Final
Corrective Action Plan Report

for

Site 29 - Crash Crew Burn Pit

Marine Corps Auxiliary Landing Field - Bogue

Bogue, North Carolina

Atlantic Division
Naval Facilities Engineering Command

Contract Number N62467-94-D-0888

Contract Task Order 0829

October 2003

FINAL
CORRECTIVE ACTION PLAN REPORT
FOR
SITE 29 - CRASH CREW BURN PIT

MARINE CORPS AUXILIARY
LANDING FIELD - BOGUE
BOGUE, NORTH CAROLINA

COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT

Submitted to:
Atlantic Division
Environmental Restoration Branch, Code 1823
Naval Facilities Engineering Command
1510 Gilbert Street
Norfolk, Virginia 23511-2699

Submitted by:
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CONTRACT NUMBER N62467-94-D-0888
CONTRACT TASK ORDER 0829

OCTOBER 2003

DIVISION OF WATER QUALITY
Certification for the Submittal of a Corrective Action Plan
Under 15A NCAC 2L .0106(l)

Responsible Party: MCAS Cherry Point
Address: Highway 70 and 101
City: Cherry Point **State:** NC **Zip Code:** 28533-0006

Site Name: Site 29, Crash Crew Burn Pit
Address: Marine Corps Auxiliary Landing Field, Bogue
City: Bogue **County:** Carteret **Zip Code:** 28594

Groundwater Section Incident Number:

I, Greg Zimmerman, a Professional Engineer/Licensed Geologist (circle one) for Tetra Tech NUS (firm or company of employment), do hereby certify that the information indicated below is enclosed as part of the required Corrective Action Plan (CAP) and that to the best of my knowledge the data, site assessments, engineering plans and other associated materials are correct and accurate.

Each item must be initialed by hand by the certifying licensed professional.

1. GZ A listing of the names and addresses of those individuals required to be notified to meet the notification requirements of 15A NCAC 2L .0114(b) are enclosed. Copies of letters and certified mail receipts are also enclosed. A copy of the newspaper notice and the title of the newspaper(s) where it was published must be included, if applicable. (Appendix K)

2. GZ A Professional Engineer or Licensed Geologist has prepared, reviewed, and certified all applicable parts of the CAP in accordance with 15A NCAC 2L .0103(e).

3. GZ A site assessment is attached or on file at the appropriate Regional Office which provides the information required by 15A NCAC 2L .0106(g). (On file and Appendix B)

4. GZ A description of the proposed corrective action and supporting justification is enclosed. (Section 4.0)

5. GZ A schedule for the implementation and operation of the CAP is enclosed. (Appendix I)

6. GZ A monitoring plan is enclosed which has the capacity to evaluate the effectiveness of the remedial activity and the movement of the contaminant plume, and which meets the requirements of 15A NCAC 2L .0110 and .0106(l). (Section 4.0)

(OVER)

GW-100(l) Rev.7/00

7. ____ The activity which resulted in the contamination incident is not permitted by the State as defined in 15A NCAC 2L .0106(e).

In addition, the undersigned also certifies that to the best of my knowledge and professional judgement and in accordance with the requirements of 15A NCAC 2L .0106(l), the following determinations have been made and are documented in the CAP:

8. ____ All source of contamination and free product have been removed or controlled in accordance with 15A NCAC 2L .0106(f) and (l).

9. ____ The contaminants have the capacity to degrade and attenuate under the site-specific conditions.

10. ____ The time and direction of contaminant travel can be predicted with reasonable certainty.

11. ____ The migration of the contaminant will not result in any violation of the standards specified in 15A NCAC 2L .0202 at any existing or foreseeable receptor.

12. ____ The contaminants have not and will not migrate onto adjacent properties, or adjacent properties are served by public water supplies which cannot be influenced by contaminants migrating off-site, or adjacent landowners have consented in writing to a request allowing the contaminant upon their property.

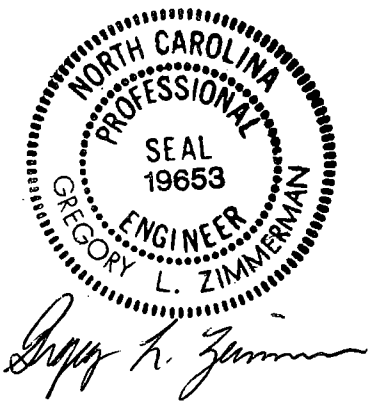
13. ____ Groundwater discharge of the contaminant plume to surface waters will not result in a violation of 15A NCAC 2B .0200.

14. ____ The area of the contaminant plume has not been identified by a state or local government groundwater use planning process for resource development.

15. ____ All necessary access agreements needed to monitor groundwater quality have been or can be obtained.

(Please Affix Seal and Signature)

NOTE: Any modifications made to this form may result in the return of your submittal.



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ACRONYMS AND ABBREVIATIONS

AS/SVE	air sparging and soil vapor extraction
bgs	below ground surface
BTEX	benzene, toluene, ethylbenzene, and xylenes
CAP	Corrective Action Plan
CLEAN	Comprehensive Long-Term Environmental Action Navy
COC	contaminant of concern
CSA	Comprehensive Site Assessment
CTO	Contract Task Order
cy	cubic yard
DRO	diesel range organics
EPA	Environmental Protection Agency
GRO	gasoline range organics
IAS	Initial Assessment Study
MCALF	Marine Corps Auxiliary Landing Field
MCAS	Marine Corps Air Station
MCL	Maximum Contaminant Level
MSL	mean sea level
NCDENR	North Carolina Department of Environment and Natural Resources
OSHA	Occupational Safety and Health Administration
OVA	organic vapor analyzer
PA	preliminary assessment
PCB	polychlorinated biphenyls
PCOC	potential chemicals of concern
PID	photoionization detector
PVC	polyvinyl chloride
RI	remedial investigation
SARA	Superfund Amendments and Reauthorization Act
SI	site inspection
TAL	Target Analyte List
TCL	Target Compound List
TCLP	Toxicity Characteristic Leaching Procedure
TEP	triethyl-phosphate
TIC	tentatively identified compound
TPH	total petroleum hydrocarbon
TRC	Technical Review Committee

TtNUS	Tetra Tech NUS, Inc.
USGS	U.S. Geological Survey
UST	underground storage tank
VOC	volatile organic compound

EXECUTIVE SUMMARY

This Corrective Action Plan (CAP) for Marine Corps Auxiliary Landing Field (MCALF), Bogue, North Carolina (Bogue Field), was prepared by Tetra Tech NUS, Inc. (TtNUS) in response to Contract Task Order (CTO) 829 under the Comprehensive Long-Term Environmental Action Navy (CLEAN), Contract Number N62467-94-D-0888. Bogue Field is operated under the jurisdiction of Marine Corps Air Station (MCAS) Cherry Point, North Carolina. The CAP is for contamination detected at Site 29 – Crash Crew Burn Pit.

SOURCE INFORMATION

Site 29 is located in the eastern portion of Bogue Field. Until about 1985, the site was used as a crash crew training area. Typical operations consisted of pouring solvents, waste oil, fuels, and other burnable materials on an airplane fuselage that was placed in a sand-bermed burn pit. The fuselage was ignited, and the flames were extinguished. No records were kept that detailed the quantity or type of liquids used at Site 29 or the dates that the site was in use. In 1985, site use was discontinued, and the bermed pit area was graded and revegetated. The area is currently covered with grass.

PREVIOUS INVESTIGATIONS

An Initial Assessment Study (IAS) conducted for MCAS Cherry Point in 1983 recommended no further action for sites at Bogue Field. However, at the request of the U.S. Environmental Protection Agency (EPA) Region 4, a site inspection (SI) was conducted at Site 29 in 1988. Contaminants were detected in site media, and floating product was identified; therefore, a remedial investigation (RI) was conducted. The Phase I RI fieldwork was conducted in two stages and the effort was completed in 1992. A Phase II RI was deemed necessary to further delineate the nature and extent of soil and groundwater contamination; Phase II was completed in 1994.

During the Phase II RI, soil samples were collected and analyzed for benzene, toluene, ethylbenzene, and xylenes (BTEX) and total petroleum hydrocarbons (TPH). BTEX concentrations exceeded state clean-up levels at a few locations; however, all detection limits for benzene and some detection limits for ethylbenzene were also higher than the clean-up levels. None of the surface soil samples (0 to 1 foot) exceeded state TPH action levels. Shallow (1 to 3 feet) and deep (3 to 11 feet) subsurface soil exceeded state TPH action levels near the former burn pit. The majority of the TPH contamination was located immediately above the water table and was the result of floating product that contaminated the soil as the water table rose into the capillary zone.

Three rounds of groundwater samples were collected during the Phase II RI and analyzed for BTEX and metals. BTEX was detected at concentrations above state groundwater standards and corresponded with the identified source area plume. The Phase II RI Report concluded that the BTEX contaminants were most likely related to site activities, and metals were believed to be the result of background levels present in the native soils.

FREE PRODUCT REMOVAL

Floating product was first discovered in a monitoring well (29GW02) in October 1990. A floating product thickness and recovery program was implemented in October 1991, and a product recovery well (29GW11) was installed. Various techniques of product recovery were used, including aggressive pumping in September 1991 and passive recovery and bailing from September 1991 to 1994. None of these systems recovered significant amounts of product because of the relatively small amount of product present. Fewer than 60 gallons of product were removed from well 29GW02, and an insignificant amount of product was removed from well 29GW11. An air sparging/soil vapor extraction (AS/SVE) system was installed in September 1997 in an attempt to remove the free product.

Free product was identified in the system vapor extraction wells shortly after system start-up in September 1997. Measurable free product persisted in the vapor extraction wells until June 1999 when a floating black “floc” began to appear. Over the next 6 months, less free product and more floc was observed. December 1999 was the last time measurable free product was reported. By August 2000, the floating black floc material was gone in most of the vapor extraction wells, and the other wells remained clean. No significant free product or floating black floc have been observed since then. However, there have been occasional minor signs of contamination (e.g., black floc in bailer, tinting, sheen, odor) in some of the vapor extraction wells.

NATURE AND EXTENT OF CONTAMINATION

Soil and groundwater samples were collected during operation of the AS/SVE system. The soil samples were collected from two intervals; 1 to 3 feet below ground surface (bgs) and 3 to 6 feet bgs. It should be noted that all or a portion of the deepest interval sample was taken from the saturated zone. Soil samples were collected in September 1997, April 1998, August 1999, and October 2001 and analyzed for BTEX and petroleum hydrocarbons. BTEX compounds were not detected in soil samples collected in October 2001. However, detection limits for benzene and ethylbenzene were higher than state action levels for many samples. This occurred for samples that required dilution because of interferences from high concentrations of GRO. Operation of the AS/SVE system has reduced the petroleum hydrocarbon concentrations in the source area. However, the concentrations of diesel range organics (DRO), gasoline

range organics (GRO), and oil and grease in samples collected in October 2001 still exceed state action levels.

Groundwater samples collected in October 1997, April 1998, and July 1998 were analyzed for BTEX compounds. Groundwater samples collected in August 1999 were analyzed for BTEX and TPH. Groundwater samples collected in October 2001 were analyzed for BTEX, base-neutral extractable organics, and metals. BTEX has not been detected in site groundwater since August 1999. Based on the results of the October 2001 sampling, naphthalene was detected in one well (29GW10) at a concentration of 28 µg/L. This exceeds the state groundwater standard of 21 µg/L. No other organics were detected at a concentration above a state standard. Iron and manganese were the only metals detected at concentrations above the state groundwater standards. The iron concentrations in monitoring wells upgradient of the source area also exceeded state standards.

PROPOSED CORRECTIVE ACTION

Based on current site conditions, the level of soil contamination, the successful removal of free product by the AS/SVE system, and the current and anticipated use of this site, the proposed corrective action is groundwater monitoring and soil removal with off-site disposal.

Groundwater monitoring will be conducted quarterly for volatile organic compounds (VOCs) and semivolatile organic compounds (SVOCs) until four consecutive results below the North Carolina Department of Environment and Natural Resources (NCDENR) Action Levels are achieved. If the action levels are not achieved during the first year of monitoring then annual groundwater monitoring shall be conducted. More frequent monitoring may be conducted once action levels are achieved. Monitoring for manganese will be conducted annually until action levels for VOCs and SVOCs are achieved. The initial round of groundwater monitoring will be conducted at four existing groundwater monitoring wells, one upgradient (29GW04), one in the area of the former burn pit (29GW02), and two downgradient (29GW09 and 29GW10).

Soil removal will be conducted to excavate petroleum contamination that exceeds NCDENR Action Levels.

The AS/SVE system will be demobilized and the system wells abandoned in accordance with state requirements. Any monitoring well that is damaged or destroyed during the soil removal activities will not be replaced unless it is needed for the monitoring program. Any monitoring well that is damaged will be properly abandoned in accordance with state requirements.

The proposed schedule for implementation of the proposed corrective action is provided in Appendix I.

1.0 INTRODUCTION

The Northern Division of the Naval Facilities Engineering Command has issued Contract Task Order (CTO) 829 to Tetra Tech NUS, Inc. (TtNUS) under Comprehensive Long-Term Environmental Action Navy (CLEAN) Contract No. N62472-90-D-1298. Under CTO 829, TtNUS has been tasked to prepare a Corrective Action Plan (CAP) for Site 29, Crash Crew Burn Pit, at Bogue Field, Marine Corps Auxiliary Landing Field (MCALF), North Carolina. Bogue Field is operated under the jurisdiction of Marine Corps Air Station (MCAS) Cherry Point, North Carolina.

This document provides information necessary for the evaluation and implementation of the proposed CAP. This document includes background information, previous investigations, free product removal efforts, the air sparging and soil vapor extraction (AS/SVE) remedial effort, current site conditions, evaluation of alternatives, and the proposed CAP schedule and cost estimate. Appendix A provides a complete database of data collected during the remedial investigation (RI) and subsequent sampling efforts conducted at Site 29.

1.1 SITE DESCRIPTION

Site 29 is located in the eastern portion of Bogue Field, as shown on Figure 1-1. Until about 1985, the site was used as a crash crew training area. Typical operations consisted of pouring solvents, waste oil, fuels, and other burnable materials on a fuselage, igniting the fuselage, and extinguishing the flames. Historical aerial photographs showed a liquid-filled, sand-bermed burn pit in the area, with a fuselage in the center. Miscellaneous scrap metal and fuselages were dumped on the land adjacent to the burn pit. The photographs also showed tankers near the burn pit that, according to base personnel, were used to store the flammable liquids. The fluids were pumped to the burn pit via above-ground hoses. The Initial Assessment Study (IAS) Report (Water and Air Research, Inc., 1983) noted visual evidence of liquids overflowing from the burn pit. No records were kept detailing the quantity or type of liquids used at this site or the dates that this site was in use. In 1985, site use was discontinued, and the bermed pit area was subsequently graded and vegetated (NUS Corporation, 1991). The area is currently covered with grass.

The site is a flat to gently sloping area. During the Phase I and Phase II RI field investigations, the general location of the burn pit was evident by the scorched soil and discolored vegetation. However, the exact limits of the burn pit cannot be seen because the original ground surface was disturbed by regrading activities conducted in 1985.

Construction debris consisting of concrete and miscellaneous rubble is located in small piles northeast of the burn pit. Miscellaneous scrap metal was also located within the construction debris areas. Gravel piles were identified northeast of the burn pit during the Phase II RI fieldwork, as shown on Figure 1-2.

1.2 PREVIOUS ACTIVITIES

The Superfund Amendments and Reauthorization Act of 1986 (SARA) required each federal facility listed on the Federal Agency Hazardous Waste Compliance Docket to perform a preliminary assessment (PA). MCAS Cherry Point is listed on the Federal Agency Hazardous Waste Compliance Docket, and Bogue Field is under the jurisdiction of MCAS Cherry Point. The IAS (Water and Air Research, Inc., 1983) conducted for MCAS Cherry Point was equivalent to and served as the PA.

The IAS conducted for MCAS Cherry Point concluded that none of the five sites identified at Bogue Field presented significant environmental problems and recommended that no further work be performed at MCALF, Bogue. However, the U.S. Environmental Protection Agency (EPA) Region 4 requested that a site inspection (SI) be performed on the Crash Crew Burn Pit (Site 29).

The SI was completed in 1988. The results of the investigation were detailed in the final SI Report (NUS Corporation, 1989). Contaminants were detected in site media; therefore, the final SI Report recommended that an RI be conducted to further define the extent of contamination, groundwater flow characteristics, and the actual and potential risks to receptors.

As recommended in the SI Report, the Phase I RI fieldwork was conducted in two stages. The first stage of the Phase I RI, a limited field investigation, was conducted in October 1990. The results of the limited field investigation were used to scope the remaining Phase I activities. The limited field investigation results and the planned Phase I RI activities were detailed in the RI Planning Documents (NUS Corporation, 1991). The Phase I RI field effort was completed in 1992, and the final Phase I RI Report was submitted in October 1992 (Halliburton NUS Environmental Corporation, 1992).

Based on discussions during a Technical Review Committee (TRC) meeting held in June 1992, a Phase II RI was deemed necessary to further delineate the nature and extent of contamination in the groundwater and soil. The final Phase II RI planning document (Halliburton NUS Environmental Corporation, 1993) was prepared in July 1993. The planning documents proposed 16 additional soil borings in a grid pattern to collect three soil samples at each location to delineate the horizontal and vertical extent of total petroleum hydrocarbon (TPH) contamination. The plans also proposed three consecutive rounds of groundwater sampling to evaluate contamination trends over time. The draft final Phase II RI Report, presenting the results of this investigation, was submitted in January 1995 (Halliburton NUS Corporation, 1995). As indicated in the guidance provided in the North Carolina

Department of Environment and Natural Resources (NCDENR) Groundwater Section Guidelines for the Investigation and Remediation of Soil and Groundwater for preparation of CAPs (NCDENR, 2000), the appropriate figures and tables submitted in the RI Report, which serves as the Comprehensive Site Assessment (CSA), are provided in Appendix B.

The Phase II RI Report recommended that the site be addressed under the state underground storage tank (UST) program, product removal be continued, and a CAP be prepared in accordance with 15A NCAC 2L.106(l) (natural degradation/attenuation) for site-related groundwater contaminants detected at concentrations above state standards. The Phase II RI Report also presented and discussed a letter from NCDENR dated November 10, 1994 requesting that a CAP be submitted (Appendix C). This letter was based on a review of the Phase I RI Report and the ongoing monthly product thickness and product recovery activities being conducted at the site. MCAS Cherry Point responded that the Phase II RI was in the process of being prepared and recommendations would be made based on the findings. However, before this CAP was to be prepared, it was decided that free product would be removed to comply with the state regulations requiring all sources of contamination and free product be removed or controlled [15A NCAC 2L.0106(l)(1) provided in Appendix D]. To achieve this requirement, an AS/SVE system was installed to remove the free product prior to preparation of the CAP.

In July 1997, a Pilot Test Work Plan for the installation, operation, and evaluation of the AS/SVE system was submitted (Brown & Root Environmental, 1997). Prior to start-up, baseline soil and groundwater samples were collected. Soil samples were collected from five soil boring locations at depth intervals of 1 to 3 feet and 4 to 6 feet. The two source area monitoring wells (29GW02 and 29GW11) that contained free product during previous investigations were sampled. The AS/SVE system was started in September 1997. Two letter reports were submitted presenting the operation and evaluation of the AS/SVE system. The first letter report (TtNUS, 1999) was submitted July 1999 and contained information on the installation, operation, and evaluation of the system through May 1999. In August 2000, the AS/SVE System Status Letter Report Addendum Year Three (TtNUS, 2000) report was submitted that presented information on the operation and evaluation of the system through June 2000.

1.3 REMEDIAL INVESTIGATION CONTAMINATION ASSESSMENT

The Phase II RI used available analytical data to identify potential chemicals of concern (PCOCs) in soil and groundwater (Halliburton NUS Corporation, 1995). Initial screening for all potential contaminates permitted the investigation to concentrate only on the identified PCOCs. Potential contaminants included Target Compound List (TCL) volatile organic compounds (VOCs) including tentatively identified compounds (TICs), TPH, TCL polychlorinated biphenyls (PCBs), and Target Analyte List (TAL) metals. The sample and cross-section locations are presented in Figure 1-3, and the cross-section depicting soil

contamination is presented in Figure 1-4. The analytical results for soil and groundwater samples collected during the RI are provided in Appendix A.

The PCOCs were present at detectable levels and have evidence of producing toxic effects in humans. The PCOCs are discussed below by medium.

1.3.1 Soil

Soil samples were collected and analyzed for benzene, toluene, ethylbenzene, and xylenes (BTEX) and TPH in support of the Phase II RI. A cross section depicting the approximate limits of TPH contamination, as presented in the Phase II RI, is shown in Figure 1-4. BTEX concentrations exceeded state clean-up levels at a few locations; however, all detection limits for benzene and some detection limits for ethylbenzene were also higher than the clan-up levels.

The risk assessment conducted for the Phase II RI considered current land use conditions and identified no risks above the established EPA target risks (i.e., Hazard Index greater than 1.0 or incremental cancer risk greater than 1.0E-6) (Halliburton NUS Corporation, 1995).

None of the surface soil samples (0 to 12 inches) exceeded state TPH action levels. Shallow (1 foot through 3 feet) and deep (3 feet through 11 feet) subsurface soils exceeded state TPH action levels near and immediately downgradient of the burn pit. The majority of the contamination is located immediately above the water table and is the result of floating product that has contaminated the soils as the water table rises into the capillary zone. As the water table drops, a portion of the contamination either remains in the soil or leaches back into the groundwater.

Based on the risk assessment, soil is not considered a medium of concern at Site 29; therefore, a quantitative risk assessment was not performed for this medium. Although soil in the immediate vicinity of the former fire training area did contain free-phase product that can serve as a source of groundwater contamination, the contamination is at a depth that prohibits direct contact by human receptors.

1.3.2 Groundwater

Groundwater samples were collected at Site 29 during three separate sampling rounds for the Phase II RI. The samples were analyzed for BTEX compounds and TAL metals. Positive results were reported for all BTEX compounds, arsenic, barium, calcium, iron, lead, magnesium, manganese, nickel, potassium, sodium, and zinc in at least one of the groundwater samples collected.

The PCOCs that were retained included BTEX, arsenic, barium, lead, manganese, nickel, and zinc. The PCOCs are summarized in Table 1-1, which compares the results of the Phase II Round 3 groundwater sampling event conducted in April 1994 to the regulatory standards, presents the frequency of detection and concentration range, and identifies the location where the exceedences occurred. BTEX contamination was identified in excess of regulatory criteria and corresponded with the identified source area plume. However, manganese and one detection of arsenic were slightly above regulatory criteria and no significant trend was observed. The RI reported that the BTEX contaminants are most likely related to site activities and that the inorganic contaminants are believed to be the result of background levels of inorganics present in the native soils.

1.4 HISTORIC PRODUCT THICKNESS SUMMARY

Floating product was first identified in monitoring wells 29GW02 and 29GW11 in January 1989, as presented in the SI Report (NUS Corporation, 1989). Consequently, a floating product thickness and recovery program was implemented. Data collected to date has identified two monitoring wells, 29GW02 and 29GW11, as containing free product. Various techniques of product recovery were tried, including aggressive pumping from September 9 through September 20, 1991 and passive recovery and bailing from September 20, 1991 to November 1994. However, none of the techniques were able to recover any significant amounts of product, mainly because of the relatively thin layer of product in the wells. Fewer than 60 gallons of product were removed from well 29GW02, and no significant amount of product was removed from 29GW11. The Phase II RI concluded that the product seemed to be isolated in the vicinity of well 29GW02.

The Phase II RI indicated that there may be a correlation between precipitation events and product recovery. During drier seasons, product migration rates are reduced, and consolidation of product in soil void spaces and adsorption to the soil particles are likely. After successive storm events, infiltrating water migrates downward, displacing the product to the capillary fringe where lateral migration to the well results in product detection and recovery.

In September 1997, an AS/SVE remedial system was employed to further address the free product. Besides air stripping and increased biological degradation, bailing of identified free product was also conducted. Detailed information on the progression of the free product removal during operation of the AS/SVE system from September 1997 through July 2001 is present in Section 2.0.

1.5 RECEPTOR INFORMATION

Site 29 is contained completely within the boundaries of MCALF Bogue Field, and the groundwater contaminant plume has not extended past the Site 29 boundary (approximately 300 feet). As noted

earlier, human receptors have no direct contact with the contaminants present in the soil. In addition, there are no water supply wells within the impacted area of the site. Consequently, human receptors would not be exposed to the groundwater at Site 29. The nearest residential area is approximately 2,000 feet from the site. The nearest water supply well was installed at Bogue Field over 1,500 feet from Site 29, but is no longer used. The well extended to a depth of 260 feet below ground surface (bgs) into the Castle Hayne limestone. The Castle Hayne limestone is the primary source of groundwater for local drinking water wells. The Castle Hayne limestone is considered a Subclass IIA groundwater, which is defined in the EPA Guidelines for Classification Under the EPA Groundwater Protection Strategy as groundwater that is currently used as a source of drinking water.

The site area is relatively flat and slopes gently in a radial direction to the west, north, and northeast from the burn pit. Surface water runoff would flow toward the topographically low areas including the drainage ditch to the west, the shooting range, and other low areas located farther to the northeast. Surface water entering the drainage ditch is locally conveyed in a north and northwest direction toward and discharging into a tributary of Goose Creek, located approximately 1,200 feet north of the site (Figure 1-1). Surface water entering the shooting range and other low areas to the northeast would pond and infiltrate into the groundwater and/or evaporate. Surface water southeast of the site would run off into a second tributary of Goose Creek located 800 feet southeast of the site.

1.6 GEOLOGY

Hydrogeologic cross-sections proposed for the 1994 RI are provided in Appendix B. The subsurface materials encountered during the RI drilling consisted primarily of silty sand from the ground surface to a depth of approximately 48 feet bgs. A silty clay with shell and rock fragments was encountered in boring 29SB02 from 48 to 68 feet bgs. Beneath this unit lies a silty sand with shell and rock fragments that extends from 68 to 83 feet bgs. A 2-foot-thick layer of clay was encountered from 83 to 85 feet bgs. At a depth of 85 feet, a sandy silt with shell fragments was encountered that was not completely penetrated by 29SB02, which was drilled to a total depth of 90 feet.

A water supply well was previously drilled at Bogue Field to a depth of 260 feet bgs. The log of the well is included in a U.S. Geological Survey (USGS) report, entitled "Well Logs from the Coastal Plain of North Carolina" (1958). The well log identifies Post-Miocene marls and sands that extend from 30 to 93 feet bgs. At 93 feet bgs, upper Miocene marls and sand of the Yorktown Formation are reported. These extend to a depth of 205 feet bgs. The (upper) Eocene-age Castle Hayne limestone exists from 205 to at least 245 feet bgs, which is the depth that logging stopped for this well. The Castle Hayne limestone is the primary source of groundwater for local drinking water wells. The Castle Hayne limestone can be considered a Subclass IIA groundwater, which is defined in the EPA Guidelines for Classification Under the EPA Groundwater Protection Strategy as a groundwater that is currently used as

a source of drinking water. The state of North Carolina groundwater classification for the Castle Hayne limestone is GA, which is an existing or potential source of drinking water supply for humans with a chloride concentration less than 250 mg/L.

1.7 HYDROGEOLOGY

During the Phase II RI in 1993 and 1994, the depth to groundwater beneath the site ranged from 6.0 to 9.0 feet bgs, depending on the date of measurement and location of the boring or well. The average depth to groundwater in the vicinity of the AS/SVE system has been measured since 1997 and has ranged from 1.9 to 6.7 feet bgs. Potentiometric surface contour maps (provided in Appendix B) were developed for the site from water level measurement data collected during the three rounds of RI Phase II sampling. The figures show that the shallow groundwater flows radially from the site to the north, east, and northwest and appears to be directly related to topography. Surface discharge points include the drainage ditch northwest of the site and Goose Creek with its tributaries located north and east of the site. These drainage ditches contained water during the full duration of this project.

An average groundwater seepage velocity for the shallow groundwater was determined during the Phase I RI from the calculated average hydraulic conductivity value, a measured hydraulic gradient, and an effective porosity value obtained from a published reference. The average hydraulic conductivity value calculated for the shallow wells (1.31E-04 feet per second) was used. The hydraulic gradient of 0.01 was determined from the potentiometric surface contour maps. An effective porosity of 0.25 was used, which is representative of sandy materials. The average seepage velocity for the shallow groundwater was calculated to be 165 feet per year. This is a maximum value (conservative) because the hydraulic gradient value used in the calculation was derived from the steepest gradient found on the potentiometric surface contour maps.

During the Phase I RI planning stages, it was determined that tidal influences caused surface water in Goose Creek to fluctuate over an approximately 1-foot interval. However, there were no noticeable tidal influences on water levels in monitoring well 29GW04 during this time period, indicating that tidal influences do not affect the shallow groundwater table in the site area. The tidal fluctuation data are included in the Phase I RI planning documents (NUS Corporation, 1991).

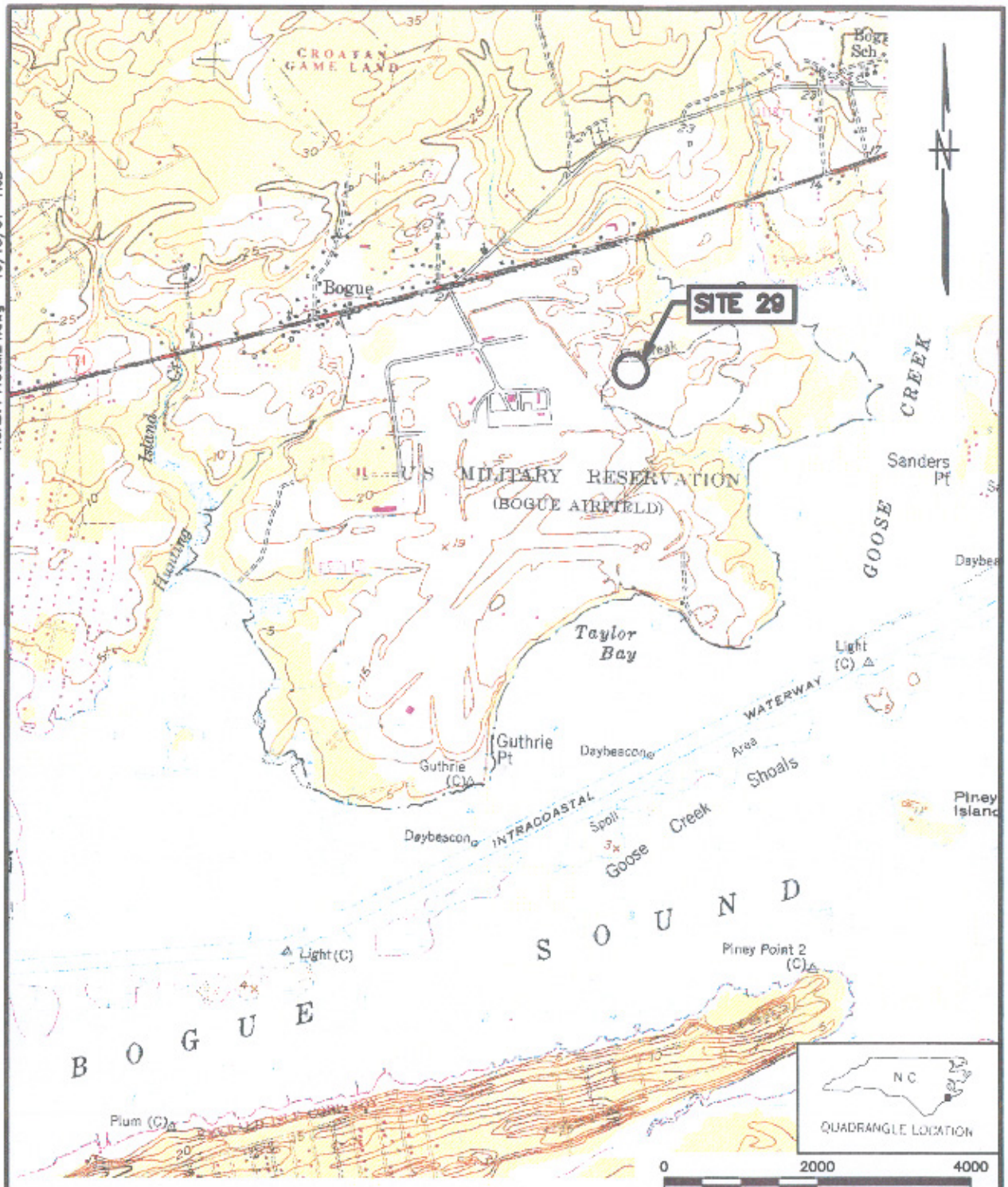
TABLE 1-1

COMPARISON OF GROUNDWATER DATA TO RELEVANT STANDARDS
SITE 29 - CRASH CREW BURN PIT
MCALF BOGUE, NORTH CAROLINA

Chemical	Regulatory Standard	Frequency of Detection	Range of Concentrations	Location of Exceedances Based on Phase II, Round 3 Results (4/94)
BTEX (µg/L)				
Benzene	1.0[1]	4/10	0.21-86.0	29GW02 (86 µg/L) 29GW09 (3.7 µg/L) 29GW10 (7.6 µg/L)
Toluene	1,000[1,2]	3/10	0.2-0.41	None
Ethylbenzene	29[2]	4/10	0.28-38.0	29GW02 (38 µg/L)
Xylenes	530[1]	6/10	0.26-134	None
METALS (mg/L)				
Arsenic	0.05[1,2]	6/10	0.0011-0.058	29GW02 (0.0582 mg/L)
Barium	2.0[1,2]	6/10	0.0077-0.0769	None
Lead	0.015[1,3]	2/10	0.0018-0.0022	None
Manganese	0.05[1,4]	10/10	0.0152-0.881	29GW01 (0.200 mg/L) 29GW02 (0.568 mg/L) 29GW03 (0.881 mg/L) 29GW04 (0.0579 mg/L) 29GW08 (0.460 mg/L) 29GW09 (0.664 mg/L) 29GW10 (0.137 mg/L)
Nickel	0.1[1,2]	1/10	0.0051	None
Zinc	2.1[1]	1/10	0.0399	None

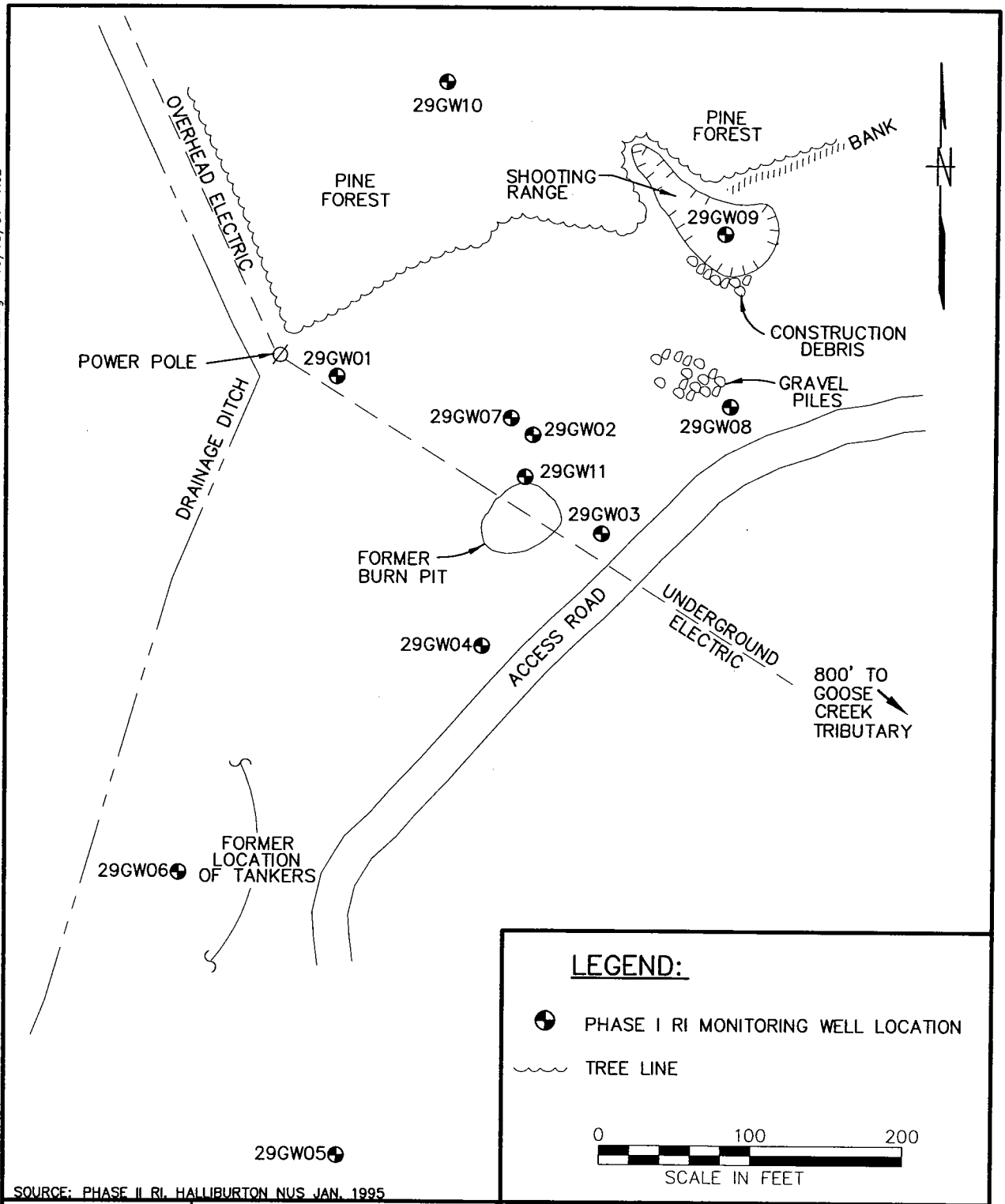
Source: Phase II RI (Halliburton NUS, 1995)

1 North Carolina State Groundwater Standard
2 Federal Primary Maximum Contaminant Level (MCL)
3 Safe Drinking Water Act Action Level
4 Federal Secondary MCL



SOURCE: SWANSBORO USGS QUADRANGLE, CD# 34077, 034077F1.TIF

DRAWN BY DLT DATE 6/16/99	Tetra Tech NUS, Inc.	CONTRACT NO. 7415	OWNER NO. 0272
CHECKED BY DATE	SITE LOCATION MAP SITE 29–CRASH CREW BURN PIT MCALF BOGUE, NORTH CAROLINA	APPROVED BY DATE	
COST/SCHED–AREA		APPROVED BY DATE	
SCALE AS NOTED		DRAWING NO. FIGURE 1–1	REV. 0

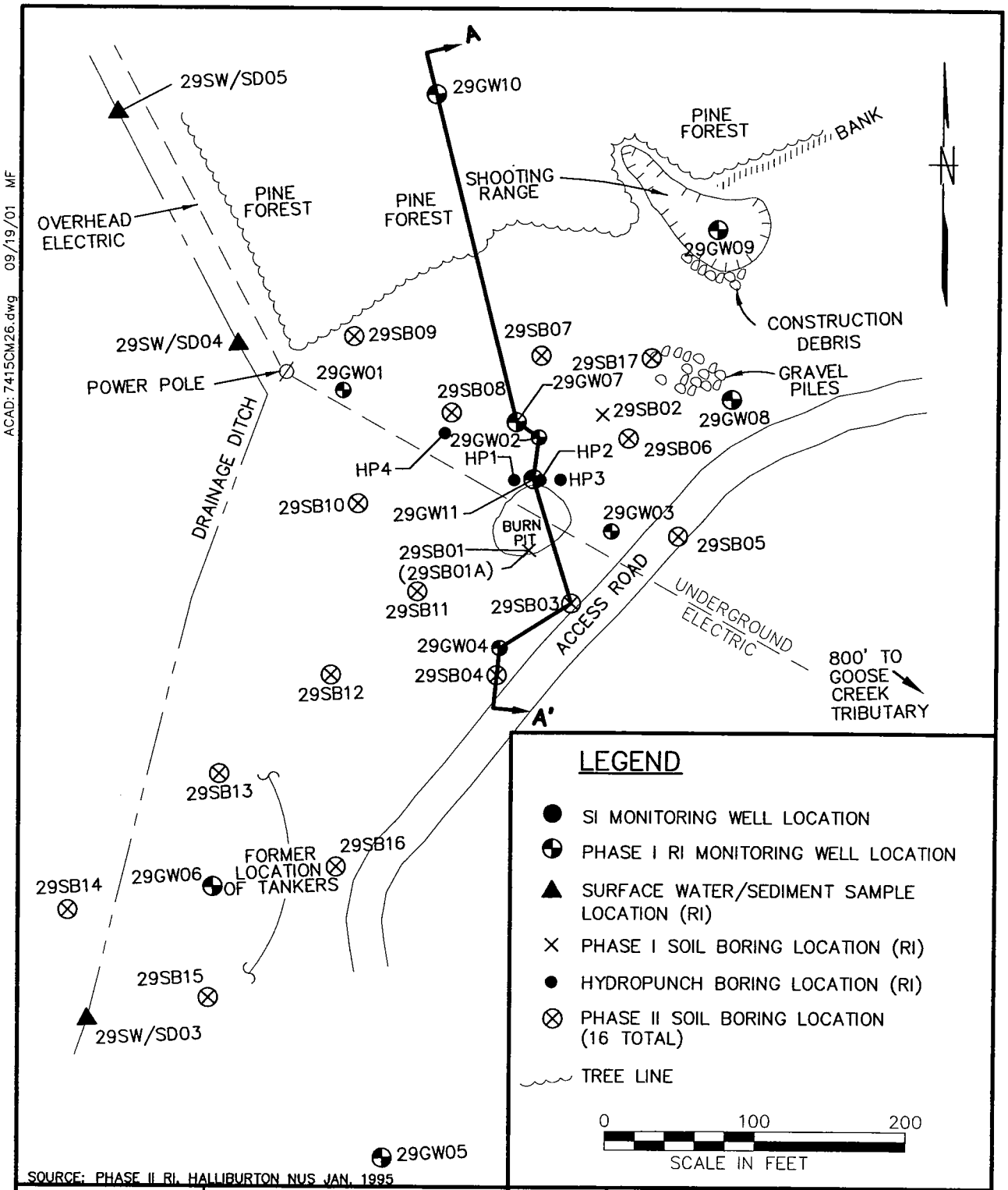


SOURCE: PHASE II RI, HALLIBURTON NUS JAN. 1995

ACAD: 7415CP02.dwg 10/18/01 HJB

DRAWN BY MF DATE 9/19/01	Tetra Tech NUS, Inc.	CONTRACT NO. 7415	OWNER NO. 0272
CHECKED BY DATE	SITE LAYOUT SITE 29–CRASH CREW BURN PIT MCALF BOGUE, NORTH CAROLINA	APPROVED BY DATE	
COST/SCHED–AREA		APPROVED BY DATE	
SCALE AS NOTED		DRAWING NO. FIGURE 1–2	REV. 0

FORM CADD NO. TtNUS_AV.DWG - REV 0 - 1/22/98



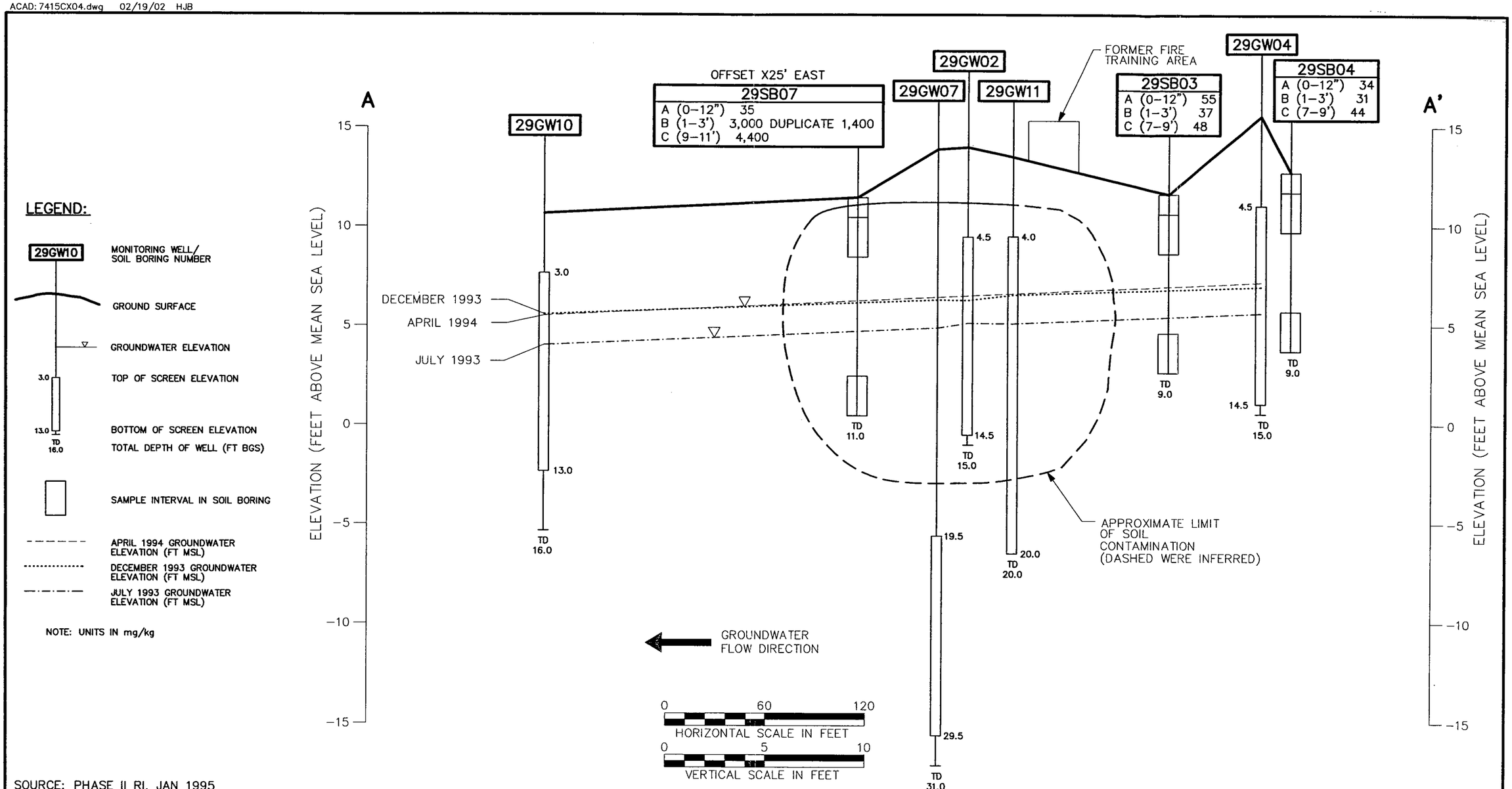
SOURCE: PHASE II RI, HALLIBURTON NUS JAN. 1995

ACAD: 7415CM26.dwg 09/19/01 MF

DRAWN BY DATE: HJP 6/30/99	Tetra Tech NUS, Inc.	CONTRACT NO. 7415	OWNER NO. 0272
CHECKED BY DATE	SITE AND CROSS SECTION LOCATION MAP SITE 29–CRASH CREW BURN PIT MARINE CORPS AUXILIARY LANDING FIELD BOGUE FIELD, NORTH CAROLINA	APPROVED BY DATE	
COST/SCHED–AREA		APPROVED BY DATE	
SCALE: AS NOTED		DRAWING NO. FIGURE 1–3	REV. 0

FORM CADD NO. TtNUS_AV.DWG - REV 0 - 1/22/98

ACAD: 7415CX04.dwg 02/19/02 HJB



LEGEND:

- 29GW10 — MONITORING WELL/ SOIL BORING NUMBER
- GROUND SURFACE
- GROUNDWATER ELEVATION
- 3.0 — TOP OF SCREEN ELEVATION
- 13.0 / TD 16.0 — BOTTOM OF SCREEN ELEVATION / TOTAL DEPTH OF WELL (FT BGS)
- SAMPLE INTERVAL IN SOIL BORING
- APRIL 1994 GROUNDWATER ELEVATION (FT MSL)
- DECEMBER 1993 GROUNDWATER ELEVATION (FT MSL)
- JULY 1993 GROUNDWATER ELEVATION (FT MSL)

NOTE: UNITS IN mg/kg

SOURCE: PHASE II RI, JAN 1995

NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

DRAWN BY HJB DATE 2/19/02
CHECKED BY DATE
COST/SCHED–AREA
SCALE AS NOTED

Tetra Tech NUS, Inc.

CROSS SECTION A–A'
RESIDUAL TPH ABOVE ACTION LEVELS
SITE 29–CRASH CREW BURN PIT
MCALF
BOGUE, NORTH CAROLINA

CONTRACT NO. 7415
OWNER NO. 0272
APPROVED BY DATE
APPROVED BY DATE
DRAWING NO. FIGURE 1–4
REV. 0

FORM CADD NO. TtNUS_BH.DGN - REV 0 - 1/20/98

2.0 INITIAL REMEDIAL ACTIONS

Free product removal and AS/SVE were conducted to address free product contamination identified at Site 29. Removal of the free product was required prior to implementation of the proposed corrective action for groundwater of monitored natural attenuation.

2.1 FREE PRODUCT REMOVAL

Floating product was first discovered in well 29GW02 in October 1990. A floating product thickness and recovery program was implemented in October 1991, and a product recovery well, 29GW11, was installed. The only monitoring wells at Site 29 that showed free product were 29GW02 and 29GW11. Various techniques of product recovery were used, including aggressive pumping in September 1991 and passive recovery and bailing from September 1991 to 1994.

None of the systems recovered significant amounts of product because of the relatively small amount of product that existed in the wells. Fewer than 60 gallons of product were removed from well 29GW02 using these methods. No significant amount of product was removed from 29GW11.

Monthly measurements of product thickness and the amount are presented in the RI Report (Halliburton NUS Corporation, 1995). The report also discusses a possible relationship to rainfall. Product recovery amounts appeared to cycle annually, with maximum recovery occurring in the summer months.

These methods of addressing the free product were not effective so alternative methods were evaluated, including AS/SVE, which was implemented in September 1997.

2.2 AIR SPARGING AND SOIL VAPOR EXTRACTION (AS/SVE) REMEDIAL SYSTEM

Installation of the AS/SVE system wells and system startup began in September 1997. The layout of the AS/SVE system is shown on Figure 2-1 and photographs of the system and site layout are provided as Photos 2-1 and Photos 2-2. Information on activities associated with the investigation of Site 29 were provided in the initial Letter Report (TtNUS, 1999) and Year Three Letter Report (TtNUS, 2000). The system is currently operational, and all free product has been eliminated.

A summary of the site activities conducted from installation through preparation of this CAP is provided in Table E-1 in Appendix E. Information on the operational status of the AS/SVE system and physical parameters measured during system operation is provided in Tables E-2 and E-3.

2.2.1 System Operation Overview

The project scope included monthly evaluation of the system for 12 months after start-up. After 1 month of full operation (October 1997), groundwater samples were collected, and after 6 months of operation (April 1998), soil and groundwater samples were collected in accordance with the work plan. In May 1998, it was decided that system evaluation would be performed every 2 months as a cost savings measure. This enabled the system to be evaluated for a longer period than the originally budgeted 1-year period. In July 1998, additional groundwater samples were collected to determine whether migration of the groundwater plume had occurred. Based on the free product remaining at the site after 12 months of operation (October 1998), additional sampling was put on hold pending further operation of the system and evaluation of the data. It was also determined that the system was going out of service too often, and system evaluations were returned to a monthly basis in December 1998. In May 1999, the Navy decided to extend the operation of the AS/SVE system for an additional 12-month period.

A meeting with the Navy and state to discuss the Status Letter Report was held on July 27, 1999. At the meeting, it was decided the system would be rewired to allow independent operation of the AS and SVE systems. This was acceptable because the extracted vapors no longer required treatment. Rewiring of the system reduced the downtime of the system as a whole. It was also decided that run meters would be installed on each blower to track the amount of time the individual systems were operational. Table E-2 in Appendix E provides the number of hours between system evaluations, the number of hours the system was operational, and the number of hours the system was not operating. The meters were installed during the August 25, 1999 field effort along with a full round of sampling, which was also requested during the July meeting. The sampling effort included four soil, four groundwater, and one air sample.

Beginning in July 1999, floating black floc, not typical free product, was observed in some of the vapor extraction wells. After October 1999, floating free product was not observed in any of the vapor extraction wells. By April 2000, the floating floc was no longer present, and a sinking black aqueous material was observed, with clear water above. Repairs to the system were made in February 2000. In May 2000, two samples of the sinking black aqueous material were collected and analyzed for Gasoline Range Organics (GRO) and Diesel Range Organics (DRO).

In June 19, 2000, the Navy decided to continue operation of the system through January 2001. Since the June 2000 field effort, the system has been in full operation; however, during the July field efforts, it was noted that the SVE system was off-line because of the high water table. Site 29 is subject to localized flooding, and this type of flooding has occurred several times during the operation of this system, including the August 2000 effort. Repairs to the system were required because of the localized flooding,

and the system was off-line for a good portion of the late summer months. However, the free product never reappeared.

The system was back in full operation during the September 2000 field effort. Observation of the wells identified no signs of free product and no signs of sinking or floating floc. The only well with any signs of contamination (discoloration) was VE21. The December 2000 event provided similar results.

On February 6, 2001, a meeting was held with the Navy and state to discuss project status and conduct a site visit. Again, no free product was observed, and only minor tinting of groundwater in some of the extraction wells was observed. In May 2001, system repairs were conducted to permit operation of the system while the state reviewed the status of the project. The July 2001 effort had similar results, and plans were made to collect a final round of groundwater and soil samples prior to submission of the CAP.

A confirmation round of soil and groundwater sampling was conducted the week of October 1, 2001. The AS/SVE system was shut off on September 10, 2001, approximately 2 weeks prior to the sampling effort. The results of the sampling are discussed in Section 3.0.

2.2.2 Free Product Evaluation

Free product was identified in the vapor extraction wells during the first system evaluation in September 1997. The system and monitoring wells were checked for free product using a clear disposable bailer. After the first 2 weeks following system start-up, free product was only observed in the vapor extraction wells. The observed free product thickness is summarized in Table 2-1.

From January 1999 through June 1999, measurable free product persisted in the vapor extraction wells; however, toward the end of this period, floating black “floc” began to appear. Over the next 6 months, less free product and more “floc” was observed. December 1999 was the last time measurable floating free product was reported. No free product, only floating “floc,” was observed in January and February 2000. In April 2000, no floating product or material was present; however, a sinking black aqueous material was noted. This material was sampled for GRO and DRO in May 2000. Also during this evaluation, a product sheen was noted in vapor extraction well VE21.

By August 2000, the sinking black floc material was gone in most of the vapor extraction wells, and all the other wells remained clean. No free product and very little, if any, signs of contamination (e.g., tinting or floc) have been observed since then.

2.2.3 Analytical Results

Prior to AS/SVE system start-up in September 1997, baseline soil and groundwater samples were collected. Groundwater samples were collected from monitoring wells 29GW02 and 29GW11. Soil samples were collected at five locations (29SB19 through 29SB23) at depth intervals of 1 to 3 feet bgs and 4 to 6 feet bgs. During the operation of the system, groundwater and soil samples were collected to monitor system progress. Air samples were collected to verify compliance with regulatory and health and safety requirements.

2.2.3.1 Soil Data

Analytical results of the soil sampling conducted in conjunction with the AS/SVE system are summarized on Figure 2-2. Baseline soil samples were collected in September 1997 and approximately 6 months later in April 1998. The results of the sampling effort were discussed in the AS/SVE System Letter Report (TtNUS, 1999). Another round of soil samples was collected in August 1999 from soil boring locations 29SB20 and 29SB22 in the immediate area of the AS/SVE system. All samples were analyzed for BTEX, GRO, DRO, eicosane, pyrene, and nonane.

As identified on Figure 2-2, the primary constituents of concern are DRO and GRO. Concentrations of these constituents decreased between system start-up and August 1999. The highest concentrations of the constituents persist near the static water-table depth (4 to 6 feet bgs).

2.2.3.2 Groundwater

The groundwater analytical results used to evaluate the AS/SVE system are summarized in Table 2-2, along with selected results from the Phase II RI sampling. The groundwater samples were analyzed for BTEX constituents. Baseline groundwater samples were collected from shallow monitoring wells 29GW02 and 29GW11 in the identified source area. Groundwater samples were also collected in October 1997, April 1998, July 1998, and August 1999. During July 1998, samples were also collected from monitoring well 29GW03 located upgradient of the source area, and well 29GW10, located downgradient of the source area.

The analytical results from monitoring wells in the source area (29GW02 and 29GW11) showed almost complete removal of the BTEX constituents after 1 month of system operation, except for one detection of benzene in well 29GW02, that slightly exceeded regulatory standards. Subsequent sampling of these wells did not identify BTEX contamination.

Based on an evaluation of the April 1998 groundwater sampling results, a decision was made to sample wells upgradient and downgradient of the source area and to resample the source area wells with the AS/SVE system shut off. The air injection system was taken off line 1 week before sampling. Concentrations in the upgradient well (29GW03) did not change compared to the RI sampling event in April 1994, when no BTEX was detected. The downgradient well (29GW10) showed a slight increase in benzene and ethylbenzene concentrations; however, toluene and xylene showed a slight decrease.

The last round of groundwater sampling associated with the operation of the AS/SVE system was conducted in August 1999. Four shallow monitoring wells were sampled in August 1999 in the system area (29GW02), downgradient of the system (29GW01 and 29GW10), and sidegradient to the system (29GW08). The groundwater samples were analyzed for BTEX and TPH. All the analytical results were below regulatory criteria except for one detection of benzene in 29GW10. Benzene was detected at a concentration of 2.9 µg/L, which is slightly above the regulatory criterion of 1.0 µg/L. However, the concentration decreased from the previous sampling efforts in 1994 and 1998 that detected benzene concentrations of 7.6 µg/L and 13.0 µg/L, respectively.

In May 2000, the sinking black aqueous material that was noted in the vapor extraction wells was sampled. The liquid was analyzed for GRO and DRO. The results of the sample collected from VE19 were 110,000 µg/L GRO and 1,700,000 µg/L DRO and for VE24 were 8,300 µg/L GRO and 160,000 µg/L DRO. The clear groundwater above the sinking material was not sampled.

2.2.3.3 Air

Air samples were collected during start-up of the system and during monthly system evaluations to determine the amount of contamination being extracted and whether treatment of the off-gas was required. As reported in the AS/SVE Letter Report (TtNUS, 1999), modeling concluded that off-gas treatment was not required to meet the regulatory and health and safety requirements. The off-gas treatment unit was taken off line in December 1997.

Since the initial status letter report, air samples were collected in August 1999 and June 2000. The analytical results from all the air sampling efforts are provided in Table 2-3. The results indicate contaminant concentrations in the off-gas were at levels that did not exceed Occupational Safety and Health Administration (OSHA) permissible exposure levels or EPA Region 3 risk-based concentrations. The concentrations did not exceed those that were used to conduct the modeling.

2.2.4 AS/SVE System Status

The AS/SVE system has been shut down. The PVC piping is generally in good condition; however, some of the connections have required replacement. Several extraction wells were damaged during storm events and during grass cutting operations. Repairs to various wells were conducted. VE21 and VE27 remain out of service and required relatively extensive repairs. The plastic sheeting has several punctures and tears, but the nylon netting is preventing the rips from getting larger. Repairs have been made to address this damage. The facility is keeping up with the grass mowing operation in the area; however, there are many thick vegetation outcrops within the system area. The system pressure, vacuum, and flow rate measurements are all within the desired ranges. The AS blower rotary vanes have been replaced three times, and the AS blower drive couple has also been replaced. The system is currently in good operating condition but does have a history of going off line. The main causes for the system going off line include excessive water in moisture separator due to high water table, intentional shut-offs during storm events, and equipment failures.

After the October 2001 confirmation sampling effort, the AS/SVE system was restarted and system parameters were collected. It is assumed that, upon implementation of the CAP, the AS/SVE system will be demobilized and system well abandonment will be conducted.

TABLE 2-1

FREE PRODUCT THICKNESS SUMMARY (INCHES)
SITE 29 - CRASH CREW BURN PIT
MCALF BOGUE, NORTH CAROLINA

WELL ID	9/6/1997*	9/17/1997	9/30/1997	10/2/1997	10/30/1997	11/20/1997	12/17/1997	1/27/1998	2/19/1998	4/1/1998	5/20/1998	7/20/1998	9/30/1998	11/30/1998	1/11/1999	5/13/1999	6/23/1999	7/27/1999	8/25/1999
VE18	-	**0.125**	0.0	**0.125**	**0.25**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0[2]	0.0[2]
VE19	-	**0.75**	0.0	0.0	**2.5**	0.0	0.0	0.0	0.0	0.0	0.0	**3.5**	0.0	**1.0**	0.0	0.0	0.0[1]	0.25[3]	**4.0**
VE20	-	0.0	0.0	0.0	0.0	**0.25**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.25**	0.0[1]	0.0[2]	0.0[2]
VE21	-	**12.5**	**0.25**	**2.0**	**6.8**	**12.0**	**17.0**	**0.125**	0.0	**0.25**	0.0	**4.0**	**6.0**	**1.5**	**0.125**	**0.5**	**0.25**	0.0[2]	**6.0** & 3[3]
VE22	-	0.0	0.0	**0.125**	0.0	**12.5**	**18.0**	0.0	0.0	**0.25**	0.0	**0.125**	0.0	0.0	0.0	0.0	0.0	0.0	0.0[2]
VE23	-	NA	**5.0**	**0.125**	**2.0**	NA	**0.125**	**6.0**	0.0	0.0	0.0	**11.0**	**0.25**	**0.125**	0.0	0.0	0.0		0.5[3]
VE24	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**1.0**	**0.5**	0.0	**0.125**	**3.75**	0.0	0.0[1]	**3.0**
VE25	-	**0.125**	0.0	0.0	0.0	**0.125**	**0.125**	0.0	0.0	0.0	0.0	**2.0**	**1.0**	**0.25**	0.0	0.0	0.0	0.0	**4.0**
VE26	-	**9.0**	**2.0**	0.0	**4.0**	**0.25**	0.0	0.0	0.0	0.0	0.0	**3.5**	0.0	**0.25**	0.0	**0.5**	0.0[1]	**0.25**	**3.0**
VE27	-	**8.0**	**0.25**	**0.125**	**6.0**	**6.0**	**13.0**	**6.0**	0.0	**0.25**	0.0	**3.5**	**1.0**	**2.0**	**0.5**	**0.5**	**0.125**	0.25[3]	**4.0**
Avg. depth to GW (feet bgs)	**6.7**	**6.5**	**5.2**	**na**	**5.6**	**5.3**	**4.3**	**3.1**	**0.8**	**4.1**	**3.8**	**5.6**	**4.5**	**5.5**	**4.6**	**4.9**	**4.9**	**5.8**	**6.6**

WELL ID		10/4/1999	10/27/1999	12/9/1999	1/5/2000	2/24/2000	4/3/2000	5/8/2000	6/27/2000	7/25/2000	8/30/2000	9/29/2000	11/7/2000	12/19/2000	2/7/2001	5/24/2001	7/10/2001	10/3/2001
VE18		0.0[2]	0.0	0.0	0.0	0.0	0.0	0.0	0.0[4]	0.0[4]	0.0[5]	0.0[5]	0.0[4]	0.0[5]	0[6]	0.0[5]	0.0	0.0
VE19		0.125[3]	0.0	0.0	0.5[3]	0.5[3]	0.0	0.0[4]	0.0	0.0	0.0[4]	0.0[5]	0.0[4]	0.0[4]	0.0	0.0	0.0	0.0[7]
VE20		0.0	**0.5**	0.0	2.0[3]	0.0	0.0	0.0[4]	0.0[4]	0.0	0.0	0.0	0.0	0.0	0[6]	0[6]	0.0	0.0[7]
VE21		**4.0**	**0.5**	2.0[3]	0.0	0.0	0.0	0.0[1,4]	0.0	0.0[3]	0.0[4]	0.0[5]	0.0[1,4]	0.0[1,4]	0[6]	0.0[1,4]	0.0	0.0[8]
VE22		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0[5]	0.0[5]	0.0[5]	0.0	0.0[5]	0.0	0.0
VE23		0.0	0.0	0.0	0.0	0.0	0.0[4]	0.0[4]	0.0[1,4]	0.0[5]	0.0[5]	0.0[5]	0.0[5]	0.0[4]	0.0	0.0[5]	0.0	0.0[7]
VE24		0.0	0.0	0.0	0.0	0.0	0.0[4]	0.0[4]	0.0[4]	0.0[5]	0.0	0.0[4]	0.0[5]	0.0[5]	0.0	0.0[5]	0.0	0.0[7]
VE25		0.125[3]	0.0	0.0	0.0	0.0	0.0[4]	0.0[4]	0.0[4]	0.0[4]	0.0	0.0[5]	0.0	0.0	0.0	0.0[4]	0.0[6]	0.0
VE26		0.0	0.0	0.0	0.0	0.0	0.0[4]	0.0[4]	0.0[4]	0.0[4]	0.0	0.0[5]	0.0[5]	0.0[5]	0[6]	0.0[6]	0.0[5]	0.0
VE27		0.25[3]	**0.15** & 3[3]	2.0[3]	0.0	0.25[3]	0.0	0.0	0.0[4]	0.0[4]	0.0	0.0[4]	0.0[5]	0.0[5]	0[6]	0.0	0.0	0.0
Avg. depth to GW (feet bgs)		**3.6**	**3.9**	**4.5**	**5.0**	**4.9**	**5.3**	**4.3**	**5.6**	**3.4**	**1.9**	**2.8**	**5.1**	**3.9**	**4.7**	**5.5**	**4.7**	**4.9**

* System installation.

1 Sheen.
2 Black floc or black flocks.
3 Floating floc, not typical free product.
4 Black material or floc identified at bottom of bailer or in multiple bails.
5 Black material or floc identified only after multiple bails at bottom.
6 Some tinting of groundwater, but no observed black floc or liquid.
7 Black tint or liquid but no sheen or smell.
8 No product, minor tint or some black flocs at bottom, petroleum smell.

Note: Only the vapor extraction (VE) wells had visible free product.
January through April 1998 were extremely rainy months with a very high water table.
Area was subject to flooding during heavy rain periods.
Free product measured in inches.
Beginning July 1999 a floating black floc was observed along with free product.
Beginning with the December 2000 sampling event, floating free product was no longer observed in the vapor extraction wells and only a floating black floc product was identified.
In April 2000, the floating floc was no longer present and a sinking black aquous material was observed.

TABLE 2-2

GROUNDWATER ANALYTICAL RESULTS USED TO EVALUATE THE AS/SVE SYSTEM
SITE 29 - CRASH CREW BURN PIT
MCALF BOGUE, NORTH CAROLINA

		29GW02						29GW11			
Chemical	**Regulatory Standard**	4/24/94	9/7/97	10/17/97	4/2/98	7/20/98	8/24/99	9/7/97	10/17/97	4/2/98	7/20/98
Benzene	1.0 (1)	**86 ug/l**	**19.0 ug/l**	**1.4 ug/l**	<1 ug/l	<1 ug/l	<1 ug/l	<5 ug/l	<1 ug/l	<1 ug/l	<1 ug/l
Ethylbenzene	29 (1)	**38 ug/l**	**31.0 ug/l**	<1 ug/l	<1 ug/l	<1 ug/l	<1 ug/l	**15.0 ug/l**	<1 ug/l	<1 ug/l	<1 ug/l
Toluene	1,000(1,2)	<1 ug/l	<5 ug/l	<1 ug/l	<1 ug/l	<1 ug/l	<1 ug/l	**13.0 ug/l**	<1 ug/l	<1 ug/l	<1 ug/l
Xylenes, Total	530 (1)	**134 ug/l**	**94.0 ug/l**	<1 ug/l	<1 ug/l	<1 ug/l	<1 ug/l	**4.0 ug/l**	<1 ug/l	<1 ug/l	<1 ug/l

		29GW03		29GW10			29GW01		29GW08	
Chemical	**Regulatory Standard**	4/24/94	7/20/98	4/24/94	7/20/98	8/24/99	4/24/94	8/24/99	4/24/94	8/24/99
Benzene	1.0 (1)	**0.3 ug/l**	<1 ug/l	**7.6 ug/l**	**13.0 ug/l**	**2.9 ug/l**	<1 ug/l	<1 ug/l	<1 ug/l	<1 ug/l
Ethylbenzene	29 (1)	<1 ug/l	<1 ug/l	**0.6 ug/l**	**0.8 ug/l**	<1 ug/l	**7.6 ug/l**	<1 ug/l	<1 ug/l	<1 ug/l
Toluene	1,000(1,2)	<1 ug/l	<1 ug/l	**0.4 ug/l**	<1 ug/l	<1 ug/l	<1 ug/l	<1 ug/l	<1 ug/l	<1 ug/l
Xylenes, Total	530 (1)	<1 ug/l	<1 ug/l	**6.6 ug/l**	**2.7 ug/l**	<1 ug/l	**9.3 ug/l**	<1 ug/l	<1 ug/l	<1 ug/l

All analytical data are contained in Appendix A.
Bold = Detected value.
Results for 4/94 are from samples collected before installation and operation of the AS/SVE system.
1 North Carolina State Groundwater Standard.
2 Federal Primary Maximum Contaminant Level (MCL).

TABLE 2-3

AIR ANALYTICAL RESULTS
SITE 29 - CRASH CREW BURN PIT
MCALF BOGUE, NORTH CAROLINA

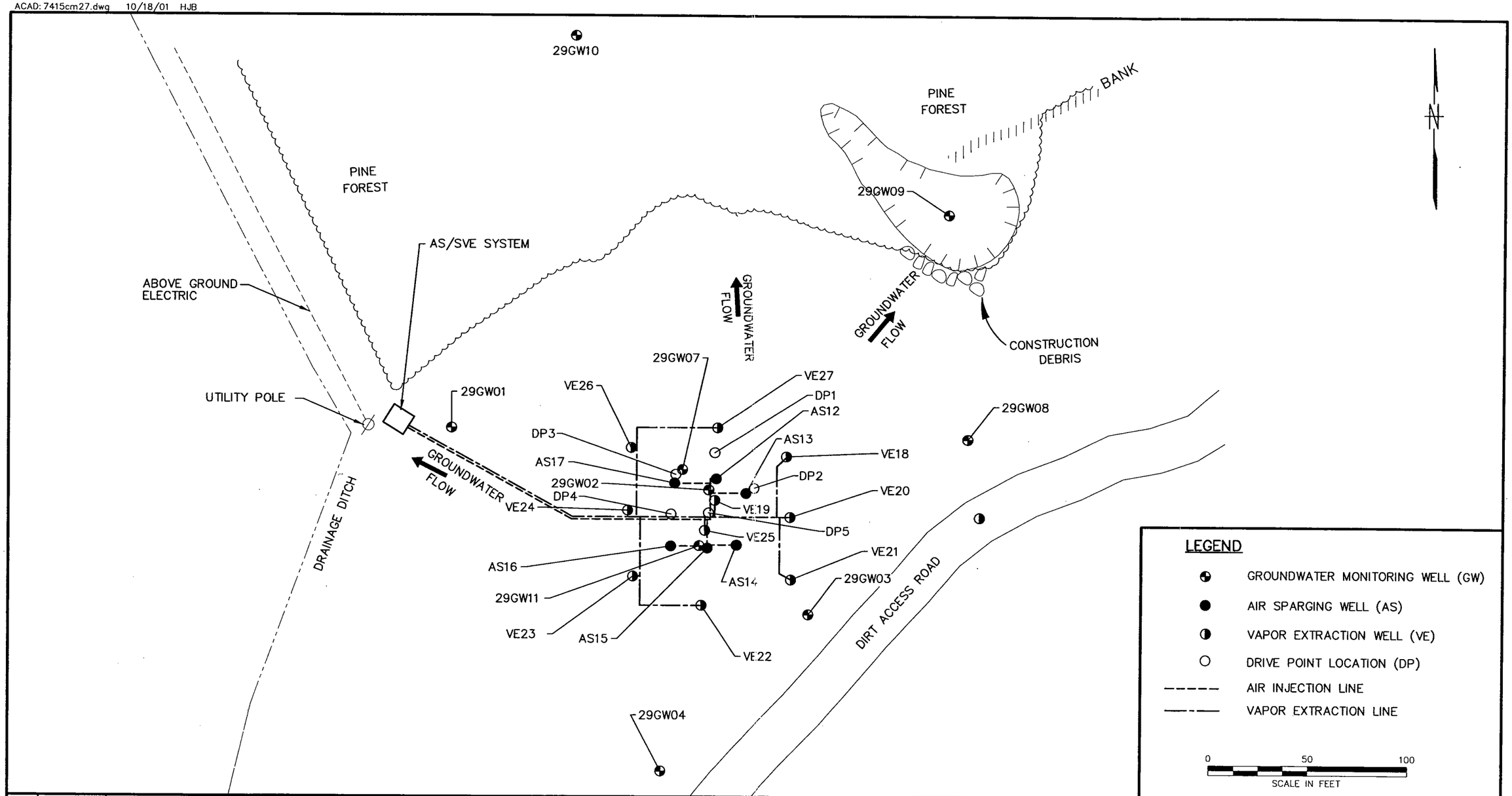
Analyte	9/12/97 SVE Only	10/3/97	11/20/97	12/18/97	1/27/98[1]
Oxygen	15.0 %	20 %	23 %	17 %	22 %
Carbon dioxide	3.40 %	1 %	0.35 %	4.1 %	0.048 %
Benzene	**1500 ppb**	**45 ppb**	<6.9 ppb	**29 ppb**	<6.7 ppb
Toluene	<68 ppb	<24 ppb	<6.9 ppb	<6.9 ppb	<6.7 ppb
Ethylbenzene	**3400 ppb**	**140 ppb**	**12 ppb**	**45 ppb**	<6.7 ppb
m,p-Xylene	**7400 ppb**	**380 ppb**	**50 ppb**	**160 ppb**	<6.7 ppb
o-Xylene	**330 ppb**	<24 ppb	<6.9 ppb	**22 ppb**	<6.7 ppb

Analyte	2/19/98[1]	4/1/98[1]	5/20/98	7/21/98	9/30/98[2]
Oxygen	22 %	21 %	21 %	16 %	12 %
Carbon dioxide	0.039 %	0.2 %	0.3 %	3 %	9.2 %
Benzene	<0.67 ppb	<3.6 ppb	<0.68 ppb	**44 ppb**	**14 ppb**
Toluene	<0.67 ppb	<3.6 ppb	**2 ppb**	<35 ppb	<3.5 ppb
Ethylbenzene	<0.67 ppb	<3.6 ppb	**1.4 ppb**	**66.0 ppb**	**30.0 ppb**
m,p-Xylene	<0.67 ppb	**12 ppb**	**5 ppb**	**100 ppb**	**26 ppb**
o-Xylene	<0.67 ppb	<3.6 ppb	**2.6 ppb**	<35 ppb	**8.7 ppb**

Analyte	1/12/99	5/14/99	8/25/99	6/27/00	2/6/01
Oxygen	14 %	19 %	14 %	17 %	21 %
Carbon dioxide	4.8 %	0.12 %	4.1 %	3.8 %	0.49 %
Benzene	<6.7 ppb	<6.8 ppb	**77 ppb**	**8.3 ppb**	<2.0 ppb
Toluene	<6.7 ppb	<6.8 ppb	**170 ppb**	**61 ppb**	<2.0 ppb
Ethylbenzene	**9.2 J ppb**	<6.8 ppb	**73 ppb**	**9.2 ppb**	<2.0 ppb
m,p-Xylene	**6.7 J ppb**	<6.8 ppb	**80 ppb**	**15 ppb** [3]	**3.5 ppb** [3]
o-Xylene	<6.7 ppb	<6.8 ppb	<24 ppb	NA	NA

NOTE: Air samples shown on this table were collected between vacuum blower and first GAC unit.
Bold = Detected value.
1 January through April 1998 had exceptionally high water table. Vadoze zone screened area not fully represented and may have provided false non-detections when considering the seasonal low full vadose zone as treatment area. March water levels were still high.
2 AS unit was not operating, which explains the lower oxygen and higher carbon dioxide.
3 Total xylenes.

ACAD: 7415cm27.dwg 10/18/01 HJB



NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

DRAWN BY HJP DATE 7/13/99
CHECKED BY DATE
COST/SCHED-AREA
SCALE AS NOTED

Tetra Tech NUS, Inc.

AS/SVE SYSTEM LAYOUT MAP
SITE 29 – CRASH CREW BURN PIT
MCALF
BOGUE, NORTH CAROLINA

CONTRACT NO. 7415
OWNER NO. ———
APPROVED BY DATE
APPROVED BY DATE
DRAWING NO. FIGURE 2-1
REV. 0

FORM CADD NO. TtNUS_BH.DGN - REV 0 - 1/20/98

ACAD: 4153GT01.dwg 06/10/03 HJB PIT

SB-21

	NCDENR ACTION LEVEL	1'-3' bgs		4'-6' bgs	
		9/6/97	4/2/98	9/6/97	4/2/98
BENZENE	5.6	<11	<11	<670	<1400
ETHYLBENZENE	240	<11	<11	5,100	6,700
TOLUENE	7,000	<11	<11	<670	<1400
XYLENES	5,000	<11	<11	19,000	4,500
DRO	40 mg/kg	8,200 mg/kg	10,000 mg/kg	29,000 mg/kg	13,000 mg/kg
GRO	10 mg/kg	300 mg/kg	880 mg/kg	8,400 mg/kg	2,600 mg/kg
PYRENE	286,000	<350	<360	150	<380
NONANE	NA	<71 mg/kg	<1.8 mg/kg	190 mg/kg	2.2 mg/kg
EICOSANE	NA	<71 mg/kg	<1.8 mg/kg	190 mg/kg	<1.9 mg/kg

SB-20

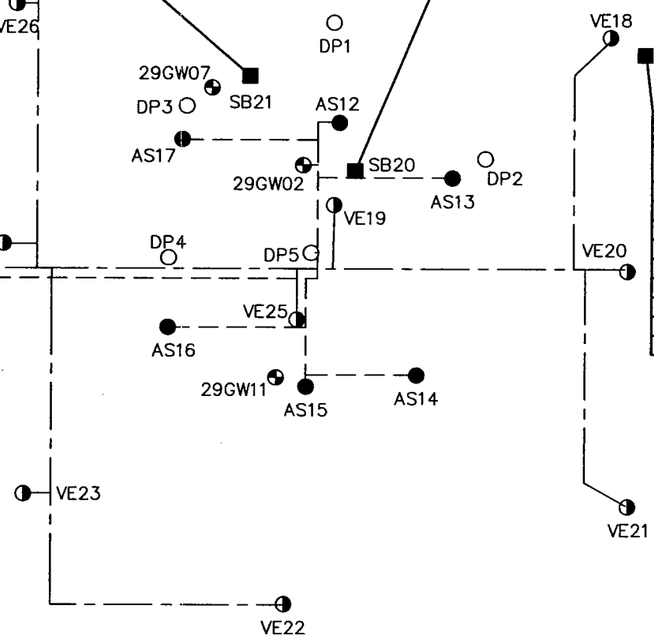
	NCDENR ACTION LEVEL	1'-3' bgs			4'-6' bgs		
		9/6/97	4/2/98	8/25/99	9/6/97	4/2/98	8/25/99
BENZENE	5.6	<11	<1300	<11	<670	<1400	<120
ETHYLBENZENE	240	<11	<1300	<11	3,000	17,000	<120
TOLUENE	7,000	<11	<1300	<11	<670	<1400	<120
XYLENES	5,000	3	<1300	<11	7,400	14,000	<120
DRO	40 mg/kg	<3.5 mg/kg	11,000 mg/kg	5,800 mg/kg	19,000 mg/kg	8,900 mg/kg	13,000 mg/kg
GRO	10 mg/kg	6.7 mg/kg	2,500 mg/kg	<14	6,200 mg/kg	2,500 mg/kg	160 mg/kg
PYRENE	286,000	<350	<370	<370	<370	<390	<400
NONANE	NA	<0.18 mg/kg	2.4 mg/kg	<9.5 mg/kg	<180 mg/kg	3.4 mg/kg	<10
EICOSANE	NA	<0.18 mg/kg	<1.8 mg/kg	<9.5 mg/kg	<180 mg/kg	3.4 mg/kg	<10

SB-19

	NCDENR ACTION LEVEL	1'-3' bgs		4'-6' bgs	
		9/6/97	4/2/98	9/6/97	4/2/98
BENZENE	5.6	<12	<11	2	<12
ETHYLBENZENE	240	<12	<11	160	82
TOLUENE	7,000	<12	<11	<11	3
XYLENES	5,000	<12	<11	370	200
DRO	40 mg/kg	370 mg/kg	320 mg/kg	8,300 mg/kg	3,700 mg/kg
GRO	10 mg/kg	<3.1 mg/kg	65 mg/kg	2,700 mg/kg	880 mg/kg
PYRENE	286,000	<410	<360	<350	<390
NONANE	NA	<2.1 mg/kg	<1.8 mg/kg	<45 mg/kg	2.1 mg/kg
EICOSANE	NA	<2.1 mg/kg	<1.8 mg/kg	<45 mg/kg	<2.0 mg/kg

SB-22

	NCDENR ACTION LEVEL	1'-3' bgs				4'-6' bgs		
		9/6/97 (DUP)		4/2/98	8/25/99	9/6/97	4/2/98	8/25/99
BENZENE	5.6	<55	<110	<11	<11	<11	<1400	<110
ETHYLBENZENE	240	410	600	<11	<11	<11	<1400	630
TOLUENE	7,000	<55	<110	<11	<11	<11	<1400	<110
XYLENES	5,000	100	120	<11	<11	<11	<1400	210
DRO	40 mg/kg	45,000 mg/kg	NA	3,200 mg/kg	3,000 mg/kg	320 mg/kg	13,000 mg/kg	7,900 mg/kg
GRO	10 mg/kg	3,100 mg/kg	NA	500 mg/kg	<2.8	720 mg/kg	3,200 mg/kg	88 mg/kg
PYRENE	286,000	88	NA	<350	39	<350	57	43
NONANE	NA	<370 mg/kg	NA	<1.8 mg/kg	<9.2	<1.8 mg/kg	3 mg/kg	<9.0
EICOSANE	NA	<370 mg/kg	NA	<1.8 mg/kg	<9.2	<1.8 mg/kg	<1.9 mg/kg	<9.0



LEGEND:

- GROUNDWATER MONITORING WELL
- DRIVE POINT
- BASELINE SOIL SAMPLE
- VAPOR EXTRACTION WELL
- AIR SPARGING WELL
- AIR INJECTION LINE
- VAPOR EXTRACTION LINE
- NA NOT ANALYZED

0 20 40
SCALE IN FEET

NOTES:

1. SOIL BORING SB-23 SAMPLES COLLECTED AT 1' TO 3' AND 4' TO 6' NOT SHOWN. RESULTS WERE ALL NON DETECTS EXCEPT FOR GRO @ 1' TO 3' @ 9.1 mg/kg. SB23 IS LOCATED WEST OF SB22. SB23 NOT RESAMPLED IN 1997 OR 1998.
2. ALL CONCENTRATIONS PRESENTED IN µg/kg EXCEPT WHERE OTHERWISE NOTED.

NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

DRAWN BY HJB DATE 6/10/03
CHECKED BY DATE
COST/SCHED-AREA
SCALE AS NOTED

Tetra Tech NUS, Inc.

SOIL SAMPLES
SITE 29-CREW CRASH BURN PIT
MCALF
BOGUE, NORTH CAROLINA

CONTRACT NO. 4153 | OWNER NO. 0829
APPROVED BY DATE
APPROVED BY DATE
DRAWING NO. FIGURE 2-2 | REV. 0

FORM CADD NO. TtNUS_BH.DGN - REV 0 - 1/20/98

PHOTOS 2-1
AIR SPARGING/SOIL VAPOR EXTRACTION SYSTEM
MCALF BOGUE FIELD, NORTH CAROLINA

Looking Northwest: AS/SVE system layout identifying location of transformer, discharge stack, holding tank, and transformer lines

AS/SVE system layout

PHOTOS 2-2

AIR SPARGING/SOIL VAPOR EXTRACTION SYSTEM
MCALF BOGUE FIELD, NORTH CAROLINA

Site layout looking west

Site layout looking east

3.0 CURRENT SITE CONDITIONS

The AS/SVE system installed in September 1997 to address free product at Site 29 operated for 4 years and, as identified in Section 2.0, was successful in eliminating the free product. The system was shut off on September 10, 2001 before confirmation soil and groundwater samples were collected. These samples were collected the week of October 1, 2001 to provide data to confirm the effectiveness of the AS/SVE remedial system and provide a baseline for the proposed corrective action. The data collected is intended to augment previously collected data and support the requirements provided in The Groundwater Section Guidelines for the Investigation and Remediation of Soil and Groundwater for Sources Other Than Petroleum Underground Storage Tanks (NCDENR, 2000).

3.1 SOIL

The confirmation soil samples were collected at locations 29SB19, 29SB20, 29SB21, and 29SB22 at depth intervals of 1 to 3 feet and 4 to 6 feet. These are the same locations and depth intervals that were sampled during operation of the AS/SVE system. Chain-of-custody records and soil sample log sheets are provided in Appendix F. Soil samples were analyzed for the following parameters: BTEX (Method 8021), DRO and GRO (Modified Method 8015), and oil and grease (Method 9071A). The analytical results were validated, and the results of the validation are provided in Appendix G. The analytical results and a comparison to NCDENR action levels are provided in Table 3-1.

BTEX compounds were not detected in any of the soil samples at the detection limits that were obtained. Some of the detection limits were elevated to a concentration above the action level. This occurred for samples that required dilution because of interferences from high concentrations of GRO. DRO concentrations exceeded the NCDENR action level (40 mg/kg) at all locations except 29SB20 and 29SB2 at depth intervals of 1 to 3 feet. GRO concentrations exceeded the NCDENR action level (10 mg/kg) at all locations except 29SB20, 29SB21, and 29SB22 at depth intervals of 1 to 3 feet. All oil and grease concentrations exceeded the NCDENR action level (250 mg/kg). The exceedances of action levels for DRO, GRO, and oil and grease are consistent with the results for samples previously collected from 1997 to 1999.

As stated previously, this area is subject to flooding and has a generally high water table throughout the year. The average depth to groundwater near the AS/SVE system is between 4 and 5 feet below the ground surface (bgs). The depth to groundwater during the soil sampling event in October 1997 was around 6.7 feet bgs (as shown in Table 2-1). During the April 1998 sampling event the area had localized flooding and in August 1999 the depth to groundwater was approximately 6.6 feet bgs. During the last sampling event in October 2001, the average depth to groundwater was reported at 4.9 feet bgs.

Table 3-2 provides a comparison of the DRO, GRO, and BTEX results for samples collected between 1997 and 2001. For most locations, there is a general decrease in the concentrations for these analytes. The heterogeneous nature of the soil contamination does not permit specific comparisons of concentration trends. It was not possible to collect soil samples from the same exact locations for each sampling event. Although many of the detection limits for BTEX exceed NCDENR action levels (see Appendix G), soil contaminants are not currently detected in groundwater (see Section 3.2). All samples except 29SB20 (1 to 3 feet) and 29SB21 (1 to 3 feet) were analyzed at a dilution because of interference from the high concentrations of GRO in the samples.

3.2 GROUNDWATER

Groundwater samples were collected from monitoring wells 29GW01 through 29GW04, 29GW06 through 29GW08, 29GW10, and 29GW11 using low-flow and sampling methods. Some of these wells were also sampled during operation of the AS/SVE system. Chain-of-custody records, low-flow purge data sheets, groundwater sample log sheets, and well construction records are provided in Appendix F. Groundwater samples were analyzed for the following parameters: BTEX (Method 8260B), DRO, GRO, halogenated solvents, and nonhalogenated solvents (Methods 601 and 602), base-neutral extractable organics (Method 625), and TAL metals (Method 6010B). The analytical results were validated, and the results of the validation are provided in Appendix G. A summary of the positive analytical results and a comparison to NCDENR groundwater quality standards are provided in Table 3-3.

BTEX compounds, halogenated solvents, and nonhalogenated solvents were not detected in any groundwater sample. The only SVOCs detected were di-n-butyl phthalate (29GW02, 29GW07, and 29GW11), naphthalene (29GW10), and phenanthrene (29GW10). The detected concentrations of di-n-butyl phthalate and phenanthrene were below the state regulatory standards. The naphthalene concentration detected at location 29GW10 (28 µg/L) was higher than the state regulatory standard (21 µg/L). Well 29GW10 is the most downgradient well. No trend in the naphthalene concentration can be determined because previous groundwater samples were not analyzed for this compound. Naphthalene was not detected in groundwater upgradient of or closer to the source area than well 29GW10.

Many metals were detected in groundwater; however, only iron and manganese were detected at concentrations higher than the regulatory standards. Most detections of iron exceeded the state standard (300 µg/L), including the concentrations at upgradient wells 29GW04 (1,240 µg/L) and 29GW06 (2,680 µg/L). The highest iron concentration (14,900 µg/L) was detected at the most downgradient well (29GW10). The only other location where the iron concentration exceeded upgradient values was well 29GW01 (9,990 µg/L).

Manganese concentrations exceeded the state standard (50 µg/L) at wells 29GW01 (152 µg/L), 29GW07 (58.9 µg/L), and 29GW10 (681 µg/L). These wells are downgradient of the source area.

TABLE 3-1

SOIL ANALYTICAL RESULTS (OCTOBER 2001)
SITE 29 – CRASH CREW BURN PIT
MCALF BOGUE, NORTH CAROLINA

Analyte	NCDENR Action Level	29SB19		29SB20		29SB21			29SB22	
		1 – 3 feet	4 – 6 feet	1 – 3 feet	4 – 6 feet	1 – 3 feet	4 – 6 feet	4 – 6 feet (duplicate)	1 – 3 feet	4 – 6 feet
BTEX (µg/kg)										
Benzene	5.6	1,100 U	1,100 U	1.1 U	270 U	1.1 U	260 U	260 U	53 U	1,100 U
Ethylbenzene	240	1,100 U	1,100 U	1.1 U	270 U	1.1 U	260 U	260 U	53 U	1,100 U
Toluene	7,000	1,100 U	1,100 U	1.1 U	270 U	1.1 U	260 U	260 U	53 U	1,100 U
Xylenes	5,000	1,100 U	1,100 U	1.1 U	270 U	1.1 U	260 U	260 U	53 U	1,100 U
TPH (mg/kg)										
DRO	40	720	9,700	8.3	18,000	11 U	3,800	3,500	150	8,900
GRO	10	6,400	11,000	0.11 U	7,200	0.11 U	1,600	2,200	8.9	11,000
Oil & Grease	250	768	3,410	506	8,410	443	1,920	1,830	548	4,100

Detection limits in exceedance of NCDENR action levels due to required dilution due to interferences from high concentrations of GRO in samples.
U - Not detected at value reported by laboratory.

TABLE 3-2

SOIL BTEX, DRO, AND GRO ANALYTICAL RESULTS (1997 TO 2001)
SITE 29 - CRASH CREW BURN PIT
MCALF BOGUE, NORTH CAROLINA

Location	Depth (feet)	Date	Benzene (µg/kg)	Ethylbenzene (µg/kg)	Toluene (µg/kg)	Xylenes (µg/kg)	DRO (mg/kg)	GRO (mg/kg)
NCDENR Action Level			5.6	240	7000	5000	40	10
29SB19	1 - 3	9/6/1997	12 U	12 U	12 U	12 U	370	3.1 U
		4/2/1998	11 U	11 U	11 U	11 U	320	65
		10/4/2001	1100 U	1100 U	1100 U	1100 U	720	6,400
	4 - 6	9/6/1997	2	160	11 U	370	8300	2700
		4/2/1998	12 U	82	3	200	3700	880
		10/4/2001	1100 U	1100 U	1100 U	1100 U	9700	11,000
29SB20	1 - 3	9/6/1997	11 U	11 U	11 U	3	3.5 U	6.7
		4/2/1998	1300 U	1300 U	1300 U	1300 U	11,000	2500
		8/25/1999	11 U	120 U	11 U	11 U	5800	14 U
		10/4/2001	1.1 U	1.1 U	1.1 U	1.1 U	8.3	0.11 U
	4 - 6	9/6/1997	670 U	3000	670 U	7400	19,000	6200
		4/2/1998	1400 U	17000	1400 U	14000	8900	2500
		8/25/1999	120 U	120 U	120 U	120 U	13,000	160
		10/4/2001	270 U	270 U	270 U	270 U	18,000	7200
29SB21	1 - 3	9/6/1997	11 U	11 U	11 U	11 U	8200	300
		4/2/1998	11 U	11 U	11 U	11 U	10,000	880
		10/4/2001	1.1 U	1.1 U	1.1 U	1.1 U	11 U	0.11 U
	4 - 6	9/6/1997	670 U	5100	670 U	19,000	29,000	8400
		4/2/1998	1400 U	6700	1400 U	4,000	13,000	2600
		10/4/2001	260 U	260 U	260 U	260 U	3800	1600
		10/4/01 (dup)	260 U	260 U	260 U	260 U	3500	2200
29SB22	1 - 3	9/6/1997	55 U	410	55 U	100	45,000	3100
		9/6/97 (dup)	110 U	600	110 U	120	na	na
		4/2/1998	11 U	11 U	11 U	11 U	3200	500
		8/25/1999	11 U	11 U	11 U	11 U	3000	2.8 U
		10/4/2001	53 U	53 U	53 U	53 U	150	8.9
	4 - 6	9/6/1997	11 U	11 U	11 U	11 U	320	720
		4/2/1998	1400 U	1400 U	1400 U	1400 U	13,000	3200
		8/25/1999	110 U	630	110 U	210	7900	88
		10/4/2001	1100 U	1100 U	1100 U	1100 U	8900	11,000

Detection limits in exceedance of NCDENR action levels due to required dilution due to interferences from high concentrations of GRO in samples.
U - Not detected at value reported by laboratory.

TABLE 3-3

GROUNDWATER ANALYTICAL RESULTS (OCTOBER 2001)
SITE 29 - CRASH CREW BURN PIT
MCALF BOGUE, NORTH CAROLINA

Analyte	Regulatory Standard	29GW01	29GW02	29GW02 (Dup)	29GW03	29GW04	29GW06	29GW07	29GW08	29GW10	29GW11
Di-n-butyl phthalate	700	10 U	10 U	2	10 U	10 U	10 U	2.7	10 U	10 U	2.6
Naphthalene	21	20 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	**28**	10 U
Phenanthrene	210	20 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	1.2	10 U
Aluminum	NA	21.1 U	98	207	21.1 U	21.1 U	21.1 U	21.1 U	21.1 U	78	21.1 U
Arsenic	50	4	2.4 U	2.4 U	2.4 U	6.4	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U
Barium	2,000	16.6	12.7	12	11.5	6.3 U	10.3	16.3	31.5	14.3	8.0
Cadmium	5	0.51 U	0.63	0.51 U	0.51 U	0.51 U	0.51 U	0.51 U	0.51 U	0.51 U	0.51 U
Calcium	NA	96,400	116,000	115,000	80,000	37,300	51,000	105,000	94,900	39,800	102,000
Chromium	50	0.74 U	1.1	0.74 U	0.89	0.74 U	1.0	0.74 U	0.74 U	0.74 U	0.74 U
Copper	1,000	2.4 U	20.1	2.4 U	2.4 U	2.4 U	2.4 U	55.4	2.4 U	2.4 U	2.4 U
Iron	300	**9,990**	205	**360**	**302**	**1,240**	**2,680**	**2,610**	61.5 U	**14,900**	25.9 U
Lead	15	2.5 U	3.4	2.5 U	2.5 U	2.6	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Magnesium	NA	3,590	10,300	10,900	2,290	498	1,390	6,760	3,990	961	6,100
Manganese	50	**152**	28.3	25.5	1.8	14.5	18	**58.9**	3.5	**681**	3.5
Potassium	NA	1,270	1,020	1,020	925	481	748	438 U	2,020	818	556
Selenium	50	3.3 U	3.3 U	3.3 U	4.3	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U
Sodium	NA	8,710	8,970	8,560	10,800	10,700	10,500	9,870	8,260	19,500	8,890
Vanadium	NA	2.5 U	3.0	2.5 U	2.5 U	2.5 U	3.3	3.3	2.5 U	2.5 U	2.5 U
Zinc	2,100	2.4 U	225	2.4 U	2.4 U	2.4 U	2.4 U	4.3 U	2.4 U	2.4 U	2.4 U

Only those analytes which were detected are presented in this table.
Exceedances of regulatory standard are indicated in bold type.
NA - Standard not available.
U - Not detected at value reported by laboratory.

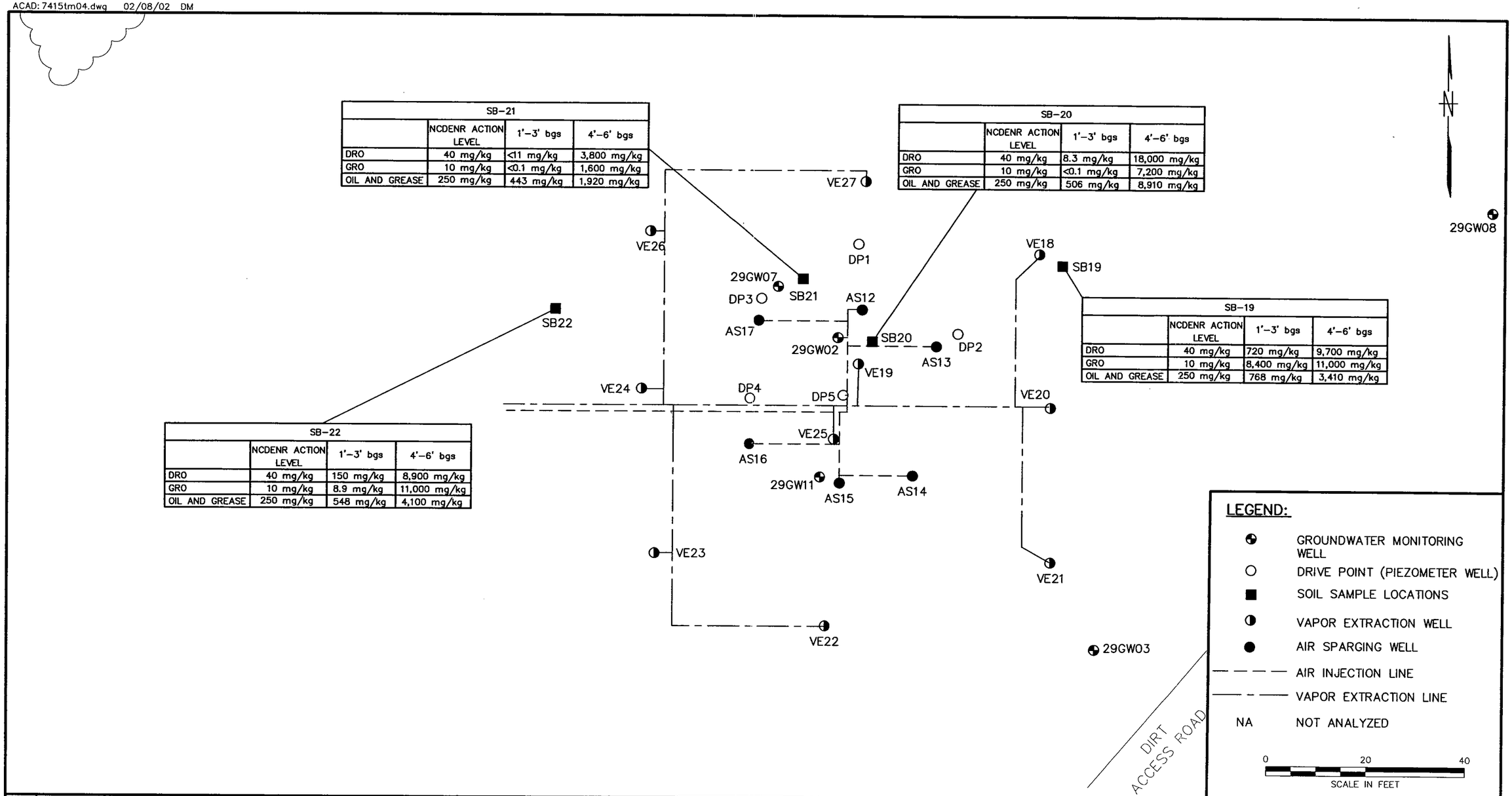
ACAD: 7415tm04.dwg 02/08/02 DM

SB-21			
	NCDENR ACTION LEVEL	1'-3' bgs	4'-6' bgs
DRO	40 mg/kg	<11 mg/kg	3,800 mg/kg
GRO	10 mg/kg	<0.1 mg/kg	1,600 mg/kg
OIL AND GREASE	250 mg/kg	443 mg/kg	1,920 mg/kg

SB-20			
	NCDENR ACTION LEVEL	1'-3' bgs	4'-6' bgs
DRO	40 mg/kg	8.3 mg/kg	18,000 mg/kg
GRO	10 mg/kg	<0.1 mg/kg	7,200 mg/kg
OIL AND GREASE	250 mg/kg	506 mg/kg	8,910 mg/kg

SB-19			
	NCDENR ACTION LEVEL	1'-3' bgs	4'-6' bgs
DRO	40 mg/kg	720 mg/kg	9,700 mg/kg
GRO	10 mg/kg	8,400 mg/kg	11,000 mg/kg
OIL AND GREASE	250 mg/kg	768 mg/kg	3,410 mg/kg

SB-22			
	NCDENR ACTION LEVEL	1'-3' bgs	4'-6' bgs
DRO	40 mg/kg	150 mg/kg	8,900 mg/kg
GRO	10 mg/kg	8.9 mg/kg	11,000 mg/kg
OIL AND GREASE	250 mg/kg	548 mg/kg	4,100 mg/kg



LEGEND:

- GROUNDWATER MONITORING WELL
- DRIVE POINT (PIEZOMETER WELL)
- SOIL SAMPLE LOCATIONS
- VAPOR EXTRACTION WELL
- AIR SPARGING WELL
- AIR INJECTION LINE
- VAPOR EXTRACTION LINE
- NA NOT ANALYZED

0 20 40
SCALE IN FEET

NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

DRAWN BY DM DATE 2/8/02
CHECKED BY DATE
COST/SCHED-AREA
SCALE AS NOTED

Tetra Tech NUS, Inc.

OCTOBER 2001 SOIL SAMPLE RESULTS
SITE 29-CREW CRASH BURN PIT
MCALF
BOGUE, NORTH CAROLINA

CONTRACT NO. 7415 | OWNER NO. 0272
APPROVED BY DATE
APPROVED BY DATE
DRAWING NO. FIGURE 3-1 | REV. 0

FORM CADD NO. TtNUS_BH.DGN - REV 0 - 1/20/98

4.0 PROPOSED CORRECTIVE ACTION

Free product at Site 29 has been eliminated by operation of an AS/SVE system and the only remaining groundwater contaminant of concern (COC), based on the last groundwater sampling event, is naphthalene. Although some, but not all, soil TPH concentrations have been reduced by operation of the AS/SVE system, concentrations of DRO, GRO, and Oil and Grease still exceed state action levels. The following sections describe the proposed groundwater alternative and evaluates and selects a preferred alternative to address the soils.

4.1 GROUNDWATER CORRECTIVE ACTION ALTERNATIVE

Continued monitoring is the proposed groundwater alternative at Site 29. Quarterly sampling with analysis for VOC and SVOC compounds is proposed to monitor groundwater. Except for the detection of benzene at well 29GW10, BTEX compounds have not been detected in groundwater at the site since August 1999. Analysis for VOCs is proposed to close out the site with respect to possible benzene contamination. When VOC concentrations are below the regulatory standard for four consecutive quarters, VOC analysis will be discontinued. Analysis for SVOCs based on the exceedance of naphthalene is proposed. During the October 2001 sampling event, naphthalene was the only organic compound detected in groundwater at a concentration higher than the regulatory standard. When all concentrations are below the regulatory standard for four consecutive quarters, groundwater monitoring will be discontinued. Annual analysis for manganese is also proposed. Although the detected concentrations are higher than the regulatory standard and background (upgradient) concentrations, the history of the site does not indicate that Site 29 is the source of manganese detected at concentrations above the regulatory standard. Manganese was not a constituent present in materials used at the burn pit but is a good indicator for monitoring natural attenuation processes. Manganese, however, should not be treated as a primary contaminant at Site 29.

Based on the exceedance of naphthalene being isolated to the October 2001 sampling event and having an anaerobic half-life of 258 days (Howard, 1991), it has been assumed that analysis of SVOCs will only be required during the first year of monitoring. For cost estimating purposes, a conservative assumption that groundwater monitoring will be conducted over a 5-year period was used (Appendix H). Volatile organic contamination has not been identified in the last two groundwater sampling rounds (since August 1999); therefore, it is likely that the monitoring duration will be less than five years.

Four wells are proposed for the groundwater monitoring program, as shown in Figure 4-1. Well 29GW04 is located approximately 50 feet upgradient of the former burn pit. Well 29GW02 is located within the source area where the AS/SVE system was installed. In addition, this well had the highest BTEX

concentrations based on previous sampling events. Well 29GW09 is located approximately 175 feet downgradient of the source area. This well was last sampled in 1994, and benzene and manganese were detected at concentrations above state standards. Groundwater at this location has never been analyzed for SVOCs. Well 29GW09 was not sampled in 2001 because it has become filled with silt. This well will be abandoned, and a new well will be installed. Well 29GW10 is located approximately 200 feet downgradient of the source area. This is the only well where naphthalene was detected in October 2001.

A cost estimate for the proposed corrective action of groundwater monitoring is also provided in Appendix H. The estimated present worth cost to implement groundwater monitoring over a 5-year period is $71,500.

4.2 SOIL CORRECTIVE ACTION ALTERNATIVES

The Remedial Investigation risk assessment conducted for the soils at Site 29, using current land use conditions, identified no risks above the established EPA target risks (Halliburton NUS, 1995). However, the level of TPH contamination in the soil still exceeds the cleanup requirements identified in the Groundwater Section Guidelines for Investigation and Remediation of Soils and Groundwater for Sources Other Than Petroleum Underground Storage Tanks (NCDENR, 2000). Therefore, the evaluation of corrective action alternatives is appropriate.

The soil corrective action alternatives to be evaluated include:

- Limited action.
- Excavation and on-site land farming.
- Excavation and off-site disposal.
- Hot Spot excavation and off-site disposal.
- In situ enhanced biological treatment.

4.2.1 Limited Action

Under this alternative, no immediate action would be taken with regard to soil. The RI identified that surface soils (0 to 1 foot deep) did not pose a threat to human health or the environment and subsurface soils would not be disturbed under the current land use conditions. Site 29 is located within the restricted zone of the active runway therefore any development of this area is prohibited. Additional institutional controls such as land-use restrictions would be needed if the current land use changes or the property was considered for sale or transfer. The land restrictions would remain in place until the established cleanup levels were achieved through natural attenuation processes or other more aggressive actions.

This alternative does not eliminate the potential impact of soils being a secondary source of contamination for the groundwater; however, continued groundwater monitoring is also being proposed under this CAP.

There would be no initial capital costs associated with this alternative, except for demobilization of the existing AS/SVE system and site restoration. However, if the land use would change or the property transferred or sold, then at that time the environmental conditions of the property would need to be reevaluated to determine if contamination still exists, and if necessary, land use restrictions would need to be imposed and enforced.

The cost estimate for this alternative is provided in Appendix H. The initial cost associated with demobilization of the AS/SVE system and restoration of the site is estimated to be $8,900. If formal deed restrictions would be required due to a change in the land use, then the cost to implement this alternative would be $18,700.

4.2.2 Excavation and On-Site Landfarming

Under this alternative, it is assumed that 3,560 cubic yards (cy) of petroleum-contaminated soil would be excavated and treated on-site via landfarming. Landfarming is a bioremediation process that is typically performed in above-ground biotreatment cells. The process requires tilling of the soil with the addition of water and nutrients to promote oxygen supply and microbial activity. A landfarming application area has been identified at Bogue Field and the NCDENR, Division of Waste Management, Wilmington Regional Office has granted permission, under permit # SR0800001, to conduct landfarming operations within the designated areas.

The permit requires that specific criteria be followed including notifications, documentation, and operating procedures. Some of the criteria identified in the permit could not be conducted because of the location of the treatment area with regard to the active runway, specifically the seeding and re-seeding efforts which attract geese and other grazing foul that pose hazards to aircraft. These issues would need to be discussed with NCDENR and a variance granted prior to implementation of this alternative.

For the purpose of evaluating alternatives, the extent of TPH contamination, as identified in the RI, was used to determine the volume of soil to be excavated and treated. As shown in Figure 4-2, the area of impacted soil is divided into shallow (1 to 3 feet) and deep (3 to 11 feet) soils. The depth to groundwater averages approximately 5 feet bgs. The proposed excavation will extend to 1 foot below the water table or approximately 6 feet bgs. Based on this information, approximately 3,560 cy of soil would require excavation. The clean soil above the deeper impacted soil will be stockpiled separately and used as backfill. The potentially impacted material, approximately 3,000 cy, will be transported directly to the on-

site treatment area located within a quarter of a mile from the excavation. Confirmation sampling would be conducted at the sides of the excavation to verify all contaminated soil is removed. It is assumed 12 soil samples would be collected (three samples from each of the four sidewalls). It is assumed that landfarming will require 1 year to remediate the impacted soils. If acceptable, the excavation will remain open until the soils that are remediated by landfarming are returned to the excavated area. If it is not acceptable to leave the excavation open for an extended time, then 3,000 cy of backfill would be acquired and used to fill in the excavation, and the remediated landfarmed soils would be used as additional cover or transported to another location as fill material.

The operating procedures for the proposed landfarming are contained in the Land Application Permit Report (Agra Environmental, 2000). The following is a brief summary of the permit requirements to assist in evaluation of this alternative.

Notification of the NCDENR, Wilmington Regional Office is required at least 48 hours prior to the initial application of contaminated soil to allow inspection of the facility. Any variances from the permit must be granted and documented prior to implementation of field efforts.

The soils to be landfarmed at this location must pass Toxicity Characteristic Leaching Procedure (TCLP) criteria using EPA SW-846/Method 1311 for metals. Records shall be kept for a minimum of 3 years from receipt of the contaminated soils. The soil shall be determined to be remediated when the NCDENR action levels of less than 10 ppm GRO (Method 5030), 40 ppm DRO (Method 3550), and 250 ppm Oil and Grease (Method 9071) have been achieved. Once these levels are achieved, the soil can be returned to the excavated area for use as backfill. Soil samples will be collected semi-annually to determine when the action levels have been achieved.

The operation of the on-site landfarm requires the application area to be properly maintained at all times and includes the prevention of surface run off. During placement of the soils, an adequate amount of lime shall be applied to maintain a proper pH level. The lime and contaminated soils shall be incorporated into the top 6 to 8 inches of native soil (by tilling or disking) within 24 hours of application. The permit identifies that to ensure sufficient oxygen is provided for biodegradation, the soil is to be tilled at 6 month intervals. Organic matter may be incorporated during the tilling process. Nutrients (nitrogen and/or phosphorus fertilizers) shall be added as needed. The permit identifies that a vegetative cover be established within 30 days of application or re-tilling. However, seeding and possibly tilling requirements will need to be waived so as not to attract various species of birds into the flightline. This issue would need to be addressed prior to selection of this alternative.

As part of the operation of the landfarm, sampling and reporting of groundwater results from the seven groundwater monitoring wells previously installed at the landfarm facility will be conducted on a semi-annual basis. The samples will be tested for VOCs and SVOCs. A minimum of two soil samples per acre, (or application area, whichever is less) shall be collected every 6 months and analyzed using EPA Methods 5030/3550/9071 for petroleum wastes. Each sample shall be comprised of a composite of six primary samples. Adequate inspection and maintenance will be required to ensure compliance with applicable state, federal, or local laws and regulations. An annual report is to be prepared and submitted as part of the operation of the on-site landfarm.

The cost estimate for this alternative is provided in Appendix H. The total present worth cost to implement this alternative is $183,000.

4.2.3 Excavation and Off-Site Disposal

Excavation and off-site disposal is a widely used and easily implemented method for addressing petroleum contaminated soil. Under this alternative, it is assumed that 3,560 cy of soil would be excavated, and a portion would require disposal at an approved off-site disposal facility. This alternative would include the use of screening instrumentation, such as organic vapor analyzers (OVAs) or other field screening techniques, to help identify the limits of excavation and to assist in segregating soils for off-site disposal or use as backfill. Fixed-base laboratory analysis would be conducted to confirm the results of the field screening efforts. Soils determined to exceed the soil action levels identified in the NCDENR groundwater section guidelines of 10 ppm GRO (Method 5030), 40 ppm DRO (Method 3550), and 250 ppm Oil and Grease (Method 9071) would be transported offsite. Excavated soils that are below these action levels would be used as backfill material. Confirmation sampling would be conducted at the sides of the excavation to verify all contaminated soil is removed. It is assumed 12 confirmation soil samples would be collected (three soil samples from each of the four sidewalls).

The limits of excavation, as shown in Figure 4-2, would be the same as discussed in the landfarming excavation alternative. Based on this information approximately 3,560 cy of soil will require excavation. The clean surface soil, approximately 560 cy, would be stockpiled separately for use as backfill. The impacted material would be field screened and segregated into 100 cy stockpiles based on the field results. Soil samples from each of the stockpiles would be collected and analyzed by a fixed-base laboratory using EPA Methods 5030/3550/9071. It is assumed that three samples would be required from each of the 30 stockpiles. For estimating purposes it is assumed that one third of the stockpiles would not exceed the action levels and could be used as backfill and the other two thirds would require off-site disposal. The estimated 2,000 cy of soil requiring off-site disposal would require TCLP testing to determine if it is hazardous and therefore requiring disposal in a Subtitle C landfill. If not hazardous, the soil can be accepted by a Subtitle D landfill or other similar disposal facility. It is assumed that the soil will

be disposed as non-hazardous. Approximately 2,000 cy of clean backfill would be required to replace the soil removed from the site.

The cost estimate for this alternative is provided in Appendix H. The total present worth cost to implement this alternative is $299,000.

4.2.4 Hot Spot Excavation and Off-Site Disposal

The RI risk assessment conducted for the soils at Site 29, using current land use conditions, identified no risks above the established EPA target risks. However, there are relatively high levels of TPH contamination in the soil. Even though the current land use scenario is not expected to change, it still may be appropriate to remove the higher levels of contamination and allow the lower levels of contamination to be remediated through natural processes. The Hot Spot contamination appears to be limited to the immediate area of the former burn pit. Hot Spot excavation and off-site disposal is an easily implemented method for addressing petroleum contaminated soil.

Under this alternative, it is assumed 500 cy of soil would be excavated and hauled offsite to an approved disposal facility. This alternative would use field screening instrumentation, such as OVAs or other field screening techniques, to determine the limits of excavation. If necessary, fixed base laboratory analysis would be conducted to confirm the results of the field screening efforts and confirmation sampling conducted at the sides of the excavation to identify level of contamination remaining at the site. For costing purposes, it is assumed 12 confirmation fixed base laboratory soil samples would be collected (three samples from each of the four sidewalls).

The limits of excavation would be determined during the excavation activities or determined prior to conducting the excavation by collecting pre-excavation samples. Prior to implementation of these alternatives, the field screening instrumentation and Hot Spot action levels will need to be agreed upon. The estimated 500 cy of soil requiring off-site disposal would require TCLP testing to determine if it is hazardous and therefore requiring disposal in a Subtitle C landfill. If not hazardous, the soil can be accepted by a Subtitle D landfill or other similar disposal facility. It is assumed that the soil will be determined non-hazardous. Approximately 500 cy of clean backfill would be required to replace the soil removed from the site.

The cost estimate for this alternative is provided in Appendix H. The total present worth cost to implement this alternative is $95,100.

4.2.5 In situ Enhanced Biological Treatment

This alternative would use the existing AS/SVE system wells as a mechanism to inject nutrients into the ground to promote the biological degradation of the petroleum contamination. This technology would employ the use of gas and vapor phase constituents to treat both the saturated and unsaturated soils.

Under this alternative both the AS wells and the SVE wells would be used to inject a mixture of air, nitrous oxide, vapor phase triethyl-phosphate (TEP), and propane into the subsurface to enhance the natural aerobic and co-metabolic processes by stimulating the growth of naturally occurring microbes. The microbes, or the enzymes they produce, would break down the contaminants contained in the soil. A specialized vendor would be contracted to design and implement the injection of the air mixture to ensure that a proper ratio of oxygen:nitrogen:phosporous:carbon is introduced and maintained.

The treatment system would consist of a mobile treatment unit. The unit includes an air compressor delivery system, air stream additives, automated manifold, valves, and controls. Flexible high-pressure hoses would connect the treatment unit to the 16 existing system wells. The treatment area would be divided into three zones and the vapor injection rotated to each zone on an 8 hours per day, 7 days per week basis. The system would be equipped with timers to direct the flow to the various zones, and automated alerts would have the ability to notify designated personnel if the system went off line or any other problem occurred. Monthly site visits would be conducted to replenish the supplies and conduct any necessary adjustments and maintenance. Quarterly oversight efforts would include soil sampling.

The time to achieve the action levels identified in the Groundwater Section Guidelines for Investigation and Remediation of Soils and Groundwater for Sources Other Than Petroleum Underground Storage Tanks (NCDENR, 2000) was obtained from a specialized vendor experienced in using this technology at sites with similar contamination and geology. The vendor estimated the action levels could be achieved in less then 18 months. The soil would be tested on a semi-annual basis to determine the effectiveness of the treatment. The soil shall be determined remediated when the NCDENR action levels of less than 10 ppm GRO (Method 5030), 40 ppm DRO (Method 3550), and 250 ppm Oil and Grease (Method 9071) have been achieved. For estimating purposes it is assumed the same soil testing required by the on-site landfarming operation will be required for this alternative. Therefore, two soil samples comprised of a composite of six primary samples shall be collected every 6 months and analyzed using EPA Methods 5030/3550/9071. Once it has been established that the soils have successfully been remediated, the treatment system will be demobilized and the system wells properly abandoned for final closure of the site.

The cost estimate for this alternative is provided in Appendix H. The total present worth cost to implement this alternative is $172,000.

4.3 COMPARISON OF SOIL CORRECTIVE ACTION ALTERNATIVES

Table 4-1 provides a comparison of the proposed soil corrective action alternatives. All of the alternatives presented are technically feasible and relatively easy to implement. The limited action alternative will leave contamination in place while the other alternatives will actively remediate the contaminated material. The excavation alternatives will only remove impacted soil to 1 foot below the water table, while the enhanced bioremediation alternative has the ability to address contamination above and below the water table.

4.4 PROPOSED CORRECTIVE ACTION

Based on current site conditions, the level of soil contamination, the successful removal of free product by the AS/SVE system, and the current and anticipated use of this site, the proposed corrective action is groundwater monitoring and soil excavation with off site disposal.

Groundwater monitoring will be conducted quarterly for VOCs and SVOCs until four consecutive results below the NCDENR Action Levels are achieved. If the action levels are not achieved during the first year of monitoring then annual groundwater monitoring shall be conducted. More frequent monitoring may be conducted once action levels are achieved. Monitoring for manganese will be conducted annually until action levels for VOCs and SVOCs are achieved. The initial round of groundwater monitoring will be conducted at four existing groundwater monitoring wells, one upgradient (29GW04), one in the area of the former burn pit (29GW02), and two downgradient (29GW09 and 29GW10).

Soil removal will be conducted to excavate petroleum contamination that exceeds the NCDENR Action Levels.

The AS/SVE system will be demobilized and the system wells abandoned in accordance with state requirements. Any monitoring well that is damaged or destroyed during the soil removal activities will not be replaced unless it is needed for the monitoring program. Any monitoring well that is damaged will be properly abandoned in accordance with state requirements.

TABLE 4-1

SOIL CORRECTIVE ACTION ALTERNATIVES
SITE 29 – CRASH CREW BURN PIT
MCALF BOGUE, NORTH CAROLINA
PAGE 1 OF 3

Soil Corrective action Alternative	Process	Feasibility	Limitations	Present Worth Cost
Limited Action	No action with regard to soil would be required; however, if the land use changed or the property were subjected to lease or transfer, then deed restrictions would need to be invoked.	This alternative is technically feasible and easily implemented.	Current land use must be maintained or deed restriction applied. Contaminated soil above NCDENR Action Levels would remain in place. This will be considered a potential secondary source for groundwater contamination. Would be addressed under the groundwater monitoring alternatives.	$8,900[(1)]
Excavation and On-Site Landfarming	Approximately 3,560 cy of soil would require excavation. Impacted soil above the NCDENR Action Levels would be treated on site at a permitted landfarming site and then used as backfill. Excavated soil below the NCDENR Action Levels would be used as backfill.	This alternative is technically feasible. Excavation of soil is easily implemented. Landfarming operations require a greater level of effort than off-site disposal.	Variances to the landfarming permit to eliminate the seeding requirements would be required. Tilling operation would need to be evaluated. Operation of the landfarm for approximately 1 year would be required. Excavation would only be conducted to 1 foot below water table. Deeper contaminated soil below the water table may remain.	$183,000

TABLE 4-1

SOIL CORRECTIVE ACTION ALTERNATIVES
SITE 29 – CRASH CREW BURN PIT
MCALF BOGUE, NORTH CAROLINA
PAGE 2 OF 3

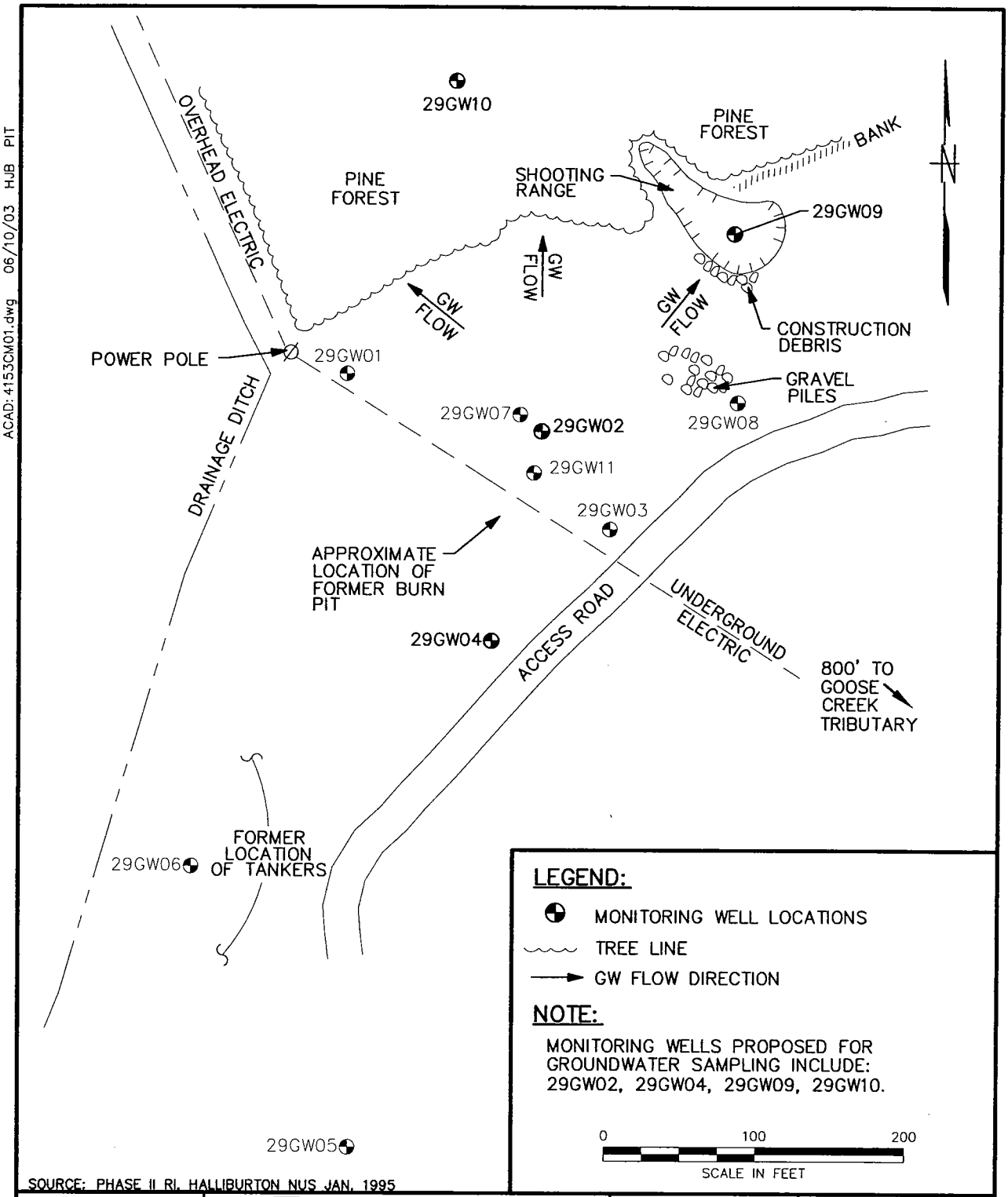
Soil Corrective action Alternative	Process	Feasibility	Limitations	Present Worth Cost
Excavation and Off-Site Disposal	Approximately 3,560 cy of soil would require excavation. Soil would be segregated on site using field screening and confirmation fixed-base laboratory analysis. Soils would be seperated into clean soils (below the NCDENR Action Levels) and contaminated soils (above the NCDENR Action Levels). Clean soil would be used as backfill and the contaminated soils would be transported off site for disposal.	This alternative is technically feasible and easily implemented.	Increased truck traffic associated with the hauling of excavated material and site restoration activities. Excavation would be conducted to 1 foot below water table. Deeper contaminated soil below the water table may remain.	$299,000
Hot Spot Excavation and Off-Site Disposal	Approximately 500 cy of soil would require excavation. Soil removal would be determined using field screening instrumentation. The contaminated soils would be transported off site for disposal. Natural processes would be relied upon to remediate contamination left behind. Field screening techniques and action levels need to be agreed upon.	This alternative is technically feasible and easily implemented.	Increased truck traffic associated with the hauling of excavated material and site restoration. Excavation could be conducted to 1 foot below water table. Deeper contaminated soil would not be removed and below the water table may remain.	$95,100

TABLE 4-1

SOIL CORRECTIVE ACTION ALTERNATIVES
SITE 29 – CRASH CREW BURN PIT
MCALF BOGUE, NORTH CAROLINA

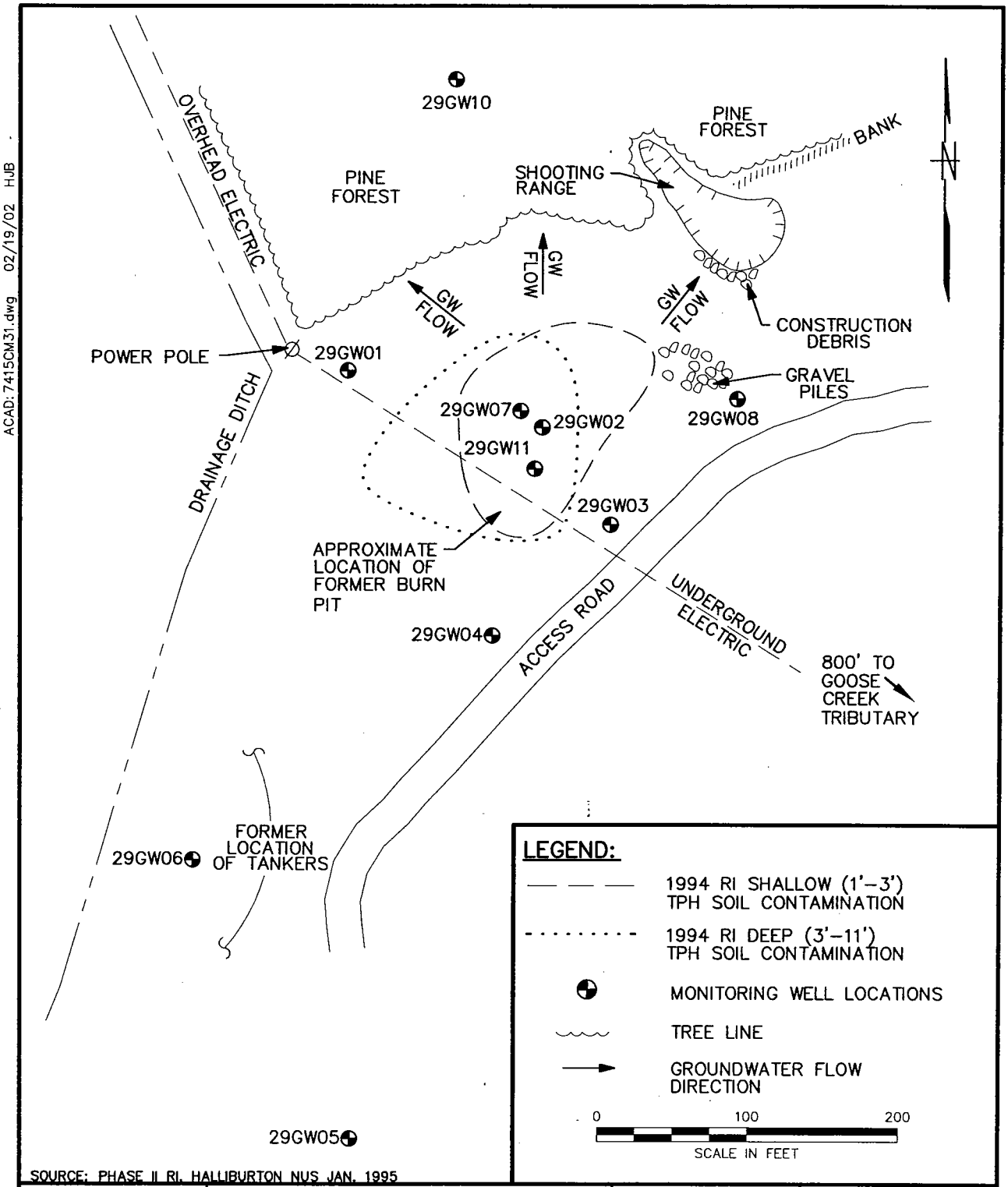
Soil Corrective action Alternative	Process	Feasibility	Limitations	Present Worth Cost
Insitu Enhanced Bioremediation	The existing AS/SVE system wells would be used as a mechanism to inject nutrients into the saturated and unsaturated zones to promote biological degradation.	This technology has proven to be technically feasible. The existing AS/SVE makes this system easy to implement; however, this alternative requires the operation of a vapor injection system for approximately 18 months.	Treatment area limited to extent of existing AS/SVE wells. If contamination exists beyond reach of system then additional injection wells may need to be installed. Unlike the excavation alternatives, treatment of contaminated soils in the saturated zone are applicable with this alternative. Injection permits from state may be required.	$172,000

1 Limited action would include only the demobilization and site restoration at an estimated cost of $8,900. If deed restrictions were required then the total cost of implementing this alternative would be $18,700.



DRAWN BY DATE: HJB 6/10/03	Tetra Tech NUS, Inc.	CONTRACT NO. 4153	OWNER NO. 0829
CHECKED BY DATE	PROPOSED GROUNDWATER MONITORING WELL LOCATIONS SITE 29–CRASH CREW BURN PIT MCALF BOGUE, NORTH CAROLINA	APPROVED BY DATE	
COST/SCHED–AREA		APPROVED BY DATE	
SCALE: AS NOTED		DRAWING NO. FIGURE 4–1	REV. 0

FORM CADD NO. TtNUS_AV.DWG – REV 0 – 1/22/98



SOURCE: PHASE II RI, HALLIBURTON NUS JAN. 1995

ACAD: 7415CM31.dwg 02/19/02 HJB

DRAWN BY DATE: HJB 2/19/02	Tetra Tech NUS, Inc.	CONTRACT NO.: 7415	OWNER NO.: 0272
CHECKED BY DATE:	LIMITS OF TPH SOIL CONTAMINATION SITE 29–CRASH CREW BURN PIT MCALF BOGUE, NORTH CAROLINA	APPROVED BY DATE:	
COST/SCHED–AREA		APPROVED BY DATE:	
SCALE: AS NOTED		DRAWING NO.: FIGURE 4–2	REV.: 0

FORM CADD NO. TtNUS_AV.DWG - REV 0 - 1/22/98

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APPENDIX A

SITE 29 DATA BASE

SITE 29 'UE FIELD
GROUNDWATER . .LYTICAL RESULTS

LOCATION	29GW01	29GW01	29GW01	29GW01	29GW01	29GW01	29GW02	29GW02	29GW02	29GW02	29GW02	29GW02	29GW02	29GW02
SAMPLE	29GW01	29GW01-1	29GW01-2	29GW01-3	S29GW01-04	S29-MW01-05	29GW02	29GW02-D	29GW02-1	29GW02-2	29GW02-2-D	29GW02-3	S29GWM02-01	S29GWM02-02
MATRIX	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW
SAMPLE DATE	10/22/1991	7/24/1993	12/13/1993	4/24/1994	8/24/1999	10/2/2001	10/22/1991	10/22/1991	7/25/1993	12/14/1993	12/14/1993	4/24/1994	9/7/1997	10/17/1997
Volatile Organics (ug/L)														
1,1,1-TRICHLOROETHANE						1.3 U	10 U							
1,1,2,2-TETRACHLOROETHANE						0.3 U	10 U							
1,1,2-TRICHLOROETHANE						0.2 U	10 U							
1,1-DICHLOROETHANE						0.7 U	10 U							
1,1-DICHLOROETHENE						1 U	10 U							
1,2-DIBROMOETHANE						1 U								
1,2-DICHLOROBENZENE						1 U								
1,2-DICHLOROETHANE						0.3 U	10 U							
1,2-DICHLOROPROPANE						0.4 U	10 U							
1,3-DICHLOROBENZENE						1 U								
1,4-DICHLOROBENZENE						1 U								
2-BUTANONE							10 UR							
2-HEXANONE							10 UR							
4-METHYL-2-PENTANONE							10 U							
ACETONE							10 UJ							
BENZENE	10 U	2 U	1 U	1 U	1 U	1 U	86 J	88	57 J	1000 U	1000 U	86 J	19	1.4
BROMODICHLOROMETHANE						1 U	10 U							
BROMOFORM						1 U	10 U							
BROMOMETHANE						1 U	10 U							
CARBON DISULFIDE							10 U							
CARBON TETRACHLORIDE						1 U	10 U							
CHLOROBENZENE						1 U	10 U							
CHLORODIBROMOMETHANE						0.9 U	10 U							
CHLOROETHANE						1 UJ	10 U							
CHLOROFORM						0.5 U	10 U							
CHLOROMETHANE						0.8 U	10 U							
CIS-1,2-DICHLOROETHENE						0.5 U								
CIS-1,3-DICHLOROPROPENE						1 U	10 U							
DICHLORODIFLUOROMETHANE						1 U								
ETHYLBENZENE	10	1.2 UJ	1.1	7.6 J	1 U	1 U	40 J	35	23 J	1000 U	1000 U	38 J	31	1 U
M+P-XYLENES		0.44 UJ	1 U	8.8 J					71 J	1000 U	1000 U	110		
METHYLENE CHLORIDE						1 U	10 UJ							
O-XYLENE		0.26 UJ	1 U	0.48 J					26 J	1000 U	1000 U	24 J		
STYRENE							10 U							
TETRACHLOROETHENE						0.3 U	10 U							
TOLUENE	10 U	0.84 UJ	1 U	1 U	1 U	1 U	3 J	3 J	1.1 UJ	1000 U	1000 U	1 U	5 U	1 U
TOTAL 1,2-DICHLOROETHENE						1 U	10 U							
TOTAL XYLENES	5 J				1 U	1 U	210 J	190					94	1 U
TRANS-1,2-DICHLOROETHENE						0.5 U								
TRANS-1,3-DICHLOROPROPENE						1 U	10 U							
TRICHLOROETHENE						1 U	10 U							
TRICHLOROFLUOROMETHANE						1 U								
VINYL CHLORIDE						1 U	10 U							
Semivolatile Organics (ug/L)														
1,2,4-TRICHLOROBENZENE	11 U					10 U	5 U	5 U						

SITE 29 - BOGUE FIELD
GROUNDWATER ANALYTICAL RESULTS

LOCATION	29GW01	29GW01	29GW01	29GW01	29GW01	29GW01	29GW02	29GW02	29GW02	29GW02	29GW02	29GW02	29GW02	29GW02
SAMPLE	29GW01	29GW01-1	29GW01-2	29GW01-3	S29GW01-04	S29-MW01-05	29GW02	29GW02-D	29GW02-1	29GW02-2	29GW02-2-D	29GW02-3	S29GWM02-01	S29GWM02-02
MATRIX	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW
SAMPLE DATE	10/22/1991	7/24/1993	12/13/1993	4/24/1994	8/24/1999	10/2/2001	10/22/1991	10/22/1991	7/25/1993	12/14/1993	12/14/1993	4/24/1994	9/7/1997	10/17/1997
1,2-DICHLOROBENZENE	11 U					10 U	5 U	5 U						
1,2-DIPHENYLHYDRAZINE						10 U								
1,3-DICHLOROBENZENE	11 U					10 U	5 U	5 U						
1,4-DICHLOROBENZENE	11 U					10 U	5 U	5 U						
2,2'-OXYBIS(1-CHLOROPROPANE)	11 U					10 U	5 U	5 U						
2,4,5-TRICHLOROPHENOL	28 U						12 U	12 U						
2,4,6-TRICHLOROPHENOL	11 U					10 U	5 U	5 U						
2,4-DICHLOROPHENOL	11 U					10 U	5 U	5 U						
2,4-DIMETHYLPHENOL	11 U					10 U	5 U	5 U						
2,4-DINITROPHENOL	28 U					50 U	12 U	12 U						
2,4-DINITROTOLUENE	11 U					10 U	5 U	5 U						
2,6-DINITROTOLUENE	11 U					10 U	5 U	5 U						
2-CHLORONAPHTHALENE	11 U					10 U	5 U	5 U						
2-CHLOROPHENOL	11 U					10 U	5 U	5 U						
2-METHYLNAPHTHALENE	16						5 UJ	72 J						
2-METHYLPHENOL	11 U						5 U	5 U						
2-NITROANILINE	28 U						12 U	12 U						
2-NITROPHENOL	11 U					10 U	5 U	5 U						
3,3'-DICHLOROBENZIDINE	11 U					20 U	5 U	5 U						
3-NITROANILINE	28 U						12 U	12 U						
4,6-DINITRO-2-METHYLPHENOL	28 U					50 U	12 U	12 U						
4-BROMOPHENYL PHENYL ETHER	11 U					10 U	5 U	5 U						
4-CHLORO-3-METHYLPHENOL	11 U					10 U	5 U	5 U						
4-CHLOROANILINE	11 U						5 U	5 U						
4-CHLOROPHENYL PHENYL ETHER	11 U					10 U	5 U	5 U						
4-METHYLPHENOL	11 U						5 U	5 U						
4-NITROANILINE	28 U						12 U	12 U						
4-NITROPHENOL	28 UR					50 U	12 UR	12 UR						
ACENAPHTHENE	11 U					10 U	5 U	5 U						
ACENAPHTHYLENE	11 U					10 U	5 U	5 U						
ANTHRACENE	11 U					10 U	5 U	5 U						
BENZIDINE						50 U								
BENZO(A)ANTHRACENE	11 U					10 U	5 U	5 U						
BENZO(A)PYRENE	11 U					10 U	5 U	5 U						
BENZO(B)FLUORANTHENE	11 U					10 U	5 U	5 U						
BENZO(G,H,I)PERYLENE	11 U					10 U	5 U	5 U						
BENZO(K)FLUORANTHENE	11 U					10 U	5 U	5 U						
BIS(2-CHLOROETHOXY)METHANE	11 U					10 U	5 U	5 U						
BIS(2-CHLOROETHYL)ETHER	11 U					10 U	5 U	5 U						
BIS(2-CHLOROISOPROPYL)ETHER														
BIS(2-ETHYLHEXYL)PHTHALATE	560 UJ					10 U	5 U	72 UJ						
BUTYL BENZYL PHTHALATE	11 U					10 U	5 U	5 U						
CARBAZOLE	11 U						5 U	5 U						
CHRYSENE	11 U					10 U	5 U	5 U						
DI-N-BUTYL PHTHALATE	11 U					10 U	5 U	5 U						
DI-N-OCTYL PHTHALATE	47 UJ					10 U	5 U	5 U						

LOCATION	29GW01	29GW01	29GW01	29GW01	29GW01	29GW01	29GW02	29GW02	29GW02	29GW02	29GW02	29GW02	29GW02	29GW02
SAMPLE	29GW01	29GW01-1	29GW01-2	29GW01-3	S29GW01-04	S29-MW01-05	29GW02	29GW02-D	29GW02-1	29GW02-2	29GW02-2-D	29GW02-3	S29GWM02-01	S29GWM02-02
MATRIX	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW
SAMPLE DATE	10/22/1991	7/24/1993	12/13/1993	4/24/1994	8/24/1999	10/2/2001	10/22/1991	10/22/1991	7/25/1993	12/14/1993	12/14/1993	4/24/1994	9/7/1997	10/17/1997
DIBENZO(A,H)ANTHRACENE	11 U					10 U	5 U	5 U						
DIBENZOFURAN	11 U						3 J	5 UJ						
DIETHYL PHTHALATE	11 UJ					10 U	5 U	5 U						
DIMETHYL PHTHALATE	11 U					10 U	5 U	5 U						
FLUORANTHENE	11 U					10 U	5 U	5 U						
FLUORENE	11 U					10 U	5 U	5 U						
HEXACHLOROBENZENE	11 U					10 U	5 U	5 U						
HEXACHLOROBUTADIENE	11 U					10 U	5 U	5 U						
HEXACHLOROCYCLOPENTADIENE	11 U					10 U	5 U	5 U						
HEXACHLOROETHANE	11 U					10 U	5 U	5 U						
INDENO(1,2,3-CD)PYRENE	11 U					10 U	5 U	5 U						
ISOPHORONE	11 U					10 U	5 U	5 U						
N-NITROSO-DI-N-PROPYLAMINE	11 U					10 U	5 U	5 U						
N-NITROSODIMETHYLAMINE						10 U								
N-NITROSODIPHENYLAMINE	11 U					10 U	5 U	5 U						
NAPHTHALENE	46					10 U	170	180						
NITROBENZENE	11 U					10 U	5 U	5 U						
PENTACHLOROPHENOL	28 U					50 U	12 U	12 U						
PHENANTHRENE	11 U					10 U	0.8 J	5 UJ						
PHENOL	11 U					10 U	5 U	5 U						
PYRENE	11 U					10 U	5 U	5 U						
Petroleum Hydrocarbons (mg/L)														
TOTAL PETROLEUM HYDROCARBONS	1.3 U				0.5 U		56 J	40 J						
Total Inorganics (ug/L)														
ALUMINUM	7400 J	53 U	154 UJ	235 UJ		21.1 U	2480	2030	55.3 UJ	42 U	42 U	30 U		
ANTIMONY	14 U	17 UJ	16 UJ	17 UJ		2.4 U	14 U	14 U	17 UJ	16 UJ	16 UJ	17 U		
ARSENIC	20.2	9.4 UJ	6.6	7.9		4.0	44.2	44.4	29.6	58.2	57.8	92.8 R		
BARIUM	41.9	21.8 UJ	21.7	16.7		16.6	33.3	32	37.8	39.9	38	15.4		
BERYLLIUM	1 U	1 U	1 U	1 U		0.17 U	1 U	1 U	1 U	1 U	1 U	1 U		
CADMIUM	1 U	2 UJ	2 U	2 U		0.51 U	1 UJ	1 UJ	2 U	2.5	2.9	2 U		
CALCIUM	103000	101000	94800	103000		96400	119000	113000	144000	129000	129000	119000		
CHROMIUM	22	8 U	8 U	6 UJ		0.74 U	11.7	11.4	8 U	8 U	8 U	30 U		
COBALT	6.1	6 UJ	3 U	8 U		2.9 U	7.3	6	6 U	3 U	3 U	8 U		
COPPER	13.4	9 U	3 U	3 U		2.4 U	7.5	12.2	9 U	3 U	3 U	3 UJ		
IRON	39800	19400	16800	21300		9990	56200	56400	26500	40200	40700	76800 J		
LEAD	13.4 J	1 UJ	1 U	1 UJ		2.5 U	9.6 J	13.2 J	1 U	1.4 UJ	1.6 UJ	2 J		
MAGNESIUM	2980 UJ	2160	2410	2510		3590	5600	6180	3730	3890	3910	5190 J		
MANGANESE	203	196	177	200		152	416	426	155	139 J	139 J	568		
MERCURY	0.2 U	0.2 U	0.2 U	0.2 U		0.07 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U		
NICKEL	11.2	7 UJ	5 U	5 U		10.4 U	6 U	6 U	7 U	5 U	5 U	5.1		
POTASSIUM	3130 UJ	2060	1560	1360		1270	11200	14000	4140	9320 J	9500 J	11800		
SELENIUM	1 UJ	1 UJ	1 U	1 UJ		3.3 U	1 U	1 U	1 UJ	1 UJ	1 UJ	1 UJ		
SILVER	2 U	5 UJ	4 U	3 UJ		0.80 U	2 U	2 U	5 U	4 U	4 U	3 UJ		
SODIUM	4440	5540 UJ	6490	5450		8710	6620 J	7440 J	5310	7030	7080	7460		
THALLIUM	1 U	2 U	1 U	1.1 UJ		5.7 U	1 U	1 U	2 U	1 UJ	1 UJ	1 UJ		
VANADIUM	34.4	5 U	4 U	3 U		2.5 U	12.4 J	7.6 J	5 U	4 U	4 U	3 U		

LOCATION	29GW01	29GW01	29GW01	29GW01	29GW01	29GW01	29GW02	29GW02	29GW02	29GW02	29GW02	29GW02	29GW02	29GW02
SAMPLE	29GW01	29GW01-1	29GW01-2	29GW01-3	S29GW01-04	S29-MW01-05	29GW02	29GW02-D	29GW02-1	29GW02-2	29GW02-2-D	29GW02-3	S29GWM02-01	S29GWM02-02
MATRIX	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW
SAMPLE DATE	10/22/1991	7/24/1993	12/13/1993	4/24/1994	8/24/1999	10/2/2001	10/22/1991	10/22/1991	7/25/1993	12/14/1993	12/14/1993	4/24/1994	9/7/1997	10/17/1997
ZINC	39 J	2 UJ	40.5 UJ	3.4 UJ		2.4 U	14.4 UJ	12.9 UJ	3.9 UJ	11.4 UJ	12 UJ	39.9		
Dissolved Inorganics (ug/L)														
ALUMINUM	11 UJ	53 U	127 UJ	231 UJ			11 U	11 U	71.9 UJ	42 U	42 U	30 U		
ANTIMONY	14 U	17 UJ	16 UJ	17 UJ			14 U	14 U	17 UJ	16 UJ	16 UJ	17 U		
ARSENIC	2.9	9.9 UJ	8.2	7.6			26.1	29.6	29.2	55.7	55.3	85.5 R		
BARIUM	23.5	21 UJ	22.1 UJ	16.5			25.1	27.5	36.5	41.1	38.5	14.6		
BERYLLIUM	1 U	1 U	1 U	1 U			1 U	1 U	1 U	1 U	1 U	1 U		
CADMIUM	1 U	2 UJ	2 U	2 U			1 UJ	1 UJ	2 U	3.5	2.7	2 U		
CALCIUM	105000	99900	97300 J	102000			122000	125000	145000	135000	130000	120000		
CHROMIUM	3 U	8 U	8 U	6 UJ			4.2	4.1	8 U	8 U	8 U	30 U		
COBALT	3 U	6 UJ	3 U	8 U			3 U	3 U	6 U	3 U	3 U	8 U		
COPPER	2 U	9 U	3 U	3 U			2 U	2.3	9 U	3 U	3 U	3 UJ		
IRON	606	18900	17500	21200			22700	24500	26100	41600	40100	76000 J		
LEAD	1 UJ	1 UJ	1.7 UJ	1 UJ			1 UJ	1 UJ	1 U	1.5 UJ	1.9 UJ	1 U		
MAGNESIUM	2570 UJ	2220	2410	2480			5670	5430	3850	4020	3880	5230 J		
MANGANESE	165	195	185	198			365	325	156	146 J	138 J	563		
MERCURY	0.2 U	0.2 U	0.2 U	0.2 U			0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U		
NICKEL	6 U	7 UJ	5 U	5 U			6 U	6 U	7 U	5 U	5 U	5 U		
POTASSIUM	2430 UJ	2020	1740	1340			12200	11200	4120	9890 J	9410 J	11800		
SELENIUM	1 UJ	1 UJ	1 U	1 UJ			1 U	1 U	1 UJ	1 UJ	1 UJ	1 UJ		
SILVER	2 U	5 UJ	4 U	3 UJ			2 U	2 U	5 U	4 U	4 U	3 UJ		
SODIUM	5010	5550 UJ	6470	5310			7030 J	7300 J	5240	7430	7170 UJ	7630		
THALLIUM	1 U	2 U	1 U	1 U			1 U	1 U	2 U	1 UJ	1 UJ	1 U		
VANADIUM	3 U	5 U	4 U	3 U			3 UJ	3 UJ	5 U	4 U	4 U	3 U		
ZINC	9.4 J	4.9 UJ	3.2 UJ	18.6 UJ			8.6 UJ	11.4 UJ	2 UJ	2 U	2 U	2 U		
Miscellaneous Parameters (mg/L)														
ALKALINITY							350							
BIOCHEMICAL OXYGEN DEMAND							140							
CHEMICAL OXYGEN DEMAND							870							
CHLORIDE							8.5							
HARDNESS							350							
TOTAL DISSOLVED SOLIDS							440							
TOTAL ORGANIC CARBON							51							

LOCATION	29GW02	29GW02	29GW02	29GW02	29GW02	29GW03	29GW03	29GW03	29GW03	29GW03	29GW03	29GW03
SAMPLE	BF-S29GWM02-03	S29GW02-04(072098)	S29GW02-04(082499)	S29-MW02-05	S29-MW02-05-D	29GW03	29GW03-1	29GW03-2	29GW03-3	29GW03-3-D	S29GW03-04	S29-MW03-05
MATRIX	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW
SAMPLE DATE	4/2/1998	7/20/1998	8/24/1999	10/2/2001	10/2/2001	10/22/1991	7/25/1993	12/13/1993	4/24/1994	4/24/1994	7/20/1998	10/2/2001
Volatile Organics (ug/L)												
1,1,1-TRICHLOROETHANE				1.3 U	1.3 U							1.3 U
1,1,2,2-TETRACHLOROETHANE				0.3 U	0.3 U							0.3 U
1,1,2-TRICHLOROETHANE				0.2 U	0.2 U							0.2 U
1,1-DICHLOROETHANE				0.7 U	0.7 U							0.7 U
1,1-DICHLOROETHENE				1 U	1 U							1 U
1,2-DIBROMOETHANE				1 U	1 U							1 U
1,2-DICHLOROBENZENE				1 U	1 U							1 U
1,2-DICHLOROETHANE				0.3 U	0.3 U							0.3 U
1,2-DICHLOROPROPANE				0.4 U	0.4 U							0.4 U
1,3-DICHLOROBENZENE				1 U	1 U							1 U
1,4-DICHLOROBENZENE				1 U	1 U							1 U
2-BUTANONE												
2-HEXANONE												
4-METHYL-2-PENTANONE												
ACETONE												
BENZENE	1 U	1 U	1 U	1 U	1 U	10 U	0.21 J	1.5	0.31 J	1 U	1 U	1 U
BROMODICHLOROMETHANE				1 U	1 U							1 U
BROMOFORM				1 U	1 U							1 U
BROMOMETHANE				1 U	1 U							1 U
CARBON DISULFIDE												
CARBON TETRACHLORIDE				1 U	1 U							1 U
CHLOROBENZENE				1 U	1 U							1 U
CHLORODIBROMOMETHANE				0.9 U	0.9 U							0.9 U
CHLOROETHANE				1 UJ	1 UJ							1 UJ
CHLOROFORM				0.5 U	0.5 U							0.5 U
CHLOROMETHANE				0.8 U	0.8 U							0.8 U
CIS-1,2-DICHLOROETHENE				0.5 U	0.5 U							0.5 U
CIS-1,3-DICHLOROPROPENE				1 U	1 U							1 U
DICHLORODIFLUOROMETHANE				1 U	1 U							1 U
ETHYLBENZENE	1 U	1 U	1 U	1 U	1 U	10 U	2 U	1 U	1 U	1 U	1 U	1 U
M+P-XYLENES							0.28 UJ	1 U	1 U	1 U		
METHYLENE CHLORIDE				1 U	1 U							1 U
O-XYLENE							2 U	1 U	1 U	1 U		
STYRENE												
TETRACHLOROETHENE				0.3 U	0.3 U							0.3 U
TOLUENE	1 U	1 U	1 U	1 U	1 U	10 U	0.36 UJ	1 U	1 U	1 U	1 U	1 U
TOTAL 1,2-DICHLOROETHENE				1 U	1 U							1 U
TOTAL XYLENES	1 U	1 U	1 U	1 U	1 U	10 U					1 U	1 U
TRANS-1,2-DICHLOROETHENE				0.5 U	0.5 U							0.5 U
TRANS-1,3-DICHLOROPROPENE				1 U	1 U							1 U
TRICHLOROETHENE				1 U	1 U							1 U
TRICHLOROFLUOROMETHANE				1 U	1 U							1 U
VINYL CHLORIDE				1 U	1 U							1 U
Semivolatile Organics (ug/L)												
1,2,4-TRICHLOROBENZENE				10 U	10 U	5 U						10 U

LOCATION	29GW02	29GW02	29GW02	29GW02	29GW02	29GW03	29GW03	29GW03	29GW03	29GW03	29GW03	29GW03
SAMPLE	BF-S29GWM02-03	S29GW02-04(072098)	S29GW02-04(082499)	S29-MW02-05	S29-MW02-05-D	29GW03	29GW03-1	29GW03-2	29GW03-3	29GW03-3-D	S29GW03-04	S29-MW03-05
MATRIX	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW
SAMPLE DATE	4/2/1998	7/20/1998	8/24/1999	10/2/2001	10/2/2001	10/22/1991	7/25/1993	12/13/1993	4/24/1994	4/24/1994	7/20/1998	10/2/2001
1,2-DICHLOROBENZENE				10 U	10 U	5 U						10 U
1,2-DIPHENYLHYDRAZINE				10 U	10 U							10 U
1,3-DICHLOROBENZENE				10 U	10 U	5 U						10 U
1,4-DICHLOROBENZENE				10 U	10 U	5 U						10 U
2,2'-OXYBIS(1-CHLOROPROPANE)				10 U	10 U	5 U						10 U
2,4,5-TRICHLOROPHENOL						14 U						
2,4,6-TRICHLOROPHENOL				10 U	10 U	5 U						10 U
2,4-DICHLOROPHENOL				10 U	10 U	5 U						10 U
2,4-DIMETHYLPHENOL				10 U	10 U	5 U						10 U
2,4-DINITROPHENOL				50 U	50 U	14 U						50 U
2,4-DINITROTOLUENE				10 U	10 U	5 U						10 U
2,6-DINITROTOLUENE				10 U	10 U	5 U						10 U
2-CHLORONAPHTHALENE				10 U	10 U	5 U						10 U
2-CHLOROPHENOL				10 U	10 U	5 U						10 U
2-METHYLNAPHTHALENE						5 U						
2-METHYLPHENOL						5 U						
2-NITROANILINE						14 U						
2-NITROPHENOL				10 U	10 U	5 U						10 U
3,3'-DICHLOROBENZIDINE				20 U	20 U	5 U						20 U
3-NITROANILINE						14 U						
4,6-DINITRO-2-METHYLPHENOL				50 U	50 U	14 U						50 U
4-BROMOPHENYL PHENYL ETHER				10 U	10 U	5 U						10 U
4-CHLORO-3-METHYLPHENOL				10 U	10 U	5 U						10 U
4-CHLOROANILINE						5 U						
4-CHLOROPHENYL PHENYL ETHER				10 U	10 U	5 U						10 U
4-METHYLPHENOL						5 U						
4-NITROANILINE						14 U						
4-NITROPHENOL				50 U	50 U	14 UR						50 U
ACENAPHTHENE				10 U	10 U	5 U						10 U
ACENAPHTHYLENE				10 U	10 U	5 U						10 U
ANTHRACENE				10 U	10 U	5 U						10 U
BENZIDINE				50 U	50 U							50 U
BENZO(A)ANTHRACENE				10 U	10 U	5 U						10 U
BENZO(A)PYRENE				10 U	10 U	5 U						10 U
BENZO(B)FLUORANTHENE				10 U	10 U	5 U						10 U
BENZO(G,H,I)PERYLENE				10 U	10 U	5 U						10 U
BENZO(K)FLUORANTHENE				10 U	10 U	5 U						10 U
BIS(2-CHLOROETHOXY)METHANE				10 U	10 U	5 U						10 U
BIS(2-CHLOROETHYL)ETHER				10 U	10 U	5 U						10 U
BIS(2-CHLOROISOPROPYL)ETHER												
BIS(2-ETHYLHEXYL)PHTHALATE				10 U	10 U	5 UJ						10 U
BUTYL BENZYL PHTHALATE				10 U	10 U	5 U						10 U
CARBAZOLE						5 U						
CHRYSENE				10 U	10 U	5 U						10 U
DI-N-BUTYL PHTHALATE				10 U	2 J	5 U						10 U
DI-N-OCTYL PHTHALATE				10 U	10 U	5 U						10 U

LOCATION	29GW02	29GW02	29GW02	29GW02	29GW02	29GW03	29GW03	29GW03	29GW03	29GW03	29GW03	29GW03	29GW03
SAMPLE	BF-S29GWM02-03	S29GW02-04(072098)	S29GW02-04(082499)	S29-MW02-05	S29-MW02-05-D	29GW03	29GW03-1	29GW03-2	29GW03-3	29GW03-3-D	S29GW03-04	S29-MW03-05
MATRIX	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW
SAMPLE DATE	4/2/1998	7/20/1998	8/24/1999	10/2/2001	10/2/2001	10/22/1991	7/25/1993	12/13/1993	4/24/1994	4/24/1994	7/20/1998	10/2/2001
DIBENZO(A,H)ANTHRACENE				10 U	10 U	5 U						10 U
DIBENZOFURAN						5 U						
DIETHYL PHTHALATE				10 U	10 U	5 U						10 U
DIMETHYL PHTHALATE				10 U	10 U	5 U						10 U
FLUORANTHENE				10 U	10 U	5 U						10 U
FLUORENE				10 U	10 U	5 U						10 U
HEXACHLOROBENZENE				10 U	10 U	5 U						10 U
HEXACHLOROBUTADIENE				10 U	10 U	5 U						10 U
HEXACHLOROCYCLOPENTADIENE				10 U	10 U	5 U						10 U
HEXACHLOROETHANE				10 U	10 U	5 U						10 U
INDENO(1,2,3-CD)PYRENE				10 U	10 U	5 U						10 U
ISOPHORONE				10 U	10 U	5 U						10 U
N-NITROSO-DI-N-PROPYLAMINE				10 U	10 U	5 U						10 U
N-NITROSODIMETHYLAMINE				10 U	10 U							10 U
N-NITROSODIPHENYLAMINE				10 U	10 U	5 U						10 U
NAPHTHALENE				10 U	10 U	5 U						10 U
NITROBENZENE				10 U	10 U	5 U						10 U
PENTACHLOROPHENOL				50 U	50 U	14 U						50 U
PHENANTHRENE				10 U	10 U	5 U						10 U
PHENOL				10 U	10 U	5 U						10 U
PYRENE				10 U	10 U	5 U						10 U
Petroleum Hydrocarbons (mg/L)												
TOTAL PETROLEUM HYDROCARBONS			0.5 U			1.3 U						
Total Inorganics (ug/L)												
ALUMINUM				98.0	207	4980	70.2 UJ	116 UJ	210 UJ	223 UJ		21.1 U
ANTIMONY				2.4 U	2.4 U	14 U	17 UJ	16 UJ	17 UJ	17 UJ		2.4 U
ARSENIC				3.2 U	3.2 U	67.6 J	1.5 UJ	5.3	7.8	8.5		3.2 U
BARIUM				12.7	12.0	29.6	13.7	8.5 UJ	3 U	3 U		11.5
BERYLLIUM				0.17 U	0.17 U	1 U	1 U	1 U	1 U	1 U		0.17 U
CADMIUM				0.63	0.51 U	1.3 J	2 U	2 U	2 U	2 U		0.51 U
CALCIUM				116000	115000	93100	81600	137000	127000	125000		80000
CHROMIUM				1.1	0.74 U	17.5	8 U	8 U	6 UJ	6 UJ		0.89
COBALT				2.9 U	3.4 U	15.5	6 U	6.7	8 U	8 U		2.9 U
COPPER				20.1	2.4 U	9	9 U	3 U	3 U	3 U		2.4 U
IRON				205	360	187000	3360	15900	16900	16600		302
LEAD				3.4	2.5 U	19.5 J	1 U	1 U	1.2 UJ	1 UJ		2.5 U
MAGNESIUM				10300	10900	3520	2670	5230	3720	3700		2290
MANGANESE				28.3	25.5	359	53	1460	881	870		1.8
MERCURY				0.07 U	0.07 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U		0.07 U
NICKEL				10.4 U	10.4 U	6 U	7 U	5 U	5 U	5 U		10.4 U
POTASSIUM				1020	1020	2400	1960	3680	2200	2330		925
SELENIUM				3.3 U	3.3 U	2.1	1 UJ	1 UJ	1 UJ	1 UJ		4.3
SILVER				0.85 U	0.80 U	2 U	5 U	4 U	3 UJ	3 UJ		1.0 U
SODIUM				8970	8560	3660 J	3860 UJ	5660	5010	4950		10800
THALLIUM				5.7 U	5.7 U	1 U	2 U	1 U	1 U	1.2 U		5.7 U
VANADIUM				3.0	2.5 U	10 J	5 U	4 U	3 U	3 U		2.5 U

LOCATION	29GW02	29GW02	29GW02	29GW02	29GW02	29GW03	29GW03	29GW03	29GW03	29GW03	29GW03	29GW03
SAMPLE	BF-S29GWM02-03	S29GW02-04(072098)	S29GW02-04(082499)	S29-MW02-05	S29-MW02-05-D	29GW03	29GW03-1	29GW03-2	29GW03-3	29GW03-3-D	S29GW03-04	S29-MW03-05
MATRIX	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW
SAMPLE DATE	4/2/1998	7/20/1998	8/24/1999	10/2/2001	10/2/2001	10/22/1991	7/25/1993	12/13/1993	4/24/1994	4/24/1994	7/20/1998	10/2/2001
ZINC				225	4.3 U	32.7 J	2.7 UJ	7.1 UJ	4.3 UJ	5 UJ		2.4 U
Dissolved Inorganics (ug/L)												
ALUMINUM						11 U	74.9 UJ	102 UJ	226 UJ	231 UJ		
ANTIMONY						14 U	17 UJ	16 UJ	17 UJ	17 UJ		
ARSENIC						1 U	2.2 UJ	6.2	7.5	7.7		
BARIUM						12.7	13.8	7.8 UJ	3 U	3.2 U		
BERYLLIUM						1 U	1 U	1 U	1 U	1 U		
CADMIUM						1 UJ	2 U	2 U	2 U	2 U		
CALCIUM						97200	85300	132000 J	126000	125000		
CHROMIUM						3 U	8 U	8 U	6 UJ	6.1 UJ		
COBALT						3 U	6 U	3.9	8 U	8 U		
COPPER						2.3	9 U	3 U	3 U	3 U		
IRON						622	3100	15300	16600	16600		
LEAD						1 UJ	1 U	1.3 UJ	1 UJ	1 UJ		
MAGNESIUM						3120	2760	4970	3720	3710		
MANGANESE						109	54.6	1430	867	861		
MERCURY						0.2 U	0.2 U	0.2 U	0.2 U	0.2 U		
NICKEL						6 U	7 U	5 U	5 U	5 U		
POTASSIUM						2160	2100	3610	2210	2250		
SELENIUM						1 U	1 UJ	1 U	1.1 UJ	1 UJ		
SILVER						2 U	5 U	4.1 J	3 UJ	3 UJ		
SODIUM						3710 J	3850 UJ	5360	5080	5020		
THALLIUM						1 U	2 U	1 U	1 U	1 U		
VANADIUM						3 UJ	5 U	4 U	3 U	3 U		
ZINC						10.4 UJ	8 UJ	7.4 UJ	3.4 UJ	3.7 UJ		
Miscellaneous Parameters (mg/L)												
ALKALINITY												
BIOCHEMICAL OXYGEN DEMAND												
CHEMICAL OXYGEN DEMAND												
CHLORIDE												
HARDNESS												
TOTAL DISSOLVED SOLIDS												
TOTAL ORGANIC CARBON												

LOCATION	29GW04	29GW04	29GW04	29GW04	29GW04	29GW05	29GW05	29GW05	29GW05	29GW05	29GW06	29GW06	29GW06	29GW06	29GW06	29GW06
SAMPLE	29GW04	29GW04-1	29GW04-2	29GW04-3	S29-MW04-05	29GW05	29GW05-1	29GW05-2	29GW05-3	29GW06	29GW06	29GW06-1	29GW06-1-D	29GW06-2	29GW06-3	S29-MW06-05
MATRIX	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW
SAMPLE DATE	10/22/1991	7/24/1993	12/13/1993	4/24/1994	10/2/2001	10/22/1991	7/23/1993	12/13/1993	4/24/1994	10/22/1991	7/23/1993	7/23/1993	12/13/1993	4/24/1994	10/3/2001	
Volatile Organics (ug/L)																
1,1,1-TRICHLOROETHANE					1.3 U	10 U				10 U					1.3 U	
1,1,2,2-TETRACHLOROETHANE					0.3 U	10 U				10 U					0.3 U	
1,1,2-TRICHLOROETHANE					0.2 U	10 U				10 U					0.2 U	
1,1-DICHLOROETHANE					0.7 U	10 U				10 U					0.7 U	
1,1-DICHLOROETHENE					1 U	10 U				10 U					1 U	
1,2-DIBROMOETHANE					1 U										1 U	
1,2-DICHLOROBENZENE					1 U										1 U	
1,2-DICHLOROETHANE					0.3 U	10 U				10 U					0.3 U	
1,2-DICHLOROPROPANE					0.4 U	10 U				10 U					0.4 U	
1,3-DICHLOROBENZENE					1 U										1 U	
1,4-DICHLOROBENZENE					1 U										1 U	
2-BUTANONE						10 UR				10 UR						
2-HEXANONE						10 UR				10 UR						
4-METHYL-2-PENTANONE						10 U				10 U						
ACETONE						10 UJ				10 UJ						
BENZENE	10 U	2 U	1 U	1 U	1 U	10 U	2 U	1 U	1 U	10 U	2 U	2 U	1 U	1 U	1 U	
BROMODICHLOROMETHANE					1 U	10 U				10 U					1 U	
BROMOFORM					1 U	10 U				10 U					1 U	
BROMOMETHANE					1 U	10 U				10 U					1 U	
CARBON DISULFIDE						10 U				10 U						
CARBON TETRACHLORIDE					1 U	10 U				10 U					1 U	
CHLOROBENZENE					1 U	10 U				10 U					1 U	
CHLORODIBROMOMETHANE					0.9 U	10 U				10 U					0.9 U	
CHLOROETHANE					1 UJ	10 U				10 U					1 UJ	
CHLOROFORM					0.5 U	10 U				10 U					0.5 U	
CHLOROMETHANE					0.8 U	10 U				10 U					0.8 U	
CIS-1,2-DICHLOROETHENE					0.5 U										0.5 U	
CIS-1,3-DICHLOROPROPENE					1 U	10 U				10 U					1 U	
DICHLORODIFLUOROMETHANE					1 U										1 U	
ETHYLBENZENE	10 U	2 U	1	0.56 J	1 U	10 U	2 U	1 U	1 U	10 U	2 U	2 U	1 U	1 U	1 U	
M+P-XYLENES		0.69 UJ	1 U	1 U			0.23 UJ	1 U	1 U		0.23 UJ	0.22 UJ	1 U	1 U		
METHYLENE CHLORIDE					1 U	10 UJ				10 UJ					1 U	
O-XYLENE		0.21 UJ	1 U	1 U			2 U	1 U	1 U		2 U	2 U	1 U	1 U		
STYRENE						10 U				10 U						
TETRACHLOROETHENE					0.3 U	10 U				10 U					0.3 U	
TOLUENE	10 U	0.89 UJ	1 U	0.22 J	1 U	10 U	0.38 UJ	1 U	1 U	10 U	0.35 UJ	0.3 UJ	1 U	1 U	1 U	
TOTAL 1,2-DICHLOROETHENE					1 U	10 U				10 U					1 U	
TOTAL XYLENES	10 U				1 U	10 U				10 U					1 U	
TRANS-1,2-DICHLOROETHENE					0.5 U										0.5 U	
TRANS-1,3-DICHLOROPROPENE					1 U	10 U				10 U					1 U	
TRICHLOROETHENE					1 U	10 U				10 U					1 U	
TRICHLOROFLUOROMETHANE					1 U										1 U	
VINYL CHLORIDE					1 U	10 U				10 U					1 U	
Semivolatile Organics (ug/L)																
1,2,4-TRICHLOROBENZENE	11 U				10 U	6 U				11 U						10 U

SITE 29 - BOGUE FIELD
GROUNDWATER ANALYTICAL RESULTS

LOCATION	29GW04	29GW04	29GW04	29GW04	29GW04	29GW05	29GW05	29GW05	29GW05	29GW06	29GW06	29GW06	29GW06	29GW06	29GW06
SAMPLE	29GW04	29GW04-1	29GW04-2	29GW04-3	S29-MW04-05	29GW05	29GW05-1	29GW05-2	29GW05-3	29GW06	29GW06-1	29GW06-1-D	29GW06-2	29GW06-3	S29-MW06-05
MATRIX	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW
SAMPLE DATE	10/22/1991	7/24/1993	12/13/1993	4/24/1994	10/2/2001	10/22/1991	7/23/1993	12/13/1993	4/24/1994	10/22/1991	7/23/1993	7/23/1993	12/13/1993	4/24/1994	10/3/2001
1,2-DICHLOROBENZENE	11 U				10 U	6 U				11 U					10 U
1,2-DIPHENYLHYDRAZINE					10 U										10 U
1,3-DICHLOROBENZENE	11 U				10 U	6 U				11 U					10 U
1,4-DICHLOROBENZENE	11 U				10 U	6 U				11 U					10 U
2,2'-OXYBIS(1-CHLOROPROPANE)	11 U				10 U	6 U				11 U					10 U
2,4,5-TRICHLOROPHENOL	28 U					14 U				27 U					
2,4,6-TRICHLOROPHENOL	11 U				10 U	6 U				11 U					10 U
2,4-DICHLOROPHENOL	11 U				10 U	6 U				11 U					10 U
2,4-DIMETHYLPHENOL	11 U				10 U	6 U				11 U					10 U
2,4-DINITROPHENOL	28 U				50 U	14 U				27 U					50 U
2,4-DINITROTOLUENE	11 U				10 U	6 U				11 U					10 U
2,6-DINITROTOLUENE	11 U				10 U	6 U				11 U					10 U
2-CHLORONAPHTHALENE	11 U				10 U	6 U				11 U					10 U
2-CHLOROPHENOL	11 U				10 U	6 U				11 U					10 U
2-METHYLNAPHTHALENE	11 U					6 U				11 U					
2-METHYLPHENOL	11 U					6 U				11 U					
2-NITROANILINE	28 U					14 U				27 U					
2-NITROPHENOL	11 U				10 U	6 U				11 U					10 U
3,3'-DICHLOROBENZIDINE	11 U				20 U	6 U				11 U					20 U
3-NITROANILINE	28 U					14 U				27 U					
4,6-DINITRO-2-METHYLPHENOL	28 U				50 U	14 U				27 U					50 U
4-BROMOPHENYL PHENYL ETHER	11 U				10 U	6 U				11 U					10 U
4-CHLORO-3-METHYLPHENOL	11 U				10 U	6 U				11 U					10 U
4-CHLOROANILINE	11 U					6 U				11 U					
4-CHLOROPHENYL PHENYL ETHER	11 U				10 U	6 U				11 U					10 U
4-METHYLPHENOL	11 U					6 U				11 U					
4-NITROANILINE	28 U					14 U				27 U					
4-NITROPHENOL	28 UR				50 U	14 UR				27 UR					50 U
ACENAPHTHENE	11 U				10 U	6 U				11 U					10 U
ACENAPHTHYLENE	11 U				10 U	6 U				11 U					10 U
ANTHRACENE	11 U				10 U	6 U				11 U					10 U
BENZIDINE					50 U										50 U
BENZO(A)ANTHRACENE	11 U				10 U	6 U				11 U					10 U
BENZO(A)PYRENE	11 U				10 U	6 U				11 U					10 U
BENZO(B)FLUORANTHENE	11 U				10 U	6 U				11 U					10 U
BENZO(G,H,I)PERYLENE	11 U				10 U	6 U				11 U					10 U
BENZO(K)FLUORANTHENE	11 U				10 U	6 U				11 U					10 U
BIS(2-CHLOROETHOXY)METHANE	11 U				10 U	6 U				11 U					10 U
BIS(2-CHLOROETHYL)ETHER	11 U				10 U	6 U				11 U					10 U
BIS(2-CHLOROISOPROPYL)ETHER															
BIS(2-ETHYLHEXYL)PHTHALATE	2300 UJ				10 U	6 UJ				1400 UJ					10 U
BUTYL BENZYL PHTHALATE	11 U				10 U	6 U				11 U					10 U
CARBAZOLE	11 U					6 U				11 U					
CHRYSENE	11 U				10 U	6 U				11 U					10 U
DI-N-BUTYL PHTHALATE	11 UJ				10 U	6 U				11 U					10 U
DI-N-OCTYL PHTHALATE	12 UJ				10 U	6 U				11 U					10 U

LOCATION	29GW04	29GW04	29GW04	29GW04	29GW04	29GW05	29GW05	29GW05	29GW05	29GW06	29GW06	29GW06	29GW06	29GW06	29GW06
SAMPLE	29GW04	29GW04-1	29GW04-2	29GW04-3	S29-MW04-05	29GW05	29GW05-1	29GW05-2	29GW05-3	29GW06	29GW06-1	29GW06-1-D	29GW06-2	29GW06-3	S29-MW06-05
MATRIX	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW
SAMPLE DATE	10/22/1991	7/24/1993	12/13/1993	4/24/1994	10/2/2001	10/22/1991	7/23/1993	12/13/1993	4/24/1994	10/22/1991	7/23/1993	7/23/1993	12/13/1993	4/24/1994	10/3/2001
DIBENZO(A,H)ANTHRACENE	11 U				10 U	6 U				11 U					10 U
DIBENZOFURAN	11 U					6 U				11 U					
DIETHYL PHTHALATE	11 U				10 U	6 U				11 UJ					10 U
DIMETHYL PHTHALATE	11 U				10 U	6 U				11 U					10 U
FLUORANTHENE	11 U				10 U	6 U				11 U					10 U
FLUORENE	11 U				10 U	6 U				11 U					10 U
HEXACHLOROBENZENE	11 U				10 U	6 U				11 U					10 U
HEXACHLOROBUTADIENE	11 U				10 U	6 U				11 U					10 U
HEXACHLOROCYCLOPENTADIENE	11 U				10 U	6 U				11 U					10 U
HEXACHLOROETHANE	11 U				10 U	6 U				11 U					10 U
INDENO(1,2,3-CD)PYRENE	11 U				10 U	6 U				11 U					10 U
ISOPHORONE	11 U				10 U	6 U				11 U					10 U
N-NITROSO-DI-N-PROPYLAMINE	11 U				10 U	6 U				11 U					10 U
N-NITROSODIMETHYLAMINE					10 U										10 U
N-NITROSODIPHENYLAMINE	11 U				10 U	6 U				11 U					10 U
NAPHTHALENE	11 U				10 U	6 U				11 U					10 U
NITROBENZENE	11 U				10 U	6 U				11 U					10 U
PENTACHLOROPHENOL	28 U				50 U	14 U				27 U					50 U
PHENANTHRENE	11 U				10 U	6 U				11 U					10 U
PHENOL	11 U				10 U	6 U				11 U					10 U
PYRENE	11 U				10 U	6 U				11 U					10 U
Petroleum Hydrocarbons (mg/L)															
TOTAL PETROLEUM HYDROCARBONS	1.3 U					1.3 U				1.3 U					
Total Inorganics (ug/L)															
ALUMINUM	8820	97.4 UJ	158 UJ	226 UJ	21.1 U	16400	182 UJ	295 UJ	544 UJ	34800 J	131 UJ	70.5 UJ	196 UJ	280 UJ	21.1 U
ANTIMONY	14 U	17 UJ	16 UJ	17 UJ	2.4 U	14 U	17 UJ	16 UJ	17 UJ	14 U	17 UJ	17 UJ	16 UJ	17 UJ	2.4 U
ARSENIC	36 J	3.4 UJ	3.2	3.4	6.4	1.9	1.1 UJ	1 U	1	24.6	2 UJ	1.7 UJ	1 U	1 U	3.2 U
BARIUM	26.5	11.7 UJ	10.9 UJ	12.4	6.3 U	42.3	20.6 UJ	17.8	11.4	101	11.4 UJ	11.7 UJ	13.5 UJ	6.7	10.3
BERYLLIUM	1.2	1 U	1 U	1 U	0.17 U	1.2	1 U	1 U	1 U	5.3	1 U	1 U	1 U	1 U	0.17 U
CADMIUM	1 UJ	2 UJ	2 U	2 U	0.51 U	1 UJ	2 UJ	2 U	2 U	2.2 UJ	2 UJ	2 UJ	2 U	2 U	0.51 U
CALCIUM	55100	40600	48800	76600	37300	40000	12300	10400	6330	108000	74500	74700	83700	66000	51000
CHROMIUM	26.9	8 U	8 U	6 UJ	0.74 U	43.9	8 U	8 U	6 UJ	106	8 U	9	8 U	6 UJ	1.0
COBALT	7.4	6 UJ	3 U	8 U	2.9 U	11.2	6 UJ	3 U	8 U	30.4	6 UJ	6 UJ	3 U	8 U	2.9 U
COPPER	6.4	9 U	3 U	3 U	2.4 U	9.6	9 U	3 U	3 U	28.5	9 U	9 U	3 U	3 U	2.4 U
IRON	50700	1340	2180	4810	1240	31500	152 UJ	619	344	75200	2270	2150	2770	1980	2680
LEAD	14.4 J	1 UJ	1 U	1 UJ	2.6	22.2 J	1 UJ	1 U	1 UJ	61 J	2.2 J	1 UJ	1 U	1 UJ	2.5 U
MAGNESIUM	3440	2040	1980	2930	498	2070	589 UJ	453	455	5350 UJ	1960	1950	2170	1610	1390
MANGANESE	83.5	39.1 UJ	26.6	57.9	14.5	105	16.5 UJ	12.5	11.7 J	240	14.4 UJ	14.5 UJ	15.2	10.9 J	18.0
MERCURY	0.2 U	0.2 U	0.2 U	0.2 U	0.07 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.07 U
NICKEL	7.8	7 UJ	5 U	5 U	10.4 U	9.7	7 UJ	5 U	5 U	31.5	7 UJ	7 UJ	5 U	5 U	10.4 U
POTASSIUM	1330	374	623	548	481	956	374	517	152 U	1900 UJ	663	378	983	544	748
SELENIUM	1.8	1 U	1 UJ	1 UJ	3.3 U	1.3	1 UJ	1 UJ	1 UJ	3.2 UJ	1 U	1 U	1 UJ	1 UJ	3.3 U
SILVER	2 U	5 UJ	4 U	3 UJ	0.80 U	2 U	5 UJ	4 U	3 UJ	2 U	5 UJ	5 UJ	4 U	3 UJ	0.80 U
SODIUM	3750 J	3660 UJ	4160	10400	10700	3730 J	4160 UJ	4860	4070	16300	10700	11200	11600	7470	10500
THALLIUM	1 U	2 U	1 U	1 U	5.7 U	1 U	2 U	1 U	1 U	1 U	2 U	2 U	1 U	1 UJ	5.7 U
VANADIUM	78.7 J	5 U	4 U	3 U	2.5 U	82.1 J	5 U	4 U	3 U	205	5 U	5 U	4 U	3 U	3.3

LOCATION	29GW04	29GW04	29GW04	29GW04	29GW04	29GW05	29GW05	29GW05	29GW05	29GW06	29GW06	29GW06	29GW06	29GW06	29GW06
SAMPLE	29GW04	29GW04-1	29GW04-2	29GW04-3	S29-MW04-05	29GW05	29GW05-1	29GW05-2	29GW05-3	29GW06	29GW06-1	29GW06-1-D	29GW06-2	29GW06-3	S29-MW06-05
MATRIX	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW
SAMPLE DATE	10/22/1991	7/24/1993	12/13/1993	4/24/1994	10/2/2001	10/22/1991	7/23/1993	12/13/1993	4/24/1994	10/22/1991	7/23/1993	7/23/1993	12/13/1993	4/24/1994	10/3/2001
ZINC	26.6	2.7 UJ	3.5 UJ	4.3 UJ	2.5 U	55.9	2 UJ	6.9 UJ	7.5 UJ	307 J	9.1 UJ	2 UJ	6.3 UJ	3.5 UJ	2.4 U
Dissolved Inorganics (ug/L)															
ALUMINUM	11 U	86.9 UJ	166 UJ	223 UJ		11 U	130 UJ	194 UJ	329 UJ	11 UJ	53 U	59.3 UJ	177 UJ	246 UJ	
ANTIMONY	14 U	17 UJ	16 UJ	17 UJ		14 U	17 UJ	16 UJ	17 UJ	14 U	17 UJ	17 UJ	16 UJ	17 UJ	
ARSENIC	2.7	3.6 UJ	3 J	3.3 J		1 U	1 U	1 U	1 U	1 U	1.2 UJ	1.6 UJ	1 U	1 U	
BARIUM	12.7	12.2 UJ	10.1 UJ	12		15.7	16.6 UJ	18.1 UJ	11.2	21.9 UJ	10.9 UJ	11.3 UJ	14.6 UJ	6.4	
BERYLLIUM	1 U	1 U	1 U	1 U		1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
CADMIUM	1 UJ	2 UJ	2 U	2 U		1 UJ	2 UJ	2 U	2 U	1 U	2 UJ	2 UJ	2 U	2 U	
CALCIUM	56600	41000	47500 J	74800		49600	12600	10300 J	6380	88500	75000	76100	86500 J	66800	
CHROMIUM	3 U	8 U	8 U	6 UJ		3 U	8 U	8 U	6 UJ	3 U	8 U	8 U	8 U	6 UJ	
COBALT	3 U	6 UJ	3 U	8 U		3 U	6 UJ	3 U	8 U	3 U	6 UJ	6 UJ	3 U	8 U	
COPPER	2 U	9 U	3 U	3 U		2 U	9 U	3 UJ	3 U	2 U	9 U	9 U	3 U	3 U	
IRON	2180	1290	2200	4630		50.3 UJ	128 UJ	129	18.2 UJ	22.8 UJ	2110	2150	2720	2000	
LEAD	1 UJ	1 UJ	1 U	1 UJ		1 UJ	1 UJ	1 U	1 UJ	1 UJ	1 UJ	1 UJ	1.5 UJ	1 UJ	
MAGNESIUM	2940	2060	1950	2890		559	501 UJ	482 UJ	459	2150 UJ	1930	2050	2320	1630	
MANGANESE	11.9 J	40.1 UJ	27	57		20.3 J	18.4 UJ	15.3	13.5 J	49.6	15.8 UJ	14.6 UJ	16.4	11.4 J	
MERCURY	0.2 U	0.2 U	0.2 U	0.2 U		0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	
NICKEL	6 U	7 UJ	5 U	5 U		6 U	7 UJ	5 U	5 U	6 U	7 UJ	7 UJ	5 U	5 U	
POTASSIUM	1080	557	621	487		633 U	355 U	597	152 U	699 UJ	599	676	865	429	
SELENIUM	1 U	1 U	1 U	1 UJ		1 U	1 UJ	1 UJ	1 UJ	1 UJ	1 U	1 U	1 U	1 UJ	
SILVER	2 U	5 UJ	4 U	3 UJ		2 U	5 UJ	4 U	3 UJ	2 U	5 UJ	5 UJ	4 U	3 UJ	
SODIUM	3770 J	4000 UJ	4090 UJ	10200		3790 J	4300 UJ	5060	4010	15600	10800	10900	11500	7330	
THALLIUM	1 U	2 U	1 U	1 U		1 U	2 U	1	1 U	1 U	2 U	2 U	1 U	1 U	
VANADIUM	3 UJ	5 U	4 U	3 U		3.8 J	5 U	4 U	3 U	3 U	5 U	5 U	4 U	3 U	
ZINC	18.4 UJ	2 UJ	10.1 UJ	12.6 UJ		11.1 UJ	4.9 UJ	8.9 UJ	6.1 UJ	8.2 J	7.2 UJ	9.5 UJ	4.9 UJ	4.7 UJ	
Miscellaneous Parameters (mg/L)															
ALKALINITY						99									
BIOCHEMICAL OXYGEN DEMAND						3 U									
CHEMICAL OXYGEN DEMAND						80									
CHLORIDE						11									
HARDNESS						120									
TOTAL DISSOLVED SOLIDS						140									
TOTAL ORGANIC CARBON						4									

LOCATION	29GW07	29GW07	29GW07	29GW07	29GW07	29GW08	29GW08	29GW08	29GW08	29GW08	29GW08	29GW09	29GW09	29GW09	29GW09
SAMPLE	29GW07	29GW07-1	29GW07-2	29GW07-3	S29-MW07-05	29GW08	29GW08-1	29GW08-2	29GW08-3	S29GW08-04	S29-MW08-05	29GW09	29GW09-1	29GW09-2	29GW09-3
MATRIX	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW
SAMPLE DATE	10/22/1991	7/25/1993	12/14/1993	4/24/1994	10/3/2001	10/22/1991	7/24/1993	12/13/1993	4/24/1994	8/24/1999	10/2/2001	10/22/1991	7/25/1993	12/13/1993	4/24/1994
Volatile Organics (ug/L)															
1,1,1-TRICHLOROETHANE					1.3 U						1.3 U				
1,1,2,2-TETRACHLOROETHANE					0.3 U						0.3 U				
1,1,2-TRICHLOROETHANE					0.2 U						0.2 U				
1,1-DICHLOROETHANE					0.7 U						0.7 U				
1,1-DICHLOROETHENE					1 U						1 U				
1,2-DIBROMOETHANE					1 U						1 U				
1,2-DICHLOROBENZENE					1 U						1 U				
1,2-DICHLOROETHANE					0.3 U						0.3 U				
1,2-DICHLOROPROPANE					0.4 U						0.4 U				
1,3-DICHLOROBENZENE					1 U						1 U				
1,4-DICHLOROBENZENE					1 U						1 U				
2-BUTANONE															
2-HEXANONE															
4-METHYL-2-PENTANONE															
ACETONE															
BENZENE	10 U	2 U	1 U	1 U	1 U	10 U	2 U	1 U	1 U	1 U	1 U	10 U	2.7	3.8	3.7 J
BROMODICHLOROMETHANE					1 U						1 U				
BROMOFORM					1 U						1 U				
BROMOMETHANE					1 U						1 U				
CARBON DISULFIDE															
CARBON TETRACHLORIDE					1 U						1 U				
CHLOROBENZENE					1 U						1 U				
CHLORODIBROMOMETHANE					0.9 U						0.9 U				
CHLOROETHANE					1 U						1 UJ				
CHLOROFORM					0.5 U						0.5 U				
CHLOROMETHANE					0.8 U						0.8 U				
CIS-1,2-DICHLOROETHENE					0.5 U						0.5 U				
CIS-1,3-DICHLOROPROPENE					1 U						1 U				
DICHLORODIFLUOROMETHANE					1 U						1 U				
ETHYLBENZENE	10 U	2 U	1 U	1 U	1 U	10 U	2 U	1 U	1 U	1 U	1 U	10 U	2 U	1 U	1 U
M+P-XYLENES		2 U	1 U	0.37 J			0.22 UJ	1 U	0.26 J				0.97 UJ	1 U	0.44 J
METHYLENE CHLORIDE					1 U						1 U				
O-XYLENE		2 U	1 U	1 U			2 U	1 U	1 U				0.62 UJ	1 U	0.38 J
STYRENE															
TETRACHLOROETHENE					0.3 U						0.3 U				
TOLUENE	10 U	0.39 UJ	1 U	1 U	1 U	10 U	0.5 UJ	1 U	1 U	1 U	1 U	10 U	1.3 UJ	1 U	0.2 J
TOTAL 1,2-DICHLOROETHENE					1 U						1 U				
TOTAL XYLENES	10 U				1 U	10 U				1 U	1 U	10 U			
TRANS-1,2-DICHLOROETHENE					0.5 U						0.5 U				
TRANS-1,3-DICHLOROPROPENE					1 U						1 U				
TRICHLOROETHENE					1 U						1 U				
TRICHLOROFLUOROMETHANE					1 U						1 U				
VINYL CHLORIDE					1 U						1 U				
Semivolatile Organics (ug/L)															
1,2,4-TRICHLOROBENZENE	11 U				10 U	10 U					10 U	10 U			

SITE 29 - BOGUE FIELD
GROUNDWATER ANALYTICAL RESULTS

LOCATION	29GW07	29GW07	29GW07	29GW07	29GW07	29GW08	29GW08	29GW08	29GW08	29GW08	29GW08	29GW09	29GW09	29GW09	29GW09
SAMPLE	29GW07	29GW07-1	29GW07-2	29GW07-3	S29-MW07-05	29GW08	29GW08-1	29GW08-2	29GW08-3	S29GW08-04	S29-MW08-05	29GW09	29GW09-1	29GW09-2	29GW09-3
MATRIX	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW
SAMPLE DATE	10/22/1991	7/25/1993	12/14/1993	4/24/1994	10/3/2001	10/22/1991	7/24/1993	12/13/1993	4/24/1994	8/24/1999	10/2/2001	10/22/1991	7/25/1993	12/13/1993	4/24/1994
1,2-DICHLOROBENZENE	11 U				10 U	10 U					10 U	10 U			
1,2-DIPHENYLHYDRAZINE					10 U						10 U				
1,3-DICHLOROBENZENE	11 U				10 U	10 U					10 U	10 U			
1,4-DICHLOROBENZENE	11 U				10 U	10 U					10 U	10 U			
2,2'-OXYBIS(1-CHLOROPROPANE)	11 U				10 U	10 U					10 U	10 U			
2,4,5-TRICHLOROPHENOL	27 U					26 U						26 U			
2,4,6-TRICHLOROPHENOL	11 U				10 U	10 U					10 U	10 U			
2,4-DICHLOROPHENOL	11 U				10 U	10 U					10 U	10 U			
2,4-DIMETHYLPHENOL	11 U				10 U	10 U					10 U	10 U			
2,4-DINITROPHENOL	27 U				50 U	26 U					50 U	26 U			
2,4-DINITROTOLUENE	11 U				10 U	10 U					10 U	10 U			
2,6-DINITROTOLUENE	11 U				10 U	10 U					10 U	10 U			
2-CHLORONAPHTHALENE	11 U				10 U	10 U					10 U	10 U			
2-CHLOROPHENOL	11 U				10 U	10 U					10 U	10 U			
2-METHYLNAPHTHALENE	11 U					10 U						10 U			
2-METHYLPHENOL	11 U					10 U						10 U			
2-NITROANILINE	27 U					26 U						26 U			
2-NITROPHENOL	11 U				10 U	10 U					10 U	10 U			
3,3'-DICHLOROBENZIDINE	11 U				20 U	10 U					20 U	10 U			
3-NITROANILINE	27 U					26 U						26 U			
4,6-DINITRO-2-METHYLPHENOL	27 U				50 U	26 U					50 U	26 U			
4-BROMOPHENYL PHENYL ETHER	11 U				10 U	10 U					10 U	10 U			
4-CHLORO-3-METHYLPHENOL	11 U				10 U	10 U					10 U	10 U			
4-CHLOROANILINE	11 U					10 U						10 U			
4-CHLOROPHENYL PHENYL ETHER	11 U				10 U	10 U					10 U	10 U			
4-METHYLPHENOL	11 U					10 U						10 U			
4-NITROANILINE	27 U					26 U						26 U			
4-NITROPHENOL	27 UR				50 U	26 UR					50 U	26 UR			
ACENAPHTHENE	11 U				10 U	10 U					10 U	10 U			
ACENAPHTHYLENE	11 U				10 U	10 U					10 U	10 U			
ANTHRACENE	11 U				10 U	10 U					10 U	10 U			
BENZIDINE					50 U						50 U				
BENZO(A)ANTHRACENE	11 U				10 U	10 U					10 U	10 U			
BENZO(A)PYRENE	11 U				10 U	10 U					10 U	10 U			
BENZO(B)FLUORANTHENE	11 U				10 U	10 U					10 U	10 U			
BENZO(G,H,I)PERYLENE	11 U				10 U	10 U					10 U	10 U			
BENZO(K)FLUORANTHENE	11 U				10 U	10 U					10 U	10 U			
BIS(2-CHLOROETHOXY)METHANE	11 U				10 U	10 U					10 U	10 U			
BIS(2-CHLOROETHYL)ETHER	11 U				10 U	10 U					10 U	10 U			
BIS(2-CHLOROISOPROPYL)ETHER															
BIS(2-ETHYLHEXYL)PHTHALATE	200 UJ				10 U	410 UJ					10 U	190 UJ			
BUTYL BENZYL PHTHALATE	11 U				10 U	10 U					10 U	10 U			
CARBAZOLE	11 U					10 U						10 U			
CHRYSENE	11 U				10 U	10 U					10 U	10 U			
DI-N-BUTYL PHTHALATE	11 U				2.7 J	10 U					10 U	10 U			
DI-N-OCTYL PHTHALATE	11 U				10 U	10 U					10 U	10 U			

LOCATION	29GW07	29GW07	29GW07	29GW07	29GW07	29GW08	29GW08	29GW08	29GW08	29GW08	29GW08	29GW09	29GW09	29GW09	29GW09
SAMPLE	29GW07	29GW07-1	29GW07-2	29GW07-3	S29-MW07-05	29GW08	29GW08-1	29GW08-2	29GW08-3	S29GW08-04	S29-MW08-05	29GW09	29GW09-1	29GW09-2	29GW09-3
MATRIX	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW
SAMPLE DATE	10/22/1991	7/25/1993	12/14/1993	4/24/1994	10/3/2001	10/22/1991	7/24/1993	12/13/1993	4/24/1994	8/24/1999	10/2/2001	10/22/1991	7/25/1993	12/13/1993	4/24/1994
DIBENZO(A,H)ANTHRACENE	11 U				10 U	10 U					10 U	10 U			
DIBENZOFURAN	11 U					10 U						10 U			
DIETHYL PHTHALATE	11 UJ				10 U	10 UJ					10 U	10 UJ			
DIMETHYL PHTHALATE	11 U				10 U	10 U					10 U	10 U			
FLUORANTHENE	11 U				10 U	10 U					10 U	10 U			
FLUORENE	11 U				10 U	10 U					10 U	10 U			
HEXACHLOROBENZENE	11 U				10 U	10 U					10 U	10 U			
HEXACHLOROBUTADIENE	11 U				10 U	10 U					10 U	10 U			
HEXACHLOROCYCLOPENTADIENE	11 U				10 U	10 U					10 U	10 U			
HEXACHLOROETHANE	11 U				10 U	10 U					10 U	10 U			
INDENO(1,2,3-CD)PYRENE	11 U				10 U	10 U					10 U	10 U			
ISOPHORONE	11 U				10 U	10 U					10 U	10 U			
N-NITROSO-DI-N-PROPYLAMINE	11 U				10 U	10 U					10 U	10 U			
N-NITROSODIMETHYLAMINE					10 U						10 U				
N-NITROSODIPHENYLAMINE	11 U				10 U	10 U					10 U	10 U			
NAPHTHALENE	11 U				10 U	10 U					10 U	10 U			
NITROBENZENE	11 U				10 U	10 U					10 U	10 U			
PENTACHLOROPHENOL	27 U				50 U	26 U					50 U	26 U			
PHENANTHRENE	11 U				10 U	10 U					10 U	10 U			
PHENOL	11 U				10 U	10 U					10 U	10 U			
PYRENE	11 U				10 U	10 U					10 U	10 U			
Petroleum Hydrocarbons (mg/L)															
TOTAL PETROLEUM HYDROCARBONS	1.3 U					1.3 U				0.5 U		1.3 U			
Total Inorganics (ug/L)															
ALUMINUM	1100 J	69 UJ	61.3 UJ	30 U	21.1 U	99100 J	53 U	130 UJ	234 UJ		21.1 U	21400 J	82 UJ	187 UJ	30 U
ANTIMONY	14 U	17 UJ	16 UJ	17 U	2.4 U	14 U	17 UJ	16 UJ	17 UJ		2.4 U	14 U	17 UJ	16 UJ	17 U
ARSENIC	1.9	1.3 UJ	1 U	1 R	3.2 U	45.4 J	1.8 UJ	1.3	1.1		3.2 U	51	6 UJ	5	4.5 R
BARIUM	17.1 UJ	7.7	12.6	10.8	16.3	339	16.5 UJ	10.9 UJ	7.2		31.5	190	72.1	76.9	61.3
BERYLLIUM	1 U	1 U	1 U	1 U	0.17 U	25.3	1 U	1 U	1 U		0.17 U	4	1 U	1 U	1 U
CADMIUM	1 U	2 U	2 U	2 U	0.51 U	8.4 UJ	2 UJ	2 U	2 U		0.51 U	5.3 UJ	2 U	2 U	2 U
CALCIUM	68700	77600	82500	81600	105000	103000	85200	69300	69900		94900	168000	140000	128000	123000
CHROMIUM	6	8 U	8 U	11.5 UJ	0.74 U	199	8 U	8 U	6 UJ		0.74 U	79.2	8 U	8 U	9.6 UJ
COBALT	3 U	6 U	3 U	8 U	2.9 U	122	16.6 J	8.5	8 U		2.9 U	43.6	6 U	3 U	8 U
COPPER	6.4	9 U	3 U	3 UJ	55.4	43.4	9 U	3 U	3 U		2.4 U	22.4	9 U	3 U	3 UJ
IRON	1220	1970	2040	2360 J	2610	364000	5900	2340	857		61.5 U	116000	11800	24500	14600 J
LEAD	5.9 J	1 U	2.8 UJ	1 U	2.5 U	99.7 J	1 UJ	1 U	1 UJ		2.5 U	46.2 J	1 U	1 U	1 U
MAGNESIUM	1650 UJ	1880	2110	2150 J	6760	11900	2240	1430	1610		3990	7490 UJ	3380	3110	3430 J
MANGANESE	53.8	40.3	43.7 J	47	58.9	2450	1820	752	460		3.5	1020	501	622	664
MERCURY	0.2 U	0.2 U	0.2 U	0.2 U	0.07 U	0.2 U	0.2 U	0.2 U	0.2 U		0.07 U	0.2 U	0.2 U	0.2 U	0.2 U
NICKEL	6 U	7 U	5 U	5 U	10.4 U	96.8	7 UJ	5 U	5 U		10.4 U	20.7	7 U	5 U	5 U
POTASSIUM	1080 UJ	795	580 J	760 UJ	438 U	6160 UJ	1840	2530	1890		2020	7620 UJ	7880	7610	7770
SELENIUM	1 UJ	1 UJ	1 UJ	1 UJ	3.3 U	1 UJ	1 UJ	1 UJ	1.2 UJ		3.3 U	1.2 UJ	1 UJ	1 UJ	1 UJ
SILVER	2 U	5 U	4 U	3 UJ	0.83 U	2 U	5 UJ	4 U	3 UJ		0.80 U	2 U	5 U	4 U	3 UJ
SODIUM	14800	12200	11800	10800	9870	3610	3780 UJ	4100	3830		8260	7410	4730 UJ	4810	4450
THALLIUM	1 U	2 U	1 UJ	1 U	5.7 U	2.2	2 U	1.2 J	1 U		5.7 U	1 U	2 U	1 U	1 U
VANADIUM	3 U	5 U	4 U	3 U	3.3	429	5 U	4 U	3 U		2.5 U	130	5 U	4 U	3 U

LOCATION	29GW07	29GW07	29GW07	29GW07	29GW07	29GW08	29GW08	29GW08	29GW08	29GW08	29GW08	29GW09	29GW09	29GW09	29GW09
SAMPLE	29GW07	29GW07-1	29GW07-2	29GW07-3	S29-MW07-05	29GW08	29GW08-1	29GW08-2	29GW08-3	S29GW08-04	S29-MW08-05	29GW09	29GW09-1	29GW09-2	29GW09-3
MATRIX	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW
SAMPLE DATE	10/22/1991	7/25/1993	12/14/1993	4/24/1994	10/3/2001	10/22/1991	7/24/1993	12/13/1993	4/24/1994	8/24/1999	10/2/2001	10/22/1991	7/25/1993	12/13/1993	4/24/1994
ZINC	12.7 J	2 UJ	3.3 UJ	3 UJ	4.3 U	472 J	2.1 UJ	2.9 UJ	3.6 UJ		2.4 U	135 J	4.9 UJ	15 UJ	2.2 UJ
Dissolved Inorganics (ug/L)															
ALUMINUM	11 UJ	53 U	42 U	30 U		11 UJ	54.7 UJ	119 UJ	218 UJ			11.9 UJ	53 U	132 UJ	30 U
ANTIMONY	14 U	17 UJ	16 UJ	17 U		14 U	17 UJ	16 UJ	17 UJ			14 U	17 UJ	16 UJ	17 U
ARSENIC	1.4	1 U	1 U	1 R		1 UJ	2.4 UJ	1.8 J	1 U			1 U	4.7 UJ	6	4.3 R
BARIUM	14.3 UJ	8.3	11.6	9.8		21.7 UJ	16 UJ	10.8 UJ	7.1			84.3	74.4	64.9	60.8
BERYLLIUM	1 U	1 U	1 U	1 U		1 U	1 U	1 U	1 U			1 U	1 U	1 U	1 U
CADMIUM	1 U	2 U	2 U	2 U		1 U	2 UJ	2 U	2 U			1 U	2 U	2 U	2 U
CALCIUM	68900	75900	82600	80900		79600	85300	71500 J	68300			125000	144000	120000 J	123000
CHROMIUM	3 U	8 U	8 U	15.1 UJ		3 U	8 U	8 U	6 UJ			3	8 U	8 U	6.4 UJ
COBALT	3 U	6 U	3 U	8 U		3 U	8.5 J	6.9	8.1			3 U	6 U	3 U	8 U
COPPER	8.7	9 U	3 U	3 UJ		2 U	9 U	3 U	3 U			2	9 U	3 U	3 UJ
IRON	6.7 UJ	1790	1930	2040 J		33.2 UJ	5700	2260	891			61.1 UJ	9900	12500	14300 J
LEAD	1 UJ	1 U	1.2 UJ	1 U		1 UJ	1 UJ	1.4 UJ	1 UJ			1 UJ	1 U	1.3 UJ	1 U
MAGNESIUM	1500 UJ	1800	2090	2150 J		1830 UJ	2280	1470	1510			4330 UJ	3370	2900	3390 J
MANGANESE	46	39.6	43.1 J	44.6		401	1820	836	542			304	516	581	666
MERCURY	0.2 U	0.2 U	0.2 U	0.2 U		0.2 U	0.2 U	0.2 U	0.2 U			0.2 U	0.2 U	0.2 U	0.2 U
NICKEL	6 U	7 U	5 U	5 U		6 U	7 UJ	5 U	5 U			6 U	7 U	5 U	5 U
POTASSIUM	832 UJ	790	679 J	759 UJ		2760 UJ	1870	2300	1880			7510 UJ	8310	7090	7360
SELENIUM	1 UJ	1 UJ	1 UJ	1 UJ		1 UJ	1 UJ	1 UJ	1.8 UJ			1 UJ	1 UJ	1 UJ	1 UJ
SILVER	2 U	5 U	4 U	3 UJ		2 U	5 UJ	4 U	3 UJ			2 U	5 U	5.1 J	3 U
SODIUM	15100	11900	11500	10600		3400	3730 UJ	4160 UJ	3840			7190	5180	4640 UJ	4470
THALLIUM	1 U	2 U	1 UJ	1 U		1 U	2 U	1 U	1 UJ			1 U	2 U	1.3	1 U
VANADIUM	3 U	5 U	4 U	3 U		3 U	5 U	4 U	3 U			3 U	5 U	4 U	3 U
ZINC	16.4 J	2 UJ	2 U	2.5 UJ		12.1 J	4.5 UJ	4.4 UJ	3.5 UJ			12.8 J	5.3 UJ	5.2 UJ	3 UJ
Miscellaneous Parameters (mg/L)															
ALKALINITY															
BIOCHEMICAL OXYGEN DEMAND															
CHEMICAL OXYGEN DEMAND															
CHLORIDE															
HARDNESS															
TOTAL DISSOLVED SOLIDS															
TOTAL ORGANIC CARBON															

LOCATION	29GW10	29GW10	29GW10	29GW10	29GW10	29GW10	29GW10	29GW11	29GW11	29GW11	29GW11	29GW11
SAMPLE	29GW10	29GW10-1	29GW10-2	29GW10-3	S29GW10-04(072098)	S29GW10-04(082499)	S29-MW10-05	S29GWM11-01	S29GWM11-02	BF-S29GWM11-03	S29GW11-04	S29-MW11-05
MATRIX	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW
SAMPLE DATE	10/22/1991	7/25/1993	12/13/1993	4/24/1994	7/20/1998	8/24/1999	10/3/2001	9/7/1997	10/17/1997	4/2/1998	7/20/1998	10/3/2001
Volatile Organics (ug/L)												
1,1,1-TRICHLOROETHANE							1.3 U					1.3 U
1,1,2,2-TETRACHLOROETHANE							0.3 U					0.3 U
1,1,2-TRICHLOROETHANE							0.2 U					0.2 U
1,1-DICHLOROETHANE							0.7 U					0.7 U
1,1-DICHLOROETHENE							1 U					1 U
1,2-DIBROMOETHANE							1 U					1 U
1,2-DICHLOROBENZENE							1 U					1 U
1,2-DICHLOROETHANE							0.3 U					0.3 U
1,2-DICHLOROPROPANE							0.4 U					0.4 U
1,3-DICHLOROBENZENE							1 U					1 U
1,4-DICHLOROBENZENE							1 U					1 U
2-BUTANONE												
2-HEXANONE												
4-METHYL-2-PENTANONE												
ACETONE												
BENZENE	10 U	8.1	1.2	7.6	13	2.9	1 U	5 U	1 U	1 U	1 U	1 U
BROMODICHLOROMETHANE							1 U					1 U
BROMOFORM							1 U					1 U
BROMOMETHANE							1 U					1 U
CARBON DISULFIDE												
CARBON TETRACHLORIDE							1 U					1 U
CHLOROBENZENE							1 U					1 U
CHLORODIBROMOMETHANE							0.9 U					0.9 U
CHLOROETHANE							1 UJ					1 UJ
CHLOROFORM							0.5 U					0.5 U
CHLOROMETHANE							0.8 U					0.8 U
CIS-1,2-DICHLOROETHENE							0.5 U					0.5 U
CIS-1,3-DICHLOROPROPENE							1 U					1 U
DICHLORODIFLUOROMETHANE							1 U					1 U
ETHYLBENZENE	10 U	1.4 J	0.28 J	0.55 J	0.84 J	1 U	1 U	15	1 U	1 U	1 U	1 U
M+P-XYLENES		29	1	6.2								
METHYLENE CHLORIDE							1 U					1 U
O-XYLENE		0.33 UJ	1 U	0.41 J								
STYRENE												
TETRACHLOROETHENE							0.3 U					0.3 U
TOLUENE	10 U	0.98 UJ	1 U	0.41 J	1 U	1 U	1 U	13	1 U	1 U	1 U	1 U
TOTAL 1,2-DICHLOROETHENE							1 U					1 U
TOTAL XYLENES	10 U				2.7	1 U	1 U	4 J	1 U	1 U	1 U	1 U
TRANS-1,2-DICHLOROETHENE							0.5 U					0.5 U
TRANS-1,3-DICHLOROPROPENE							1 U					1 U
TRICHLOROETHENE							1 U					1 U
TRICHLOROFLUOROMETHANE							1 U					1 U
VINYL CHLORIDE							1 U					1 U
Semivolatile Organics (ug/L)												
1,2,4-TRICHLOROBENZENE	11 U						10 U					10 U

SITE 29 - BOGUE FIELD
GROUNDWATER ANALYTICAL RESULTS

LOCATION	29GW10	29GW10	29GW10	29GW10	29GW10	29GW10	29GW10	29GW11	29GW11	29GW11	29GW11	29GW11
SAMPLE	29GW10	29GW10-1	29GW10-2	29GW10-3	S29GW10-04(072098)	S29GW10-04(082499)	S29-MW10-05	S29GWM11-01	S29GWM11-02	BF-S29GWM11-03	S29GW11-04	S29-MW11-05
MATRIX	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW
SAMPLE DATE	10/22/1991	7/25/1993	12/13/1993	4/24/1994	7/20/1998	8/24/1999	10/3/2001	9/7/1997	10/17/1997	4/2/1998	7/20/1998	10/3/2001
1,2-DICHLOROBENZENE	11 U						10 U					10 U
1,2-DIPHENYLHYDRAZINE							10 U					10 U
1,3-DICHLOROBENZENE	11 U						10 U					10 U
1,4-DICHLOROBENZENE	11 U						10 U					10 U
2,2'-OXYBIS(1-CHLOROPROPANE)	11 U						10 U					10 U
2,4,5-TRICHLOROPHENOL	28 U											
2,4,6-TRICHLOROPHENOL	11 U						10 U					10 U
2,4-DICHLOROPHENOL	11 U						10 U					10 U
2,4-DIMETHYLPHENOL	11 U						10 U					10 U
2,4-DINITROPHENOL	28 U						50 U					50 U
2,4-DINITROTOLUENE	11 U						10 U					10 U
2,6-DINITROTOLUENE	11 U						10 U					10 U
2-CHLORONAPHTHALENE	11 U						10 U					10 U
2-CHLOROPHENOL	11 U						10 U					10 U
2-METHYLNAPHTHALENE	11 U											
2-METHYLPHENOL	11 U											
2-NITROANILINE	28 U											
2-NITROPHENOL	11 U						10 U					10 U
3,3'-DICHLOROBENZIDINE	11 U						20 U					20 U
3-NITROANILINE	28 U											
4,6-DINITRO-2-METHYLPHENOL	28 U						50 U					50 U
4-BROMOPHENYL PHENYL ETHER	11 U						10 U					10 U
4-CHLORO-3-METHYLPHENOL	11 U						10 U					10 U
4-CHLOROANILINE	11 U											
4-CHLOROPHENYL PHENYL ETHER	11 U						10 U					10 U
4-METHYLPHENOL	11 U											
4-NITROANILINE	28 U											
4-NITROPHENOL	28 UR						50 U					50 U
ACENAPHTHENE	11 U						10 U					10 U
ACENAPHTHYLENE	11 U						10 U					10 U
ANTHRACENE	11 U						10 U					10 U
BENZIDINE							50 U					50 U
BENZO(A)ANTHRACENE	11 U						10 U					10 U
BENZO(A)PYRENE	11 U						10 U					10 U
BENZO(B)FLUORANTHENE	11 U						10 U					10 U
BENZO(G,H,I)PERYLENE	11 U						10 U					10 U
BENZO(K)FLUORANTHENE	11 U						10 U					10 U
BIS(2-CHLOROETHOXY)METHANE	11 U						10 U					10 U
BIS(2-CHLOROETHYL)ETHER	11 U						10 U					10 U
BIS(2-CHLOROISOPROPYL)ETHER												
BIS(2-ETHYLHEXYL)PHTHALATE	1200 UJ						10 U					10 U
BUTYL BENZYL PHTHALATE	11 U						10 U					10 U
CARBAZOLE	11 U											
CHRYSENE	11 U						10 U					10 U
DI-N-BUTYL PHTHALATE	11 U						10 U					2.6 J
DI-N-OCTYL PHTHALATE	11 U						10 U					10 U

LOCATION	29GW10	29GW10	29GW10	29GW10	29GW10	29GW10	29GW10	29GW11	29GW11	29GW11	29GW11	29GW11
SAMPLE	29GW10	29GW10-1	29GW10-2	29GW10-3	S29GW10-04(072098)	S29GW10-04(082499)	S29-MW10-05	S29GWM11-01	S29GWM11-02	BF-S29GWM11-03	S29GW11-04	S29-MW11-05
MATRIX	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW
SAMPLE DATE	10/22/1991	7/25/1993	12/13/1993	4/24/1994	7/20/1998	8/24/1999	10/3/2001	9/7/1997	10/17/1997	4/2/1998	7/20/1998	10/3/2001
DIBENZO(A,H)ANTHRACENE	11 U						10 U					10 U
DIBENZOFURAN	11 U											
DIETHYL PHTHALATE	11 UJ						10 U					10 U
DIMETHYL PHTHALATE	11 U						10 U					10 U
FLUORANTHENE	11 U						10 U					10 U
FLUORENE	11 U						10 U					10 U
HEXACHLOROBENZENE	11 U						10 U					10 U
HEXACHLOROBUTADIENE	11 U						10 U					10 U
HEXACHLOROCYCLOPENTADIENE	11 U						10 U					10 U
HEXACHLOROETHANE	11 U						10 U					10 U
INDENO(1,2,3-CD)PYRENE	11 U						10 U					10 U
ISOPHORONE	11 U						10 U					10 U
N-NITROSO-DI-N-PROPYLAMINE	11 U						10 U					10 U
N-NITROSODIMETHYLAMINE							10 U					10 U
N-NITROSODIPHENYLAMINE	11 U						10 U					10 U
NAPHTHALENE	11 U						28					10 U
NITROBENZENE	11 U						10 U					10 U
PENTACHLOROPHENOL	28 U						50 U					50 U
PHENANTHRENE	11 U						1.2 J					10 U
PHENOL	11 U						10 U					10 U
PYRENE	11 U						10 U					10 U
Petroleum Hydrocarbons (mg/L)												
TOTAL PETROLEUM HYDROCARBONS	1.3 U					0.5 U						
Total Inorganics (ug/L)												
ALUMINUM	7950 J	489 UJ	186 UJ	280 UJ			78.0					21.1 U
ANTIMONY	14 U	17 UJ	16 UJ	17 UJ			2.4 U					2.4 U
ARSENIC	12.8	2.8 UJ	1 U	1 U			3.2 U					3.2 U
BARIUM	102	45.2	21.1	25.6			14.3					8.0
BERYLLIUM	1 U	1 U	1 U	1 U			0.17 U					0.17 U
CADMIUM	1 U	2 U	2 U	2 U			0.51 U					0.51 U
CALCIUM	92800	111000	52700	84000			39800					102000
CHROMIUM	25.2	8 U	8 U	6 UJ			0.74 U					0.74 U
COBALT	6.2	6 U	3 U	8 U			2.9 U					2.9 U
COPPER	17.5	9 U	3 U	3 U			2.4 U					2.4 U
IRON	24700	37000	12500	20000			14900					25.9 U
LEAD	12.8 J	1.8	1 U	1 UJ			2.5 U					2.5 U
MAGNESIUM	4720 UJ	2690	2000	2610			961					6100
MANGANESE	176	236	68.9	137			681					3.5
MERCURY	0.2 U	0.2 U	0.2 U	0.2 U			0.07 U					0.07 U
NICKEL	13.6	7 U	5 U	5 U			10.4 U					10.4 U
POTASSIUM	2990 UJ	6660	2030	2300			818					556
SELENIUM	1.7 UJ	1 UJ	1 UJ	1 UJ			3.3 U					3.3 U
SILVER	2 U	5 U	4 U	3 UJ			0.80 U					0.80 U
SODIUM	14400	5550	17600	14900			19500					8890
THALLIUM	1 U	2 U	1 U	1 U			5.7 U					5.7 U
VANADIUM	46.1	6.5	4 U	3 U			2.5 U					2.5 U

LOCATION	29GW10	29GW10	29GW10	29GW10	29GW10	29GW10	29GW10	29GW11	29GW11	29GW11	29GW11	29GW11
SAMPLE	29GW10	29GW10-1	29GW10-2	29GW10-3	S29GW10-04(072098)	S29GW10-04(082499)	S29-MW10-05	S29GWM11-01	S29GWM11-02	BF-S29GWM11-03	S29GW11-04	S29-MW11-05
MATRIX	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW
SAMPLE DATE	10/22/1991	7/25/1993	12/13/1993	4/24/1994	7/20/1998	8/24/1999	10/3/2001	9/7/1997	10/17/1997	4/2/1998	7/20/1998	10/3/2001
ZINC	68.1 J	3.3 UJ	11 UJ	3.5 UJ			2.4 U					2.4 U
Dissolved Inorganics (ug/L)												
ALUMINUM	11 UJ	53 U	172 UJ	266 UJ								
ANTIMONY	14 U	17 UJ	16 UJ	17 UJ								
ARSENIC	1.8	2.5 UJ	1.1 J	1.4								
BARIUM	40.4	39.1	21.4 UJ	24.2								
BERYLLIUM	1 U	1 U	1 U	1 U								
CADMIUM	1 U	2 U	2 U	2 U								
CALCIUM	87000	100000	55300 J	80100								
CHROMIUM	3 U	8 U	8 U	6 UJ								
COBALT	3 U	6 U	3 U	8 U								
COPPER	2 U	9 U	3 U	3 U								
IRON	25.4 UJ	32000	12500	18800								
LEAD	1 UJ	1 U	1 U	1 UJ								
MAGNESIUM	3260 UJ	2380	2010	2480								
MANGANESE	88	211	73.1	130								
MERCURY	0.2 U	0.2 U	0.2 U	0.2 U								
NICKEL	6 U	7 U	5 U	5 U								
POTASSIUM	1990 UJ	6270	2040	2200								
SELENIUM	1 UJ	1 UJ	1 U	1 UJ								
SILVER	2 U	5 U	4 U	3 UJ								
SODIUM	15100	5100	17700	14200								
THALLIUM	1 U	2 U	1 U	1 UJ								
VANADIUM	3 U	5 U	4 U	3 U								
ZINC	18 J	3.3 UJ	8 UJ	3.5 UJ								
Miscellaneous Parameters (mg/L)												
ALKALINITY												
BIOCHEMICAL OXYGEN DEMAND												
CHEMICAL OXYGEN DEMAND												
CHLORIDE												
HARDNESS												
TOTAL DISSOLVED SOLIDS												
TOTAL ORGANIC CARBON												

SITE 29 JE FIELD
SOIL ANALYTICAL RESULTS

LOCATION	29SB03	29SB03	29SB03	29SB04	29SB04	29SB04	29SB05	29SB05	29SB05	29SB05	29SB05	29SB06	29SB06	29SB06	29SB07	29SB07	29SB07	29SB07	29SB08	29SB08
SAMPLE	29SB03A	29SB03B	29SB03C	29SB04A	29SB04B	29SB04C	29SB05A	29SB05A-D	29SB05B	29SB05B-10/17/91	29SB05C	29SB06A	29SB06B	29SB06C	29SB07A	29SB07B	29SB07B-D	29SB07C	29SB08A	29SB08B
MATRIX	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO
TOP DEPTH	0	1	0	0	1	0	0	0	1	0	5	0	1	5	0	1	1	0	0	1
BOTTOM DEPTH	1	3	9	1	3	9	1	1	3	0	7	1	3	7	1	3	3	11	1	3
SAMPLE DATE	7/20/1993	7/20/1993	7/20/1993	7/20/1993	7/20/1993	7/20/1993	7/19/1993	7/19/1993	7/19/1993	10/17/1991	7/19/1993	7/19/1993	7/19/1993	7/19/1993	7/19/1993	7/19/1993	7/19/1993	7/19/1993	7/19/1993	7/19/1993
Volatile Organics (ug/kg)																				
1,1,1-TRICHLOROETHANE										11 U										
1,1,2,2-TETRACHLOROETHANE										11 U										
1,1,2-TRICHLOROETHANE										11 U										
1,1-DICHLOROETHANE										11 U										
1,1-DICHLOROETHENE										11 U										
1,2-DICHLOROETHANE										11 U										
1,2-DICHLOROPROPANE										11 U										
2-BUTANONE										11 U										
2-HEXANONE										11 U										
4-METHYL-2-PENTANONE										11 U										
ACETONE										14 UJ										
BENZENE	110 U	100 U	120 U	100 U	100 U	110 U	100 U	100 U	110 U	11 U	120 U	110 U	110 U	120 U	110 U	1100 UJ	1600 J	1200 U	110 U	1000 U
BROMODICHLOROMETHANE										11 U										
BROMOFORM										11 U										
BROMOMETHANE										11 U										
CARBON DISULFIDE										11 U										
CARBON TETRACHLORIDE										11 U										
CHLOROBENZENE										11 U										
CHLORODIBROMOMETHANE										11 U										
CHLOROETHANE										11 U										
CHLOROFORM										11 U										
CHLOROMETHANE										11 U										
CIS-1,3-DICHLOROPROPENE										11 U										
ETHYLBENZENE	110 U	100 U	120 U	100 U	100 U	110 U	100 U	100 U	110 U	11 U	120 U	110 U	110 U	120 U	110 U	1100 U	1100 U	1200 U	110 U	1000 U
HEXANE																				
METHYLENE CHLORIDE										11 UJ										
STYRENE										11 U										
TETRACHLOROETHENE										11 U										
TOLUENE	110 U	100 U	120 U	100 U	100 U	110 U	100 U	100 U	110 U	2 J	120 U	110 U	110 U	120 U	110 U	1100 U	1100 U	1200 U	110 U	1000 U
TOTAL 1,2-DICHLOROETHENE										11 U										
TOTAL XYLENES	170 U	100 U	120 U	150 U	160 U	170 U	150 U	160 U	160 U	11 U	180 U	160 U	160 U	180 U	160 U	1700 U	1700 U	1800 U	160 U	160 U
TRANS-1,3-DICHLOROPROPENE										11 U										
TRICHLOROETHENE										11 U										
VINYL CHLORIDE										11 U										
Semivolatile Organics (ug/kg)																				
1,2,4-TRICHLOROBENZENE										660 U										
1,2-DICHLOROBENZENE										660 U										
1,3-DICHLOROBENZENE										660 U										
1,4-DICHLOROBENZENE										660 U										
2,2'-OXYBIS(1-CHLOROPROPANE)										660 U										
2,4,5-TRICHLOROPHENOL										1600 U										
2,4,6-TRICHLOROPHENOL										660 U										
2,4-DICHLOROPHENOL										660 U										
2,4-DIMETHYLPHENOL										660 U										
2,4-DINITROPHENOL										1600 U										
2,4-DINITROTOLUENE										660 U										
2,6-DINITROTOLUENE										660 U										
2-CHLORONAPHTHALENE										660 U										
2-CHLOROPHENOL										660 U										
2-METHYLNAPHTHALENE										660 U										
2-METHYLPHENOL										660 U										
2-NITROANILINE										1600 U										

LOCATION	29SB03	29SB03	29SB03	29SB04	29SB04	29SB04	29SB05	29SB05	29SB05	29SB05	29SB05	29SB06	29SB06	29SB06	29SB07	29SB07	29SB07	29SB07	29SB08	29SB08
SAMPLE	29SB03A	29SB03B	29SB03C	29SB04A	29SB04B	29SB04C	29SB05A	29SB05A-D	29SB05B	29SB05B-10/17/91	29SB05C	29SB06A	29SB06B	29SB06C	29SB07A	29SB07B	29SB07B-D	29SB07C	29SB08A	29SB08B
MATRIX	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO
TOP DEPTH	0	1	0	0	1	0	0	0	1	0	5	0	1	5	0	1	1	0	0	1
BOTTOM DEPTH	1	3	9	1	3	9	1	1	3	0	7	1	3	7	1	3	3	11	1	3
SAMPLE DATE	7/20/1993	7/20/1993	7/20/1993	7/20/1993	7/20/1993	7/20/1993	7/19/1993	7/19/1993	7/19/1993	10/17/1991	7/19/1993	7/19/1993	7/19/1993	7/19/1993	7/19/1993	7/19/1993	7/19/1993	7/19/1993	7/19/1993	7/19/1993
2-NITROPHENOL										660 U										
3,3'-DICHLOROBENZIDINE										660 U										
3-NITROANILINE										1600 U										
4,6-DINITRO-2-METHYLPHENOL										1600 U										
4-BROMOPHENYL PHENYL ETHER										660 U										
4-CHLORO-3-METHYLPHENOL										660 U										
4-CHLOROANILINE										660 U										
4-CHLOROPHENYL PHENYL ETHER										660 U										
4-METHYLPHENOL										660 U										
4-NITROANILINE										1600 U										
4-NITROPHENOL										1600 UR										
ACENAPHTHENE										660 U										
ACENAPHTHYLENE										660 U										
ANTHRACENE										660 U										
BENZO(A)ANTHRACENE										660 U										
BENZO(A)PYRENE										660 U										
BENZO(B)FLUORANTHENE										660 U										
BENZO(G,H,I)PERYLENE										660 U										
BENZO(K)FLUORANTHENE										660 U										
BIS(2-CHLOROETHOXY)METHANE										660 U										
BIS(2-CHLOROETHYL)ETHER										660 U										
BIS(2-ETHYLHEXYL)PHTHALATE										660 U										
BUTYL BENZYL PHTHALATE										660 U										
CARBAZOLE										660 U										
CHRYSENE										660 U										
DI-N-BUTYL PHTHALATE										660 U										
DI-N-OCTYL PHTHALATE										660 U										
DIBENZO(A,H)ANTHRACENE										660 U										
DIBENZOFURAN										660 U										
DIETHYL PHTHALATE										660 U										
DIMETHYL PHTHALATE										660 U										
FLUORANTHENE										660 U										
FLUORENE										660 U										
HEXACHLOROBENZENE										660 U										
HEXACHLOROBUTADIENE										660 U										
HEXACHLOROCYCLOPENTADIENE										660 U										
HEXACHLOROETHANE										660 U										
INDENO(1,2,3-CD)PYRENE										660 U										
ISOPHORONE										660 U										
N-NITROSO-DI-N-PROPYLAMINE										660 U										
N-NITROSODIPHENYLAMINE										660 U										
NAPHTHALENE										660 U										
NITROBENZENE										660 U										
PENTACHLOROPHENOL										1600 U										
PHENANTHRENE										660 U										
PHENOL										660 U										
PYRENE										660 U										
Petroleum Hydrocarbons (mg/kg)																				
DIESEL RANGE ORGANICS	11 U	10 U	12 U	11 U	11 U	12 U	11 U	11 U	11 U		12 U	11 U	11 U	12 U	11 U	4700 J	3500 J	4400 J	11 U	10000 J
GASOLINE RANGE ORGANICS	5.6 U	5.1 U	6 U	5.1 U	5.2 U	5.7 U	5.2 U	5.2 U	5.5 U		6 U	5.3 U	5.4 U	6 U	5.3 U	3700 J	1800 J	2500	5.4 U	4100 J
ICOSANE																				
ICOSANE+NONANE																				
NONANE																				

LOCATION	29SB03	29SB03	29SB03	29SB04	29SB04	29SB04	29SB05	29SB05	29SB05	29SB05	29SB05	29SB06	29SB06	29SB06	29SB07	29SB07	29SB07	29SB07	29SB08	29SB08
SAMPLE	29SB03A	29SB03B	29SB03C	29SB04A	29SB04B	29SB04C	29SB05A	29SB05A-D	29SB05B	29SB05B-10/17/91	29SB05C	29SB06A	29SB06B	29SB06C	29SB07A	29SB07B	29SB07B-D	29SB07C	29SB08A	29SB08B
MATRIX	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO
TOP DEPTH	0	1	0	0	1	0	0	0	1	0	5	0	1	5	0	1	1	0	0	1
BOTTOM DEPTH	1	3	9	1	3	9	1	1	3	0	7	1	3	7	1	3	3	11	1	3
SAMPLE DATE	7/20/1993	7/20/1993	7/20/1993	7/20/1993	7/20/1993	7/20/1993	7/19/1993	7/19/1993	7/19/1993	10/17/1991	7/19/1993	7/19/1993	7/19/1993	7/19/1993	7/19/1993	7/19/1993	7/19/1993	7/19/1993	7/19/1993	7/19/1993
OIL & GREASE																				
TOTAL PETROLEUM HYDROCARBONS	55	37	48	34	31	44	33	37	34	16 UJ	41	67	38	35	35	3000 J	1400 J	4400	32	12000
TPH-DIESEL-FUEL #2																				
Inorganics (mg/kg)																				
ALUMINUM										3200										
ANTIMONY										3.1 U										
ARSENIC										3.3 J										
BARIUM										3.7										
BERYLLIUM										0.22 U										
CADMIUM										0.22 UJ										
CALCIUM										197 J										
CHROMIUM										4.5 J										
COBALT										0.66 U										
COPPER										0.44 U										
IRON										3120 J										
LEAD										2.9 J										
MAGNESIUM										83.1										
MANGANESE										6										
MERCURY										0.09 U										
NICKEL										1.8 UJ										
POTASSIUM										139 U										
SELENIUM										0.22 U										
SILVER										0.44 U										
SODIUM										7.5 J										
THALLIUM										0.22 UJ										
VANADIUM										6.6										
ZINC										4.4 UJ										
Miscellaneous Parameters																				
TOTAL ORGANIC CARBON (mg/kg)										3200										
TOTAL SOLIDS (%)										89.6										

SITE 29 - BOGUE FIELD
SOIL ANALYTICAL RESULTS
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LOCATION	29SB08	29SB09	29SB09	29SB09	29SB10	29SB10	29SB10	29SB11	29SB11	29SB11	29SB11	29SB12	29SB12	29SB12	29SB13	29SB13	29SB13	29SB13	29SB14	29SB14
SAMPLE	29SB08C	29SB09A	29SB09B	29SB09C	29SB10A	29SB10B	29SB10C	29SB11A	29SB11B	29SB11C	29SB11C-D	29SB12A	29SB12B	29SB12C	29SB13A	29SB13A-D	29SB13B	29SB13C	29SB14A	29SB14B
MATRIX	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO
TOP DEPTH	5	0	1	0	0	1	0	0	1	0	0	0	1	5	0	0	1	3	0	1
BOTTOM DEPTH	7	1	3	9	1	3	9	1	3	9	9	1	3	7	1	1	3	5	1	3
SAMPLE DATE	7/19/1993	7/19/1993	7/19/1993	7/19/1993	7/19/1993	7/19/1993	7/19/1993	7/20/1993	7/20/1993	7/20/1993	7/20/1993	7/20/1993	7/20/1993	7/20/1993	7/20/1993	7/20/1993	7/20/1993	7/20/1993	7/20/1993	7/20/1993
Volatile Organics (ug/kg)																				
1,1,1-TRICHLOROETHANE																				
1,1,2,2-TETRACHLOROETHANE																				
1,1,2-TRICHLOROETHANE																				
1,1-DICHLOROETHANE																				
1,1-DICHLOROETHENE																				
1,2-DICHLOROETHANE																				
1,2-DICHLOROPROPANE																				
2-BUTANONE																				
2-HEXANONE																				
4-METHYL-2-PENTANONE																				
ACETONE																				
BENZENE	2400 U	100 U	110 U	120 U	110 U	1100 U	110 U	110 U	110 U	170 J	130 UJ	100 U	110 U	200	110 U	110 U	110 U	120 U	110 U	110 U
BROMODICHLOROMETHANE																				
BROMOFORM																				
BROMOMETHANE																				
CARBON DISULFIDE																				
CARBON TETRACHLORIDE																				
CHLOROBENZENE																				
CHLORODIBROMOMETHANE																				
CHLOROETHANE																				
CHLOROFORM																				
CHLOROMETHANE																				
CIS-1,3-DICHLOROPROPENE																				
ETHYLBENZENE	6300 J	100 U	110 U	120 U	110 U	1100 U	110 U	110 U	110 U	110 U	130 U	100 U	110 U	110 U	110 U	110 U	110 U	120 U	110 U	110 U
HEXANE																				
METHYLENE CHLORIDE																				
STYRENE																				
TETRACHLOROETHENE																				
TOLUENE	2400 U	100 U	110 U	120 U	110 U	1100 U	110 U	110 U	110 U	110 U	130 U	100 U	110 U	110 U	110 U	110 U	110 U	120 U	110 U	110 U
TOTAL 1,2-DICHLOROETHENE																				
TOTAL XYLENES	5900 J	160 U	160 U	180 U	170 U	1700 U	170 U	170 U	160 U	170 U	200 U	160 U	160 U	170 U	160 U	160 U	160 U	170 U	160 U	170 U
TRANS-1,3-DICHLOROPROPENE																				
TRICHLOROETHENE																				
VINYL CHLORIDE																				
Semivolatile Organics (ug/kg)																				
1,2,4-TRICHLOROBENZENE																				
1,2-DICHLOROBENZENE																				
1,3-DICHLOROBENZENE																				
1,4-DICHLOROBENZENE																				
2,2'-OXYBIS(1-CHLOROPROPANE)																				
2,4,5-TRICHLOROPHENOL																				
2,4,6-TRICHLOROPHENOL																				
2,4-DICHLOROPHENOL																				
2,4-DIMETHYLPHENOL																				
2,4-DINITROPHENOL																				
2,4-DINITROTOLUENE																				
2,6-DINITROTOLUENE																				
2-CHLORONAPHTHALENE																				
2-CHLOROPHENOL																				
2-METHYLNAPHTHALENE																				
2-METHYLPHENOL																				
2-NITROANILINE																				

SITE 29 JE FIELD
SOIL ANALYTICAL RESULTS

LOCATION	29SB08	29SB09	29SB09	29SB09	29SB10	29SB10	29SB10	29SB11	29SB11	29SB11	29SB11	29SB12	29SB12	29SB12	29SB13	29SB13	29SB13	29SB13	29SB14	29SB14
SAMPLE	29SB08C	29SB09A	29SB09B	29SB09C	29SB10A	29SB10B	29SB10C	29SB11A	29SB11B	29SB11C	29SB11C-D	29SB12A	29SB12B	29SB12C	29SB13A	29SB13A-D	29SB13B	29SB13C	29SB14A	29SB14B
MATRIX	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO
TOP DEPTH	5	0	1	0	0	1	0	0	1	0	0	0	1	5	0	0	1	3	0	1
BOTTOM DEPTH	7	1	3	9	1	3	9	1	3	9	9	1	3	7	1	1	3	5	1	3
SAMPLE DATE	7/19/1993	7/19/1993	7/19/1993	7/19/1993	7/19/1993	7/19/1993	7/19/1993	7/20/1993	7/20/1993	7/20/1993	7/20/1993	7/20/1993	7/20/1993	7/20/1993	7/20/1993	7/20/1993	7/20/1993	7/20/1993	7/20/1993	7/20/1993
2-NITROPHENOL																				
3,3'-DICHLOROBENZIDINE																				
3-NITROANILINE																				
4,6-DINITRO-2-METHYLPHENOL																				
4-BROMOPHENYL PHENYL ETHER																				
4-CHLORO-3-METHYLPHENOL																				
4-CHLOROANILINE																				
4-CHLOROPHENYL PHENYL ETHER																				
4-METHYLPHENOL																				
4-NITROANILINE																				
4-NITROPHENOL																				
ACENAPHTHENE																				
ACENAPHTHYLENE																				
ANTHRACENE																				
BENZO(A)ANTHRACENE																				
BENZO(A)PYRENE																				
BENZO(B)FLUORANTHENE																				
BENZO(G,H,I)PERYLENE																				
BENZO(K)FLUORANTHENE																				
BIS(2-CHLOROETHOXY)METHANE																				
BIS(2-CHLOROETHYL)ETHER																				
BIS(2-ETHYLHEXYL)PHTHALATE																				
BUTYL BENZYL PHTHALATE																				
CARBAZOLE																				
CHRYSENE																				
DI-N-BUTYL PHTHALATE																				
DI-N-OCTYL PHTHALATE																				
DIBENZO(A,H)ANTHRACENE																				
DIBENZOFURAN																				
DIETHYL PHTHALATE																				
DIMETHYL PHTHALATE																				
FLUORANTHENE																				
FLUORENE																				
HEXACHLOROBENZENE																				
HEXACHLOROBUTADIENE																				
HEXACHLOROCYCLOPENTADIENE																				
HEXACHLOROETHANE																				
INDENO(1,2,3-CD)PYRENE																				
ISOPHORONE																				
N-NITROSO-DI-N-PROPYLAMINE																				
N-NITROSODIPHENYLAMINE																				
NAPHTHALENE																				
NITROBENZENE																				
PENTACHLOROPHENOL																				
PHENANTHRENE																				
PHENOL																				
PYRENE																				
Petroleum Hydrocarbons (mg/kg)																				
DIESEL RANGE ORGANICS	15000 J	11 U	11 U	44	11 U	2800 J	12 U	11 U	11 U	12 U	14 U	11 U	11 U	12 U	11 U	11 U	11 U	12 U	11 U	11 U
GASOLINE RANGE ORGANICS	20000 J	5.2 U	5.3 U	9.9	5.6 U	3200	5.7 U	5.5 U	5.3 U	5.7 U	6.6 U	5.2 U	5.4 U	5.7 U	5.3 U	5.4 U	5.4 U	5.8 U	5.4 U	5.6 U
ICOSANE																				
ICOSANE+NONANE																				
NONANE																				

SITE 29 - BOGUE FIELD
SOIL ANALYTICAL RESULTS
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LOCATION	29SB08	29SB09	29SB09	29SB09	29SB10	29SB10	29SB10	29SB11	29SB11	29SB11	29SB11	29SB12	29SB12	29SB12	29SB13	29SB13	29SB13	29SB13	29SB14	29SB14
SAMPLE	29SB08C	29SB09A	29SB09B	29SB09C	29SB10A	29SB10B	29SB10C	29SB11A	29SB11B	29SB11C	29SB11C-D	29SB12A	29SB12B	29SB12C	29SB13A	29SB13A-D	29SB13B	29SB13C	29SB14A	29SB14B
MATRIX	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO
TOP DEPTH	5	0	1	0	0	1	0	0	1	0	0	0	1	5	0	0	1	3	0	1
BOTTOM DEPTH	7	1	3	9	1	3	9	1	3	9	9	1	3	7	1	1	3	5	1	3
SAMPLE DATE	7/19/1993	7/19/1993	7/19/1993	7/19/1993	7/19/1993	7/19/1993	7/19/1993	7/20/1993	7/20/1993	7/20/1993	7/20/1993	7/20/1993	7/20/1993	7/20/1993	7/20/1993	7/20/1993	7/20/1993	7/20/1993	7/20/1993	7/20/1993
OIL & GREASE																				
TOTAL PETROLEUM HYDROCARBONS	13000	37	15	42	23	4000	24	31	14	31	42	74	31	37	54	53	24	24	25	29
TPH-DIESEL-FUEL #2																				
Inorganics (mg/kg)																				
ALUMINUM																				
ANTIMONY																				
ARSENIC																				
BARIUM																				
BERYLLIUM																				
CADMIUM																				
CALCIUM																				
CHROMIUM																				
COBALT																				
COPPER																				
IRON																				
LEAD																				
MAGNESIUM																				
MANGANESE																				
MERCURY																				
NICKEL																				
POTASSIUM																				
SELENIUM																				
SILVER																				
SODIUM																				
THALLIUM																				
VANADIUM																				
ZINC																				
Miscellaneous Parameters																				
TOTAL ORGANIC CARBON (mg/kg)																				
TOTAL SOLIDS (%)																				

LOCATION	29SB14	29SB14	29SB15	29SB15	29SB15	29SB16	29SB16	29SB16	29SB17	29SB17	29SB17	29SB18	29SB18	29SB18	29SB19	29SB19	29SB19	29SB19
SAMPLE	29SB14B-D	29SB14C	29SB15A	29SB15B	29SB15C	29SB16A	29SB16B	29SB16C	29SB17A	29SB17B	29SB17C	29SB18A*	29SB18B*	29SB18C*	BF-S29SB190103-2	BF-S29SB190406-2	S29-SB19-0103	S29-SB19-0406
MATRIX	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO
TOP DEPTH	1	3	0	1	3	0	1	3	0	1	5	0	1	3	1	4	1	4
BOTTOM DEPTH	3	5	1	3	5	1	3	5	1	3	7	1	3	5	3	6	3	6
SAMPLE DATE	7/20/1993	7/20/1993	7/20/1993	7/20/1993	7/20/1993	7/20/1993	7/20/1993	7/20/1993	7/20/1993	7/20/1993	7/20/1993	7/20/1993	7/20/1993	7/20/1993	4/2/1998	4/2/1998	10/4/2001	10/4/2001
Volatile Organics (ug/kg)																		
1,1,1-TRICHLOROETHANE																		
1,1,2,2-TETRACHLOROETHANE																		
1,1,2-TRICHLOROETHANE																		
1,1-DICHLOROETHANE																		
1,1-DICHLOROETHENE																		
1,2-DICHLOROETHANE																		
1,2-DICHLOROPROPANE																		
2-BUTANONE																		
2-HEXANONE																		
4-METHYL-2-PENTANONE																		
ACETONE																		
BENZENE	110 U	120 U	100 U	110 U	140 U	100 U	110 U	120 U	100 U	100 U	1100 U	110 U	110 U	120 U	11 U	12 U	1100 U	1100 U
BROMODICHLOROMETHANE																		
BROMOFORM																		
BROMOMETHANE																		
CARBON DISULFIDE																		
CARBON TETRACHLORIDE																		
CHLOROBENZENE																		
CHLORODIBROMOMETHANE																		
CHLOROETHANE																		
CHLOROFORM																		
CHLOROMETHANE																		
CIS-1,3-DICHLOROPROPENE																		
ETHYLBENZENE	110 U	120 U	100 U	110 U	140 U	100 U	110 U	120 U	100 U	100 U	1100 U	110 U	110 U	120 U	11 U	82	1100 U	1100 U
HEXANE															11 U	27		
METHYLENE CHLORIDE																		
STYRENE																		
TETRACHLOROETHENE																		
TOLUENE	110 U	120 U	100 U	110 U	140 U	100 U	110 U	120 U	100 U	100 U	1100 U	110 U	110 U	120 U	11 U	3 J	1100 U	1100 U
TOTAL 1,2-DICHLOROETHENE																		
TOTAL XYLENES	170 U	180 U	160 U	160 U	210 U	160 U	160 U	180 U	160 U	150 U	1600 U	160 U	160 U	180 U	11 U	200	1100 U	1100 U
TRANS-1,3-DICHLOROPROPENE																		
TRICHLOROETHENE																		
VINYL CHLORIDE																		
Semivolatile Organics (ug/kg)																		
1,2,4-TRICHLOROBENZENE																		
1,2-DICHLOROBENZENE																		
1,3-DICHLOROBENZENE																		
1,4-DICHLOROBENZENE																		
2,2'-OXYBIS(1-CHLOROPROPANE)																		
2,4,5-TRICHLOROPHENOL																		
2,4,6-TRICHLOROPHENOL																		
2,4-DICHLOROPHENOL																		
2,4-DIMETHYLPHENOL																		
2,4-DINITROPHENOL																		
2,4-DINITROTOLUENE																		
2,6-DINITROTOLUENE																		
2-CHLORONAPHTHALENE																		
2-CHLOROPHENOL																		
2-METHYLNAPHTHALENE																		
2-METHYLPHENOL																		
2-NITROANILINE																		

SITE 29 - BOGUE FIELD
SOIL ANALYTICAL RESULTS

LOCATION	29SB14	29SB14	29SB15	29SB15	29SB15	29SB16	29SB16	29SB16	29SB17	29SB17	29SB17	29SB18	29SB18	29SB18	29SB19	29SB19	29SB19	29SB19
SAMPLE	29SB14B-D	29SB14C	29SB15A	29SB15B	29SB15C	29SB16A	29SB16B	29SB16C	29SB17A	29SB17B	29SB17C	29SB18A*	29SB18B*	29SB18C*	BF-S29SB190103-2	BF-S29SB190406-2	S29-SB19-0103	S29-SB19-0406
MATRIX	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO
TOP DEPTH	1	3	0	1	3	0	1	3	0	1	5	0	1	3	1	4	1	4
BOTTOM DEPTH	3	5	1	3	5	1	3	5	1	3	7	1	3	5	3	6	3	6
SAMPLE DATE	7/20/1993	7/20/1993	7/20/1993	7/20/1993	7/20/1993	7/20/1993	7/20/1993	7/20/1993	7/20/1993	7/20/1993	7/20/1993	7/20/1993	7/20/1993	7/20/1993	4/2/1998	4/2/1998	10/4/2001	10/4/2001
2-NITROPHENOL																		
3,3'-DICHLOROBENZIDINE																		
3-NITROANILINE																		
4,6-DINITRO-2-METHYLPHENOL																		
4-BROMOPHENYL PHENYL ETHER																		
4-CHLORO-3-METHYLPHENOL																		
4-CHLOROANILINE																		
4-CHLOROPHENYL PHENYL ETHER																		
4-METHYLPHENOL																		
4-NITROANILINE																		
4-NITROPHENOL																		
ACENAPHTHENE																		
ACENAPHTHYLENE																		
ANTHRACENE																		
BENZO(A)ANTHRACENE																		
BENZO(A)PYRENE																		
BENZO(B)FLUORANTHENE																		
BENZO(G,H,I)PERYLENE																		
BENZO(K)FLUORANTHENE																		
BIS(2-CHLOROETHOXY)METHANE																		
BIS(2-CHLOROETHYL)ETHER																		
BIS(2-ETHYLHEXYL)PHTHALATE																		
BUTYL BENZYL PHTHALATE																		
CARBAZOLE																		
CHRYSENE																		
DI-N-BUTYL PHTHALATE																		
DI-N-OCTYL PHTHALATE																		
DIBENZO(A,H)ANTHRACENE																		
DIBENZOFURAN																		
DIETHYL PHTHALATE																		
DIMETHYL PHTHALATE																		
FLUORANTHENE																		
FLUORENE																		
HEXACHLOROBENZENE																		
HEXACHLOROBUTADIENE																		
HEXACHLOROCYCLOPENTADIENE																		
HEXACHLOROETHANE																		
INDENO(1,2,3-CD)PYRENE																		
ISOPHORONE																		
N-NITROSO-DI-N-PROPYLAMINE																		
N-NITROSODIPHENYLAMINE																		
NAPHTHALENE																		
NITROBENZENE																		
PENTACHLOROPHENOL																		
PHENANTHRENE																		
PHENOL																		
PYRENE															360 U	390 U		
Petroleum Hydrocarbons (mg/kg)																		
DIESEL RANGE ORGANICS	11 U	12 U	11 U	11 U	13 U	19	11 U	12 U	11 U	11 U	77 J	11 U	11 U	12 U			720	9700
GASOLINE RANGE ORGANICS	5.6 U	6 U	5.2 U	5.4 U	7 U	5.2 U	5.3 U	6 U	5.2 U	4.9 U	0	5.3 U	5.5 U	6.1 U	65	880	6400	11000
ICOSANE																		
ICOSANE+NONANE															1.8 U	2 U		
NONANE															1.8 U	2.1		

SITE 29 - JE FIELD
SOIL ANALYTICAL RESULTS

LOCATION	29SB14	29SB14	29SB15	29SB15	29SB15	29SB16	29SB16	29SB16	29SB17	29SB17	29SB17	29SB18	29SB18	29SB18	29SB19	29SB19	29SB19	29SB19
SAMPLE	29SB14B-D	29SB14C	29SB15A	29SB15B	29SB15C	29SB16A	29SB16B	29SB16C	29SB17A	29SB17B	29SB17C	29SB18A*	29SB18B*	29SB18C*	BF-S29SB190103-2	BF-S29SB190406-2	S29-SB19-0103	S29-SB19-0406
MATRIX	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO
TOP DEPTH	1	3	0	1	3	0	1	3	0	1	5	0	1	3	1	4	1	4
BOTTOM DEPTH	3	5	1	3	5	1	3	5	1	3	7	1	3	5	3	6	3	6
SAMPLE DATE	7/20/1993	7/20/1993	7/20/1993	7/20/1993	7/20/1993	7/20/1993	7/20/1993	7/20/1993	7/20/1993	7/20/1993	7/20/1993	7/20/1993	7/20/1993	7/20/1993	4/2/1998	4/2/1998	10/4/2001	10/4/2001
OIL & GREASE																	768	3410
TOTAL PETROLEUM HYDROCARBONS	23	30	48	24	23	82	18	31	41	39	400	36	23	24				
TPH-DIESEL-FUEL #2															320	3700		
Inorganics (mg/kg)																		
ALUMINUM																		
ANTIMONY																		
ARSENIC																		
BARIUM																		
BERYLLIUM																		
CADMIUM																		
CALCIUM																		
CHROMIUM																		
COBALT																		
COPPER																		
IRON																		
LEAD																		
MAGNESIUM																		
MANGANESE																		
MERCURY																		
NICKEL																		
POTASSIUM																		
SELENIUM																		
SILVER																		
SODIUM																		
THALLIUM																		
VANADIUM																		
ZINC																		
Miscellaneous Parameters																		
TOTAL ORGANIC CARBON (mg/kg)																		
TOTAL SOLIDS (%)																		

LOCATION	29SB19	29SB19	29SB20	29SB20	29SB20	29SB20	29SB20	29SB20	29SB20	29SB20	29SB21	29SB21
SAMPLE	S29SB190103-1	S29SB190406-1	BF-S29SB200103-2	BF-S29SB200507-2	S29-SB20-0103	S29-SB20-0406	S29SB200103-1	S29SB200103-3	S29SB200406-3	S29SB200507-1	BF-S29SB210103-2	BF-S29SB210406-2
MATRIX	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO
TOP DEPTH	0	0	1	5	1	4	0	0	0	0	1	4
BOTTOM DEPTH	0	0	3	7	3	6	0	0	0	0	3	6
SAMPLE DATE	9/6/1997	9/6/1997	4/2/1998	4/2/1998	10/4/2001	10/4/2001	9/6/1997	8/25/1999	8/25/1999	9/6/1997	4/2/1998	4/2/1998
Volatile Organics (ug/kg)												
1,1,1-TRICHLOROETHANE												
1,1,2,2-TETRACHLOROETHANE												
1,1,2-TRICHLOROETHANE												
1,1-DICHLOROETHANE												
1,1-DICHLOROETHENE												
1,2-DICHLOROETHANE												
1,2-DICHLOROPROPANE												
2-BUTANONE												
2-HEXANONE												
4-METHYL-2-PENTANONE												
ACETONE												
BENZENE	12 U	2 J	1300 U	1400 U	1.1 U	270 U	11 U	11 U	120 U	670 U	11 U	1400 U
BROMODICHLOROMETHANE												
BROMOFORM												
BROMOMETHANE												
CARBON DISULFIDE												
CARBON TETRACHLORIDE												
CHLOROBENZENE												
CHLORODIBROMOMETHANE												
CHLOROETHANE												
CHLOROFORM												
CHLOROMETHANE												
CIS-1,3-DICHLOROPROPENE												
ETHYLBENZENE	12 U	160	1300 U	17000	1.1 U	270 U	11 U	11 U	120 U	3000	11 U	6700
HEXANE			1300 U	1700							11 U	220 J
METHYLENE CHLORIDE												
STYRENE												
TETRACHLOROETHENE												
TOLUENE	12 U	11 U	1300 U	1400 U	1.1 U	270 U	11 U	11 U	120 U	670 U	11 U	1400 U
TOTAL 1,2-DICHLOROETHENE												
TOTAL XYLENES	12 U	370	1300 U	14000	1.1 U	270 U	3 J	11 U	120 U	7400	11 U	4500
TRANS-1,3-DICHLOROPROPENE												
TRICHLOROETHENE												
VINYL CHLORIDE												
Semivolatile Organics (ug/kg)												
1,2,4-TRICHLOROBENZENE												
1,2-DICHLOROBENZENE												
1,3-DICHLOROBENZENE												
1,4-DICHLOROBENZENE												
2,2'-OXYBIS(1-CHLOROPROPANE)												
2,4,5-TRICHLOROPHENOL												
2,4,6-TRICHLOROPHENOL												
2,4-DICHLOROPHENOL												
2,4-DIMETHYLPHENOL												
2,4-DINITROPHENOL												
2,4-DINITROTOLUENE												
2,6-DINITROTOLUENE												
2-CHLORONAPHTHALENE												
2-CHLOROPHENOL												
2-METHYLNAPHTHALENE												
2-METHYLPHENOL												
2-NITROANILINE												

SITE 29 - E FIELD
SOIL ANALYTICAL RESULTS
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LOCATION	29SB19	29SB19	29SB20	29SB20	29SB20	29SB20	29SB20	29SB20	29SB20	29SB20	29SB21	29SB21
SAMPLE	S29SB190103-1	S29SB190406-1	BF-S29SB200103-2	BF-S29SB200507-2	S29-SB20-0103	S29-SB20-0406	S29SB200103-1	S29SB200103-3	S29SB200406-3	S29SB200507-1	BF-S29SB210103-2	BF-S29SB210406-2
MATRIX	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO
TOP DEPTH	0	0	1	5	1	4	0	0	0	0	1	4
BOTTOM DEPTH	0	0	3	7	3	6	0	0	0	0	3	6
SAMPLE DATE	9/6/1997	9/6/1997	4/2/1998	4/2/1998	10/4/2001	10/4/2001	9/6/1997	8/25/1999	8/25/1999	9/6/1997	4/2/1998	4/2/1998
2-NITROPHENOL												
3,3'-DICHLOROBENZIDINE												
3-NITROANILINE												
4,6-DINITRO-2-METHYLPHENOL												
4-BROMOPHENYL PHENYL ETHER												
4-CHLORO-3-METHYLPHENOL												
4-CHLOROANILINE												
4-CHLOROPHENYL PHENYL ETHER												
4-METHYLPHENOL												
4-NITROANILINE												
4-NITROPHENOL												
ACENAPHTHENE												
ACENAPHTHYLENE												
ANTHRACENE												
BENZO(A)ANTHRACENE												
BENZO(A)PYRENE												
BENZO(B)FLUORANTHENE												
BENZO(G,H,I)PERYLENE												
BENZO(K)FLUORANTHENE												
BIS(2-CHLOROETHOXY)METHANE												
BIS(2-CHLOROETHYL)ETHER												
BIS(2-ETHYLHEXYL)PHTHALATE												
BUTYL BENZYL PHTHALATE												
CARBAZOLE												
CHRYSENE												
DI-N-BUTYL PHTHALATE												
DI-N-OCTYL PHTHALATE												
DIBENZO(A,H)ANTHRACENE												
DIBENZOFURAN												
DIETHYL PHTHALATE												
DIMETHYL PHTHALATE												
FLUORANTHENE												
FLUORENE												
HEXACHLOROBENZENE												
HEXACHLOROBUTADIENE												
HEXACHLOROCYCLOPENTADIENE												
HEXACHLOROETHANE												
INDENO(1,2,3-CD)PYRENE												
ISOPHORONE												
N-NITROSO-DI-N-PROPYLAMINE												
N-NITROSODIPHENYLAMINE												
NAPHTHALENE												
NITROBENZENE												
PENTACHLOROPHENOL												
PHENANTHRENE												
PHENOL												
PYRENE	410 U	350 U	370 U	390 U			350 U	370 U	400 U	370 U	360 U	380 U
Petroleum Hydrocarbons (mg/kg)												
DIESEL RANGE ORGANICS					8.3 J	18000						
GASOLINE RANGE ORGANICS	3.1 U	2700	2500	2500	0.110 U	7200	6.7	14 U	160	6200	880	2600
ICOSANE	2.1 U	45 U					0.18 U			180 U		
ICOSANE+NONANE			1.8 U	3.4				9.5 U	10 U		1.8 U	1.9 U
NONANE	2.1 U	45 U	2.4	3.4			0.18 U			180 U	1.8 U	2.2

LOCATION	29SB19	29SB19	29SB20	29SB20	29SB20	29SB20	29SB20	29SB20	29SB20	29SB20	29SB21	29SB21
SAMPLE	S29SB190103-1	S29SB190406-1	BF-S29SB200103-2	BF-S29SB200507-2	S29-SB20-0103	S29-SB20-0406	S29SB200103-1	S29SB200103-3	S29SB200406-3	S29SB200507-1	BF-S29SB210103-2	BF-S29SB210406-2
MATRIX	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO
TOP DEPTH	0	0	1	5	1	4	0	0	0	0	1	4
BOTTOM DEPTH	0	0	3	7	3	6	0	0	0	0	3	6
SAMPLE DATE	9/6/1997	9/6/1997	4/2/1998	4/2/1998	10/4/2001	10/4/2001	9/6/1997	8/25/1999	8/25/1999	9/6/1997	4/2/1998	4/2/1998
OIL & GREASE					506	8410		0.1	1.3			
TOTAL PETROLEUM HYDROCARBONS												
TPH-DIESEL-FUEL #2	370	8300	11000	8900			3.5 U	5800	13000	19000	10000	13000
Inorganics (mg/kg)												
ALUMINUM												
ANTIMONY												
ARSENIC												
BARIUM												
BERYLLIUM												
CADMIUM												
CALCIUM												
CHROMIUM												
COBALT												
COPPER												
IRON												
LEAD												
MAGNESIUM												
MANGANESE												
MERCURY												
NICKEL												
POTASSIUM												
SELENIUM												
SILVER												
SODIUM												
THALLIUM												
VANADIUM												
ZINC												
Miscellaneous Parameters												
TOTAL ORGANIC CARBON (mg/kg)												
TOTAL SOLIDS (%)												

LOCATION	29SB21	29SB21	29SB21	29SB21	29SB21	29SB22	29SB22	29SB22	29SB22	29SB22	29SB22	29SB22	29SB22
SAMPLE	S29-SB21-0103	S29-SB21-0406	S29-SB21-0406-D	S29SB210103-1	S29SB210406-1	BF-S29SB220103-2	BF-S29SB220406-2	S29-SB22-0103	S29-SB22-0406	S29SB220102-3	S29SB220103-1	S29SB220406-1	S29SB220406-3
MATRIX	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO
TOP DEPTH	1	4	4	0	0	1	4	1	4	0	0	0	0
BOTTOM DEPTH	3	6	6	0	0	3	6	3	6	0	0	0	0
SAMPLE DATE	10/4/2001	10/4/2001	10/4/2001	9/6/1997	9/6/1997	4/2/1998	4/2/1998	10/4/2001	10/4/2001	8/25/1999	9/6/1997	9/6/1997	8/25/1999
Volatile Organics (ug/kg)													
1,1,1-TRICHLOROETHANE													
1,1,2,2-TETRACHLOROETHANE													
1,1,2-TRICHLOROETHANE													
1,1-DICHLOROETHANE													
1,1-DICHLOROETHENE													
1,2-DICHLOROETHANE													
1,2-DICHLOROPROPANE													
2-BUTANONE													
2-HEXANONE													
4-METHYL-2-PENTANONE													
ACETONE													
BENZENE	11 U	260 U	260 U	11 U	670 U	11 U	1400 U	53 U	1100 U	11 U	55 U	11 U	110 U
BROMODICHLOROMETHANE													
BROMOFORM													
BROMOMETHANE													
CARBON DISULFIDE													
CARBON TETRACHLORIDE													
CHLOROBENZENE													
CHLORODIBROMOMETHANE													
CHLOROETHANE													
CHLOROFORM													
CHLOROMETHANE													
CIS-1,3-DICHLOROPROPENE													
ETHYLBENZENE	11 U	260 U	260 U	11 U	5100	11 U	1400 U	53 U	1100 U	11 U	410	11 U	630
HEXANE						11 U	1400 U						
METHYLENE CHLORIDE													
STYRENE													
TETRACHLOROETHENE													
TOLUENE	11 U	260 U	260 U	11 U	670 U	11 U	1400 U	53 U	1100 U	11 U	55 U	11 U	110 U
TOTAL 1,2-DICHLOROETHENE													
TOTAL XYLENES	11 U	260 U	260 U	11 U	19000	11 U	1400 U	53 U	1100 U	11 U	100	11 U	210
TRANS-1,3-DICHLOROPROPENE													
TRICHLOROETHENE													
VINYL CHLORIDE													
Semivolatile Organics (ug/kg)													
1,2,4-TRICHLOROBENZENE													
1,2-DICHLOROBENZENE													
1,3-DICHLOROBENZENE													
1,4-DICHLOROBENZENE													
2,2'-OXYBIS(1-CHLOROPROPANE)													
2,4,5-TRICHLOROPHENOL													
2,4,6-TRICHLOROPHENOL													
2,4-DICHLOROPHENOL													
2,4-DIMETHYLPHENOL													
2,4-DINITROPHENOL													
2,4-DINITROTOLUENE													
2,6-DINITROTOLUENE													
2-CHLORONAPHTHALENE													
2-CHLOROPHENOL													
2-METHYLNAPHTHALENE													
2-METHYLPHENOL													
2-NITROANILINE													

LOCATION	29SB21	29SB21	29SB21	29SB21	29SB21	29SB22	29SB22	29SB22	29SB22	29SB22	29SB22	29SB22	29SB22
SAMPLE	S29-SB21-0103	S29-SB21-0406	S29-SB21-0406-D	S29SB210103-1	S29SB210406-1	BF-S29SB220103-2	BF-S29SB220406-2	S29-SB22-0103	S29-SB22-0406	S29SB220102-3	S29SB220103-1	S29SB220406-1	S29SB220406-3
MATRIX	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO
TOP DEPTH	1	4	4	0	0	1	4	1	4	0	0	0	0
BOTTOM DEPTH	3	6	6	0	0	3	6	3	6	0	0	0	0
SAMPLE DATE	10/4/2001	10/4/2001	10/4/2001	9/6/1997	9/6/1997	4/2/1998	4/2/1998	10/4/2001	10/4/2001	8/25/1999	9/6/1997	9/6/1997	8/25/1999
2-NITROPHENOL													
3,3'-DICHLOROBENZIDINE													
3-NITROANILINE													
4,6-DINITRO-2-METHYLPHENOL													
4-BROMOPHENYL PHENYL ETHER													
4-CHLORO-3-METHYLPHENOL													
4-CHLOROANILINE													
4-CHLOROPHENYL PHENYL ETHER													
4-METHYLPHENOL													
4-NITROANILINE													
4-NITROPHENOL													
ACENAPHTHENE													
ACENAPHTHYLENE													
ANTHRACENE													
BENZO(A)ANTHRACENE													
BENZO(A)PYRENE													
BENZO(B)FLUORANTHENE													
BENZO(G,H,I)PERYLENE													
BENZO(K)FLUORANTHENE													
BIS(2-CHLOROETHOXY)METHANE													
BIS(2-CHLOROETHYL)ETHER													
BIS(2-ETHYLHEXYL)PHTHALATE													
BUTYL BENZYL PHTHALATE													
CARBAZOLE													
CHRYSENE													
DI-N-BUTYL PHTHALATE													
DI-N-OCTYL PHTHALATE													
DIBENZO(A,H)ANTHRACENE													
DIBENZOFURAN													
DIETHYL PHTHALATE													
DIMETHYL PHTHALATE													
FLUORANTHENE													
FLUORENE													
HEXACHLOROBENZENE													
HEXACHLOROBUTADIENE													
HEXACHLOROCYCLOPENTADIENE													
HEXACHLOROETHANE													
INDENO(1,2,3-CD)PYRENE													
ISOPHORONE													
N-NITROSO-DI-N-PROPYLAMINE													
N-NITROSODIPHENYLAMINE													
NAPHTHALENE													
NITROBENZENE													
PENTACHLOROPHENOL													
PHENANTHRENE													
PHENOL													
PYRENE				350 U	150 J	350 U	57 J			39 J	88 J	350 U	43 J
Petroleum Hydrocarbons (mg/kg)													
DIESEL RANGE ORGANICS	11 U	3800	3500					150	8900				
GASOLINE RANGE ORGANICS	0.110 U	1600	2200	300	8400	500	3200	8.9	11000	2.8 U	3100	720	88
ICOSANE				71 U	190 U						370 U	1.8 U	
ICOSANE+NONANE						1.8 U	3			9.2 U			9 U
NONANE				71 U	190 U	1.8 U	1.9 U				370 U	1.8 U	

SITE 29 UE FIELD
SOIL ANALYTICAL RESULTS
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LOCATION	29SB21	29SB21	29SB21	29SB21	29SB21	29SB22	29SB22	29SB22	29SB22	29SB22	29SB22	29SB22	29SB22
SAMPLE	S29-SB21-0103	S29-SB21-0406	S29-SB21-0406-D	S29SB210103-1	S29SB210406-1	BF-S29SB220103-2	BF-S29SB220406-2	S29-SB22-0103	S29-SB22-0406	S29SB220102-3	S29SB220103-1	S29SB220406-1	S29SB220406-3
MATRIX	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO
TOP DEPTH	1	4	4	0	0	1	4	1	4	0	0	0	0
BOTTOM DEPTH	3	6	6	0	0	3	6	3	6	0	0	0	0
SAMPLE DATE	10/4/2001	10/4/2001	10/4/2001	9/6/1997	9/6/1997	4/2/1998	4/2/1998	10/4/2001	10/4/2001	8/25/1999	9/6/1997	9/6/1997	8/25/1999
OIL & GREASE	443	1920	1830					548	4100	0.34			0.72
TOTAL PETROLEUM HYDROCARBONS													
TPH-DIESEL-FUEL #2				8200	29000	3200	13000			3000	45000	320	7900
Inorganics (mg/kg)													
ALUMINUM													
ANTIMONY													
ARSENIC													
BARIUM													
BERYLLIUM													
CADMIUM													
CALCIUM													
CHROMIUM													
COBALT													
COPPER													
IRON													
LEAD													
MAGNESIUM													
MANGANESE													
MERCURY													
NICKEL													
POTASSIUM													
SELENIUM													
SILVER													
SODIUM													
THALLIUM													
VANADIUM													
ZINC													
Miscellaneous Parameters													
TOTAL ORGANIC CARBON (mg/kg)													
TOTAL SOLIDS (%)													

SITE 29 - BOGUE FIELD
SOIL ANALYTICAL RESULTS
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LOCATION	29SB23	29SB23
SAMPLE	S29SB230103-1	S29SB230406-1
MATRIX	SO	SO
TOP DEPTH	0	0
BOTTOM DEPTH	0	0
SAMPLE DATE	9/6/1997	9/6/1997
Volatile Organics (ug/kg)		
1,1,1-TRICHLOROETHANE		
1,1,2,2-TETRACHLOROETHANE		
1,1,2-TRICHLOROETHANE		
1,1-DICHLOROETHANE		
1,1-DICHLOROETHENE		
1,2-DICHLOROETHANE		
1,2-DICHLOROPROPANE		
2-BUTANONE		
2-HEXANONE		
4-METHYL-2-PENTANONE		
ACETONE		
BENZENE	11 U	11 U
BROMODICHLOROMETHANE		
BROMOFORM		
BROMOMETHANE		
CARBON DISULFIDE		
CARBON TETRACHLORIDE		
CHLOROBENZENE		
CHLORODIBROMOMETHANE		
CHLOROETHANE		
CHLOROFORM		
CHLOROMETHANE		
CIS-1,3-DICHLOROPROPENE		
ETHYLBENZENE	11 U	11 U
HEXANE		
METHYLENE CHLORIDE		
STYRENE		
TETRACHLOROETHENE		
TOLUENE	11 U	11 U
TOTAL 1,2-DICHLOROETHENE		
TOTAL XYLENES	11 U	11 U
TRANS-1,3-DICHLOROPROPENE		
TRICHLOROETHENE		
VINYL CHLORIDE		
Semivolatile Organics (ug/kg)		
1,2,4-TRICHLOROBENZENE		
1,2-DICHLOROBENZENE		
1,3-DICHLOROBENZENE		
1,4-DICHLOROBENZENE		
2,2'-OXYBIS(1-CHLOROPROPANE)		
2,4,5-TRICHLOROPHENOL		
2,4,6-TRICHLOROPHENOL		
2,4-DICHLOROPHENOL		
2,4-DIMETHYLPHENOL		
2,4-DINITROPHENOL		
2,4-DINITROTOLUENE		
2,6-DINITROTOLUENE		
2-CHLORONAPHTHALENE		
2-CHLOROPHENOL		
2-METHYLNAPHTHALENE		
2-METHYLPHENOL		
2-NITROANILINE		

SITE 29 · JE FIELD
SOIL ANALYTICAL RESULTS

LOCATION	29SB23	29SB23
SAMPLE	S29SB230103-1	S29SB230406-1
MATRIX	SO	SO
TOP DEPTH	0	0
BOTTOM DEPTH	0	0
SAMPLE DATE	9/6/1997	9/6/1997
2-NITROPHENOL		
3,3'-DICHLOROBENZIDINE		
3-NITROANILINE		
4,6-DINITRO-2-METHYLPHENOL		
4-BROMOPHENYL PHENYL ETHER		
4-CHLORO-3-METHYLPHENOL		
4-CHLOROANILINE		
4-CHLOROPHENYL PHENYL ETHER		
4-METHYLPHENOL		
4-NITROANILINE		
4-NITROPHENOL		
ACENAPHTHENE		
ACENAPHTHYLENE		
ANTHRACENE		
BENZO(A)ANTHRACENE		
BENZO(A)PYRENE		
BENZO(B)FLUORANTHENE		
BENZO(G,H,I)PERYLENE		
BENZO(K)FLUORANTHENE		
BIS(2-CHLOROETHOXY)METHANE		
BIS(2-CHLOROETHYL)ETHER		
BIS(2-ETHYLHEXYL)PHTHALATE		
BUTYL BENZYL PHTHALATE		
CARBAZOLE		
CHRYSENE		
DI-N-BUTYL PHTHALATE		
DI-N-OCTYL PHTHALATE		
DIBENZO(A,H)ANTHRACENE		
DIBENZOFURAN		
DIETHYL PHTHALATE		
DIMETHYL PHTHALATE		
FLUORANTHENE		
FLUORENE		
HEXACHLOROBENZENE		
HEXACHLOROBUTADIENE		
HEXACHLOROCYCLOPENTADIENE		
HEXACHLOROETHANE		
INDENO(1,2,3-CD)PYRENE		
ISOPHORONE		
N-NITROSO-DI-N-PROPYLAMINE		
N-NITROSODIPHENYLAMINE		
NAPHTHALENE		
NITROBENZENE		
PENTACHLOROPHENOL		
PHENANTHRENE		
PHENOL		
PYRENE	350 U	370 U

Petroleum Hydrocarbons (mg/kg)

DIESEL RANGE ORGANICS		
GASOLINE RANGE ORGANICS	9.1	2.8 U
ICOSANE	0.18 U	0.19 U
ICOSANE+NONANE		
NONANE	0.18 U	0.19 U

SITE 29 - BOGUE FIELD
SOIL ANALYTICAL RESULTS

LOCATION	29SB23	29SB23
SAMPLE	S29SB230103-1	S29SB230406-1
MATRIX	SO	SO
TOP DEPTH	0	0
BOTTOM DEPTH	0	0
SAMPLE DATE	9/6/1997	9/6/1997
OIL & GREASE		
TOTAL PETROLEUM HYDROCARBONS		
TPH-DIESEL-FUEL #2	3.5 U	3.7 U
Inorganics (mg/kg)		
ALUMINUM		
ANTIMONY		
ARSENIC		
BARIUM		
BERYLLIUM		
CADMIUM		
CALCIUM		
CHROMIUM		
COBALT		
COPPER		
IRON		
LEAD		
MAGNESIUM		
MANGANESE		
MERCURY		
NICKEL		
POTASSIUM		
SELENIUM		
SILVER		
SODIUM		
THALLIUM		
VANADIUM		
ZINC		
Miscellaneous Parameters		
TOTAL ORGANIC CARBON (mg/kg)		
TOTAL SOLIDS (%)		

APPENDIX B

REMEDIAL INVESTIGATION TABLES AND FIGURES

GROUNDWATER ELEVATION
TABLES AND FIGURES

TABLE 4-1

GROUNDWATER ELEVATIONS
SITE 29 - CRASH CREW BURN PIT
MCALF BOGUE FIELD, NORTH CAROLINA

Data Point	Elevation of Measuring Point (ft MSL)	July 23, 1993		December 13, 1993		April 4, 1994	
		Depth to Water (feet)	Elevation of Water (ft MSL)	Depth to Water (feet)	Elevation of Water (ft MSL)	Depth to Water (feet)	Elevation of Water (ft MSL)
29GW01	13.16	8.01	5.15	7.03	6.13	7.00	6.16
29GW02	13.98	9.36	5.13(1)	8.35	6.28(1)	7.47	6.51
29GW03	13.48	8.46	5.02	7.02	6.46	6.75	6.73
29GW04	14.66	9.02	5.64	7.69	6.97	7.47	7.19
29GW05	15.97	8.48	7.49	7.36	8.61	7.48	8.49
29GW06	14.15	6.95	7.20	6.20	7.95	6.25	7.90
29GW07	13.88	8.99	4.89	7.58	6.30	7.44	6.44
29GW08	12.74	8.29	4.45	6.72	6.02	6.35	6.39
29GW09	9.93	5.93	4.00	4.24	5.69	3.88	6.05
29GW10	10.65	6.63	4.02	5.08	5.57	5.14	5.51
29GW11	14.04	9.51	5.11(1)	7.83	6.55(1)	ND	ND
S-1	5.85	1.05	4.80	0.45	5.40	0.57	5.28
S-2(2)	2.14	ND	2*	ND	2*	ND	2*

* Approximate.
ND No data.
(1) Product encountered in well. Groundwater elevation adjusted to account for product, based on these assumptions: the specific gravity of the product = 0.80, elevation of water table = elevation of measuring point - [depth to water - (0.80 x product thickness)]. The calculations are as follows:

- July 1993, Well 29GW02: Depth to water, 9.36 feet; Depth to product, 8.72 feet; Product thickness, 0.64 feet (0.80 x 0.64 = 0.51); Elevation of water table, 13.98-(9.36-0.51) = 5.13
- July 1993, Well 29GW11: Depth to water, 9.51 feet; Depth to product, 8.79 feet; Product thickness, 0.72 feet (0.72 x 0.80 = 0.58); Elevation of water table, 14.04-(9.51-0.58) = 5.11
- December 1993, Well 29GW02: Depth to water, 8.35 feet; Depth to product, 7.54 feet; Product thickness, 0.81 feet (0.81 x 0.80 = 0.65); Elevation of water table, 13.98-(8.35-0.65) = 6.28
- December 1993, Well 29GW11: Depth to water, 7.83 feet:; Depth to product, 7.40 feet; Product thickness, 0.43 feet (0.43 x 0.80 = 0.34); Elevation of water table, 14.04-(7.83-0.34) = 6.55

(2) Staff Gauge S-2 was gone. Elevation is approximated based on field observations.
Note: Product thickness measurements were not taken on April 4, 1994.

TABLE 4-2

PRODUCT THICKNESS AND REMOVAL DATA - 29GW02
SITE 29 - CRASH CREW BURN PIT
MCALF BOGUE FIELD, NORTH CAROLINA

Date	Precipitation Data (Inches)	Avg. Approximate Product Thickness (Inches)	Product Removal Per Month (Gallons)
January 1992	7.36	2	0.12
February 1992	2.41	2	0.25
March 1992	4.09	0.19	0.34
April 1992	2.22	0	0.17
May 1992	1.36	10.1	1
June 1992	4.93	11.39	9.25
July 1992	1.7	17.4	8.5
August 1992	11.19	10	4.5
September 1992	3.1	0	0.08
October 1992	2.2	0.36	4.5
November 1992	4.15	0	3
December 1992	2.13	0	1.5
January 1993	NA	0	0.25
February 1993	NA	1.75	0.5
March 1993	NA	0.75	0
April 1993	NA	0	0.03
May 1993	1.44	0.06	0.008
June 1993	1.58	0	0.01
July 1993	5.17	9.5	0.43
August 1993	3.54	14.25	1.9
September 1993	6.99	7.5	7.31
October 1993	5.03	NA	NA
November 1993	3.86	0.02	0.14
December 1993	2.85	0.46	1.77
January 1994	7.76	0.03	0.6
February 1994	1.46	0.03	0.5
March 1994	6.78	0	0
April 1994	0.35	NA	0
May 1994	2.99	0.01	0.06
June 1994	2.74	1.1	0.75
July 1994	3.2	2.23	0.8
August 1994	5.05	2.19	0.9
September 1994	5.13	1.76	0.9
October 1994	3.94	NA	NA
November 1994	2.44	NA	NA

NA: Not available

Note: Less than 2 gallons of product was removed from 29GW02 from October 1991 to January 1992

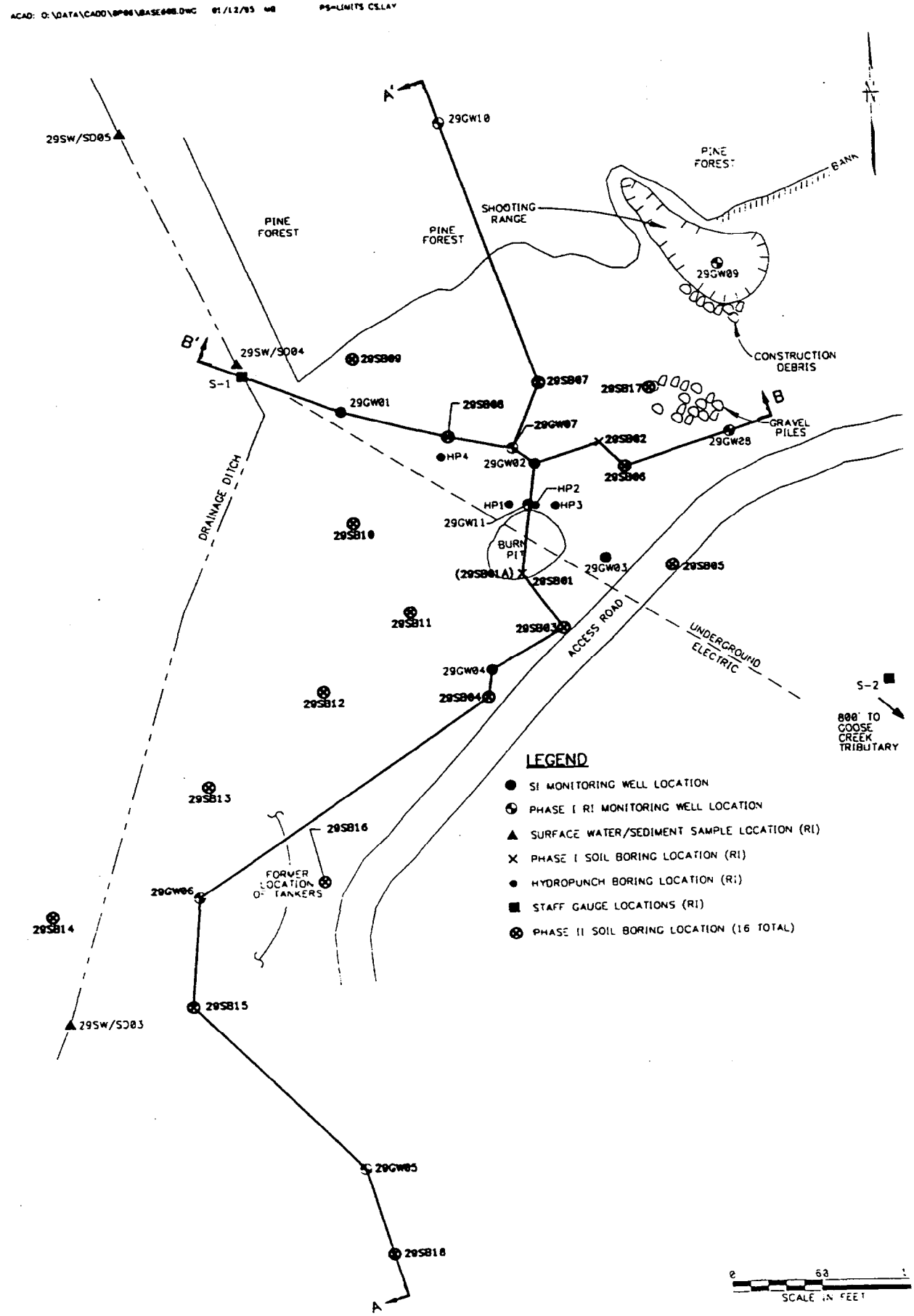
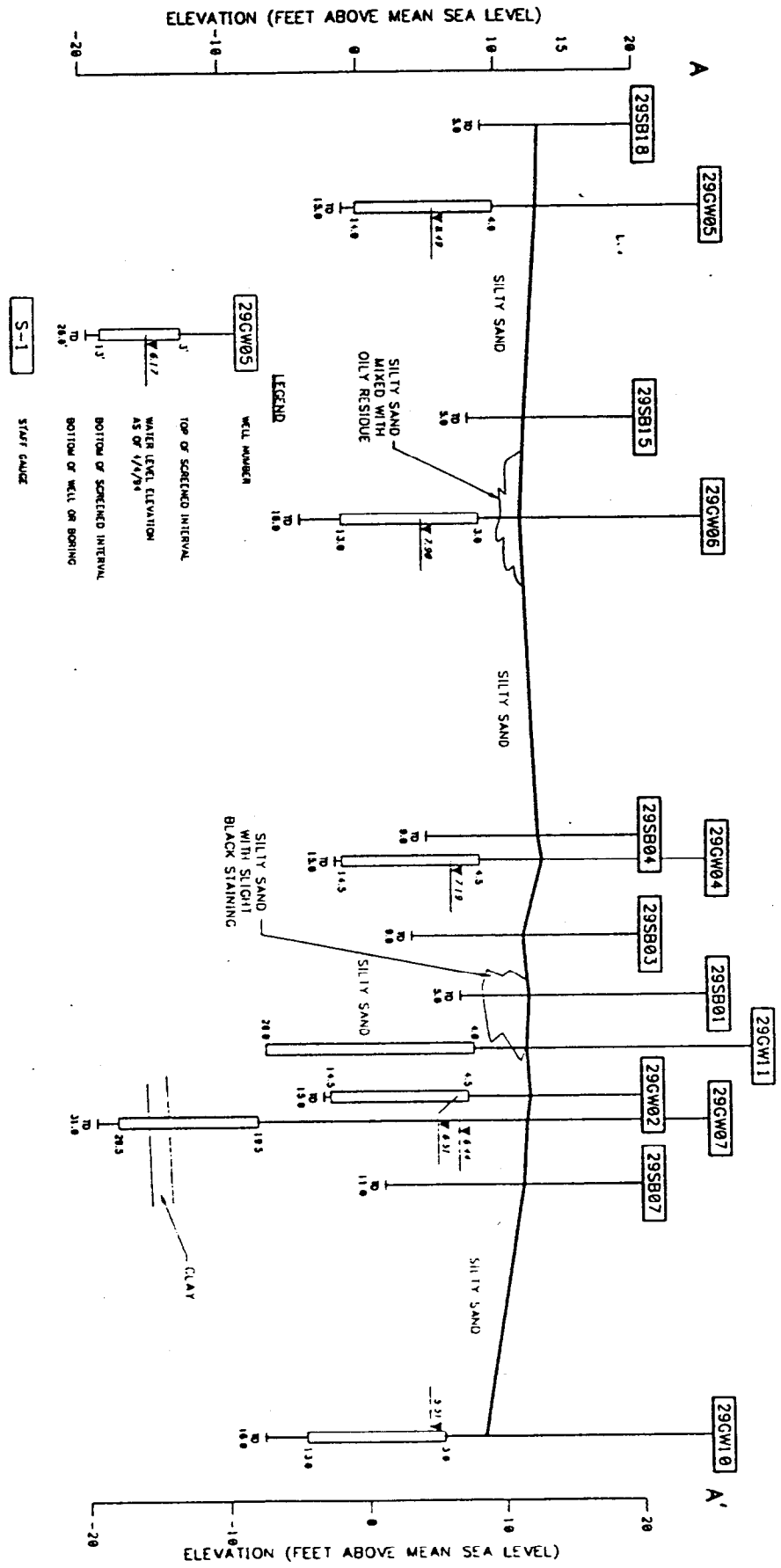


FIGURE 4-

CROSS SECTION LOCATION MAP
CRASH CREW BURN PIT
BOGUE FIELD

HALLIBURTON N
Environmental Corporat

D-11-94-27



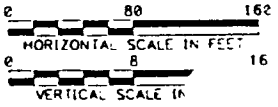


FIGURE 4-2

HYDROGEOLOGICAL CROSS SECTION A-A'
BOGUE FIELD, NORTH CAROLINA

Halliburton NUS CORPORATION

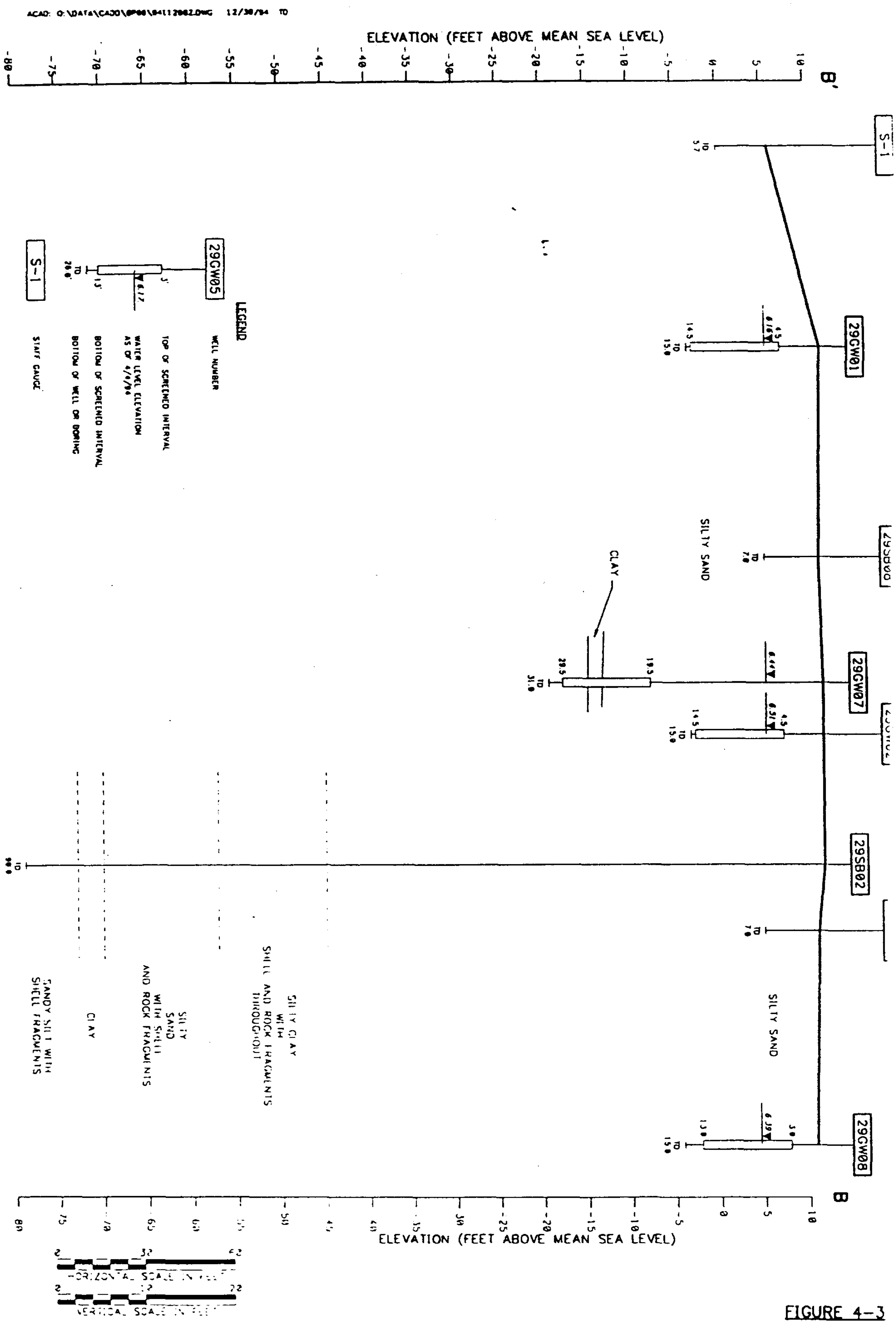


FIGURE 4-3

HYDROGEOLOGICAL CROSS SECTION B-B'
BOGUE FIELD, NORTH CAROLINA

Halliburton NUS CORPORATION

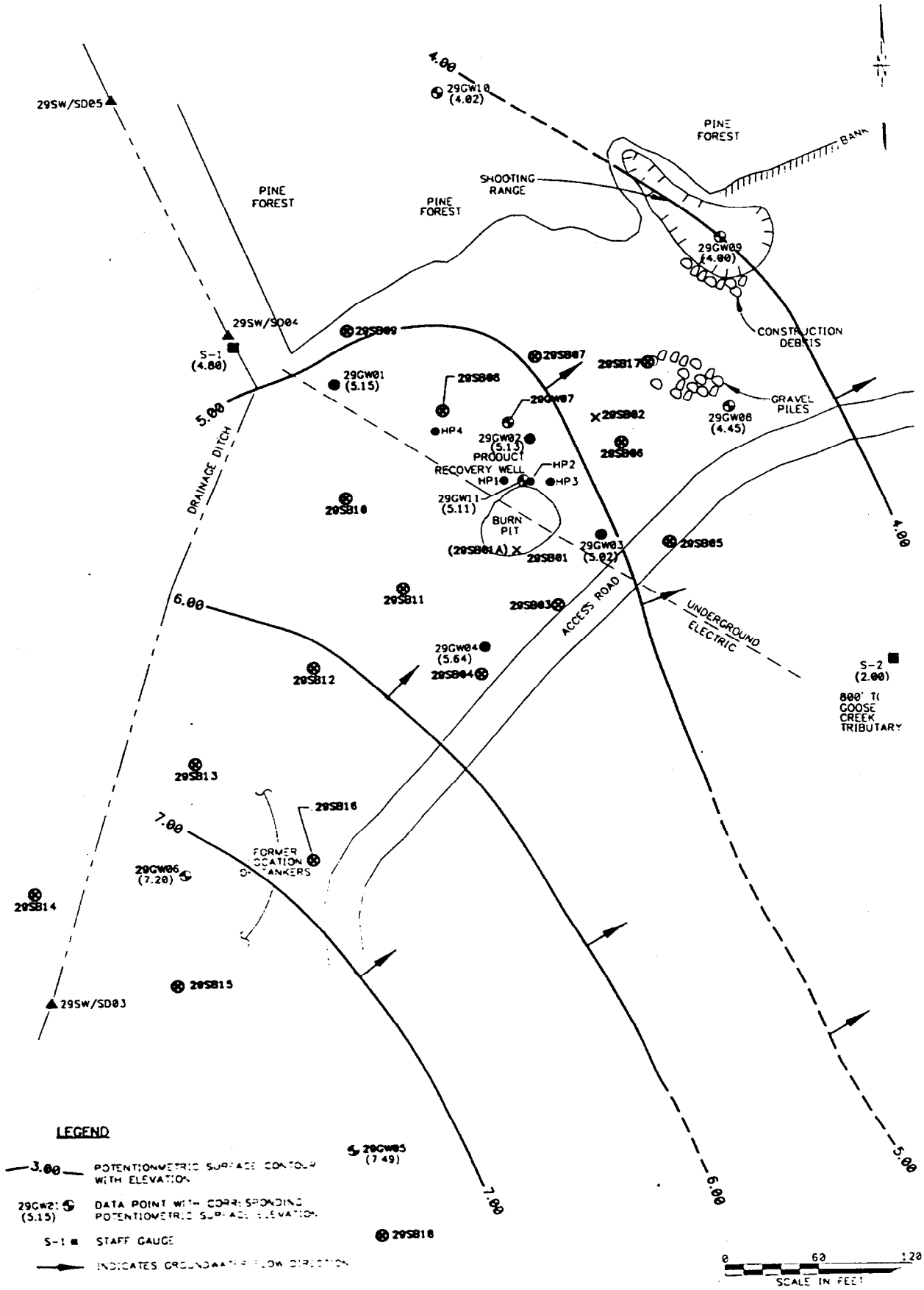
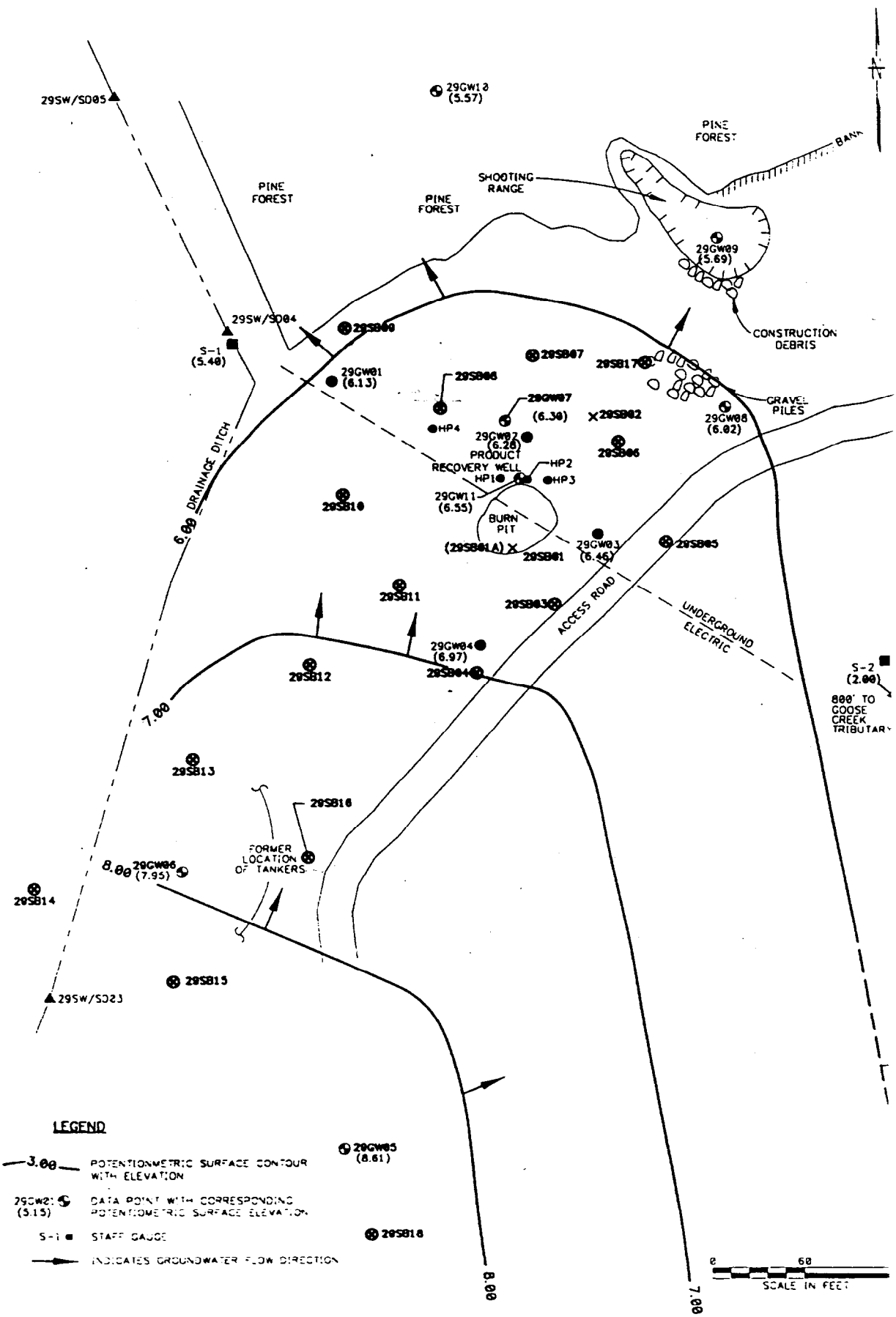


FIGURE 4-4

POTENTIOMETRIC SURFACE CONTOURS
AS OF JULY 23, 1993
CRASH CREW BURN PIT
BOGUE FIELD

HALLIBURTON NUS
Environmental Corporation

D-11-94-27

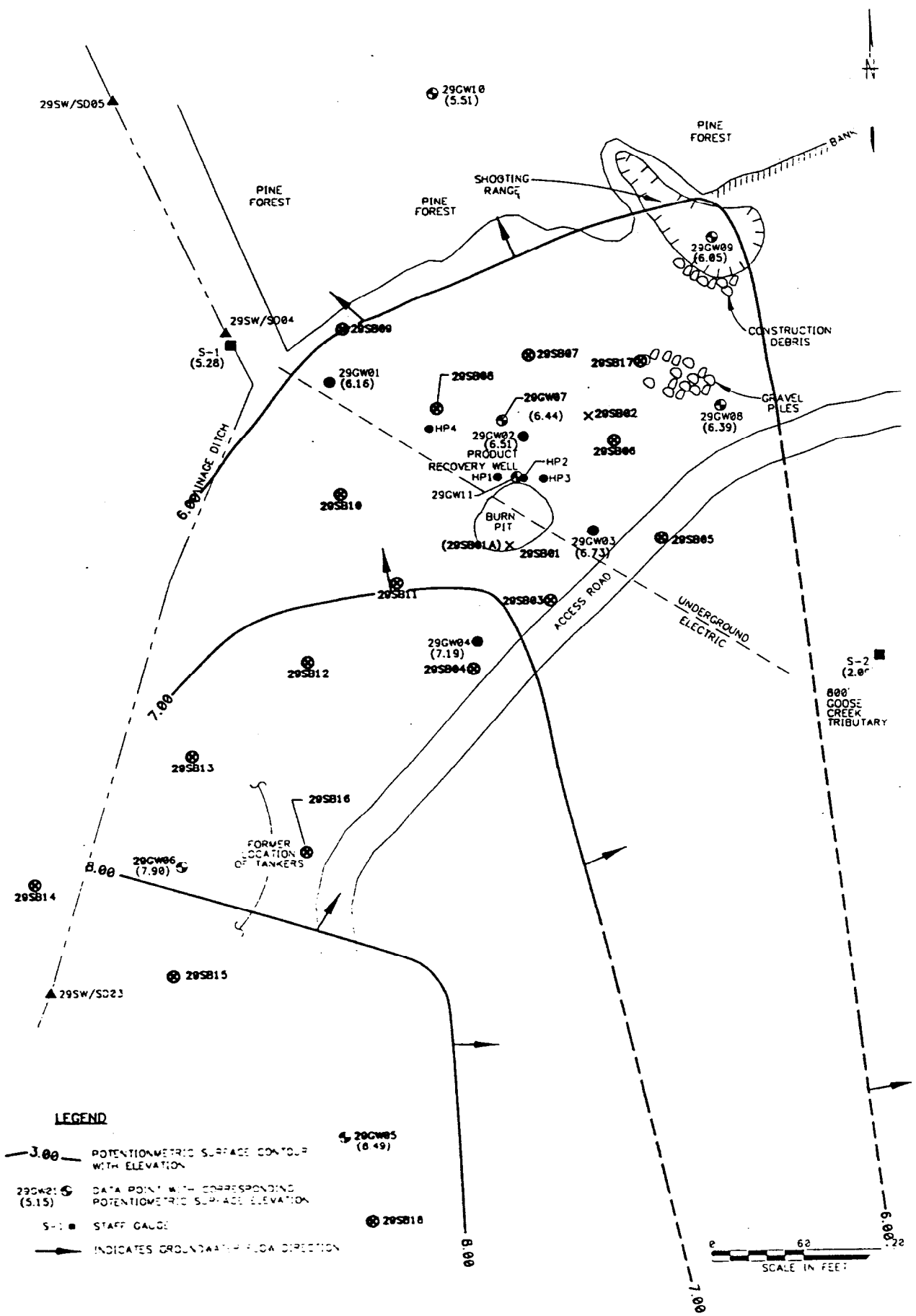


POTENTIOMETRIC SURFACE CONTOURS
AS OF DECEMBER 13, 1993
CRASH CREW BURN PIT
BOGUE FIELD

FIGURE 4-

HALLIBURTON N
Environmental Corpora

D-11-94-27



POTENTIOMETRIC SURFACE CONTOURS
AS OF APRIL 4, 1994
CRASH CREW BURN PIT
BOGUE FIELD

FIGURE 4-6

HALLIBURTON NUS
Environmental Corporation

EXTENT OF SOIL AND GROUNDWATER CONTAMINATION
TABLES AND FIGURES

TABLE 5-1

SUMMARY OF ANALYTICAL RESULTS
SOIL SAMPLES (mg/kg) – JULY 1993
MCALF, BOGUE FIELD, NORTH CAROLINA

Sample ID	Parameter	Benzene	Ethyl-benzene	Toluene	Xylenes	Low to Medium BP TPH	Medium to High BP TPH	Residual TPH
	Analytical Methodology	SW846/ 5030	SW846/ 5030	SW846/ 5030	SW846/ 5030	SW846/ 5030	SW846/ 3550/5030	EPA 418.1
	Depth							
29SB03A	0-12"	0.11 U	0.11 U	0.11 U	0.17 U	5.6 U	11 U	**55**
29SB03B	1-3'	0.1 U	0.1 U	0.1 U	0.1 U	5.1 U	10 U	**37**
29SB03C	7-9'	0.12 U	0.12 U	0.12 U	0.12 U	6 U	12 U	**48**
29SB04A	0-12"	0.1 U	0.1 U	0.1 U	0.15 U	5.1 U	11 U	**34**
29SB04B	1-3'	0.1 U	0.1 U	0.1 U	0.16 U	5.2 U	11 U	**31**
29SB04C	7-9'	0.11 U	0.11 U	0.11 U	0.17 U	5.7 U	12 U	**44**
29SB05A	0-12"	0.1 U	0.1 U	0.1 U	0.15 U	5.2 U	11 U	**33**
29SB05A-D	0-12"	0.1 U	0.1 U	0.1 U	0.16 U	5.2 U	11 U	**37**
29SB05B	1-3'	0.11 U	0.11 U	0.11 U	0.16 U	5.5 U	11 U	**34**
29SB05C	5-7'	0.12 U	0.12 U	0.12 U	0.18 U	6 U	12 U	**41**
29SB06A	0-12"	0.11 U	0.11 U	0.11 U	0.16 U	5.3 U	11 U	**67**
29SB06B	1-3'	0.11 U	0.11 U	0.11 U	0.16 U	5.4 U	11 U	**38**
29SB06C	5-7'	0.12 U	0.12 U	0.12 U	0.18 U	6 U	12 U	**35**
29SB07A	0-12"	0.11 U	0.11 U	0.11 U	0.16 U	5.3 U	11 U	**35**
29SB07B	1-3'	1.1 UJ	1.1 U	1.1 U	1.7 U	**3,700 J**	**4,700 J**	**3,000 J**
29SB07B-D	1-3'	**1.6 J**	1.1 U	1.1 U	1.7 U	**1,800 J**	**3,500 J**	**1,400 J**
29SB07C	9-11'	1.2 U	1.2 U	1.2 U	1.8 U	**2,500**	**4,400 J**	**4,400**
29SB08A	0-12"	0.11 U	0.11 U	0.11 U	0.16 U	5.4 U	11 U	**32**
29SB08B	1-3'	1 U	1 U	1 U	1.6 U	**4,100 J**	**10,000 J**	**12,000**
29SB08C	5-7'	2.4 U	**6.3 J**	2.4 U	**5.9 J**	**20,000 J**	**15,000 J**	**13,000**
29SB09A	0-12"	0.1 U	0.1 U	0.1 U	0.16 U	5.2 U	11 U	**37**
29SB09B	1-3'	0.11 U	0.11 U	0.11 U	0.16 U	5.3 U	11 U	**15**
29SB09C	7-9'	0.12 U	0.12 U	0.12 U	0.18 U	**9.9**	**44**	**42**
29SB10A	0-12"	0.11 U	0.11 U	0.11 U	0.17 U	5.6 U	11 U	**23**
29SB10B	1-3'	1.1 U	1.1 U	1.1 U	1.7 U	**3,200**	**2,800 J**	**4,000**
29SB10C	7-9'	0.11 U	0.11 U	0.11 U	0.17 U	5.7 U	12 U	**24**
29SB11A	0-12"	0.11 U	0.11 U	0.11 U	0.17 U	5.5 U	11 U	**31**
29SB11B	1-3'	0.11 U	0.11 U	0.11 U	0.16 U	5.3 U	11 U	**14**
29SB11C	7-9'	**0.17 J**	0.11 U	0.11 U	0.17 U	5.7 U	12 U	**31**
29SB11C-D	7-9'	0.13 UJ	0.13 U	0.13 U	0.2 U	6.6 U	14 U	**42**
29SB12A	0-12"	0.1 U	0.1 U	0.1 U	0.16 U	5.2 U	11 U	**74**
29SB12B	1-3'	0.11 U	0.11 U	0.11 U	0.16 U	5.4 U	11 U	**31**

TABLE 5-1 (Continued)
SUMMARY OF ANALYTICAL RESULTS
SOIL SAMPLES (mg/kg)
MCALF, BOGUE FIELD, NORTH CAROLINA

Sample ID	Parameter	Benzene	Ethyl-benzene	Toluene	Xylenes	Low to Medium BP TPH	Medium to High BP TPH	Residual TPH
	Analytical Methodology	SW846/ 5030	SW846/ 5030	SW846/ 5030	SW846/ 5030	SW846/ 5030	SW846/ 3550/5030	EPA 418.1
	Depth							
29SB12C	5-7'	**0.2**	0.11 U	0.11 U	0.17 U	5.7 U	12 U	**37**
29SB13A	0-12"	0.11 U	0.11 U	0.11 U	0.16 U	5.3 U	11 U	**54**
29SB13A-D	0-12"	0.11 U	0.11 U	0.11 U	0.16 U	5.4 U	11 U	**53**
29SB13B	1-3'	0.11 U	0.11 U	0.11 U	0.16 U	5.4 U	11 U	**24**
29SB13C	3-5'	0.12 U	0.12 U	0.12 U	0.17 U	5.8 U	12 U	**24**
29SB14A	0-12"	0.11 U	0.11 U	0.11 U	0.16 U	5.4 U	11 U	**25**
29SB14B	1-3'	0.11 U	0.11 U	0.11 U	0.17 U	5.6 U	11 U	**29**
29SB14B-D	1-3'	0.11 U	0.11 U	0.11 U	0.17 U	5.6 U	11 U	**23**
29SB14C	3-5'	0.12 U	0.12 U	0.12 U	0.18 U	6 U	12 U	**30**
29SB15A	0-12"	0.1 U	0.1 U	0.1 U	0.16 U	5.2 U	11 U	**48**
29SB15B	1-3'	0.11 U	0.11 U	0.11 U	0.16 U	5.4 U	11 U	**24**
29SB15C	3-5'	0.14 U	0.14 U	0.14 U	0.21 U	7 U	13 U	**23**
29SB16A	0-12"	0.1 U	0.1 U	0.1 U	0.16 U	5.2 U	**19**	**82**
29SB16B	1-3'	0.11 U	0.11 U	0.11 U	0.16 U	5.3 U	11 U	**18**
29SB16C	3-5'	0.12 U	0.12 U	0.12 U	0.18 U	6 U	12 U	**31**
29SB17A	0-12"	0.1 U	0.1 U	0.1 U	0.16 U	5.2 U	11 U	**41**
29SB17B	1-3'	0.1 U	0.1 U	0.1 U	0.15 U	4.9 U	11 U	**39**
29SB17C	5-7'	1.1 U	1.1 U	1.1 U	1.6 U	NR	**77 J**	**400**
29SB18A*	0-12"	0.11 U	0.11 U	0.11 U	0.16 U	5.3 U	11 U	**36**
29SB18B*	1-3'	0.11 U	0.11 U	0.11 U	0.16 U	5.5 U	11 U	**23**
29SB18C*	3-5'	0.12 U	0.12 U	0.12 U	0.18 U	6.1 U	12 U	**24**

*Background sample.
All positive results presented in boldface type.
Duplicate results presented for samples with "-D" suffix.
Qualifier codes:
U Not detected at specified detection limit.
J Estimated positive result.
NR Not reported

TABLE 5-2

SUMMARY OF BACKGROUND GROUNDWATER ANALYTICAL RESULTS (µg/L)
MCALF, BOGUE FIELD, NORTH CAROLINA

Analyte	29GW05 - Round 1 (7/93)		29GW05 - Round 2 (12/93)		29GW05 - Round 3 (4/94)	
Benzene	2 U		1 U		1 U	
Ethylbenzene	2 U		1 U		1 U	
M,P-Xylene	0.23 UJ		1 U		1 U	
O-Xylene	2 U		1 U		1 U	
Toluene	0.38 UJ		1 U		1 U	
Aluminum	182 UJ	130 UJ	295 UJ	194 UJ	544 UJ	329 UJ
Antimony	17 UJ	17 UJ	16 UJ	16 UJ	17 UJ	17 UJ
Arsenic	1.1 UJ	1 U	1 U	1 U	**1**	1 U
Barium	20.6 UJ	16.6 UJ	**17.8**	18.1	**11.4**	**11.2**
Beryllium	1 U	1 U	1 U	1 U	1 U	1 U
Cadmium	2 UJ	2 UJ	2 U	2 U	2 U	2 U
Calcium	**12300**	**12600**	**10400**	**10300 J**	**6330**	**6380**
Chromium	8 U	8 U	8 U	8 U	6 U	6 U
Cobalt	6 UJ	6 UJ	3 U	3 U	8 U	8 U
Copper	9 U	9 U	3 U	3 UJ	3 U	3 U
Iron	152 UJ	128 UJ	**619**	**129**	**344**	18.2
Lead	1 UJ	1 UJ	1 U	1 U	1 U	1 U
Magnesium	589 UJ	501 UJ	**453**	482	**455**	**459**
Manganese	16.5 UJ	18.4 UJ	**12.5**	**15.3**	**11.7 J**	**1.5 J**
Mercury	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Nickel	7 UJ	7 UJ	5 U	5 U	5 U	5 U
Potassium	**374**	355 U	**517**	**597**	152 U	152 U
Selenium	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ
Silver	5 UJ	5 UJ	4 U	4 U	3 UJ	3 UJ
Sodium	4160 UJ	4300 UJ	**4860**	**5060**	**4070**	**4010**
Thallium	2 U	2 U	1 U	**1**	1 U	1 U
Vanadium	5 U	5 U	4 U	4 U	3 U	3 U
Zinc	2 UJ	4.9 UJ	6.9 UJ	8.9 UJ	7.5 UJ	6.1 UJ

Metals results for unfiltered samples are presented in left-hand column and for filtered samples are presented in right-hand column for each sample.

Qualifier Codes: NA - Not Analyzed; U - Not Detected; J - Estimated Value; UJ - Detection/Quantitation Limit Estimated.
Bold indicates a positive result.

TABLE 5-3

SUMMARY OF ANALYTICAL RESULTS – JULY 1993
GROUNDWATER PHASE II, ROUND 1 SAMPLES (µg/L)
MCALF, BOGUE FIELD, NORTH CAROLINA

Analyte	29GW01		29GW02		29GW03		29GW04	
Benzene	2 U		**57 J**		**0.21 J**		2 U	
Ethylbenzene	1.2 UJ		**23 J**		2 U		2 U	
Toluene	0.84 UJ		1.1 UJ		0.36 UJ		0.89 UJ	
m-/p-Xylene	0.44 UJ		**71 J**		0.28 UJ		0.69 UJ	
o-Xylene	0.26 UJ		**26 J**		2 U		0.21 UJ	
Aluminum	53 U	53 U	55.3 UJ	71.9 UJ	70.2 UJ	74.9 UJ	97.4 UJ	86.9 UJ
Antimony	17 UJ	17 UJ	17 UJ	17 UJ	17 UJ	17 UJ	17 UJ	17 UJ
Arsenic	9.4 UJ	9.9 UJ	**29.6**	**29.2**	1.5 UJ	2.2 UJ	3.4 UJ	3.6 UJ
Barium	21.8 UJ	21 UJ	**37.8**	**36.5**	**13.7**	**13.8**	11.7 UJ	12.2 UJ
Beryllium	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Cadmium	2 UJ	2 UJ	2 U	2 U	2 U	2 U	2 UJ	2 UJ
Calcium	**101000**	**99900**	**144000**	**145000**	**81600**	**85300**	**40600**	**41000**
Chromium	8 U	8 U	8 U	8 U	8 U	8 U	8 U	8 U
Cobalt	6 UJ	6 UJ	6 U	6 U	6 U	6 U	6 UJ	6 UJ
Copper	9 U	9 U	9 U	9 U	9 U	9 U	9 U	9 U
Iron	**19400**	**18900**	**26500**	**26100**	**3360**	**3100**	**1340**	**1290**
Lead	1 UJ	1 UJ	1 U	1 U	1 U	1 U	1 UJ	1 UJ
Magnesium	**2160**	**2220**	**3730**	**3850**	**2670**	**2760**	**2040**	**2060**
Manganese	**196**	**195**	**155**	**156**	**53**	**54.6**	39.1 UJ	40.1 UJ
Mercury	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Nickel	7 UJ	7 UJ	7 U	7 U	7 U	7 U	7 UJ	7 UJ
Potassium	**2060**	**2020**	**4140**	**4120**	**1960**	**2100**	**374**	**557**
Selenium	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 U	1 U
Silver	5 UJ	5 UJ	5 U	5 U	5 U	5 U	5 UJ	5 UJ
Sodium	5540 UJ	5550 UJ	**5310**	**5240**	3860 UJ	3850 UJ	3660 UJ	4000 UJ
Thallium	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Vanadium	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Zinc	2 UJ	4.9 UJ	3.9 UJ	2 UJ	2.7 UJ	8 UJ	2.7 UJ	2 UJ

TABLE 5-3 (Continued)
SUMMARY OF ANALYTICAL RESULTS
GROUNDWATER PHASE II, ROUND 1 SAMPLES (µg/L)
MCALF, BOGUE FIELD, NORTH CAROLINA

Analyte	29GW05		29GW06		29GW06D		29GW07	
Benzene	2 U		2 U		2 U		2 U	
Ethylbenzene	2 U		2 U		2 U		2 U	
Toluene	0.38 UJ		0.35 UJ		0.3 UJ		0.39 UJ	
m-/p-Xylene	0.23 UJ		0.23 UJ		0.22 UJ		2 U	
o-Xylene	2 U		2 U		2 U		2 U	
Aluminum	182 UJ	130 UJ	131 UJ	53 U	70.5 UJ	59.3 UJ	69 UJ	53 U
Antimony	17 UJ	17 UJ	17 UJ	17 UJ	17 UJ	17 UJ	17 UJ	17 UJ
Arsenic	1.1 UJ	1 U	2 UJ	1.2 UJ	1.7 UJ	1.6 UJ	1.3 UJ	1 U
Barium	20.6 UJ	16.6 UJ	11.4 UJ	10.9 UJ	11.7 UJ	11.3 UJ	**7.7**	**8.3**
Beryllium	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Cadmium	2 UJ	2 UJ	2 UJ	2 UJ	2 UJ	2 UJ	2 U	2 U
Calcium	**12300**	**12600**	**74500**	**75000**	**74700**	**76100**	**77600**	**75900**
Chromium	8 U	8 U	8 U	8 U	**9**	8 U	8 U	8 U
Cobalt	6 UJ	6 UJ	6 UJ	6 UJ	6 UJ	6 UJ	6 U	6 U
Copper	9 U	9 U	9 U	9 U	9 U	9 U	9 U	9 U
Iron	152 UJ	128 UJ	**2270**	**2110**	**2150**	**2150**	**1970**	**1790**
Lead	1 UJ	1 UJ	**2.2 J**	1 UJ	1 UJ	1 UJ	1 U	1 U
Magnesium	589 UJ	501 UJ	**1960**	**1930**	**1950**	**2050**	**1880**	**1800**
Manganese	16.5 UJ	18.4 UJ	14.4 UJ	15.8 UJ	14.5 UJ	14.6 UJ	**40.3**	**39.6**
Mercury	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Nickel	7 UJ	7 UJ	7 UJ	7 UJ	7 UJ	7 UJ	7 U	7 U
Potassium	**374**	355 U	**663**	**599**	**378**	**676**	**795**	**790**
Selenium	1 UJ	1 UJ	1 U	1 U	1 U	1 U	1 UJ	1 UJ
Silver	5 UJ	5 UJ	5 UJ	5 UJ	5 UJ	5 UJ	5 U	5 U
Sodium	4160 UJ	4300 UJ	**10700**	**10800**	**11200**	**10900**	**12200**	**11900**
Thallium	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Vanadium	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Zinc	2 UJ	4.9 UJ	9.1 UJ	7.2 UJ	2 UJ	9.5 UJ	2 UJ	2 UJ

TABLE 5-3 (Continued)
SUMMARY OF ANALYTICAL RESULTS
GROUNDWATER PHASE II, ROUND 1 SAMPLES (µg/L)
MCALF, BOGUE FIELD, NORTH CAROLINA

Analyte	29GW08		29GW09		29GW10	
Benzene	2 U		**2.7**		**8.1**	
Ethylbenzene	2 U		2 U		**1.4 J**	
Toluene	0.5 UJ		1.3 UJ		0.98 UJ	
m-/p-Xylene	0.22 UJ		0.97 UJ		**29**	
o-Xylene	2 U		0.62 UJ		0.33 UJ	
Aluminum	53 U	54.7 UJ	82 UJ	53 U	489 UJ	53 U
Antimony	17 UJ	17 UJ	17 UJ	17 UJ	17 UJ	17 UJ
Arsenic	1.8 UJ	2.4 UJ	6 UJ	4.7 UJ	2.8 UJ	2.5 UJ
Barium	16.5 UJ	16 UJ	**72.1**	**74.4**	**45.2**	**39.1**
Beryllium	1 U	1 U	1 U	1 U	1 U	1 U
Cadmium	2 UJ	2 UJ	2 U	2 U	2 U	2 U
Calcium	**85200**	**85300**	**140000**	**144000**	**111000**	**100000**
Chromium	8 U	8 U	8 U	8 U	8 U	8 U
Cobalt	**16.6 J**	**8.5 J**	6 U	6 U	6 U	6 U
Copper	9 U	9 U	9 U	9 U	9 U	9 U
Iron	**5900**	**5700**	**11800**	**9900**	**37000**	**32000**
Lead	1 UJ	1 UJ	1 U	1 U	**1.8**	1 U
Magnesium	**2240**	**2280**	**3380**	**3370**	**2690**	**2380**
Manganese	**1820**	**1820**	**501**	**516**	**236**	**211**
Mercury	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Nickel	7 UJ	7 UJ	7 U	7 U	7 U	7 U
Potassium	**1840**	**1870**	**7880**	**8310**	**6660**	**6270**
Selenium	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ
Silver	5 UJ	5 UJ	5 U	5 U	5 U	5 U
Sodium	3780 UJ	3730 UJ	4730 UJ	**5180**	**5550**	**5100**
Thallium	2 U	2 U	2 U	2 U	2 U	2 U
Vanadium	5 U	5 U	5 U	5 U	**6.5**	5 U
Zinc	2.1 UJ	4.5 UJ	4.9 UJ	5.3 UJ	3.3 UJ	3.3 UJ

Metals results for unfiltered samples are presented in left-hand column and for filtered samples are presented in right-hand column for each sample.
Qualifier Codes: U - Not Detected; J - Estimated Value; UJ - Detection/Quantitation Limited Estimated.

TABLE 5-4

SUMMARY OF ANALYTICAL RESULTS – DECEMBER 1993
GROUNDWATER PHASE II, ROUND 2 SAMPLES (µg/L)
MCALF, BOGUE FIELD, NORTH CAROLINA

Analyte	29GW01		29GW02		29GW02-D		29GW03	
Benzene	1 U		1000 U		1000 U		**1.5**	
Ethylbenzene	**1.1**		1000 U		1000 U		1 U	
Toluene	1 U		1000 U		1000 U		1 U	
m,p-Xylene	1 U		1000 U		1000 U		1 U	
o-Xylene	1 U		1000 U		1000 U		1 U	
Aluminum	154 UJ	127 UJ	42 U	42 U	42 U	42 U	116 UJ	102 UJ
Antimony	16 UJ	16 UJ	16 UJ	16 UJ	16 UJ	16 UJ	16 UJ	16 UJ
Arsenic	**6.6**	**8.2**	**58.2**	**55.7**	**57.8**	**55.3**	**5.3**	**6.2**
Barium	**21.7**	22.1 UJ	**39.9**	**41.1**	**38**	**38.5**	8.5 UJ	7.8 UJ
Beryllium	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Cadmium	2 U	2 U	**2.5**	**3.5**	**2.9**	**2.7**	2 U	2 U
Calcium	**94800**	**97300 J**	**129000**	**135000**	**129000**	**130000**	**137000**	**132000 J**
Chromium	8 U	8 U	8 U	8 U	8 U	8 U	8 U	8 U
Cobalt	3 U	3 U	3 U	3 U	3 U	3 U	**6.7**	**3.9**
Copper	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U
Iron	**16800**	**17500**	**40200**	**41600**	**40700**	**40100**	**15900**	**15300**
Lead	1 U	1.7 UJ	1.4 UJ	1.5 UJ	1.6 UJ	1.9 UJ	1 U	1.3 UJ
Magnesium	**2410**	**2410**	**3890**	**4020**	**3910**	**3880**	**5230**	**4970**
Manganese	**177**	**185**	**139 J**	**146 J**	**139 J**	**138 J**	**1460**	**1430**
Mercury	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Nickel	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Potassium	**1560**	**1740**	**9320 J**	**9890 J**	**9500 J**	**9410 J**	**3680**	**3610**
Selenium	1 U	1 U	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 U
Silver	4 U	4 U	4 U	4 U	4 U	4 U	4 U	**4.1 J**
Sodium	**6490**	**6470**	**7030**	**7430**	**7080**	**7170**	**5660**	**5360**
Thallium	1 U	1 U	1 UJ	1 UJ	1 UJ	1 UJ	1 U	1 U
Vanadium	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U
Zinc	40.5 UJ	3.2 UJ	11.4 UJ	2 U	12 UJ	2 U	7.1 UJ	7.4 UJ

TABLE 5-4 (Continued)
SUMMARY OF ANALYTICAL RESULTS
GROUNDWATER PHASE II, ROUND 2 SAMPLES (µg/L)
MCALF, BOGUE FIELD, NORTH CAROLINA

Analyte	29GW04		29GW05		29GW06		29GW07	
Benzene	1 U		1 U		1 U		1 U	
Ethylbenzene	1		1 U		1 U		1 U	
Toluene	1 U		1 U		1 U		1 U	
m-/p-Xylenes	1 U		1 U		1 U		1 U	
o-Xylene	1 U		1 U		1 U		1 U	
Aluminum	158 UJ	166 UJ	295 UJ	194 UJ	196 UJ	177 UJ	61.3 UJ	42 U
Antimony	16 UJ	16 UJ	16 UJ	16 UJ	16 UJ	16 UJ	16 UJ	16 UJ
Arsenic	3.2	3 J	1 U	1 U	1 U	1 U	1 U	1 U
Barium	10.9 UJ	10.1 UJ	17.8	18.1 UJ	13.5 UJ	14.6 UJ	12.6	11.6
Beryllium	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Cadmium	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Calcium	48800	47500 J	10400	10300 J	83700	86500 J	82500	82600
Chromium	8 U	8 U	8 U	8 U	8 U	8 U	8 U	8 U
Cobalt	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U
Copper	3 U	3 U	3 U	3 UJ	3 U	3 U	3 U	3 U
Iron	2180	2200	619	129	2770	2720	2040	1930
Lead	1 U	1 U	1 U	1 U	1 U	1.5 UJ	2.8 UJ	1.2 UJ
Magnesium	1980	1950	453	482 UJ	2170	2320	2110	2090
Manganese	26.6	27	12.5	15.3	15.2	16.4	43.7 J	43.1 J
Mercury	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Nickel	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Potassium	623	621	517	597	983	865	580 J	679 J
Selenium	1 UJ	1 U	1 UJ	1 UJ	1 UJ	1 U	1 UJ	1 UJ
Silver	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U
Sodium	4160	4090 UJ	4860	5060	11600	11500	11800	11500
Thallium	1 U	1 U	1 U	1	1 U	1 U	1 UJ	1 UJ
Vanadium	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U
Zinc	3.5 UJ	10.1 UJ	6.9 UJ	8.9 UJ	6.3 UJ	4.9 UJ	3.3 UJ	2 U

TABLE 5-4 (Continued)
SUMMARY OF ANALYTICAL RESULTS
GROUNDWATER PHASE II, ROUND 2 SAMPLES (µg/L)
MCALF, BOGUE FIELD, NORTH CAROLINA

Analyte	29GW08		29GW09		29GW10	
Benzene	1 U		**3.8**		**1.2**	
Ethylbenzene	1 U		1 U		**0.28 J**	
Toluene	1 U		1 U		1 U	
m-/p-Xylenes	1 U		1 U		**1**	
o-Xylene	1 U		1 U		1 U	
Aluminum	130 UJ	119 UJ	187 UJ	132 UJ	186 UJ	172 UJ
Antimony	16 UJ	16 UJ	16 UJ	16 UJ	16 UJ	16 UJ
Arsenic	**1.3**	**1.8 J**	**5**	**6**	1 U	**1.1 J**
Barium	10.9 UJ	10.8 UJ	**76.9**	**64.9**	**21.1**	21.4 UJ
Beryllium	1 U	1 U	1 U	1 U	1 U	1 U
Cadmium	2 U	2 U	2 U	2 U	2 U	2 U
Calcium	**69300**	**71500 J**	**128000**	**120000 J**	**52700**	**55300 J**
Chromium	8 U	8 U	8 U	8 U	8 U	8 U
Cobalt	**8.5**	**6.9**	3 U	3 U	3 U	3 U
Copper	3 U	3 U	3 U	3 U	3 U	3 U
Iron	**2340**	**2260**	**24500**	**12500**	**12500**	**12500**
Lead	1 U	1.4 UJ	1 U	1.3 UJ	1 U	1 U
Magnesium	**1430**	**1470**	**3110**	**2900**	**2000**	**2010**
Manganese	**752**	**836**	**622**	**581**	**68.9**	**73.1**
Mercury	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Nickel	5 U	5 U	5 U	5 U	5 U	5 U
Potassium	**2530**	**2300**	**7610**	**7090**	**2030**	**2040**
Selenium	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 U
Silver	4 U	4 U	4 U	**5.1 J**	4 U	4 U
Sodium	**4100**	4160 UJ	**4810**	4640 UJ	**17600**	**17700**
Thallium	**1.2 J**	1 U	1 U	**1.3**	1 U	1 U
Vanadium	4 U	4 U	4 U	4 U	4 U	4 U
Zinc	2.9 UJ	4.4 UJ	15 UJ	5.2 UJ	11 UJ	8 UJ

Metals results for unfiltered samples are presented in left-hand column and for filtered samples are presented in right-hand column for each sample.
Qualifier codes: U = Not detected; J = Estimated value; UJ = Detection/quantitation limit estimated.

TABLE 5-5

SUMMARY OF ANALYTICAL RESULTS – APRIL 1994
GROUNDWATER PHASE II, ROUND 3 (µg/L)
MCALF, BOGUE FIELD, NORTH CAROLINA

ANALYTE	29GW01		29GW02		29GW03		29GW03-D		29GW04		29GW05	
Benzene	1 U		**86 J**		**0.31 J**		1 U		1 U		1 U	
Ethylbenzene	**7.6 J**		**38 J**		1 U		1 U		**0.56 J**		1 U	
Toluene	1 U		1 U		1 U		1 U		**0.22 J**		1 U	
m-, p-Xylene	**8.8 J**		**110**		1 U		1 U		1 U		1 U	
o-Xylene	**0.48 J**		**24 J**		1 U		1 U		1 U		1 U	
Aluminum	235 UJ	231 UJ	30 U	30 U	210 UJ	226 UJ	223 UJ	231 UJ	226 UJ	223 UJ	544 UJ	329 UJ
Antimony	17 UJ	17 UJ	17 U	17 U	17 UJ	17 UJ	17 UJ	17 UJ	17 UJ	17 UJ	17 UJ	17 UJ
Arsenic	**7.9**	**7.6**	92.8 R	85.5 R	**7.8**	**7.5**	**8.5**	**7.7**	**3.4**	**3.3 J**	**1**	1 U
Barium	**16.7**	**16.5**	**15.4**	**14.6**	3 U	3 U	3 U	**3.2**	**12.4**	**12**	**11.4**	**11.2**
Beryllium	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Cadmium	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Calcium	**103000**	**102000**	**119000**	**120000**	**127000**	**126000**	**125000**	**125000**	**76600**	**74800**	**6330**	**6380**
Chromium	6 UJ	6 UJ	30 U	30 U	6 UJ	6 UJ	6 UJ	**6.1 J**	6 UJ	6 UJ	6 UJ	6 UJ
Cobalt	8 U	8 U	8 U	8 U	8 U	8 U	8 U	8 U	8 U	8 U	8 U	8 U
Copper	3 U	3 U	3 UJ	3 UJ	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U
Iron	**21300**	**21200**	**76800 J**	**76000 J**	**16900**	**16600**	**16600**	**16600**	**4810**	**4630**	**344**	18.2 UJ
Lead	1 UJ	1 UJ	**2 J**	1 U	1.2 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ
Magnesium	**2510**	**2480**	**5190 J**	**5230 J**	**3720**	**3720**	**3700**	**3710**	**2930**	**2890**	**455**	**459**
Manganese	**200**	**198**	**568**	**563**	**881**	**867**	**870**	**861**	**57.9**	**57**	**11.7 J**	**13.5 J**
Mercury	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Nickel	5 U	5 U	**5.1**	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Potassium	**1360**	**1340**	**11800**	**11800**	**2200**	**2210**	**2330**	**2250**	**548**	**487**	152 U	152 U
Selenium	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1.1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ
Silver	3 UJ	3 UJ	3 UJ	3 UJ	3 UJ	3 UJ	3 UJ	3 UJ	3 UJ	3 UJ	3 UJ	3 UJ
Sodium	**5450**	**5310**	**7460**	**7630**	**5010**	**5080**	**4950**	**5020**	**10400**	**10200**	**4070**	**4010**
Thallium	1.1 UJ	1 U	1 UJ	1 U	1 U	1 U	1.2 UJ	1 U	1 U	1 U	1 U	1 U
Vanadium	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U
Zinc	3.4 UJ	18.6 UJ	**39.9**	2 U	4.3 UJ	3.4 UJ	5 UJ	3.7 UJ	4.3 UJ	12.6 UJ	7.5 UJ	6.1 UJ

TABLE 5-5 (Continued)
SUMMARY OF ANALYTICAL RESULTS
GROUNDWATER PHASE II, ROUND 3 (µg/L)
MCALF, BOGUE FIELD, NORTH CAROLINA

ANALYTE	29GW06		29GW07		29GW08		29GW09		29GW10	
Benzene	1 U		1 U		1 U		**3.7 J**		**7.6**	
Ethylbenzene	1 U		1 U		1 U		1 U		**0.55 J**	
Toluene	1 U		1 U		1 U		**0.2 J**		**0.41 J**	
m-, p-Xylene	1 U		**0.37 J**		**0.26 J**		**0.44 J**		**6.2**	
o-Xylene	1 U		1 U		1 U		**0.38 J**		**0.41 J**	
Aluminum	280 UJ	246 UJ	30 U	30 U	234 UJ	218 UJ	30 U	30 U	280 UJ	266 UJ
Antimony	17 UJ	17 UJ	17 U	17 U	17 UJ	17 UJ	17 U	17 U	17 UJ	17 UJ
Arsenic	1 U	1 U	1 R	1 R	**1.1**	1 U	4.5 R	4.3 R	1 U	**1.4**
Barium	**6.7**	**6.4**	**10.8**	**9.8**	**7.2**	**7.1**	**61.3**	**60.8**	**25.6**	**24.2**
Beryllium	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Cadmium	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Calcium	**66000**	**66800**	**81600**	**80900**	**69900**	**68300**	**123000**	**123000**	**84000**	**80100**
Chromium	6 UJ	6 UJ	11.5 UJ	15.1 UJ	6 UJ	6 UJ	9.6 UJ	6.4 UJ	6 UJ	6 UJ
Cobalt	8 U	8 U	8 U	8 U	8 U	**8.1**	8 U	8 U	8 U	8 U
Copper	3 U	3 U	3 UJ	3 UJ	3 U	3 U	3 UJ	**3** UJ	3 U	3 U
Iron	**1980**	**2000**	**2360 J**	**2040 J**	**857**	**891**	**14600 J**	**14300 J**	**20000**	**18800**
Lead	1 UJ	1 UJ	1 U	1 U	1 UJ	1 UJ	1 U	1 U	1 UJ	1 UJ
Magnesium	**1610**	**1630**	**2150 J**	**2150 J**	**1610**	**1510**	**3430 J**	**3390 J**	**2610**	**2480**
Manganese	**10.9 J**	**11.4 J**	**47**	**44.6**	**460**	**542**	**664**	**666**	**137**	**130**
Mercury	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Nickel	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Potassium	**544**	**429**	760 UJ	759 UJ	**1890**	**1880**	**7770**	**7360**	**2300**	**2200**
Selenium	1 UJ	1 UJ	1 UJ	1 UJ	1.2 UJ	1.8 UJ	1 UJ	1 UJ	1 UJ	1 UJ
Silver	3 UJ	3 UJ	3 UJ	3 UJ	3 UJ	3 UJ	3 UJ	3 U	3 UJ	3 UJ
Sodium	**7470**	**7330**	**10800**	**10600**	**3830**	**3840**	**4450**	**4470**	**14900**	**14200**
Thallium	1 UJ	1 U	1 U	1 U	1 U	1 UJ	1 U	1 U	1 U	1 UJ
Vanadium	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U
Zinc	3.5 UJ	4.7 UJ	3 UJ	2.5 UJ	3.6 UJ	3.5 UJ	2.2 UJ	3 UJ	3.5 UJ	3.5 UJ

Metals results for unfiltered samples are presented in left-hand column and for filtered samples are presented in right-hand column for each sample.

Qualifier codes: U = Not detected; J = Estimated value; UJ = Detection/quantitation limit estimated; R = Rejected value.

TABLE 5-6

SUMMARY OF POSITIVE BTEX RESULTS
GROUNDWATER PHASE II, ROUNDS 1, 2, AND 3 (µg/L)
MCALF, BOGUE FIELD, NORTH CAROLINA

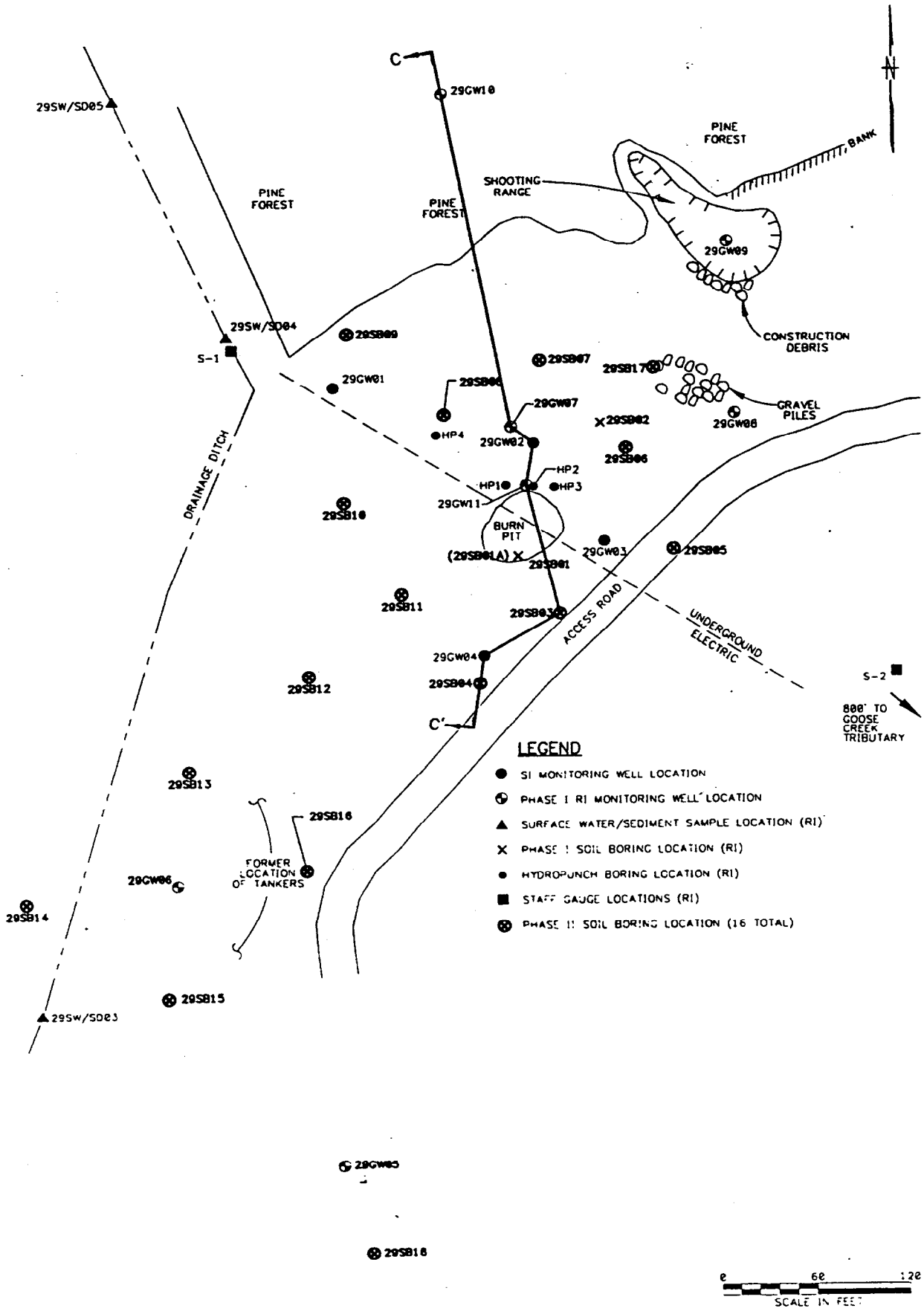
Sampling Location	Sampling Stage	Benzene	Ethylbenzene	m-/p-Xylene	o-Xylene	Toluene	Total Xylenes
29GW01	SI	7	0.6J	NA	NA	10 U	10U
	Phase I, RI	1 U	10	NA	NA	10 U	5
	Phase II, Round 1	2 U	1.2 UJ	0.44 UJ	0.26 UJ	0.84 UJ	NA
	Phase II, Round 2	1 U	1.1	1 U	1 U	1 U	NA
	Phase II, Round 3	1 U	7.6J	8.8J	0.48J	1 U	NA
29GW02	SI	110	68	NA	NA	13	220
	Phase I, RI	88	40J	NA	NA	3J	210J
	Phase II, Round 1	57J	23J	71J	26J	1.1 UJ	NA
	Phase II, Round 2	1000 U	1000 U	1000 U	1000 U	1000 U	NA
	Phase II, Round 3	86J	38J	110	24J	1 U	NA
29GW03	SI	2J	10 U	NA	NA	10 U	10 U
	Phase I, RI	10 U	10 U	NA	NA	10 U	10 U
	Phase II, Round 1	0.21J	2 U	0.28 UJ	2 U	0.36 UJ	NA
	Phase II, Round 2	1.5	1 U	1 U	1 U	1 U	NA
	Phase II, Round 3	0.31J	1 U	1 U	1 U	1 U	NA
29GW04	SI	15	8	NA	NA	10 U	10 U
	Phase I, RI	10 U	10 U	10 U	10 U	10 U	10 U
	Phase II, Round 1	2 U	2 U	0.69 UJ	0.89 UJ	0.69 UJ	NA
	Phase II, Round 2	1 U	1	1 U	1 U	1 U	NA
	Phase II, Round 3	1 U	0.56J	1 U	1 U	0.22J	NA
29GW05	Phase I, RI	10 U	10 U	NA	NA	10 U	10 U
	Phase II, Round 1	2 U	2 U	0.23 UJ	2 U	0.38 UJ	NA
	Phase II, Round 2	1 U	1 U	1 U	1 U	1 U	NA
	Phase II, Round 3	1 U	1 U	1 U	1 U	1 U	NA

TABLE 5-6 (Continued)
SUMMARY OF POSITIVE BTEX RESULTS
GROUNDWATER PHASE II, ROUNDS 1, 2, AND 3 (µg/L)
MCALF, BOGUE FIELD, NORTH CAROLINA

Sampling Location	Sampling Stage	Benzene	Ethylbenzene	m-/p-Xylene	O-Xylene	Toluene	Total Xylenes
29GW06	Phase I, RI	10 U	10 U	NA	NA	10 U	10 U
	Phase II, Round 1	2 U	2 U	0.23	2 U	0.35 UJ	NA
	Phase II, Round 2	1 U	1 U	1 U	1 U	1 U	NA
	Phase II, Round 3	1 U	1 U	1 U	1 U	1 U	NA
29GW07	Phase I, RI	10 U	10 U	NA	NA	10 U	10 U
	Phase II, Round 1	2 U	2 U	2 U	2 U	0.39 UJ	NA
	Phase II, Round 2	1 U	1 U	1 U	1 U	1 U	NA
	Phase II, Round 3	1 U	1 U	0.37J	1 U	1 U	NA
29GW08	Phase I, RI	10 U	10 U	NA	NA	10 U	10 U
	Phase II, Round 1	2 U	2 U	0.22 UJ	2 U	0.5 UJ	NA
	Phase II, Round 2	1 U	1 U	1 U	1 U	1 U	NA
	Phase II, Round 3	1 U	1 U	0.26J	1 U	1 U	NA
29GW09	Phase I, RI	10 U	10 U	NA	NA	10 U	10 U
	Phase II, Round 1	2.7	2 U	0.97 UJ	0.62 UJ	1.3 UJ	NA
	Phase II, Round 2	3.8	1 U	1 U	1 U	1 U	NA
	Phase II, Round 3	3.7J	1 U	0.44J	0.38J	0.2J	NA
29GW10	Phase I, RI	10 U	100	NA	NA	10 U	10 U
	Phase II, Round 1	8.1	1.4J	29	0.33 UJ	0.98 UJ	NA
	Phase II, Round 2	1.2	0.28J	1	1 U	1 U	NA
	Phase II, Round 3	7.6	0.55J	6.2	0.41J	0.41J	NA

Qualifier codes: NA = Not Analyzed; ND = Not detected; U = Not detected at reported detection/quantitation limit; UJ = Estimated detection/quantitation limit; J = Estimated value.

Sampling dates: SI – 1988; Phase I RI – October 1991; Phase II Round 1 – July 1993; Phase II Round 2 – December 1993; Phase II Round 3 – April 1994

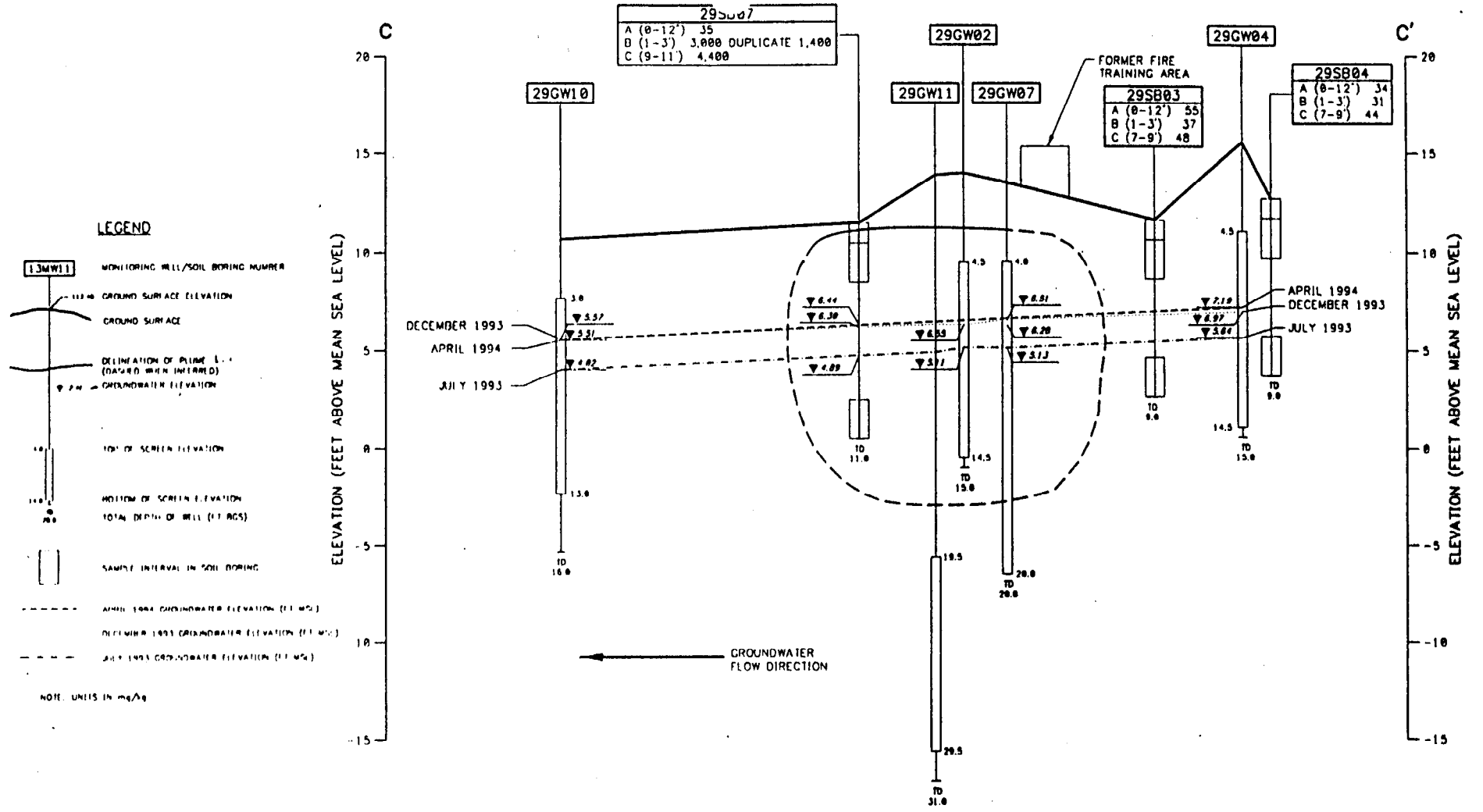


GENERAL SITE FEATURES AND DATA POINT LOCATIONS CRASH CREW BURN PIT BOGUE FIELD

FIGURE 5-1

D-11-94-27

HALLIBURTON NUS Environmental Corporation

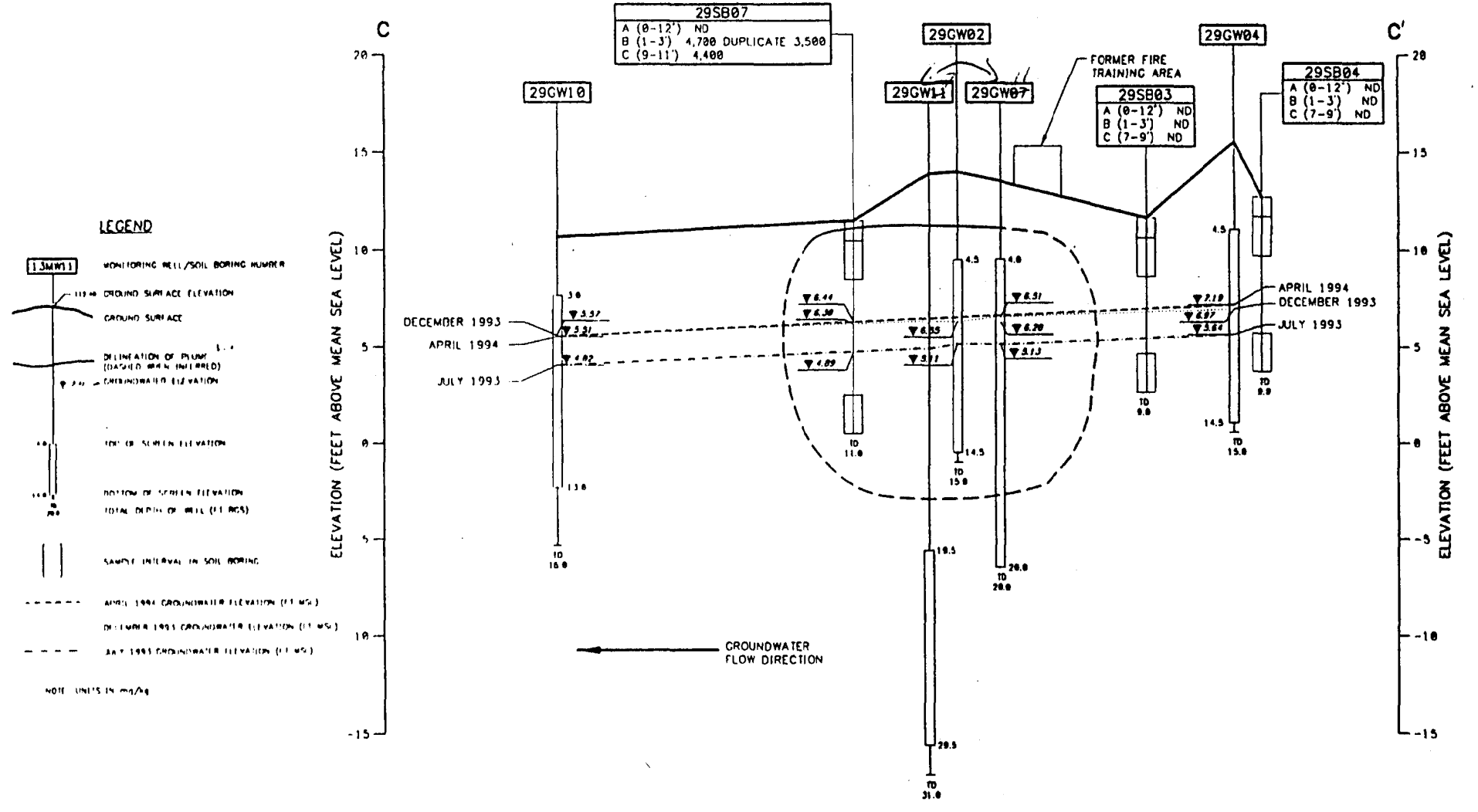


CROSS SECTION C-C'
RESIDUAL TPH ABOVE SSE ACTION LEVELS
BOGUE FIELD, NORTH CAROLINA

FIGURE 5-2

Halliburton NUS CORPORATION

TAPE 10
042195

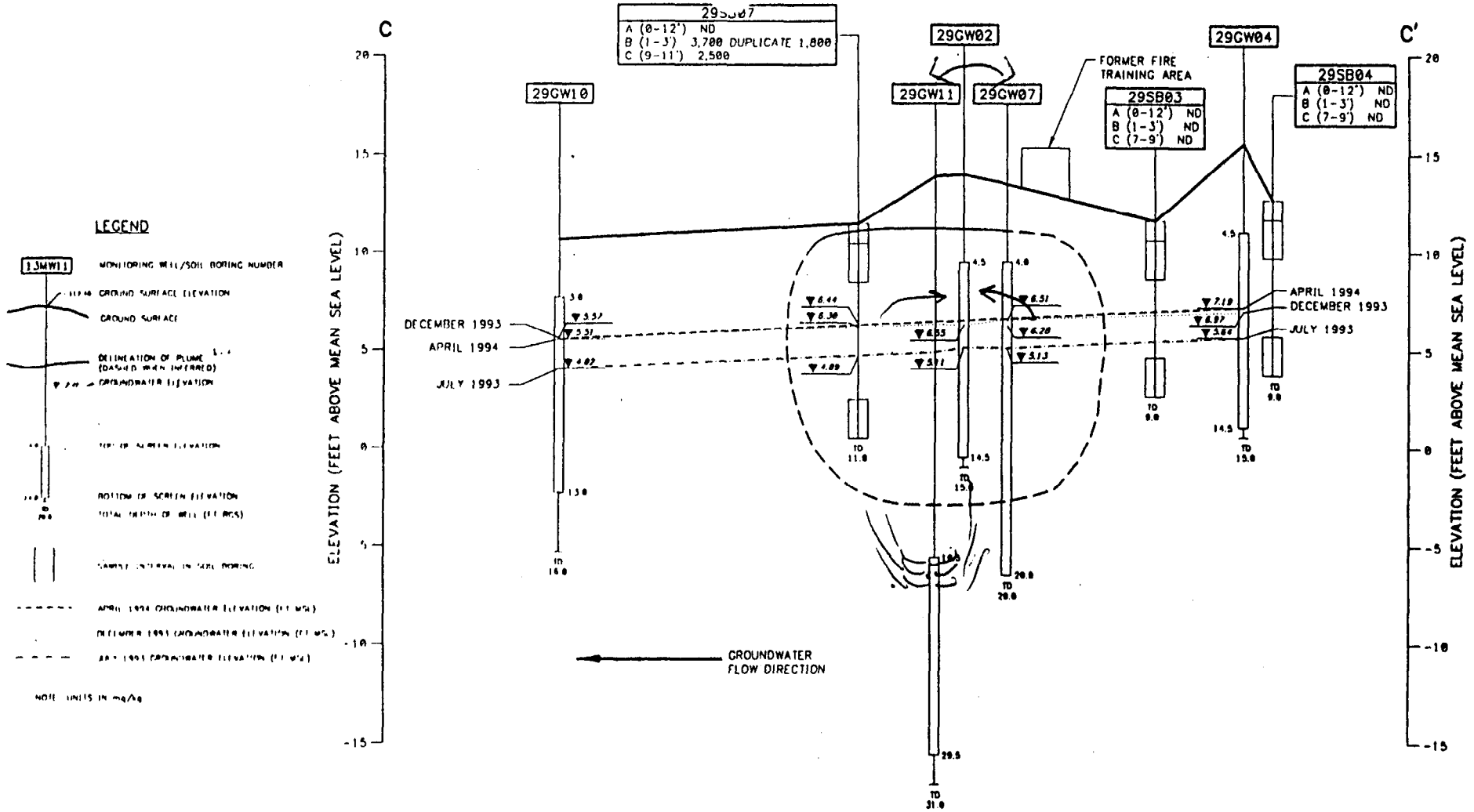


CROSS SECTION C-C'
MEDIUM TO HIGH BOILING POINT TPH ABOVE SSE ACTION LEVELS
BOGUE FIELD, NORTH CAROLINA

0 60 120
HORIZONTAL SCALE IN FEET
0 5 10
VERTICAL SCALE IN FEET

FIGURE 5-3

Halliburton NUS CORPORATION



CROSS SECTION C-C'
LOW TO MEDIUM BOILING POINT TPH ABOVE SSE ACTION LEVELS
BOGUE FIELD, NORTH CAROLINA

HORIZONTAL SCALE IN FEET
VERTICAL SCALE IN FEET

FIGURE 5-4

Halliburton NUS CORPORATION

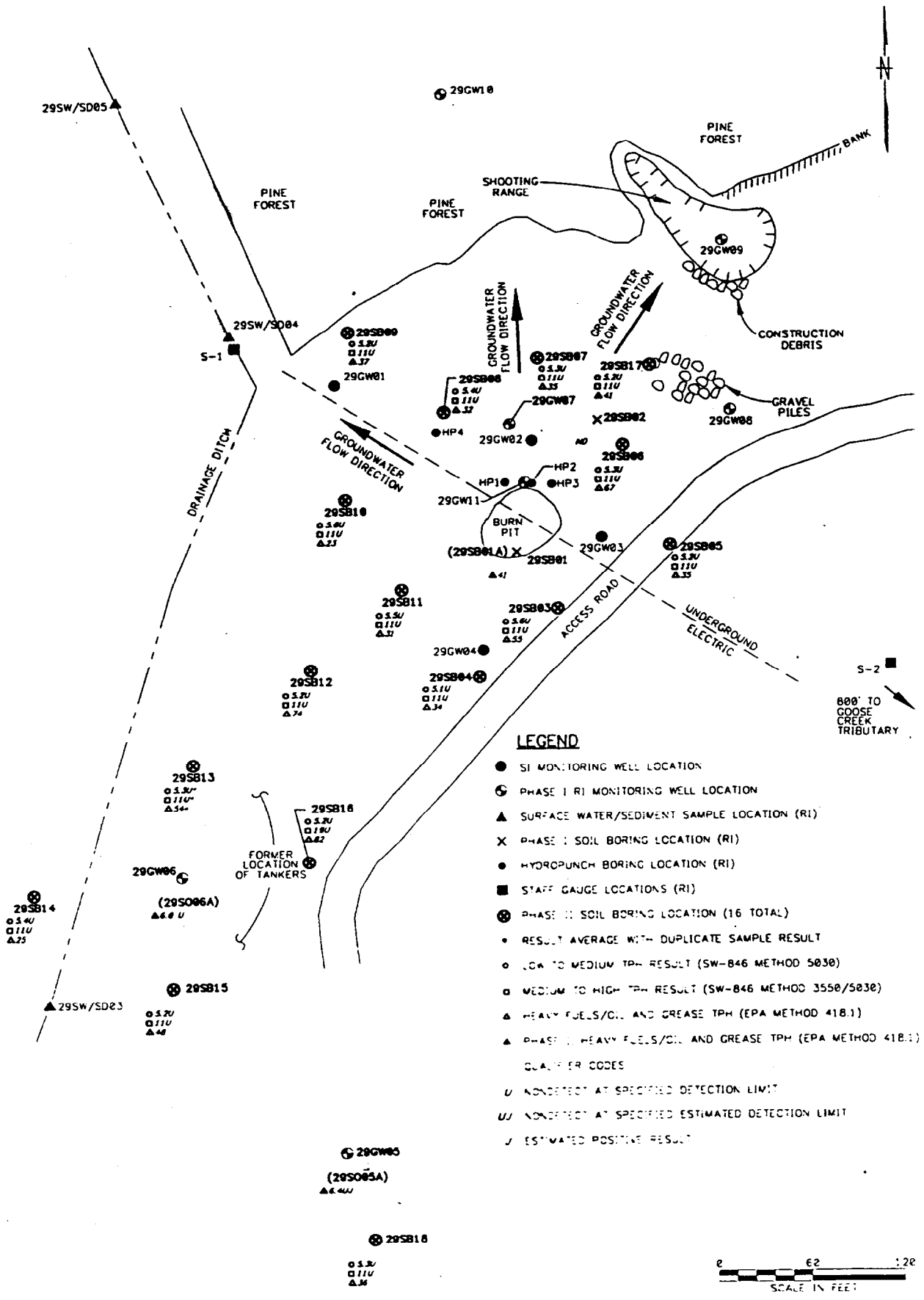


FIGURE 5-5

SURFACE SOIL (0-12") TPH RESULTS (mg/kg)
CRASH CREW BURN PIT
BOGUE FIELD

D-11-94-27

HALLIBURTON NUS
Environmental Corporation

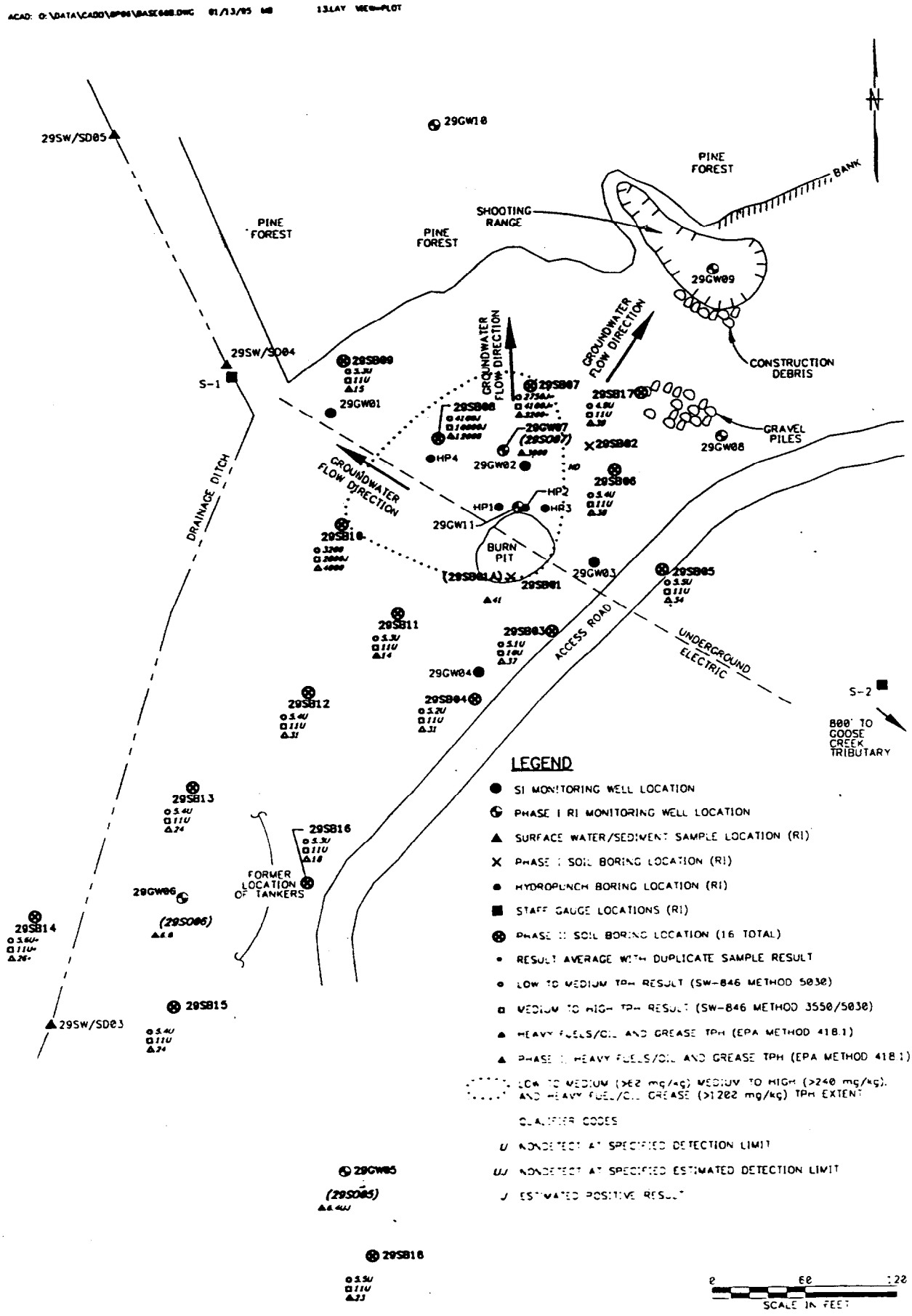


FIGURE 5-6

SHALLOW SUBSURFACE SOIL (1'-3') TPH RESULTS (mg/kg)
CRASH CREW BURN PIT
BOGUE FIELD

D-11-94-27

HALLIBURTON NUS
Environmental Corporation

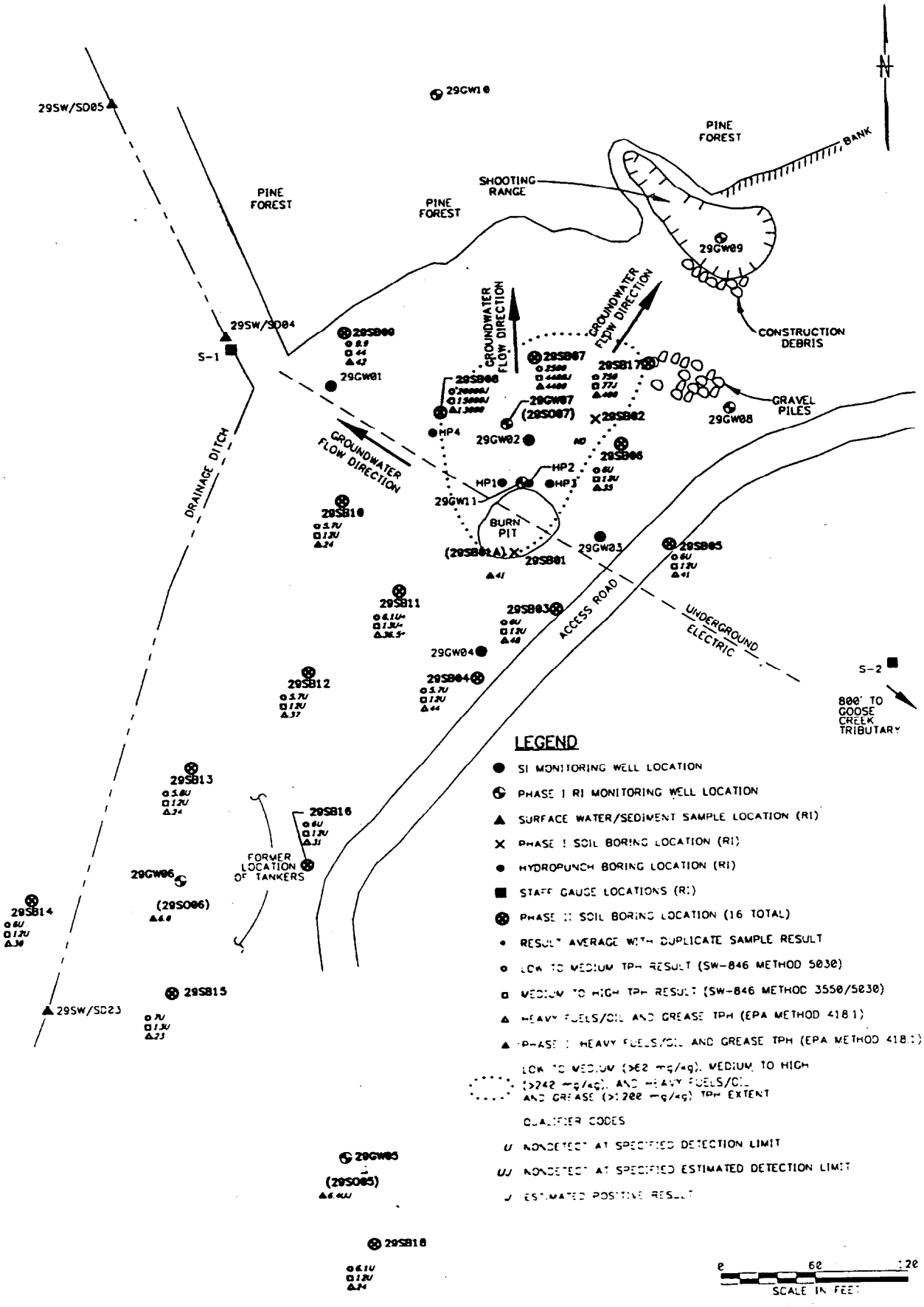


FIGURE 5-7

DEEP SUBSURFACE SOIL (3'-11') TPH RESULTS (mg/kg)
CRASH CREW BURN PIT
BOGUE FIELD

D-11-94-27

HALLIBURTON NUS
Environmental Corporation

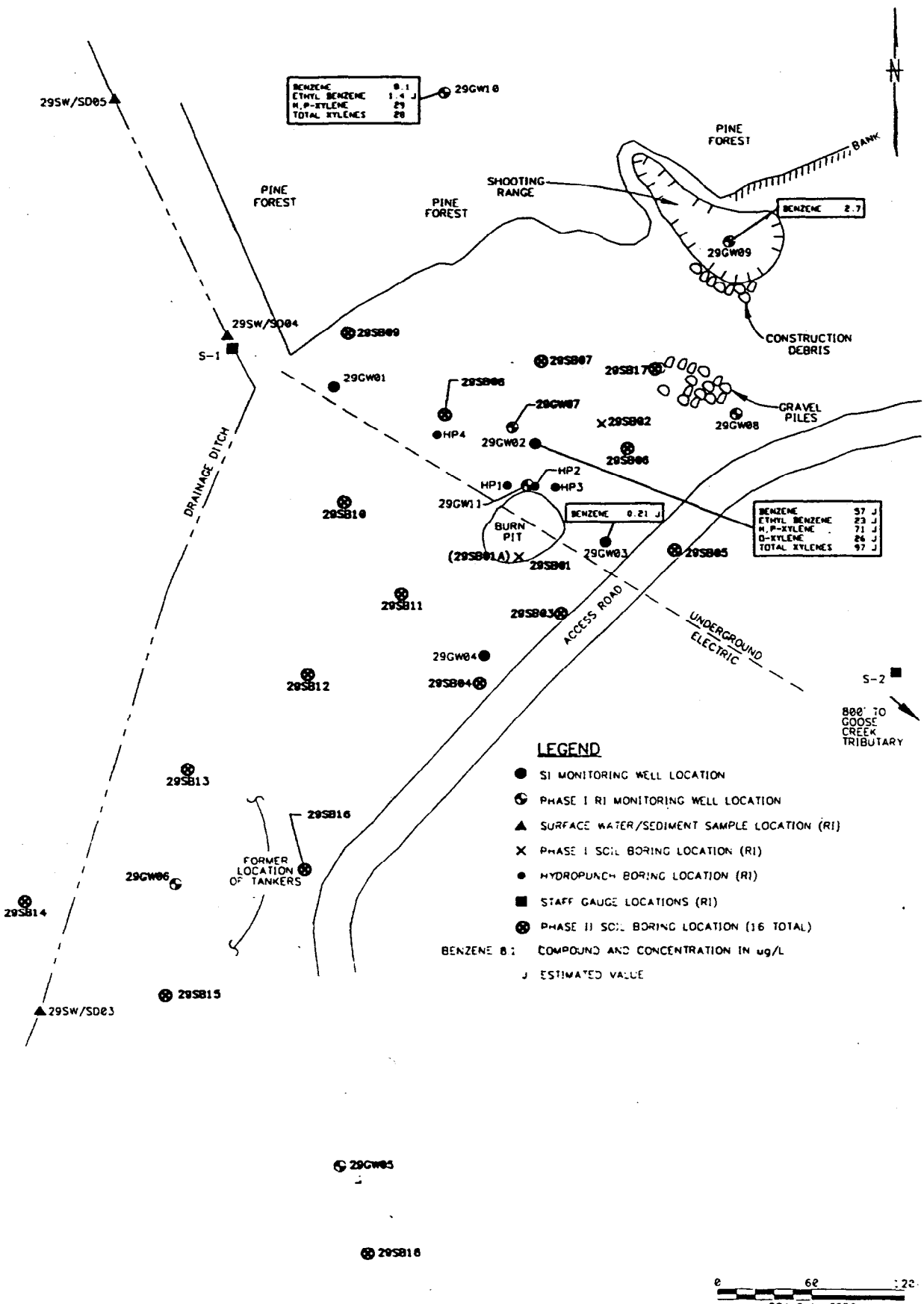


FIGURE 5-8

GROUNDWATER ROUND 1 BTEX RESULTS
CRASH CREW BURN PIT
BOGUE FIELD

D-11-94-27

HALLIBURTON NUS
Environmental Corporation

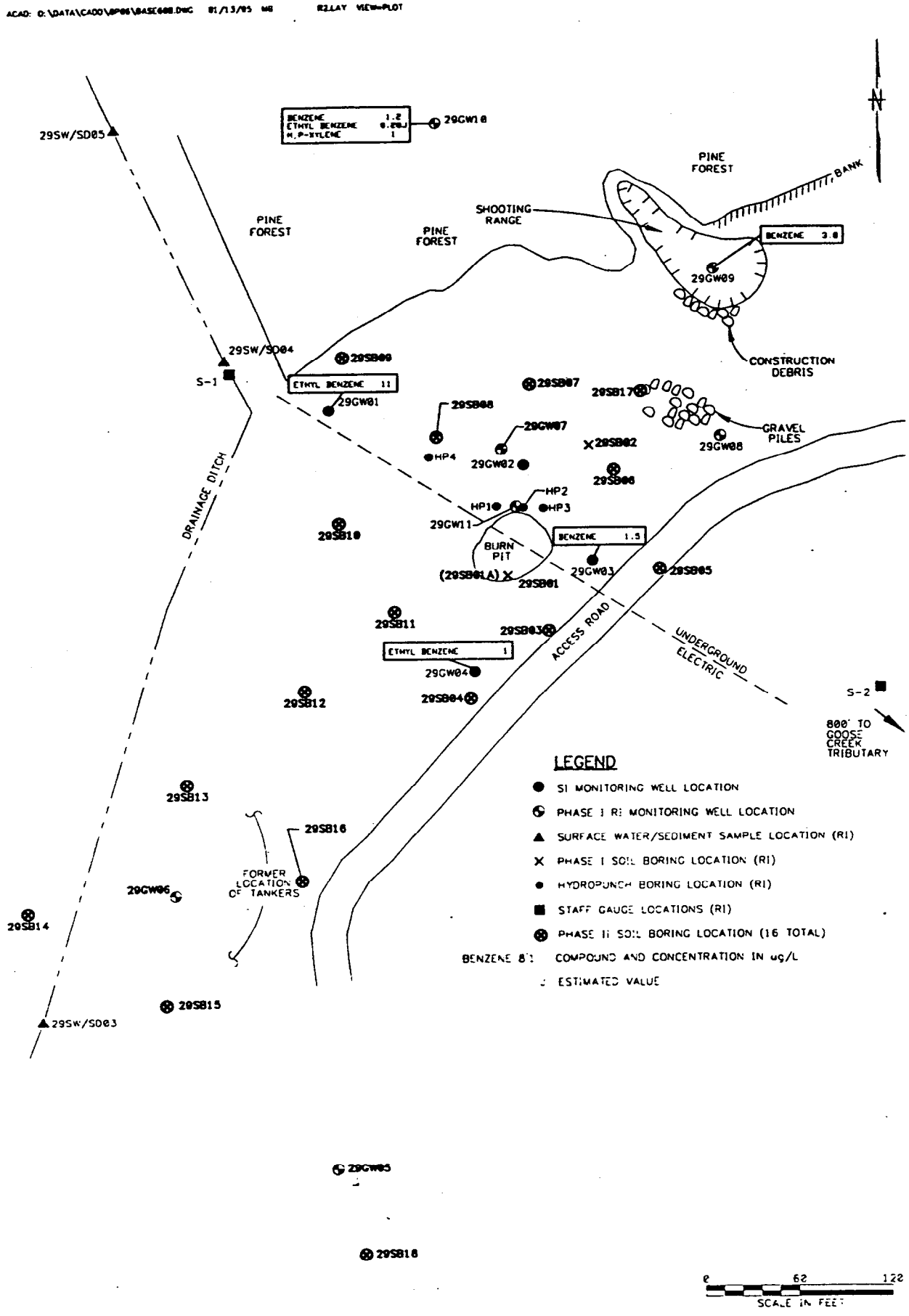


FIGURE 5-9

GROUNDWATER ROUND 2 BTEX RESULTS
CRASH CREW BURN PIT
BOGUE FIELD

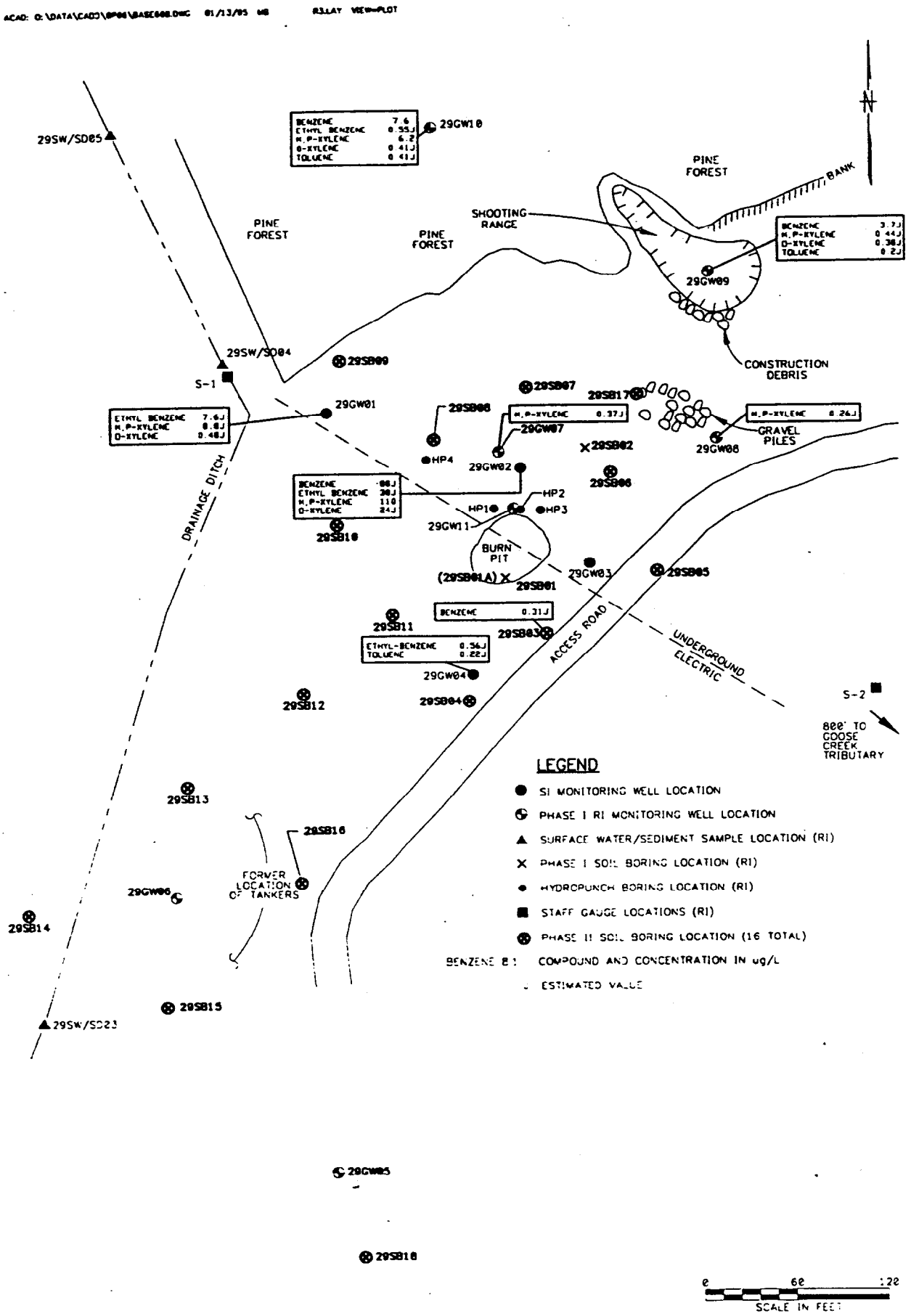


FIGURE 5-10

GROUNDWATER ROUND 3 BTEX RESULTS
CRASH CREW BURN PIT
BOGUE FIELD

APPENDIX C

STATE OF NORTH CAROLINA DEPARTMENT OF ENVIRONMENT, HEALTH, AND NATURAL RESOURCES LETTER NOVEMBER 10, 1994

State of North Carolina
Department of Environment, Health, and Natural Resources
Wilmington Regional Office
James B. Hunt, Jr., Governor DIVISION OF ENVIRONMENTAL MANAGEMENT Bob Jamieson
Jonathan B. Howes, Secretary Groundwater Section Regional Manager

November 10, 1994

CERTIFIED MAIL Z 275 496 163
RETURN RECEIPT REQUESTED

Mr. R.D. Nelson
Environmental Affairs Officer
United States Marine Corps
Marine Corps Air Station
Cherry Point, North Carolina 28533-5001

Subject: Corrective Action Plan
Marine Corps Auxiliary Landing Field
Former Crash Crew Burn Pit
Bogue Field
Carteret County

Dear Mr. Nelson:

Recent review of the subject file shows that the Division of Environmental Management received a Remedial Investigation report for the subject site on July 23, 1993. Additional correspondence has provided the Division with regular monitoring of free product thickness and product recovery reports for the site. The available information suggests that the low level of contamination at the site results from effective natural degredation. We assume this process will continue to occur at the site.

As required by State regulations under 15A NCAC 2L .0106 the Division requests that a Corrective Action Plan be submitted for the subject site. Due to the nature of the contamination and site geology, you may wish to pursue corrective action under 15A NCAC 2L .0106 k, l, or m. A copy of 15A NCAC 2L is enclosed. Should you wish to pursue one of the corrective action options, you will be required to completed on of the appropriate certification forms, which are also enclosed.

The Division requests that you make a written response to this letter within 15 days of its receipt. your response should include the plan of action you intend to take and a schedule with a time table.

Should you have any questions concerning this letter or require addtional information, please contact Diane Rossi at 99100 395-3900.

Sincerely,

Charles F. Stehman, Ph. D.
Environmental Supervisor I

enclosures

CFS/CDR/gjg

cc: WiRO-GWS
Mr. Jack Butler, Superfund Section

s:/gws/diane/usmcbogue.oct

APPENDIX D

NCDENR REGULATION
15A NCAC 2L.0106(l)(1)

will be met at a location no closer than one year time of travel upgradient of an existing or foreseeable receptor, based on travel time and the natural attenuation capacity of subsurface materials or on a physical barrier to groundwater migration that exists or will be installed by the person making the request;

(5) that, if the contaminant plume is expected to intercept surface waters, the groundwater discharge will not possess contaminant concentrations that would result in violations of standards for surface waters contained in 15A NCAC 2B .0200;

(6) that public notice of the request has been provided in accordance with Rule .0114(b) of this Section;

(7) that the proposed corrective action plan would be consistent with all other environmental laws.

* (l) Any person required to implement an approved corrective action plan for a non-permitted site pursuant to this Rule may request that the Director approve such a plan based upon natural processes of degradation and attenuation of contaminants. A request submitted to the Director under this Paragraph shall include a description of site specific conditions, including written documentation of projected groundwater use in the contaminated area based on current state or local government planning efforts; the technical basis for the request; and any other information requested by the Director to thoroughly evaluate the request. In addition, the person making the request must demonstrate to the satisfaction of the Director:

(1) that all sources of contamination and free product have been removed or controlled pursuant to Paragraph (f) of this Rule;

(2) that the contaminant has the capacity to degrade or attenuate under the site-specific conditions;

(3) that the time and direction of contaminant travel can be predicted with reasonable certainty;

(4) that contaminant migration will not result in any violation of applicable groundwater standards at any existing or foreseeable receptor;

(5) that contaminants have not and will not migrate onto adjacent properties, or that:

(A) such properties are served by an existing public water supply system dependent on surface waters or hydraulically isolated groundwater, or

(B) the owners of such properties have consented in writing to the request;

(6) that, if the contaminant plume is expected to intercept surface waters, the groundwater discharge will not possess contaminant concentrations that would result in violations of standards for surface waters contained in 15A NCAC 2B .0200;

(7) that the person making the request will put in place a groundwater monitoring program sufficient to track the degradation and attenuation of contaminants and contaminant by-products within and down gradient of the plume and to detect contaminants and contaminant by-products prior to their reaching any existing or foreseeable receptor at least one year's time of travel upgradient of the receptor and no greater than the distance the groundwater at the contaminated site is predicted to travel in five years;

(8) that all necessary access agreements needed to monitor groundwater quality pursuant to Subparagraph (7) of this Paragraph have been or can be obtained;

(9) that public notice of the request has been provided in accordance with Rule .0114(b) of this Section; and

(10) that the proposed corrective action plan would be consistent with all other environmental laws.

(m) The Division or any person required to implement an approved corrective action plan for a non-permitted site pursuant to this Rule may request that the Director approve termination of corrective action.

(1) A request submitted to the Director under this Paragraph shall include:

(A) a discussion of the duration of the corrective action, the total project's cost, projected annual cost for continuance and evaluation of the success of the corrective action;

(B) an evaluation of alternate treatment technologies which could result in further reduction of contaminant levels projected capital and annual operating costs for each technology;

(C) effects, including health and safety impacts, on groundwater users if contaminant levels remain at levels existing at the time corrective action is terminated; and

APPENDIX E

AS/SVE SYSTEM ACTIVITIES SUMMARY AND PHYSICAL PARAMETER MEASUREMENTS

TABLE E-1

AS/SVE SYSTEM - ACTIVITIES SUMMARY
SITE 29 - CRASH CREW BURN PIT
MCALF BOGUE, NORTH CAROLINA
PAGE 1 OF 5

Date	Activity	Comments
9/2/97 through 9/5/97	Installation of system wells	Free product identified in 29GW11 (0.40' thick) and 29GW02 (2.11' thick) prior to system well installation.
9/6/97	Baseline soil sample collection	Five soil boring locations with samples collected from 1'-3' and 4'-6' intervals.
9/7/97	Baseline groundwater collection	29GW02 and 29GW11 sampled. Wells purged prior to sample collection.
9/8/97 through 9/11/97	System installation	None
9/12/97	Initial system start-up Collect air sample (SVE only)	Initial operation of SVE to evaluate soil contamination only. Free product observed in extraction wells. Collected pre-carbon air sample.
9/16/97 through 9/18/97	System evaluation	Heavy rains over weekend. System not operating. Auto shut-off didn't operate correctly. Kept system off until repairs and modifications could be made.
9/30/97 through 10/2/97	System repair and expansion	Installed additional moisture separator with auto shut-off/auto-drain including product separation capability.
10/3/97	Complete system startup (AS/SVE)	Collected pre-carbon air sample. Set system on full auto.
10/14/97	System checked	System operating.
10/17/97	One-month evaluation	System not operating. 1500-gal holding tank full. Collected groundwater samples from 29GW02 and 29GW11. System couldn't be turned back on until holding tank emptied.
10/30/97	System re-start	Holding tank was emptied and disposed of at MCAS Cherry Point. System vacuum adjusted. System set on "run" not "auto."
11/20/97	Monthly evaluation	System operating. Collected air sample.
12/17/97	Monthly evaluation	System operating. Air evaluation identified off-gas treatment not required; therefore, took carbon off-line. Collected carbon sample for disposal. Air sample collected. Removed product using vacuum blower.
1/16/98	Monthly evaluation	System operating. Collected air sample.
1/27/98	Monthly evaluation	System operating. Collected air sample and system data.

TABLE E-1

AS/SVE SYSTEM - ACTIVITIES SUMMARY
SITE 29 - CRASH CREW BURN PIT
MCALF BOGUE, NORTH CAROLINA

Date	Activity	Comments
2/19/89	Monthly evaluation	Heavy rains prior to visit. System running, but no air flow because of high water table and break in AS trunk line. Repaired system and re-set pressures. Collected air sample.
4/1/98 through 4/2/98	Month six evaluation	System operating. Collected soil and groundwater samples. Collected air sample. System data recorded.
5/20/98	Bimonthly evaluation	System operating. Collected air sample.
7/20/98 through 7/21/98	Bimonthly evaluation and additional groundwater sampling.	Only vapor extraction operating. Air sparge off-line. Additional groundwater sampling based on 6th month data. No soil samples collected. Collected air sample. Full system put back on-line.
9/30/98	Bimonthly evaluation	System not operating. Couldn't re-start AS unit. Removed product using SVE unit. Collected air sample. Operate SVE only. Ordered service of AS blower.
10/22/98 and 11/10/98	System repair	AS blower damaged beyond repair. Unit was replaced by vendor, and system put back on-line. Twelve-month soil and groundwater sampling put on hold pending review of data. Free product still exists at the site.
12/1/98	Monthly evaluation	Systems operating; however, break in air injection trunk line preventing air sparging. Repaired line, and collected system data. Made adjustments to system to reduce noise from AS unit.
1/11/99	Monthly evaluation	System not operating. Re-set SVE breaker and replaced drive shaft on AS unit. Collected air sample and system data. Additional field efforts were put on hold pending modification to contract.
5/12/99	Monthly evaluation	The first additional system evaluation was conducted on 5/12/99 through 5/14/99. Upon arrival at Site 29 the system was not operating. Repairs were made and the system put back on-line.
6/23/99	Monthly evaluation	System in full operation. Data collected and minor system adjustments made.
7/20/99	Report submittal	AS/SVE Status Letter Report submitted.

TABLE E-1

AS/SVE SYSTEM - ACTIVITIES SUMMARY
SITE 29 - CRASH CREW BURN PIT
MCALF BOGUE, NORTH CAROLINA

Date	Activity	Comments
7/27/99	Monthly evaluation and meeting	Meeting with State to discuss AS/SVE Status Letter Report. System evaluation and tour conducted. System was not operating because of full moisture separator.
8/25/99	Monthly evaluation and sampling effort	System evaluation conducted and collected groundwater and soil samples. System was shut off for 5 days prior to sampling effort. Air sample was collected. As per July meeting, run meters installed and system was rewired to permit independent operation of AS and SVE units.
10/4/99	Monthly evaluation	AS/SVE unit operated full time. SVE system went off line 49.2 hrs after previous evaluation. Conducted minor repairs and performed evaluation.
10/27/99	Monthly evaluation	System in full operation. Conducted system evaluation and data collection.
11/18/99	Monthly evaluation	System in full operation. Conducted system evaluation. Run meters identified. SVE system was off for 102 hrs and AS system off for 41.6 hrs.
12/9/99	Monthly evaluation	AS system off line. Unit couldn't be restarted and called for replacement. SVE system and other site measurements collected.
1/5/00	System repairs and monthly evaluation	AS blower replaced. System evaluation and data collection conducted.
2/23/00	Monthly evaluation	SVE unit off line. Excessive system vibration. Repairs made to system. Full system back on line.
4/4/00	Monthly evaluation	SVE unit off line. Contacted manufacture to make repair to system. Unable to get SVE system back on line. Collected AS system and other site measurements.
4/25/00	System repairs	Conducted repairs to system. AS unit needed rotary vane replacement. Parts ordered. Full system placed back on line.

TABLE E-1

AS/SVE SYSTEM - ACTIVITIES SUMMARY
SITE 29 - CRASH CREW BURN PIT
MCALF BOGUE, NORTH CAROLINA

Date	Activity	Comments
5/9/00	Monthly evaluation and groundwater sampling	System was shut off prior to groundwater sample collection. Collected sinking black product/liquid from vapor extraction wells - 19 and 24. AS blower had excessive vibration due to bad rotary vane. Only operating SVE system. Collected SVE system and other site measurements.
5/30/00	System repairs	AS blower repaired and other minor repairs made to system. Full system placed back on line.
6/27/00	Monthly evaluation and air sample collection	Conducted system evaluation and collected air sample. System in full operation.
7/25/00	Monthly evaluation	System not running because of heavy rains and localized flooding. Full system put back on line and system measurements collected.
8/30/00	Monthly evaluation and project review meeting	System not running because of localized flooding and heavy rains. SVE system placed back on line, but AS motor starter burned out and needed replaced. All SVE wells clean except VE 21 with some black floc.
9/6/00	System repairs	Motor starter replaced and SVE system placed back on line.
9/28/00	Monthly evaluation	System in full operation. No rain for last week or so (dry). Wells still show no signs of free product. System data collected and recorded in log book (1302).
11/7/00	Monthly evaluation	System in full operation. System data collected and recorded. Only well with any signs of contamination was VE 21. All other wells appeared clean.
12/19/00	Monthly evaluation	System in full operation. System data collected and recorded. No free product.
2/6/01	Monthly evaluation, air sample collection, and project review meeting.	Meeting and site visit with new NC state representative. System in full operation. No black floc observed and only minor tinting of groundwater. No free product. System data collected and recorded.
4/10/01	System checks	System is running. Field efforts places on hold pending state decision on operation of the system.

TABLE E-1

AS/SVE SYSTEM - ACTIVITIES SUMMARY
SITE 29 - CRASH CREW BURN PIT
MCALF BOGUE, NORTH CAROLINA

Date	Activity	Comments
5/24/01	Monthly evaluation	Decision made to check on system. SVE system in operation but AS blower needed rebuilt and was taken off line.
6/15/01	System repair	AS blower reconnected and full system placed back into operation. Minor repairs the following week were required on the SVE system.
7/10/01	Monthly evaluation	System in full operation. System data collected and recorded. All wells appeared clean with only VE 26 showing limited signs of black material. No free product. Direction given to proceed with efforts to write CAP.
10/1/01	Groundwater and soil sample collection for CAP	AS/SVE system was shut off on September 10, 2001 in preparation for sampling effort. The first week of October, soil and gas samples were collected. System was restarted and evaluation conducted. The system is currently in full operation, but is expected to be shut down prior to implementation of MNA.

TABLE E-2

AS/SVE SYSTEM - HOURS OF OPERATION
SITE 29 - CRASH CREW BURN PIT
MCALF BOGUE, NORTH CAROLINA

Date	Hours between evaluation periods	Air Sparge Unit				Vapor Extraction Unit			
		Run Meter Reading	Hours System Running	Hours Off-Line	Percent time of operation	Run Meter Reading	Hours System Running	Hours Off-Line	Percent time of operation
8/25/99	Run Meter Installation	0.7	meter installed		NA	0.7	meter installed		NA
8/26/99	16.2	16.9	16.2	0.0	100%	16.9	16.2	0.0	100%
10/4/99	965.1	49.9	33.0	932.1	3%	307.7	290.8	674.3	30%
10/6/99	42.0	63.9	14.0	28.0	33%	325.7	18.0	24.0	43%
10/6/99	4.0	67.4	3.5	0.5	88%	2.2	meter installed		NA
10/27/99	501.5	568.6	501.2	0.3	100%	503.3	501.1	0.4	100%
11/18/99	529.0	1,097.1	528.5	0.5	100%	1,032.0	528.7	0.3	100%
12/9/99	502.3	1,598.1	501.0	1.2	100%	1,533.2	501.2	1.1	100%
1/5/00	647.7	1,598.1	0.0	647.7	0%	2,178.1	644.9	2.8	100%
2/24/00	1,201.0	2,795.0	1,196.9	4.1	100%	2,601.5	423.4	777.6	35%
5/9/00	1,703.3	3,724.1	929.1	774.2	55%	3,527.4	925.9	777.4	54%
6/27/00	1,181.7	4,230.4	506.3	675.4	43%	4,705.2	1,177.8	3.9	100%
7/25/00	672.0	4,869.8	639.4	32.6	95%	4,804.5	99.3	572.7	15%
8/30/00	862.0	5,721.4	851.6	10.4	99%	4,804.5	0.0	862.0	0%
9/29/00	700.5	5,944.1	222.7	477.8	32%	5,027.4	222.9	477.6	32%
11/7/00	954.0	6,895.5	951.4	2.6	100%	5,978.9	951.5	2.5	100%
12/19/00	1,009.0	7,902.3	1,006.8	2.2	100%	6,985.3	1,006.4	2.6	100%
2/6/01	1,195.0	9,081.3	1,179.0	2.2	99%	8,164.3	1,179.0	16.0	99%
5/24/01	2,561.0	11,641.1	2,559.8	1.2	100%	9,472.8	1,308.5	1,252.5	51%
7/10/01	1,104.0	11,994.0	352.9	751.1	32%	9,516.4	43.6	1,060.4	4%
10/01/01	2,016.0	13,485.2	1,491.0	525.0	74%	11,007.6	1,490.6	525.4	74%
Totals	18,367.3	---	13,484.3	3,591.8	73%	---	11,329.8	7,037.5	62%

NA Not Applicable.

TABLE E-3

AS/SVE SYSTEM - PHYSICAL PARAMETER MEASUREMENTS
SITE 29 - CRASH CREW BURN PIT
MCALF BOGUE, NORTH CAROLINA

SAMPLE POINT	SVE Start-Up Only 9/12/1997				Full Start-Up 10/1/97				WEEK 1 10/3/97				First Month 10/30/97				Second Month [1] 11/20/1997			
	VAC ("H_2O)	VELOCITY (ft/min)	FLOW (ft^3/min)	V	VAC/PRES ("H_2O/psi)	VELOCITY (ft/min)	FLOW (ft^3/min)	V	VAC/PRES ("H_2O/psi)	VELOCITY (ft/min)	FLOW (ft^3/min)	V	VAC/PRES ("H_2O/psi)	VELOCITY (ft/min)	FLOW (ft^3/min)	V	VAC/PRES ("H_2O/psi)	VELOCITY (ft/min)	FLOW (ft^3/min)	V
SVE Unit																				
Readings before moisture separator (MS). Valve positions before/after MS	35	>6000	>131	NA / 3/4 open	40 "H_2O	>6000	>131	NA / 3/4 open	NC	NC	NC	NA / 5/8 open	NC	900	20	NA / Full Open	19"H_2O	725	16	NA / Full Open
Gage before air filter	38	NA	NA	NA	42 "H_2O	NA	NA	NA	38 "H_2O	NA	NA	NA	10"H_2O	NA	NA	NA	20"H_2O	NA	NA	NA
Gage after air filter	38	NA	NA	NA	42 "H_2O	NA	NA	NA	38 "H_2O	NA	NA	NA	10"H_2O	NA	NA	NA	26"H_2O	NA	NA	NA
AS Unit																				
Before make-up valve (gage)	NC	NC	NC	NA	1.5 psi	NA	NA	NA	6.0 psi	NA	NA	NA	NC	NA	NA	NA	5.0 psi	NA	NA	NA
Line after make-up valve	NC	NC	NC	1/2 open	6.5 psi	1100	24	1/2 open	5.0 psi	NC	NC	1/2 open	NC	NA	NA	1/2 open	6.0 PSI	900	20	1/2
SVE Wells																				
VE18	29	1000	22	Full	40 "H_2O	400	9	Full	37 "H_2O	100	2	Full	NC	NC	NC	NC	19"H_2O	20	0.4	Full
VE19	28	800	17	Full	38 "H_2O	700	15	Full	38 "H_2O	210	5	Full	NC	NC	NC	NC	20"H_2O	25	0.5	Full
VE20	28	650	14	Full	36 "H_2O	100	2	Full	36 "H_2O	50	1	Full	NC	NC	NC	NC	20"H_2O	30	0.7	Full
VE21	29	250	5	Full	32 "H_2O	150	3	Full	37 "H_2O	50	1	Full	NC	NC	NC	NC	20"H_2O	10	0.2	Full
VE22	31	300	7	Full	36 "H_2O	10	0	Full	40 "H_2O	100	2	Full	NC	NC	NC	NC	18"H_2O	25	0.5	Full
VE23	18	300	7	Full	34 "H_2O	100	2	Full	38 "H_2O	150	3	Full	NC	NC	NC	NC	20"H_2O	30	0.7	Full
VE24	20	800	17	Full	32 "H_2O	300	7	Full	38 "H_2O	300	7	Full	NC	NC	NC	NC	20"H_2O	25	0.5	Full
VE25	29	450	10	Full	38 "H_2O	200	4	Full	39 "H_2O	180	4	Full	NC	NC	NC	NC	18"H_2O	50	1.1	Full
VE26	20	600	13	Full	40 "H_2O	300	7	Full	38 "H_2O	300	7	Full	NC	NC	NC	NC	20"H_2O	25	0.5	Full
VE27	31	650	14	Full	40 "H_2O	50	1	Full	38 "H_2O	100	2	Full	NC	NC	NC	NC	19"H_2O	25	0.5	Full
Total Flow Rate		5800	127			2310	50			1540	34							265	5.8	
AS Wells																				
AS12	NR	NR	NR	Full	6.5 psi	220	5	Full	6.0 psi	75	2	Full	NC	NC	NC	NC	5.5 psi	50	1.1	Full
AS13	NR	NR	NR	Full	6.0 psi	90	2	Full	5.9 psi	80	2	Full	NC	NC	NC	NC	5.5 psi	50	1.1	Full
AS14	NR	NR	NR	Full	6.0 psi	180	4	Full	5.9 psi	65	1	Full	NC	NC	NC	NC	5.5 psi	30	0.7	Full
AS15	NR	NR	NR	Full	6.0 psi	200	4	Full	5.8 psi	50	1	Full	NC	NC	NC	NC	5.5 psi	60	1.3	Full
AS16	NR	NR	NR	Full	6.0 psi	75	2	Full	6.0 psi	50	1	Full	NC	NC	NC	NC	5.5 psi	55	1.2	Full
AS17	NR	NR	NR	Full	6.0 psi	400	9	Full	6.0 psi	150	3	Full	NC	NC	NC	NC	5.5 psi	50	1.1	Full
Total Flow Rate						1165	25			470	10							295	6.4	
Drive Point Mon. Wells					(vacuum)				(vacuum)											
DP01	NC	NA	NA	NA	0.0 "H_2O	NA	NA	NA	0.10 "H_2O	NA	NA	NA	NC	NA	NA	NA	0.0 "H_2O	NA	NA	NA
DP02	NC	NA	NA	NA	0.0 "H_2O	NA	NA	NA	0.68 "H_2O	NA	NA	NA	NC	NA	NA	NA	0.0 "H_2O	NA	NA	NA
DP03	NC	NA	NA	NA	0.2 "H_2O	NA	NA	NA	0.38 "H_2O	NA	NA	NA	NC	NA	NA	NA	0.0 "H_2O	NA	NA	NA
DP04	NC	NA	NA	NA	0.0 "H_2O	NA	NA	NA	0.70 "H_2O	NA	NA	NA	NC	NA	NA	NA	0.0 "H_2O	NA	NA	NA
DP05	NC	NA	NA	NA	0.0 "H_2O	NA	NA	NA	0.20 "H_2O	NA	NA	NA	NC	NA	NA	NA	0.0 "H_2O	NA	NA	NA

TABLE E-3

AS/SVE SYSTEM - PHYSICAL PARAMETER MEASUREMENTS
SITE 29 - CRASH CREW BURN PIT
MCALF BOGUE, NORTH CAROLINA

SAMPLE POINT	Third Month 12/18/1997				Fourth Month 1/27/1998				Fifth Month 2/19/1998 (2)				Seventh Month 4/1/1998				
	VAC/PRES ("H_2O/psi)	VELOCITY (ft/min)	FLOW (ft^3/min)	V	VAC/PRES ("H_2O/psi)	VELOCITY (ft/min)	FLOW (ft^3/min)	V	VAC/PRES ("H_2O/psi)	VELOCITY (ft/min)	FLOW (ft^3/min)	V	VAC/PRES ("H_2O/psi)	VELOCITY (ft/min)	FLOW (ft^3/min)	PID (ppm)	V
SVE Unit																	
Readings before moisture separator (MS). Valve positions before/after MS	16"H_2O	1200	26	1/2 open / 1/2 open	15"H_2O	500	11	1/2 open / 1/2 open	16"H_2O	150	3	1/2 open / 1/2 open	10"H_2O	750	16	NA	1/2 open / 1/2 open
Gage before air filter	32"H_2O	NA	NA	NA	38"H_2O	NA	NA	NA	40"H_2O	NA	NA	NA	32"H_2O	NA	NA	NA	NA
Gage after air filter	37"H_2O	NA	NA	NA	45"H_2O	NA	NA	NA	49"H_2O	NA	NA	NA	42"H_2O	NA	NA	NA	NA
AS Unit																	
Before make-up valve (gage)	5.0 psi	NA	NA	NA	7.5 psi	NA	NA	NA	9.25 psi	NA	NA	NA	7 psi	NA	NA	NA	NA
Line after make-up valve	3.5	1025	22	1/2	5.5 psi	750	16	1/2	NC	NC	NC	1/2	6 psi	1500	33	NA	1/2
SVE Wells															0		
VE18	16"H_2O	25	0.5	Full	15"H_2O	125	2.7	Full	0"H_2O	0	0.0	Full	10	50	1	650.0	Full
VE19	16"H_2O	55	1.2	Full	15"H_2O	10	0.2	Full	Nothing	Nothing	0.0	Full	10	75	2	815.0	Full
VE20	16"H_2O	30	0.7	Full	15"H_2O	25	0.5	Full	Nothing	Nothing	0.0	Full	10	40	1	745.0	Full
VE21	16"H_2O	20	0.4	Full	15"H_2O	12	0.3	Full	Nothing	Nothing	0.0	Full	9.5	25	1	925.0	Full
VE22	17"H_2O	50	1.1	Full	15"H_2O	12	0.3	Full	Nothing	Nothing	0.0	Full	10	25	1	1060.0	Full
VE23	16"H_2O	30	0.7	Full	15"H_2O	12	0.3	Full	0.1"H_2O	10 to 20	0.0	Full	10	35	1	725.0	Full
VE24	18"H_2O	30	0.7	Full	15"H_2O	12	0.3	Full	Nothing	Nothing	0.0	Full	10	100	2	755.0	Full
VE25	16"H_2O	30	0.7	Full	15"H_2O	30	0.7	Full	Nothing	Nothing	0.0	Full	10	400	9	730.0	Full
VE26	16"H_2O	40	0.9	Full	15"H_2O	15	0.3	Full	0.4"H_2O	10 to 20	0.0	Full	9.5	100	2	565.0	Full
VE27	16"H_2O	35	0.8	Full	15"H_2O	12	0.3	Full	Nothing	Nothing	0.0	Full	10	40	1	580.0	Full
Total Flow Rate		345	7.5			265	5.8			0	0.0			890	19.4		
AS Wells																	
AS12	5.5 psi	75	1.6	Full	5.0 psi	25	0.5	Full	NC	NC	NC	Full	5	380	8.3	7.9	Full
AS13	5.5 psi	60	1.3	Full	5.0 psi	75	1.6	Full	NC	NC	NC	Full	NC	NC	NC	5.7	Full
AS14	5.5 psi	75	1.6	Full	5.0 psi	70	1.5	Full	NC	NC	NC	Full	6	180	3.9	4.9	Full
AS15	5.5 psi	75	1.6	Full	5.0 psi	25	0.5	Full	NC	NC	NC	Full	6	400	8.7	5.0	Full
AS16	5.5 psi	80	1.7	Full	5.25 psi	55	1.2	Full	NC	NC	NC	Full	6	350	7.6	5.1	Full
AS17	5.5 psi	75	1.6	Full	5.0 psi	100	2.2	Full	NC	NC	NC	Full	6	400	8.7	10.8	Full
Total Flow Rate		440	9.6			350	7.6			0	0.0			1710	37.3		
Drive Point Mon. Wells	(vacuum)				(vacuum)				(vacuum)								
DP01	0.10 "H_2O	NA	NA	NA	0.02 "H_2O	NA	NA	NA	NC	NA	NA	NA	0.1 (vac)	NA	NA	850	NA
DP02	0.03 "H_2O	NA	NA	NA	0.03 "H_2O	NA	NA	NA	NC	NA	NA	NA	1.0 (pres)	NA	NA	690	NA
DP03	0.34 "H_2O	NA	NA	NA	0.02 "H_2O	NA	NA	NA	NC	NA	NA	NA	0.1 (vac)	NA	NA	900	NA
DP04	0.80 "H_2O	NA	NA	NA	0.04 "H_2O	NA	NA	NA	NC	NA	NA	NA	0.4 (pres)	NA	NA	730	NA
DP05	0.30 "H_2O	NA	NA	NA	0.01 "H_2O	NA	NA	NA	NC	NA	NA	NA	0.00	NA	NA	270	NA

TABLE E-3

AS/SVE SYSTEM - PHYSICAL PARAMETER MEASUREMENTS
SITE 29 - CRASH CREW BURN PIT
MCALF BOGUE, NORTH CAROLINA

SAMPLE POINT	Eighth Month 5/20/1998 (1)					Tenth Month 7/20/1998 (1)					Twelfth Month 9/30/1998 (1)				
	VAC/PRES ("H_2O/psi)	VELOCITY (ft/min)	FLOW (ft^3/min)	PID (ppm)	V	VAC/PRES ("H_2O/psi)	VELOCITY (ft/min)	FLOW (ft^3/min)	PID (ppm)	V	VAC/PRES ("H_2O/psi)	VELOCITY (ft/min)	FLOW (ft^3/min)	PID (ppm)	V
SVE Unit															
Readings before moisture separator (MS). Valve positions before/after MS	11 "H_2O	140	3	NA	1/2 open / 1/2 open	22 "H_2O	1200	26	NA	1/2 open / 1/2 open	22 "H_2O	750	16	NA	1/2 open / 1/2 open
Gage before air filter	35 "H_2O	NA	NA	NA	NA	33 "H_2O	NA	NA	NA	NA		NA	NA	NA	NA
Gage after air filter	47 "H_2O	NA	NA	NA	NA	76 "H_2O	NA	NA	NA	NA		NA	NA	NA	NA
AS Unit															
Before make-up valve (gage)	6.0 psi	NA	NA	NA	NA	6 psi	NA	NA	NA	NA	OFF LINE	NA	NA	NA	NA
Line after make-up valve	6.5 psi	0	0	NA	1/2	7 psi	1600	35	NA	1/2		0	0	NA	1/2
SVE Wells													0		
VE18	2.2	30	1	243.0	Full	22	200	4	220	Full	NC	NC	NC	130.0	Full
VE19	2	50	1	241.0	Full	22	160	3	490	Full	NC	NC	NC	NC	Full
VE20	1.6	30	1	NA	Full	22	60	1	25	Full	NC	NC	NC	285.0	Full
VE21	1.2	5	0	NA	Full	22	50	1	330	Full	NC	NC	NC	230.0	Full
VE22	0.5	0	0	NA	Full	22	75	2	710	Full	NC	NC	NC	415.0	Full
VE23	1	25	1	NA	Full	22	20	0	861	Full	NC	NC	NC	850.0	Full
VE24	2.2	25	1	NA	Full	22	300	7	210	Full	NC	NC	NC	NC	Full
VE25	1.2	50	1	NA	Full	22	150	3	157	Full	NC	NC	NC	NC	Full
VE26	1.6	10	0	344.0	Full	22	170	4	350	Full	NC	NC	NC	640.0	Full
VE27	1	15	0	518.0	Full	22	75	2	910	Full	NC	NC	NC	300.0	Full
Total Flow Rate		240	5.2				1260	27.5				0	0.0		
AS Wells															
AS12	6.5	350	7.6	NA	Full	6.5	320	7.0	NR	Full	OFF LINE			0.0	Full
AS13	6.5	Water	0.0	NA	Full	6.5	700	15.3	NR	Full				11.0	Full
AS14	6.5	Water	0.0	NA	Full	6.5	150	3.3	NR	Full				NC	Full
AS15	6.5	410	8.9	NA	Full	6.5	500	10.9	NR	Full				NC	Full
AS16	6.5	Water	0.0	NA	Full	6.5	200	4.4	NR	Full				NC	Full
AS17	6.5	Water	0.0	NA	Full	6.5	500	10.9	NR	Full				0.0	Full
Total Flow Rate		NA	NA				2370	51.7							
Drive Point Mon. Wells															
DP01	0.03	NA	NA	NA	NA	0.00	NA	NA	310	NA	0.00	NA	NA	NC	NA
DP02	0.00	NA	NA	NA	NA	0.00	NA	NA	0	NA	0.00	NA	NA	125	NA
DP03	0.02	NA	NA	NA	NA	0.00	NA	NA	130	NA	0.00	NA	NA	1100	NA
DP04	0.02	NA	NA	NA	NA	0.00	NA	NA	60	NA	0.00	NA	NA	800	NA
DP05	0.00	NA	NA	NA	NA	0.00	NA	NA	0	NA	0.00	NA	NA	40	NA

TABLE E-3

AS/SVE SYSTEM - PHYSICAL PARAMETER MEASUREMENTS
SITE 29 - CRASH CREW BURN PIT
MCALF BOGUE, NORTH CAROLINA

SAMPLE POINT	Fifteenth Month 12/1/1998 [1]					Twentieth Month 5/13/99					Twenty-first Month 6/23/99				
	VAC/PRES ("H_2O/psi)	VELOCITY (ft/min)	FLOW (ft^3/min)	PID (ppm)	V	VAC/PRES ("H_2O/psi)	VELOCITY (ft/min)	FLOW (ft^3/min)	PID (ppm)	V	VAC/PRES ("H_2O/psi)	VELOCITY (ft/min)	FLOW (ft^3/min)	PID (ppm)	V
SVE Unit															
Readings before moisture separator (MS). Valve positions before/after MS	28 "H_2O	580	13	NA	1/2 open / 1/2 open	36 "H_2O	1585	35	NA	1/2 open / 1/2 open	36 "H_2O	1650	36	35	1/2 open / 1/2 open
Gage before air filter	50 "H_2O	NA	NA	NA	NA	56 "H_2O	NA	NA	NA	NA	54 "H_2O	NA	NA	NA	NA
Gage after air filter	74 "H_2O	NA	NA	NA	NA	70 "H_2O	NA	NA	NA	NA	70 "H_2O	NA	NA	NA	NA
AS Unit															
Before make-up valve (gage)	6 psi	NA	NA	NA	NA	7 psi	NA	NA	NA	NA	8 psi	NA	NA	NA	NA
Line after make-up valve	5.5 psi	gauge	15.75	NA	1/2	8.5 psi	23	1	NA	1/2	8 psi	1500	33	NA	1/2
SVE Wells															
VE18	22	75	2	104	Full	34	155	3	228	Full	38	75	2	500	Full
VE19	27	200	4	70	Full	36	87.5	2	675	Full	34	75	2	100	Full
VE20	22	75	2	138	Full	33	105	2	155	Full	16	30	1	10	Full
VE21	26	60	1	225	Full	36	450	10	77.8	Full	14	100	2	>5000	Full
VE22	28	35	1	108	Full	36	240	5	365	Full	38	75	2	100	Full
VE23	25	250	5	57	Full	34	1750	38	1465	Full	36	50	1	0	Full
VE24	27	210	5	510	Full	34	4500	98	814	Full	36	200	4	30	Full
VE25	25	180	4	258	Full	34	137.5	3	222	Full	36	75	2	250	Full
VE26	26	290	6	110	Full	37	300	7	405	Full	38	65	1	150	Full
VE27	25	70	2	360	Full	35	88	2	795	Full	36	125	3	150	Full
Total Flow Rate		1445	31.5				7813	170.5				870	19.0		
AS Wells															
AS12	5.5	WATER	NC	1.2	Full	8.0	320	7	0.0	Full	7.0	200	4	0.0	Full
AS13	5.5	NC	NC	10.1	Full	8.0	300	7	0.0	Full	7.0	150	3	0.0	Full
AS14	5.5	NC	NC	5.1	Full	8.5	335	7	0.0	Full	7.0	180	4	5.0	Full
AS15	5.5	NC	NC	0.0	Full	8.5	185	4	0.0	Full	6.0	300	7	50.0	Full
AS16	5.5	NC	NC	4.9	Full	8.0	10500	229	0.0	Full	6.0	76000	1658	5.0	Full
AS17	5.5	NC	NC	0.0	Full	8.0	525	11	0.0	Full	7.0	600	13	0.0	Full
Total Flow Rate															
Drive Point Mon. Wells															
DP01	0.00	NA	NA	NC	NA	0.00	NA	NA	164	NA	0.00	NA	NA	100	NA
DP02	0.00	NA	NA	38	NA	0.00	NA	NA	5.5	NA	0.00	NA	NA	0	NA
DP03	0.00	NA	NA	34	NA	0.00	NA	NA	109	NA	0.00	NA	NA	20	NA
DP04	0.00	NA	NA	28	NA	0.00	NA	NA	286	NA	0.00	NA	NA	10	NA
DP05	0.00	NA	NA	233	NA	0.00	NA	NA	144	NA	0.00	NA	NA	50	NA

TABLE E-3

AS/SVE SYSTEM - PHYSICAL PARAMETER MEASUREMENTS
SITE 29 - CRASH CREW BURN PIT
MCALF BOGUE, NORTH CAROLINA

SAMPLE POINT	Twenty-second Month 7/27/99					Twenty-third Month 8/25/99					Twenty-fourth Month 10/4/1999 & 10/5/1999				
	VAC/PRES ("H_2O/psi)	VELOCITY (ft/min)	FLOW (ft^3/min)	PID (ppm)	V	VAC/PRES ("H_2O/psi)	VELOCITY (ft/min)	FLOW (ft^3/min)	PID (ppm)	V	VAC/PRES ("H_2O/psi)	VELOCITY (ft/min)	FLOW (ft^3/min)	PID (ppm)	V
SVE Unit															
Readings before moisture separator (MS). Valve positions before/after MS	22 "H_2O	2800	61	54	1/2 open / 1/2 open	25 "H_2O	2750	60	NA	1/2 open / 1/2 open	30 "H_2O	375	8	NA	1/4 open / 1/4 open
Gage before air filter	65 "H_2O	NA	NA	NA	NA	39 "H_2O	NA	NA	NA	NA	60 "H_2O	NA	NA	NA	NA
Gage after air filter	40 "H_2O	NA	NA	NA	NA	80 "H_2O	NA	NA	NA	NA	50 "H_2O	NA	NA	NA	NA
AS Unit															
Before make-up valve (gage)	8 psi	NA	NA	NA	NA	NA	NA	NA	NA	NA	9 psi	NA	NA	NA	NA
Line after make-up valve	8 psi	2400	52	NA	1/2	6.5 psi	2000	44	NA	1/2	9 psi	1700	37	NA	1/2
SVE Wells															
VE18	20	625	14	290	Full	20	430	9	NA	Full	25	375	8	(*)	Full
VE19	22	250	5	240	Full	19.5	170	4	NA	Full	28	340	7	68	Full
VE20	20	375	8	0	Full	19.5	215	5	NA	Full	28	349	8	1280(*)	Full
VE21	21	450	10	225	Full	19.75	185	4	NA	Full	24	300	7	521	Full
VE22	22	315	7	0	Full	21	180	4	NA	Full	27	325	7	360	Full
VE23	22	220	5	246.5	Full	20.25	370	8	NA	Full	28	445	10	240	Full
VE24	22	410	9	23	Full	20	600	13	NA	Full	20	430	9	230	Full
VE25	22	310	7	110	Full	20	300	7	NA	Full	27	400	9	617	Full
VE26	22	590	13	240	Full	20	550	12	NA	Full	28	260	6	420	Full
VE27	21	200	4	120	Full	20	450	10	NA	Full	27	335	7	830	Full
Total Flow Rate		3745	81.7				3450	75.3				3559	77.6		
AS Wells															
AS12	8.0	350	8	NA	Full	6.0	290	6	NA	Full	8.5	150	3	0	Full
AS13	8.0	270	6	NA	Full	6.0	180	4	NA	Full	8.5	80	2	0	Full
AS14	Water	Water	Water	NA	Full	6.0	215	5	NA	Full	8.5	110	2	(*)	Full
AS15	7.5	7.5	0	NA	Full	6.0	540.0	12	NA	Full	8.75	300.0	7	(*)	Full
AS16	Water	Water	Water	NA	Full	5.5	320	7	NA	Full	WATER	WATER	WATER	0	Full
AS17	8.0	8	0	NA	Full	6.0	430	9	NA	Full	9.0	250	5	0	Full
Total Flow Rate															
Drive Point Mon. Wells															
DP01	0.05	NA	NA	0	NA	0.25	NA	NA	NA	NA	NA	NA	NA	380	NA
DP02	1.00	NA	NA	0	NA	1.65	NA	NA	NA	NA	NA	NA	NA	140	NA
DP03	0.00	NA	NA	0	NA	0.20	NA	NA	NA	NA	NA	NA	NA	270	NA
DP04	0.00	NA	NA	0	NA	0.35	NA	NA	NA	NA	NA	NA	NA	612	NA
DP05	0.00	NA	NA	0	NA	0.08	NA	NA	NA	NA	NA	NA	NA	71	NA

(*) -- Wells were repaired with PVC glue, which shows up on PID. Therefore, PID readings would not prove to be accurate GW/Soil readings.

TABLE E-3

AS/SVE SYSTEM - PHYSICAL PARAMETER MEASUREMENTS
SITE 29 - CRASH CREW BURN PIT
MCALF BOGUE, NORTH CAROLINA
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SAMPLE POINT	Twenty-fifth Month 10/27/99					Twenty-seventh Month 12/9/99					Twenty-eighth Month 1/5/00				
	VAC/PRES ("H_2O/psi)	VELOCITY (ft/min)	FLOW (ft^3/min)	PID (ppm)	V	VAC/PRES ("H_2O/psi)	VELOCITY (ft/min)	FLOW (ft^3/min)	PID (ppm)	V	VAC/PRES ("H_2O/psi)	VELOCITY (ft/min)	FLOW (ft^3/min)	PID (ppm)	V
SVE Unit															
Readings before moisture separator (MS). Valve positions before/after MS	20 "H_2O	375	8	NA	1/2 open / 1/2 open	32 "H_2O	770	17	NA	1/2 open / 1/2 open	35 "H_2O	500	11	NA	1/2 open / 1/2 open
Gage before air filter	72 "H_2O	NA	NA	NA	NA	Off Line	NA	NA	NA	NA	84 "H_2O	NA	NA	NA	NA
Gage after air filter	40 "H_2O	NA	NA	NA	NA	Off Line	NA	NA	NA	NA	44 "H_2O	NA	NA	NA	NA
AS Unit															
Before make-up valve (gage)	9 psi	NA	NA	NA	NA	Off Line	NA	NA	NA	NA	9.5 psi	NA	NA	NA	NA
Line after make-up valve	8 psi	3450	75	NA	1/2	Off Line	Off Line	Off Line	NA	1/2	8.5 psi	325	7	NA	1/2
SVE Wells															
VE18	19.75	289	6	N/C	Full	32	390	9	15	Full	34	445	10	0.5	Full
VE19	19	345	8	52	Full	32	500	11	325	Full	34	485	11	12	Full
VE20	19.5	285	6	940	Full	32	375	8	23	Full	33	385	8	45	Full
VE21	20	260	6	490	Full	32	400	9	35	Full	33.75	395	9	85	Full
VE22	WATER		WATER	400	Full	31	350	8	2	Full	33.75	415	9	0	Full
VE23	19.5	288	6	215	Full	31	380	8	105	Full	32.25	390	9	0	Full
VE24	20.25	265	6	128	Full	31	480	10	40	Full	33.5	290	6	75	Full
VE25	19	337	7	547	Full	31	500	11	175	Full	33.5	195	4	100	Full
VE26	19.75	316	7	300	Full	32	440	10	150	Full	34	335	7	50	Full
VE27	20	295	6	621	Full	32	450	10	85	Full	33.75	425	9	40	Full
Total Flow Rate		2680	58.5				4265	93.0				3760	82.0		
AS Wells															
AS12	7.0	285	6	0	Full	NA	NA	NA	0	Full	8.0	240.0	5	0	Full
AS13	WATER	WATER	WATER	0	Full	NA	NA	NA	0	Full	Water	Water	Water	0	Full
AS14	WATER	WATER	WATER	0	Full	NA	NA	NA	0	Full	8.0	190.0	4	0	Full
AS15	7.00	554.0	12	12	Full	NA	NA	NA	0	Full	8.0	395.0	9	0	Full
AS16	WATER	WATER	WATER	0	Full	NA	NA	NA	0	Full	Water	Water	Water	0	Full
AS17	WATER	WATER	WATER	0	Full	NA	NA	NA	0	Full	Water	Water	Water	0	Full
Total Flow Rate															
Drive Point Mon. Wells															
DP01	0.00	NA	NA	221	NA	NA	NA	NA	0	NA	NA	NA	NA	7	NA
DP02	0.10	NA	NA	151	NA	NA	NA	NA	0	NA	NA	NA	NA	0	NA
DP03	0.00	NA	NA	48	NA	NA	NA	NA	0	NA	NA	NA	NA	20	NA
DP04	0.10	NA	NA	0	NA	NA	NA	NA	0	NA	NA	NA	NA	0	NA
DP05	0.10	NA	NA	0	NA	NA	NA	NA	0	NA	NA	NA	NA	0	NA

TABLE E-3

AS/SVE SYSTEM - PHYSICAL PARAMETER MEASUREMENTS
SITE 29 - CRASH CREW BURN PIT
MCALF BOGUE, NORTH CAROLINA

SAMPLE POINT	Twenty-ninth Month 2/24/00					Thirty-second Month 4/4/00					Thirty-third Month 5/9/00				
	VAC/PRES ("H_2O/psi)	VELOCITY (ft/min)	FLOW (ft^3/min)	PID (ppm)	V	VAC/PRES ("H_2O/psi)	VELOCITY (ft/min)	FLOW (ft^3/min)	PID (ppm)	V	VAC/PRES ("H_2O/psi)	VELOCITY (ft/min)	FLOW (ft^3/min)	PID (ppm)	V
SVE Unit															
Readings before moisture separator (MS). Valve positions before/after MS	NC	NC	NC	NC	1/2 open / 1/2 open	20 "H2O	1100	24	NA	1/2 open / 1/2 open	24 "H2O	NC	NC	NA	1/2 open / 1/2 open
Gage before air filter	NC	NC	NC	NC	NA	62 "H2O	NA	NA	NA	NA	84 "H2O	NA	NA	NA	NA
Gage after air filter	NC	NC	NC	NC	NA	40 "H2O	NA	NA	NA	NA	38 "H2O	NA	NA	NA	NA
AS Unit															
Before make-up valve (gage)	NC	NC	NC	NC	NC	Off Line	Off Line	Off Line	Off Line	Off Line	Off Line	Off Line	Off Line	Off Line	Off Line
Line after make-up valve	NC	NC	NC	NC	NC	Off Line	Off Line	Off Line	Off Line	Off Line	Off Line	Off Line	Off Line	Off Line	Off Line
SVE Wells															
VE18	33.75	450	10	0.0	Full	16	220	5	30.0	Full	25	305	7	35.0	Full
VE19	34	475	10	0.0	Full	17	250	5	42.0	Full	24	375	8	12.0	Full
VE20	33.5	400	9	25	Full	17	260	6	64	Full	24	330	7	NC	Full
VE21	33.5	385	8	45	Full	17	280	6	27	Full	26	320	7	57	Full
VE22	32.75	425	9	15	Full	18	265	6	107	Full	24	390	9	17	Full
VE23	33.75	400	9	0.0	Full	17	310	7	43.0	Full	24	310	7	0.0	Full
VE24	34	300	7	120	Full	16	240	6	98	Full	25	375	8	0	Full
VE25	33	200	4	150	Full	18	275	6	55	Full	24	360	8	15	Full
VE26	33.5	375	8	60	Full	16	250	5	24	Full	25	320	7	0	Full
VE27	33.75	450	10	10	Full	17	225	5	91	Full	25	300	7	97	Full
Total Flow Rate		3860	84.2				2575	56.2				3385	73.9		
AS Wells															
AS12	8.25	250.0	5	0.0	Full	Off Line	Off Line	Off Line	0.0	Full	Off Line	Off Line	Off Line	0.0	Full
AS13	8.25	200.0	4	0.0	Full	Off Line	Off Line	Off Line	0.0	Full	Off Line	Off Line	Off Line	0.0	Full
AS14	8.25	225.0	5	0.0	Full	Off Line	Off Line	Off Line	0.0	Full	Off Line	Off Line	Off Line	0.0	Full
AS15	8.25	450.0	10	0.0	Full	Off Line	Off Line	Off Line	0.0	Full	Off Line	Off Line	Off Line	0.0	Full
AS16	8.25	325.0	7	0.0	Full	Off Line	Off Line	Off Line	0.0	Full	Off Line	Off Line	Off Line	0.0	Full
AS17	8.25	450.0	10	0.0	Full	Off Line	Off Line	Off Line	0.0	Full	Off Line	Off Line	Off Line	0.0	Full
Total Flow Rate															
Drive Point Mon. Wells															
DP01	0.0	NA	NA	15	NA	NA	NA	NA	88.7	NA	NA	NA	NA	11.9	NA
DP02	1.5	NA	NA	0.0	NA	NA	NA	NA	22.6	NA	NA	NA	NA	1.1	NA
DP03	0.0	NA	NA	25	NA	NA	NA	NA	75.0	NA	NA	NA	NA	20.8	NA
DP04	0.5	NA	NA	0.0	NA	NA	NA	NA	222.0	NA	NA	NA	NA	10.2	NA
DP05	0.0	NA	NA	0.0	NA	NA	NA	NA	82.0	NA	NA	NA	NA	16.9	NA

TABLE E-3

AS/SVE SYSTEM - PHYSICAL PARAMETER MEASUREMENTS
SITE 29 - CRASH CREW BURN PIT
MCALF BOGUE, NORTH CAROLINA

SAMPLE POINT	Thirty-fourth Month 6/27/00					Thirty-fifth Month 7/25/00					Thirty-sixth Month 8/30/00					Thirty-seventh Month 9/29/00				
	VAC/PRES ("H_2O/psi)	VELOCITY (ft/min)	FLOW (ft^3/min)	PID (ppm)	V	VAC/PRES ("H_2O/psi)	VELOCITY (ft/min)	FLOW (ft^3/min)	PID (ppm)	V	VAC/PRES ("H_2O/psi)	VELOCITY (ft/min)	FLOW (ft^3/min)	PID (ppm)	V	VAC/PRES ("H_2O/psi)	VELOCITY (ft/min)	FLOW (ft^3/min)	PID (ppm)	V
SVE Unit																				
Readings before moisture separator (MS). Valve positions before/after MS	15 "H2O	360	NC	NA	1/2 open / 1/2 open	NR	NR	NR	NR	1/2 open / 1/2 open	NR	NR	NR	NR	1/2 open / 1/2 open	33 "H2O	500	11	NA	1/2 open / 1/2 open
Gage before air filter	90 "H2O	NA	NA	NA	NA	NR	NR	NR	NR	NA	NR	NR	NR	NR	NA	71 "H2O	NA	NA	NA	NA
Gage after air filter	31 "H2O	NA	NA	NA	NA	NR	NR	NR	NR	NA	NR	NR	NR	NR	NA	45 "H2O	NA	NA	NA	NA
AS Unit																				
Before make-up valve (gage)	7 psi	NA	NA	NA	NA	10 psi	NA	>25 cfm	NA	NA	NR	NR	NR	NA	NA	7 psi	NA	NA	NA	NA
Line after make-up valve	6 psi	1650	36	NA	1/2	NC	NC	NC	NA	3/4 closed	NR	NR	NR	NA	3/4	6 psi	1700	37	NA	3/4
SVE Wells																				
VE18	30	350	8	3.7	Full	NR	NR	NR	110.0	Full	NR	NR	NR	240.0	Full	30	360	8	NC	Full
VE19	30	400	9	6.2	Full	NR	NR	NR	109.0	Full	NR	NR	NR	391.0	Full	333	500	11	NC	Full
VE20	30	354	8	115	Full	NR	NR	NR	7	Full	NR	NR	NR	49	Full	34	365	8	NC	Full
VE21	30	545	12	32	Full	NR	NR	NR	136	Full	NR	NR	NR	25	Full	32	350	8	NC	Full
VE22	30	429	9	106	Full	NR	NR	NR	143	Full	NR	NR	NR	320	Full	32	440	10	NC	Full
VE23	30	510	11	3.8	Full	NR	NR	NR	87.9	Full	NR	NR	NR	415.0	Full	33	260	6	NC	Full
VE24	30	460	10	9	Full	NR	NR	NR	84	Full	NR	NR	NR	20	Full	29.5	420	9	NC	Full
VE25	30	315	7	167	Full	NR	NR	NR	101	Full	NR	NR	NR	0	Full	33	350	8	NC	Full
VE26	30	330	7	13	Full	NR	NR	NR	11	Full	NR	NR	NR	0	Full	30.5	310	7	NC	Full
VE27	29.5	340	7	210	Full	NR	NR	NR	55	Full	NR	NR	NR	94	Full	30	360	8	NC	Full
Total Flow Rate		4033	88.0				0	0.0				0	0.0							
AS Wells																				
AS12	6.00	275.0	6	0.0	Full	6.00	275.0	6	3.4	Full	NR	NR	NR	0.0	Full	6.00	150.0	6	NC	Full
AS13	6.50	150.0	3	0.0	Full	6.50	150.0	3	NC	Full	NR	NR	NR	2.3	Full	6.50	200.0	6	NC	Full
AS14	NA	NA	NA	0.0	Full	NA	NA	NA	NC	Full	NR	NR	NR	0.0	Full	NA	125.0	6.0	NC	Full
AS15	5.50	450.0	10	0.0	Full	5.50	450.0	10	NC	Full	NR	NR	NR	0.0	Full	5.50	125.0	6	NC	Full
AS16	NA	NA	NA	0.0	Full	NA	NA	NA	NC	Full	NR	NR	NR	0.0	Full	NA	300.0	5.5	NC	Full
AS17	6.00	NA	NA	0.0	Full	6.00	NA	NA	NC	Full	NR	NR	NR	2.2	Full	6.00	90.0	5.5	NC	Full
Total Flow Rate																				
Drive Point Mon. Wells																				
DP01	0	NA	NA	90.0	NA	0	NA	NA	85.0	NA	0	NA	NA	2.0	NA	0	NA	NA	NC	NA
DP02	0	NA	NA	0.0	NA	0	NA	NA	135.0	NA	0	NA	NA	1.9	NA	0	NA	NA	NC	NA
DP03	0	NA	NA	65.0	NA	0	NA	NA	36.0	NA	0	NA	NA	2.0	NA	0	NA	NA	NC	NA
DP04	0	NA	NA	112.0	NA	0	NA	NA	79.0	NA	0	NA	NA	1.8	NA	0	NA	NA	NC	NA
DP05	0	NA	NA	26.7	NA	0	NA	NA	28.0	NA	0	NA	NA	1.8	NA	0	NA	NA	NC	NA

TABLE E-3

AS/SVE SYSTEM - PHYSICAL PARAMETER MEASUREMENTS
SITE 29 - CRASH CREW BURN PIT
MCALF BOGUE, NORTH CAROLINA

SAMPLE POINT	Thirty-eighth Month 11/7/00					Thirty-ninth Month 12/19/00					Forty-First Month 2/6/01				
	VAC/PRES ("H_2O/psi)	VELOCITY (ft/min)	FLOW (ft^3/min)	PID (ppm)	V	VAC/PRES ("H_2O/psi)	VELOCITY (ft/min)	FLOW (ft^3/min)	PID (ppm)	V	VAC/PRES ("H_2O/psi)	VELOCITY (ft/min)	FLOW (ft^3/min)	PID (ppm)	V
SVE Unit															
Readings before moisture separator (MS). Valve positions before/after MS	33 "H2O	1280	28	NA	1/2 open / 1/2 open	32 "H2O	480	10	NA	1/2 open / 1/2 open	48 "H2O	>1500	>33	NA	1/2 open / 1/2 open
Gage before air filter	90 "H2O	NA	NA	NA	NA	90 "H2O	NA	NA	NA	NA	98 "H2O	NA	NA	NA	NA
Gage after air filter	50 "H2O	NA	NA	NA	NA	50 "H2O	NA	NA	NA	NA	62 "H2O	NA	NA	NA	NA
AS Unit															
Before make-up valve (gage)	9.5	NA	NA	NA	NA	10 psi	NA	NA	NA	NA	11.5 psi	NA	NA	NA	NA
Line after make-up valve	8.5 psi	1900	41	NA	1/2	7.5 psi	Gauge	>25	NA	3/4	7.0 psi	Gauge	>25	NA	3/4
SVE Wells															
VE18	30	405	9	70.0	Full	30	290	6	18.0	Full	42	503	11	10.0	Full
VE19	30	390	9	30.0	Full	26	310	7	18.7	Full	38	300	7	56.0	Full
VE20	29	495	11	35	Full	30	350	8	17	Full	45	535	12	8	Full
VE21	30	500	11	200	Full	30	315	7	70	Full	42	370	8	78	Full
VE22	30	503	11	0	Full	28	300	7	30	Full	38	430	9	12	Full
VE23	30	486	11	46.0	Full	29	290	6	31.0	Full	40	400	9	25.0	Full
VE24	32	320	7	27	Full	31	350	8	8	Full	44	max	max	90	Full
VE25	30	465	10	170	Full	30	250	5	34	Full	43	375	8	82	Full
VE26	32	300	7	20	Full	30	440	10	95	Full	39	390	9	25	Full
VE27	35	390	9	290	Full	32	500	11	33	Full	41	420	9	30	Full
Total Flow Rate															
AS Wells															
AS12	8.00	250.0	5	0.0	Full	6.00	375.0	8	0.0	Full	7.00	340.0	7	0.0	Full
AS13	8.25	150.0	3	0.0	Full	NC	NC	NA	0.0	Full	7.00	270.0	NA	5.4	Full
AS14	7.75	200.0	NA	0.0	Full	NC	NC	NA	0.0	Full	7.00	NC	NA	0.0	Full
AS15	8.00	500.0	11	NA	Full	NC	NC	NA	0.0	Full	7.00	450.0	NA	0.0	Full
AS16	NA	NA	NA	0.0	Full	NC	NC	NA	0.0	Full	7.00	NC	NA	0.0	Full
AS17	NA	NA	NA	0.0	Full	NC	NC	NA	0.0	Full	7.00	NC	NA	0.0	Full
Total Flow Rate															
Drive Point Mon. Wells															
DP01	0	NA	NA	100.0	NA	0	NA	NA	12.0	NA	0	NA	NA	14.0	NA
DP02	0	NA	NA	3.0	NA	0	NA	NA	3.2	NA	0	NA	NA	14.0	NA
DP03	0	NA	NA	22.0	NA	0	NA	NA	30.4	NA	0	NA	NA	26.0	NA
DP04	0	NA	NA	120.0	NA	0	NA	NA	114.0	NA	0	NA	NA	11.0	NA
DP05	0	NA	NA	14.0	NA	0	NA	NA	NC	NA	0	NA	NA	10.0	NA

TABLE E-3

AS/SVE SYSTEM - PHYSICAL PARAMETER MEASUREMENTS
SITE 29 - CRASH CREW BURN PIT
MCALF BOGUE, NORTH CAROLINA

SAMPLE POINT	*Forty-fourth Month* 5/24/01					*Forty-sixth Month* 7/10/01				
	VAC/PRES ("H_2O/psi)	VELOCITY (ft/min)	FLOW (ft^3/min)	PID (ppm)	V	VAC/PRES ("H_2O/psi)	VELOCITY (ft/min)	FLOW (ft^3/min)	PID (ppm)	V
SVE Unit										
Readings before moisture separator (MS). Valve positions before/after MS	16 "H2O	875	19	NA	1/2 open / 1/2 open	22 "H2O	575	13	NA	1/2 open / 1/2 open
Gage before air filter	90 "H2O	NA	NA	NA	NA	34 "H2O	NA	NA	NA	NA
Gage after air filter	38 "H2O	NA	NA	NA	NA	34 "H2O	NA	NA	NA	NA
AS Unit										
Before make-up valve (gage)	NR	NA	NA	NA	NA	14 psi	NA	NA	NA	NA
Line after make-up valve	NR	Gauge	NC	NA	3/4	7.0 psi	Gauge	NC	NA	3/4
SVE Wells										
VE18	20	270	6	NC	Full	22	290	6	235.0	Full
VE19	20	400	9	NC	Full	22	256	6	130.0	Full
VE20	20	302	7	NC	Full	22	275	6	106	Full
VE21	20	300	7	NC	Full	NC	NC	NC	NC	Full
VE22	20	255	6	NC	Full	21	215	5	110	Full
VE23	20	305	7	NC	Full	21	350	8	105.0	Full
VE24	20	380	8	NC	Full	21	290	6	190	Full
VE25	19	365	8	NC	Full	21	250	5	126	Full
VE26	19	280	6	NC	Full	22	295	6	75	Full
VE27	18	250	5	NC	Full	21	290	6	140	Full
Total Flow Rate										
AS Wells	AS system out of service									
AS12	NC	NC	NC	NR	Full	7.00	375.0	8	54.2	Full
AS13	NC	NC	NC	NR	Full	7.00	NC	NA	3.8	Full
AS14	NC	NC	NC	NR	Full	7.00	NC	NA	9.3	Full
AS15	NC	NC	NC	NR	Full	7.00	572.0	12	NC	Full
AS16	NC	NC	NC	NR	Full	7.00	NC	NA	39.1	Full
AS17	NC	NC	NC	NR	Full	7.00	NC	NA	35.4	Full
Total Flow Rate										
Drive Point Mon. Wells										
DP01	0	NA	NA	NR	NA	0	NA	NA	31.0	NA
DP02	0	NA	NA	NR	NA	0	NA	NA	0.9	NA
DP03	0	NA	NA	NR	NA	0	NA	NA	5.4	NA
DP04	0	NA	NA	NR	NA	0	NA	NA	63.5	NA
DP05	0	NA	NA	NR	NA	0	NA	NA	0.0	NA

V = Valve position
NA = Not Applicable
NR = System not being operated
NC = Not Collected
1 Well measurements collected on 12/17/97during third month evaluation before any adjustments to the system were made.
2 Due to heavy rain the water table was elevated to just below ground surface which means the extraction well screens were below the water level.
3 Month seven evaluation skipped to provide time to evaluate data collected during sixth month sampling event.
4 Next day (2/7/01) needed to readjust back to 33" H2O due to excessive water being collected in moisture separator.

APPENDIX F

FIELD SAMPLING FORMS (OCTOBER 2001)

Chain of Custody Record

SEVERN TRENT SERVICES — Severn Trent Laboratories, Inc.

STL-4124 (1200)

Client: Tetra Tech NUS	Project Manager: Rob Simcik	Date: 10/2/01	Chain of Custody Number: 079537
Address: 661 Andersen Drive	Telephone Number (Area Code)/Fax Number: (412) 921-8163 / 412-921-4040	Lab Number:	Page 1 of ___
City: Pittsburgh / State: PA / Zip Code: 15220	Site Contact: Ken Cobb	Lab Contact: Veronica B.	
Project Name and Location (State): CTO 272 Bogue Field, NC	Carrier/Waybill Number: 808063668960		
Contract/Purchase Order/Quote No.: 375241 / 44291 / PORTOTV			

Sample I.D. No. and Description (Containers for each sample may be combined on one line)	Date	Time	Matrix: Air	Aqueous	Sed	Soil	Containers & Preservatives: Unpres	H2SO4	HNO3	HCl	NaOH	ZnAc/NaOH	Analysis: 8260B (BTEX)	601/602 Purge & Trap	625	6010 & TAL metals	Special Instructions/ Conditions of Receipt
S29-MW01-05	10/2/01	1035		✓						✓			✓	✓	✓	✓	① BTEX
S29-MW02-05	10/2/01	1125		✓						"			✓	✓	✓	✓	② GRO/DRO/Solvents Hal & Non Hal
S29-MW03-05	10/2/01	1340		✓						"			✓	✓	✓	✓	
S29-MW04-05	10/2/01	1655		✓						"			✓	✓	✓	✓	③ Oil & Grease
S29-MW08-05	10/2/01	1740		✓									✓	✓	✓	✓	④ Metals (unfiltered low flow).
S29-DUP01	10/2/01	1125		✓						"			✓	✓	✓	✓	
TB #1	10/2/01	—		✓						"			✓	✓			

Possible Hazard Identification: ☑ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal: ☐ Return To Client ☑ Disposal By Lab ☐ Archive For ___ Months (A fee may be assessed if samples are retained longer than 3 months)

Turn Around Time Required: ☐ 24 Hours ☐ 48 Hours ☐ 7 Days ☐ 14 Days ☑ 21 Days ☐ Other ___

QC Requirements (Specify):

1. Relinquished By	Date: 10/2/01	Time: 1830	1. Received By: FedEx 808063668960	Date: 10/2/01	Time
2. Relinquished By	Date	Time	2. Received By	Date	Time
3. Relinquished By	Date	Time	3. Received By	Date	Time

Comments

DISTRIBUTION: WHITE - Stays with the Sample; CANARY - Returned to Client with Report; PINK - Field Copy

Chain of Custody Record

SEVERN TRENT SERVICES — Severn Trent Laboratories, Inc.

STL-4124 (1200)

Client: TetraTech NUS	Project Manager: Rob Simcik	Date: 10/3/01	Chain of Custody Number: 079538
Address: 661 Anderson Drive	Telephone Number (Area Code)/Fax Number: (412) 921-8163	Lab Number:	Page 1 of 1
City: Pittsburgh / State: PA / Zip Code: 15220	Site Contact:	Lab Contact:	
Project Name and Location (State): CTO 272 Bogue Field, NC	Carrier/Waybill Number: FedEx 808063668950		
Contract/Purchase Order/Quote No.: 375241 / 44291 / BORTOTV			

Sample I.D. No. and Description (Containers for each sample may be combined on one line)	Date	Time	Matrix: Air	Aqueous	Sed	Soil	Containers & Preservatives: Unpres	H2SO4	HNO3	HCl	NaOH	ZnAc/NaOH	Analysis (Attach list if more space is needed): (1) 8260B (BTEX)	(2) 601/602	(3) 625	(4) 6010B	Special Instructions/ Conditions of Receipt
S29-MW07-05	10/3/01	1215		✓									✓	✓	✓	✓	(1) BTEX
S29-MW11-05	10/3/01	1230		✓									✓	✓	✓	✓	(2) Flagged to MDL
S29-MW10-05	10/3/01	1600		✓									✓	✓	✓	✓	(3) Oil & Grease
S29-MW06-05	10/3/01	1505		✓									✓	✓	✓	✓	(4) TAL metals
TB02-S29	10/3/01	—		✓										✓			
MS/MSD-S29 (5)	10/3/01	1505		✓									✓	✓	✓	✓	(5) LAB Requirement for Extra Sample only if needed by Lab.

Possible Hazard Identification: ☑ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal: ☐ Return To Client ☑ Disposal By Lab ☐ Archive For _____ Months (A fee may be assessed if samples are retained longer than 3 months)

Turn Around Time Required: ☐ 24 Hours ☐ 48 Hours ☐ 7 Days ☐ 14 Days ☑ 21 Days ☐ Other _____

QC Requirements (Specify):

	Date	Time		Date	Time
1. Relinquished By	10/3/01	1640	1. Received By: FedEx : 808063668950	10/3/01	1900
2. Relinquished By			2. Received By		
3. Relinquished By			3. Received By		

Comments:

DISTRIBUTION: WHITE - Stays with the Sample. CANARY - Returned to Client with Report. PINK - Field Copy

Chain of Custody Record

SEVERN TRENT SERVICES — **Severn Trent Laboratories, Inc.**

STL-4124 (1200)

Client: Tetra Tech NUS	Project Manager: Rob Simcik	Date: 10/4/01	Chain of Custody Number: 079539
Address: 661 Anderson Drive	Telephone Number (Area Code)/Fax Number: (412) 921-8163 (412)921-4040	Lab Number:	Page 1 of 1
City: Pittsburgh / State: PA / Zip Code: 15220	Site Contact: Rob Simcik	Lab Contact: Vernon B	
Project Name and Location (State): CTO 272 Bogue Field, NC	Carrier/Waybill Number: 809063668949		
Contract/Purchase Order/Quote No.: 375241 / 44291 / BORTUV			

Sample I.D. No. and Description (Containers for each sample may be combined on one line)	Date	Time	Matrix: Air	Aqueous	Sed	Soil	Containers & Preservatives: Unpres	H2SO4	HNO3	HCl	NaOH	ZnAc/NaOH	Analysis: 8015 MOD	8015/8020	9071A	Special Instructions/ Conditions of Receipt
S29-SB20-0103	10/4/01	0850				✓							✓	✓	✓	① DRO
S29-SB20-0406	10/4/01	0925				✓							✓	✓	✓	② GRO / BTEX
S29-SB21-0103	10/4/01	0940				✓							✓	✓	✓	③ 0.1 Grav
S29-SB21-0406	10/4/01	1012				✓							✓	✓	✓	
S29-DUP02	10/4/01	1012				✓							✓	✓	✓	
S29-SB19-0103	10/4/01	1050				✓							✓	✓	✓	
S29-SB19-0406	10/4/01	1113				✓							✓	✓	✓	
S29-SB22-0103	10/4/01	1139											✓	✓	✓	
S29-SB22-0406	10/4/01												✓	✓	✓	
S29-TB03	10/4/01	—												✓		
S29-MS/MSD	10/4/01	1138											✓	✓	✓	

Possible Hazard Identification
☑ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal
☐ Return To Client ☑ Disposal By Lab ☐ Archive For _____ Months (A fee may be assessed if samples are retained longer than 3 months)

Turn Around Time Required
☐ 24 Hours ☐ 48 Hours ☐ 7 Days ☐ 14 Days ☑ 21 Days ☐ Other _____

QC Requirements (Specify)

	Date	Time		Date	Time
1. Relinquished By	10/4/01	1500	1. Received By: FEDEX 809063668949	10/4/01	—
2. Relinquished By			2. Received By		
3. Relinquished By			3. Received By		

Comments

DISTRIBUTION: WHITE - Stays with the Sample; CANARY - Returned to Client with Report; PINK - Field Copy

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: MCALF Bosque Field
PROJECT NUMBER: CTO 272 S.C. 29 7415-0800

WELL ID.: S29: MW01
DATE: 10/2/01

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	Salinity (%)	ORP (mV)	Comments (Cumulative Vol. & Color)
0925	7.91'	~~~	6.76	.652	0	6.79	22.1	0.02		~~~
0935	7.92'	180	6.97	.514	0	4.90	22.0	0.02		MDD
0945	7.95	260	6.91	.456	1	1.84	22.4	0.01		2600
0955	7.95	250	6.91	.466	2	8.06	22.7	0.01		2500
1005	7.95	290	7.00	.456	4	5.15	22.7	0.01		2900
1015	7.95	250	7.01	.454	2	3.60	22.6	0.01		2500
1025	7.95	220	7.00	.458	1	3.10	22.7	0.01		2200
1035	7.95	250	7.00	.461	2	4.89	22.9	0.01		Sample 2500

SIGNATURE(S):

PAGE 1 OF 1

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: MCALF Bogue Field Site 29
Project No.: 7415-0800

[] Domestic Well Data
[■] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 529-MW01-05
Sample Location: MW01
Sampled By: RL
C.O.C. No.: 079577
Type of Sample:
[■] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 10/2/01	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	TBD	TBD
Time: 1035								
Method: Low Flow	Clear	7.66	.461	22.9	0	4.89	—	—

PURGE DATA:

Date: 10/2/01	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	TBD	TBD
Method: Low Flow-Purge								
Monitor Reading (ppm): 0.0								
Well Casing Diameter & Material Type: 2" PVC				See Purge Sheet				
Total Well Depth (TD): 17.16								
Static Water Level (WL): 7.91								
One Casing Volume(gal/L): 1.48								
Start Purge (hrs): 0925								
End Purge (hrs): 1035								
Total Purge Time (min): 70								
Total Vol. Purged (gal/L): 7.1	.5 gal							

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
601/602 GRO/PRO/Solvents		2 40mL Vials	1035
6010B TAL metals		1:500 mL Plastic	10/4/01
625 Base/Neutrals and Acids		2 1 Liter Amber	
8260B VOCs (BTEX)		2 40 mL Vials	

OBSERVATIONS / NOTES:

Clear Sample.

Circle if Applicable:

MS/MSD | Duplicate ID No.: N/A

Signature(s):

TBD: To Be Determined

NUS CORPORATION

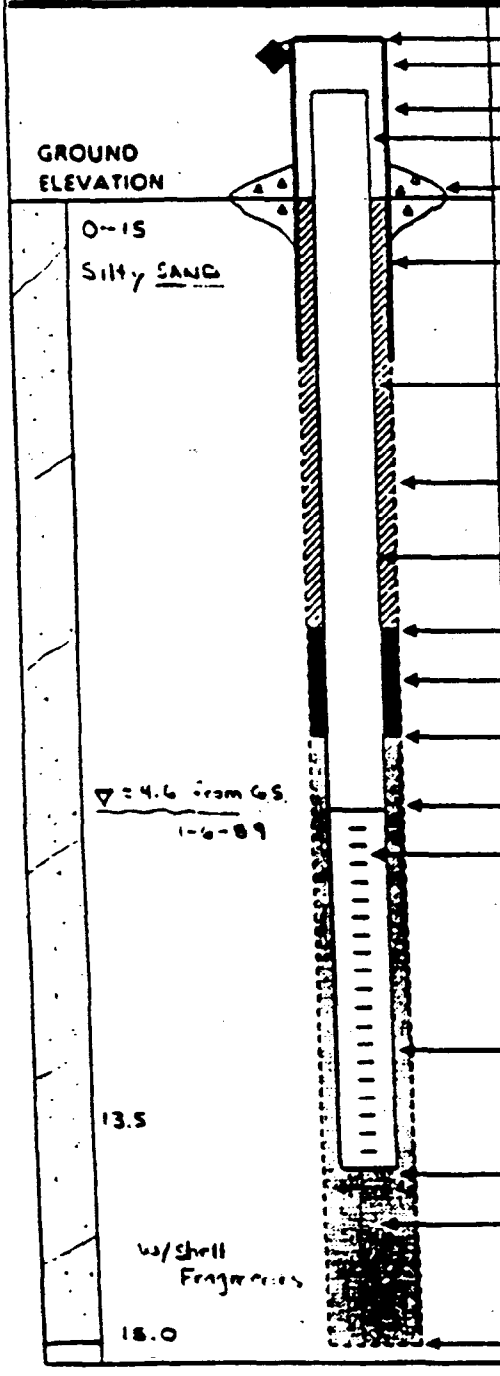
BORING NO.: 29 GW01

OVERBURDEN
MONITORING WELL SHEET

PROJECT MCALF BOGUE
PROJECT NO. 7095
ELEVATION
FIELD GEOLOGIST S CONTI

LOCATION SITE 29
BORING 29 GW 01
DATE 1-4-89
WL - 7.13 TPVC (1-6-89)
= 4.6 G.Sur.

DRILLER D. DOTY/ATEC
DRILLING METHOD H.S. AUGERS
DEVELOPMENT METHOD PUMPING



ELEVATION OF TOP OF SURFACE CASING :
ELEVATION OF TOP OF RISER PIPE:
STICK - UP TOP OF SURFACE CASING:
STICK - UP RISER PIPE :
TYPE OF SURFACE SEAL: 5'x5' x6" CONCRETE PAD
I.D. OF SURFACE CASING: 4"
TYPE OF SURFACE CASING: STEEL
RISER PIPE I.D. 2"
TYPE OF RISER PIPE: SCH 40 PVC
BOREHOLE DIAMETER: 8"
TYPE OF BACKFILL: CONCRETE
ELEVATION / DEPTH TOP OF SEAL: 12.5'
TYPE OF SEAL: BENTONITE PELLETS
DEPTH TOP OF SAND PACK: 13.5'
ELEVATION / DEPTH TOP OF SCREEN: 14.5
TYPE OF SCREEN: PVC
SLOT SIZE x LENGTH: 20 SL x 10'
I.D. OF SCREEN: 2"
TYPE OF SAND PACK: NO 1 SAND
ELEVATION / DEPTH BOTTOM OF SCREEN: 14.5'
ELEVATION / DEPTH BOTTOM OF SAND PACK: 15.0'
TYPE OF BACKFILL BELOW OBSERVATION WELL:
ELEVATION / DEPTH OF HOLE: 15.0

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: MCAL Field, Bogue Field Site 29
PROJECT NUMBER: CTO 272, 7415

WELL ID.: MW02
DATE: 10/2/01

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	Salinity (%)	ORP (mV)	Comments (Cumulative Vol. & Color)
0955	9.10	~200	7.23	0.627	0	1.37	25.3	0.02	—	Clear, clear
1000	9.11	~200	Power lost		—	—	—	—	—	clear, no flow or color
1010	9.12	250	7.65	0.611	0	1.99	25.2	0.02	—	clear
1015	9.14	250	7.84	0.618	0	2.06	25.3	0.02	—	clear
1025	9.20	250	7.77	0.620	0	1.75	25.8	0.02	—	clear
1035	9.16	250	7.86	0.621	Battery went dead, changed battery.					Note Recently Changed
1045	9.18	225	7.8	0.63	0	0.7	26	0.0	—	clear
1055	9.17	225	7.9	0.63	0	3.7	26	0.0	—	clear
1105	9.15	225	7.9	0.63	0	1.4	26	0.0	—	clear
1115	9.11	200	7.9	0.63	0	1.3	26	0.0		clear
1120	9.11	200	7.9	0.63	0	1.3	26	0.0		SAME Collected

SIGNATURE(S):

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: MCAIF Bogue Field CTO 272
Project No.: 7415-0800

Sample ID No.: 529-MW02-05
Sample Location: MW02
Sampled By: M
C.O.C. No.: 079537

[] Domestic Well Data
[■] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type: Dup Sample 529-DUP01

Type of Sample:
[■] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 10/2/01	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	TBD	TBD
Time: 1025								
Method: Low Flow Purge	Clear	7.9	0.67	26	0	1.5	—	—

PURGE DATA:

Date: 10/2/01	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	TBD	TBD
Method: Low Flow Purge								
Monitor Reading (ppm): 0.0								
Well Casing Diameter & Material Type: 2" PVC								
Total Well Depth (TD): 17.10				See Purge Sheet				
Static Water Level (WL): 8.81								
One Casing Volume(gal/L): 1.32								
Start Purge (hrs): 0955								
End Purge (hrs): 1120								
Total Purge Time (min): 1hr 25 min								
Total Vol. Purged (gal/L):	5 gal							

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
601/602 ERO/PRO/ Halo/Non Halo Solvents		2 : 40 ml vial	1125
6010 B TAL Metals		1 : 500 ml Plastic	
625 Base Neutrals (Oil & Grease)		2 : Amber Glass	
8260B BTEX		2 : 40 ml Vials	

OBSERVATIONS / NOTES:

Duplicate taken at this well.

Circle if Applicable:

MS/MSD	Duplicate ID No.:
N/A	DUP01

Signature(s):

TBD: To Be Determined

NUS CORPORATION

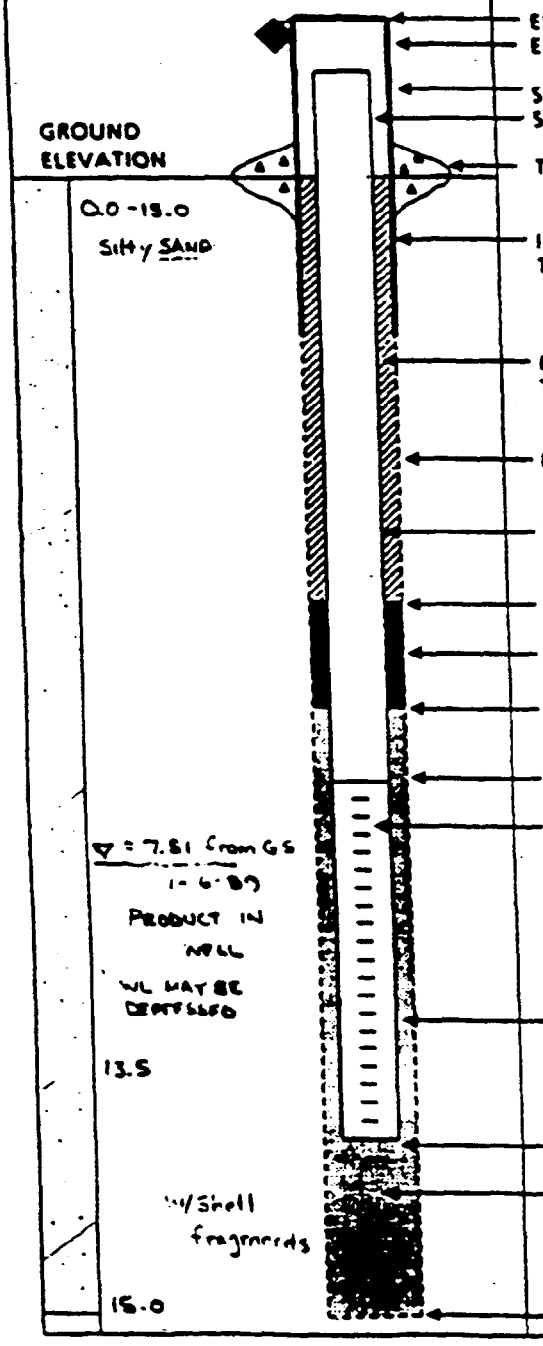
BORING NO.: 29GW02

OVERBURDEN
MONITORING WELL SHEET

PROJECT MCALF - BOGUE
PROJECT NO. 7095
ELEVATION
FIELD GEOLOGIST S CONTI

LOCATION SITE 29
BORING 29GW02
DATE 1-4-89
WL 10.91 TPVC (1-6-89)
" 7.51 FROM G.S.

DRILLER D. DOTY/ATEC
DRILLING METHOD H.S AUGERS
DEVELOPMENT METHOD PUMPING



ELEVATION OF TOP OF SURFACE CASING :
ELEVATION OF TOP OF RISER PIPE:
STICK - UP TOP OF SURFACE CASING:
STICK - UP RISER PIPE :
TYPE OF SURFACE SEAL: 5'x5'x6" CONCRETE PAD
I.D. OF SURFACE CASING: 4"
TYPE OF SURFACE CASING: STEEL
RISER PIPE I.D. 2"
TYPE OF RISER PIPE: PVC - SCH 40
BOREHOLE DIAMETER: 8"
TYPE OF BACKFILL: CONCRETE
ELEVATION / DEPTH TOP OF SEAL: 12.5'
TYPE OF SEAL: BENTONITE PELLETS
DEPTH TOP OF SAND PACK: 13.5'
ELEVATION / DEPTH TOP OF SCREEN: 14.5'
TYPE OF SCREEN: PVC
SLOT SIZE x LENGTH: 20SL x 10'
I.D. OF SCREEN: 2"
TYPE OF SAND PACK: #1 SAND
ELEVATION / DEPTH BOTTOM OF SCREEN: 14.5'
ELEVATION / DEPTH BOTTOM OF SAND PACK: 15.0
TYPE OF BACKFILL BELOW OBSERVATION WELL:
ELEVATION / DEPTH OF HOLE: 15.0

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Soccer Field Site 89 — WELL ID.: SS-89 MW03
PROJECT NUMBER: CTO 272 — DATE: 10/8/01

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	Salinity (%)	ORP (mV)	Comments (Cumulative Vol. & Color)
1200	8.33	—	7.66	.339	124	7.78	23.8	0.01		— Start Purge
1210	8.42	220	7.64	.354	47	6.04	23.1	0.01		2200
1220	8.43	250	7.64	.359	21	6.10	23.8	0.01		4500
1230	8.43	240	7.64	.356	16	5.49	24.2	0.01		6700
1240	8.43	266	7.67	.353	14	5.62	24.2	0.01		8900
1250	8.43	244	7.67	.358	7	6.42	24.2	0.01		11100
1300	8.43	244	7.60	.352	5	4.93	24.3	0.01		13300
1310	8.43	244	7.68	.357	3	10.37	24.4	0.01		15500
1320	8.43	244	7.70	.351	2	4.79	24.4	0.01		17700 ~~Samples~~
1340	8.43	244	7.70	.351	2	4.99	24.4	0.01		Sample

SIGNATURE(S):

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: MCALF Bogue Field Site 29 CTO 272
Project No.: 7415

Sample ID No.: 529-MW03-05
Sample Location: MW03
Sampled By: DK
C.O.C. No.: 079537

[] Domestic Well Data
[■] Monitoring Well Data
[] Other Well Type: _____
[] QA Sample Type: _____

Type of Sample:
[■] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 10/2/01	Color	pH	S.C.	Temp.	Turbidity	DO	TBD	TBD
Time:	Visual	Standard	mS/cm	°C	NTU	mg/l		
Method: Low Flow	Clear	7.76	0.79	24.4	2	4.99	—	—

PURGE DATA:

Date: 10/2/01	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	TBD	TBD
Method: Low Flow Purge								
Monitor Reading (ppm): 0.0								
Well Casing Diameter & Material Type: 2" PVC								
Total Well Depth (TD): 16.45'			See purge sheet					
Static Water Level (WL): 8.35'								
One Casing Volume(gal/L): 1.3								
Start Purge (hrs): 1200								
End Purge (hrs):								
Total Purge Time (min):								
Total Vol. Purged (gal/L):								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
601/602 GRO/DRO	Solvents	2 : 40 ml Vials	10/2/01
6010B TAL metals		1 : 500 ml Plastic	
625 Base Neutrals (0.1% Quench)		2 : 1 Liter Amber glass	
8260 B BTEX		2 : 40 ml Vials	

OBSERVATIONS / NOTES:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
N/A	

Signature(s):

TBD: To Be Determined

NUS CORPORATION

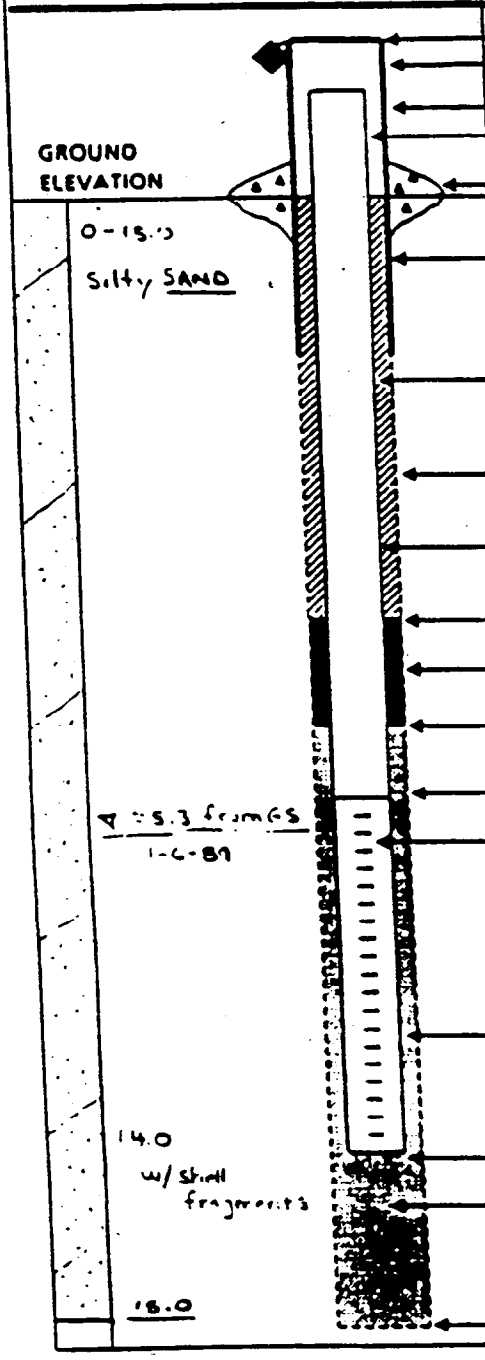
BORING NO.: 296W03

OVERBURDEN
MONITORING WELL SHEET

PROJECT MCALF-BOYUE
PROJECT NO. 7095
ELEVATION
FIELD GEOLOGIST S CONTI

LOCATION SITE 29
BORING 296W03
DATE 1-4-89
WL 7.8' FROM TPVC 1-6-89
≈ 5.3' " G.SUR

DRILLER D.DOTY/ATEC
DRILLING METHOD H.S. AUGERS
DEVELOPMENT METHOD PUMPING



ELEVATION OF TOP OF SURFACE CASING: ____
ELEVATION OF TOP OF RISER PIPE: ____
STICK - UP TOP OF SURFACE CASING: ____
STICK - UP RISER PIPE: ____
TYPE OF SURFACE SEAL: 5'x5'x 6" CONCRETE PAD
I.D. OF SURFACE CASING: 4"
TYPE OF SURFACE CASING: STEEL
RISER PIPE I.D. 2"
TYPE OF RISER PIPE: SCH 40 PVC
BORE HOLE DIAMETER: 8"
TYPE OF BACKFILL: CONCRETE
ELEVATION / DEPTH TOP OF SEAL: 12.5'
TYPE OF SEAL: BENTONITE PELLETS
DEPTH TOP OF SAND PACK: 13.5'
ELEVATION / DEPTH TOP OF SCREEN: 14.5'
TYPE OF SCREEN: PVC
SLOT SIZE x LENGTH: 20 SL x 10'
I.D. OF SCREEN: 2"
TYPE OF SAND PACK: #1 SAND
ELEVATION / DEPTH BOTTOM OF SCREEN: 14.5'
ELEVATION / DEPTH BOTTOM OF SAND PACK: 15.0
TYPE OF BACKFILL BELOW OBSERVATION WELL: ____
ELEVATION / DEPTH OF HOLE: 15.0'

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Bayou Field Site 29 WELL ID.: Site 29 MW04
PROJECT NUMBER: CTO 272 DATE: 10/2/01

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	Salinity (%)	ORP (mV)	Comments (Cumulative Vol. & Color)
1555	9.06	-	7.3	.26	24	5.4	24	0.0		Start Purge
1605	9.05	290	7.4	.26	18	9.2	23	0.0		2900 Turbidity not reading correctly
1615	9.05	200	7.4	.22	18	6.7	22	0.0		2000 "
1625	9.04	270	7.0	.22	8	4.9	22	0.0		2700 "
1635	9.07	290	7.2	.22	8	3.5	22	0.0		2900 "
1645	9.03	260	7.1	.23	8	9.1	22	0.0		2600 "
1655	9.03	220	7.0	.22	0	2.4	22	0.0		2200 Turbidity fixed Sample

SIGNATURE(S):

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: Bogue Field Site 29
Project No.: CTO 272 (7415)

[] Domestic Well Data
[■] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: S29-MW04-05
Sample Location: MW04
Sampled By: C Saylor
C.O.C. No.: 029537
Type of Sample:
[■] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 10/2/01	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	TBD	TBD
Time: 1655								
Method: Grab	Clear/Sediment	7.07	.22	22	0	2.14	—	—

PURGE DATA:

Date: 10/2/01	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	TBD	TBD
Method: Low Flow Pump								
Monitor Reading (ppm): 0								
Well Casing Diameter & Material Type: 2" PVC		See Attached						
Total Well Depth (TD):								
Static Water Level (WL): 9.06								
One Casing Volume(gal/L):								
Start Purge (hrs): 1555								
End Purge (hrs): 1655								
Total Purge Time (min): 60								
Total Vol. Purged (gal/L): 3.6								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
601/602 GRO/PRO	Solvents	2 40 ml Vials	J
6010 B TAL metals		1 500 ml Plastic	J
625 Base/Neutrals Acids		2 1 L Amber glass	J
8260 B VOC (BTEX)		2 40 ml Vials	J

OBSERVATIONS / NOTES:

Circle if Applicable:
MS/MSD
Duplicate ID No.: N/A

Signature(s):

TBD: To Be Determined

NUS CORPORATION

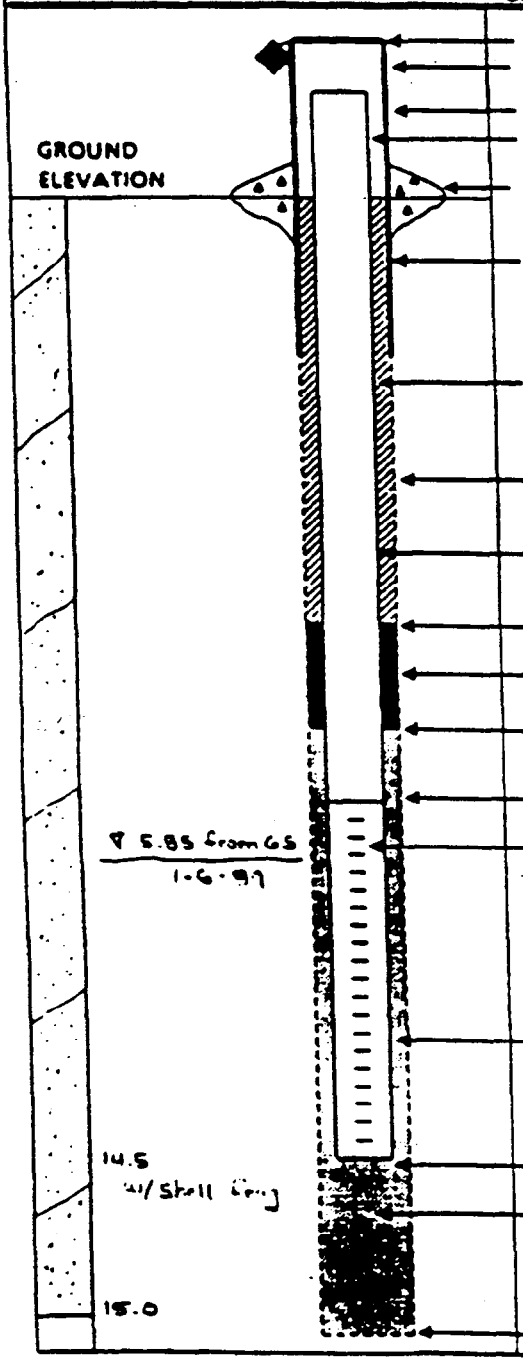
BORING NO.: 29GW04

OVERBURDEN
MONITORING WELL SHEET

PROJECT MCALF-BOGUE
PROJECT NO. 7095
ELEVATION
FIELD GEOLOGIST S CONTI

LOCATION SITE 29
BORING 29GW04
DATE 1-5-89
WL 8.35 From TOC (1-6-89)
5.85 " GS "

DRILLER D. DOTY/ATEC
DRILLING METHOD H.S. AUGERS
DEVELOPMENT METHOD PUMPING



ELEVATION OF TOP OF SURFACE CASING :
ELEVATION OF TOP OF RISER PIPE:
STICK - UP TOP OF SURFACE CASING:
STICK - UP RISER PIPE :
TYPE OF SURFACE SEAL: 5'x5'x 6" CONCRETE PAD
I.D. OF SURFACE CASING: 4"
TYPE OF SURFACE CASING: STEEL
RISER PIPE I.D. 2"
TYPE OF RISER PIPE: PVC SCH 40
BOREHOLE DIAMETER: 8"
TYPE OF BACKFILL: CONCRETE
ELEVATION / DEPTH TOP OF SEAL: 12.5'
TYPE OF SEAL: BENTONITE PELLETS
DEPTH TOP OF SAND PACK: 13.5'
ELEVATION / DEPTH TOP OF SCREEN: 14.5'
TYPE OF SCREEN: PVC
SLOT SIZE x LENGTH: 20 SL x 10'
I.D. OF SCREEN: 2"
TYPE OF SAND PACK: #1 SAND
ELEVATION / DEPTH BOTTOM OF SCREEN: 14.5'
ELEVATION / DEPTH BOTTOM OF SAND PACK: 15.0'
TYPE OF BACKFILL BELOW OBSERVATION WELL:
ELEVATION / DEPTH OF HOLE: 15.0

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Bayou Fe ld, Sta 29 WELL ID.: MW-06
PROJECT NUMBER: CTO 272 DATE: 10/3/01

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	Salinity (%)	ORP (mV)	Comments (Cumulative Vol. & Color)
1345	7.14	—	7.15	.244	1	1.97	24.5	0	—	Start Purge
1355	7.25	210	6.89	.226	2	2.35	25.3	0	—	2100 2400
1405	7.25	210	6.84	.226	2	2.35	24.7	0	—	2100 4200
1415	7.25	210	7.15	.248	2	2.84	24.8	0	—	2100 6300
1425	7.25	210	7.14	.254	2	2.37	24.2	0	—	2100 8400
1435	7.25	220	7.05	.265	2	2.30	24.2	0	—	2200 10,600
1445	7.25	240	7.06	.271	1	5.69	24.2	0	—	2400 13,000
1455	7.25	240	7.08	.278	1	6.82	24.3	0	—	2400 15,400
1505			7.08	.287	0	3.95	24.0	0	—	2400 17,800

SIGNATURE(S): _____

PAGE __ OF

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: MCALF Bogue Field NC
Project No.: 7415 CTO 272

Sample ID No.: 529-MW06-05
Sample Location: MW-06
Sampled By: AR
C.O.C. No.: 079578 (554)

[ ] Domestic Well Data
[■] Monitoring Well Data
[ ] Other Well Type: _____
[ ] QA Sample Type: _____

Type of Sample:
[■] Low Concentration
[ ] High Concentration

SAMPLING DATA:

Date: 10/3/01	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	TBD	TBD
Time: 1505								
Method: Grab	Clear	7.04	.297	24.0	0	3.95	—	—

PURGE DATA:

Date: 10/3/01	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	TBD	TBD
Method: Low Flow Pump								
Monitor Reading (ppm): 0								
Well Casing Diameter & Material Type: 2" PVC				See attached purge sheet				
Total Well Depth (TD): 16.1								
Static Water Level (WL): 7.19								
One Casing Volume (gal/L): 1.43								
Start Purge (hrs): 13:45								
End Purge (hrs): 15:05								
Total Purge Time (min): 80								
Total Vol. Purged (gal/L): 4.7								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
601/602 (CRL/PID)	Solvents	3 40ml VOA	✓
6010 B (TAL metals)		1 500ml Plastic	✓
625 (Base Neutral Acids)		2 1 L Amber	✓
8260 B (ATEX)		2 40ml VOA	✓

OBSERVATIONS / NOTES:

Circle if Applicable:
MS/MSD
Duplicate ID No.: N/A

Signature(s):

TBD: To Be Determined

NUS CORPORATION
A Halliburton Company

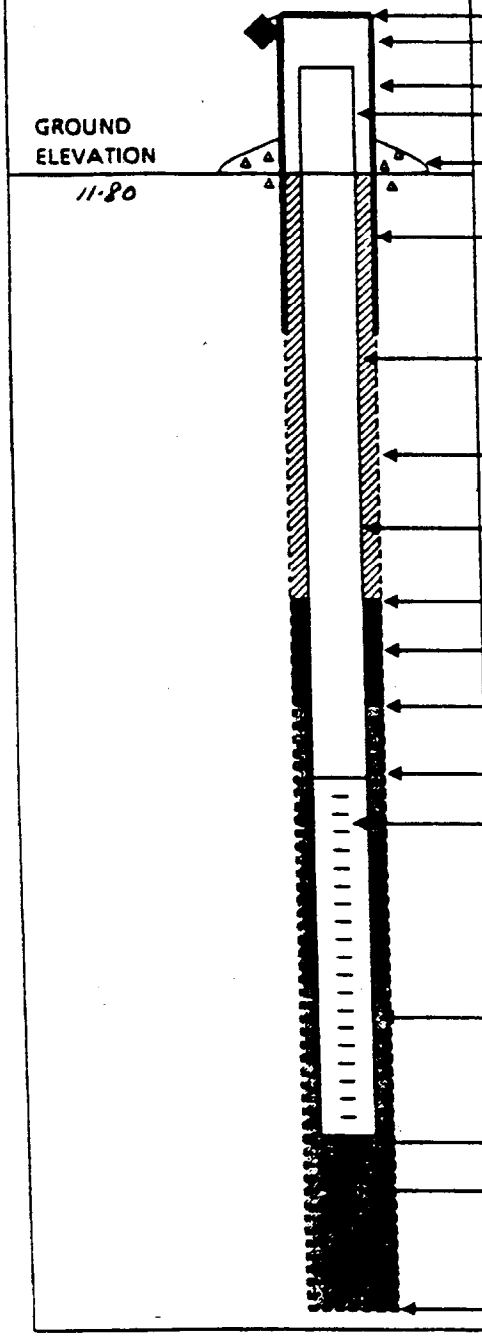
BORING NO 29GW06

OVERBURDEN
MONITORING WELL SHEET

PROJECT BOGUE
PROJECT NO. 2F35
ELEVATION 11.80
FIELD GEOLOGIST M. COCHRAN

LOCATION BOGUE NC
BORING 29GW06
DATE 10-16-91

DRILLER SANFORD SWEETING
DRILLING METHOD H.S.A
DEVELOPMENT METHOD Pump



ELEVATION OF TOP OF SURFACE CASING: 14.76
ELEVATION OF TOP OF RISER PIPE: 14.15
STICK - UP TOP OF SURFACE CASING: 2.96
STICK - UP RISER PIPE: 2.35
TYPE OF SURFACE SEAL: Cement PAD
I.D. OF SURFACE CASING:
TYPE OF SURFACE CASING:
RISER PIPE I.D. 2 INCH
TYPE OF RISER PIPE: PVC
BOREHOLE DIAMETER: 10 INCHES
TYPE OF BACKFILL:
ELEVATION / DEPTH TOP OF SEAL: 10.80 / 1'
TYPE OF SEAL: BENTONITE PELLETS
DEPTH TOP OF SAND PACK: 9.80 / 2'
ELEVATION / DEPTH TOP OF SCREEN: 8.80 / 3'
TYPE OF SCREEN: PVC SLOTTED
SLOT SIZE x LENGTH: 010 X 10'
I.D. OF SCREEN: 2"
TYPE OF SAND PACK: UNIFORM SAND
ELEVATION / DEPTH BOTTOM OF SCREEN: -1.2 / 13'
ELEVATION / DEPTH BOTTOM OF SAND PACK:
TYPE OF BACKFILL BELOW OBSERVATION WELL: UNIFORM SAND
ELEVATION / DEPTH OF HOLE: -4.2 / 16'

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: MCALF Bogue Field Site 29 CTO 272
PROJECT NUMBER: 7415
WELL ID.: MW07
DATE: 10/3/01

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	Salinity (%)	ORP (mV)	Comments (Cumulative Vol. & Color)
0925	8.75'	-	-	-	-	-	-	-	-	Begin Purge
0935	8.86'	250	6.99	0.480	0	0.80	23.5	0.01	-	Clear, no color
0950	8.85'	250	7.42	0.485	0	1.82	24.2	0.02	-	"
1000	8.84'	200	7.51	0.487	0	1.83	24.4	0.02	-	"
1015	8.83'	200	7.34	0.481	0	1.10	24.4	0.02	-	"
1030	8.83'	200	7.37	0.484	0	1.25	24.6	0.02	-	"
1045	8.86'	200	7.38	0.487	0	1.01	24.7	0.02	-	"
1100	8.85'	225	7.43	0.486	0	0.51	25.1	0.02	-	"
1115	8.85'	225	7.44	0.485	0	2.46	25.1	0.02	-	"
1130	8.85'	225	7.35	0.485	0	0.48	25.9	0.02	-	"
1145	8.85'	225	7.35	0.484	0	0.48	25.3	0.02	-	"
1200	8.85	200	7.33	0.483	0	0.48	25.9	0.02	-	"
1215	8.85	200	7.34	0.484	0	0.48	25.8	0.02	-	SAMPLE Collected

SIGNATURE(S):

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: MCALF Bogue Field
Project No.: 7415 CTO 272

Sample ID No.: 529-MW07-05
Sample Location: MW07
Sampled By: RE
C.O.C. No.: 079538

[] Domestic Well Data
[■] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Type of Sample:
[■] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 10/3/01	Color	pH	S.C.	Temp.	Turbidity	DO	TBD	TBD
Time:	Visual	Standard	mS/cm	°C	NTU	mg/l		
Method: Low Flow Sample	clear	7.34	0.761	25.8	0	0.76	—	—

PURGE DATA:

Date: 10/3/01	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	TBD	TBD
Method: Low Flow Purge								
Monitor Reading (ppm): 0.0								
Well Casing Diameter & Material Type: 2" PVC								
Total Well Depth (TD): 32.05'								
Static Water Level (WL): 8.75'								
One Casing Volume(gal/L): 3.7 gal								
Start Purge (hrs): 0925								
End Purge (hrs): 1215								
Total Purge Time (min): 290								
Total Vol. Purged (gal/L):								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
601/602 (GRO/BTEX)	Solvents	2 40 ml VOA Vials	
6010 B (TAL metals)		1 500 ml Plastic	
625 (Base Neutrals, Acids)	Oil, Grease	2 1 L Amber Glass	
8260 B VOCs (BTEX)		2 40 ml Vials	

OBSERVATIONS / NOTES:

Filtered Sample

Circle if Applicable:

MS/MSD | Duplicate ID No.: N/A

Signature(s):

TBD: To Be Determined

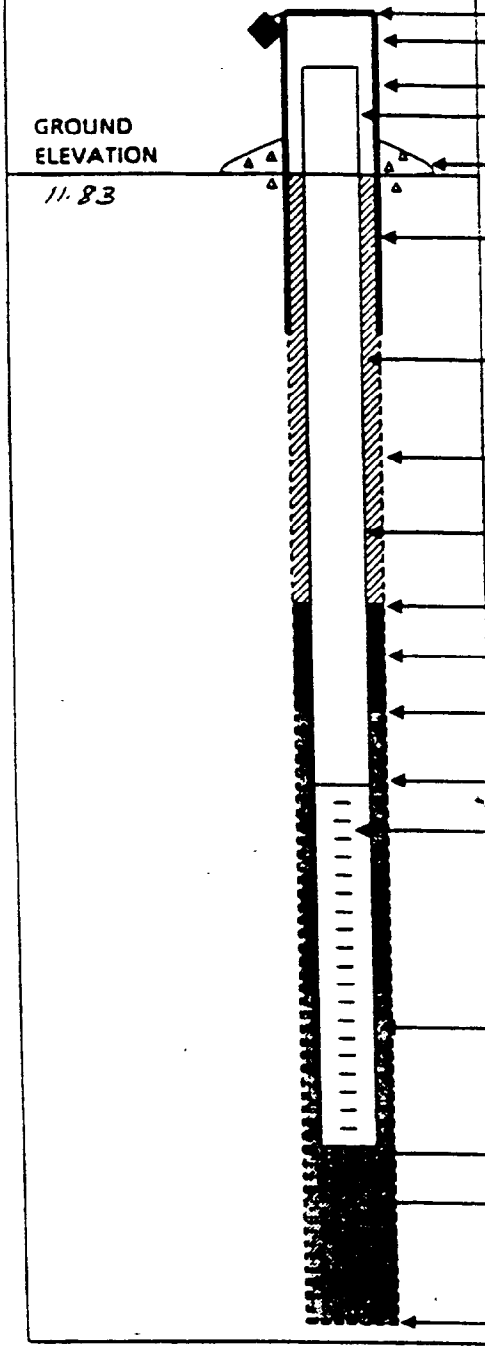
NUS CORPORATION
A Halliburton Company

BORING NO 29 GW07

OVERBURDEN
MONITORING WELL SHEET

PROJECT BOGUE FIELD LOCATION BOGUE N.C.
PROJECT NO. 2F35 BORING 29 GW07
ELEVATION 11.83 DATE 10-17-91
FIELD GEOLOGIST M. COCHRAN

DRILLER SANFORD
DRILLING SWEETING
METHOD H.S.A.
DEVELOPMENT
METHOD PUMP



ELEVATION OF TOP OF SURFACE CASING: 14.46
ELEVATION OF TOP OF RISER PIPE: 13.88
STICK - UP TOP OF SURFACE CASING: 2.63
STICK - UP RISER PIPE: 2.05
TYPE OF SURFACE SEAL: Cement Pad
I.D. OF SURFACE CASING:
TYPE OF SURFACE CASING:
RISER PIPE I.D. 2"
TYPE OF RISER PIPE: PVC
BOREHOLE DIAMETER: 10"
TYPE OF BACKFILL: BENTONITE - CEMENT GROUT
ELEVATION / DEPTH TOP OF SEAL: -5.17/17
TYPE OF SEAL: HOLE PLUG
DEPTH TOP OF SAND PACK: -7.17/19
ELEVATION / DEPTH TOP OF SCREEN: -7.67/19.5
TYPE OF SCREEN: PVC SLOTTED
SLOT SIZE x LENGTH: 010" X 10'
I.D. OF SCREEN: 2"
TYPE OF SAND PACK: UNIFOAM SAND
ELEVATION / DEPTH BOTTOM OF SCREEN: -17.67/29.5
ELEVATION / DEPTH BOTTOM OF SAND PACK:
TYPE OF BACKFILL BELOW OBSERVATION WELL: NATURAL BACKFILL
ELEVATION / DEPTH OF HOLE: -19.17/31'

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: MCAS Beaufort Field
CTO 272
PROJECT NUMBER: 7415

WELL ID.: MW08
DATE: 10/2/01

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	Salinity (%)	ORP (mV)	Comments (Cumulative Vol. & Color)
1610	8.45'	–	–	–	–	–	–	–	–	Began Purge
1615	8.43'	250	7.16	0.437	7	1.13	24.8	0.01	–	Clear No Color
1620	8.40'	175	7.09	0.429	5	0.67	24.6	0.01	–	clear "
1630	8.43'	200	7.07	0.422	4	1.18	24.4	0.01	–	Clear
1640	8.41'	200	7.10	0.434	2	2.91	24.2	0.01	–	Adjusted pump to 200 cc/min
1647	8.42'	200	7.04	0.430	1	0.09	24.1	0.01	–	Clear.
1652	8.42'	200	7.03	0.430	0	0.95	24.0	0.01	–	"
1705	8.44'	200	7.01	0.431	0	1.82	23.6	0.01	–	"
1715	8.43'	200	7.02	0.433	0	0.39	23.5	0.01	–	Clear
1725	8.44'	200	7.07	0.433	0	0.28	23.4	0.01	–	"
1735	8.44'	200	7.02	0.433	0	1.23	23.4	0.01	–	Clear No Color
1740	8.43'	200	7.02	0.433	0	0.64	23.4	0.01	–	SAMPLE Collected

SIGNATURE(S):

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: MCAS Bogue Field
Project No.: CTO 272 / 7415

Sample ID No.: S29-MW08-05
Sample Location: MW08
Sampled By: AK
C.O.C. No.:

[] Domestic Well Data
[■] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Type of Sample:
[■] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color	pH	S.C.	Temp.	Turbidity	DO	TBD	TBD
Date: 10/2/01	Visual	Standard	mS/cm	°C	NTU	mg/l		
Time:								
Method: Low Flow	Clear	7.02	0.477	23.4	0	0.64	—	—

PURGE DATA:

	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	TBD	TBD
Date: 10/2/01								
Method: Low Flow Purge								
Monitor Reading (ppm): 0.0								
Well Casing Diameter & Material Type: 2" PVC								
Total Well Depth (TD): 15.35'								
Static Water Level (WL): 8.45'								
One Casing Volume(gal/L): 1.1 gal								
Start Purge (hrs):								
End Purge (hrs):								
Total Purge Time (min):								
Total Vol. Purged (gal/L):								

See Attached Purge Sheet

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
601/602 (GRO/BRO) Solvents HALS (NON Hal)		2 : 40ml Vials	10/2
6010B TAL metals		1 : 500 ml Poly	
EPA-625 Base Neutral Acid (Ordinance)		2 : Amber 946ml	
8260B BTEX		2 : 40 ml Vials	

OBSERVATIONS / NOTES:

Circle if Applicable:

MS/MSD

Duplicate ID No.: N/A

Signature(s):

TBD: To Be Determined

BORING NO.: 29 GW 08

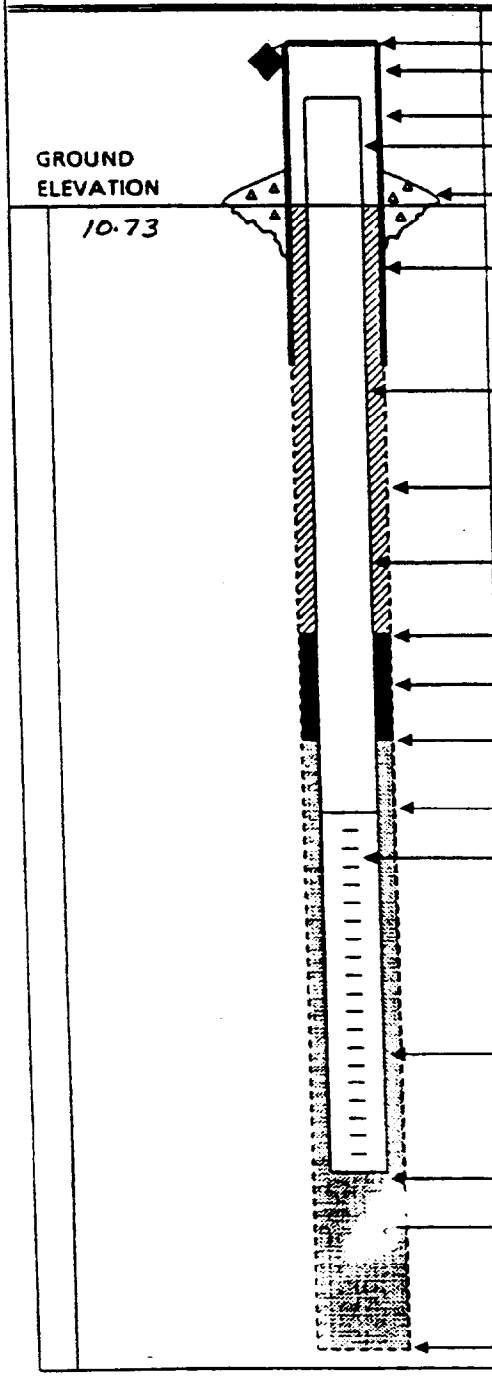
NUS CORPORATION
A Halliburton Company

OVERBURDEN
MONITORING WELL SHEET

PROJECT BOGUE
PROJECT NO. 2F3C
ELEVATION 10.73
FIELD GEOLOGIST M. COCHRAN

LOCATION BOGUE NC
BORING 29 GW 08
DATE 10-16-91

DRILLER SANFORD
DRILLING METHOD H.S.A.
DEVELOPMENT METHOD PUMP



ELEVATION OF TOP OF SURFACE CASING: 13.56
ELEVATION OF TOP OF RISER PIPE: 12.74
STICK - UP TOP OF SURFACE CASING: 2.83
STICK - UP RISER PIPE: 2.01
TYPE OF SURFACE SEAL: CEMENT PAD
I.D. OF SURFACE CASING:
TYPE OF SURFACE CASING:
RISER PIPE I.D. 2"
TYPE OF RISER PIPE: PVC
BOREHOLE DIAMETER: 10"
TYPE OF BACKFILL:
ELEVATION / DEPTH TOP OF SEAL: 9.73 / 1'
TYPE OF SEAL: BENTONITE PELLETS
DEPTH TOP OF SAND PACK: 8.73 / 2'
ELEVATION / DEPTH TOP OF SCREEN: 7.73 / 3'
TYPE OF SCREEN: PVC SLOTTED
SLOT SIZE x LENGTH: .010" x 10'
I.D. OF SCREEN: 2"
TYPE OF SAND PACK: [illegible]
ELEVATION / DEPTH BOTTOM OF SCREEN: -2.27 / 13'
ELEVATION / DEPTH BOTTOM OF SAND PACK: -2.27 / 13'
TYPE OF BACKFILL BELOW OBSERVATION WELL: NATURAL BACKFILL
ELEVATION / DEPTH OF HOLE: -4.27 / 15'

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: McALF Bogue Field Site 29, CTO272
PROJECT NUMBER: 7415

WELL ID.: MW10
DATE: 10/3/01

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	Salinity (%)	ORP (mV)	Comments (Cumulative Vol. & Color)
1310	6.45'	250/300	—	—	—	—	—	—	—	Began Purge
1315	6.50'	250	7.10	.342	6	1.25	21.4	0.01	—	Clear, Slight Petro Smell.
1330	6.49'	250	6.81	0.323	1	1.26	21.6	0.01	—	Clear, No color
1335	6.49'	240	6.85	0.304	1	2.24	20.8	0.01	—	"
1342	6.48'	200	6.76	0.301	0	1.01	21.2	0.01	—	Battery Struggling.
CAUTION Power Pack went out Had to use Car Battery										
1425	6.48'	250	6.88	0.296	0	1.41	20.8	0.01	—	Car battery
1435	6.48'	250	6.80	0.292	0	1.28	20.9	0.01	—	Clear, no color
1440	6.48'	250	6.77	0.287	0	1.28	20.6	0.01	—	"
1455	6.48'	250	6.79	0.279	0	1.49	20.5	0.01	—	"
1510	6.50'	250	6.74	0.278	0	1.10	20.5	0.01	—	"
1530	6.51'	250	6.80	0.278	0	1.81	20.5	0.01	—	"
1550	6.55'	250	6.77	0.279	0	1.56	20.5	0.01	—	"
1600	6.55'	250	6.76	0.277	0	1.89	20.5	0.01		Collected Sample

SIGNATURE(S):

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: MCALF Bogue Field
Project No.: 7415 CTO 272

[] Domestic Well Data
[x] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: S29-MW10-05
Sample Location: MW10
Sampled By: RS
C.O.C. No.: 079538 (STL)
Type of Sample:
[x] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 10/3/01 / Time: / Method: Low Flow Sampling	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	TBD	TBD
	Clear	6.76	0.27	20.5	0	1.81	—	—

PURGE DATA:

Date: 10/3/01	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	TBD	TBD
Method: Low Flow Purge								
Monitor Reading (ppm): 0.0								
Well Casing Diameter & Material Type: 2" PVC				See attached purge sheet				
Total Well Depth (TD): 6.45								
Static Water Level (WL): 15.40								
One Casing Volume(gal/L): 1.13 gal								
Start Purge (hrs): 1310								
End Purge (hrs): 1600								
Total Purge Time (min):								
Total Vol. Purged (gal/L):								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
601/602 (GRO/DRO/Solvents)		2 40 ml vials	✓
6010B (TAL Metals)		1 500 ml Plastic	✓
625 (Base/Neutral Acids)		2 1L Amber	✓
8260B (BTEX)		2 40 ml vials	✓

OBSERVATIONS / NOTES:

When first started to purge noticed slight petroleum smell which went away. ~~Fr~~ Water Clear w/ no Color.

Circle if Applicable:		Signature(s):
MS/MSD	Duplicate ID No.: N/A	[signature]

TBD: To Be Determined

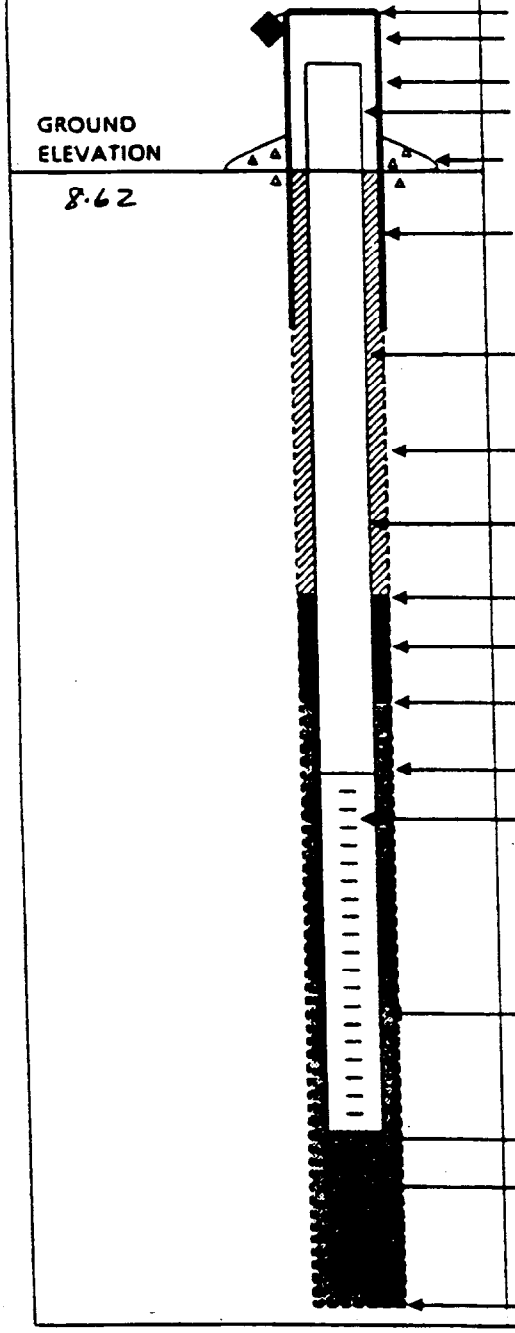
NUS CORPORATION
A Halliburton Company

BORING NO. 296W10

OVERBURDEN
MONITORING WELL SHEET

PROJECT BOGUE FIELD LOCATION BOGUE NC.
PROJECT NO. 2F35 BORING 296W10
ELEVATION 8.62 DATE 10-17-91
FIELD GEOLOGIST M. G. COCHRAN

DRILLER E. LEFEVER.
DRILLING METHOD HSA
DEVELOPMENT METHOD PUMP



ELEVATION OF TOP OF SURFACE CASING: 11.81
ELEVATION OF TOP OF RISER PIPE: 10.65
STICK - UP TOP OF SURFACE CASING: 3.19
STICK - UP RISER PIPE: 2.03
TYPE OF SURFACE SEAL: CEMENT PAD
I.D. OF SURFACE CASING:
TYPE OF SURFACE CASING:
RISER PIPE I.D. 2 INCH
TYPE OF RISER PIPE: PVC
BOREHOLE DIAMETER: 10 INCH
TYPE OF BACKFILL:
ELEVATION / DEPTH TOP OF SEAL: 7.62 / 1'
TYPE OF SEAL: BENTONITE PELLETS
DEPTH TOP OF SAND PACK: 6.62 / 2'
ELEVATION / DEPTH TOP OF SCREEN: 5.62 / 3
TYPE OF SCREEN: PVC
SLOT SIZE x LENGTH:
I.D. OF SCREEN: 2 INCH
TYPE OF SAND PACK: UNIFORM SAND
ELEVATION / DEPTH BOTTOM OF SCREEN: -4.38 / 13
ELEVATION / DEPTH BOTTOM OF SAND PACK: -4.38 / 13
TYPE OF BACKFILL BELOW OBSERVATION WELL: NATURAL BACKFILL
ELEVATION / DEPTH OF HOLE: -7.38 / 16'

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Bergen Gold Site 09 WELL ID.: MW-11
PROJECT NUMBER: CTO 222 DATE: 10/3/01

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	Salinity (%)	ORP (mV)	Comments (Cumulative Vol. & Color)
0916	8.83	—	7.10	.543	2	5.19	22.6	0.02	—	Start Purge Clear
0930	8.92	246	7.84	.531	0	2.76	23.0	0.02	—	3700 3700 "
0945	8.92	293	7.95	.534	0	2.60	23.2	0.02	—	4400 8100 "
1000	8.92	307	7.95	.533	0	4.67	23.4	0.02	—	4660 12,760 "
1015	8.92	307	7.96	.537	0	8.21	23.2	0.02	—	4600 17,360 "
1030	8.92	280	7.93	.533	0	2.73	23.2	0.02	—	4200 21,560 "
1045	8.92	353	7.95	.534	0	3.54	23.4	0.02	—	5600 26,560
1100	8.92	266	7.95	.533	0	3.47	23.8	0.02	—	4020 30,580
1115	8.92	266	7.96	.544	0	8.72	24.7	0.02	—	4300 34,880
1130	8.92	293	7.96	.540	0	8.64	25.1	0.02	—	4400 39,280
1145	8.92	293	7.94	.537	0	8.76	25.3	0.02	—	4400 43,680
1200	8.92	293	7.97	.539	0	8.68	25.2	0.02	—	4400 48,080
1215	8.92	293	7.97	.540	0	8.86	25.2	0.02	—	4400 52,480
1230	8.92		7.97	.540	0	8.70	25.4	0.02		4400 56,880
							0			

SIGNATURE(S):

PAGE OF

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: MCALF Bopper Field
Project No.: 7415 CTO272

Sample ID No.: S29-MW11-05
Sample Location: MW11
Sampled By: N
C.O.C. No.: 079578 (SFL)

- [ ] Domestic Well Data
- [x] Monitoring Well Data
- [ ] Other Well Type: _____
- [ ] QA Sample Type: _____

Type of Sample:
- [x] Low Concentration
- [ ] High Concentration

SAMPLING DATA:

Date: 10/3/01	Color	pH	S.C.	Temp.	Turbidity	DO	TBD	TBD
Time: 1230	Visual	Standard	mS/cm	°C	NTU	mg/l		
Method: Low Flow	Clear	7.97	0.540	25.4	0	8.90	—	—

PURGE DATA:

Date: 10/3/01	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	TBD	TBD
Method: Low Flow Purge								
Monitor Reading (ppm): 0.0								
Well Casing Diameter & Material Type: 4" PVC								
Total Well Depth (TD): 22.20'								
Static Water Level (WL): 8.83'								
One Casing Volume(gal/L): 8.74 gal = 3 casings : 26.07 gal								
Start Purge (hrs): 0915								
End Purge (hrs): 1230								
Total Purge Time (min):								
Total Vol. Purged (gal/L): 15 L								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements		Collected
601/602 (GRO/BRO)	(Solvents)	2	40 ml Vials	~
6010 B (Total metals)		1	500 ml Plastic	—
625 (Base Neutrals Acids)		2	1 L Amber	~
8260 B (BTEX)		2	40 ml Vials	~

OBSERVATIONS / NOTES:

Circle if Applicable:

MS/MSD | Duplicate ID No.: MW12

Signature(s):

TBD: To Be Determined

BORING NO.: 29 GW 11

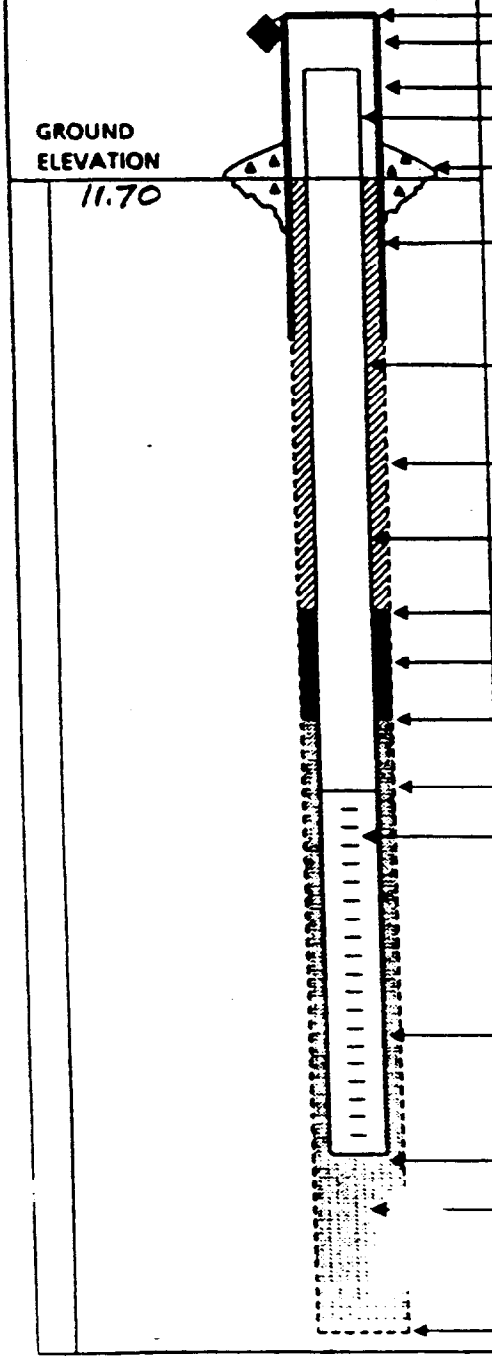
NUS CORPORATION
A Halliburton Company

OVERBURDEN
MONITORING WELL SHEET

PROJECT BOGUE FIELD
PROJECT NO. 2F35
ELEVATION 11.
FIELD GEOLOGIST M. G. COCHRAN

LOCATION BOGUE NC
BORING 29 GW 11
DATE 10-17-91

DRILLER SANFORD SWEETING
DRILLING METHOD HOLLOW STEM
DEVELOPMENT METHOD



ELEVATION OF TOP OF SURFACE CASING: 14.69
ELEVATION OF TOP OF RISER PIPE: 13.88
STICK - UP TOP OF SURFACE CASING: 2.63
STICK - UP RISER PIPE: 2.05
TYPE OF SURFACE SEAL: CONCRETE
I.D. OF SURFACE CASING: 6"
TYPE OF SURFACE CASING: SQUARE BOX
RISER PIPE I.D. 4 INCH
TYPE OF RISER PIPE: PVC SCHEDULE 40
BOREHOLE DIAMETER: 12"
TYPE OF BACKFILL: CONCRETE
ELEVATION / DEPTH TOP OF SEAL: 10.70/1
TYPE OF SEAL:
DEPTH TOP OF SAND PACK: 9.20/2.5'
ELEVATION / DEPTH TOP OF SCREEN: 7.70/4'
TYPE OF SCREEN: PVC SLOTTED
SLOT SIZE x LENGTH: .010 X 16'
I.D. OF SCREEN: 4"
TYPE OF SAND PACK: UNIFORM SAND
ELEVATION / DEPTH BOTTOM OF SCREEN: -8.30/20'
ELEVATION / DEPTH BOTTOM OF SAND PACK: -8.30/20'
TYPE OF BACKFILL BELOW OBSERVATION WELL: NA
ELEVATION / DEPTH OF HOLE: -8.30/20'

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCALF Bogue Field, NC
Project No.: CTO 272 / 7415

Sample ID No.: 529-SB19-0103
Sample Location: SB19
Sampled By: MS
C.O.C. No.: 079539

- [] Surface Soil
- [■] Subsurface Soil
- [] Sediment
- [] Other:
- [] QA Sample Type:

Type of Sample:
- [■] Low Concentration
- [] High Concentration

GRAB SAMPLE DATA:

Date: 10/7/01	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1050	1'-3'	Light Brown	Sandy
Method: HANA Auger			
Monitor Reading (ppm): 22.1			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
8015 MOD (DRO)	1 8oz glass	✓	
8015 B / 8021 B (GRO & BTEX)	3 Encore	✓	
9071 A (Oil & Grease)	1 4oz glass	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD

Duplicate ID No.: N/A

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCAF Bogue Field, NC
Project No.: CTO 272 / 7415

Sample ID No.: SS29-SB19-0406
Sample Location: SB19
Sampled By: MS
C.O.C. No.: 079539

- [ ] Surface Soil
- [x] Subsurface Soil
- [ ] Sediment
- [ ] Other:
- [ ] QA Sample Type:

Type of Sample:
- [ ] Low Concentration
- [x] High Concentration

GRAB SAMPLE DATA:

Date: 10/4/01	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1113	4'-6'	Light Brown	Sandy
Method: Hand Auger			
Monitor Reading (ppm): 104			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
8015 MOD (DRO)	1 8oz glass	✓	
8015B / 8021B (GRO & BTEX)	3 ENCORE	✓	
9071A (Oil & Grease)	1 4oz glass	✓	

OBSERVATIONS / NOTES:

Strong to medium Petroleum Smell
- Not as bad as deep samples at SB 20 & 21 location.

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
N/A	

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCALF Bogue Field, NC CTO 272 CTO 272
Project No.: 7415

Sample ID No.: S29-SB20-0103
Sample Location: SB20
Sampled By: AS
C.O.C. No.: 079539

- [ ] Surface Soil
- [x] Subsurface Soil
- [ ] Sediment
- [ ] Other:
- [ ] QA Sample Type:

Type of Sample:
- [ ] Low Concentration
- [x] High Concentration

GRAB SAMPLE DATA:

Date: 10/4/01	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 0850	1'-3'	Light Brown	Sandy
Method: Hand Auger			
Monitor Reading (ppm): 24.8			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
8015 Mod (DRO)	1 8oz glass	✓	✓
8015B/8021B (GRO & BTEX)	3 Encore	✓	✓
9071 A (Oil & Grease)	1 4oz glass	✓	✓

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD

Duplicate ID No.: N/A

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCALF Bogue Field, NC
Project No.: CTO 272 / 7415

Sample ID No.: S29-SB20-0406
Sample Location: SB20
Sampled By: RS
C.O.C. No.: 079539

- [ ] Surface Soil
- [x] Subsurface Soil
- [ ] Sediment
- [ ] Other:
- [ ] QA Sample Type:

Type of Sample:
- [ ] Low Concentration
- [x] High Concentration

GRAB SAMPLE DATA:

Date: 10/4/01	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 0925	4'-6'	Light/med Brown	Sandy
Method: HAND AUGER			
Monitor Reading (ppm): 281			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
8015 Mod (DRO)	1 8oz g/ss	✓	
8021B/8260B (GRO & BTEX)	3 Encore	✓	
9071A (Oil & Grease)	1 4oz g/ss	✓	

OBSERVATIONS / NOTES:

Strong petroleum smell
Moist but not wet

MAP:

Circle if Applicable:

MS/MSD

Duplicate ID No.: N/A

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCALF Bogue Field, NC
Project No.: CTO 272 / 7415

Sample ID No.: S29-SB21-0103
Sample Location: SB21
Sampled By: M
C.O.C. No.: 079539

- [] Surface Soil
- [■] Subsurface Soil
- [] Sediment
- [] Other: _____
- [] QA Sample Type: _____

Type of Sample:
- [■] Low Concentration
- [] High Concentration

GRAB SAMPLE DATA:

Date: 10/4/01	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 0940	1'-3'	Light Brown	Sandy
Method: Hand Auger			
Monitor Reading (ppm): 0.0			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
8015 MOD (DRO)	1 8oz glass	✓	
8015B / 8021B (GRO & BTEX)	3 ENCORE	✓	
9071A (Oil & Grease)	1 4oz glass	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD | Duplicate ID No.: N/A

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCAIF Bogue Field, NC
Project No.: CTO 272 / 7415

Sample ID No.: S29-SB21-0406
Sample Location: SB21
Sampled By: JS
C.O.C. No.: 079539

- [ ] Surface Soil
- [x] Subsurface Soil
- [ ] Sediment
- [ ] Other: ____
- [ ] QA Sample Type: ____

Type of Sample:
- [ ] Low Concentration
- [x] High Concentration

GRAB SAMPLE DATA:

Date: 10/4/01	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1012	4'-6'	Light Brown	SAND
Method: HAND AUGER			
Monitor Reading (ppm): 475			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
8015 MOD (DRO)	1 8oz glass	✓	
8015B/8021A (GRO & BTEX)	3 Encore	✓	
9071A (oil & grease)	1 4oz glass	✓	

OBSERVATIONS / NOTES:

Duplicate Sample taken this Location this Depth.
S29-DUP01

MAP:

#STRONG PETROLEUM SMELL

Circle if Applicable:

MS/MSD	Duplicate ID No.: S29-DUP01

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Page ___ of ___

Project Site Name: MCALF Bogue Field
Project No.: Site 29 CTO 272 / 7415

Sample ID No.: S29-SB22-0103
Sample Location: SB22
Sampled By: AL
C.O.C. No.: 079539

- [] Surface Soil
- [x] Subsurface Soil
- [] Sediment
- [] Other: _____
- [] QA Sample Type: _____

Type of Sample:
- [] Low Concentration
- [] High Concentration

GRAB SAMPLE DATA:

Date: 10/4/01	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1138	1'-3'	Light Brown	Sandy
Method: Hand Auger			
Monitor Reading (ppm): 0.0			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
8015 MOD (DRO)	1 8oz glass	✓	
8015B / 8021B (GRO & BTEX)	3 Encore	✓	
9071A (O&G)	1 4oz glass	✓	

OBSERVATIONS / NOTES:

MS/MSD extra sample collected at this location and depth.

MAP:

Circle if Applicable:

MS/MSD	~~Duplicate ID No.:~~
S29-MS/MSD	

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCALF Bogue Field, NC
Project No.: CTO 272 / 7415

Sample ID No.: 529-SB22-0406
Sample Location: SB22
Sampled By: RL
C.O.C. No.: 075939

- [ ] Surface Soil
- [x] Subsurface Soil
- [ ] Sediment
- [ ] Other: _____
- [ ] QA Sample Type: _____

Type of Sample:
- [ ] Low Concentration
- [ ] High Concentration

GRAB SAMPLE DATA:

Date: 10/4/01	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1205			
Method: Hand Auger			
Monitor Reading (ppm): 24.7			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
8015 MOD (DRO)	1 8oz glass	✓	
8015B / 8021B (GRO & BTEX)	3 Encore	✓	
9071A (Oil and Grease)	1 4oz glass	✓	

OBSERVATIONS / NOTES:

Medium to Strong petroleum smell. Note hole was open to 15 mm below PID reading collected.

MAP:

Circle if Applicable:

MS/MSD N/P

Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

EQUIPMENT CALIBRATION LOG

PROJECT NAME: Bryce Field

SITE NAME:

PROJECT No.:

INSTRUMENT NAME/MODEL: 2 Horiba U-10 / Photovac 2020

MANUFACTURER: Horiba / Photovac

SERIAL NUMBER: (Horiba) 906006 / 012001 - DQHS 313 (Photovac)

Date of Calibration	Instrument I.D. Number	Person Performing Calibration	Instrument Settings		Instrument Readings		Calibration Standard (Lot No.)	Remarks and Comments
			Pre-calibration	Post-calibration	Pre-calibration	Post-calibration		
Morning 10/2/01	DQHS 313	C Snyder	93.7	100.0	93.7	100.0	01-1936	Photovac 2020 initial cal
10/2/01	906006	" "					4.0	4.0 ph, 4.45 cond., 0 turb, 10.50 DO
10/2/01	012001	" "					4.0	4.0 ph, 4.49 cond, 0 turb, 9.89 DO
End of Day 10/2/01	DQHS 313	C Snyder				93.9	a-1936	
10/2/01	906006	" "					4.0	4.01 ph, 4.33 cond, 0 turb, 10.10 DO
10/2/01	012001	" "					4.0	4.05 ph, 4.41 cond, 0 turb, 8.95 DO
10/3/01	DQHS 313	" "	~~93~~ 100.0	100.0	93.4	100.0	01-1936	Cal morning
Morning 10/3/01	906006	" "					4.0	3.99 ph, 4.48 cond, 0 turb, 9.84 DO
10/3/01	012001	" "						3.99 ph, 4.49 cond, 0 turb, 9.94 DO

APPENDIX G

DATA VALIDATION LETTERS

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

TO: **MR. R. SIMCIK** **DATE:** **DECEMBER 18, 2001**

FROM: **BERNARD F SPADA III** **COPIES:** **DV FILE**

SUBJECT: **ORGANIC DATA VALIDATION- VOA/PET**
CTO 272, MCAS CHERRY POINT
SDG C1J050261

SAMPLES: 1/Aqueous

S29-TB03

9/Soils

S29-DUP02	S29-SB19-0103	S29-SB19-0406
S29-SB20-0103	S29-SB20-0406	S29-SB22-0406
S29-SB21-0103	S29-SB21-0406	S29-SB22-0103

OVERVIEW

The sample set for CTO 272, MCAS Cherry Point, SDG C1J050261 consists of one (1) aqueous blank sample and nine (9) environmental soil samples. The aqueous sample was analyzed for Benzene, Toluene, Ethylbenzene, and Xylenes (BTEX) by method SW-846 8021B. The soil samples were analyzed for BTEX, gasoline range organics (GRO), diesel range organics (DRO), and Oil and Grease by methods SW-846 8021B, 8015B, 8015 MOD, and 9071A respectively.

The samples were collected by Tetra Tech NUS on October 4, 2001 and analyzed by Severn Trent Laboratories. All analyses were conducted in accordance with Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria using SW-846 Methods 8021B, 8015B, 8015 MOD and 9071A analytical and reporting protocols. The data contained in this SDG were validated with regard to the following parameters:

* • Data completeness
• Holding times
* • Initial and continuing calibration
* • Laboratory method and field quality control blank results
* • Surrogate spike recoveries
* • Matrix Spike Recoveries
* • Blank Spike Recoveries
* • Field Duplicate Precision
* • Sample Quantitation
• Detection Limits

The symbol (*) indicates that all quality control criteria were met for this parameter. Problems affecting data quality are discussed below; documentation supporting these findings is presented in Appendix C. Qualified Analytical results are presented in Appendix A.

The text of this report is formulated to address only gross noncompliances resulting in the rejection of data and the elimination of false positives.

BTEX

All samples except S29-SB20-0103 and S29-SB21-0103 were analyzed at a dilution due to interference from the high concentrations of GRO in the samples. Dilutions ranged from 5X to 20X. Elevated reporting limits were reported in the diluted analyses.

GRO

All samples except S29-SB20-0103 and S29-SB21-0103 were analyzed at a dilution due to the high levels of target analytes present.

DRO

The surrogate recovery for sample S29-SB-20-103 was 0%. The sample was re-extracted out of holding time and analyzed. The surrogate recovery for the re-extracted sample was 13%. The result from the re-extracted sample was transposed to the original run and qualified as estimated (J), due to the holding time exceedance.

Oil and Grease

No qualifiers were assigned to this fraction.

EXECUTIVE SUMMARY

Laboratory Performance Issues: One DRO analysis was qualified due to a holding time exceedance.

Other Factors Affecting Data Quality: None.

The data for these analyses were reviewed with reference to the EPA Functional Guidelines for Organic Data Validation (10/99) and the NFESC guidelines. The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC guidelines and the Quality Assurance Project Plan (QAPP)."

Tetra Tech NUS

Bernard F. Spada III
Chemist/Data Validator

TetraTech NUS

Joseph A. Samchuck
Data Validation Quality Assurance Officer

Attachments:
1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as Reported by the Laboratory
3. Appendix C - Support Documentation

APPENDIX A

QUALIFIED ANALYTICAL RESULTS

Qualifier Codes:

A = Lab Blank Contamination
B = Field Blank Contamination
C = Calibration (i.e., % RSDs, %Ds, ICVs, CCVs, RPDs, RRFs, etc.) Noncompliance
D = MS/MSD Noncompliance
E = LCS/LCSD Noncompliance
F = Lab Duplicate Imprecision
G = Field Duplicate Imprecision
H = Holding Time Exceedance
I = ICP Serial Dilution Noncompliance
J = GFAA PDS - GFAA MSA's r < 0.995
K = ICP Interference - include ICSAB % R's
L = Instrument Calibration Range Exceedance
M = Sample Preservation
N = Internal Standard Noncompliance
N01 = Internal Standard Noncompliance Dioxins
N02 = Recovery Standard Noncompliance Dioxins
N03 = Clean-up Standard Noncompliance Dioxins
O = Poor Instrument Performance (i.e., base-time drifting)
P = Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
Q = Other problems (can encompass a number of issues)
R = Surrogates Recovery Noncompliance
S = Pesticide/PCB Resolution
T = % Breakdown Noncompliance for DDT and Endrin
U = Pest/PCD% between columns for positive results
V = Non-linear calibrations, tuning r < 0.995 (correlation coefficient)
W = EMPC result
X = Signal to noise response drop
Y = Percent solids <30%
Z = Uncertainty at 2 sigma deviation is less than sample activity

SAMPLE NUMBER:	S29-DUP02	S29-SB19-0103	S29-SB19-0406	S29-SB20-0103
SAMPLE DATE:	10/04/01	10/04/01	10/04/01	10/04/01
LABORATORY ID:	C1J050261005	C1J050261006	C1J050261007	C1J050261001
QC_TYPE:	NORMAL	NORMAL	NORMAL	NORMAL
% SOLIDS:	94.6 %	93.7 %	94.3 %	91.0 %
UNITS:	UG/KG	UG/KG	UG/KG	UG/KG
FIELD DUPLICATE OF:	S29-SB21-0406			

	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE
VOLATILES												
BENZENE	260	U		1100	U		1100	U		1.1	U	
ETHYLBENZENE	260	U		1100	U		1100	U		1.1	U	
TOLUENE	260	U		1100	U		1100	U		1.1	U	
TOTAL XYLENES	260	U		1100	U		1100	U		1.1	U	

CTO272-MCAS CHERRY POINT
SOIL DATA
STL-PGH
SDG: C1J050261

SAMPLE NUMBER:	S29-SB20-0406			S29-SB21-0103			S29-SB21-0406			S29-SB22-0103		
SAMPLE DATE:	10/04/01			10/04/01			10/04/01			10/04/01		
LABORATORY ID:	C1J050261002			C1J050261003			C1J050261004			C1J050261008		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	93.6 %			94.8 %			95.1 %			94.9 %		
UNITS:	UG/KG			UG/KG			UG/KG			UG/KG		
FIELD DUPLICATE OF:												
	RESULT	**QUAL**	**CODE**	**RESULT**	**QUAL**	**CODE**	**RESULT**	**QUAL**	**CODE**	**RESULT**	**QUAL**	**CODE**
VOLATILES												
BENZENE	270	U		1.1	U		260	U		53	U	
ETHYLBENZENE	270	U		1.1	U		260	U		53	U	
TOLUENE	270	U		1.1	U		260	U		53	U	
TOTAL XYLENES	270	U		1.1	U		260	U		53	U	

SAMPLE NUMBER:	S29-SB22-0406			
SAMPLE DATE:	10/04/01	/ /	/ /	/ /
LABORATORY ID:	C1J050261009			
QC_TYPE:	NORMAL			
% SOLIDS:	94.7 %	100.0 %	100.0 %	100.0 %
UNITS:	UG/KG			
FIELD DUPLICATE OF:				

	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE
VOLATILES												
BENZENE	1100	U										
ETHYLBENZENE	1100	U										
TOLUENE	1100	U										
TOTAL XYLENES	1100	U										

CTO272-MCAS CHERRY POINT
WATER DATA
STL-PGH
SDG: C1J050261

SAMPLE NUMBER:	S29-TB03			
SAMPLE DATE:	10/04/01	/ /	/ /	/ /
LABORATORY ID:	C1J050261010			
QC_TYPE:	NORMAL			
% SOLIDS:	0.0 %	100.0 %	100.0 %	100.0 %
UNITS:	UG/L			
FIELD DUPLICATE OF:				

	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE
VOLATILES												
BENZENE	1	U										
ETHYLBENZENE	1	U										
TOLUENE	1	U										
TOTAL XYLENES	1	U										

SAMPLE NUMBER:	S29-DUP02	S29-SB19-0103	S29-SB19-0406	S29-SB20-0103
SAMPLE DATE:	10/04/01	10/04/01	10/04/01	10/04/01
LABORATORY ID:	C1J050261005	C1J050261006	C1J050261007	C1J050261001
QC_TYPE:	NORMAL	NORMAL	NORMAL	NORMAL
% SOLIDS:	94.6 %	93.7 %	94.3 %	91.0 %
UNITS:	MG/KG	MG/KG	MG/KG	MG/KG
FIELD DUPLICATE OF:	S29-SB21-0406			

	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE
DIESEL RANGE ORGANICS	3500			720			9700			8.3	J	PH
GASOLINE RANGE ORGANICS	2200			6400			11000			0.110	U	
OIL & GREASE	1830			768			3410			506		

CTO272-MCAS CHERRY POINT
SOIL DATA
STL-PGH
SDG: C1J050261

SAMPLE NUMBER:	S29-SB20-0406			S29-SB21-0103			S29-SB21-0406			S29-SB22-0103		
SAMPLE DATE:	10/04/01			10/04/01			10/04/01			10/04/01		
LABORATORY ID:	C1J050261002			C1J050261003			C1J050261004			C1J050261008		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	93.6 %			94.8 %			95.1 %			94.9 %		
UNITS:	MG/KG			MG/KG			MG/KG			MG/KG		
FIELD DUPLICATE OF:												
	RESULT	**QUAL**	**CODE**	**RESULT**	**QUAL**	**CODE**	**RESULT**	**QUAL**	**CODE**	**RESULT**	**QUAL**	**CODE**
DIESEL RANGE ORGANICS	18000			11	U		3800			150		
GASOLINE RANGE ORGANICS	7200			0.110	U		1600			8.9		
OIL & GREASE	8410			443			1920			548		

SAMPLE NUMBER:	S29-SB22-0406			
SAMPLE DATE:	10/04/01	/ /	/ /	/ /
LABORATORY ID:	C1J050261009			
QC_TYPE:	NORMAL			
% SOLIDS:	94.7 %	100.0 %	100.0 %	100.0 %
UNITS:	MG/KG			
FIELD DUPLICATE OF:				

	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE
DIESEL RANGE ORGANICS	8900											
GASOLINE RANGE ORGANICS	11000											
OIL & GREASE	4100											

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

TO: **MR. R. SIMCIK** **DATE:** **DECEMBER 18, 2001**

FROM: **BERNARD F SPADA III** **COPIES:** **DV FILE**

SUBJECT: **ORGANIC DATA VALIDATION- VOA/BTEX/SVOA**
CTO 272, MCAS CHERRY POINT
SDG C1J040275

SAMPLES: 12/Aqueous

S29-DUP01	S29-MW01-05	S29-MW02-05
S29-MW03-05	S29-MW04-05	S29-MW06-05
S29-MW07-05	S29-MW08-05	S29-MW10-05
S29-MW11-05	S29-TB01*	S29-TB02*

OVERVIEW

The sample set for CTO 272, MCAS Cherry Point, SDG C1J040275 consists of nine (9) environmental aqueous samples one (1) field blank and two trip blanks. The aqueous samples were analyzed for Benzene, Toluene, Ethylbenzene, and Xylenes (BTEX) by method SW-846 8260B, EPA Method 602, and semivolatile organic carbons (SVOA) by EPA Method 625. They were also analyzed for volatile organic carbons (VOC) by EPA Method 601. The trip blanks, indicated by and asterisk, were analyzed for volatile organic carbons (VOC) and Benzene, Toluene, Ethylbenzene and Xylene (BTEX) by EPA Methods 601 and 602 respectively.

The samples were collected by Tetra Tech NUS on October 2 and 3, 2001 and analyzed by Severn Trent Laboratories. All analyses were conducted in accordance with Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria using SW-846 Methods 8260B, EPA 601, 602 and 625 analytical and reporting protocols. The data contained in this SDG were validated with regard to the following parameters:

* • Data completeness
* • Holding times
• Initial and continuing calibration
* • Laboratory method and field quality control blank results
* • Surrogate spike recoveries
* • Matrix Spike Recoveries
* • Blank Spike Recoveries
* • Field Duplicate Precision
* • Sample Quantitation
* • Detection Limits

The symbol (*) indicates that all quality control criteria were met for this parameter. Problems affecting data quality are discussed below; documentation supporting these findings is presented in Appendix C. Qualified Analytical results are presented in Appendix A.

The text of this report is formulated to address only gross noncompliances resulting in the rejection of data and the elimination of false positives.

BTEX

BTEX compounds were reported and used in validation from the EPA 602 analyses because the detection limits were lower than Method 8260B.

VOA

2-chloroethyl-vinyl-ether was not reported by the laboratory due to inconsistent responses in acid preserved samples.

The continuing calibration analyzed on October 10, 2001 at 7:54 exceeded the ±25%D acceptance limit for chloroethane. All associated non-detects were qualified as estimated (UJ).

SVOA

Samples S29-DUP01, S29-MW07-05, and S29-MW11-05 had positive results below the detection limit for di-n-butyl phthalate. These samples were qualified as estimated (J) due to uncertainty near detection limit.

Sample S29-MW10-05 had a positive result below the detection limit for phenanthrene. This sample was qualified as estimated (J) due to uncertainty near detection limit.

EXECUTIVE SUMMARY

Laboratory Performance Issues: A calibration noncompliance was noted for chloroethane.

Other Factors Affecting Data Quality: None.

The data for these analyses were reviewed with reference to the EPA Functional Guidelines for Organic Data Validation (10/99) and the NFESC guidelines. The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC guidelines and the Quality Assurance Project Plan (QAPP)."

Tetra Tech NUS

Bernard F. Spada III
Chemist/Data Validator

TetraTech NUS

Joseph A. Samchuck
Data Validation Quality Assurance Officer

Attachments:
1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as Reported by the Laboratory
3. Appendix C - Support Documentation

Tentatively Identified Compounds

Semivolatile

Unknown phthalate
Unknown decanol
Benzoic acid
Unknown substituted naphthal
Unknown organic acid
Unknown substituted propene
1-butoxy-2-propanol
Unknown branched alkane
Unknown substituted benzene
2-methylnaphthalene
1-methylnaphthalene
p-tolylacetic acid
o-tolylacetic acid

Qualifier Codes:

A	=	Lab Blank Contamination
B	=	Field Blank Contamination
C	=	Calibration (i.e., % RSDs, %Ds, ICVs, CCVs, RPDs, RRFs, etc.) Noncompliance
D	=	MS/MSD Noncompliance
E	=	LCS/LCSD Noncompliance
F	=	Lab Duplicate Imprecision
G	=	Field Duplicate Imprecision
H	=	Holding Time Exceedance
I	=	ICP Serial Dilution Noncompliance
J	=	GFAA PDS - GFAA MSA's $r < 0.995$
K	=	ICP Interference - include ICSAB % R's
L	=	Instrument Calibration Range Exceedance
M	=	Sample Preservation
N	=	Internal Standard Noncompliance
O	=	Poor Instrument Performance (i.e., base-time drifting)
P	=	Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
Q	=	Other problems (can encompass a number of issues)
R	=	Surrogates Recovery Noncompliance
S	=	Pesticide/PCB Resolution
T	=	% Breakdown Noncompliance for DDT and Endrin
U	=	Pest/PCD% between columns for positive results
V	=	Non-linear calibrations, tuning $r < 0.995$ (correlation coefficient)
W	=	EMPC result
X	=	Signal to noise response drop
Y	=	Percent solids <30%
Z	=	Uncertainty at 2 sigma deviation is less than sample activity

APPENDIX A

QUALIFIED ANALYTICAL RESULTS

SAMPLE NUMBER:	S29-DUP01	S29-MW01-05	S29-MW02-05	S29-MW03-05
SAMPLE DATE:	10/02/01	10/02/01	10/02/01	10/02/01
LABORATORY ID:	C1J040275006	C1J040275001	C1J040275002	C1J040275003
QC_TYPE:	NORMAL	NORMAL	NORMAL	NORMAL
% SOLIDS:	0.0 %	0.0 %	0.0 %	0.0 %
UNITS:	UG/L	UG/L	UG/L	UG/L
FIELD DUPLICATE OF:	S29-MW02-05			

	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE
VOLATILES												
1,1,1-TRICHLOROETHANE	1.3	U		1.3	U		1.3	U		1.3	U	
1,1,2,2-TETRACHLOROETHANE	0.3	U		0.3	U		0.3	U		0.3	U	
1,1,2-TRICHLOROETHANE	0.2	U		0.2	U		0.2	U		0.2	U	
1,1-DICHLOROETHANE	0.7	U		0.7	U		0.7	U		0.7	U	
1,1-DICHLOROETHENE	1	U		1	U		1	U		1	U	
1,2-DIBROMOETHANE	1	U		1	U		1	U		1	U	
1,2-DICHLOROBENZENE	1	U		1	U		1	U		1	U	
1,2-DICHLOROETHANE	0.3	U		0.3	U		0.3	U		0.3	U	
1,2-DICHLOROPROPANE	0.4	U		0.4	U		0.4	U		0.4	U	
1,3-DICHLOROBENZENE	1	U		1	U		1	U		1	U	
1,4-DICHLOROBENZENE	1	U		1	U		1	U		1	U	
BROMODICHLOROMETHANE	1	U		1	U		1	U		1	U	
BROMOFORM	1	U		1	U		1	U		1	U	
BROMOMETHANE	1	U		1	U		1	U		1	U	
CARBON TETRACHLORIDE	1	U		1	U		1	U		1	U	
CHLOROBENZENE	1	U		1	U		1	U		1	U	
CHLORODIBROMOMETHANE	0.9	U		0.9	U		0.9	U		0.9	U	
CHLOROETHANE	1	UJ	C	1	UJ	C	1	UJ	C	1	UJ	C
CHLOROFORM	0.5	U		0.5	U		0.5	U		0.5	U	
CHLOROMETHANE	0.8	U		0.8	U		0.8	U		0.8	U	
CIS-1,2-DICHLOROETHENE	0.5	U		0.5	U		0.5	U		0.5	U	
CIS-1,3-DICHLOROPROPENE	1	U		1	U		1	U		1	U	
DICHLORODIFLUOROMETHANE	1	U		1	U		1	U		1	U	
METHYLENE CHLORIDE	1	U		1	U		1	U		1	U	
TETRACHLOROETHENE	0.3	U		0.3	U		0.3	U		0.3	U	
TOTAL 1,2-DICHLOROETHENE	1	U		1	U		1	U		1	U	
TRANS-1,2-DICHLOROETHENE	0.5	U		0.5	U		0.5	U		0.5	U	
TRANS-1,3-DICHLOROPROPENE	1	U		1	U		1	U		1	U	
TRICHLOROETHENE	1	U		1	U		1	U		1	U	
TRICHLOROFLUOROMETHANE	1	U		1	U		1	U		1	U	
VINYL CHLORIDE	1	U		1	U		1	U		1	U	

CTO272-MCAS CHERRY POINT
WATER DATA
STL-PGH
SDG: C1J040275

SAMPLE NUMBER:	S29-MW04-05			S29-MW06-05			S29-MW07-05			S29-MW08-05		
SAMPLE DATE:	10/02/01			10/03/01			10/03/01			10/02/01		
LABORATORY ID:	C1J040275004			C1J040275010			C1J040275007			C1J040275005		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	0.0 %			0.0 %			0.0 %			0.0 %		
UNITS:	UG/L			UG/L			UG/L			UG/L		
FIELD DUPLICATE OF:												

	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE
VOLATILES												
1,1,1-TRICHLOROETHANE	1.3	U		1.3	U		1.3	U		1.3	U	
1,1,2,2-TETRACHLOROETHANE	0.3	U		0.3	U		0.3	U		0.3	U	
1,1,2-TRICHLOROETHANE	0.2	U		0.2	U		0.2	U		0.2	U	
1,1-DICHLOROETHANE	0.7	U		0.7	U		0.7	U		0.7	U	
1,1-DICHLOROETHENE	1	U		1	U		1	U		1	U	
1,2-DIBROMOETHANE	1	U		1	U		1	U		1	U	
1,2-DICHLOROBENZENE	1	U		1	U		1	U		1	U	
1,2-DICHLOROETHANE	0.3	U		0.3	U		0.3	U		0.3	U	
1,2-DICHLOROPROPANE	0.4	U		0.4	U		0.4	U		0.4	U	
1,3-DICHLOROBENZENE	1	U		1	U		1	U		1	U	
1,4-DICHLOROBENZENE	1	U		1	U		1	U		1	U	
BROMODICHLOROMETHANE	1	U		1	U		1	U		1	U	
BROMOFORM	1	U		1	U		1	U		1	U	
BROMOMETHANE	1	U		1	U		1	U		1	U	
CARBON TETRACHLORIDE	1	U		1	U		1	U		1	U	
CHLOROBENZENE	1	U		1	U		1	U		1	U	
CHLORODIBROMOMETHANE	0.9	U		0.9	U		0.9	U		0.9	U	
CHLOROETHANE	1	UJ	C	1	UJ	C	1	U		1	UJ	C
CHLOROFORM	0.5	U		0.5	U		0.5	U		0.5	U	
CHLOROMETHANE	0.8	U		0.8	U		0.8	U		0.8	U	
CIS-1,2-DICHLOROETHENE	0.5	U		0.5	U		0.5	U		0.5	U	
CIS-1,3-DICHLOROPROPENE	1	U		1	U		1	U		1	U	
DICHLORODIFLUOROMETHANE	1	U		1	U		1	U		1	U	
METHYLENE CHLORIDE	1	U		1	U		1	U		1	U	
TETRACHLOROETHENE	0.3	U		0.3	U		0.3	U		0.3	U	
TOTAL 1,2-DICHLOROETHENE	1	U		1	U		1	U		1	U	
TRANS-1,2-DICHLOROETHENE	0.5	U		0.5	U		0.5	U		0.5	U	
TRANS-1,3-DICHLOROPROPENE	1	U		1	U		1	U		1	U	
TRICHLOROETHENE	1	U		1	U		1	U		1	U	
TRICHLOROFLUOROMETHANE	1	U		1	U		1	U		1	U	
VINYL CHLORIDE	1	U		1	U		1	U		1	U	

SAMPLE NUMBER:	S29-MW10-05	S29-MW11-05	S29-TB01	S29-TB02
SAMPLE DATE:	10/03/01	10/03/01	10/02/01	10/03/01
LABORATORY ID:	C1J040275009	C1J040275008	C1J040275011	C1J040275012
QC_TYPE:	NORMAL	NORMAL	NORMAL	NORMAL
% SOLIDS:	0.0 %	0.0 %	0.0 %	0.0 %
UNITS:	UG/L	UG/L	UG/L	UG/L
FIELD DUPLICATE OF:				

	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE
VOLATILES												
1,1,1-TRICHLOROETHANE	1.3	U		1.3	U		1.3	U		1.3	U	
1,1,2,2-TETRACHLOROETHANE	0.3	U		0.3	U		0.3	U		0.3	U	
1,1,2-TRICHLOROETHANE	0.2	U		0.2	U		0.2	U		0.2	U	
1,1-DICHLOROETHANE	0.7	U		0.7	U		0.7	U		0.7	U	
1,1-DICHLOROETHENE	1	U		1	U		1	U		1	U	
1,2-DIBROMOETHANE	1	U		1	U		1	U		1	U	
1,2-DICHLOROBENZENE	1	U		1	U		1	U		1	U	
1,2-DICHLOROETHANE	0.3	U		0.3	U		0.3	U		0.3	U	
1,2-DICHLOROPROPANE	0.4	U		0.4	U		0.4	U		0.4	U	
1,3-DICHLOROBENZENE	1	U		1	U		1	U		1	U	
1,4-DICHLOROBENZENE	1	U		1	U		1	U		1	U	
BROMODICHLOROMETHANE	1	U		1	U		1	U		1	U	
BROMOFORM	1	U		1	U		1	U		1	U	
BROMOMETHANE	1	U		1	U		1	U		1	U	
CARBON TETRACHLORIDE	1	U		1	U		1	U		1	U	
CHLOROBENZENE	1	U		1	U		1	U		1	U	
CHLORODIBROMOMETHANE	0.9	U		0.9	U		0.9	U		0.9	U	
CHLOROETHANE	1	UJ	C	1	UJ	C	1	U		1	U	
CHLOROFORM	0.5	U		0.5	U		0.5	U		0.5	U	
CHLOROMETHANE	0.8	U		0.8	U		0.8	U		0.8	U	
CIS-1,2-DICHLOROETHENE	0.5	U		0.5	U		0.5	U		0.5	U	
CIS-1,3-DICHLOROPROPENE	1	U		1	U		1	U		1	U	
DICHLORODIFLUOROMETHANE	1	U		1	U		1	U		1	U	
METHYLENE CHLORIDE	1	U		1	U		1	U		1	U	
TETRACHLOROETHENE	0.3	U		0.3	U		0.3	U		0.3	U	
TOTAL 1,2-DICHLOROETHENE	1	U		1	U		1	U		1	U	
TRANS-1,2-DICHLOROETHENE	0.5	U		0.5	U		0.5	U		0.5	U	
TRANS-1,3-DICHLOROPROPENE	1	U		1	U		1	U		1	U	
TRICHLOROETHENE	1	U		1	U		1	U		1	U	
TRICHLOROFLUOROMETHANE	1	U		1	U		1	U		1	U	
VINYL CHLORIDE	1	U		1	U		1	U		1	U	

CTO272-MCAS CHERRY POINT
WATER DATA
STL-PGH
SDG: C1J040275

SAMPLE NUMBER:	S29-DUP01			S29-MW01-05			S29-MW02-05			S29-MW03-05		
SAMPLE DATE:	10/02/01			10/02/01			10/02/01			10/02/01		
LABORATORY ID:	C1J040275006			C1J040275001			C1J040275002			C1J040275003		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	0.0 %			0.0 %			0.0 %			0.0 %		
UNITS:	UG/L			UG/L			UG/L			UG/L		
FIELD DUPLICATE OF:	S29-MW02-05											
	RESULT	**QUAL**	**CODE**	**RESULT**	**QUAL**	**CODE**	**RESULT**	**QUAL**	**CODE**	**RESULT**	**QUAL**	**CODE**
VOLATILES												
BENZENE	1	U		1	U		1	U		1	U	
ETHYLBENZENE	1	U		1	U		1	U		1	U	
TOLUENE	1	U		1	U		1	U		1	U	
TOTAL XYLENES	1	U		1	U		1	U		1	U	

SAMPLE NUMBER:	S29-MW04-05	S29-MW06-05	S29-MW07-05	S29-MW08-05
SAMPLE DATE:	10/02/01	10/03/01	10/03/01	10/02/01
LABORATORY ID:	C1J040275004	C1J040275010	C1J040275007	C1J040275005
QC_TYPE:	NORMAL	NORMAL	NORMAL	NORMAL
% SOLIDS:	0.0 %	0.0 %	0.0 %	0.0 %
UNITS:	UG/L	UG/L	UG/L	UG/L
FIELD DUPLICATE OF:				

	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE
VOLATILES												
BENZENE	1	U		1	U		1	U		1	U	
ETHYLBENZENE	1	U		1	U		1	U		1	U	
TOLUENE	1	U		1	U		1	U		1	U	
TOTAL XYLENES	1	U		1	U		1	U		1	U	

CTO272-MCAS CHERRY POINT
WATER DATA
STL-PGH
SDG: C1J040275

SAMPLE NUMBER:	S29-MW10-05	S29-MW11-05	S29-TB01	S29-TB02
SAMPLE DATE:	10/03/01	10/03/01	10/02/01	10/03/01
LABORATORY ID:	C1J040275009	C1J040275008	C1J040275011	C1J040275012
QC_TYPE:	NORMAL	NORMAL	NORMAL	NORMAL
% SOLIDS:	0.0 %	0.0 %	0.0 %	0.0 %
UNITS:	UG/L	UG/L	UG/L	UG/L
FIELD DUPLICATE OF:				

	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE
VOLATILES												
BENZENE	1	U		1	U		1	U		1	U	
ETHYLBENZENE	1	U		1	U		1	U		1	U	
TOLUENE	1	U		1	U		1	U		1	U	
TOTAL XYLENES	1	U		1	U		1	U		1	U	

SAMPLE NUMBER:	S29-DUP01	S29-MW01-05	S29-MW02-05	S29-MW03-05
SAMPLE DATE:	10/02/01	10/02/01	10/02/01	10/02/01
LABORATORY ID:	C1J040275006	C1J040275001	C1J040275002	C1J040275003
QC_TYPE:	NORMAL	NORMAL	NORMAL	NORMAL
% SOLIDS:	0.0 %	0.0 %	0.0 %	0.0 %
UNITS:	UG/L	UG/L	UG/L	UG/L
FIELD DUPLICATE OF:	S29-MW02-05			

	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE
SEMIVOLATILES												
1,2,4-TRICHLOROBENZENE	10	U		10	U		10	U		10	U	
1,2-DICHLOROBENZENE	10	U		10	U		10	U		10	U	
1,2-DIPHENYLHYDRAZINE	10	U		10	U		10	U		10	U	
1,3-DICHLOROBENZENE	10	U		10	U		10	U		10	U	
1,4-DICHLOROBENZENE	10	U		10	U		10	U		10	U	
2,2'-OXYBIS(1-CHLOROPROPANE)	10	U		10	U		10	U		10	U	
2,4,6-TRICHLOROPHENOL	10	U		10	U		10	U		10	U	
2,4-DICHLOROPHENOL	10	U		10	U		10	U		10	U	
2,4-DIMETHYLPHENOL	10	U		10	U		10	U		10	U	
2,4-DINITROPHENOL	50	U		50	U		50	U		50	U	
2,4-DINITROTOLUENE	10	U		10	U		10	U		10	U	
2,6-DINITROTOLUENE	10	U		10	U		10	U		10	U	
2-CHLORONAPHTHALENE	10	U		10	U		10	U		10	U	
2-CHLOROPHENOL	10	U		10	U		10	U		10	U	
2-NITROPHENOL	10	U		10	U		10	U		10	U	
3,3'-DICHLOROBENZIDINE	20	U		20	U		20	U		20	U	
4,6-DINITRO-2-METHYLPHENOL	50	U		50	U		50	U		50	U	
4-BROMOPHENYL PHENYL ETHER	10	U		10	U		10	U		10	U	
4-CHLORO-3-METHYLPHENOL	10	U		10	U		10	U		10	U	
4-CHLOROPHENYL PHENYL ETHER	10	U		10	U		10	U		10	U	
4-NITROPHENOL	50	U		50	U		50	U		50	U	
ACENAPHTHENE	10	U		10	U		10	U		10	U	
ACENAPHTHYLENE	10	U		10	U		10	U		10	U	
ANTHRACENE	10	U		10	U		10	U		10	U	
BENZIDINE	50	U		50	U		50	U		50	U	
BENZO(A)ANTHRACENE	10	U		10	U		10	U		10	U	
BENZO(A)PYRENE	10	U		10	U		10	U		10	U	
BENZO(B)FLUORANTHENE	10	U		10	U		10	U		10	U	
BENZO(G,H,I)PERYLENE	10	U		10	U		10	U		10	U	
BENZO(K)FLUORANTHENE	10	U		10	U		10	U		10	U	
BIS(2-CHLOROETHOXY)METHANE	10	U		10	U		10	U		10	U	

CTO272-MCAS CHERRY POINT
WATER DATA
STL-PGH
SDG: C1J040275

SAMPLE NUMBER:	S29-DUP01			S29-MW01-05			S29-MW02-05			S29-MW03-05		
SAMPLE DATE:	10/02/01			10/02/01			10/02/01			10/02/01		
LABORATORY ID:	C1J040275006			C1J040275001			C1J040275002			C1J040275003		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	0.0 %			0.0 %			0.0 %			0.0 %		
UNITS:	UG/L			UG/L			UG/L			UG/L		
FIELD DUPLICATE OF:	S29-MW02-05											

	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE
SEMIVOLATILES												
BIS(2-CHLOROETHYL)ETHER	10	U		10	U		10	U		10	U	
BIS(2-ETHYLHEXYL)PHTHALATE	10	U		10	U		10	U		10	U	
BUTYL BENZYL PHTHALATE	10	U		10	U		10	U		10	U	
CHRYSENE	10	U		10	U		10	U		10	U	
DI-N-BUTYL PHTHALATE	2	J	P	10	U		10	U		10	U	
DI-N-OCTYL PHTHALATE	10	U		10	U		10	U		10	U	
DIBENZO(A,H)ANTHRACENE	10	U		10	U		10	U		10	U	
DIETHYL PHTHALATE	10	U		10	U		10	U		10	U	
DIMETHYL PHTHALATE	10	U		10	U		10	U		10	U	
FLUORANTHENE	10	U		10	U		10	U		10	U	
FLUORENE	10	U		10	U		10	U		10	U	
HEXACHLOROBENZENE	10	U		10	U		10	U		10	U	
HEXACHLOROBUTADIENE	10	U		10	U		10	U		10	U	
HEXACHLOROCYCLOPENTADIENE	10	U		10	U		10	U		10	U	
HEXACHLOROETHANE	10	U		10	U		10	U		10	U	
INDENO(1,2,3-CD)PYRENE	10	U		10	U		10	U		10	U	
ISOPHORONE	10	U		10	U		10	U		10	U	
N-NITROSO-DI-N-PROPYLAMINE	10	U		10	U		10	U		10	U	
N-NITROSODIMETHYLAMINE	10	U		10	U		10	U		10	U	
N-NITROSODIPHENYLAMINE	10	U		10	U		10	U		10	U	
NAPHTHALENE	10	U		10	U		10	U		10	U	
NITROBENZENE	10	U		10	U		10	U		10	U	
PENTACHLOROPHENOL	50	U		50	U		50	U		50	U	
PHENANTHRENE	10	U		10	U		10	U		10	U	
PHENOL	10	U		10	U		10	U		10	U	
PYRENE	10	U		10	U		10	U		10	U	

SAMPLE NUMBER:	S29-MW04-05			S29-MW06-05			S29-MW07-05			S29-MW08-05		
SAMPLE DATE:	10/02/01			10/03/01			10/03/01			10/02/01		
LABORATORY ID:	C1J040275004			C1J040275010			C1J040275007			C1J040275005		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	0.0 %			0.0 %			0.0 %			0.0 %		
UNITS:	UG/L			UG/L			UG/L			UG/L		
FIELD DUPLICATE OF:												
	RESULT	**QUAL**	**CODE**	**RESULT**	**QUAL**	**CODE**	**RESULT**	**QUAL**	**CODE**	**RESULT**	**QUAL**	**CODE**
SEMIVOLATILES												
1,2,4-TRICHLOROBENZENE	10	U		10	U		10	U		10	U	
1,2-DICHLOROBENZENE	10	U		10	U		10	U		10	U	
1,2-DIPHENYLHYDRAZINE	10	U		10	U		10	U		10	U	
1,3-DICHLOROBENZENE	10	U		10	U		10	U		10	U	
1,4-DICHLOROBENZENE	10	U		10	U		10	U		10	U	
2,2'-OXYBIS(1-CHLOROPROPANE)	10	U		10	U		10	U		10	U	
2,4,6-TRICHLOROPHENOL	10	U		10	U		10	U		10	U	
2,4-DICHLOROPHENOL	10	U		10	U		10	U		10	U	
2,4-DIMETHYLPHENOL	10	U		10	U		10	U		10	U	
2,4-DINITROPHENOL	50	U		50	U		50	U		50	U	
2,4-DINITROTOLUENE	10	U		10	U		10	U		10	U	
2,6-DINITROTOLUENE	10	U		10	U		10	U		10	U	
2-CHLORONAPHTHALENE	10	U		10	U		10	U		10	U	
2-CHLOROPHENOL	10	U		10	U		10	U		10	U	
2-NITROPHENOL	10	U		10	U		10	U		10	U	
3,3'-DICHLOROBENZIDINE	20	U		20	U		20	U		20	U	
4,6-DINITRO-2-METHYLPHENOL	50	U		50	U		50	U		50	U	
4-BROMOPHENYL PHENYL ETHER	10	U		10	U		10	U		10	U	
4-CHLORO-3-METHYLPHENOL	10	U		10	U		10	U		10	U	
4-CHLOROPHENYL PHENYL ETHER	10	U		10	U		10	U		10	U	
4-NITROPHENOL	50	U		50	U		50	U		50	U	
ACENAPHTHENE	10	U		10	U		10	U		10	U	
ACENAPHTHYLENE	10	U		10	U		10	U		10	U	
ANTHRACENE	10	U		10	U		10	U		10	U	
BENZIDINE	50	U		50	U		50	U		50	U	
BENZO(A)ANTHRACENE	10	U		10	U		10	U		10	U	
BENZO(A)PYRENE	10	U		10	U		10	U		10	U	
BENZO(B)FLUORANTHENE	10	U		10	U		10	U		10	U	
BENZO(G,H,I)PERYLENE	10	U		10	U		10	U		10	U	
BENZO(K)FLUORANTHENE	10	U		10	U		10	U		10	U	
BIS(2-CHLOROETHOXY)METHANE	10	U		10	U		10	U		10	U	

CTO272-MCAS CHERRY POINT
WATER DATA
STL-PGH
SDG: C1J040275

SAMPLE NUMBER:	S29-MW04-05			S29-MW06-05			S29-MW07-05			S29-MW08-05		
SAMPLE DATE:	10/02/01			10/03/01			10/03/01			10/02/01		
LABORATORY ID:	C1J040275004			C1J040275010			C1J040275007			C1J040275005		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	0.0 %			0.0 %			0.0 %			0.0 %		
UNITS:	UG/L			UG/L			UG/L			UG/L		
FIELD DUPLICATE OF:												
	RESULT	**QUAL**	**CODE**	**RESULT**	**QUAL**	**CODE**	**RESULT**	**QUAL**	**CODE**	**RESULT**	**QUAL**	**CODE**
SEMIVOLATILES												
BIS(2-CHLOROETHYL)ETHER	10	U		10	U		10	U		10	U	
BIS(2-ETHYLHEXYL)PHTHALATE	10	U		10	U		10	U		10	U	
BUTYL BENZYL PHTHALATE	10	U		10	U		10	U		10	U	
CHRYSENE	10	U		10	U		10	U		10	U	
DI-N-BUTYL PHTHALATE	10	U		10	U		2.7	J	P	10	U	
DI-N-OCTYL PHTHALATE	10	U		10	U		10	U		10	U	
DIBENZO(A,H)ANTHRACENE	10	U		10	U		10	U		10	U	
DIETHYL PHTHALATE	10	U		10	U		10	U		10	U	
DIMETHYL PHTHALATE	10	U		10	U		10	U		10	U	
FLUORANTHENE	10	U		10	U		10	U		10	U	
FLUORENE	10	U		10	U		10	U		10	U	
HEXACHLOROBENZENE	10	U		10	U		10	U		10	U	
HEXACHLOROBUTADIENE	10	U		10	U		10	U		10	U	
HEXACHLOROCYCLOPENTADIENE	10	U		10	U		10	U		10	U	
HEXACHLOROETHANE	10	U		10	U		10	U		10	U	
INDENO(1,2,3-CD)PYRENE	10	U		10	U		10	U		10	U	
ISOPHORONE	10	U		10	U		10	U		10	U	
N-NITROSO-DI-N-PROPYLAMINE	10	U		10	U		10	U		10	U	
N-NITROSODIMETHYLAMINE	10	U		10	U		10	U		10	U	
N-NITROSODIPHENYLAMINE	10	U		10	U		10	U		10	U	
NAPHTHALENE	10	U		10	U		10	U		10	U	
NITROBENZENE	10	U		10	U		10	U		10	U	
PENTACHLOROPHENOL	50	U		50	U		50	U		50	U	
PHENANTHRENE	10	U		10	U		10	U		10	U	
PHENOL	10	U		10	U		10	U		10	U	
PYRENE	10	U		10	U		10	U		10	U	

SAMPLE NUMBER:	S29-MW10-05		S29-MW11-05			
SAMPLE DATE:	10/03/01		10/03/01	/ /		/ /
LABORATORY ID:	C1J040275009		C1J040275008			
QC_TYPE:	NORMAL		NORMAL			
% SOLIDS:	0.0 %		0.0 %	100.0 %		100.0 %
UNITS:	UG/L		UG/L			
FIELD DUPLICATE OF:						

	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE
SEMIVOLATILES												
1,2,4-TRICHLOROBENZENE	10	U		10	U							
1,2-DICHLOROBENZENE	10	U		10	U							
1,2-DIPHENYLHYDRAZINE	10	U		10	U							
1,3-DICHLOROBENZENE	10	U		10	U							
1,4-DICHLOROBENZENE	10	U		10	U							
2,2'-OXYBIS(1-CHLOROPROPANE)	10	U		10	U							
2,4,6-TRICHLOROPHENOL	10	U		10	U							
2,4-DICHLOROPHENOL	10	U		10	U							
2,4-DIMETHYLPHENOL	10	U		10	U							
2,4-DINITROPHENOL	50	U		50	U							
2,4-DINITROTOLUENE	10	U		10	U							
2,6-DINITROTOLUENE	10	U		10	U							
2-CHLORONAPHTHALENE	10	U		10	U							
2-CHLOROPHENOL	10	U		10	U							
2-NITROPHENOL	10	U		10	U							
3,3'-DICHLOROBENZIDINE	20	U		20	U							
4,6-DINITRO-2-METHYLPHENOL	50	U		50	U							
4-BROMOPHENYL PHENYL ETHER	10	U		10	U							
4-CHLORO-3-METHYLPHENOL	10	U		10	U							
4-CHLOROPHENYL PHENYL ETHER	10	U		10	U							
4-NITROPHENOL	50	U		50	U							
ACENAPHTHENE	10	U		10	U							
ACENAPHTHYLENE	10	U		10	U							
ANTHRACENE	10	U		10	U							
BENZIDINE	50	U		50	U							
BENZO(A)ANTHRACENE	10	U		10	U							
BENZO(A)PYRENE	10	U		10	U							
BENZO(B)FLUORANTHENE	10	U		10	U							
BENZO(G,H,I)PERYLENE	10	U		10	U							
BENZO(K)FLUORANTHENE	10	U		10	U							
BIS(2-CHLOROETHOXY)METHANE	10	U		10	U							

CTO272-MCAS CHERRY POINT
WATER DATA
STL-PGH
SDG: C1J040275

SAMPLE NUMBER:	S29-MW10-05			S29-MW11-05			/ /			/ /		
SAMPLE DATE:	10/03/01			10/03/01								
LABORATORY ID:	C1J040275009			C1J040275008								
QC_TYPE:	NORMAL			NORMAL								
% SOLIDS:	0.0 %			0.0 %			100.0 %			100.0 %		
UNITS:	UG/L			UG/L								
FIELD DUPLICATE OF:												
	RESULT	**QUAL**	**CODE**	**RESULT**	**QUAL**	**CODE**	**RESULT**	**QUAL**	**CODE**	**RESULT**	**QUAL**	**CODE**
SEMIVOLATILES												
BIS(2-CHLOROETHYL)ETHER	10	U		10	U							
BIS(2-ETHYLHEXYL)PHTHALATE	10	U		10	U							
BUTYL BENZYL PHTHALATE	10	U		10	U							
CHRYSENE	10	U		10	U							
DI-N-BUTYL PHTHALATE	10	U		2.6	J	P						
DI-N-OCTYL PHTHALATE	10	U		10	U							
DIBENZO(A,H)ANTHRACENE	10	U		10	U							
DIETHYL PHTHALATE	10	U		10	U							
DIMETHYL PHTHALATE	10	U		10	U							
FLUORANTHENE	10	U		10	U							
FLUORENE	10	U		10	U							
HEXACHLOROBENZENE	10	U		10	U							
HEXACHLOROBUTADIENE	10	U		10	U							
HEXACHLOROCYCLOPENTADIENE	10	U		10	U							
HEXACHLOROETHANE	10	U		10	U							
INDENO(1,2,3-CD)PYRENE	10	U		10	U							
ISOPHORONE	10	U		10	U							
N-NITROSO-DI-N-PROPYLAMINE	10	U		10	U							
N-NITROSODIMETHYLAMINE	10	U		10	U							
N-NITROSODIPHENYLAMINE	10	U		10	U							
NAPHTHALENE	28			10	U							
NITROBENZENE	10	U		10	U							
PENTACHLOROPHENOL	50	U		50	U							
PHENANTHRENE	1.2	J	P	10	U							
PHENOL	10	U		10	U							
PYRENE	10	U		10	U							

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

TO:	**R. SIMCIK**	**DATE:**	**December 18, 2001**
FROM:	**CATHERINE NORONHA**	**COPIES:**	**DV FILE**

SUBJECT: **INORGANIC DATA VALIDATION**
CTO-272 MCAS CHERRY POINT–TAL METALS
SAMPLE DELIVERY GROUP (SDG) – C1J040275

SAMPLES: 10/Aqueous

S29-DUP01	S29-MW01-05	S29-MW02-05
S29-MW03-05	S29-MW04-05	S29-MW06-05
S29-MW07-05	S29-MW08-05	S29-MW10-05
S29-MW11-05		

Overview

The sample set for CTO 272, **MCAS CHERRY POINT**, SDG C1J040275, consists of ten (10) aqueous environmental samples. One field duplicate pairs S29-DUP01/ S29-MW02-05 is included in the SDG.

All samples were analyzed for TAL metals. The samples were collected by TetraTech NUS on October 2-3, 2001 and analyzed by STL-Pittsburgh under Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. All samples were analyzed for TAL metals using SW 846 method 6010B. Mercury was also analyzed using method 7470A.

The data were evaluated based on the following parameters:

* • Data Completeness
* • Holding Times
* • Calibration Recoveries
• Laboratory Blank Analyses
* • ICP Interference Check Results
* • Matrix Spike Results
* • Laboratory Duplicate Results
* • Field Duplicate Results
* • ICP Serial Dilution Results
* • Detection Limits
* • Sample Quantitation

* - All quality control criteria were met for this parameter.

Laboratory Blank Analyses

The following contaminants were detected in the laboratory method/preparation blanks at the following maximum concentrations:

Analyte	Maximum Concentration	Action Level
Barium	1.5 µg/L	7.5µg/L
Beryllium	1.2 µg/L	6.0 µg/L
Calcium	28.5 µg/L	142.5 µg/L
Cobalt	3.4 µg/L	17.0 µg/L
Iron	28.8 µg/L	144.0 µg/L
Magnesium	28.3 µg/L	141.5 µg/L
Silver	0.9µg/L	4.5 µg/L
Sodium	27.0 µg/L	135 µg/L
Zinc	3.7 µg/L	18.5 µg/L

An action level of 5X the maximum concentration were used to evaluate the sample data for blank contamination. Sample aliquot and dilution factors, if appropriate, were taken into consideration when evaluation for blank contamination. Positive results for barium, cobalt, iron, silver, and zinc less than the action level were qualified "U" as a result of blank contamination.

Executive Summary

Laboratory Performance: Several analytes were present in the laboratory method/preparation blanks.

Other Factors Affecting Data Quality: None.

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Review", February 1994 and the NFESC document entitled "Navy IRCDQM" (September 1999).

The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Tetra Tech NUS
Catherine Noronha
Environmental Scientist

TetraTech NUS
Joseph A. Samchuck
Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation

Data Qualifier Key:

U - Value is a nondetect as reported by the laboratory.

J - Positive result is considered estimated, "J", as a result of technical noncompliances.

APPENDIX A
QUALIFIED ANALYTICAL RESULTS

Qualifier Codes:

A = Lab Blank Contamination
B = Field Blank Contamination
C = Calibration (i.e., % RSDs, %Ds, ICVs, CCVs, RPDs, RRFs, etc.) Noncompliance
D = MS/MSD Noncompliance
E = LCS/LCSD Noncompliance
F = Lab Duplicate Imprecision
G = Field Duplicate Imprecision
H = Holding Time Exceedance
I = ICP Serial Dilution Noncompliance
J = GFAA PDS - GFAA MSA's $r < 0.995$
K = ICP Interference - include ICSAB % R's
L = Instrument Calibration Range Exceedance
M = Sample Preservation
N = Internal Standard Noncompliance
O = Poor Instrument Performance (i.e., base-time drifting)
P = Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
Q = Other problems (can encompass a number of issues)
R = Surrogates Recovery Noncompliance
S = Pesticide/PCB Resolution
T = % Breakdown Noncompliance for DDT and Endrin
U = Pest/PCD% between columns for positive results
V = Non-linear calibrations, tuning $r < 0.995$ (correlation coefficient)
W = EMPC result
X = Signal to noise response drop
Y = Percent solids <30%
Z = Uncertainty at 2 sigma deviation is less than sample activity

SAMPLE NUMBER:	S29-DUP01	S29-MW01-05	S29-MW02-05	S29-MW03-05
SAMPLE DATE:	10/02/01	10/02/01	10/02/01	10/02/01
LABORATORY ID:	C1J040275006	C1J040275001	C1J040275002	C1J040275003
QC_TYPE:	NORMAL	NORMAL	NORMAL	NORMAL
% SOLIDS:	0.0 %	0.0 %	0.0 %	0.0 %
UNITS:	UG/L	UG/L	UG/L	UG/L
FIELD DUPLICATE OF:	S29-MW02-05			

	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE
INORGANICS												
ALUMINUM	207			21.1	U		98.0			21.1	U	
ANTIMONY	2.4	U		2.4	U		2.4	U		2.4	U	
ARSENIC	3.2	U		4.0			3.2	U		3.2	U	
BARIUM	12.0			16.6			12.7			11.5		
BERYLLIUM	0.17	U		0.17	U		0.17	U		0.17	U	
CADMIUM	0.51	U		0.51	U		0.63			0.51	U	
CALCIUM	115000			96400			116000			80000		
CHROMIUM	0.74	U		0.74	U		1.1			0.89		
COBALT	3.4	U	A	2.9	U		2.9	U		2.9	U	
COPPER	2.4	U		2.4	U		20.1			2.4	U	
IRON	360			9990			205			302		
LEAD	2.5	U		2.5	U		3.4			2.5	U	
MAGNESIUM	10900			3590			10300			2290		
MANGANESE	25.5			152			28.3			1.8		
MERCURY	0.07	U		0.07	U		0.07	U		0.07	U	
NICKEL	10.4	U		10.4	U		10.4	U		10.4	U	
POTASSIUM	1020			1270			1020			925		
SELENIUM	3.3	U		3.3	U		3.3	U		4.3		
SILVER	0.80	U		0.80	U		0.85	U	A	1.0	U	A
SODIUM	8560			8710			8970			10800		
THALLIUM	5.7	U		5.7	U		5.7	U		5.7	U	
VANADIUM	2.5	U		2.5	U		3.0			2.5	U	
ZINC	4.3	U	A	2.4	U		225			2.4	U	

CTO272-MCAS CHERRY POINT
WATER DATA
STL-PGH
SDG: C1J040275

SAMPLE NUMBER:	S29-MW04-05			S29-MW06-05			S29-MW07-05			S29-MW08-05		
SAMPLE DATE:	10/02/01			10/03/01			10/03/01			10/02/01		
LABORATORY ID:	C1J040275004			C1J040275010			C1J040275007			C1J040275005		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	0.0 %			0.0 %			0.0 %			0.0 %		
UNITS:	UG/L			UG/L			UG/L			UG/L		
FIELD DUPLICATE OF:												

	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE
INORGANICS												
ALUMINUM	21.1	U		21.1	U		21.1	U		21.1	U	
ANTIMONY	2.4	U		2.4	U		2.4	U		2.4	U	
ARSENIC	6.4			3.2	U		3.2	U		3.2	U	
BARIUM	6.3	U	A	10.3			16.3			31.5		
BERYLLIUM	0.17	U		0.17	U		0.17	U		0.17	U	
CADMIUM	0.51	U		0.51	U		0.51	U		0.51	U	
CALCIUM	37300			51000			105000			94900		
CHROMIUM	0.74	U		1.0			0.74	U		0.74	U	
COBALT	2.9	U		2.9	U		2.9	U		2.9	U	
COPPER	2.4	U		2.4	U		55.4			2.4	U	
IRON	1240			2680			2610			61.5	U	A
LEAD	2.6			2.5	U		2.5	U		2.5	U	
MAGNESIUM	498			1390			6760			3990		
MANGANESE	14.5			18.0			58.9			3.5		
MERCURY	0.07	U		0.07	U		0.07	U		0.07	U	
NICKEL	10.4	U		10.4	U		10.4	U		10.4	U	
POTASSIUM	481			748			438	U		2020		
SELENIUM	3.3	U		3.3	U		3.3	U		3.3	U	
SILVER	0.80	U		0.80	U		0.83	U	A	0.80	U	A
SODIUM	10700			10500			9870			8260		
THALLIUM	5.7	U		5.7	U		5.7	U		5.7	U	
VANADIUM	2.5	U		3.3			3.3			2.5	U	
ZINC	2.5	U	A	2.4	U		4.3	U	A	2.4	U	

SAMPLE NUMBER:	S29-MW10-05			S29-MW11-05			/ /			/ /		
SAMPLE DATE:	10/03/01			10/03/01								
LABORATORY ID:	C1J040275009			C1J040275008								
QC_TYPE:	NORMAL			NORMAL								
% SOLIDS:	0.0 %			0.0 %			100.0 %			100.0 %		
UNITS:	UG/L			UG/L								
FIELD DUPLICATE OF:												

	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE
INORGANICS												
ALUMINUM	78.0			21.1	U							
ANTIMONY	2.4	U		2.4	U							
ARSENIC	3.2	U		3.2	U							
BARIUM	14.3			8.0								
BERYLLIUM	0.17	U		0.17	U							
CADMIUM	0.51	U		0.51	U							
CALCIUM	39800			102000								
CHROMIUM	0.74	U		0.74	U							
COBALT	2.9	U		2.9	U							
COPPER	2.4	U		2.4	U							
IRON	14900			25.9	U	A						
LEAD	2.5	U		2.5	U							
MAGNESIUM	961			6100								
MANGANESE	681			3.5								
MERCURY	0.07	U		0.07	U							
NICKEL	10.4	U		10.4	U							
POTASSIUM	818			556								
SELENIUM	3.3	U		3.3	U							
SILVER	0.80	U		0.80	U							
SODIUM	19500			8890								
THALLIUM	5.7	U		5.7	U							
VANADIUM	2.5	U		2.5	U							
ZINC	2.4	U		2.4	U							

APPENDIX H

GROUNDWATER AND SOIL CORRECTIVE ACTION ALTERNATIVE COST ESTIMATE

GROUNDWATER REMEDIAL ALTERNATIVE COST ESTIMATE

MCALF BOGUE FIELD
BOGUE, NORTH CAROLINA
SITE 29 - CRASH CREW BURN PIT
GROUNDWATER ALTERNATIVE 1: GROUNDWATER MONITORING
CAPITAL COST

	Quantity	Unit	Subcontract	Material	Labor	Equipment	Subcontract	Material	Labor	Equipment	Subtotal
1 PROJECT PLANNING											
1.1 Prepare Long-term Groundwater Monitoring Plan	100	hr			$35.00		$0	$0	$3,500	$0	$3,500
1.2 Health and Safety Addendum	50	hr			$35.00		$0	$0	$1,750	$0	$1,750
Subtotal							$0	$0	$5,250	$0	$5,250
Local Area Adjustments							100.0%	104.2%	72.7%	72.7%	
							$0	$0	$3,817	$0	$3,817
Overhead on Labor Cost @ 30%									$1,145		$1,145
G & A on Labor Cost @ 10%									$382		$382
G & A on Material Cost @ 10%								$0			$0
G & A on Subcontract Cost @ 10%							$0				$0
Total Direct Cost							$0	$0	$5,343	$0	$5,343
Indirects on Total Direct Cost @ 35%											$1,870
Profit on Total Direct Cost @ 10%											$534
Subtotal											$7,748
Health & Safety Monitoring @ 1%											$77
Total Field Cost											$7,825
Contingency on Total Field and Subcontractor Costs @ 20%											$1,565
Engineering on Total Field Cost @ 10%											$783
TOTAL COST											**$10,173**
TOTAL PRESENT WORTH (see attached sheets)											**$71,482**

MCALF BOGUE FIELD
BOGUE, NORTH CAROLINA
SITE 29 - CRASH CREW BURN PIT
GROUNDWATER ALTERNATIVE 1: GROUNDWATER MONITORING
Annual Cost

Item	Item Cost Year 1 (1)	Item Cost Years 2, 3 & 4 (2)	Item Cost Year 5 (3)	Notes
Sampling	$9,164	$2,291	$9,164	Labor, Field Supplies, Travel Expenses
Analysis/Water	$10,920	$2,730	$10,920	Analyze 6 samples per event for VOCs and SVOCs. Quarterly year 1; annually years 2, 3, and 4 and quarterly for year 5. Analyze for manganese annually.
Quarterly Report	$4,050		$4,050	
Annual Report	$2,250	$2,250	$2,250	Document sampling events and results
TOTALS	$26,384	$7,271	$26,384	

(1) Sampling would occur quarterly for the first year.
(2) Sampling would occur annually for the years 2, 3 and 4.
(3) Sampling would occur quarterly for year 5.

MCALF BOGUE FIELD
BOGUE, NORTH CAROLINA
SITE 29 - CRASH CREW BURN PIT
GROUNDWATER ALTERNATIVE 1: GROUNDWATER MONITORING
Present Worth Analysis

Year	Capital Cost	Annual Cost	Total Year Cost	Annual Discount Rate at 7%	Present Worth
0	$10,173		$10,173	1.000	$10,173
1		$26,384	$26,384	0.935	$24,669
2		$7,271	$7,271	0.873	$6,348
3		$7,271	$7,271	0.816	$5,933
4		$7,271	$7,271	0.763	$5,548
5		$26,384	$26,384	0.713	$18,812
				TOTAL PRESENT WORTH	$71,482

SOIL REMEDIAL ALTERNATIVE COST ESTIMATES

ALTERNATIVE 1

LIMITED ACTION

MCALF BOGUE FIELD
BOGUE, NORTH CAROLINA
SITE 29 - CRASH CREW BURN PIT
SOIL ALTERNATIVE 1: LIMITED ACTION
CAPITAL COST

Item	Quantity	Unit	Unit Cost Subcontract	Unit Cost Material	Unit Cost Labor	Unit Cost Equipment	Extended Cost Subcontract	Extended Cost Material	Extended Cost Labor	Extended Cost Equipment	Subtotal
1 INSTITUTIONAL CONTROLS AND SITE RESTORATION											
1.1 Deed Restrictions	200	hours			$35.00		$0	$0	$7,000	$0	$7,000
1.2 Abandon Monitoring Wells, 6 wells @ 20 ft & 10 wells @ 8 ft	200	lf	$12.00				$2,400	$0	$0	$0	$2,400
1.3 Abandon Piezometer Wells, 5 wells @ 8 ft each	40	lf	$12.00				$480	$0	$0	$0	$480
1.4 Site Restoration	2,000	sy		$0.26	$1.19	$0.18	$0	$520	$2,380	$360	$3,260
Subtotal							$2,880	$520	$9,380	$360	$13,140
Local Area Adjustments							100.0%	104.2%	72.7%	72.7%	
Subtotal							$2,880	$542	$6,819	$262	$10,503
Overhead on Labor Cost @ 30%									$2,046		$2,046
G & A on Labor Cost @ 10%									$682		$682
G & A on Material Cost @ 10%								$54			$54
G & A on Subcontract Cost @ 10%							$288				$288
Total Direct Cost							$3,168	$596	$9,547	$262	$13,573
Indirects on Total Direct Cost @ 0%											$0
Profit on Total Direct Cost @ 10%											$1,357
Subtotal											$14,930
Health & Safety Monitoring @ 0%											$0
Total Field Cost											$14,930
Contingency on Total Field Cost @ 15%											$2,239
Engineering on Total Field Cost @ 10%											$1,493
TOTAL COST											**$18,662**
TOTAL COST NOT INCLUDING DEED RESTRICTIONS											**$8,866**

SOIL REMEDIAL ALTERNATIVE COST ESTIMATES

ALTERNATIVE 2
EXCAVATION WITH ON-SITE LANDFARMING

MCALF BOGUE FIELD
BOGUE, NORTH CAROLINA
SITE 29 - CRASH CREW BURN PIT
SOIL ALTERNATIVE 2: EXCAVATION AND LANDFARMING
CAPITAL COST

Item	Quantity	Unit	Unit Cost Subcontract	Unit Cost Material	Unit Cost Labor	Unit Cost Equipment	Extended Cost Subcontract	Extended Cost Material	Extended Cost Labor	Extended Cost Equipment	Subtotal
1 PROJECT PLANNING											
1.1 Prepare Remedial Action Plan	50	hours			$35.00		$0	$0	$1,750	$0	$1,750
1.2 Well Abandonment, 6 Wells @ 20 ft each	120	lf	$12.00				$1,440	$0	$0	$0	$1,440
2 MOBILIZATION/DEMOBILIZATION AND FIELD SUPPORT											
2.1 Construction Equipment Mobilization/Demobilization	1	ls			$89.00	$313.00	$0	$0	$89	$313	$402
2.2 Landfarming Equipment Mobilization/Demobilization	2	ls			$33.50	$117.00	$0	$0	$67	$234	$301
3 DECONTAMINATION											
3.1 Temporary Equipment Decon Pad	1	ls		$2,900.00	$3,325.00	$350.00	$0	$2,900	$3,325	$350	$6,575
3.2 Decontamination Services	1	mo	$2,200.00				$2,200	$0	$0	$0	$2,200
3.3 Decon Water	1,000	gal	$0.20				$200	$0	$0	$0	$200
3.4 Decon Water Storage Tank, 6,000 gallon	1	mo	$600.00				$600	$0	$0	$0	$600
3.5 Clean Water Storage Tank, 4,000 gallon	1	mo	$540.00				$540	$0	$0	$0	$540
3.6 Disposal of Decon Waste (liquid & solid)	1	mo	$900.00				$900	$0	$0	$0	$900
3.7 PPE (3 p * 5 days * 4 weeks)	60	day		$31.67			$0	$1,900	$0	$0	$1,900
4 EXCAVATE CONTAMINATED SOIL											
4.1 Clear Vegetation/Site Preparation	0.4	ac			$1,200.00	$950.00	$0	$0	$480	$380	$860
4.2 Excavate Soil	3,560	cy			$0.79	$0.94	$0	$0	$2,812	$3,346	$6,159
4.3 Front End Loader, 150 ft haul	3,560	cy			$0.83	$1.04	$0	$0	$2,955	$3,702	$6,657
4.4 Prepare Lined Materials Handling Area	1	ls	$1,000.00				$1,000	$0	$0	$0	$1,000
4.5 Load Segregated Soil	3,000	cy			$0.61	$0.47	$0	$0	$1,830	$1,410	$3,240
4.6 Screen with OVA to Delineate Area	2	wk			$800.00	$350.00	$0	$0	$1,600	$700	$2,300
4.7 Limits of Excavation Verification Testing (O&G, DRO, GRO)	12	ea	$150.00		$5.00		$1,800	$0	$60	$0	$1,860
4.8 Replace Clean Soil	560	cy			$0.60	$0.55	$0	$0	$336	$308	$644
5 LANDFARMING											
5.1 Haul 1/4 Mile	3,000	cy			$0.69	$1.63	$0	$0	$2,070	$4,890	$6,960
5.2 Spread Soil	3,000	cy			$0.62	$0.39	$0	$0	$1,860	$1,170	$3,030
5.3 Remove Large Rocks and Debris	1	ls			$500.00		$0	$0	$500	$0	$500
5.4 Add initial fertilizer	18,000	sy		$0.06	$0.01		$0	$1,080	$180	$0	$1,260
5.5 Add initial lime	18,000	sy		$0.08	$0.01		$0	$1,440	$180	$0	$1,620
5.6 Add fertilizer at 6 months	18,000	sy		$0.06	$0.01		$0	$1,080	$180	$0	$1,260
5.7 Add lime at 6 months	18,000	sy		$0.08	$0.01		$0	$1,440	$180	$0	$1,620
5.8 Rototiller Soil at 0 months, 6 inches deep	18,000	sy			$0.25	$0.08	$0	$0	$4,500	$1,440	$5,940
5.9 Rototiller Soil at 6 months, 6 inches deep	18,000	sy			$0.25	$0.08	$0	$0	$4,500	$1,440	$5,940
5.10 Erosion Control Ditch	1,600	lf			$0.60	$0.40	$0	$0	$960	$640	$1,600
6 SITE RESTORATION											
6.1 Remove Remediated Soil	3,000	cy			$0.61	$0.47	$0	$0	$1,830	$1,410	$3,240
6.2 Haul 1/4 Mile	3,000	cy			$0.69	$1.63	$0	$0	$2,070	$4,890	$6,960
6.3 Dump, Spread Soil	3,000	cy			$0.62	$0.39	$0	$0	$1,860	$1,170	$3,030
6.4 Fine Grading and seeding, incl. lime, fert, and seed	2,000	sy		$0.26	$1.19	$0.18	$0	$520	$2,380	$360	$3,260
7 MISCELLANEOUS											
7.1 Construction Oversite - Initial Construction	4	wk			$480.00		$0	$0	$1,920	$0	$1,920
7.2 Construction Oversite - Landfarming Operation	1	wk			$480.00		$0	$0	$480	$0	$480
7.3 Post Construction Documents	100	hr			$40.00		$0	$0	$4,000	$0	$4,000
Subtotal							$8,680	$10,360	$44,954	$28,154	$92,148
Local Area Adjustments							100.0%	104.2%	72.7%	72.7%	
							$8,680	$10,795	$32,682	$20,468	$72,625
Overhead on Labor Cost @ 30%									$9,805		$9,805
G & A on Labor Cost @ 10%									$3,268		$3,268
G & A on Material Cost @ 10%								$1,080			$1,080
G & A on Subcontract Cost @ 10%							$868				$868
Total Direct Cost							$9,548	$11,875	$45,754	$20,468	$87,645
Indirects on Total Direct Cost @ 35%											$30,676
Profit on Total Direct Cost @ 10%											$8,765
Subtotal											$127,085
Health & Safety Monitoring @ 1%											$1,271

MCALF BOGUE FIELD
BOGUE, NORTH CAROLINA
SITE 29 - CRASH CREW BURN PIT
SOIL ALTERNATIVE 2: EXCAVATION AND LANDFARMING
CAPITAL COST

Item	Quantity	Unit	Unit Cost Subcontract	Material	Labor	Equipment	Extended Cost Subcontract	Material	Labor	Equipment	Subtotal
Total Field Cost											$128,356
Contingency on Total Field and Subcontractor Costs @ 15%											$19,253
Engineering on Total Field Cost @ 10%			(Total Field Cost minus Subcontractor's Total Direct Cost)								$11,881
TOTAL CAPITAL COST											**$159,490**
TOTAL PRESENT WORTH (see attached sheet)											**$182,557**

MCALF BOGUE FIELD
BOGUE, NORTH CAROLINA
SITE 29 - CRASH CREW BURN PIT
SOIL ALTERNATIVE 2: EXCAVATION AND LANDFARMING
Annual Cost

Item	Item Cost Year 1	Notes
Sampling	$6,000	Labor, Mobilization/Demobilization, Field Supplies, twice per year.
Analysis/Water	$4,270	Analyze samples from seven wells for VOCs and SVOCs twice per year.
Analysis/Soil	$2,400	Analyze two composite samples per acre for 4 acres of landfarming area for Oil and Grease, Diesel Range Organics, and Gasoline Range Organics twice per vear.
Report	$12,000	Document sampling events and results twice per year.
TOTALS	$24,670	

Sampling will occur every 6 months for 12 months. Cost shown is the sum of both rounds of sampling.

MCALF BOGUE FIELD
BOGUE, NORTH CAROLINA
SITE 29 - CRASH CREW BURN PIT
SOIL ALTERNATIVE 2: EXCAVATION AND LANDFARMING
Present Worth Analysis

Year	Capital Cost	Annual Cost	Total Year Cost	Annual Discount Rate at 7%	Present Worth
0	$159,490		$159,490	1.000	$159,490
1		$24,670	$24,670	0.935	$23,066
			TOTAL PRESENT WORTH		**$182,557**

SOIL REMEDIAL ALTERNATIVE COST ESTIMATES

ALTERNATIVE 3
EXCAVATION WITH OFF-SITE DISPOSAL

MCALF BOGUE FIELD
BOGUE, NORTH CAROLINA
SITE 29
SOIL ALTERNATIVE 3: EXCAVATION AND OFF-SITE DISPOSAL
CAPITAL COST

Item	Quantity	Unit	Unit Cost Subcontract	Unit Cost Material	Unit Cost Labor	Unit Cost Equipment	Extended Cost Subcontract	Extended Cost Material	Extended Cost Labor	Extended Cost Equipment	Subtotal
1 PROJECT PLANNING AND PREPARATION											
1.1 Prepare Remedial Action Plan	50	hours			$35.00		$0	$0	$1,750	$0	$1,750
1.2 Well Abandonment, 6 Wells @ 20 ft each	120	lf	$12.00				$1,440	$0	$0	$0	$1,440
2 MOBILIZATION/DEMOBILIZATION AND FIELD SUPPORT											
2.1 Equipment Mobilization/Demobilization	1	ls			$89.00	$313.00	$0	$0	$89	$313	$402
3 DECONTAMINATION											
3.1 Temporary Equipment Decon Pad	1	ls		$2,900.00	$3,325.00	$350.00	$0	$2,900	$3,325	$350	$6,575
3.2 Decontamination Services	1	mo	$2,200.00				$2,200	$0	$0	$0	$2,200
3.3 Decon Water	1,000	gal	$0.20				$200	$0	$0	$0	$200
3.4 Decon Water Storage Tank, 6,000 gallon	1	mo	$600.00				$600	$0	$0	$0	$600
3.5 Clean Water Storage Tank, 4,000 gallon	1	mo	$540.00				$540	$0	$0	$0	$540
3.6 Disposal of Decon Waste (liquid & solid)	1	mo	$900.00				$900	$0	$0	$0	$900
3.7 PPE (3 p * 5 days * 4 weeks)	60	day		$31.67			$0	$1,900	$0	$0	$1,900
4 EXCAVATE CONTAMINATED SOIL											
4.1 Clear Vegetation/Site Preparation	0.4	ac			$1,200.00	$950.00	$0	$0	$480	$380	$860
4.2 Excavate Soil	3,560	cy			$0.79	$0.94	$0	$0	$2,812	$3,346	$6,159
4.3 Front End Loader, 150 ft haul	3,560	cy			$0.83	$1.04	$0	$0	$2,955	$3,702	$6,657
4.4 Prepare Lined Materials Handling Area	1	ls	$1,000.00				$1,000	$0	$0	$0	$1,000
4.5 Load Segregated Soil	3,560	cy			$0.61	$0.47	$0	$0	$2,172	$1,673	$3,845
4.6 Screen with OVA to Delineate Area	2	wk			$800.00	$350.00	$0	$0	$1,600	$700	$2,300
4.7 Limits of Excavation Verification Testing (O&G, DRO, GRO)	12	ea	$150.00		$5.00		$1,800	$0	$60	$0	$1,860
5 DISPOSAL											
5.1 Waste Characterization Testing (TCLP),1 per 1000 cy	3	ea	$820.00				$2,460	$0	$0	$0	$2,460
5.2 Transportation & Off-Site Disposal	2,000	cy	$57.00				$114,000	$0	$0	$0	$114,000
5.3 Confirmation Testing (2 tests per pile, 15 piles)(O&G, DRO, GRO)	30	ea	$150.00		$5.00		$4,500	$0	$150	$0	$4,650
6 SITE RESTORATION											
6.1 Import clean backfill	2,000	cy		$6.55	$0.26	$0.72	$0	$13,100	$520	$1,440	$15,060
6.2 Place and Grade Imported Soil	2,000	cy			$0.16	$0.37	$0	$0	$320	$740	$1,060
6.3 Replace and Grade Excavated Soil	1,560	cy			$0.16	$0.37	$0	$0	$250	$577	$827
6.4 Fine Grading and seeding, incl. lime, fert, and seed	2,000	sy		$0.26	$1.19	$0.18	$0	$520	$2,380	$360	$3,260
7 MISCELLANEOUS											
7.1 Construction Oversite (1p*5days*4 weeks)	4	wk			$480.00		$0	$0	$1,920	$0	$1,920
7.2 Post Construction Documents	100	hr			$40.00		$0	$0	$4,000	$0	$4,000
Subtotal							$129,640	$18,420	$24,782	$13,582	$186,425
Local Area Adjustments							100.0%	104.2%	72.7%	72.7%	
							$129,640	$19,194	$18,017	$9,874	$176,725
Overhead on Labor Cost @ 30%									$5,405		$5,405
G & A on Labor Cost @ 10%									$1,802		$1,802
G & A on Material Cost @ 10%								$1,919			$1,919
G & A on Subcontract Cost @ 10%							$12,964				$12,964
Total Direct Cost							$142,604	$21,113	$25,224	$9,874	$198,815
Indirects on Total Direct Cost @ 35%			(not including off-site disposal)								$29,685
Profit on Total Direct Cost @ 10%											$19,882
Subtotal											$248,382
Health & Safety Monitoring @ 1%											$2,484
Total Field Cost											$250,866
Contingency on Total Field and Subcontractor Costs @ 15%											$37,630
Engineering on Total Field Cost @ 10%			(Total Field Cost minus Subcontractor's Total Direct Cost)								$10,826
TOTAL COST											**$299,322**

SOIL REMEDIAL ALTERNATIVE COST ESTIMATES

ALTERNATIVE 4
HOT SPOT EXCAVATION WITH OFF-SITE DISPOSAL

MCALF BOGUE FIELD
BOGUE, NORTH CAROLINA
SITE 29
SOIL ALTERNATIVE 4: HOT SPOT EXCAVATION AND OFF-SITE DISPOSAL
CAPITAL COST

Item	Quantity	Unit	Unit Cost Subcontract	Material	Labor	Equipment	Extended Cost Subcontract	Material	Labor	Equipment	Subtotal
1 PROJECT PLANNING AND PREPARATION											
1.1 Prepare Remedial Action Plan	50	hours			$35.00		$0	$0	$1,750	$0	$1,750
1.2 Well Abandonment, 6 Wells @ 20 ft each	120	lf	$12.00				$1,440	$0	$0	$0	$1,440
2 MOBILIZATION/DEMOBILIZATION AND FIELD SUPPORT											
2.1 Equipment Mobilization/Demobilization	1	ls			$89.00	$313.00	$0	$0	$89	$313	$402
3 DECONTAMINATION											
3.1 Temporary Equipment Decon Pad	1	ls		$2,900.00	$3,325.00	$350.00	$0	$2,900	$3,325	$350	$6,575
3.2 Decontamination Services	1	mo	$2,200.00				$2,200	$0	$0	$0	$2,200
3.3 Decon Water	1,000	gal	$0.20				$200	$0	$0	$0	$200
3.4 Decon Water Storage Tank, 6,000 gallon	1	mo	$600.00				$600	$0	$0	$0	$600
3.5 Clean Water Storage Tank, 4,000 gallon	1	mo	$540.00				$540	$0	$0	$0	$540
3.6 Disposal of Decon Waste (liquid & solid)	1	mo	$900.00				$900	$0	$0	$0	$900
3.7 PPE (3 p * 5 days * 1 week)	15	day		$31.67			$0	$475	$0	$0	$475
4 EXCAVATE CONTAMINATED SOIL											
4.1 Clear Vegetation/Site Preparation	0.1	ac			$1,200.00	$950.00	$0	$0	$120	$95	$215
4.2 Excavate Soil	500	cy			$0.79	$0.94	$0	$0	$395	$470	$865
4.3 Front End Loader, 150 ft haul	500	cy			$0.83	$1.04	$0	$0	$415	$520	$935
4.4 Screen with OVA to Delineate Area	1	wk			$800.00	$350.00	$0	$0	$800	$350	$1,150
4.5 Limits of Excavation Verification Testing (O&G, DRO, GRO)	12	ea	$150.00		$5.00		$1,800	$0	$60	$0	$1,860
5 DISPOSAL											
5.1 Waste Characterization Testing (TCLP),1 per 1000 cy	1	ea	$820.00				$820	$0	$0	$0	$820
5.2 Transportation & Off-Site Disposal	500	cy	$57.00				$28,500	$0	$0	$0	$28,500
6 SITE RESTORATION											
6.1 Import clean backfill	500	cy		$6.85	$0.26	$0.72	$0	$3,425	$130	$360	$3,915
6.2 Place and Grade Imported Soil	500	cy			$0.16	$0.37	$0	$0	$80	$185	$265
6.4 Fine Grading and seeding, incl. lime, fert, and seed	500	sy		$0.26	$1.19	$0.18	$0	$130	$595	$90	$815
7 MISCELLANEOUS											
7.1 Construction Oversite (1p*5days*1 week)	1	wk			$480.00		$0	$0	$480	$0	$480
7.2 Post Construction Documents	50	hr			$40.00		$0	$0	$2,000	$0	$2,000
Subtotal							$37,000	$6,930	$10,239	$2,733	$56,902
Local Area Adjustments							100.0%	104.2%	72.7%	72.7%	
							$37,000	$7,221	$7,444	$1,987	$53,652
Overhead on Labor Cost @ 30%									$2,233		$2,233
G & A on Labor Cost @ 10%									$744		$744
G & A on Material Cost @ 10%								$722			$722
G & A on Subcontract Cost @ 10%							$3,700				$3,700
Total Direct Cost							$40,700	$7,943	$10,421	$1,987	$61,051
Indirects on Total Direct Cost @ 35%			(not including off-site disposal)								$11,393
Profit on Total Direct Cost @ 10%											$6,105
Subtotal											$78,549
Health & Safety Monitoring @ 1%											$785
Total Field Cost											$79,335
Contingency on Total Field and Subcontractor Costs @ 15%											$11,900
Engineering on Total Field Cost @ 10%			(Total Field Cost minus Subcontractor's Total Direct Cost)								$3,863
TOTAL COST											**$95,099**

SOIL REMEDIAL ALTERNATIVE COST ESTIMATES

ALTERNATIVE 5

IN SITU ENHANCED BIOLOGICAL TREATMENT

MCALF BOGUE FIELD
BOGUE, NORTH CAROLINA
SITE 29 - CRASH CREW BURN PIT
SOIL ALTERNATIVE 5: IN SITU ENHANCED BIOLOGICAL TREATMENT
CAPITAL COST

Item	Quantity	Unit	Unit Cost Subcontract	Material	Labor	Equipment	Extended Cost Subcontract	Material	Labor	Equipment	Subtotal	Comments
1 PROJECT PLANNING												
1.1 Prepare Remedial Action Plan & Permitting	100	hr			$35.00		$0	$0	$3,500	$0	$3,500	
2 MOBILIZATION/DEMOBILIZATION AND FIELD SUPPORT												
2.1 Professional Oversight (1p*1wk)	1	mwk			$1,200.00		$0	$0	$1,200	$0	$1,200	
2.2 Nutrient Injection System Mobilization	1	ea	$5,000.00				$5,000	$0	$0	$0	$5,000	
2.3 Nutrient Injection System Demobilization	1	ea	$2,000.00				$2,000	$0	$0	$0	$2,000	
3 NUTRIENT INJECTION SYSTEM												
3.1 Equipment, Installation, and Start-up	1	ls	$32,000.00				$32,000	$0	$0	$0	$32,000	
4 SITE RESTORATION												
4.1 Site Restoration	2,000	sy		$0.26	$1.19	$0.18	$0	$520	$2,380	$360	$3,260	
4.2 Abandon Monitoring Wells, 6 wells @ 20 ft & 10 wells @ 8 ft	200	lf	$12.00				$2,400	$0	$0	$0	$2,400	
4.3 Abandon Piezometer Wells, 5 wells @ 8 ft each	40	lf	$12.00				$480	$0	$0	$0	$480	
Subtotal							$41,880	$520	$7,080	$360	$49,840	
Local Area Adjustments							100.0%	104.2%	72.7%	72.7%		
Subtotal							$41,880	$542	$5,147	$262	$47,831	
Overhead on Labor Cost @ 30%									$1,544		$1,544	
G & A on Labor Cost @ 10%									$515		$515	
G & A on Material Cost @ 10%								$54			$54	
G & A on Subcontract Cost @ 10%							$4,188				$4,188	
Total Direct Cost							$46,068	$596	$7,206	$262	$54,132	
Indirects on Total Direct Cost @ 30%											$16,240	
Profit on Total Direct Cost @ 10%											$5,413	
Subtotal											$75,784	
Health & Safety Monitoring @ 2%											$1,516	
Total Field Cost											$77,300	
Contingency on Total Field Cost @ 20%											$15,460	
Engineering on Total Field Cost @ 15%											$11,595	
TOTAL CAPITAL COST											**$104,355**	
TOTAL PRESENT WORTH (see attached shees)											**$171,559**	

MCALF BOGUE FIELD
BOGUE, NORTH CAROLINA
SITE 29 - CRASH CREW BURN PIT
SOIL ALTERNATIVE 5: IN SITU ENHANCED BIOLOGICAL TREATMENT
Operation and Maintenance Costs per Year

Year 1

Item	Qty	Unit	Unit Cost	Subtotal Cost	Notes
Oversight (l p* 3 days* 4 trips)	4	trips	$1,600.00	$6,400	
System Operation and Maintenance	12	mo	$2,000.00	$24,000	
Subtotal Cost for Year 1 of Operation				$30,400	

Year 2

Item	Qty	Unit	Unit Cost	Subtotal Cost	Notes
Oversight (l p* 3 days* 2 trips)	2	trips	$1,600.00	$3,200	
System Operation and Maintenance	6	mo	$2,000.00	$12,000	
Subtotal Cost for Year 2 of Operation				$15,200	

MCALF BOGUE FIELD
BOGUE, NORTH CAROLINA
SITE 29 - CRASH CREW BURN PIT
SOIL ALTERNATIVE 5: IN SITU ENHANCED BIOLOGICAL TREATMENT
Annual Cost

Item	Item Cost Year 1 (1)	Item Cost Year 2 (2)	Notes
Sampling	$6,000	$3,000	Labor, Mobilization/Demobilization, Field Supplies
Analysis/Soil	$600	$300	Analyze two composite samples for Oil and Grease, Diesel Range Organics, and Gasoline Range Organics
Report	$12,000	$6,000	Document sampling events and results
TOTALS	$18,600	$9,300	

Sampling will occur every 6 months for 18 months.
(1) Sampling would occur twice during Year 1.
(2) Sampling would occur once during Year 2.

MCALF BOGUE FIELD
BOGUE, NORTH CAROLINA
SITE 29 - CRASH CREW BURN PIT
SOIL ALTERNATIVE 5: IN SITU ENHANCED BIOLOGICAL TREATMENT
Present Worth Analysis

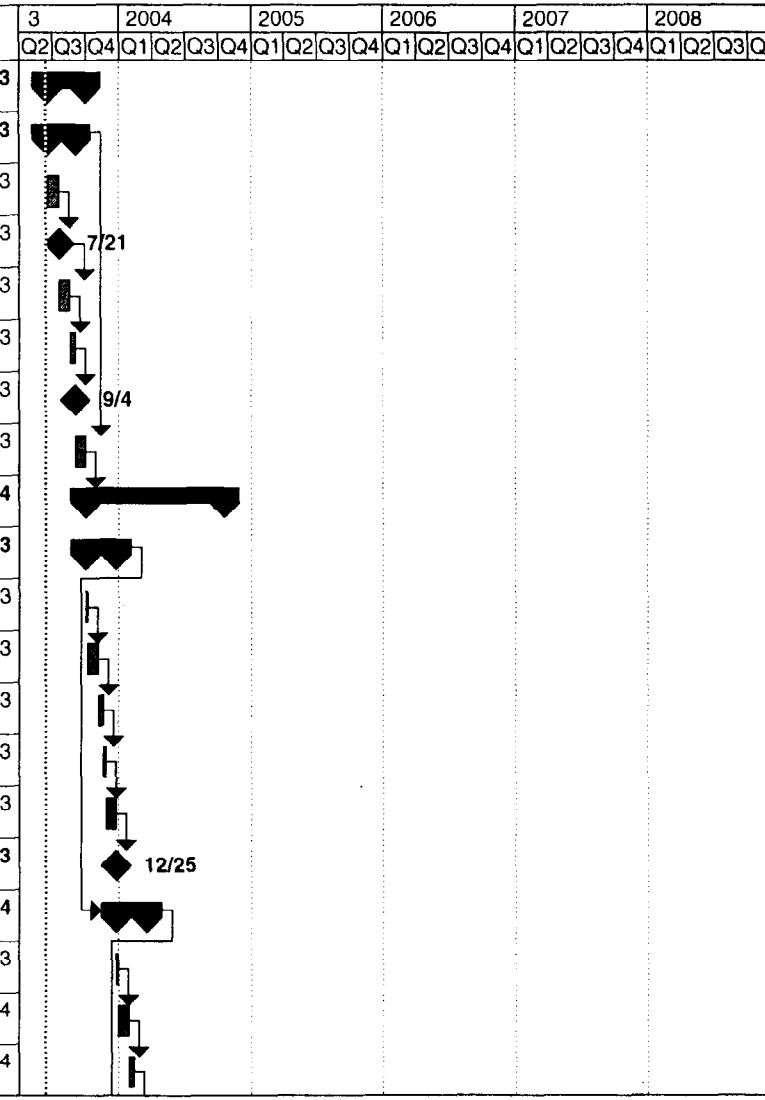
Year	Capital Cost	Operation and Maintenance Cost	Annual Cost	Total Year Cost	Annual Discount Rate at 7%	Present Worth
0	$104,355			$104,355	1.000	$104,355
1		$30,400	$18,600	$49,000	0.935	$45,815
2		$15,200	$9,300	$24,500	0.873	$21,389
					TOTAL PRESENT WORTH	**$171,559**

APPENDIX I

PROPOSED CORRECTIVE ACTION SCHEDULE

MCALF Bogue Field
Groundwater Monitoring

ID	Task Name	Work Days	Start	Finish
1	**Soil Removal Action**	**75 days**	**Fri 6/20/03**	**Thu 10/2/03**
2	**Prepare Soil Removal Work Plan**	**55 days**	**Fri 6/20/03**	**Thu 9/4/03**
3	Prepare Draft Work Plan	22 days	Fri 6/20/03	Mon 7/21/03
4	Submit Draft Work Plan	0 days	Mon 7/21/03	Mon 7/21/03
5	Navy Review	22 days	Tue 7/22/03	Wed 8/20/03
6	Prepare Final Work Plan	11 days	Thu 8/21/03	Thu 9/4/03
7	Submit Final Work Plan	0 days	Thu 9/4/03	Thu 9/4/03
8	Conduct Removal Action	20 days	Fri 9/5/03	Thu 10/2/03
9	**Groundwater Monitoring, Year 1**	**272 days**	**Fri 10/3/03**	**Mon 10/18/04**
10	**First Quarter Monitoring Event**	**60 days**	**Fri 10/3/03**	**Thu 12/25/03**
11	Field Sampling	3 days	Fri 10/3/03	Tue 10/7/03
12	Chemical Analysis	22 days	Wed 10/8/03	Thu 11/6/03
13	Data Validation	10 days	Fri 11/7/03	Thu 11/20/03
14	Data Management	5 days	Fri 11/21/03	Thu 11/27/03
15	Prepare Quarterly Report	20 days	Fri 11/28/03	Thu 12/25/03
16	**Submit First Quarter Year One Report**	**0 days**	**Thu 12/25/03**	**Thu 12/25/03**
17	**Second Quarter Monitoring Event**	**60 days**	**Fri 12/26/03**	**Thu 3/18/04**
18	Field Sampling	3 days	Fri 12/26/03	Tue 12/30/03
19	Chemical Analysis	22 days	Wed 12/31/03	Thu 1/29/04
20	Data Validation	10 days	Fri 1/30/04	Thu 2/12/04



MCALF Bogue Field
Groundwater Monitoring Schedule
Date: Thu 6/12/03

Task
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Rolled Up Split
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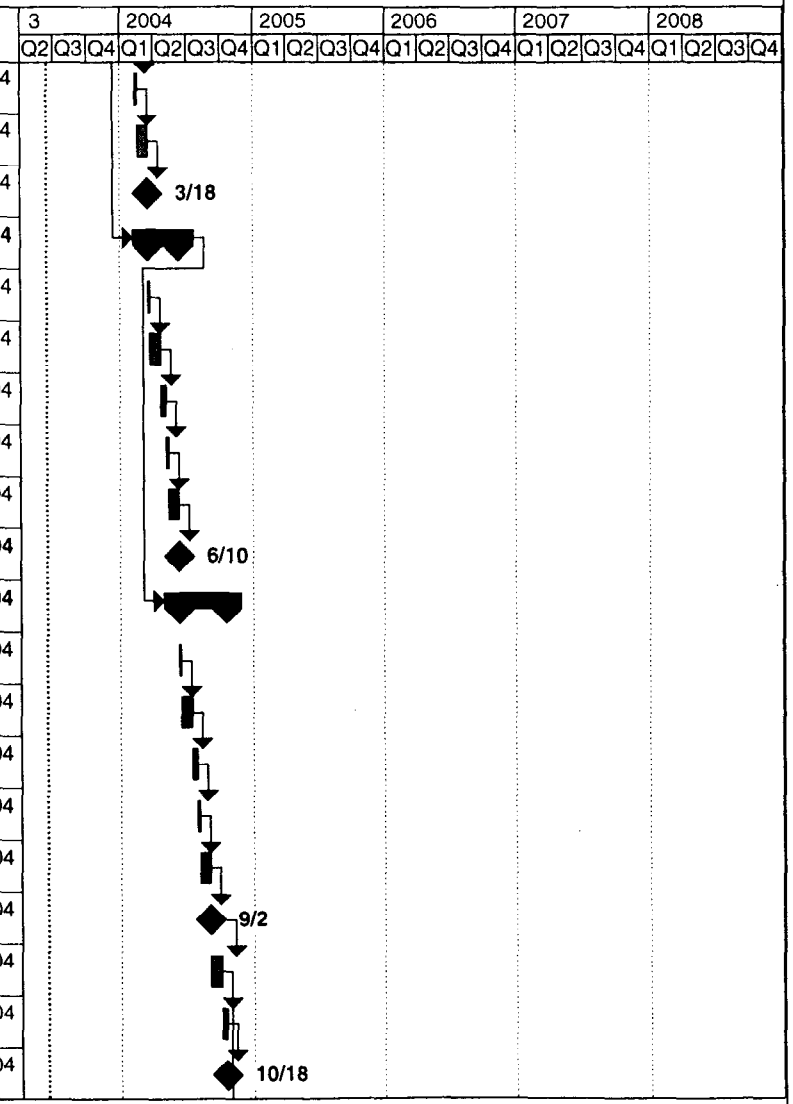
MCALF Bogue Field
Groundwater Monitoring

ID	Task Name	Work Days	Start	Finish
21	Data Management	5 days	Fri 2/13/04	Thu 2/19/04
22	Prepare Quarterly Report	20 days	Fri 2/20/04	Thu 3/18/04
23	**Submit Second Quarter, Year One Report**	0 days	Thu 3/18/04	Thu 3/18/04
24	**Third Quarter Monitoring Event**	**60 days**	**Fri 3/19/04**	**Thu 6/10/04**
25	Field Sampling	3 days	Fri 3/19/04	Tue 3/23/04
26	Chemical Analysis	22 days	Wed 3/24/04	Thu 4/22/04
27	Data Validation	10 days	Fri 4/23/04	Thu 5/6/04
28	Data Management	5 days	Fri 5/7/04	Thu 5/13/04
29	Prepare Quarterly Report	20 days	Fri 5/14/04	Thu 6/10/04
30	**Submit First Quarter Year One Report**	**0 days**	**Thu 6/10/04**	**Thu 6/10/04**
31	**Fourth Quarter Monitoring Event**	**92 days**	**Fri 6/11/04**	**Mon 10/18/04**
32	Field Sampling	3 days	Fri 6/11/04	Tue 6/15/04
33	Chemical Analysis	22 days	Wed 6/16/04	Thu 7/15/04
34	Data Validation	10 days	Fri 7/16/04	Thu 7/29/04
35	Data Management	5 days	Fri 7/30/04	Thu 8/5/04
36	Prepare Draft Annual Year One Report	20 days	Fri 8/6/04	Thu 9/2/04
37	**Submit Draft Annual Year One Report**	**0 days**	**Thu 9/2/04**	Thu 9/2/04
38	Navy and Regulator Review	22 days	Fri 9/3/04	Mon 10/4/04
39	Prepare Final Report	10 days	Tue 10/5/04	Mon 10/18/04
40	**Submit Final Annual Year One GW Report**	0 days	Mon 10/18/04	Mon 10/18/04



MCALF Bogue Field
Groundwater Monitoring Schedule
Date: Thu 6/12/03

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Rolled Up Task
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Rolled Up Progress
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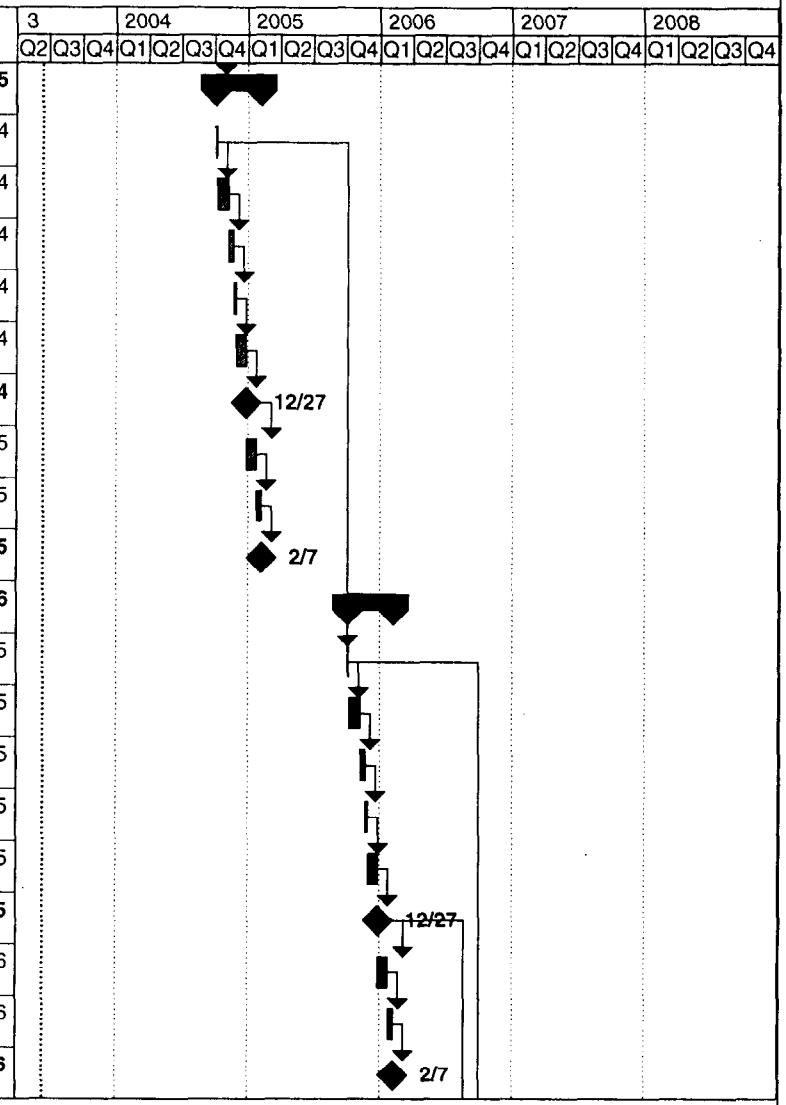
MCALF Bogue Field
Groundwater Monitoring

ID	Task Name	Work Days	Start	Finish
41	**Groundwater Monitoring, Year 2**	**90 days**	**Tue 10/5/04**	**Mon 2/7/05**
42	Field Sampling	3 days	Tue 10/5/04	Thu 10/7/04
43	Chemical Analysis	22 days	Fri 10/8/04	Mon 11/8/04
44	Data Validation	10 days	Tue 11/9/04	Mon 11/22/04
45	Data Management	5 days	Tue 11/23/04	Mon 11/29/04
46	Prepare Draft Report	20 days	Tue 11/30/04	Mon 12/27/04
47	**Submit Draft Year 2 GW Report**	**0 days**	**Mon 12/27/04**	**Mon 12/27/04**
48	Navy and Regulator Review	20 days	Tue 12/28/04	Mon 1/24/05
49	Prepare Final Report	10 days	Tue 1/25/05	Mon 2/7/05
50	**Submit Final Year 2 GW Report**	**0 days**	**Mon 2/7/05**	**Mon 2/7/05**
51	**Groundwater Monitoring, Year 3**	**90 days**	**Wed 10/5/05**	**Tue 2/7/06**
52	Field Sampling	3 days	Wed 10/5/05	Fri 10/7/05
53	Chemical Analysis	22 days	Mon 10/10/05	Tue 11/8/05
54	Data Validation	10 days	Wed 11/9/05	Tue 11/22/05
55	Data Management	5 days	Wed 11/23/05	Tue 11/29/05
56	Prepare Draft Report	20 days	Wed 11/30/05	Tue 12/27/05
57	**Submit Draft Annual Year 3 GW Report**	**0 days**	**Tue 12/27/05**	**Tue 12/27/05**
58	Navy and Regulator Review	20 days	Wed 12/28/05	Tue 1/24/06
59	Prepare Final Report	10 days	Wed 1/25/06	Tue 2/7/06
60	**Submit Final Annual Year 3 GW Report**	**0 days**	**Tue 2/7/06**	**Tue 2/7/06**



MCALF Bogue Field
Groundwater Monitoring Schedule
Date: Thu 6/12/03

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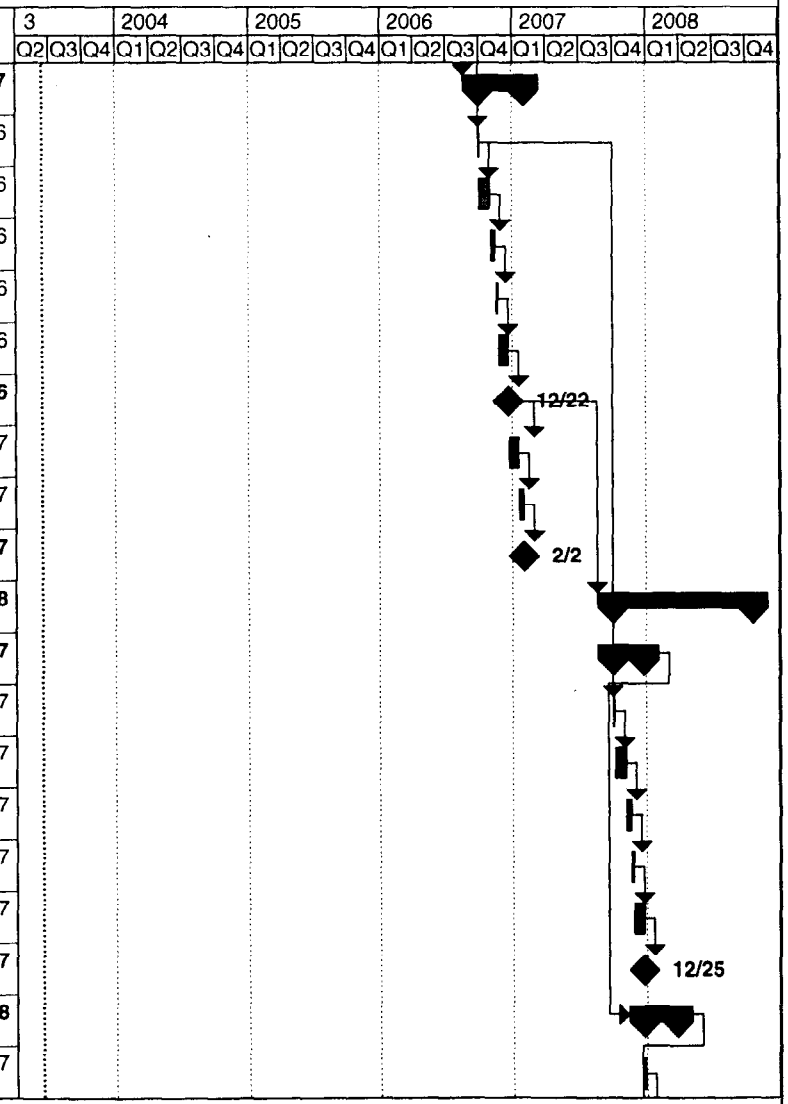
MCALF Bogue Field
Groundwater Monitoring

ID	Task Name	Work Days	Start	Finish
61	**Groundwater Monitoring, Year 4**	**90 days**	**Mon 10/2/06**	**Fri 2/2/07**
62	Field Sampling	3 days	Mon 10/2/06	Wed 10/4/06
63	Chemical Analysis	22 days	Thu 10/5/06	Fri 11/3/06
64	Data Validation	10 days	Mon 11/6/06	Fri 11/17/06
65	Data Management	5 days	Mon 11/20/06	Fri 11/24/06
66	Prepare Draft Report	20 days	Mon 11/27/06	Fri 12/22/06
67	**Submit Draft Annual Year 4 GW Report**	**0 days**	**Fri 12/22/06**	**Fri 12/22/06**
68	Navy and Regulator Review	20 days	Mon 12/25/06	Fri 1/19/07
69	Prepare Final Report	10 days	Mon 1/22/07	Fri 2/2/07
70	**Submit Final Annual Year 4 GW Report**	**0 days**	**Fri 2/2/07**	**Fri 2/2/07**
71	**Groundwater Monitoring, Year 5**	**275 days**	**Wed 10/3/07**	**Tue 10/21/08**
72	**First Quarter Year 5 Monitoring Event**	**60 days**	**Wed 10/3/07**	**Tue 12/25/07**
73	Field Sampling	3 days	Wed 10/3/07	Fri 10/5/07
74	Chemical Analysis	22 days	Mon 10/8/07	Tue 11/6/07
75	Data Validation	10 days	Wed 11/7/07	Tue 11/20/07
76	Data Management	5 days	Wed 11/21/07	Tue 11/27/07
77	Prepare Quarterly Report	20 days	Wed 11/28/07	Tue 12/25/07
78	**Submit First Quarter Year Five Report**	**0 days**	**Tue 12/25/07**	**Tue 12/25/07**
79	**Second Quarter Year 5 Monitoring Event**	**65 days**	**Wed 12/26/07**	**Tue 3/25/08**
80	Field Sampling	3 days	Wed 12/26/07	Fri 12/28/07



MCALF Bogue Field
Groundwater Monitoring Schedule
Date: Thu 6/12/03

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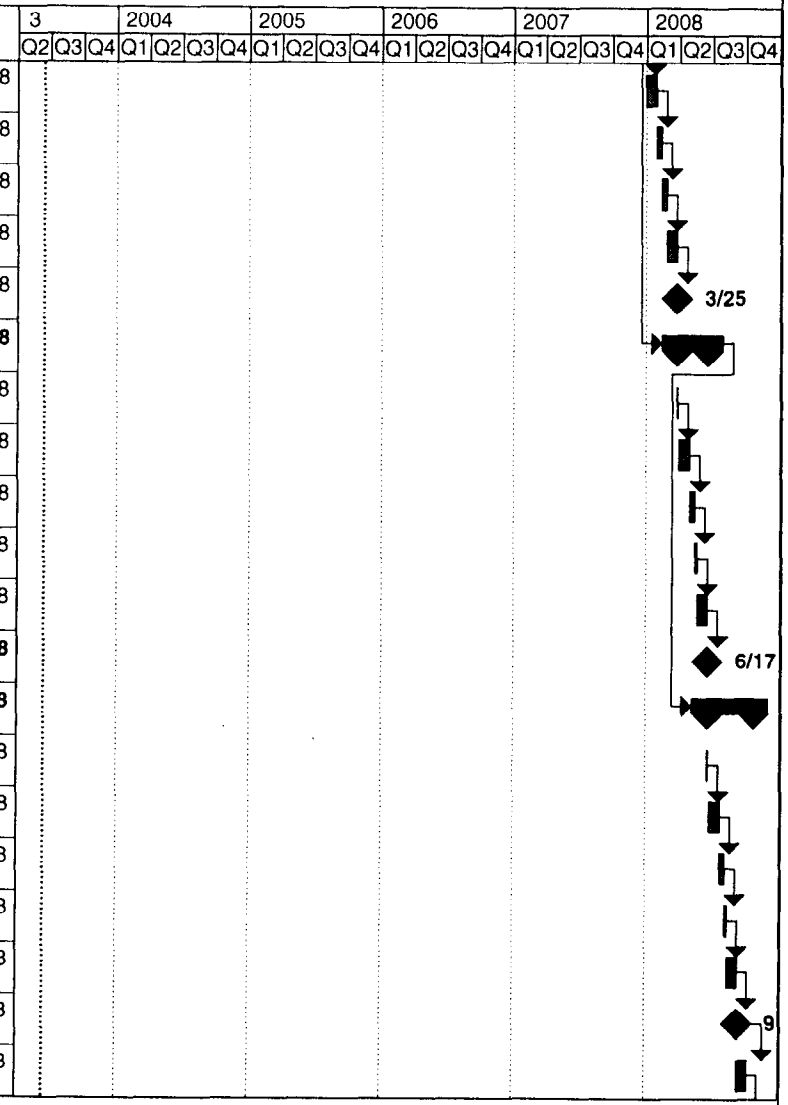
MCALF Bogue Field
Groundwater Monitoring

ID	Task Name	Work Days	Start	Finish
81	Chemical Analysis	22 days	Mon 12/31/07	Tue 1/29/08
82	Data Validation	10 days	Wed 1/30/08	Tue 2/12/08
83	Data Management	10 days	Wed 2/13/08	Tue 2/26/08
84	Prepare Quarterly Report	20 days	Wed 2/27/08	Tue 3/25/08
85	**Submit Second Quarter, Year Five Report**	0 days	Tue 3/25/08	Tue 3/25/08
86	**Third Quarter Year 5 Monitoring Event**	**60 days**	**Wed 3/26/08**	**Tue 6/17/08**
87	Field Sampling	3 days	Wed 3/26/08	Fri 3/28/08
88	Chemical Analysis	22 days	Mon 3/31/08	Tue 4/29/08
89	Data Validation	10 days	Wed 4/30/08	Tue 5/13/08
90	Data Management	5 days	Wed 5/14/08	Tue 5/20/08
91	Prepare Quarterly Report	20 days	Wed 5/21/08	Tue 6/17/08
92	**Submit First Quarter Year Five Report**	**0 days**	**Tue 6/17/08**	**Tue 6/17/08**
93	**Fourth Quarter Year 5 Monitoring Event**	**90 days**	**Wed 6/18/08**	**Tue 10/21/08**
94	Field Sampling	3 days	Wed 6/18/08	Fri 6/20/08
95	Chemical Analysis	22 days	Mon 6/23/08	Tue 7/22/08
96	Data Validation	10 days	Wed 7/23/08	Tue 8/5/08
97	Data Management	5 days	Wed 8/6/08	Tue 8/12/08
98	Prepare Draft Annual Year Five Report	20 days	Wed 8/13/08	Tue 9/9/08
99	**Submit Draft Annual Year Five Report**	**0 days**	**Tue 9/9/08**	Tue 9/9/08
100	Navy and Regulator Review	20 days	Wed 9/10/08	Tue 10/7/08



MCALF Bogue Field
Groundwater Monitoring Schedule
Date: Thu 6/12/03

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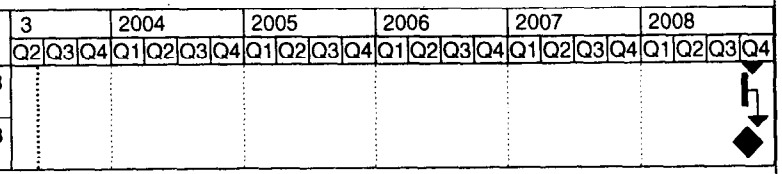
MCALF Bogue Field
Groundwater Monitoring

ID	Task Name	Work Days	Start	Finish
101	Prepare Final GW Report	10 days	Wed 10/8/08	Tue 10/21/08
102	**Submit Final Annual Year 5 Report**	**0 days**	**Tue 10/21/08**	**Tue 10/21/08**



MCALF Bogue Field
Groundwater Monitoring Schedule
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APPENDIX J

VENDOR INFORMATION ON IN SITU ENHANCED BIOLOGICAL TREATMENT

13245 Ladybank Lane
Oak Hill, VA 20171
703.834.5566
Fax 703.834.7553

1345 Garner Lane, #150
Columbia, SC 29210
803.798.4377
Fax 803.798.4378

www.pha-er.com

MAGNUS™ TECHNOLOGY

PHA ENVIRONMENTAL RESTORATION'S BIOLOGICAL DEGRADATION METHOD

PHA has developed proprietary technologies and expertise in the areas of microbiology, nutrition chemistry, flow dynamics, systems design and operations directed towards environmental restoration. Pha has proven and commercialized a technology that due to its broad adaptability and effectiveness is truly "state of the art", Multiple Application Gas Nutrient System (Magnus).

Magnus technology has proven to successfully remediate:

Gasoline, Diesel Fuel, Creosote, Chlorinated Solvents And Other Voc's
(BTEX, PAH's, EDB, TCE, DCE, PCE, TPH, MTBE)

The predictability of Magnus and the experience of phA allow it to successfully complete pay for performance, or firm fixed price contracts.

As a technology implementer phA has played a vital role in award winning teaming efforts*. phA remediation techniques not only provide a safe and cost effective solution, they can be implemented with relatively no disruption of operations on-site. Magnus, *in situ* bioremediation is ideal for use under buildings, highways, runways, or anywhere excavation is impractical or undesirable.

Overview: Magnus Technology

Magnus Bioremediation is an emerging treatment technology that can quickly restore contaminated property. Magnus Bioremediation technology uses microorganisms to destroy hazardous contaminants or to convert them to harmless forms. Magnus provides a means of introducing vapor phase nutrients to stimulate growth of naturally occurring indigenous microorganisms. Since in situ bioremediation technology is based on biological destruction of the contaminants at the site, risks associated with handling, transporting, treating, and storing contaminated residuals are avoided. This is a significant reduction of risk to workers and to the public. Magnus has been proven in large and small-scale cleanup of groundwater and soil contamination. The science and engineering behind Magnus has produced a system that rapidly achieves groundwater standards (closure) with broad applicability across a variety of contaminants of concern (COC's).

Physically, Magnus can be generalized as a system of nutrients, chemical agents, injection wells, mixing, metering and timing equipment. But the art of Magnus is its ability to be adaptable and customizable throughout the of remediation process; from the targeting of COC's, to system deployment options, to precise nutrient/agent delivery. Magnus is an adjustable and flexible process.

Treating groundwater and soil with single system implementation Magnus Bioremediation works with natural aerobic and co-metabolic processes to stimulate the growth of naturally occurring microbes. The microbes or the enzymes they produce then break down and remove the contaminants from the soil and groundwater by degradation. By applying the selected nutrients and carbon sources in a gas or vapor phase the problems associated with well fouling, limited radius of influence and other limitations are eliminated. All of the nutrient and carbon sources used by phA are benign and have been approved for underground injection and generate no hazardous waste products. The production and controlled use of nutrients and other agents in vapor form provide increased diffusion and binding, thus resulting in more consistent and controlled degradation. The significantly greater area of influence afforded by the Magnus system over liquid injection or oxidant injection means less site disruption, fewer wells, and a controlled nutrient application. Broad selection of customizable nutrient, agents and carbon source combinations allows single system deployments holds true even on sites with mixed contaminates.

PhA has developed specific Magnus application methodologies:

$Magnus_{Ae}$	Aerobic pathways: hydrocarbons, BTEX, and the lower chlorinated
$Magnus_{CM}$	Co-metabolic pathways: TCE, MTBE
$Magnus_{RD}$	Reductive Dechlorination: PCE
$Magnus_{CO}$	Chemical Oxidation: an adjunct for highly recalcitrant compounds. (BAP, phynol ether)
$Magnus_{SES}$	Surfactant Enhanced Solubilization: high soil binding compounds (PAH's)

These processes can be applied in combination or singularly to optimize site remediation. Magnus has been implemented in lithologies ranging from sand to dense clays (10^{-5}cm/sec) to fractured bedrock.

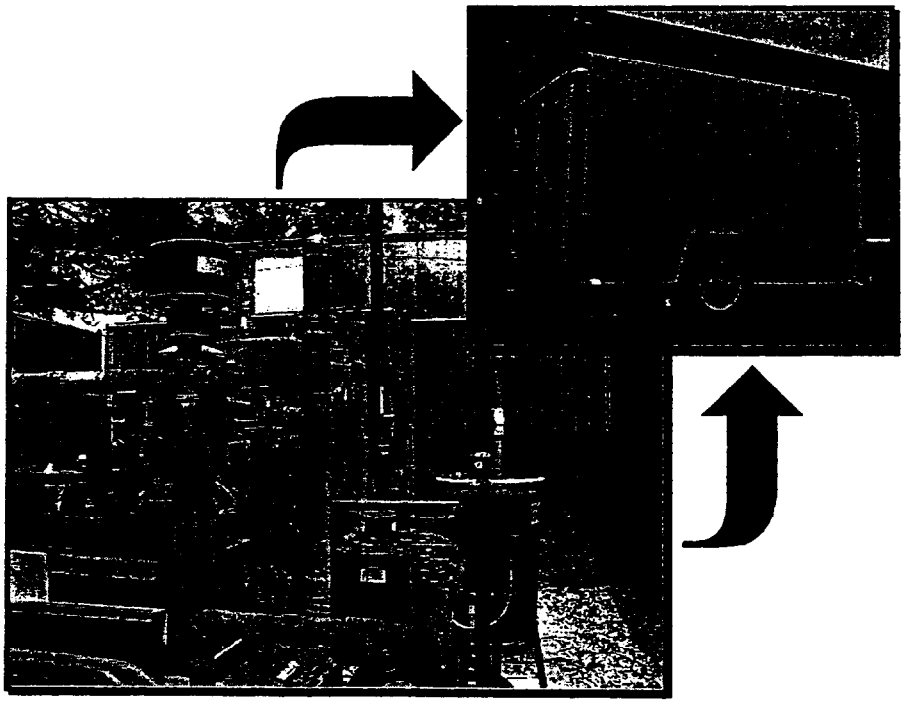
Magnus technology has many benefits over traditional and competing remediation technologies:

- There is no requirement to extract, treat and dispose groundwater as with traditional "pump and treat" systems.
- There are no contaminants released to the atmosphere.
- The materials used are benign; therefore there is no concern of further contamination or harm.
- This is a biological system, there is less potential for "rebound" of contaminant concentrations than with physical treatment methods.
- Magnus® bioremediation is completed in shorter time frames than traditional remediation technologies.

- Magnus remediates to drinking water standards in less than half the time of traditional methods
- Magnus allows corrective action to less than 1 ppb (Undetectable levels), rather than to 1000ppb, as is common through the other remediation techniques in a heterogeneous environment.
- Use of Magnus does not preclude the use of other approaches and can a modified to work in tandem or in sequence.
- Magnus *In situ* bioremediation is more cost effective than baseline technologies (soil vapor extraction and groundwater pump-and-treat.
- PhA has consistently been selected to correct and complete sites where Pump and Treat, SVE, Air Sparging or Bioventing are under performing.

PhA is currently conducting research and bench scale testing of the Magnus system to provide effective remediation solutions to additional contaminates, including: PCB's, MGP sites, Formaldehyde, Pesticides, Metals, Nitrates, 1,1,2,2 tetrachloroethane, Dowtherm, and Carbon tetrachloride.

PHA IS COMMITTED TO SOLVING YOUR CONTAMINATED SITE PROBLEMS, ON TIME AND WITHIN BUDGET.



*Award from Consulting Engineers of South Carolina

Multiple Application Gas Nutrient System (Magnus): An Innovative and Flexible Delivery System for Multi-Method *in situ* Enhanced Bioremediation

Multiple Application Gas Nutrient System (Magnus) is an *in situ* enhanced bioremediation technology utilizing an innovative gas and vapor delivery system and custom treatment protocols to achieve reduction of contaminants to below groundwater standards. Through the use of gas and vapor phase treatment constituents, Magnus systems are able to treat both groundwater and soil (vadose zone) contamination from a single implementation. Treatment constituents provide the environment necessary for the indigenous microorganism populations to rapidly grow and utilize hydrocarbons as a food source.

Several Magnus methodologies are available from a single delivery system.

$Magnus_{AE}$ utilizes direct aerobic oxidation to degrade contaminants such as hydrocarbons, low weight polycyclic aromatic hydrocarbons, and lower chlorinated hydrocarbons (DCE, VC).

$Magnus_{CM}$ utilizes indirect, or co-metabolic, aerobic oxidation to degrade contaminants such as the higher chlorinated hydrocarbons (TCE), MTBE, and to supplement treatment for low hydrocarbon concentrations.

$Magnus_{RD}$ utilizes anaerobic, reductive dehalogenation to degrade contaminants resistant to aerobic degradation, such as highly chlorinated hydrocarbons (PCE, CT).

The integration of Magnus in a single system allows rapid implementation of multiple treatment methodologies for mixed contaminant plumes. Magnus systems are customized for each site, and are usually self-contained in a small, tow-behind trailer. Treatment injection is usually performed by installation of ½ in. to ¾ in. wells, or, in the case of system conversions, existing wells not needed for other purposes may be retrofitted for injection. Magnus utilizes gas and vapor injection, so fewer wells are needed than for liquid or slurry injection technologies. Typical radius of influence for Magnus injection is 30-35 feet.

Magnus systems have been selected for deployment on several sites that had previously been undergoing treatment with alternative technologies, such as Pump and Treat and Air-Sparging. In these cases, the existing technology had reached a treatment plateau, and persistent, low levels of contamination above groundwater standards remained. Data for a site conversion at NAS Jacksonville demonstrated Benzene reduced from 650 ug/l to BDL, and MTBE reduced from 110 ug/l to <2 ug/l, in 9 months. Simple implementation, combined with rapid cleanup technologies, makes Magnus a very cost effective solution to treatment campaigns that have "flat-lined".

Magnus systems have also been successfully deployed on sites with high concentrations of contaminants in both soil and groundwater.

Selective data for a site after 3 months of treatment demonstrated Benzene reduced from 30,000 ug/l to <5 ug/l, Toluene reduced from 30,400 ug/l to <5 ug/l, MTBE reduced from 6,570 ug/l to <5 ug/l, and EDB reduced from 1,250 ug/l to <5 ug/l.

Selective data from a creosote/diesel site treated for 12 months demonstrated total diesel range organics reduced from 14,800 mg/kg to 115 mg/kg, Naphthalene reduced from 6,400 mg/kg to 2 mg/kg, and Benzo (A) Pyrene reduced from 55 mg/l to 0.76 mg/kg.

Sites where Magnus has been employed include operating and abandoned commercial fuel storage/transfer sites, Naval Air Stations, Air Force bases, and a creosote dipping facility.

MAGNUS Remediation Summary
Darlington, South Carolina
Abandoned Creosote Pit

Closed Site

$MAGNUS_{Ae}$ Start Date: April, 1997
$MAGNUS_{Ae}$ Shut Down Date: June, 2000
$MAGNUS_{CM}$ Start Date: October, 1998
$MAGNUS_{CM}$ Shut Down Date: June, 1999

Contaminants of Concern: Assorted Volatile Organic Carbons (VOC)
Polycyclic Aromatic Hyrocarbons (PAH)
Diesel Fuel (DRO)

Soil: Sand and Clayey Sand to 20 ft.
Clay below 20 ft. BGS

Highest Starting Concentration: Representative compounds:
Naphthalene (VOC) 6,400 mg/kg
Fluoranthene 720 mg/kg
Pyrene 430 mg/kg
Benzo (A) Pyrene 55 mg/kg
Naphthalene 1,000 mg/kg
Anthracene 240 mg/kg
Phenanthrene 1,100 mg/kg
Fluorene 540 mg/kg
DRO 14,800 mg/kg

Status: Site is closed.

Site Characteristics:
The Darlington County Prison Farm creosote dipping facility ceased operations in 1984. The timber dipping pit, which was 63 ft. long, 5 ft. wide, and 5 ft. deep, was lined with metal and surrounded by a concrete pad used to hold curing timber. During use, the pit contained a mixture of creosote and diesel. Phase I and II surveys revealed that the soil and groundwater contamination extended from the former pit towards a near-by swamp over an area approximately 300 ft. long by 180 ft. wide. Depth to ground water ranged from approximately 16 ft. near the former pit to 1 ft. or less near the swamp. The identified contaminants are extremely complex, and may be characterized as primarily polycyclic aromatic hydrocarbons (PAH, the constituents of creosote), and Diesel that was used as a carrier and thinning agent. Additionally, the PAH contamination is stratified throughout the vadose zone, with the higher concentrations found deeper in the soil, although lower concentrations are found in the groundwater. The majority of the Diesel contamination is found at the groundwater interface at approximately 16 ft. BGS.

Remediation History:
The site was abandoned in 1991, and the pit excavated to remove the contaminated soil. The amount removed (3,800 cubic yards) far exceeded estimates, and the soil was subsequently returned to the excavation site.

MAGNUS Remediation Design:
The MAGNUS system designed for this site was housed in a small wood shed built on site. The shed houses an air blower; treatment constituents; and the controls, valves and manifolds to deliver the nutrient mixture to the appropriate wells as determined by the injection protocol. Eight injection wells were installed, each with estimated ROI of 30-35 ft.

MAGNUS Remediation Operation:
The $MAGNUS_{Ae}$ system went into operation in April, 1997 in an "air only" mode. The first sampling event in August, 1997 revealed that the soil was nutrient limited, and permission was granted to initiate the full nutrient delivery mode in September, 1997. Following two more sampling events, $MAGNUS_{CM}$ was introduced in October, 1998 to remediate the recalcitrant PAH constituents. The $MAGNUS_{Ae}$ system was shut down in July, 2000.

Remediation Results:
Remediation results for PAH degradation in both soil and groundwater were significant by the June/August 1998 soil and groundwater sampling events. Almost all PAH contaminants were reduced to levels below Site Specific Target Levels (SSTL), over 95% of the contaminants had been degraded, and the Diesel constituent was entirely degraded. Sampling performed in June, 1999 demonstrated that in the groundwater, no established maximum contamination levels are exceeded. Soil samples taken from the worst-case "hot spot" demonstrated only one constituent that exceeded SSTL. Sampling in June/July 2000 demonstrated residual, low level PAH in the vadose zone.

Comments:
A risk based analysis was conducted to demonstrate that the current levels of PAH should be protective of the environment at this specific site. The site is closed.

APPENDIX K

NOTIFICATIONS

All three high schools improved their scores over 2002. West Carteret High School posted the highest scores in the school's history, with a combined score of 1040, which is 14 points above the national average and 39 points above the state average.

West Carteret's scores are based on 150 students, or 72.5 percent of the Class of 2003.

East Carteret High School increased by 9 points, from 961 to 970. The score is 31 points below the state average, and were the lowest of the three high schools.

East Carteret's scores were based on 68 students, or 51.5 percent of the Class of 2003 taking the test.

Dr. Lewis said, "Personnel at East Carteret continue to examine student preparation and factors that will contribute to better SAT outcomes for students."

Croatan High students increased by 13 points, from 493 to 507 compared to the previous year. The school posted a 507 math score compared to 511 the previous year.

SAT scores are based on a self-selected sample of students who elect to take the test for college admission purposes, and year-to-year fluctuations are common, according to Dr. Lewis.

"In fact, the College Board reports that over half of all high schools experience verbal or math score changes of at least 10 points from one year to the next," he said. "For this reason, it is best to view score changes over a period of several years."

Dr. Lewis said ways to help improve student performance on SATs include focused instruction, teaching students how to think, stressing challenging coursework as the norm, offering SAT preparation, and setting high expectations for students across grade levels.

PUBLIC NOTICE

NOTICE CONCERNING APPROVAL OF THE CORRECTIVE ACTION PLAN (CAP) FOR SITE 29, CRASH CREW BURN PIT MARINE CORPS AUXILIARY LANDING FIELD (MCALF) BOGUE, NC

CARTERET COUNTY, NORTH CAROLINA

In accordance with 15A NCAC 2L .0114, public notification is hereby given of the receipt of a request for approval by the North Carolina Division of Waste Management of a Corrective Action Plan (CAP) for the above referenced site. The Corrective Action Plan proposes:

- To utilize the natural process of degradation and attenuation as a method to cleanup petroleum-contaminated groundwater to standards established in 15A NCAC 2L.202, and
- To utilize excavation to remove petroleum-contaminated soil to the soil to groundwater maximum contaminant concentration above the groundwater table.

If you would like to examine the site Corrective Action Plan, please contact Mr. Ken Cobb of the Environmental Affairs Department at MCAS Cherry Point. Mr. Cobb may be contacted by telephone at (252) 466-5376 during normal weekday business hours.

In addition, Mr. George Lane of the NC DENR Raleigh Office has the Corrective Action Plan along with other site information on file and available for public view. You may arrange to review this information by contacting the regional office listed below.

Any written comments concerning this approval should be submitted within 30 days of the date this notice is posted.

Please send written comments to the following address:

North Carolina Department of Environment and Natural Resources
Superfund Section
Attn: Mr. George Lane
401 Oberlin Road
Raleigh, North Carolina 28605
(919) 733-2801 x340

Raleigh Office Staff may be contacted during normal weekday business hours to answer questions or arrange an appointment to review the information on file pertaining to this action.

The Carteret News-Times, Wednesday, Aug. 27, 2003 (page 4A)

UNITED STATES MARINE CORPS
MARINE CORPS AIR STATION
PSC BOX 8003
CHERRY POINT, NORTH CAROLINA 28533-0003

5090/14000
LN
August 20, 2003

CERTIFIED MAIL (7000 1530 0005 9294 3251)
RETURN RECEIPT REQUESTED

Mary Ann Hinshaw
County Manager
Carteret County
Courthouse Square
Beaufort, NC 28516

SUBJECT: NOTICE CONCERNING APPROVAL OF THE CORRECTIVE ACTION PLAN (CAP) FOR SITE 29, CRASH CREW BURN PIT, MARINE CORPS AUXILIARY LANDING FIELD (MCALF), BOGUE, NORTH CAROLINA, CARTERET COUNTY

Dear Ms. Hinshaw:

This letter is being provided to inform you that the North Carolina Department of Environment and Natural Resources (NC DENR) has granted Marine Corps Air Station, Cherry Point's request for approval of the Corrective Action Plan (CAP) at the subject site. Because the property you own, control, or occupy is located contiguous to MCALF, Bogue, the State's rules governing groundwater classification and standards (15A NCAC 2L .0114) require that you be informed of the subject activities.

The subject Correction Action Plan will utilize the natural process of degradation and attenuation as a method to cleanup petroleum-contaminated groundwater to standards established in 15A NCAC 2L.202 and utilize excavation to remove petroleum-contaminated soil to groundwater maximum contaminant concentration above the groundwater table.

If you would like additional information related to the subject Correction Action Plan, please contact Mr. Ken Cobb of the Environmental Affairs Department at MCAS Cherry Point. Mr. Cobb may be contacted by telephone at (252) 466-5376 during normal weekday business hours.

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Raleigh, North Carolina 28605
(919)733-2801 x340

Raleigh Office Staff may be contacted during normal weekday business hours to answer questions or arrange an appointment to review the information on file pertaining to this action. Notification of approval of this Corrective Action Plan is also being made by certified mail to the Mayor of Bogue, North Carolina, and the Carteret County Manager. Additionally, a notification of this action will be posted in the Carteret Times newspaper.

Sincerely,

G. W. RADFORD
Environmental Affairs Officer
By direction of the
Commanding General

Copy to:
Public Affairs Officer

SENDER: *COMPLETE THIS SECTION*

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Mary Ann Hinshaw
County Manager
Carteret County
Courthouse Square
Beaufort NC 28516

COMPLETE THIS SECTION ON DELIVERY

A. Received by *(Please Print Clearly)*: Barr Davis

B. Date of Delivery: 8-21-03

C. Signature: X Barr Davis ☐ Agent ☐ Addressee

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
☒ Certified Mail ☐ Express Mail
☐ Registered ☐ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? *(Extra Fee)* ☐ Yes

2. Article Number *(Copy from service label)*
7000 1530 0005 9294 3251

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UNITED STATES MARINE CORPS
MARINE CORPS AIR STATION
PSC BOX 8003
CHERRY POINT, NORTH CAROLINA 28533-0003

5090/14000
LN
August 20, 2003

CERTIFIED MAIL (7000 1530 0005 9294 3244)
RETURN RECEIPT REQUESTED

J. T. Garrett
Director,
Carteret County Health Department
Courthouse Square
Beaufort, NC 28516

SUBJECT: NOTICE CONCERNING APPROVAL OF THE CORRECTIVE ACTION PLAN (CAP) FOR SITE 29, CRASH CREW BURN PIT, MARINE CORPS AUXILIARY LANDING FIELD (MCALF), BOGUE, NORTH CAROLINA, CARTERET COUNTY

Dear Mr. Garrett:

This letter is being provided to inform you that the North Carolina Department of Environment and Natural Resources (NC DENR) has granted Marine Corps Air Station, Cherry Point's request for approval of the Corrective Action Plan (CAP) at the subject site. Because the property you own, control, or occupy is located contiguous to MCALF, Bogue, the State's rules governing groundwater classification and standards (15A NCAC 2L .0114) require that you be informed of the subject activities.

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If you would like additional information related to the subject Correction Action Plan, please contact Mr. Ken Cobb of the Environmental Affairs Department at MCAS Cherry Point. Mr. Cobb may be contacted by telephone at (252) 466-5376 during normal weekday business hours.

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August 20, 2003

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Superfund Section
Attn: Mr. George Lane
401 Oberlin Road
Raleigh, North Carolina 28605
(919)733-2801 x340

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Sincerely,

C. W. RADFORD
Environmental Affairs Officer
By direction of the
Commanding General

Copy to:
Public Affairs Officer

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1. Article Addressed to:

J. T. Garrett
Director
Carteret County Health Dept
Courthouse Square
Beaufort NC 28516

COMPLETE THIS SECTION ON DELIVERY

A. Received by (Please Print Clearly) Beau Davis
B. Date of Delivery 6-2-03

C. Signature
X Ben Davis
☐ Agent
☐ Addressee

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
☒ Certified Mail ☐ Express Mail
☐ Registered ☐ Return Receipt for Merchandise
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4. Restricted Delivery? (Extra Fee) ☐ Yes

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CHERRY POINT, NORTH CAROLINA 28533-0003

5090/14000
LN
August 20, 2003

CERTIFIED MAIL (7000 1530 0005 9294 3268)
RETURN RECEIPT REQUESTED

Mayor Harold Shipp
Town of Bogue
P.O. Box 2258
Swansboro, NC 28584

SUBJECT: NOTICE CONCERNING APPROVAL OF THE CORRECTIVE ACTION PLAN (CAP) FOR SITE 29, CRASH CREW BURN PIT, MARINE CORPS AUXILIARY LANDING FIELD (MCALF), BOGUE, NORTH CAROLINA, CARTERET COUNTY

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Superfund Section
Attn: Mr. George Lane
401 Oberlin Road
Raleigh, North Carolina 28605
(919)733-2801 x340

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By direction of the
Commanding General

Copy to:
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C. Signature
X Ben Davis
☐ Agent
☐ Addressee

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If YES, enter delivery address below: ☐ No

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Swansboro, NC 28584

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1. Article Addressed to:

Mayor Harold Shipp
Town of Bogue
Po Box 2258
Swansboro NC 28584

COMPLETE THIS SECTION ON DELIVERY

A. Received by *(Please Print Clearly)*: A. Goguen
B. Date of Delivery: 08/22/03

C. Signature: X [signature]
☐ Agent
☐ Addressee

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

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