-3 are based on these observations and discussions with site personnel.

Leachate is transported daily by tanker truck from the lagoon to the Wellsville Sewage Treatment Plant (STP). Upon arrival at the site in the morning, the tanker operator performs a visual inspection of the LCS in the area around PS-1. During this inspection, the leachate levels are checked in the two holding tanks (T-1 and T-2), the overflow pond, and the inflows from the uphill LCS and PS-2.

The operator then opens the leachate drain valve (V-7) allowing leachate to drain from the overflow pond into holding tanks T-1 and T-2. He then connects the tanker fill hose to the stand pipe located on the concrete pad north of PS-1. Once the connection is made, the three-way control valve located in the valve pit (V-5) is turned to the "truck fill" position. The pump control is then switched from automatic to manual and the truck is filled.

After the truck is filled the pump is switched back to automatic and the control valve turned to "lagoon-out." At this setting the lagoon continues to drain into the holding tanks at a slow rate through the drain valve (V-7). If the tanks become full, the pump, now in the automatic mode, turns on and pumps leachate from the holding tanks through the control valve and back to the lagoon. The system is left in this condition while the operator delivers the load to the Village of Wellsville STP.

This process is continued throughout the day and a maximum of six truckloads (30,000 gallons total) of leachate is delivered to the STP. At the end of the last load, the operator closes the lagoon drain (V-7) and leaves the system in the automatic mode. Leachate continues to flow from PS-2 (when it is functioning), which is a simple sump-pump set up, into S-1. From S-1 it drains into T-1 and T-2, and from there it is pumped into the lagoon if a high level condition exists.

Leachate Generation

During the evaluation of the landfill for the PIRA, estimates of the monthly and mean annual leachate generation rates were calculated. These calculations were performed using a simple water-balance model described in Design, Construction, and Monitoring of Sanitary Landfill (A. Bagchi 1990).

The model uses the algebraic sum of the precipitation volume (P), surface runoff volume (R), and evapotranspiration volume (Ev) to predict total leachate generation (Lv).

$$Lv = P - (R + Ev)$$

(theoretical vol. generated)

Using this equation, Figure 2-4 was created comparing the theoretical leachate volume generated to the actual volume recovered as reported by the village of Wellsville. The area between the two curves indicates the estimated volume of leachate that escaped to the environment in 1990. This uncollected leachate is assumed to have migrated vertically and horizontally from the landfill into the local groundwater and surface water.

In assessing the impact of the estimated leachate volume, it should be noted that groundwater flow has not been accounted for. Presently there is not enough information to determine whether groundwater flows through the refuse, and if so, in what quantities. It is also unknown whether groundwater enters the leachate collection system directly without passing through the landfill. This information will be obtained during the Phase II RI investigation.

In addition to the above calculations, an estimate of the LCS flow rates was made based on field observations. On the day of the site visit, (March 18, 1992, an average wet period, spring day) 20,000 gallons (four truckloads) was removed from the LCS during a 4-hour period. During this time, the water level in the LCS overflow pond dropped 4 inches. The surface area of the overflow pond is approximately 4,400 square feet. Therefore, the LCS flow rate is estimated to be approximately 60,000 gallons per day (gpd).

The current operations at the site allow for a maximum collection of 30,000 gpd leachate. At this rate, only 50% of the leachate in the LCS could be collected for treatment during a typical "wet" period. Conversations with site employees indicated that during periods of heavier precipitation or snow melt, the transfer pump cannot keep up with the inflow. The capacity of the transfer pump is estimated to be between 250 and 500 gpm. Therefore, extremely high flows would be at greater than 360,000 gpd, or more than 10 times the collection rate.

Based on the field observations and meteorological data for the Wellsville area, it is assumed that for approximately 90 days a year the LCS would flow at an average rate of 60,000 gpd or 90 2.7 million gal/year (mgy). Subtracting this volume and the volume collected by the village in 1990 (8.8 mgy) from the theoretical volume of leachate generated (20.2 mgy) the annual flow of leachate to the groundwater would be 8.7 mgy.

Leachate Quality

In an attempt to determine the impact of the leachate overflow problem, available data on the types and respective concentrations of contaminants in the leachate was reviewed, including the 1986 Malcolm Pirnie report, which identified six VOCs (including vinyl chloride, TCE, and trans-1,2-dichloroethane) above background groundwater levels. These samples were taken from a trench along the east side of the landfill and the leachate sump, which is located near PS-1.

The Phase I RI identified only three VOCs in the leachate, of which only TCE was above NYSDEC Class C surface water standards. The two samples were collected from Manhole No. 4 and PS-2. It was noted in the Phase I RI report that there was very little flow in the LCS at the time of sampling. This may have had a bearing on the VOC concentrations that were detected, especially if there is groundwater inflow into the LCS, as is suspected.

In addition, the Phase I RI analytical results of air samples collected from risers and manholes in the LCS identified several VOCs above 10 ppm.

In addition to the samples that were analyzed for TCL compounds, leachate samples were also analyzed for conventional pollution parameters by RCRA Research in 1979 (see Table 2-2). The village of Wellsville was contacted for a more current analysis of the leachate but no current data was available. The RCRA Research samples identified several parameters that exceed discharge standards under the State Pollution Discharge Elimination System (SPDES) program. The most significant environmental impact would be caused by the excessive oxygen demand of the leachate.

The following calculations, which are based on the available data, illustrate the magnitude of the impact:

Assume: Average wet weather leachate overflow = 30,000 gpd (based on field observations)
: average chemical oxygen demand (COD) = 4,000 mg/L (approximately 1/3 of average 1979 concentrations)
: average 5-day biological oxygen demand (BOD_5) = ½ COD = 2,000 mg/L

Then the BOD_5 loading to surface water

$$= \frac{0.03 \text{ mgd} \times 5{,}000 \text{ mg/L} \times 8.34 \text{ lb}}{\text{Mg(mg/L)}}$$

$$= 500 \text{ lb/day } BOD_5$$

In comparison, a typical single-family home or mobile home generates an average of 0.17 lb/day of BOD_5. Therefore, a community of 1,000 persons directly discharging their waste water would add only 170 lb/day of BOD_5 or one third of the leachate loading. If the actual BOD_5 discharges are of this order of magnitude, it is assumed that there are environmental impacts associated with the leachate.

The uncontrolled release of leachate to the unnamed tributary will continue to contravene NYSDEC surface water standards as long as the landfill remains in its current state. Because this tributary feeds Duffy Hollow Creek south of the landfill, the water quality of Duffy Hollow Creek could also be impacted. However, the tributary is an intermittent water body, which makes its impact on Duffy Hollow Creek difficult to quantify without a long-term study.

Groundwater Quality

Although there is some question as to the levels of VOCs in the leachate overflow, VOCs have been detected in groundwater samples collected in the vicinity of the site. Analysis of samples collected from local springs to the southeast of the site and from monitoring wells located to the east and south of the site detected in the same VOCs that were identified in the leachate samples. Six of the VOCs--1,1-dichloroethene, 1,2-dichloroethane, total-dichloroethene, toluene, trichloroethene, and vinyl chloride (DCE, DCA, tDCE, toluene, TCE, and VC)--have been identified as contaminants of concern in the Phase I RI report.

Site Access

In addition to the leachate overflow and groundwater contamination, the Phase I RI also identified controlling site access as a potential concern. There is evidence of trespassing by hunters, model airplane enthusiasts, and ATV operators. Of these, the ATV operators are the most significant problem. The use of ATVs causes disturbance and erosion of the existing ground cover. They will also cause damage to the final cover when it is place, which would increase the long-term operational cost of the landfill. The Phase I RI health risk evaluation also identified these trespassers as potential receptors of direct exposure to on-site contaminants.

Table 2-1

WELLSVILLE LEACHATE ANALYSIS (RCRA 1979)

Report Date: 10/15/79
Sample Date: 9/26/79

Composite Samples		Sample Identification		
Parameter	Units of Measure	Northwest Fill Area	Central Fill Area	South Fill Area
pH	Standard Units	6.27	6.36	6.59
Total acidicy (pH = 8.3)	% as HCl	0.26	0.54	0.15
Total alkalinity (pH = 4.5)	mg/L as $CaCo_3$	3,720	3,260	2,790
Conductivity	µmhos/cm	7.050	6,100	5,650
Total solids (103°C)	mg/L	10,500	8,370	6,890
Total dissolved solids (103°C)	mg/L	10,400	7,450	6,190
Total suspended solids	mg/L	102	915	708
Chloride	mg/L	808	863	590
Fluoride	mg/L	0.716	0.514	0.315
Biochemical oxygen demand - 5 day	mg/L	2,910	1,770	930
Chemical oxygen demand	mg/L	16,300	10,900	8,230
Sulfate	mg/L	24	36	6.0
Sulfide	mg/L	22.1	47.0	43.6
Total cyanide	mg/L	<0.05	<0.05	<0.05
	mg N/L	1.8	1.1	1.5
	mg N/L	0.500	0.650	1.82
Ammonia	mg N/L	61.8	96.4	108
Total kjeldhal nitrogen	mg N/L	62	98	110
Total phosphorus	mg P/L	0.056	0.300	0.183
Total organic carbon	mg/L	3,640	3,010	2,300
Total inorganic carbon	mg/L	210	194	196
Total grease and oils	mg/L	579	921	291
Total phenol	mg/L	3.78	2.00	28.5
Soluble cadmium	mg/L	0.018	<0.003	<0.003
Soluble chromium	mg/L	0.018	0.006	<0.002
Soluble copper	mg/L	0.072	0.003	0.003

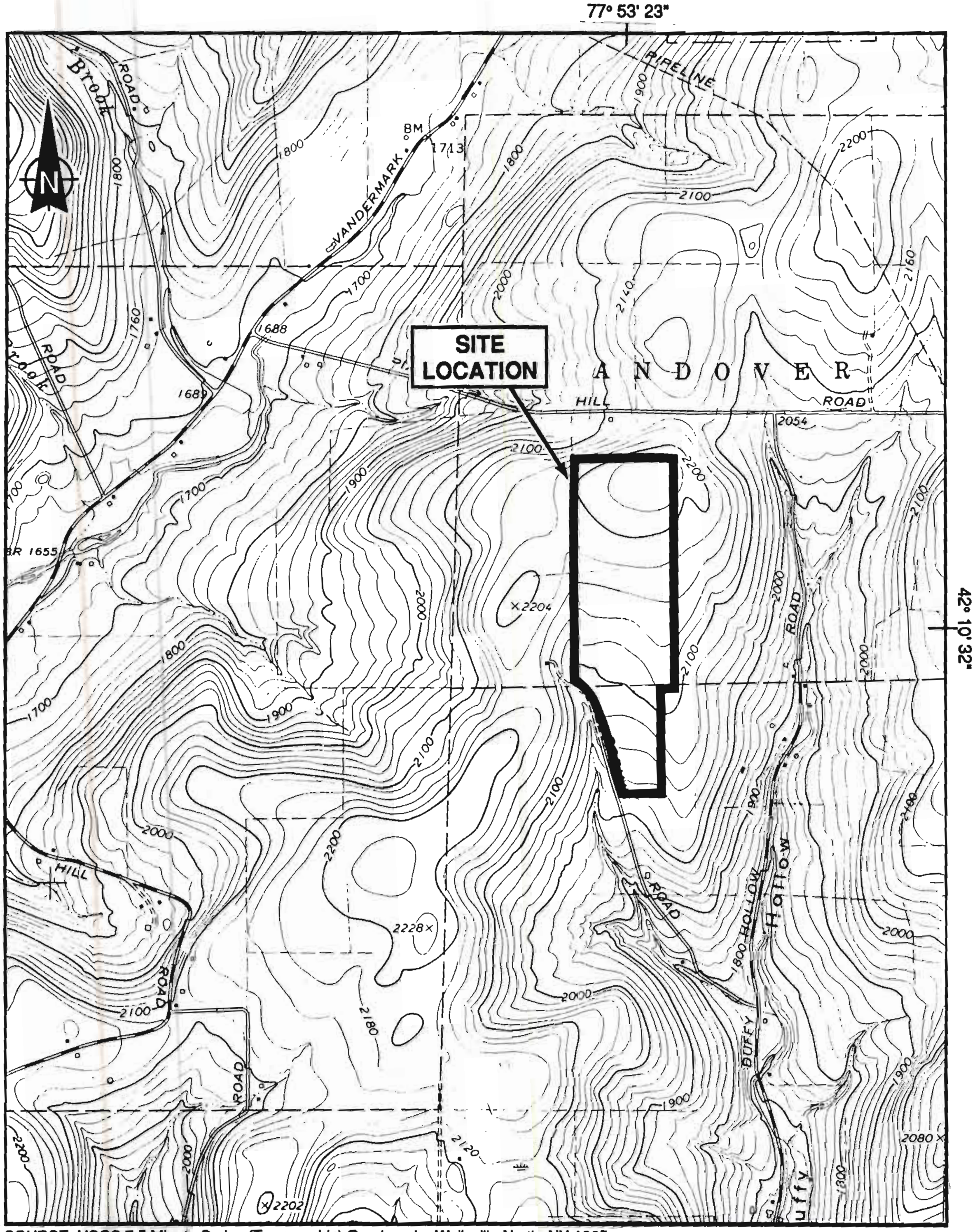
Table 2-1

WELLSVILLE LEACHATE ANALYSIS (RCRA 1979)

Report Date: 10/15/79
Sample Date: 9/26/79

Composite Samples		Sample Identification		
Parameter	**Units of Measure**	**Northwest Fill Area**	**Central Fill Area**	**South Fill Area**
Soluble iron	mg/L	1,300	420	460
Soluble lead	mg/L	<0.02	<0.02	<0.02
Soluble manganese	mg/L	84.0	78.0	20.0
Soluble nickel	mg/L	<0.02	<0.02	<0.02
Soluble mercury	mg/L	<0.7	<0.7	<0.7
Soluble zinc	µg/L	0.132	0.296	0.041
Halogenated organic scan	µg/L as Chlorine; Lindane Standard	0.33	0.51	0.24
Total volatile chlorinated organic scan	µg/L as Chlorine; Carbon Tetrachloride Standard	93,800	18,900	12,200

Source:



SOURCE: USGS 7.5 Minute Series (Topographic) Quadrangle, Wellsville North, NY 1965.

SCALE 1:24,000

0 ½ 1 Mile

0 .5 1 Kilometer

Figure 2-1
SITE LOCATION MAP, WELLSVILLE-ANDOVER LANDFILL

OB3WELLS-SITE1

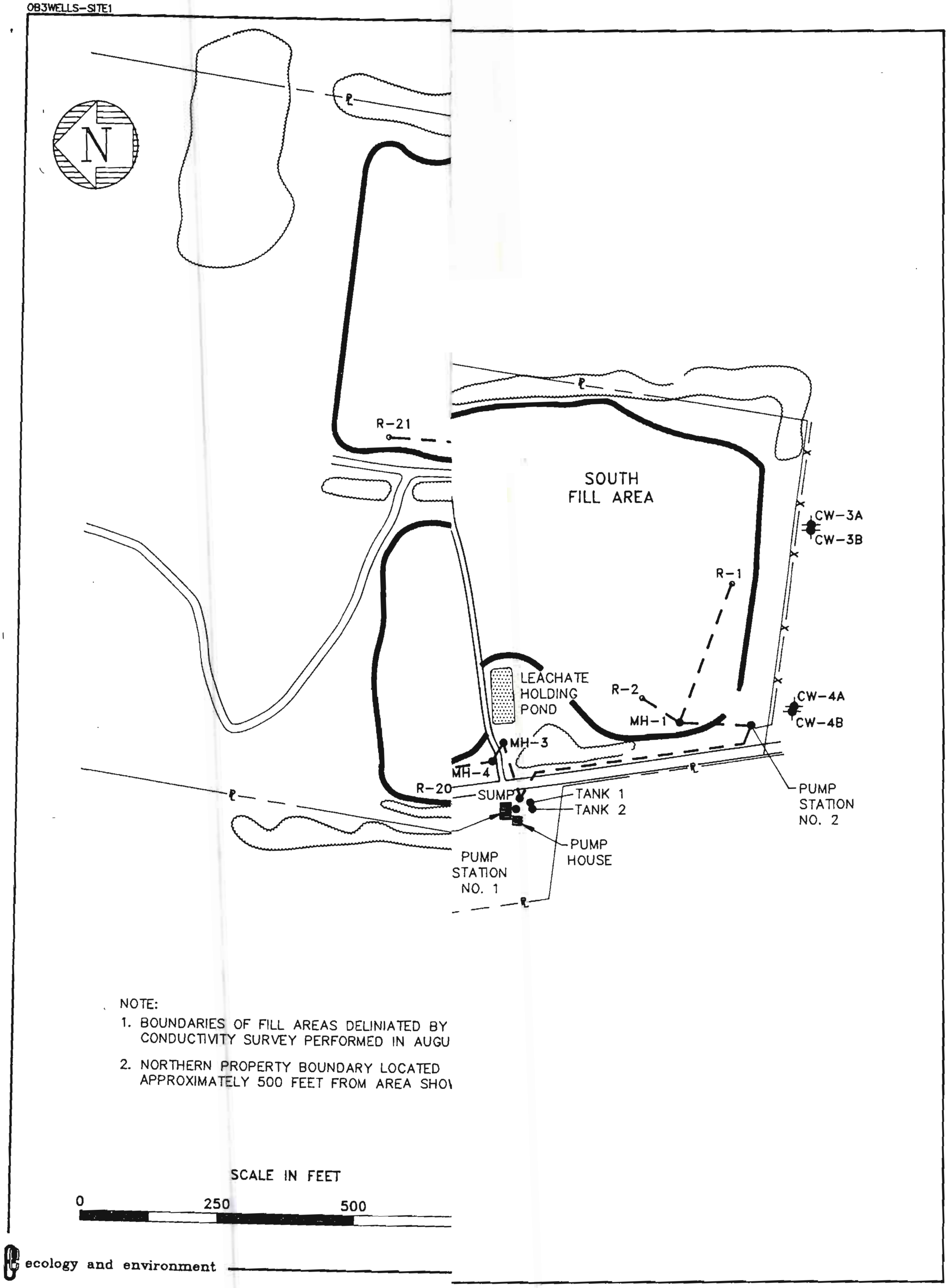


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Figure 2–2 WELLSVILE – ANDOVER LANDFILL SITE PLAN

OB3LEACHDTL-FIG2-3

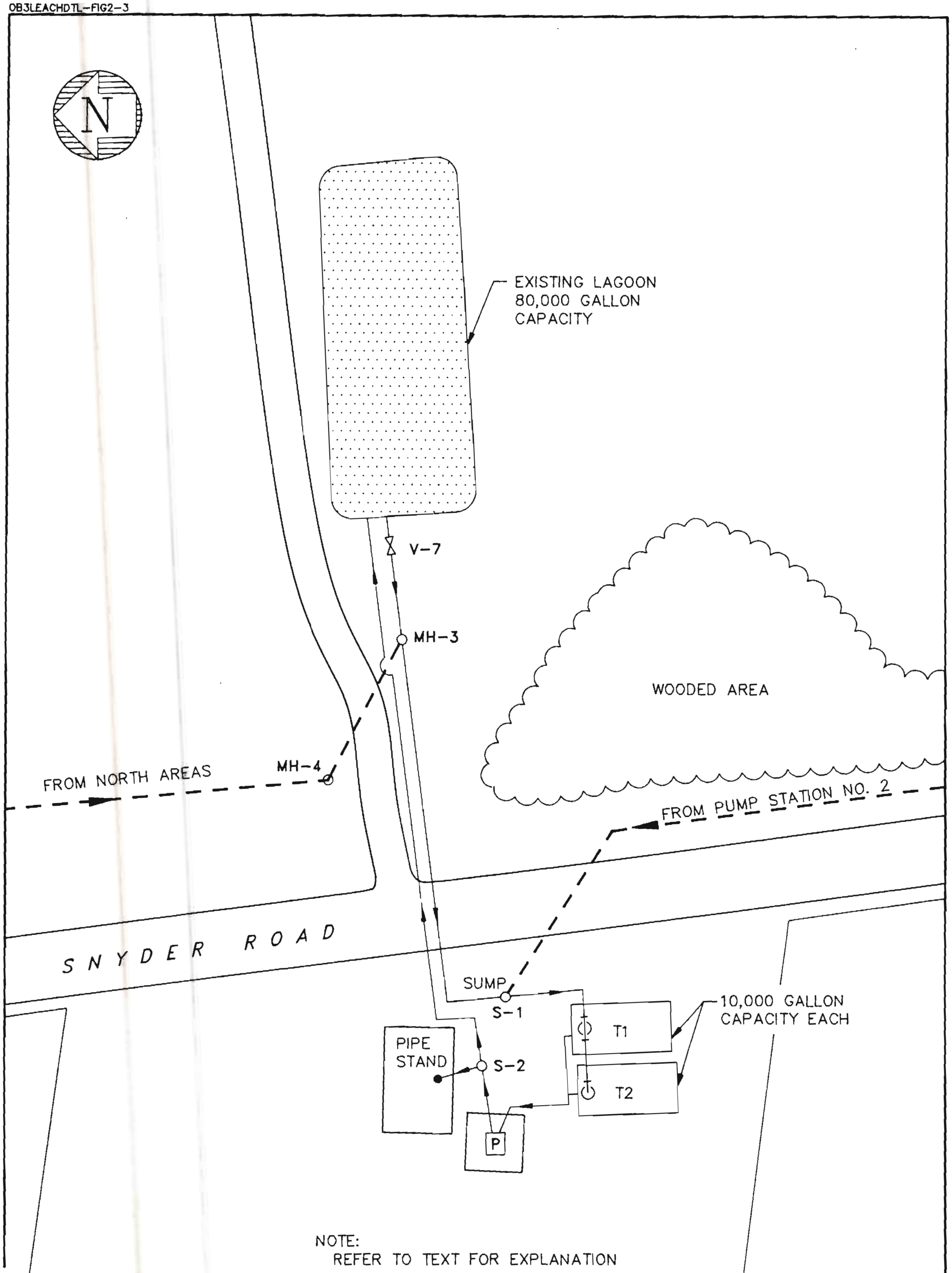

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Figure 2-3 WELLSVILLE-ANDOVER LANDFILL LEACHATE COLLECTION SYSTEM DETAIL

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Total Calculated Leachate Generated	20.2 Mgal
Total Leachate Collected by Wellsville	8.8 Mgal — 43.6%
Total Estimated Overflowing to Surface Water	2.7 Mgal
Total Estimated Migrating to Groundwater	8.7 Mgal

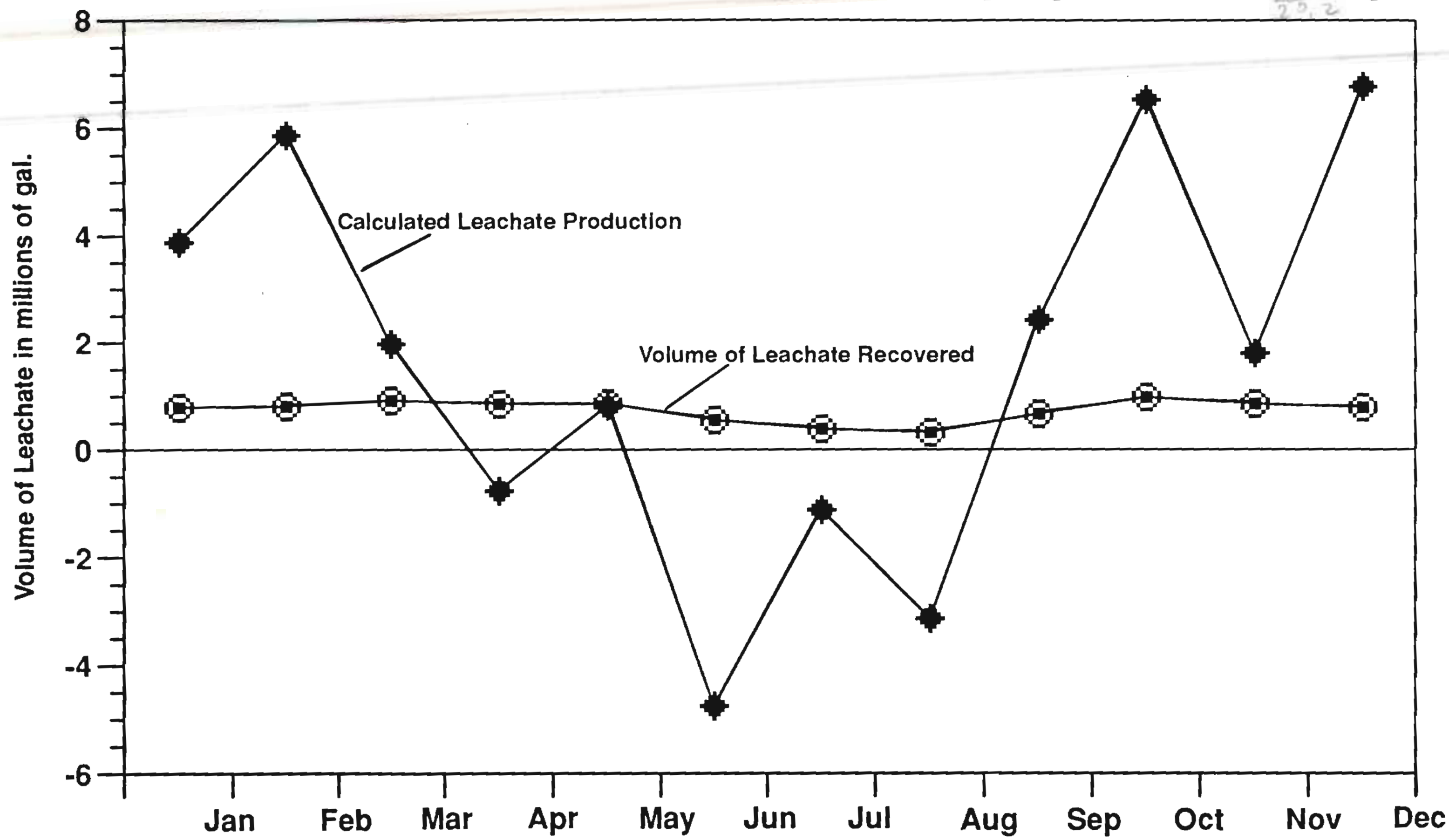

Figure 2-4
WELLSVILLE-ANDOVER LANDFILL
WATER BALANCE 1990

3. EVALUATION OF INTERIM ALTERNATIVES

The alternatives outlined below have been selected based on their applicability for reducing the impact of the Wellsville-Andover Landfill on human health and the environment. Since there is only a minor chance of direct contact with the waste materials, the development of PIRA alternatives concentrated on the leachate problems previously identified. The objectives stated below were used as a guideline for the evaluation of PIRAs.

Objectives

Based on the review and evaluation of the available data, the following PIRA objectives were developed:

- Reduce, control, and/or treat the leachate that is currently overflowing the existing LCS;
- Reduce the generation of leachate;
- Reduce the impact of leachate on the groundwater; and
- Reduce the potential for unauthorized site access.

These objectives are used as the basis for the development of PIRA alternatives for the site.

Phased Placement of a Final Cover. This alternative consists of the phased placement of a final cover (cap), which is required as a minimum by 6 NYCRR, Part 360 for landfill closures. The cap will most likely be a multiple layered type and include a gas venting layer, geosynthetic membrane barrier layer, a soil protection/drainage layer, and a topsoil layer. Placement of a final cap will reduce the surface infiltration into the landfill mass, thus reducing the leachate generation by at least 75%. Its effectiveness would depend heavily on the groundwater flow patterns. — Need to determine this first

Several conditions must be met prior to placement of the final cap. Among these, but not exclusively, are an accurate determination of the area boundaries in order to determine the areal extent of the cap; and the extent of groundwater inflow must be known to determine if there is a need to incorporate a groundwater control system into the cap design.

At present these conditions are not satisfied. The Phase I RI groundwater results have identified off-site migration of the leachate through the groundwater to the east and south. This finding requires further study because, prior to the RI, it was assumed that the direction of groundwater flow was to the southwest. Based on the findings of the Phase II RI, it may be necessary to move waste out of the path of groundwater flow or to divert the flow, if possible. In either case, the surface of the landfill areas will be disturbed, making the early implementation of a cap inappropriate.

Installation of Groundwater Cutoff Walls. This alternative measure is not appropriate at this time due to lack of data on groundwater flow. It will be further investigated upon completion of the Phase II RI.

Improvements to Surface Water Diversion Ditch Along the Northern Edge of the Landfill. The existing diversion ditches appear to be adequate. There was no evidence of surface runoff entering the landfill from upgradient areas.

Improving Operation and Maintenance of LCS. PS-2, which pumps leachate from southern cells to the holding tanks at PS-1, should be repaired. Based on field observations and conversations with site personnel, the pump does not work and leachate overflows continuously.

A second possibility is to provide an equalization facility at the village of Wellsville STP. This would reduce the impact of leachate on plant operations by providing a more constant flow to the plant for treatment and may allow the village plant to process more leachate.

The only other option identified as an operation and maintenance alternative is to increase the amount of leachate transported to and treated at the STP. However, discussions with STP personnel indicates that the treatment of the leachate currently creates minor problems at the plant. The STP has only enough storage to equalize leachate from the first truckload. Thereafter, leachate is unloaded rapidly and directly into the influent stream. The resultant slug load may cause some deterioration in treatment efficiency. However, the plant has consistently met discharge requirements.

iron

The STP operator also indicated problems related to the staining properties of the leachate and limited plant sludge storage capacity in the winter. The operator believes the leachate creates a large quantity of sludge, primarily due to the high iron content. Sludge storage is required in winter because the village uses sludge drying beds to dewater sludge.

Improving or Increasing Leachate Storage Capacity. Construction of additional leachate storage at the landfill site would provide additional protection against overflow during periods of heavy leachate generation. Improved or increased leachate storage capacity may be applicable as a stand-alone alternative or in conjunction with hauling or treatment alternatives. The total storage capacity required would be determined based on a number of factors, including peak flow rates, durations of high flows, capacities of treatment alternatives, and revised hauling rates.

On-Site Leachate Treatment. Based on the data available, on-site treatment of the landfill leachate appears feasible. A treatment system including unit processes such as equalization, iron precipitation, biological treatment, clarification, holding, and sludge treatment would significantly reduce the oxygen demand and VOC content of the waste stream and, therefore, provide increased health, safety, and environmental protection. Presently, it is not possible to determine which unit processes will be required or to make a realistic estimate of the size of the various unit processes. The following factors have a significant effect on final selection and sizing determinations:

- **Leachate Concentrations and Quantity.** Preliminary estimates used in this report are based on very limited data and are used only to illustrate a point. Additional data will be required to size the various unit processes and to estimate sludge production if treatment is considered further.

- **Feasibility of additional leachate treatment at the Wellsville STP.** Investigation of this factor will effect the sizing of the various processes and even final treatment requirements. For example, the STP may be able to accept more leachate if a pre-treatment system is installed at the landfill site that significantly reduces the oxygen demand of the leachate or removes iron.

- **Feasibility of additional sludge treatment at the STP.** If it is possible to treat additional sludge at the STP, the number of treatment options increases. For example, an alternative that could be considered would include cessation of leachate hauling by the village, treatment of the leachate stream at the landfill and hauling and treatment of the sludge produced by the treatment process at the STP.

4. CONCLUSIONS AND RECOMMENDATIONS

Two factors are evident from the evaluation of the known and existing conditions at the landfill:

- The quantity of untreated leachate escaping from the LCS to the environment is much greater than originally estimated; and
- Additional data regarding leachate overflow quantity and quality is needed prior to the further evaluation of PIRA alternatives pertaining to the LCS.

Though there is a lack of data pertaining to the quality and quantity of leachate being produced, the available data indicate that there may be a significant problem that requires immediate attention due to leachate leaking from the LCS.

Furthermo·e, site access is relatively unrestricted and trespassers may be directly exposed to on-site contaminants.

The impact of leachate on the groundwater is also a concern. However, the two most effective solutions identified for mitigating this impact (i.e., a final cover and groundwater controls) are not easily implemented as an interim solution. These actions will likely be incorporated into a final, comprehensive remedial plan, pending results of the Phase II RI.

Therefore, the following interim actions are recommended:

1. Limit site access, especially in areas of increased risk such as the leachatє storage pond;
2. Obtain additional data regarding the quantity and quality of leachate overflowing the LCS to determine the magnitude of the existing problem and provide a basis for the further evaluation of alternatives that would reduce the impact. Additional information that should be obtained includes:
   - Contaminant analyses on leachate for COD; BOD; total Kjeldahl nitrogen (TKN); pH; oil and grease; and suspended solids;

- Contaminant analysis on leachate for TCL parameters;
- Daily estimates of total leachate flow within the LCS; and
- The feasibility of transporting and/or treating additional leachate or sludge at the village of Wellsville STP.

In addition to those more immediate data needs, several questions will need to be answered during the Phase II RI in order to develop final remedial actions. These needs will be discussed in the Phase I FS report.