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**Alamance County
Austin Quarter Road Solid Waste Management Facility
Cell 2B Expansion**

Hydrogeologic Investigation Work Plan

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1. Location

Proposed Cell 2B expansion is located to the east of the currently active Cell 1. The western berm of Cell 2B is the existing Cell 1 Intermediate Berm. The Cell is approximately 8 acres in area and is designed for a five year design life. The Cell 2B area is cleared of trees and brushes except for about one acre in the southeast corner of the expansion area. As shown on the attached "Cell 2B Proposed Well Layout", a topsoil stockpile and portions of the daily cover soil stockpile are located within the proposed footprint. The main Cell 1 access road as well as operations staging area are also located in the area of proposed Cell 2B.

The daily cover stockpile will be depleted prior to Cell 2B construction, and has little impact on investigation or design. The topsoil stockpile will be relocated prior to Cell 2B construction. It is anticipated that this material will be used as part of Cell 1 final cover construction. Access to Cell 1 will be moved to the north end of the Cell just before construction of Cell 2B.

Preliminary lines and grades for Cell 2B are taken from "Overall Base of Compacted Soil Liner", Drawing G5 of the April, 1993 approved Permit Drawings. A subsurface hydrogeological investigation will be conducted to establish feasibility of base grades and to assure adequate separation from groundwater and bedrock. The scope of investigation is described below.

2. Hydrogeological Investigation

The goal of the hydrogeological investigation is to collect information required to provide a Design Hydrogeologic Report in accordance with 15A NCAC 13B 1623 (b). A total of eight borings is required, depending on geologic conditions encountered. There are two existing wells within the Cell 2B footprint; S11 is a temporary monitoring well included in the Water Quality Management Plan and Well 1, which was installed as part of the Site Hydrogeologic Report. In addition, S10, another temporary monitoring well, is located just to the north of the proposed expansion area. Several monitoring wells and test pits installed for the Site Hydrogeologic Report were located in the Cell 2B area, but were abandoned during Cell 1 construction. The attached drawings shows the location of existing and abandoned monitoring wells.

A total of six new borings are proposed at the locations shown on the attached drawing. These locations have been selected for maximum coverage and also to minimize risk of damage during Cell 1 operations. The wells will be marked and protected from damage by earth moving equipment.

All six new wells will be converted to piezometers. The new piezometers, in conjunction with existing wells in the area, will be used to collect water level information so that groundwater flow directions can be determined and the characteristics of the uppermost aquifer can be identified and described.

Borings will be advanced utilizing hollow-stem auger drilling methods to depths ranging from 20 to 40 feet, depending on subsurface conditions. The projected boring depths are shown on Table 1. In each boring, split-spoon samples will be collected at 2.5 foot intervals for the upper ten feet and five foot intervals below that to boring completion. In addition, split-spoon samples will also be collected at major changes in lithology. In some borings, Shelby

tube samples will be collected for analysis in a soils laboratory. In three of the borings, the upper ten feet of bedrock will be cored utilizing NX rock coring methods.

Piezometers will be constructed with 10 to 15 foot length 2-inch schedule 40 PVC screens, with the remainder of the piezometer constructed of 2-inch schedule 40 PVC riser pipe. All piezometers will be installed in accordance with the applicable North Carolina Well Construction Standards codified in 15A NCAC 2C. Upon completion of installation of the piezometers, each will be properly developed to ensure good hydraulic communication with the surrounding aquifer material.

Once all piezometers have been installed and properly developed, aquifer testing, (slug tests) will be performed on selected piezometers. The results of these tests will be used to determine recharge/discharge from the aquifer as well as provide an indication of the horizontal hydraulic conductivity of the formation. Data from the slug tests will be analyzed using Hvorslev's, Bouwer-Rice, or the Cooper-Bredehoeft-Papadopoulos methods.

The results of the geotechnical testing will be used to determine if the soils found on the site are suitable for construction of the various components of the landfill (i.e., berms, liners, and final cover) and to define the physical characteristics of the lithologic units of the uppermost aquifer system. In addition to borings several test pits will be excavated and soils samples tested.

During the drilling activities, soil samples will be collected for geotechnical classification and analysis in the laboratory. Bulk soil samples as well as relatively undisturbed Shelby tube samples will be collected. The tests which will be conducted on boring or test pit samples may include:

- Particle Size Analysis of Soils ASTM D422-63)
- Liquid and Plastic Limits (ASTM D4318-83)
- Classification of Soils for Engineering Purposes (ASTM D2487-69)
- Standard Proctor (ASTM D698-78)
- Hydraulic Conductivity Testing (ASTM 5084)
- Natural Moisture Content (ASTM D2216)
- Unit Weight
- Specific Gravity (ASTM D854)

The data analysis will occur after completion of the field work. The goal or the end result of the data analysis and interpretation is to establish an understanding of the Hydrogeologic conditions underlying the proposed Cell 2B area.

A report (Design Hydrogeologic Report) will be prepared in accordance with 15A NCAC 13B.1623 upon completion of all field activities and data analysis. This report will include data collected during the project as well as any interpretation of the data. Descriptions of all field procedures which include site reconnaissance, drilling, piezometer installation, piezometer development and sample collection will be included. The report will contain all boring logs, piezometer completion diagrams, laboratory testing data, water level information, and calculations. In addition, items such as groundwater and bedrock surface contour maps and stratigraphic cross sections will be included in the report.

Groundwater flow regimes including horizontal and vertical components of groundwater flow, horizontal and vertical gradients, and flow rates will be discussed.

3. Schedule

Drilling will commence in early December, 1996. Aquifer testing will be completed in December and water level monitoring will be conducted on a monthly basis throughout the design and permit review period. It is anticipated that an Application for Permit-to-Construct, including the Design Hydrogeologic Report, will be submitted in mid-1997. Cell 2A is scheduled to be on line by early 1999.

Attachment: "Cell 2B - Proposed Well Layout"

TABLE 1 - PROJECTED BORING DEPTHS - CELL 2B

Proposed Boring No.	Proposed Coordinates		Approx. G.S. Elev. (ft MSL)	Approx. T.O.R. Elev. (ft MSL)	Approx. Depth to Rock (ft)
	Northing	Easting			
B-34	793,653	1,912,970	511	485	26
B-35	793,435	1,913,310	499	484	15
B-36	793,303	1,913,457	510	478	32
B-37	793,580	1,913,560	505	487	18
B-38	793,947	1,913,152	519	494	25
B-39	793,755	1,913,175	521	491	30
B-1*	793,679	1,913,493	508.6	491.0	17.6
S-11*	793,553	1,913,149	509.8	487.8	22

* Denotes Existing Borings/Monitoring Wells

APPROVED
 DATE: 12/11/11
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