02-01

TRIGON
ENGINEERING CONSULTANTS, INC.

Geotechnical, Environmental,
Construction Materials, & Roofing Engineers

P.O. Box 18846•Zip 27419-8846•313 Gallimore Dairy Rd. Greensboro, N.C. 27409•(919)668-0093

August 3, 1990

Mr. Bobby Lutfy
Solid Waste Section, DEM
401 Oberlin Road
Raleigh, North Carolina 27607

Subject: Groundwater Monitoring # 02-01
Alexander County Landfill
Trigon Project No. 035-90-003

Dear Mr. Lutfy:

Enclosed is one copy of the groundwater monitoring plan for Alexander County landfill for your review. We look forward to your comments on the plan and to meeting you at the site on August 14.

Very truly yours,

TRIGON ENGINEERING CONSULTANTS, INC.

Nicholas L. Bogen

Nicholas L. Bogen, P.G.
Director of Groundwater Services

NLB/mb

859-0252

Enclosures

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GROUNDWATER MONITORING PLAN

FOR

ALEXANDER COUNTY LANDFILL

#02-01

Prepared by:

Trigon Engineering Consultants, Inc.
609 Germantown Road
Raleigh, North Carolina 27607

August 3, 1990

Trigon Project No. 035-90-003

1.0 - Introduction

Alexander County Landfill covers an area of approximately 24 acres on an unnamed ridge north of the Catawba River and about two miles southwest of Millersville, North Carolina (Figure 1). Although the landfill has been in operation for about 10 years, the impact of the facility on groundwater in the area, if any, is not known. As a result, Alexander County has initiated a groundwater monitoring program for the landfill site.

The purpose of the monitoring program is to determine the chemical quality of groundwater both upgradient and downgradient of the landfill so that its impact on the subsurface environment can be quantified. An important part of the program will be to identify hydraulically conductive zones in the subsurface because these zones are commonly the main pathways of contaminant migration.

Field investigations to be carried out at the landfill include sampling of subsurface soils to obtain information about the distribution of conductive zones and installation of monitoring wells for sampling and chemical analysis. Four monitoring wells will be installed around the perimeter of the landfill, as close as possible to the permit boundary. Because the landfill is relatively small, the four wells will be adequate to characterize groundwater quality in the area.

1.1 - Site Setting

Alexander County is in the western Piedmont province, a deeply dissected upland terrain underlain mainly by residual soils developed from schist and gneiss. The landfill is half a mile north of the Catawba River and about 100 feet higher in elevation. All of the creeks and streams around the landfill drain into the Catawba River or its tributaries.

The area around the landfill is sparsely developed with farms and residences. Much of the immediately surrounding land is undeveloped timberland on moderately steep slopes. There is no developed land between the landfill and the river.

1.2 - Geology

Alexander County is in the Inner Piedmont belt, a region characterized by metasedimentary and metaigneous rocks including schist, micaceous gneiss, calc-silicate rocks, quartizite and granitic rocks. According to the Geologic Map of North Carolina (1985), the landfill occupies an area underlain mainly by biotite gneiss. Partially weathered and decomposed schist and gneiss are exposed in borrow pits at the site itself. Compositional layering is sub-horizontal and is defined by relict schistose structure in residual soils with bands of more resistant gneiss interlayered.

The extent of fracturing of the bedrock beneath the site is not known due to poor exposure and a lack of previous borings. No fault zones are mapped in the vicinity of the site, however.

1.3 - Hydrogeology

Little information is available about the hydrogeology of Alexander County and the landfill site, other than what may be inferred from the topography and drainage. In general, the groundwater table beneath the Piedmont lies at depths of 10 feet to 50 feet within the diffuse boundary between saprolite and hard rock. Near streams that flow year-round, however, the water table may be shallower and may lie within alluvium. Hydraulic conductivities tend to be highest in alluvium, intermediate in saprolite and lowest within bedrock, except where substantial fracturing has occurred. In partially weathered rock where the layering is sub-horizontal, the hydraulic conductivity is probably much higher horizontally than vertically.

The location of the landfill on a ridge suggests that the immediate vicinity is a zone of groundwater recharge. Several small streams rise near the landfill boundaries, however, which suggests that discharge occurs near the site, at least seasonally. The water table probably lies at shallow depths near these streams.

According to Mundorff (1955), groundwater beneath the Piedmont in the vicinity of Winston-Salem normally lies within two feet of its mean level. In extremely wet or dry years, the water table generally lies within six feet of its normal mean. During the month of August, the water table is usually one feet below its mean annual level. Conditions in Alexander County are not likely to be substantially different.

The hydraulic gradient in the vicinity of the landfill is probably directed to the southwest judging by the original topography (Figure 1). The landfill itself is likely to cause a local mound on the water table directly beneath it. The additional hydraulic head resulting from the mound probably causes small components of radial flow away from the center of the landfill.

2.0 - Installation of Monitoring Wells

Four monitoring wells will be installed near the perimeter of the landfill, three of which will be downgradient as inferred from the original site topography. MW-1 (Figure 2) will be the upgradient well. MW-2 will be located near a small stream which rises along the southern boundary of the landfill (See Figure 1) and MW-3 and MW-4 will be located along the western boundary. It is assumed that the permit boundary of the landfill lies 50 feet in from the property lines. The wells will be located as close as possible to the permit boundary but outside the fill zone.

2.1 - Drilling and Soil Exploration

Drilling will be carried out with 6.25-inch hollow-stem augers in soil and partially weathered rock, and by continuous coring in bedrock. Split spoon samples will be collected at five-foot intervals. All samples will be logged by a qualified inspector. Where the water table is encountered in unconsolidated sediment or partially weathered rock, it will be assumed that these materials have the highest hydraulic conductivity and well screens will be set across the water table. If the

water table is found to lie in competent bedrock, then drilling will proceed ten to twenty feet below the water table (but not deeper than 40 feet total) in order to locate the most conductive zone. In this case, four-inch PVC casing will be grouted into the overburden and no screen will be installed.

Screen lengths will be 15 feet in each monitoring well with seven feet above the water table. Because the water table is likely to be within six feet of its mean seasonal level even in extremely wet or dry years, 15-foot screens should be sufficient for monitoring purposes.

Well materials will be two-inch diameter PVC. Twenty=slot screens with bottom caps will be set in properly graded sand which will extend one foot above the top of the screen. A minimum of one foot of bentonite will be used as a seal and the balance of the annulus will be grouted to the surface. Above ground locking caps will complete the installation. Each well will be developed by pumping for one hour or until clear water is obtained.

2.2 - Documentation

After the monitoring wells are completed, copies of boring logs, well construction diagrams and a location map will be provided to the state. These documents will include data on soil and rock types, hydraulically conductive zones encountered, water levels and as-built dimensions of each well.

no "open wells" discussed in phone conversation 8-28-90