

3.16-3/27/1995-262

REMEDIAL INVESTIGATION PHOTOGRAPH ALBUM

**OPERABLE UNIT NO. 8 (SITE 16)
OPERABLE UNIT NO. 11 (SITES 7 AND 80)
OPERABLE UNIT NO. 12 (SITE 3)**

**MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA**

CONTRACT TASK ORDER 0274

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LIST OF ACRONYMS AND ABBREVIATIONS

bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CLEJ	Camp Lejeune
DOD	Department of the Defense
DoN	Department of the Navy
EMD	Environmental Management Division (Camp Lejeune)
ESE	Environmental Science and Engineering, Inc.
FFA	Federal Facilities Agreement
FMF	Fleet Marine Force
FMFLANT	Fleet Marine Support Atlantic
FSSG	Force Service Support Group
GSRA	Greater Sandy Run Area
IAS	Initial Assessment Study
IDW	Investigative Derived Waste
IRP	Installation Restoration Program
LANTDIV	Naval Facilities Engineering Command, Atlantic Division
MAGTF	Marine Air Ground Task Force
MCAS	Marine Corps Air Station
MCB	Marine Corps Base
NACIP	Navy Assessment and Control of Installation Pollutants
NC DEHNR	North Carolina Department of Environment, Health, and Natural Resources
NCP	National Contingency Plan
NPL	National Priorities List
NREA	Natural Resources and Environmental Affairs
OU	Operable Unit
PAH	Polynuclear Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
QA/QC	Quality Assurance/Quality Control
RCRA	Resource Conservation and Recovery Act
RI/FS	Remedial Investigation/Feasibility Study

SAP	Sampling and Analysis Plan
SARA	Superfund Amendments and Reauthorization Act
TAL	Target Analyte List
TCL	Target Compound List
TCLP	Toxicity Characteristics Leaching Procedure
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey

1.0 INTRODUCTION

Marine Corps Base (MCB) Camp Lejeune was placed on the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) National Priorities List (NPL) effective November 4, 1989 (54 Federal Register 41015, October 4, 1989). Subsequent to this listing, the United States Environmental Protection Agency (USEPA) Region IV, the North Carolina Department of Environment, Health and Natural Resources (DEHNR), and the United States Department of the Navy (DoN) entered into a Federal Facilities Agreement (FFA) for MCB Camp Lejeune. The primary purpose of the FFA was to ensure that environmental impacts associated with past and present activities at the MCB are thoroughly investigated, and that appropriate CERCLA Response Resource Conservation Recovery Act (RCRA) corrective action alternatives are developed and implemented as necessary to protect the public health and welfare, and the environment (MCB Camp Lejeune FFA, 1989).

The scope of the FFA included the implementation of a remedial investigation/feasibility study (RI/FS) at thirteen Operable Units (OUs) and twenty-seven sites across MCB Camp Lejeune. This Remedial Investigation Photograph Album describes the RI field activities that have been conducted at three of the OUs: OU No. 8 (Site 16) - Montford Point Burn Dump; OU No. 11 (Site 7) - Tarawa Terrace Dump, and (Site 80) - Paradise Point Golf Course Maintenance Area; and OU No. 12 (Site 3) - Old Creosote Plant. The four sites have been grouped into three OUs for purposes of this RI/FS.

1.1 Location and Setting

MCB Camp Lejeune is located in Onslow County, North Carolina, approximately 45 miles southwest of New Bern and 47 miles northeast of Wilmington. The facility covers approximately 236 square miles. This includes the recent acquisition of approximately 64 square miles west of the facility within the Greater Sandy Run Area (GSRA) of the county. The military reservation is bisected by the New River, which flows in a southeasterly direction and forms a large estuary before entering the Atlantic Ocean.

The eastern border of MCB Camp Lejeune is the Atlantic shoreline. The western and northwestern boundaries are U.S. Route 17 and State Route 24, respectively. The City of Jacksonville, North Carolina, borders MCB Camp Lejeune to the north. MCB Camp Lejeune is depicted in Figure 1-1.

Construction of MCB Camp Lejeune began in 1941 with the objective of developing the "Worlds Most Complete Amphibious Training Base". Construction of the base started at Hadnot Point, where the major functions of the base are centered. Development at the Camp Lejeune Complex is primarily in five geographical locations under the jurisdiction of the Base Command. These areas include Camp Geiger, Courthouse Bay, Mainside, Montford Point, and the Rifle Range Area. Site 16 is located in the Montford Point Area; Sites 7, 80, and 3 are located on the Mainside.

1.2 Purpose and Format of the Remedial Investigation Photograph Album

The purpose of this photographic album is to provide the DoN and Marine Corps with a brief overview of the RI field activities. The objective of the RI is to evaluate the nature and extent of the threat or potential threat to public health and welfare or to the environment caused by the release or threatened release of hazardous substances, pollutants, contaminants, or constituents at the site and to establish requirements for the performance of the feasibility study. The field activities were conducted by Baker Environmental, Inc. (Baker) for the DoN from October 1994 through December 1994. This album contains representative site and site activity photographs.

The Remedial Investigation Photograph Album is formatted as follows. Section 1.0 provides an introduction, and the purpose and format of the photograph album. Section 2.0 provides a brief overview of the sites and site photographs. Section 3.0 provides descriptions of general investigations (i.e., soil investigation, groundwater investigation) conducted at each site, and specific investigations for each site. Photographs are provided, depicting the investigation activities.

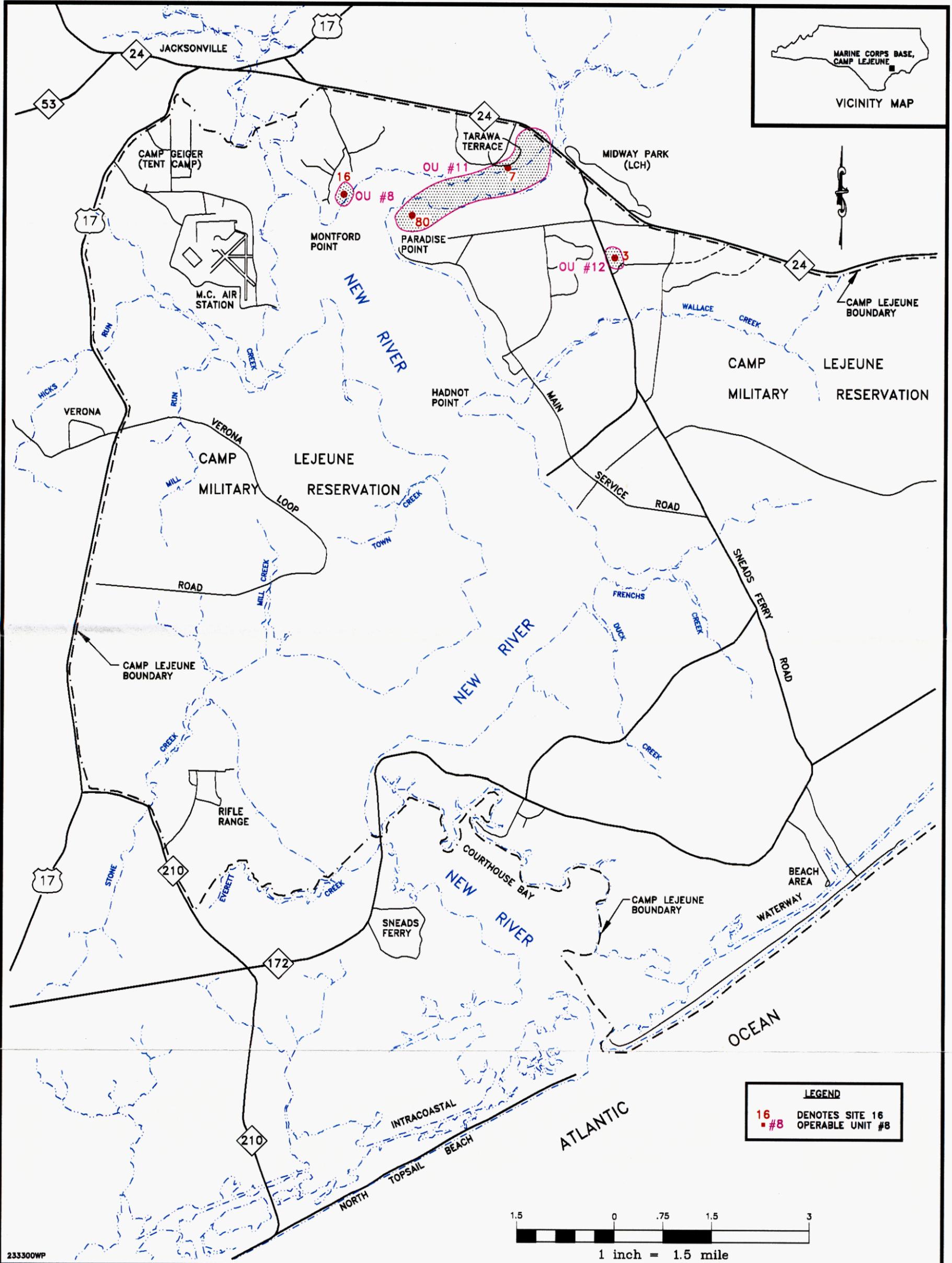


FIGURE 1-1
 OPERABLE UNITS AND SITE LOCATIONS AT
 MARINE CORPS BASE CAMP LEJEUNE
 CTO-0233
 MARINE CORPS BASE, CAMP LEJEUNE
 NORTH CAROLINA

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2.0 SITE CHARACTERISTICS

This section provides a description of each site location and setting, and a brief history of site waste disposal activities at OU Nos. 8, 11, and 12.

2.1 Operable Unit No. 8 (Site 16) - Montford Point Burn Dump

This section addresses the setting, site topography and drainage features, and site history for Site 16 - Montford Point Burn Dump.

2.1.1 Site Location and Setting

The former Montford Point Burn Dump area is located southwest of the intersection of Montford Landing Road and Wilson Drive in the Montford Point area of Camp Lejeune (see Figure 1-1). The study area is approximately 4 acres in size. The Northeast Creek is approximately 400 feet southeast from the boundary of the burn dump. The remainder of the study area is bordered by wooded areas.

Most of the site is currently a cleared area; the other areas are comprised of pine trees. There is an opening in the wooded area in the southeast corner of the study area which leads to Northeast Creek. An apparent storm sewer line, located to the southeast of the burn dump, runs in a northeast-southwest direction. There is also a storm sewer line that runs from the intersection with Coolidge Road and Harding Road, and connects to the storm line southeast of the site. Currently, the study area is being used for staging vehicles and for vehicle training exercises. In the center of the study area is a mock-up jet aircraft. This aircraft is used to train in refueling exercises by tank truck operators. During these exercises, however, no fuel is used. A four-foot wide ditch, believed to be a fire break, was noticed advancing from the storm sewer line to the southwest of the study area and extending around the western side of the former burn dump. There are no permanent structures at this site.

2.1.2 Site History

Limited information is available concerning the operational history of the burn dump. Practices at other burn dumps at MCB Camp Lejeune indicate that the Montford Point Burn Dump may have accepted municipal waste/trash from the surrounding area housing and activity buildings. Records indicate that liquids (waste oils) were also disposed of at this site. Typically, the debris was burned, then graded to the perimeter of the disposal area so that more debris could be dumped and burned.



SITE 16



OU8-Site16: End of Access Road (looking southeast) coming off Wilson Road at Site 16 opening up into Former Burn Dump.



OU8-Site16: Site 16 looking south, across Former Burn Dump. Monitoring well 16-MW05 is to the right side of the photo. A training plane for fueling sits in the center of Burn Dump.



SITE 16



OU8-Site16: Photograph taken from monitoring well 16-MW05 looking south towards monitoring well 16-MW06. Test boring 16-BD-SB14 is shown in front of monitoring well 16-MW06 and test boring 16-BD-SB20 is shown to the right back at tree line.



OU8-Site16: Photograph taken from monitoring well 16-MW05 looking east/southeast at the open area leading down towards Northeast Creek.



SITE 16



OU8-Site16: View looking east across the surface drainage area. Hand auger location 16-SDA-SB01 is in the foreground and 16-SDA-SB02 is in the background. The cleared area depicts a sewer right-of-way that crosses (from northeast to southwest) the drainage area.



OU8-Site16: View is looking south/southeast along access road towards Northeast Creek. Hand auger location 16-SDA-SB03 is in the foreground. This access leads to monitoring well location 16-MW03.



SITE 16



OU8-Site16: Photograph taken on access road looking southeast at monitoring well 16-MW03. Northeast Creek is in the background.



OU8-Site16: Looking east/southeast along access road to Northeast Creek. Hand auger location 16-SDA-SB04 is marked by red flag in the center of photograph. Monitoring well 16-MW03 is to the back right of photograph.



SITE 16



OU8-Site16: Photograph taken from hand auger location 16-SDA-SB04 looking east/southeast along access ramp to Northeast Creek. This is a probable location for a staff gauge. Monitoring well 16-MW03 is to the right of the photograph.

SITE 16



OU8-Site16: View is from Harding Road looking east/southeast along the sewer right-of-way. Monitoring well 16-MW04 can be seen in the distance near the center of the picture. The cleared area of the Former Burn Dump is located thru woods on the left side of sewer right-of-way.



SITE 16



OU8-Site16: Monitoring well 16-MW04, looking east/southeast, with a sewer manhole in the foreground. This location is the intersection point of the two sewer right-of-ways.

2.2 Operable Unit No. 11 (Site 7) - Tarawa Terrace Dump

This section addresses the site location and setting, and site history for Site 7 - Tarawa Terrace Dump.

2.2.1 Site Location and Setting

Site 7, the Tarawa Terrace Dump, is located northeast of the sewage treatment plant and south of the community center between Tarawa Boulevard and Northeast Creek. The general location of the site is shown on Figure 1-1. The study area is approximately 5 acres in size, and public access is not restricted. A swamp area is encountered in the southern portion of the study area in the vicinity of Northeast Creek. The entire study area is dense with wooded areas and ground cover. Northeast Creek flows to the west in the direction of the New River. Two unnamed surface water bodies, within the site boundaries, flow southerly in the direction of Northeast Creek. Northeast Creek and the surface water bodies are influenced by tides. During high tide much of the swamp area is covered with ponded water.

During a March 1994 site reconnaissance, four areas of concern were apparent. Aerial photos from 1973 and 1978 indicated a potential dump area east of the utility right-of-way. Additionally, a smaller cleared area was shown on the western side of the utility right-of-way. The area south of the community center is a concern based on elevated levels of pesticides/PCBs reported in a previous investigation (Halliburton NUS, 1991). Visual debris (i.e., paint cans, motoroil cans, and other rusted cans) were observed in the wooded area east of the sewage treatment plant. What appeared to be a cleared area, where past dumping may have occurred, was observed due east of the sewage treatment plant adjacent to the smaller surface water body.

2.2.2 Site History

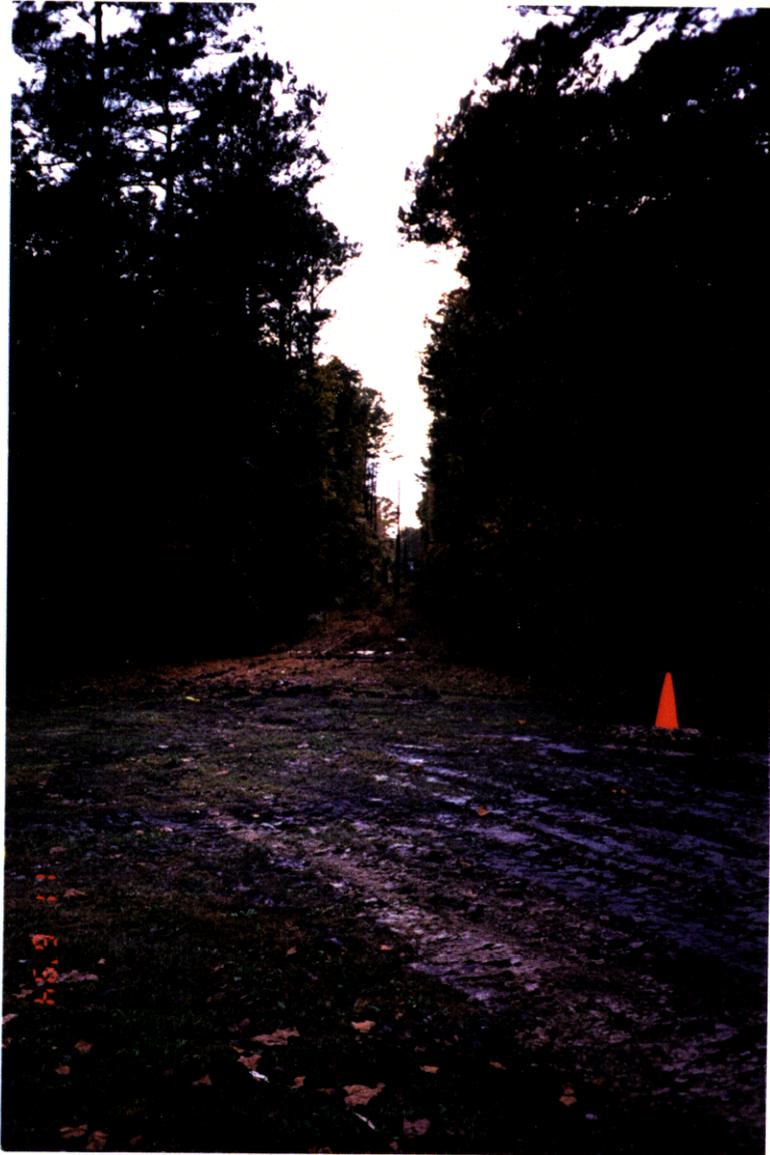
Site 7, the Tarawa Terrace Dump, is a former dump that was used during the construction of the base housing located in Tarawa Terrace. Precise years of operation are unknown, but it has been reported that the dump was closed in 1972. Historical records do not indicate that hazardous materials were disposed of at this facility, only construction debris, sewage treatment plant filter media, and household trash are known to have been disposed. Aerial photos from the 1970s indicate a cleared area east of the right-of-way, and a smaller cleared area west of the right-of-way.



SITE 7



OU11-Site7: Photograph was taken from the rear of the Community Center looking east towards playground. Soil borings 7-CC-SB01 and 7-CC-SB02 are in the playground area. "East" area of concern is to the right of the photograph.



OU11-Site7: Photograph taken from Tarawa Boulevard looking west/southwest along electric service line right-of-way to sewage treatment plant. Test boring 7-NA-SB03 is in the foreground.



SITE 7



OU11-Site7: View is from cleared access road in southwest area looking east/northeast toward temporary well 7-TW02. Hand auger 7-SWA-SB04 is approximately 15 feet on the left side of the cleared access road.



OU11-Site7:

Photograph of the Western Tributary in “north” area of concern looking down tributary towards the south.



SITE 7



OU11-Site7: Close-up of monitoring well 7-MW05 showing the soft area behind well where a backhoe was stuck. This area is at the northern boundary of swamp.



OU11-Site7: Photograph shows a large pile of asphalt roofing shingles near the cleared access road in the southwest area. This is near monitoring well 7-MW05.



SITE 7



OU11-Site7: Photograph shows culvert from storm drains. This is the start the Eastern Tributary in the “east” area of concern.



OU11-Site7: This view is looking south along the Eastern Tributary course. A drainage ditch is coming in from the right hand side into the Eastern Tributary at the center of photograph. Monitoring well 7-MW01 is located towards the south on the west side of the Tributary.



SITE 7



OU11-Site7: View is looking northwest in the upstream direction of the drainage ditch in the “east” area. Photograph was taken approximately 25-30 feet from the confluence with the Eastern Tributary. Soil boring 7-EA-SB06 is on the left side of the photograph.

2.3 Operable Unit No. 11 (Site 80) - Paradise Point Golf Course Maintenance Area

This section address the site location and setting, and site history for Site 80 - Paradise Point Golf Course Maintenance Area.

2.3.1 Site Location and Setting

The study area is northwest of Brewster Boulevard within the Paradise Point Golf Course, as shown on Figure 1-1. Site 80 consists of a 1-acre area located in the rear of the machine shop (Building 1916) and a maintenance wash area consisting of a concrete wash pad and sump. The sump is used to collect water and oil runoff generated from spraying off the maintenance equipment. A drainage ditch is located to the northeast of the wash area. The drainage ditch starts in the area of monitoring well location 80-MW03, curves around the back of the site, and leaves the site to the north. There is a large crescent shaped soil mound in the northeast portion of the site, behind the maintenance building (Building 600). The soil mound is overgrown with small pines. There is an open area in front of the mounds where vegetation debris is deposited. There is old maintenance equipment placed in the lawn and wooded areas around the maintenance shop. An oil collection system is located in the maintenance building (Building 600). Two drums, which have been removed from the site by Activity personnel, were located northeast of Building 600 just across the dirt access road.

2.3.2 Site History

Site 80, Paradise Point Golf Course Maintenance Area, is used for maintenance and cleaning of equipment used at the golf course. The area is used to house and mix pesticides and herbicides used in the golf course maintenance. Prior to construction of the existing concrete wash pad, chemical mixing was conducted on a concrete pad with no containment controls. The soil mound, located in the northeast portion of the site, was generated during the construction of ponds along the golf fairways in 1987 or 1988. It was reported that wastes were disposed of in this area. Employees of the maintenance facility were instructed not to use the soil from this area for fill material. It has not been documented whether wastes were disposed on the mounds, or whether the area beneath the piles was used to dispose wastes.



SITE 80



OU11-Site80: View is from the fuel dispensing area looking northeast towards Building 1916. Test borings 80-MA-SB01 and 80-MA-SB03 are visible.



OU11-Site80: Photograph taken from the southeast corner the Maintenance Building 1916 looking west/southwest towards the fuel-dispensing area. Two groundwater monitoring wells (UST site) are shown.



SITE 80



OU11-Site80: Photograph taken from Access Road looking north/northwest to maintenance area and monitoring well 80-MW04. This well is located off of the northwest corner of Building 1916, also this well is located in the septic tank area.



OU11-Site80: Photograph taken from the southeast corner the Maintenance Building 1916 looking west/southwest towards the fuel-dispensing area. Two groundwater monitoring wells (UST site) are shown.



SITE 80



OU11-Site80: Photograph taken from Access Road looking north/northwest to maintenance area and monitoring well 80-MW04. This well is located off of the northwest corner of Building 1916, also this well is located in the septic tank area.



OU11-Site80: View is looking east/northeast along Access Road leading back to the open area. Maintenance Buildings 1916 and 600 are on the right hand side.



SITE 80



OU11-Site80: View is looking south/southeast between Maintenance Buildings 1916 (on right) and 600. Test borings 80-MA-SB02 and 80-MA-SB04 are between the buildings.



OU11-Site80: The next three photographs are a panorama view of the open area with debris pile. A low soil mound approximately 5-6 feet high can be seen in the background with young pine tree growth. Test borings 80-OA-SB01 and 80-OA-SB02 are located to the left side of the open area. The orange flagging visible in front of the soil mound indicates access to hand auger locations performed on top of the mound.



SITE 80



OU11-Site80: This photograph is the middle of the panorama view showing the debris pile. Test boring 80-OA-SB03 is located directly in front of the debris pile.



OU11-Site80: Photograph shows the right side of the debris pile. Test boring 80-OA-SB05 is located in the foreground and to the right of the debris pile.



SITE 80



OU11-Site80: Photograph taken from the rear of the right side of the debris pile looking north towards monitoring well 80-MW06. Test boring 80-OA-SB04 was drilled in the cleared area to the left of 80-MW06.



OU11-Site80: Photograph taken from 80-BB-SB01 looking east/southeast. A ditch, approximately 6 feet deep, is 12-15 feet away.



SITE 80



OU11-Site80: Photograph taken from south side of Building 1916 looking south/southeast. A shallow drainage channel leads into the drainage ditch. Monitoring well 80-MW03 can be seen to the right side of the drainage ditch. A drilling rig is set up on intermediate well 80-MW03IW.



OU11-Site80:

View of concrete pad wash area
with monitoring well 80-MW03 to
the left.



SITE 80



OU11-Site80: View is taken from electrical right-of-way looking south/southwest. Monitoring well 80-MW07 “background well” is in the center of the photograph.

2.4 Operable Unit No. 12 (Site 3) - Old Creosote Plant

This section addresses the site location and setting, and site history for Site 3 - Old Creosote Plant.

2.4.1 Site Location and Setting

The Old Creosote Plant area is located on the mainside portion of MCB Camp Lejeune, approximately one quarter mile east of Holcomb Boulevard and one mile north of Wallace Creek. The general site location is shown on Figure 1-1. Remnants of the former creosote plant including a chimney, concrete pads, and train rails are present in the southern and/or northern portions of the site. The cleared area in the northern portion of the site was reported to be the location of the former sawmill.

The site area encompasses approximately 5 acres, is generally flat and unpaved, and is intersected by a dirt access road. Access to the site is unrestricted. The study area can be directly accessed from Holcomb Boulevard. The Camp Lejeune Railroad lies approximately 200 feet to the west of the study area. The remainder of the area is surrounded by woods.

2.4.2 Site History

The Old Creosote Plant reportedly operated from 1951 to 1952 to supply treated lumber during construction of the base railroad. Logs were cut into railroad ties at an on-site sawmill, then pressure treated with hot creosote stored in a railroad tank car. There is no indication of creosote disposal on site, and records show that creosote remaining in the pressure chamber at the end of the treatment cycle was stored for future use. Historical information indicates that the on-site sawmill was located north of the current dirt access road.



SITE 3



OU12-Site3: Photograph taken from Access Road off Holcomb Boulevard before railroad tracks, looking east. Monitoring well 3-MW04 is visible on the right.



OU12-Site3: Site 3 from Access Road, looking at north area. Monitoring well 3-MW03 is visible in the rear and to the right of the photograph.



SITE 3



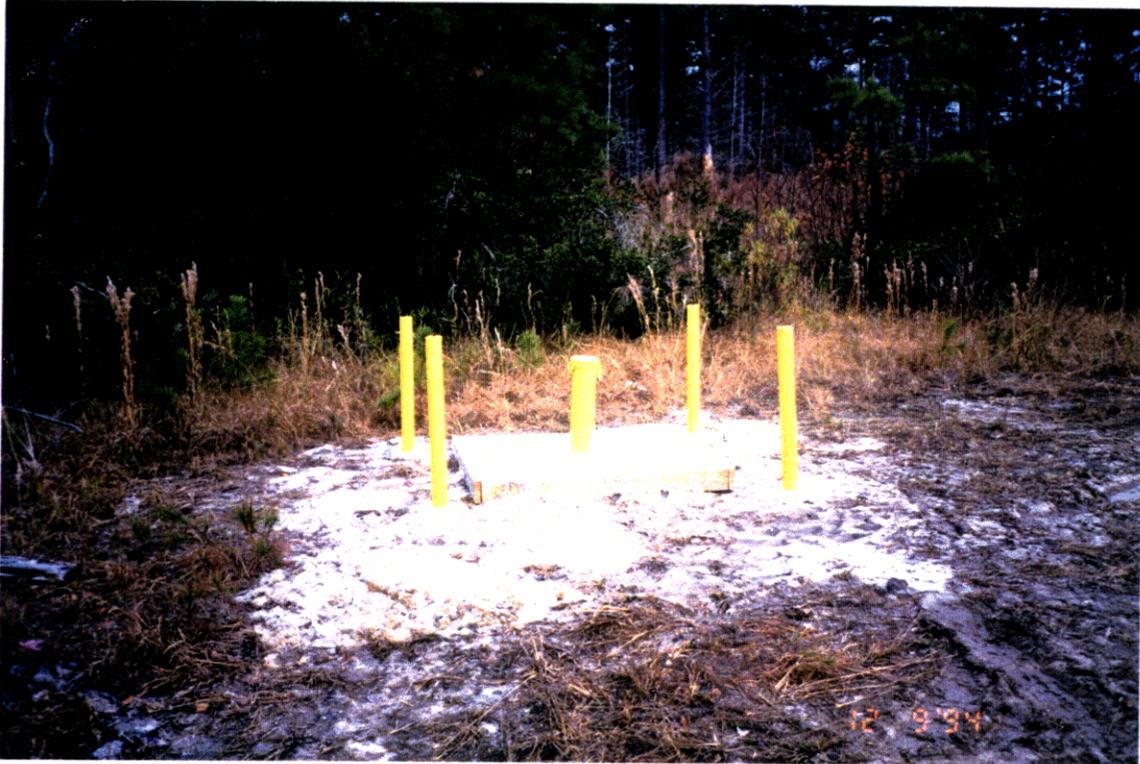
OU12-Site3: View of trees at the north boundary of Site 3.



OU12-Site3: Photograph of trees at the north/northeast boundary of Site 3 with monitoring well 3-MW08 visible.



SITE 3



OU12-Site3: Monitoring well 3-MW08, north area.

SITE 3



OU12-Site3:

Photograph of south area (treatment area). Monitoring well 3-MW02 is visible at the right center of the photograph.



SITE 3



OU12-Site3: Photograph of the concrete pad in the north area of Site 3.



OU12-Site3: Photograph looking northeast toward monitoring well location 3-MW02, chimney and concrete pad with rails within former treatment area.



SITE 3



OU12-Site3: Photograph taken in the southern area of Site 3 looking south along concrete pad with rails within former treatment area. Monitoring well 3-MW02IW is on the left side of the photograph.



OU12-Site3: View (looking east) of monitoring wells 3-MW02 (on left) and 3-MW02IW (on right). Wells are located east of north/south running concrete pad in treatment area.



SITE 3



OU12-Site3: Photograph shows evidence of old rail spur at southern tip of south area. Existing base railroad is seen in background.



OU12-Site3: Drainage ditch at south end of southern area. Base railroad is seen on the right side of the photograph.

3.0 FIELD INVESTIGATIONS

The following section provides descriptions of the specific investigations conducted at OUNos. 8, 11 and 12, and of the general investigations conducted at each site.

3.1 Specific Investigations

This subsection describes the specific field investigations conducted at each of the four sites.

3.1.1 Site 16 - Montford Point Burn Dump

The following RI field activities/investigations were conducted at Site 16:

- Surveying
- Soil Investigation
- Groundwater Investigation
- Test Pit Investigation
- Surface Water and Sediment Investigation
- Tidal Study

An initial survey was performed at Site 16 which involved the surveying of the current site features, soil sampling locations grid, monitoring well locations, and test pit locations.

A 150 x 100-foot sampling grid was established within the former burn dump. A total of 22 sampling locations were located. Due to the actual site area being smaller than what was originally estimated from air photographs and observations made during the March 1994 site visit, only 20 soil sampling locations were drilled. Some soil sampling locations were moved to fill in gaps and provide more thorough site characterization. Hand auger samples were obtained from the surface drainage area leading from the site to Northeast Creek.

Six shallow groundwater monitoring wells were installed during the RI to assess groundwater quality. Two rounds of groundwater samples and water level measurements were collected from the monitoring wells. In situ slug tests were performed in all of the installed monitoring wells to determine aquifer characteristics.

Four test pits were excavated in the burn dump area to investigate the existence and nature of disposed material. The locations were determined from the results of the soil investigation. The test pit investigation was performed in Level "B" protection.

Surface water and sediment samples were collected from five locations in Northeast Creek.

A staff gauge was installed in Northeast Creek as part of the tidal study conducted at Site 16. Measurements were collected at the staff gauge, and in one monitoring well adjacent to Northeast Creek and one well within the burn dump. These measurements were made over a three day period.

3.1.2 Site 7 - Tarawa Terrace Dump

The following RI field activities/investigations were conducted at Site 7:

- Surveying
- Soil Investigation
- Groundwater Investigation
- Test Pit Investigation
- Surface Water and Sediment Investigation
- Benthic Study
- Earthworm Bioassay
- Tidal Study

The site survey established sampling location grids in the identified "North" and "East" Areas of Concern. All existing and newly installed monitoring wells, and the temporary wells installed during the RI were surveyed for location and elevation. Current site features were also located during the site survey.

The soil investigation was conducted to assess the nature and extent of contamination which may have resulted from previous disposal practices or site activities. Three areas of concern were identified from air photographs and observations made during the March 1994 site visit.

Two groundwater monitoring wells were installed during the RI to better define groundwater quality. The three existing wells, two newly installed wells, and the three temporary wells were sampled and two rounds of water level measurements collected. In situ slug tests were performed in the two newly installed monitoring wells to determine aquifer characteristics.

Five test pits were excavated in the southwest area of the site to investigate the existence and nature of disposed material. The locations were determined from field observations of surface materials. The test pit investigation was performed in Level "B" protection.

Surface water and sediment samples were collected from six sampling stations in Northeast Creek. Three sampling stations in the western tributary and two stations in the eastern tributary were sampled. The drainage ditch flowing into the western tributary was sampled at two locations. The swamp area adjacent to Northeast Creek had four sediment samples collected.

Benthic samples were collected from Northeast Creek and the western tributary. Earthworm bioaccumulation in-situ bioassays were conducted in the areas of known PCB contamination. The earthworm bioassay results were used in the ecological risk assessment.

Staff gauges were installed in Northeast Creek and the eastern tributary as part of the tidal study conducted at Site 7. Measurements were collected at the Northeast Creek staff gauge and in one monitoring well in the southern area of the site. These measurements were made over a three day period.

3.1.3 Site 80 - Paradise Point Golf Course Maintenance Area

The following RI field activities/investigations were conducted at Site 80:

- Soil Investigation
- Groundwater Investigation
- Site Survey

The soil investigation was conducted to assess the nature and extent of contamination at the five areas of concern.

Four shallow wells and one intermediate well were installed during the RI to assess groundwater quality. One round of groundwater samples and two rounds of water level measurements were collected from all existing and newly installed monitoring wells. In situ slug tests were performed in the newly installed monitoring wells to determine aquifer characteristics.

A site survey was conducted following completion of the soil and groundwater investigations. The site survey included locating current site features, and surveying soil sampling locations and monitoring wells for location and elevation.

3.1.4 Site 3 - Old Creosote Plant

The following RI field activities/investigations were conducted at Site 3:

- Site Survey
- ENSYS Field Testing
- Soil Investigation
- Groundwater Investigation

An initial site survey was performed to establish soil sampling grids in the four identified areas of concern. These areas of concern included the north area of the site, and the treatment area, concrete pads and the railroad spur in the southern area of the site. Current site features were surveyed, and additional sampling locations, and existing and newly installed monitoring wells were surveyed for location and elevation.

The established soil sampling locations were initially sampled for surface soils and field tested by the ENSYS system for polynuclear aromatic hydrocarbons (PAHs). Based on positive detections above detection limits for the ENSYS test kits, sampling was expanded in all directions to determine the horizontal extent of contamination. Positive detection samples were submitted for laboratory confirmation. Sampling locations where positive detections of PAHs were encountered were further sampled at depth to determine the vertical extent of contamination at the site.

Five shallow monitoring wells and one intermediate well were installed to assess the groundwater quality. One round of groundwater samples and two rounds of water level measurements were collected from all existing and newly installed monitoring wells. In situ slug tests were performed in the newly installed monitoring wells to determine aquifer characteristics.

3.2 General Investigations

The following subsection briefly describes the general investigative procedures employed during the field program.

3.2.1 Soil Investigation

The soil investigations conducted at OU Nos. 8, 11 and 12 were performed to assess the nature and extent of contamination which may have resulted from previous disposal practices or site activities. Additionally, the investigations were performed to assess human health, ecological, and environmental risks associated with exposure to surface and subsurface soils. The drilling and sampling programs focused on suspected disposal/storage areas.

Hand augers were used in certain areas of the sites to collect surface and subsurface samples for analysis. Samples were collected in the surface drainage area at Site 16, the southwest area at Site 7, and the soil mound at Site 80. All initial samples at Site 3 were collected with hand augers for ENSYS testing.

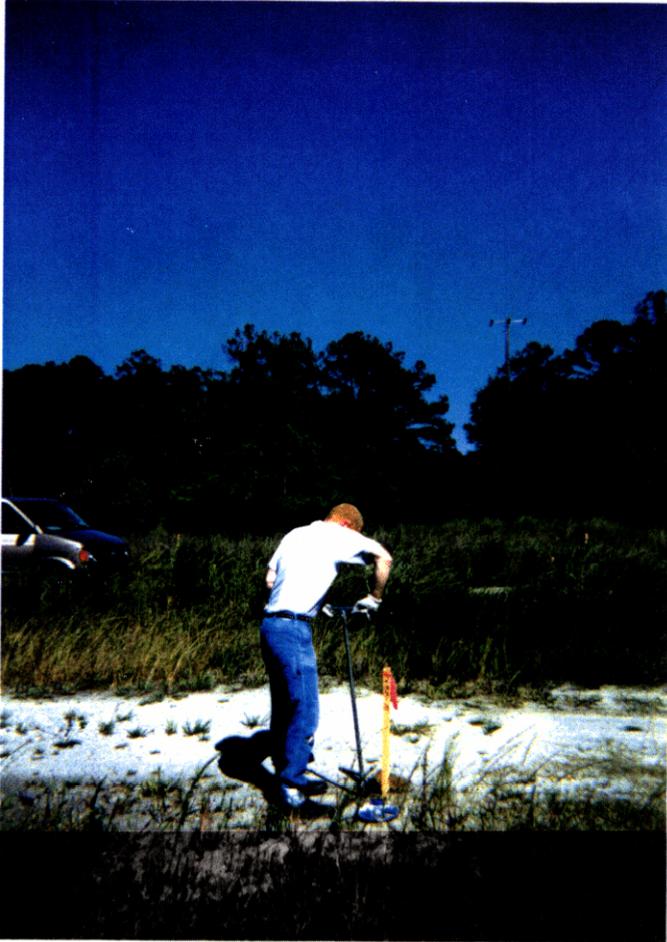
Drilling operations employed both truck mounted and all-terrain vehicle (ATV) drill rigs using hollow stem augers and mud rotary techniques. Surface [0 to 12 inches below ground surface (bgs)] and subsurface soil samples were collected to evaluate the horizontal and vertical extent of potentially impacted soils. Surface soil samples were collected using decontaminated stainless steel spoons, hand augers, or split-spoon samplers. Subsurface soil samples were collected using decontaminated split-spoon samplers. Soil sampling was conducted in accordance with USEPA Region IV guidelines. Drill cuttings from soil borings and shallow monitoring well borings were not containerized. Drilling mud from the intermediate well boring location at Site 3 were containerized, sampled, and analyzed in order to evaluate disposal options.

Depending on the site, and location within the site, the soils were analyzed for full Target Compound List (TCL) organics, Target Analyte List (TAL) metals, and polynuclear aromatic hydrocarbons (PAHs). In addition, one composite sample was submitted from a shallow monitoring well test boring at Site 3 and submitted for analysis of engineering parameters. The investigative derived waste (IDW) containerized from Site 3 was analyzed for total Toxicity Characteristics Leaching Procedure (TCLP) and RCRA hazardous characteristics to evaluate process and disposal options for treatment of potentially impacted soil. Analysis of engineering parameters consisted of grain size and atterberg limits for evaluation of subsurface physical conditions.

Photographs depicting soil investigation activities follow.

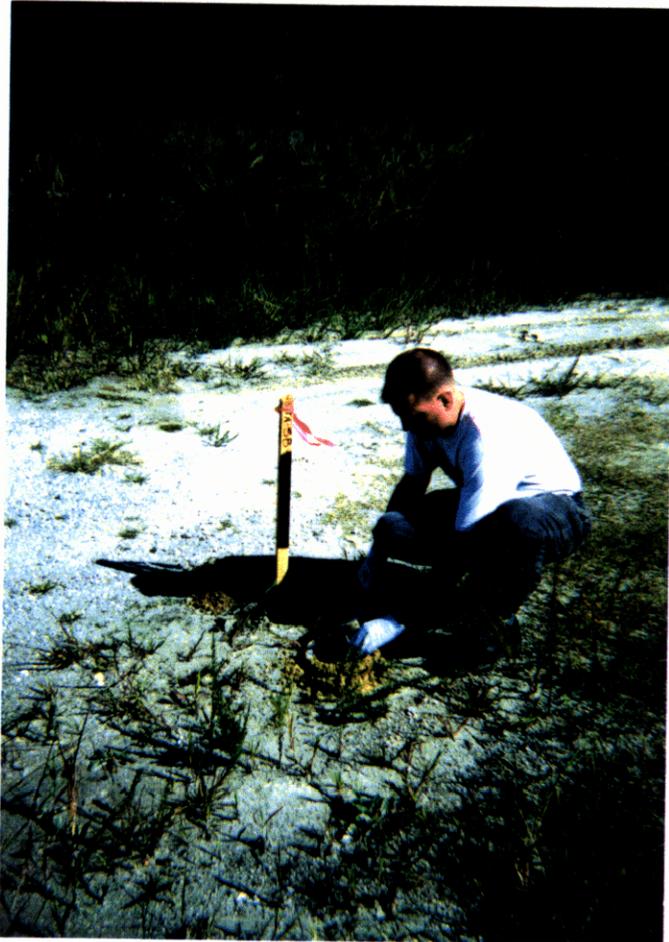


SOIL INVESTIGATION



SOILINVEST:

Baker personnel hand augering sample location 3-TA-SB15 in treatment area for ENSYS testing.



SOILINVEST: Baker personnel collecting a soil sample from location 3-TA-SB15 for ENSYS testing.

3.2.2 Groundwater Investigations

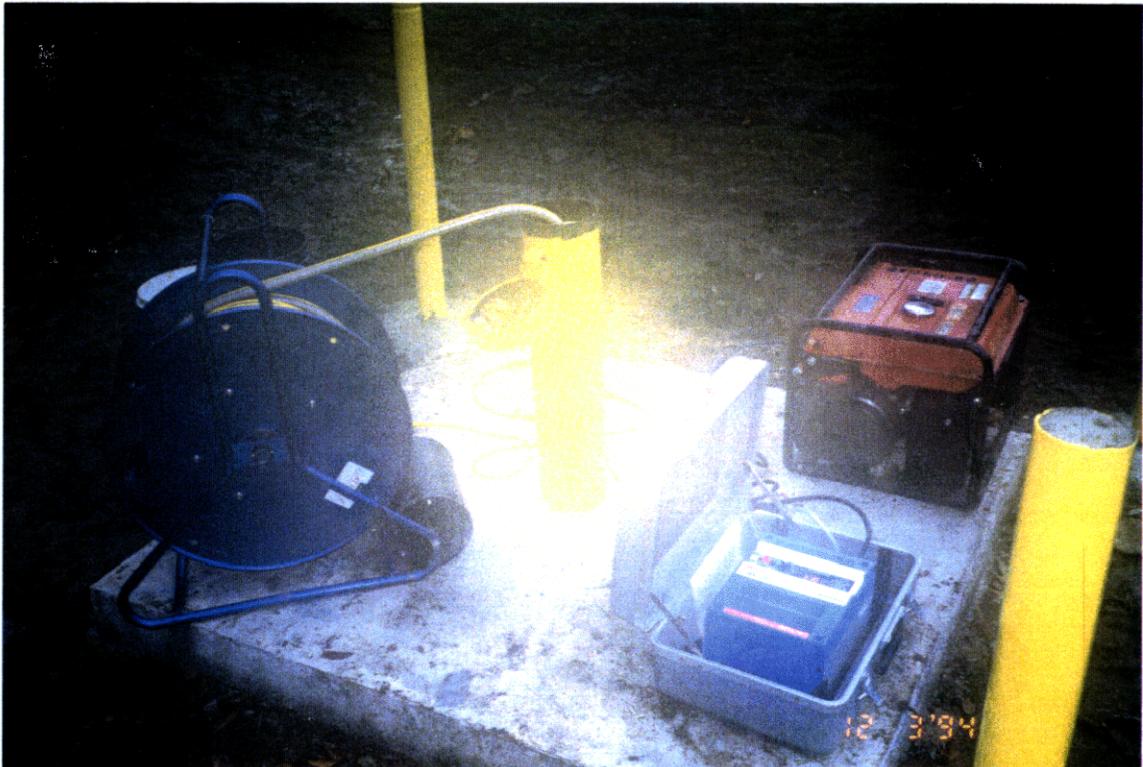
The groundwater investigations focused on evaluating surficial and intermediate groundwater quality. The investigation included drilling/installation of monitoring wells, well development, groundwater sampling, water level measurements, and in situ slug tests. The monitoring wells were placed to better define the extent of groundwater contamination based on existing data from previous investigations.

For CTO - 0274, Type II (i.e., wells installed without an outer casing to seal off a confining layer) shallow monitoring wells and Type III (i.e., wells installed with an outer casing to seal off a confining layer) intermediate monitoring wells were installed. The wells were constructed of 2-inch PVC screen (0.01-inch slot) and riser. The annular space between the PVC screen and borehole wall was backfilled with coarse sand, extending approximately two feet above the screen. A bentonite seal, approximately 2-feet thick, was placed above the sand pack. The remaining annular space was backfilled with a cement-bentonite grout mix. A concrete pad was constructed around the well installations with a steel, above ground protective casing with locking cover installed over the PVC riser. Four steel protective posts were installed at the corners of the concrete pad.

Each well was developed following installation to remove fine-grained sediments and to improve the hydraulic conductivity between the well and the formation. The newly installed shallow wells were developed by surging and pumping (centrifugal pump). The intermediate wells were developed with air (compressor with organics filter). IDW generated during this investigation (i.e., drilling mud, development water, and purge water) were containerized and sampled for assessment of disposal options.

Groundwater samples were collected from both existing and newly installed monitoring wells. Samples were analyzed for full TCL organics and TAL metals (total and dissolved), or TCL semivolatiles depending on previously evaluated site disposal history. Monitoring wells were purged using the "low-flow" technique which has been adopted at MCB Camp Lejeune with a Redi-Flow submersible pump. Water quality measurements for pH, specific conductance and turbidity were taken to determine when stabilization of the groundwater had occurred and purging was complete. The groundwater investigation included several rounds of groundwater level measurements. In situ slug tests were performed in newly installed monitoring wells to determine aquifer characteristics.

Photographs depicting the groundwater investigation activities follow.



GWSAMPLING: Close up photograph of a low-flow purging and sampling set up (well 80-MW03IW).



GROUNDWATER INVESTIGATION



GWSAMPLING: Monitoring well 3-MW05 with data logger/transducer/slugs installed for a slug test.

3.2.3 Surface Water and Sediment Investigations

Surface water and sediment investigations focused on Northeast Creek and tributaries flowing into Northeast Creek at Sites 16 and 7. These investigations were conducted to characterize and delineate potential contamination, assess human health and ecological risks, and evaluate possible remedial technologies.

One surface water and two sediment samples (surface and subsurface) were collected at each sampling station. Surface water samples were collected by dipping the laboratory supplied bottles directly into the water. Sediment samples were recovered using stainless steel hand-held coring equipment. Samples were extruded into separate stainless steel bowls (dedicated for specific sampling depths). Representative volatile organic samples were collected and placed in sample containers prior to the sample being homogenized. The composite, homogenized sample was then placed in appropriate sample containers for the remaining required analyses. Samples were analyzed for full TCL organics and TAL metals.

Photographs depicting the surface water and sediment investigation follow.



SURFACE WATER AND SEDIMENT INVESTIGATION



SWSEDINVEST:

Photograph taken from Northeast Creek (middle of creek) looking at sampling station 16-SW/SD03 located in the middle of the photograph.

**SURFACE WATER AND
SEDIMENT INVESTIGATION**



SWSEDINVEST: Photograph is of sampling station 7-ET-SW/SD02 looking east.



**SURFACE WATER AND
SEDIMENT INVESTIGATION**



SWSEDINVEST:

Photograph of sampling station 7-NC-SW/SD03 along Northeast Creek. This is confluence of Eastern Tributary with Northeast Creek.

3.2.4 Aquatic/Ecological Investigations

Aquatic/Ecological surveys were conducted in Northeast Creek and the western tributary that flows into Northeast Creek at Site 7. These surveys were performed to evaluate possible contaminant migration from the site and potential impact on the aquatic habitat.

Benthic samples were collected from four locations in Northeast Creek and three locations in the western tributary. Each of the sampling stations were initially described as to water conditions (i.e., tides, quality), physical characteristics of the area around the sampling stations, and a description of the "biotic" community.

Benthic macroinvertebrates were sampled at each station using a Standard Ponar Grab Sampler. A gill net was positioned across the mouth of the western tributary where it feeds Northeast Creek (Station 7- WT-SW/SD03) to determine how significant an ecological area this tributary may be. Organisms collected from the grab sampler and gill net were identified and counted. Abnormal markings observed on the organisms were also noted. Statistical summaries and evaluations were performed in order to determine species diversity, and biological relevance and pollution tolerance.

Earthworm bioaccumulation in-situ bioassays were conducted at Site 7 in the areas of known PCB contamination. Two stations were established in the known areas of PCB contamination. One station was established in a background location in the area of the sewage treatment facility. Chambers were constructed of 6-inch diameter PVC pipe with monofilament screens covering both ends of the chamber to allow for water drainage. The chambers were placed in excavated holes within a 1.5-meter diameter area. The earthworms were in place for a period of 28 days. Soil conditions (i.e., moisture and temperature) were monitored daily. If soil conditions became too dry, distilled water was added to the chamber to restore moisture content to an acceptable level. Following the 28-day exposure, the chambers were recovered, the earthworms were hand sorted, counted, rinsed with distilled water, and evaluated for mortality and sublethal endpoints.

Photographs depicting the Aquatic/Ecological Investigation follow.



**AQUATIC/ECOLOGICAL
INVESTIGATIONS**



AQUATICECOL: Photograph taken from station 7-WT-SW/SD03 looking north.



AQUATICECOL: Photograph taken from station 7-WT-SW/SD03 facing away from the station looking out into the Northeast Creek.



**AQUATIC/ECOLOGICAL
INVESTIGATIONS**



AQUATICECOL: Photograph of ponded water east of the Community Center parking lot near sampling location 7-EA-SB05.



AQUATICECOL: The view is looking south/southeast towards earthworm station 5-8 (in “north” area). The Western Tributary runs behind the worm cells.



**AQUATIC/ECOLOGICAL
INVESTIGATIONS**



AQUATICECOL: Photograph was taken looking southwest towards earthworm stations 1-4 (in "east" area).



AQUATICECOL: Baker personnel sifting through worm cells 9A and 9B.



**AQUATIC/ECOLOGICAL
INVESTIGATIONS**



AQUATICECOL: Ten worms from worm cell 6A with a scale in front.

3.2.5 Tidal Study

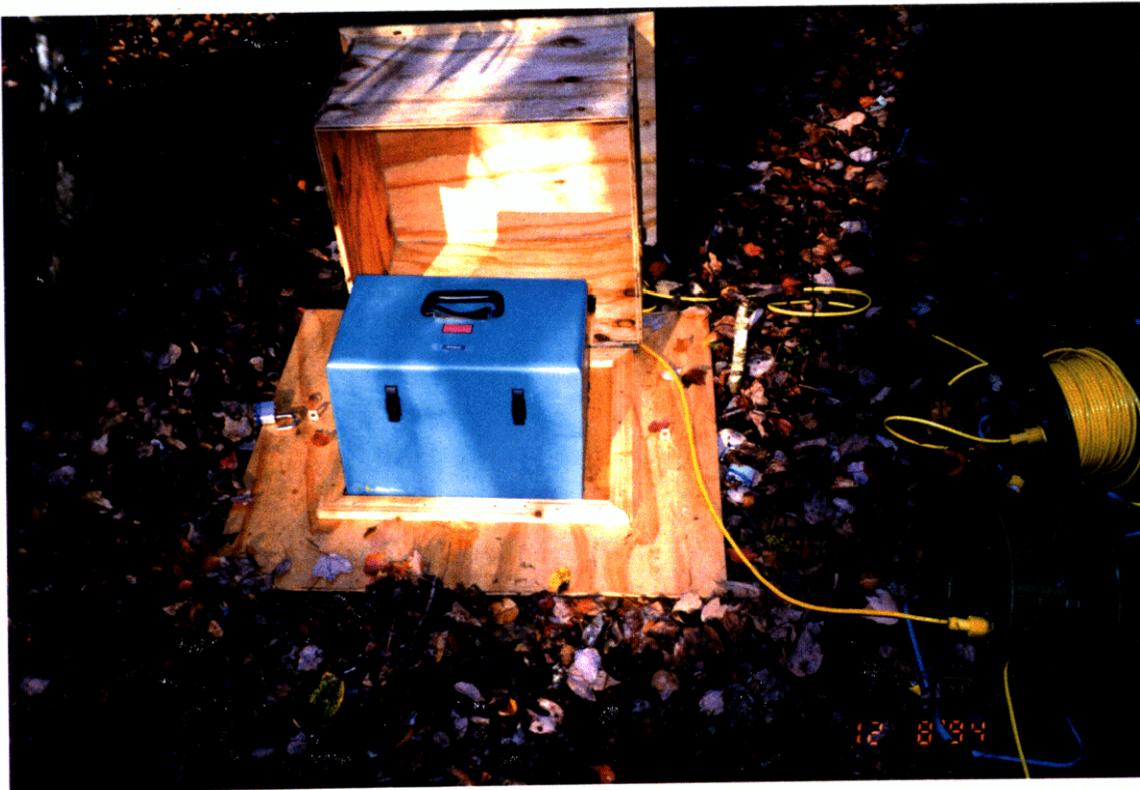
Tidal studies were conducted at Sites 16 and 7 to determine the existence of tidal influences in Northeast Creek and within the shallow groundwater at the sites. Staff gauges, with pressure transducers to measure and record the rise and fall of the water surface, were installed in Northeast Creek. Pressure transducers were also installed in selected wells at the two sites to measure fluctuations in the surficial groundwater and correlate with changes in Northeast Creek. Readings were collected over three day periods at each site.

The changes in water levels were recorded on In Situ HERMIT Data Loggers Models 2000 and 1000C. These readings were plotted on graphs to illustrate the changes in water levels over time and to correlate the results between Northeast Creek and the surficial groundwater at the two sites.

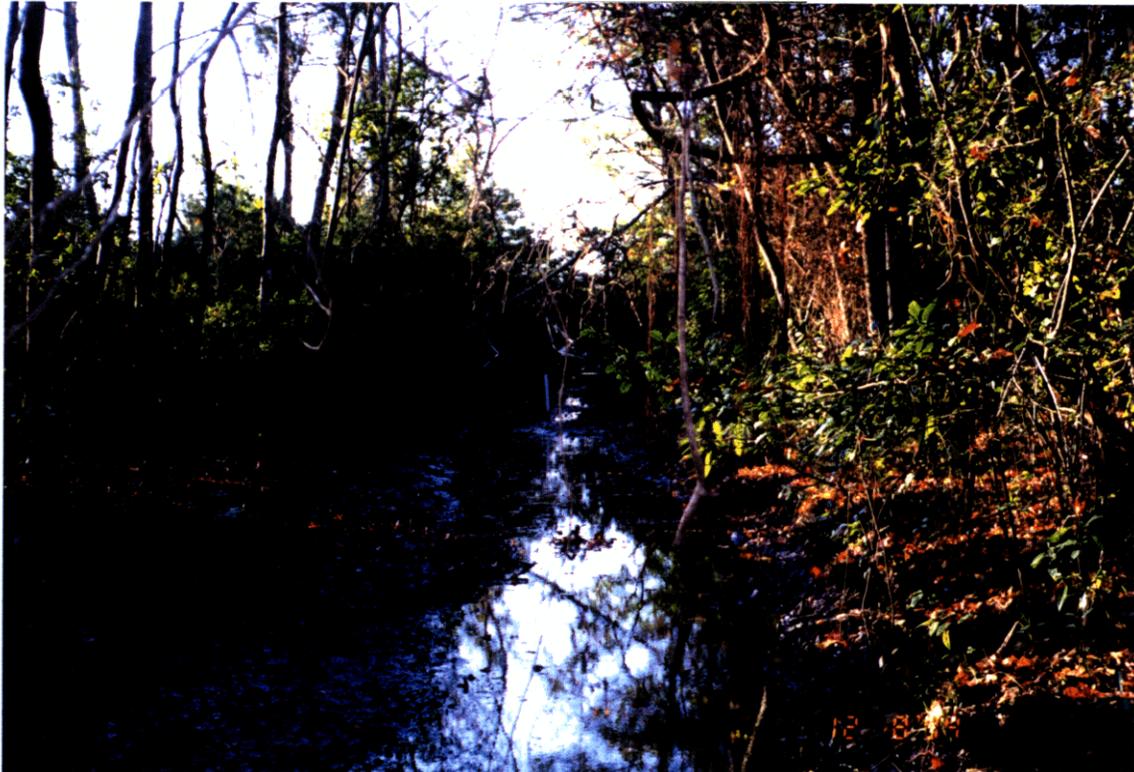
Photographs depicting the Tidal Study follow.



TIDAL STUDY



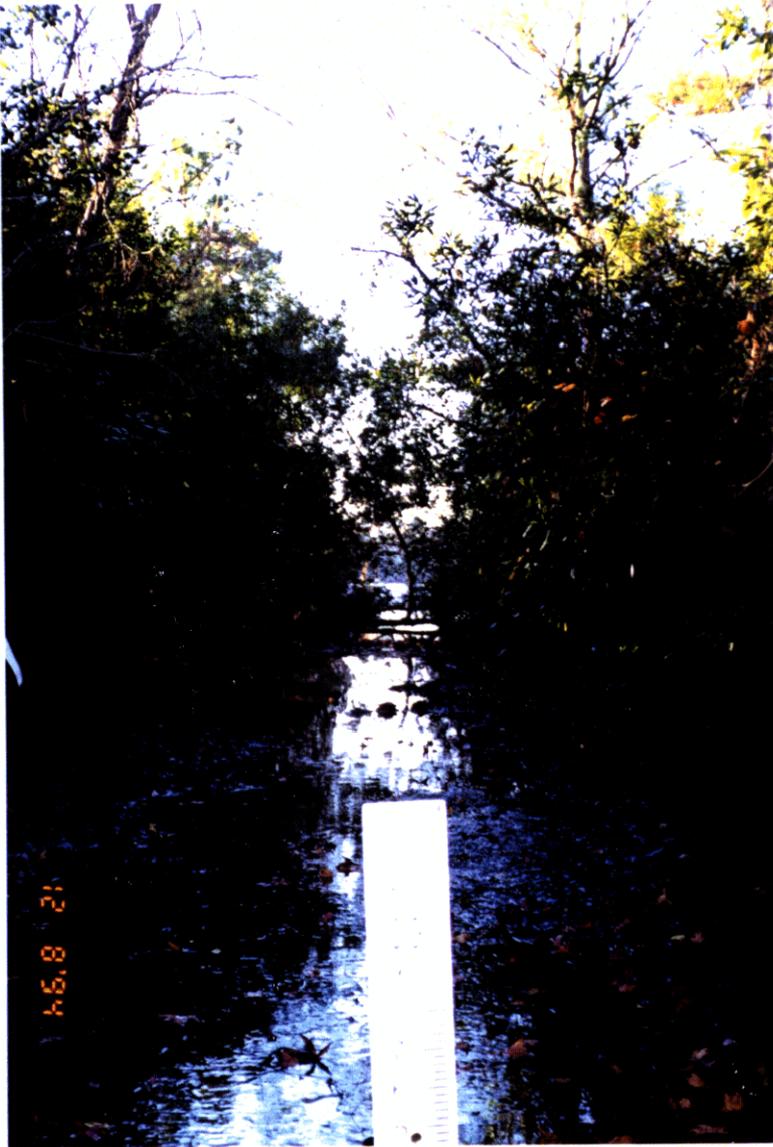
TIDALSTUDY: Photograph taken at low tide on the west bank of the Western Tributary showing data logger box and reels.



TIDALSTUDY: The Western Tributary looking downstream at a staff gauge from equipment location on the bank.



TIDAL STUDY



TIDALSTUDY: Photograph shows the Western Tributary at low tide from staff gauge location. View is looking downstream towards Northeast Creek.



TIDALSTUDY: Photograph shows a staff gauge in Northeast Creek near the Western Tributary approximately 50 feet offshore at (0.25) reading during low tide.

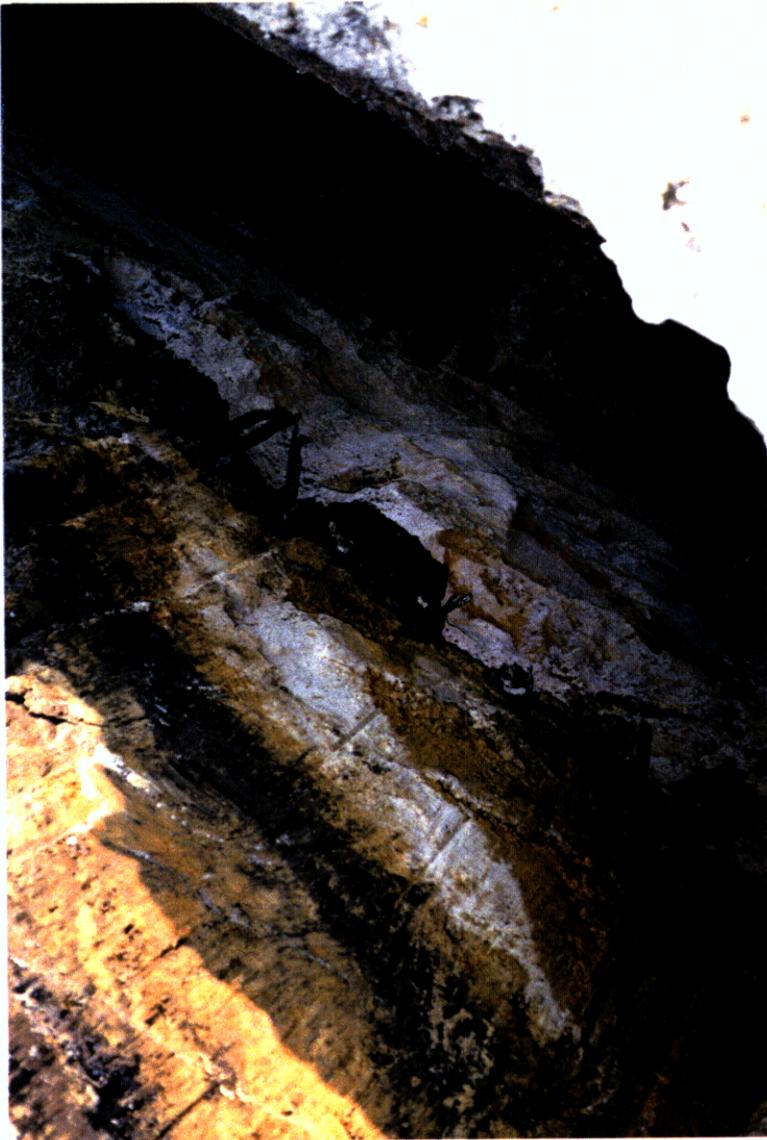
3.2.6 Test Pit Investigations

Test pits were excavated at Sites 16 and 7 to investigate the existence of any remaining trash or debris. Trench locations were based on visual observations or field instrument screening of the soil borings, or areas of visible surface debris. Four test pits at Site 16 and five trenches at Site 7 were excavated. The trenches were approximately twenty (20) feet in length and excavated to the top of the groundwater surface or a depth of approximately twelve (12) feet. Notes were made of any trash or debris encountered in the test pits, and a log of the soils within the trench was prepared.

Composite soil samples were collected from each of the test pits at Site 7 and submitted to the laboratory. Analysis of these soil samples was for full TCL organics and TAL metals.

Photographs depicting the Test Pit Investigation follow.

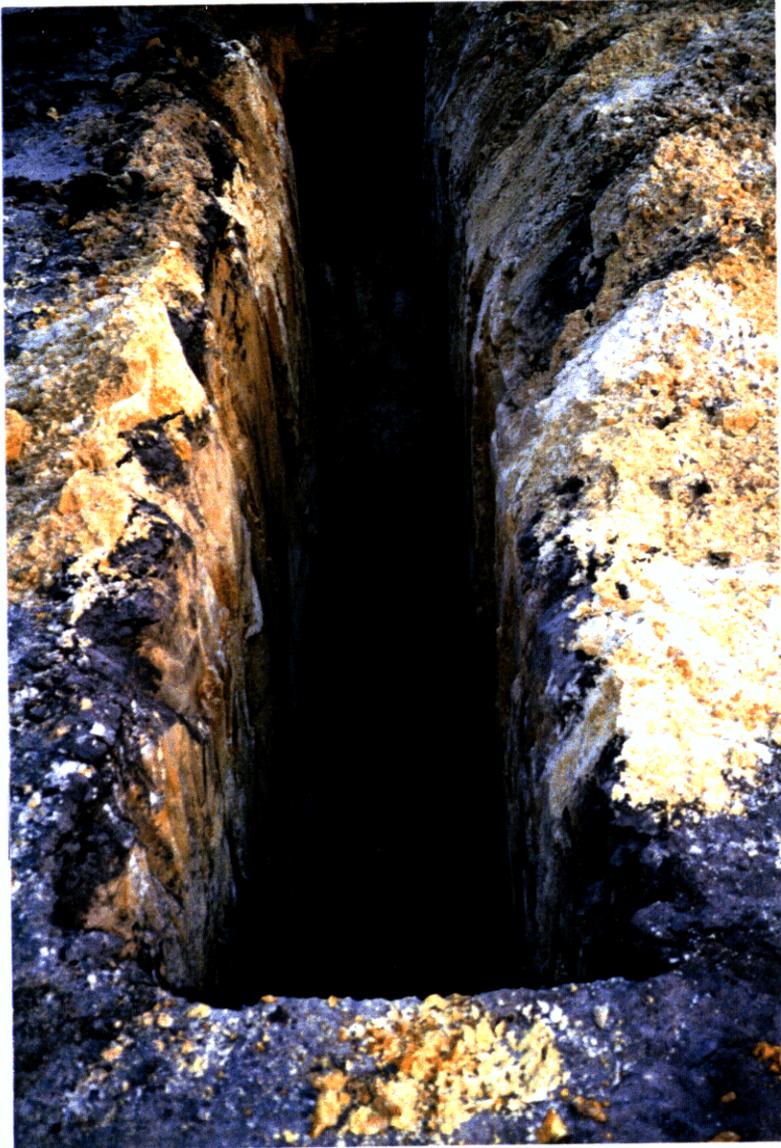
**TEST PIT
INVESTIGATIONS**



TESTPIT: Photograph shows the east wall of test pit 16-BD-TP03 (southeast area of Former Burn Dump) at the north end of the trench. Metal strips with nails, roofing shingles, and rotting wood are at the top of the trench.



TEST PIT INVESTIGATIONS



TESTPIT: Test pit 16-BD-TP04 (northeast area of former burn dump) looking south/southeast.

**TEST PIT
INVESTIGATIONS**



TESTPIT: Test pit 16-BD-TP01 located in the north area of Site 16. Visible inside of pit are treated poles. Equipment is John Deere J310D backhoe.



TEST PIT INVESTIGATIONS



TESTPIT: Test pit 16-BD-TP01 showing treated poles.

**TEST PIT
INVESTIGATIONS**



TESTPIT: Baker personnel in Level "B" safety gear at test pit 16-BD-TP02 located in southwest area of former burn dump.



TEST PIT INVESTIGATIONS



TESTPIT: Photograph of test pit 7-SWA-TP02 looking north. Water is visible on the bottom of the pit.



TESTPIT: View of spoil pile from test pit 7-SWA-TP02 looking east. Large quantity of roofing shingles is visible.



TEST PIT INVESTIGATIONS



TESTPIT: View of test pit 7-SWA-TP05 looking west.

**TEST PIT
INVESTIGATIONS**



TESTPIT: Photograph looking south across test pit 7-SWA-TP05 with spoil pile in the rear.



TEST PIT INVESTIGATIONS



TESTPIT: View of southern end of test pit 7-SWA-TP02 looking into the eastern edge of pit. Roofing shingles in sidewall are at a depth of 4.5 feet.

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