SECTION 2

HYDROGEOLOGIC SUMMARY

2 HYDROGEOLOGIC INVESTIGATION SUMMARY

Introduction

The purpose of this report was to summarize and evaluate the geology and hydrogeology beneath the permitted Clinton Landfill No. 3 as to the suitability of the site for development of a Chemical Waste Unit in accordance with applicable regulations.

Prior to submittal of the US EPA Region V permit application for the Clinton Landfill No. 3, Clinton Landfill, Inc. conducted a hydrogeologic site investigation. The results of the investigation were provided within the permit application for that facility which was submitted to the Illinois Environmental Protection Agency (IEPA). A copy of the hydrogeologic investigation report from the Clinton Landfill No. 3 investigation along with supporting information is provided in Appendix E. Geologic cross sections and potentiometric surfaces are provided with the Geologic Drawings (Drawing Nos. G1 through G21). Field hydraulic conductivity data and laboratory geotechnical reports are provided in Appendices F and G, respectively. The following sections summarize the key findings of the hydrogeolgic investigation:

Field Activities

- The hydrogeologic investigation was primarily conducted in 6 phases between December 1996 to October 2005.
- The drilling program was conducted under a Professional Engineer with field activities conducted under the direction of a Licensed Professional Geologist.
- The investigation included the advancement of 30 continuously logged borings and the installation of 20 monitoring wells in addition to existing information collected at the adjacent Clinton Landfill No. 2 (10 continuously logged borings and 4 monitoring wells). Ten of the continuously logged borings which were advanced during the investigation for the Clinton Landfill No. 3 are located within or near the proposed Chemical Waste Unit (EX-3, EX-7, EX-9, EX-17, EX-18, EX-19, EX-20, EX-21, EX-26, and EX-27).
- Representative samples were selected by the Professional Engineer for laboratory analysis of vertical hydraulic conductivity, grain size, plasticity, specific gravity, total organic content, cation exchange capacity, and strength parameters.
- Monitoring wells installed at the site were used to collect in-situ hydraulic conductivity data and are to collect groundwater elevation information for preparation of potentiometric surfaces.

Hydrogeologic Investigation Findings

- A succession of low-permeability cohesive soil units (Tiskilwa Formation, Roxana/Robein Silt, Berry Clay, Radnor Till, Vandalia Till, Smithboro Till, Yarmouth Soil, Tilton Till, and Hillary Till) are present across the proposed site which will separate the footprint of the proposed Chemical Waste Unit from the regional aquifer. These low permeability cohesive soil units have an average thickness of approximately 200 feet at the site (approximately 170 feet of which will remain between the bottom of the proposed liner invert and the regional Mahomet Sand

Aquifer). Field and laboratory test results and field observations indicate that these materials will effectively restrict vertical and horizontal movement of groundwater and will serve as an additional environmental safeguard at the proposed Chemical Waste Unit.

- The proposed design for the Chemical Waste Unit includes a triple composite liner system. From the subgrade up across the landfill base, the liner will consist of 3 feet of recompacted clay ($k \leq 1x10^{-7}$ cm/sec), a 60-mil HDPE geomembrane, a HDPE geocomposite secondary leachate collection layer, a second 60-mil HDPE geomembrane, a geosynthetic clay liner, and a third 60-mil HDPE geomembrane. Along the sidewall of the proposed Chemical Waste Unit, the liner will consist of 3 feet of recompacted clay ($k \leq 1x10^{-7}$ cm/sec), a 60-mil HDPE geomembrane, a HDPE geocomposite secondary leachate collection layer, a second 60-mil HDPE geomembrane, a HDEP geocomposite drainage layer and 18 inches of random fill or select waste.

  Such a liner design greatly exceeds the requirements of the United States Environmental Protection Agency (USEPA) and has been accepted by the IEPA and other experts in the landfill field as providing a high level of environmental safety. The natural clay underlying the proposed Chemical Waste Unit is unweathered and will act as a second, natural liner system for the landfill.

- The hydrogeologic conditions at the site and the landfill design allow a comprehensive groundwater monitoring system to be implemented which will adequately verify that groundwater resources are not being threatened by the landfill.

Discussion of the individual soil broings, groundwater monitoring wells, laboratory testing, site description, climatic aspects of the study area, regional geologic units, structural features, regional hydrogeology, site geology, and site hydrogeology are discussed in great detail in the *Description of Hydrogeology* report that was prepared for permitting of the Clinton Landfill No. 3. This report and supporting information is provided within Appendices E, F, and G.