

Carmen Johnson

Fac/Perm/Co ID#	Date	Doc ID#
08-03	8/13/08	DIN XXXXXXXXXX

Permit #08-03
Doc. No. 5521



BUNNELL-LAMMONS ENGINEERING, INC.
 GEOTECHNICAL, ENVIRONMENTAL AND CONSTRUCTION MATERIALS CONSULTANTS

REPORT OF GEOLOGIC OBSERVATION: CELL No. 9 CONSTRUCTION

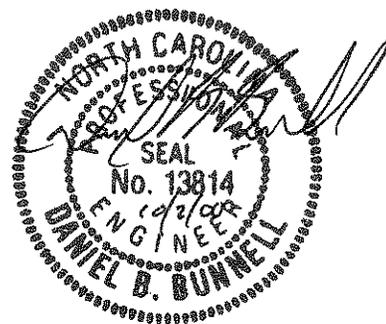
**EAST CAROLINA REGIONAL MSW LANDFILL
 BERTIE COUNTY, NORTH CAROLINA**

Prepared for:

HODGES, HARBIN, NEWBERRY, & TRIBBLE, INC.
 484 Mulberry Street, Suite 265
 Macon, Georgia 31201

Prepared by:

BUNNELL-LAMMONS ENGINEERING, INC.
 1200 Woodruff Road, Suite B-7
 Greenville, South Carolina 29607



October 2, 2000

BLE Project Number J00-1001-29



BUNNELL-LAMMONS ENGINEERING, INC.
GEOTECHNICAL, ENVIRONMENTAL AND CONSTRUCTION MATERIALS CONSULTANTS

October 2, 2000

Hodges, Harbin, Newberry, & Tribble, Inc.
484 Mulberry Street, Suite 265
Macon, Georgia 31201

Attention: Mr. William F. Hodges, P.E.

Subject: **Report of Geologic Observation: Cell No. 9 Construction**
East Carolina Regional MSW Landfill
Bertie County, North Carolina
BLE Project Number J00-1001-29

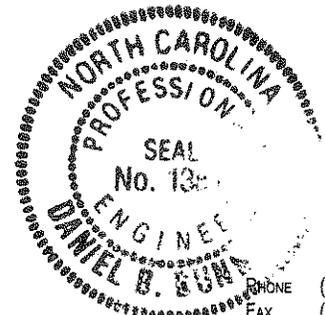
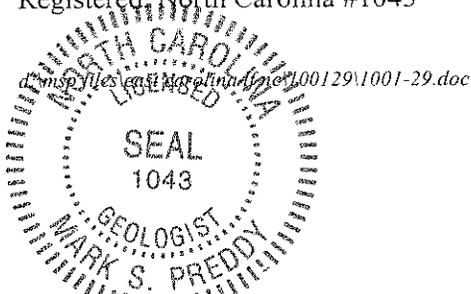
As authorized, Bunnell-Lammons Engineering, Inc. (BLE) performed field geologic observations during Cell No. 9 subgrade preparation activities at the subject site. The purpose of this work was to observe and document the location of pertinent geologic features within the future Cell No. 9 footprint. The enclosed report describes the work performed and presents the results obtained.

We appreciate the opportunity to serve as your hydrogeological and geotechnical consultant on this project and look forward to working with you in the future. If you have any questions, please contact us at (864) 288-1265.

Sincerely,
BUNNELL-LAMMONS ENGINEERING, INC.

Mark S. Preddy, P.G.
Senior Hydrogeologist
Registered, North Carolina #1043

Daniel B. Bunnell, P.E.
Principal Geotechnical Engineer
Registered, North Carolina #13814





PROJECT INFORMATION

The East Carolina Regional Municipal Solid Waste (MSW) Landfill is located at 1922 Republican Road in Bertie County, 7.5 miles northwest of Windsor, North Carolina near the community of Aulander (Figure 1). The site consists of about 641 acres, which was formerly rural farmland and pine forest. The landfill is owned and operated by Republic Services of North Carolina, LLC.

The landfill is being developed in phases, as new solid waste cells are needed. Phases 1 and 2 at the landfill consist of Cells No. 3 through 8. Phase 3 will consist of two solid waste cells (Cells No. 9 and 10). Currently, Cell No. 9 is under construction. The subgrade for the Cell No. 9 compacted clay liner will consist of in-situ or natural soils in the west end of the cell and structural fill in the east end of the cell.

BLE personnel are familiar with the site and previously performed several geologic/hydrogeologic investigations at the site, including the Site Hydrogeologic Report (SHR)¹, and the Design Hydrogeologic Report (DHR)² for Phase 3. This report documents the geologic observations during the preparation of the natural or in-situ soil subgrade prior to fill soil placement in Cell No. 9.

SITE GEOLOGY

The site is located within the Coastal Plain region in northeastern North Carolina. The Coastal Plain consists of sediments that range in age from recent to Cretaceous or older and which lie on top of "basement" or crystalline rocks that are similar or equivalent to the igneous and metamorphic rocks of the Piedmont region. The Coastal Plain sediments range in thickness from a featheredge along the western edge to several thousand feet along the coast.

¹Report of Geologic and Hydrogeologic Assessment, dated December 1, 1992, Law Engineering Job Number 2490472602.

²Design Hydrogeologic Report, Phase 3 (Cells 9 and 10), dated January 25, 2000, BLE Project Number J98-1001-18.

In the typical Coastal Plain stratigraphic sequence, Cretaceous sediments directly overlie the basement rocks and consist of the Black Creek and Cape Fear geologic formations. Tertiary sediments, which overlie the Cretaceous formations, consist of the Yorktown and Duplin geologic formations. Near-surface geologic units at the site include the Yorktown formation that lie unconformably on top of the Black Creek formation.

Within the zone of investigation at the site (less than 65 feet below ground surface), the subsurface geology consists of four distinct soil layers, which are part of the Tertiary Yorktown Formation (Layers I and II) and Cretaceous Black Creek Formation (Layers III and IV). Layer I is a silty clay aquitard at the ground surface which has low permeability and serves as a confining layer for the underlying Layer II sandy aquifer. Layer II is the uppermost ground-water aquifer and consists of silty sand with potentiometric levels above the base of Layer I during most of the year. Layer III is a silty clay aquitard which serves as an intervening confining unit between the uppermost aquifer (Layer II) and an underlying confined aquifer (Layer IV). Layer IV is a confined aquifer consisting of silty sand, with potentiometric levels above the top of Layer III. Layers II and IV are fully separated by Layer III across the Phase 3 area.

FIELD OBSERVATIONS

Mr. Mark S. Preddy, P.G. of BLE visited the site on February 29, March 1, April 11, and May 17, 2000. During these visits, the exposed ground surface was observed in order to identify anomalous geologic features not identified during previous geologic investigations. The visits were conducted during the site clearing and grading activities, and at the start of fill soil placement on top of in-situ soils. Site photographs taken by BLE's on-site construction quality assurance (CQA) technician during site grading operations were also observed. Geologic site observations are described below and are shown on photographs 1 through 10 in the Appendix. The report of CQA monitoring of the cell construction is provided in a separate report.

The site visits during February and March were performed after the cell area was cleared of trees (Appendix, Photo 1). The site visit during April was performed during the removal of the organic "A horizon" soils. The removal of these organic soils was performed with minimal disturbance to

Layer I using a bulldozer and a trackhoe excavator (Appendix, Photo 3). The May site visit was performed during the start of fill soil placement on top of residual layer I soil (Appendix, Photo 9). The Layer I soil was observed to be consistent with the descriptions provided in the SHR and DHR.

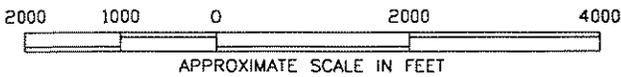
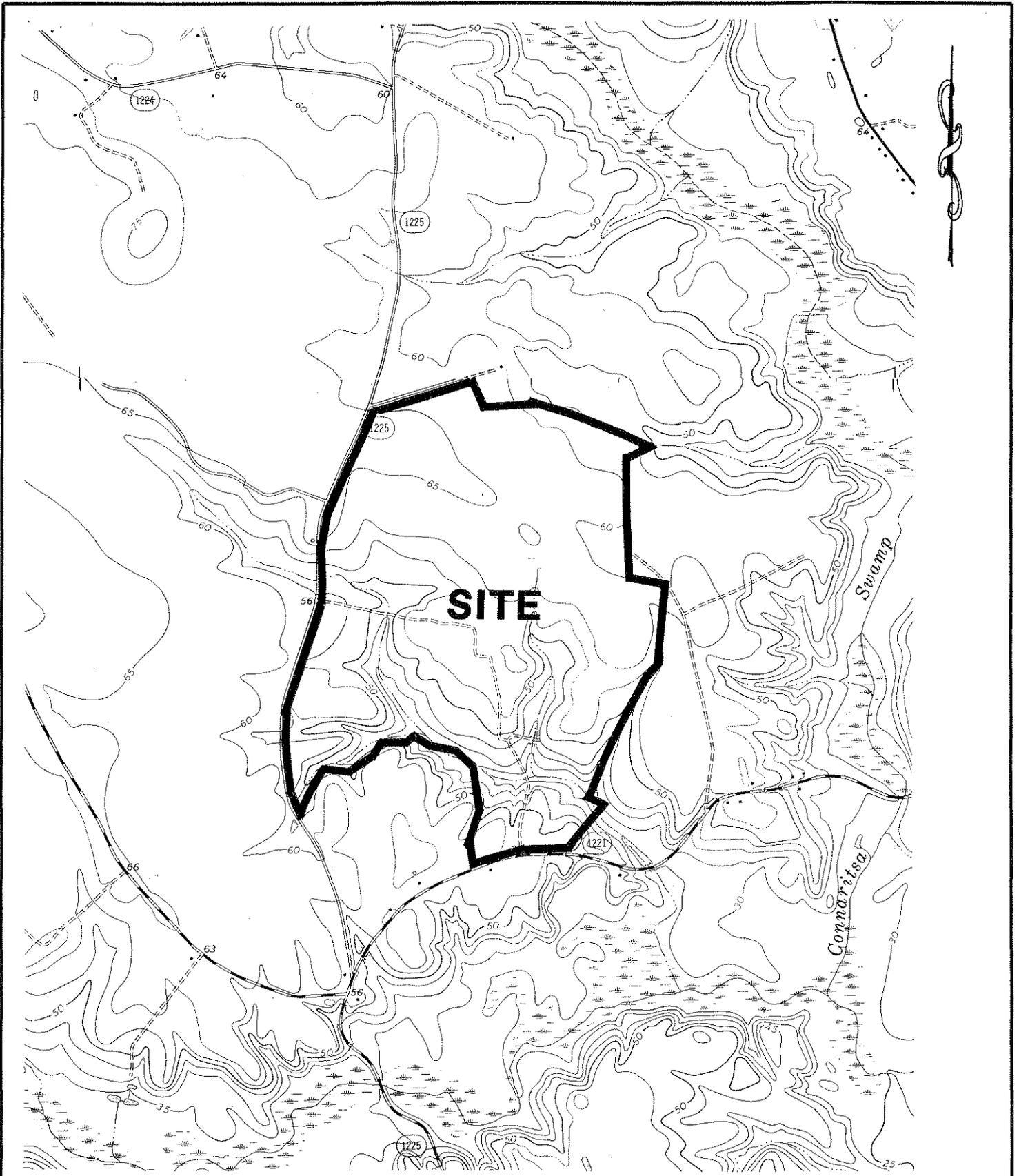
Layer I is an aquitard that includes the upper soil layer and extends from the ground surface to the top of Layer II, confining the Layer II aquifer. Layer I is primarily mottled light gray and orange-brown, stiff, silty clay to clayey silt with varying amounts of fine sand. This unit has been classified as CL, CH, ML and MH, according to the Unified Soil Classification System (USCS).

The deepest excavation into Layer I was at the cell's sump area, where the area was excavated to approximately eight feet below the original ground surface (Appendix, Photos 7-8). Based on the previous soil test borings, Layer I was interpreted to be approximately 17 feet thick in the vicinity of the sump location. The excavation into Layer I did not breach this confining layer. The Layer I soil was observed to be consistent across the Cell No. 9 area.

CONCLUSIONS

Layer I soil extends over the Cell No. 9 area and do not appear to have been breached by clearing or grading activities. Furthermore, Layer I will continue to serve as a confining layer for the Layer II aquifer. We conclude that modification of the existing *Water Quality Monitoring Plan* is not necessary.

FIGURES



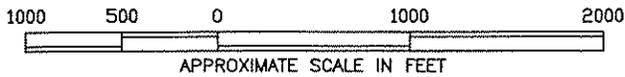
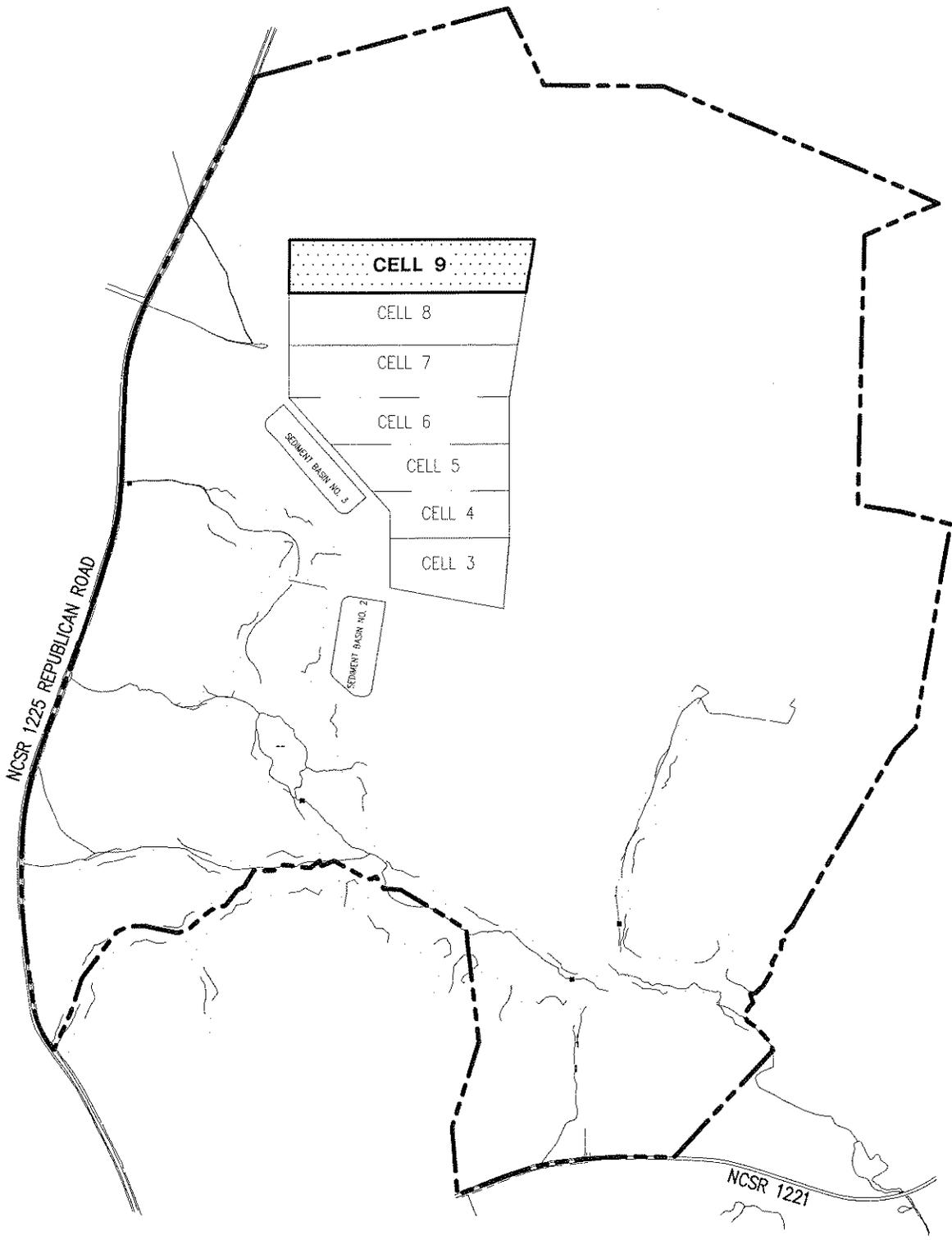
REFERENCE:
 USGS TOPOGRAPHIC MAP, 7.5 MINUTE SERIES,
 AULANDER AND REPUBLICAN, N.C. QUADRANGLES, 1972.

DRAWN:	AEH	DATE:	07-14-00
CHECKED:	GLW	CAD:	ECLF28-SVM
APPROVED:		JOB NO:	J00-1001-28

IBLE INC.
BUNNELL-LAMMONS ENGINEERING, INC.
 1200 WOODRUFF ROAD, SUITE B-7
 GREENVILLE, SOUTH CAROLINA 29607
 PHONE: (864)288-1265 FAX: (864)288-4430

SITE VICINITY MAP
 EAST CAROLINA REGIONAL MSW LANDFILL
 BERTIE COUNTY, NORTH CAROLINA

FIGURE
1



REFERENCE:
 DRAWING TITLED "SURVEY AND BOUNDARY SURVEY, EAST CAROLINA LANDFILL", DATED NOVEMBER 1996, PREPARED BY HHNT.

DRAWN:	AEH	DATE:	08-02-00
CHECKED:	GLW	CAD:	ECLF28-CELL9SLM
APPROVED:		JOB NO:	J00-1001-28

IBLE INC.
BUNNELL-LAMMONS ENGINEERING, INC.
 1200 WOODRUFF ROAD, SUITE B-7
 GREENVILLE, SOUTH CAROLINA 29607
 PHONE: (864)288-1265 FAX: (864)288-4430

SITE LOCATION MAP
 CELL NO. 9
 EAST CAROLINA MSW LANDFILL
 BERTIE COUNTY, NORTH CAROLINA

FIGURE
2

APPENDIX A
Photographs

**EAST CAROLINA REGIONAL MSW LANDFILL
BERTIE COUNTY, NORTH CAROLINA
BLE PROJECT #J00-1001-29**



Photograph 1: 3/1/00 Facing northwest from the north side of Cell No. 8 after the trees have been logged and removed from the Cell No. 9 & 10 area.



Photograph 2: 4/11/00 Facing east from the western end of Cell No. 9 during the removal of the "A horizon" organic soil.

EAST CAROLINA REGIONAL MSW LANDFILL
BERTIE COUNTY, NORTH CAROLINA
BLE PROJECT #J00-1001-29



Photograph 3: 4/11/00 Facing north from the north side of Cell No. 8 during the removal of the “A horizon” organic soil. A bulldozer piles-up the organic soils and, a trackhoe loads the soil into trucks to be removed.



Photograph 4: 4/11/00 Facing west from the central portion of Cell No. 9 during organic soil removal. Layer I soil is exposed (brown fine sandy, silty clay and clayey silt).

**EAST CAROLINA REGIONAL MSW LANDFILL
BERTIE COUNTY, NORTH CAROLINA
BLE PROJECT #J00-1001-29**



Photograph 5: 4/11/00 Western end of Cell No. 9 during organic soil removal. Layer I soil is exposed (brown fine sandy, silty clay and clayey silt).



Photograph 6: 5/17/00 Facing northwest from the north side of Cell No. 8 after organic soil has been removed and before fill soil placement.

**EAST CAROLINA REGIONAL MSW LANDFILL
BERTIE COUNTY, NORTH CAROLINA
BLE PROJECT #J00-1001-29**



Photograph 7: 5/11/00 Western end of Cell No. 9 where the sump will be located.



Photograph 8: 5/17/00 Facing north at the western end of Cell No. 9 (sump location). The Layer I soil is typical brown and gray fine sandy, silty clay and clayey silt.

**EAST CAROLINA REGIONAL MSW LANDFILL
BERTIE COUNTY, NORTH CAROLINA
BLE PROJECT #J00-1001-29**



Photograph 9: 5/11/00 Eastern end of Cell No. 9 facing west during fill soil placement. Residual Layer I soil is exposed consisting of typical gray and brown fine sandy, silty clay and clayey silt.



Photograph 10: 5/17/00 Residual Layer I soil, consisting of typical brown and gray fine sandy, silty clay and clayey silt.