WEHRAN ENGINEERING
Consulting Engineers

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August 22, 1984

Mr. Robert Mitrey
NYSDEC
Region 9
600 Delaware Avenue
Buffalo, New York 14202

RE: Groundwater Monitoring Program
at Lancaster Sanitary Landfill
(WE Project No. 01339035 B-5)

Dear Mr. Mitrey:

This report has been prepared in order to address Item 3, "Groundwater Monitoring Re-evaluation Program" of the New York State DEC Consent Order (Schedule A), regarding the Lancaster Sanitary Landfill. The following items are discussed in accordance with the concerns of the State, as expressed during our August 10, 1984, meeting with Ms. Mary McIntosh:

1. The installation of additional monitoring wells, especially southwest of the landfill.
2. The possible need to monitor the glacial outwash aquifer.
3. The application of geophysical techniques.
4. Sampling frequency and parameters for analysis.

The results of three previous investigations (reports) were used as the basis of the enclosed monitoring plan evaluation. These are: Hydrogeologic Investigation, Wehran Engineering and RECRA Research, Inc., June 21, 1979; Supplemental Hydrogeologic Investigation, Wehran Engineering and RECRA Research, Inc., January 14, 1980; and Bedrock Aquifer Investigation, Wehran Engineering, August 4, 1980.

Groundwater Monitoring of the Glacial Outwash

In the vicinity of the landfill, the primary direction of groundwater flow and contaminant migration is downward from the glacial outwash into the underlying Onondaga Limestone. Accordingly, the primary emphasis of our groundwater monitoring program must, and does, address water quality in the

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bedrock. A lesser horizontal component of flow does exist however, within the outwash, and provides the potential for off-site contaminant migration within this zone. Based on this potential, a limited monitoring program of the outwash is proposed.

The plan consists of three shallow monitoring wells installed along the southern border of the site as shown on Figure 1. The actual location of the wells would be determined in the field, subject to outwash thickness encountered during installation of the bedrock wells. In the event that both aquifer thickness and groundwater contamination were observed to be generally extensive, the proposed program could be modified to include additional wells. One of the wells (western most) would be installed adjacent to the bedrock monitoring well forming a couplet.

Additional Bedrock Monitoring Wells

Currently, groundwater is being monitored in six bedrock wells in the vicinity of the Lancaster Sanitary Landfill: W-3, W-5, W-6, W-7, W-8, and B-24D (refer to Figure 1). The objective of installing and monitoring additional wells would be to more accurately define the direction and extent of off-site contaminant migration within the Onondaga Limestone aquifer.

The direction of groundwater flow in the bedrock is generally toward the west-southwest, and is consistent with flow in the upper glacial aquifer (Bedrock Aquifer Investigation, Wehran, August 4, 1980). This is supported by water quality data which indicates Well W-3 contains elevated values of organics, manganese, specific conductance, and chloride.

A total of eight additional bedrock monitoring wells are proposed to be constructed and sampled in a two-phase approach. Phase I would consist of the installation of four wells in the vicinity of the Lancaster Speedway, and the property immediately south of the thruway as shown on Figure 1. These wells have been designated as "I" for Phase I. The location of these wells would provide additional water level data as well as water quality data to more accurately define the direction of contaminant migration. Upon installation of the four wells, it is proposed that a quarterly sampling event be conducted (as discussed below) prior to initiation of Phase II.

Phase II would consist of the installation and sampling of four monitoring wells to be located based on the result of Phase I. It is anticipated that these wells be located at increasing distances from the landfill, directly downgradient of flow, in order to more accurately assess the horizontal extent of contaminant migration. So as not to be omitted from a total well count, these wells are shown on Figure 1, at tentative locations and are designated "II".

The wells would be constructed in a similar fashion to existing Wells 1 through 8. That is, the boring would be advanced to a depth of 15 feet below the top of saturated rock. It is assumed that permission from off-site property owners would not be a problem. The road right-of-way could also be used, if necessary.

Application of Geophysical Techniques

An earth resistivity survey was conducted as part of the Supplemental Hydrogeologic Investigation (January 14, 1980) in order to define the extent of leachate migration from the Lancaster Sanitary Landfill. The study was conducted during the week of August 20, 1979, and employed the services of a three-person field crew composed of Wehran Engineering and Recra Research, Inc. personnel. All work was performed with a Bison Modes 2350 earth resistivity meter. Resistivity investigations were conducted around and within the landfill complex, with rather extensive investigations to the south and southwest of the landfill south of the New York State Thruway (Interstate 90).

The results of this investigation were summarized in the January 14, 1980, Supplemental Hydrogeologic Investigation Report as follows:

> The earth resistivity study conducted in August and September 1979, to assess leachate migration in the glacial outwash deposits and the Onondaga Limestone, did not indicate extensive plume migration from the landfill. Factors complicating the interpretation of our resistivity results were:
>
> 1. A highly variable level of resistivity readings within the glacial outwash and glaciolacustrine deposits encountered in and around the site.
>
> 2. The variable depth of outwash deposits overlying the highly resistant Onondaga Limestone.

3. The possibility that other sources of groundwater contamination, most notably the New York State Thruway, could mask results from the landfill itself."...."Test soundings set up on "clean" and "dirty" outwash showed wide variation in the resistivities of each material, thereby, masking leachate occurrence in the zones being tested. It is possible that the lower readings on the west/northwest side of the Lancaster Landfill could be a result of natural geologic changes and not the result of a leachate plume."

Based on this limited success of our previous resistivity survey, additional geophysical investigations are not recommended at this time.

Sampling Frequency and Parameters for Analysis

The current groundwater monitoring program includes six bedrock wells which are sampled quarterly for the following parameters:

| | |
|---|---|
| pH | Mn (Total) |
| Conductance | Mn (Soluble) |
| Alkalinity | Benezene |
| Chloride | Ethylbenzene |
| TOC | Methylene Chloride |
| Ammonia Nitrogen | Toluene |
| Nitrate Nitrogen | Trichloroethylene |
| Fe (Total) | Vinyl Chloride |
| Fe (Soluble) | |

Our proposed plan (Phase I) would add four bedrock wells and three outwash wells to bring the total number to 13. Phase II would likely add four bedrock wells, bringing the ultimate total number of monitoring wells at the site to 17.

It is recommended that the current quarterly sampling frequency be continued for the parameters listed above. Due to the concerns of the DEC however, a more in-depth evaluation of heavy metals would be conducted immediately upon the installation of the seven Phase I wells and would include the six existing wells. This evaluation would consist of the analysis of priority

pollutant metals in all 13 wells in addition to the indicator parameters listed above. Upon review of the data in terms of the presence and/or severity of contamination from heavy metals, the need for future monitoring of metals would be addressed. If, for example, no evidence of metals were found, this portion of the monitoring plan might be discontinued. Conversely, if metals were found in significant concentrations in certain wells, these wells may be sampled for metals on an annual or semi-annual basis.

We would be happy to discuss any questions you may have regarding our proposed monitoring plan.

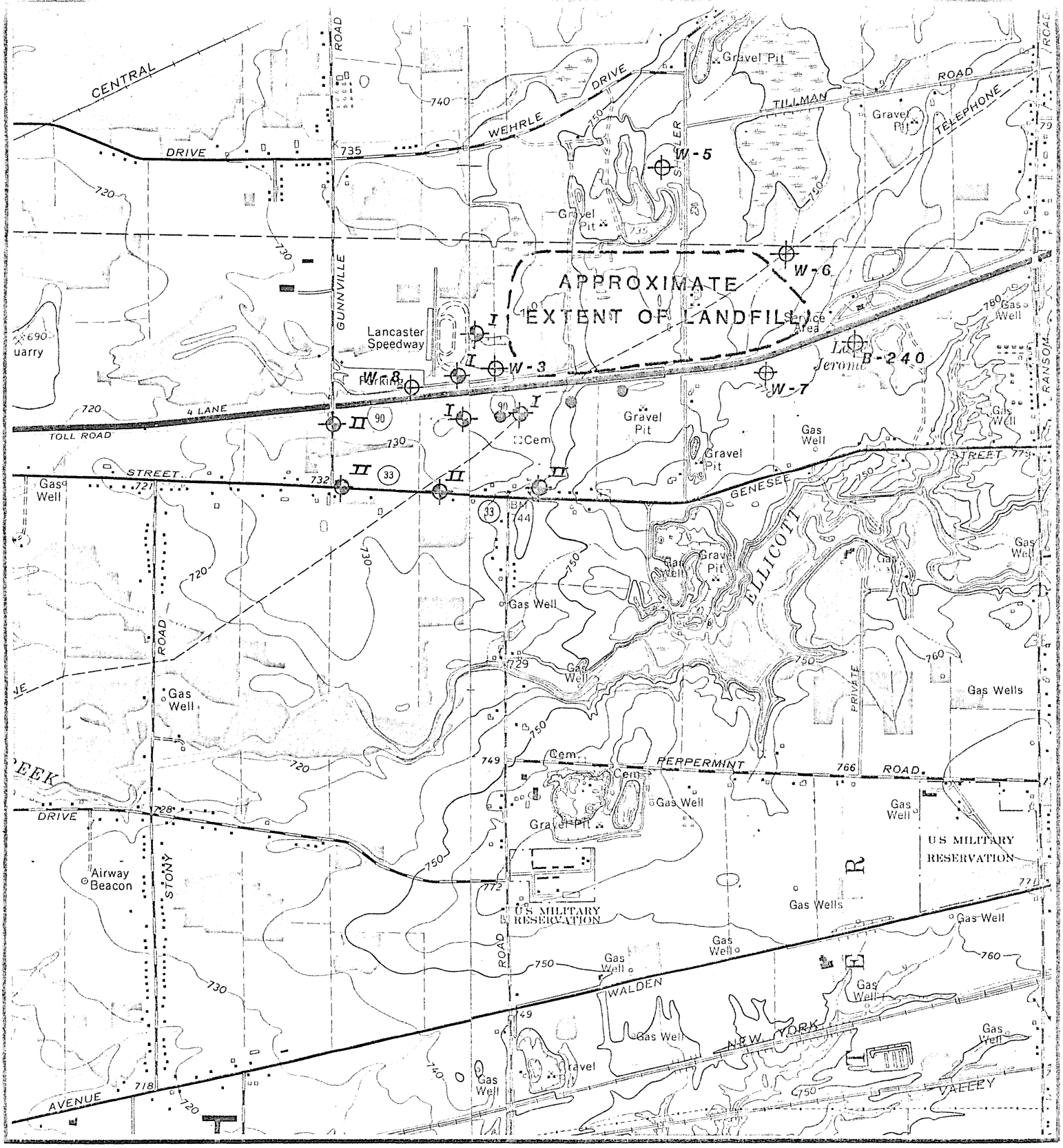
Very truly yours,

**WEHRAN ENGINEERING, P. C.**

William G. Soukup
Senior Geologist

James R. Woods, P. E.
Senior Engineer

WGS/JRW/in
Enclosure




NOTE: BASE MAP TAKEN FROM CLARENCE AND LANCASTER, N.Y. (1965) U.S.G.S. QUADRANGLES

- ● *PROPOSED OUTWASH MONITORING WELL*
- ⊕ *EXIST. MONITORING WELL*
- ⊕ *PROPOSED BEDROCK MONITORING WELL*
- I *PHASE ONE*
- II *PHASE TWO*

FIGURE 1

# LOCATION OF EXISTING AND PROPOSED MONITORING WELLS

LANCASTER SANITARY LANDFILL
Erie County New York