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REPORT ON DUE DILIGENCE ASSESSMENT OF ENVIRONMENTAL CONCERNS AT BUILDING 900 AREA NAS CECIL FIELD FL

1/1/1998

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REPORT ON

DUE DILIGENCE ASSESSMENT OF ENVIRONMENTAL CONCERNS: NORTHROP GRUMMAN CORPORATION CECIL FIELD PROJECT BUILDING NO. 900 AREA JACKSONVILLE, DUVAL COUNTY, FLORIDA

Submitted to:

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January 1998

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January 6, 1998

973-3778

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Attn: Mr. Richard Doria, P.E.
Manager, Environmental Engineering

RE: DRAFT ENVIRONMENTAL DUE DILIGENCE ASSESSMENT
NORTHROP GRUMMAN CORPORATION - CECIL FIELD PROJECT
BUILDING NO. 900 AREA
JACKSONVILLE, DUVAL COUNTY, FLORIDA

Dear Rick:

Golder Associates Inc. is pleased to present the attached Due Diligence Report regarding environmental concerns associated with the Building No. 900 Area at Naval Air Station Cecil Field. The environmental due diligence evaluation was conducted by Golder Associates as part of a broader due diligence evaluation being performed by NGC in conjunction with evaluation of leasing options of certain facilities at NAS Cecil Field by NGC.

Please feel free to contact us with questions or comments concerning this correspondence or the attached report. Golder Associates appreciates the opportunity to provide professional services to Northrop Grumman Corporation.

Very truly yours,

GOLDER ASSOCIATES INC.

Mark J. Jordana, P.G.
Senior Project Manager

Attachment

pc: Ron Holliday -- Northrop Grumman Corporation

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1.0 SUMMARY

Northrop Grumman Corporation (NGC) retained Golder Associates Inc. to perform a focused environmental due diligence investigation at selected areas of Naval Air Station (NAS) Cecil Field located in Jacksonville, Duval County, Florida. NGC is currently evaluating the feasibility of establishing operations at NAS Cecil Field, which is presently in the Base Realignment and Closure (BRAC) Program being administered by the U.S. Navy. Reportedly, the U.S. Navy will turn over administration of the facility to the City of Jacksonville upon closure of U.S. Navy activities at the base.

NAS Cecil Field includes two main areas: the main base area (which is 9,516 acres) and the Yellow Water Weapons Compound area (which is 8,091 acres). The sites that are presently being considered by NGC are located in both of these areas of the base. This report addresses investigative activities performed by Golder Associates at the Building No. 900 area of the base. Specifically, existing environmental documentation and records for the Building No. 900 area were reviewed, and an inspection of this area of the base was conducted by Golder Associates. Based on the review of existing documents and the site inspection, Golder Associates developed and implemented a scope of work designed to characterize baseline soil and groundwater conditions in the vicinity of Building No. 900.

A Statement of Work for the baseline characterization investigation was prepared by Golder Associates and submitted to NGC in a November 11, 1997 correspondence. Information that was used to develop the Statement of Work included a preliminary review of the base-wide Environmental Baseline Survey (EBS) Report prepared by ABB Environmental Services, Inc. (ABB) during November 1994, a review of a preliminary NGC Environmental Summary Report for NAS Cecil Field included in an internal memorandum dated October 8, 1997, and site inspections conducted by Golder Associates' personnel on October 21 and 22, 1997.

The baseline characterization investigation conducted in the Building No. 900 area included installation of an 130-foot deep geotechnical boring to characterize the lithology of the subsurface strata down to the first significant confining horizon underlying the site. In addition, shallow soil borings were installed and soil samples were collected from shallow, unsaturated strata at 10

locations in the Building No. 900 area. Soil samples collected from the 10 shallow borings were screened in the field for the presence of volatile organic compounds (VOCs) and/or submitted to Savannah Laboratories & Environmental Services, Inc. (Savannah Labs) for chemical analysis. The soil samples were analyzed by Savannah Labs for a broad list of parameters which included volatile and semi-volatile organic compounds, polycyclic aromatic hydrocarbons (PAHs), residual petroleum hydrocarbons, polychlorinated biphenyls (PCBs), and selected metals.

In addition, temporary monitoring wells were installed into the upper and lower surficial aquifer at six locations in the Building No. 900 area, and groundwater samples were collected from the shallow (i.e., 15 feet) and deeper (i.e., 50 feet) temporary monitoring wells for laboratory analyses. The groundwater samples were analyzed by Savannah Labs for volatile and semi-volatile organic compounds, PAHs, PCBs, selected metals, residual petroleum hydrocarbons, and other inorganic constituents. The temporary monitoring wells were surveyed and groundwater elevation measurements were recorded in each well to characterize groundwater flow conditions in the Building No. 900 area.

Results of the deep soil borings and hydrogeologic characterization efforts indicate the Building No. 900 area is underlain by approximately 128 feet of sediments which comprise the surficial aquifer above the Hawthorn Group, which is a low permeability confining unit at the base of the surficial aquifer. The upper 100 feet of the surficial aquifer is comprised of fine to medium grained silty sand. From 100 to 128 feet below ground surface, the lower surficial aquifer is comprised of medium to coarse grained sand with some gravel size particles and shells with a trace of silt and clay. No sediment materials which were representative of the rock aquifer typically encountered at the base of the surficial aquifer system were identified in the deep soil boring drilled near Building No. 900. At 128 feet below ground surface, the surficial aquifer was underlain by marl with phosphatic material. This phosphatic marl typically represents the top of the Hawthorn Group, which is the confining unit underlying the surficial aquifer. Groundwater flow in the upper surficial aquifer was determined to be generally toward the west based on measurements recorded during the baseline characterization investigation. Groundwater flow in the lower surficial aquifer (i.e., the 50-foot depth interval) was determined to be generally toward the south to southwest based on measurements recorded during the baseline characterization investigation.

Results of the baseline soil characterization indicate detectable concentrations of several metals in the samples collected in the Building No. 900 area. Specifically, barium, chromium, lead, and mercury were reported at concentrations which exceeded analytical method detection limits (MDLs). None of the reported metals in soil in the Building No. 900 area exceeded soil clean-up goals established by the Florida Department of Environmental Protection (FDEP). In addition to metals, benzene, toluene, and xylenes were reported in one soil sample at the TMW-6 location at concentrations which exceeded the analytical MDLs. The reported concentrations of benzene, toluene, and xylenes were below the FDEP soil clean-up goals for industrial facilities. Benzene was reported at a concentration of 8.6 micrograms per kilogram (μg/kg), which exceeds the Florida leachability-based clean-up goal for benzene of 3.0 μg/kg in soil. However, benzene was not detected in shallow groundwater at the TMW-6 location, and the leachability-based clean-up goals are applicable for sites with groundwater contamination or if there was a recent discharge; therefore, the leachability-based clean-up goals may not be currently applicable to the Building No. 900 area.

Results of the baseline groundwater characterization in the Building No. 900 area indicate arsenic, barium, chromium, cobalt, lead, nickel, vanadium, and zinc were reported in groundwater at concentrations which exceeded analytical MDLs. Lead was reported in five deep (i.e., 50-feet) groundwater samples at concentrations which exceeded the Florida water quality standard maximum contaminant level (MCL) of 0.015 milligrams per liter (mg/l) for lead. The maximum concentration of lead reported in groundwater in the Building No. 900 area was 0.085 mg/l. No elevated lead concentrations were reported for groundwater collected from shallow monitoring wells in the Building No. 900 area. Chromium was reported in two deep groundwater samples at concentrations which exceeded the Florida MCL of 0.1 mg/l for chromium. The maximum concentration of chromium reported in groundwater in the Building No. 900 area was 0.120 mg/l. No elevated chromium concentrations were reported for groundwater collected from shallow monitoring wells in the Building No. 900 area. Vanadium was reported in one deep groundwater sample at a concentration which exceeded the Florida guidance concentration of 0.049 mg/l for vanadium. The maximum concentration of vanadium reported in deep groundwater in the Building No. 900 area was 0.11 mg/l. No elevated vanadium concentrations were reported for groundwater collected from shallow monitoring wells in the Building No. 900 area. No other

metals were reported at concentrations exceeding Florida MCLs in groundwater samples collected in the Building No. 900 area.

Bromodichloromethane was reported in three deep groundwater samples collected from the Building No. 900 area at concentrations that ranged from 1.2 microgram per liter (μg/l) to 4.7 μg/l, which exceeded the Florida guidance concentration of 0.6 μg/l for bromodichloromethane. Dibromochloromethane was reported in one deep groundwater sample collected from the Building No. 900 area at a concentration of 1.8 μg/l, which exceeded the Florida guidance concentration of 1.0 μg/l for dibromochloromethane. Chloroform was reported in four deep groundwater samples collected from the Building No. 900 area at concentrations that ranged from 2.1 μg/l to 15 μg/l, which included one sample (with a concentration of 15 μg/l) which exceeded the Florida guidance concentration of 6.0 μg/l for chloroform. Concentrations of all three of these constituents above Florida guidance concentrations were reported in the deep groundwater sample collected from TMW-3D, which is located at the upgradient property boundary of the Building No. 900 area for the 50-foot depth interval based on groundwater elevation data collected during the baseline characterization investigation.

No concentrations of bromodichloromethane, dibromochloromethane, or chloroform above laboratory MDLs were reported for groundwater collected from shallow monitoring wells in the Building No. 900 area.

Carbon disulfide was reported in three groundwater samples collected from the Building No. 900 area at concentrations that ranged from 2.1 μg/l to 14 μg/l, which is less than the Florida guidance concentration of 700 μg/l for carbon disulfide. No other targeted constituents were reported above the respective analytical MDL in groundwater samples collected from the Building No. 900 area.

Previous investigations performed by the U.S. Navy's contractor, ABB Environmental Services, Inc. (ABB), indicated that review of facility plans confirmed that a 2,000-gallon fuel oil UST was installed during 1968 at the south end of the building. Reportedly, the UST is inactive but has not been removed, and no closure report was obtained from BRAC records during performance of the current investigation. A small area of stressed vegetation was

reported at the southeast corner of the building in the vicinity of the UST. During the confirmatory sampling program conducted during 1997, ABB installed a soil boring in the vicinity of the UST to the water table at a depth of 7.0 feet. Soil samples were screened for headspace concentrations of VOCs. Reportedly, no excessively contaminated soil (based on the FDEP definition[1] for contaminated soil in Chapter 62-770 F.A.C.) was identified. However, higher soil headspace concentrations were reported at a depth of 7.0 feet than concentrations reported from shallower intervals, which may suggest petroleum constituents were present in groundwater at the water table but not present at significant concentrations in shallow soil. Reportedly, no groundwater sampling was performed by ABB in the Building No. 900 area.

Results of the preliminary baseline characterization investigation conducted by Golder Associates did not identify substantial soil or groundwater impacts in the vicinity of the UST. Low concentrations of certain metals were reported in soil. Benzene, toluene, and xylenes were reported at low concentrations in soil at the TMW-6 location approximately 100 feet from the UST, but it is uncertain these constituents in soil are associated with the UST. No MCL violations were reported in shallow groundwater. Concentrations of lead above MCLs were reported in deeper groundwater; however, lead concentrations in this area were consistent with background concentrations reported for lead throughout the deeper groundwater interval.

Groundwater samples collected in the Building No. 900 area during the preliminary baseline characterization investigation recently completed by Golder Associates had elevated turbidity measurements, which may have resulted from suspended sediments in groundwater samples, potentially resulting in increased metals concentrations reported by the laboratory. Lead was reported in all six deep groundwater samples, and lead concentrations from five of the six deep groundwater samples exceeded the Florida MCL for of 0.015 mg/l for lead. The consistently elevated lead concentrations in deep groundwater samples may indicate groundwater impacts have occurred to the aquifer underlying the area from past activities at the base, or it may indicate elevated concentrations of lead are representative of background conditions in the Building No. 900 area. The elevated lead concentrations may have resulted from the effects of suspended

[1] Chapter 62-770 F.A.C. defines excessively contaminated soil as soil that causes a total corrected hydrocarbon measurement of 50 parts per million (ppm) or higher for the Kerosene Analytical Group (which includes fuel oil) based on organic vapor analyses with a flame ionization detector (FID) or photo ionization detector (PID).

sediments in the groundwater samples on laboratory analyses. It may be appropriate to collect confirmatory samples from selected monitoring wells which had MCL exceedences reported for metals, filter the samples in accordance with FDEP criteria, and reanalyze the samples for metals of concern.

Exceedences of Florida MCLs for bromodichloromethane, dibromochloromethane, and chloroform were reported for one or more deep groundwater sample, including wells that are located at the apparent upgradient boundary of the Building No. 900 area based on groundwater elevation measurements recorded during the current investigation. These substances may be associated with industrial activities; however, they may be artifacts of the sampling program or laboratory analyses. It may be appropriate to perform confirmatory sampling and analysis to confirm the presence of these constituents in groundwater in the Building No. 900 area.

Benzene, toluene, and xylenes were detected in one soil sample, including a benzene concentration reported above the Florida leachability-based soil clean-up goals. Benzene was not reported in groundwater at the location where the soil sample was collected, which suggests leaching may not be occurring. However, given that only one soil sample was collected in this area, it is not possible to determine if the detection of benzene constituents a small isolated release or whether the sample was collected from the outer perimeter of an area where a substantial release occurred.

Groundwater flow in the deeper surficial aquifer (i.e., 50-feet) was determined to be toward the south. Consequently, certain U.S. Navy operations located north of Building No. 900 may be hydraulically upgradient of the Building No. 900 area. Most notable potential upgradient source areas include the former vehicle fueling operations at Building No. 180, located approximately 300 feet north of the Building No. 900 area, and former hazardous materials and hazardous waste storage areas located approximately 600 feet northeast of the Building No. 900 area.

2.0 INTRODUCTION

2.1 Overview

During October 1997, NGC retained Golder Associates to perform a focused environmental due diligence investigation at selected areas of NAS Cecil Field located in Jacksonville, Duval County, Florida. The investigations were performed as a component of a broader due diligence being performed by NGC associated with evaluation of the feasibility of taking over certain areas of the base, which is slated for closure. The purpose of the environmental due diligence evaluation was to review and summarize pre-existing information regarding the environmental status of the areas of the property which were under consideration by NGC, and use the information obtained during the records review to develop a soil and groundwater testing program to characterize baseline environmental conditions in the vicinity of the areas of the base NGC is evaluating. The preliminary information review was conducted during October and early November 1997, and a Statement of Work which defined the scope of the baseline characterization investigation was submitted by Golder Associates to NGC on November 11, 1997.

NGC is evaluating several areas of NAS Cecil Field for future NGC operations, and preliminary environmental due diligence evaluations have been initiated in several of the areas under consideration. This report details the investigative efforts which have been performed to date at the Building No. 900 area. Building No. 900 is a former bowling alley on the main base of NAS Cecil Field, and is currently closed and not in use by the U.S. Navy.

2.2 Purpose and Scope

The purpose of the environmental due diligence evaluation was to characterize baseline environmental conditions in the general vicinity of Building No. 900 on the main base of NAS Cecil Field. The evaluation at the Building No. 900 area was conducted in two phases. The first phase included a preliminary review of available information and a walk over inspection of the site. The second phase consisted of a field program which included soil and groundwater sample collection and analysis. The results of the first phase of work are reported in Section 3.0 of this document and were used to develop the scope of work conducted for the second phase of the

investigation. A description of the second phase of the investigation is provided in Section 4.0, and the investigative findings of the second phase of the investigation are described in Section 5.0 of this report. Section 6.0 of this report presents the conclusions and recommendations resulting from this study.

During the first phase of the evaluation, information was reviewed to evaluate the current level of understanding of site conditions in the Building No. 900 area of the site, and to develop a Statement of Work for the field investigation in this area. Information that was used to develop the Statement of Work included a preliminary review of the base-wide EBS Report prepared by ABB during November 1994, a review of a preliminary NGC Environmental Summary Report included in an internal memorandum dated October 8, 1997, and site inspections conducted by Golder Associates' personnel on October 21 and 22, 1997.

In addition, Golder Associates was provided with, and performed a preliminary review of, BRAC documents for NAS Cecil Field which had been loaded onto compact discs (CDs) by ABB. The version of CDs provided to Golder Associates was dated July and August 1995. More recent versions of BRAC documents were not reviewed by Golder Associates until after preparation of the Statement of Work. However, review of the most recent documents available through the BRAC office at NAS Cecil Field revealed that a Sampling and Analysis Outline (SAO) was prepared by ABB during October 1995 and a Confirmatory Sampling Report (CSR) for the former underground storage tank (UST) in the Building No. 900 area was issued by ABB during November 1997. The limited baseline environmental data available for the Building No. 900 area from the U.S. Navy are summarized in Section 3.2 of this report.

2.3 Special Terms and Conditions and Standard of Care

The environmental due diligence evaluation was performed in accordance with the scope of investigation presented in the Statement of Work developed for the Building No. 900 area of the site presented in our November 11, 1997 correspondence to NGC. Given that negotiations were ongoing during November 1997 between NGC, the U.S. Navy, and the City of Jacksonville regarding which areas of the base would become available for use by NGC, the

scope of our investigation was modified from the November 11, 1997 Statement of Work based on verbal communications with NGC.

Golder Associates' professional services were performed, findings obtained, and report prepared in accordance with standard professional principles and practices in the fields of environmental science and site assessment. This representation is in lieu of all other representations, either expressed or implied. Our services were performed in accordance with the terms and conditions of the Master Service Agreement between NGC and Golder Associates.

2.4 Limitations and Exceptions of Assessment

Findings presented in this correspondence are based on select publicly available information, information provided by representatives of the U.S. Navy and/or the City of Jacksonville, and on site conditions observed at the time of the site inspections and field investigations conducted during the period from October 1997 to December 1997. During the due diligence evaluation, Golder Associates relied on information provided by representatives of the U.S. Navy. Golder Associates cannot accept responsibility for any deficiencies, mis-statements, or inaccuracies contained in this report which have resulted from omission, misrepresentations, or fraudulent acts of the persons involved. This document has been prepared for the sole use by NGC, and Golder Associates is not responsible for independent conclusions, opinions, or recommendations made by others or otherwise based on the findings presented in this report.

2.5 Limiting Conditions and Methodology Used

During performance of the information review, Golder Associates was provided copies of records stored on CDs and were provided access to BRAC records on base. However, the CDs were over two years old, and the BRAC records on base were not organized such that Golder Associates developed a high level of confidence that we had identified and reviewed a comprehensive listing of all information which has been generated by the U.S. Navy regarding environmental conditions at the Building No. 900 area. Consequently, certain information may

exist for the Building No. 900 area which has not been reviewed by Golder Associates during performance of the current investigation.

During development and implementation of the scope for the field investigation, the goal of the investigation was to characterize baseline environmental conditions at selected areas near Building No. 900. A limited soil and groundwater investigation was conducted. Soil sample collection was restricted to near the ground surface (generally from 0 to 2 feet below ground surface); consequently, the investigation was not designed to characterize soil chemistry through an extensive vertical section of the soil column. In addition, soil samples were collected at relatively broad spacing throughout the Building No. 900 area.

Groundwater samples were collected from temporary monitoring wells screened in the water table interval (i.e., roughly 15 feet below ground surface) and in a lower section of the surficial aquifer (i.e., roughly 50 feet below ground surface). Groundwater sample locations were selected to provide representative groundwater quality data in areas of interest at the site. However, the groundwater monitoring network was not designed to delineate the lateral and vertical extent of groundwater impacts at the property, if groundwater concerns were identified at the site.

There is no assurance that the soil and groundwater monitoring program conducted for the baseline environmental characterization has identified the location of all source areas for soil or groundwater impacts which may exist at the areas of interest at the property.

Additionally, the site inspections did not include evaluation of the potential for asbestos containing materials to be present in structures located on the inspected properties. No evaluations of the potential for radon, lead-based paint, or lead in drinking water were performed. No wetland surveys were conducted, and no ecological resources evaluations were performed.

3.0 BACKGROUND INFORMATION

3.1 Overview of the NAS Cecil Field Main Base Area

3.1.1 General Site Conditions

Building No. 900 is located on the main base of NAS Cecil Field. The main base is located in the western portion of Duval County, Florida as shown on Figure 1 and consists of approximately 9,516 acres of land. The center of Building No. 900 is located approximately 30°13'59" north latitude and 81°53'20" west longitude. A site plan is shown on Figure 2.

The NAS Cecil Field main base area presently consists of a number of buildings, roadways, flight lines, paved areas, and green space. Presently, the area has little topographic relief, with a typical elevation of approximately 80 feet above mean sea level (msl). Rowell Creek drains west of the area to Taylor Creek south of the area to Yellow Water Creek, which is located south and west of the main base.

3.1.2 Geologic and Hydrogeologic Characteristics

The main base is located within the western portion of Duval County. The regional geologic units in this area consist of three sedimentary deposits; undifferentiated sediments deposited since the mid-Miocene, the Miocene age Hawthorn Group, and Eocene limestone units. These sedimentary units dip eastward at approximately 4 to 8 feet per mile.

The undifferentiated sediments above the Hawthorn Group are Holocene, Pleistocene, Pliocene, and upper Miocene in age. The Holocene and Pleistocene sediments consist of fine to medium grained unconsolidated quartz sands with varying amounts of silt and clay. These units were deposited on marine terraces and beach ridges. The Pliocene and upper Miocene sediments consist of sand, shell, calcareous clay, and soft friable limestone, and were deposited in a shallow marine environment. The undifferentiated post-Hawthorn sediments vary in thickness from less than 10 feet along the coast to over 100 feet in western Duval County.

Unconformably underlying the surficial sediments is the Hawthorn Group of early to middle Miocene age. These sediments consist of sandy clay and clayey sand with layers of phosphatic sands, limestone and dolomite. The phosphatic sands are a distinguishing characteristic that is not seen in the overlying post-Hawthorn sediments. The Hawthorn Group is subdivided into four formations; the Statenville Formation, the Coosawhatchee Formation, the Marks Head Formation, and the Penny Farms Formation. Eocene limestone units unconformably underlie the Hawthorn Group.

The regional hydrogeologic system in northeast Florida is generally described in terms of a three-unit system. The three units are: the surficial aquifer system, the upper confining unit, and the Floridan aquifer system.

The surficial aquifer is comprised of two hydrogeologic zones, the upper surficial aquifer and the rock aquifer. These hydrogeologic zones correspond to the geologic post-Hawthorn sediments. The upper surficial aquifer consists of fine to medium grained sands and is principally recharged directly from precipitation. Discharge from the upper surficial aquifer is from evapotranspiration, downward leakage, pumping, and seepage into surface water bodies. The rock aquifer is the principal water-bearing zone of the surficial aquifer system in Duval County, and consists of a permeable limestone that grades into a medium to coarse sand and shell deposit. The rock aquifer is located at the base of the post-Hawthorn sediments. The rock aquifer may be locally discontinuous or absent in western Duval County.

The potentiometric surface for the surficial aquifer system is generally less than 5 to 10 feet below ground surface. Regional groundwater flow in the surficial aquifer is towards the major discharge areas; the St. Johns River and the Atlantic Ocean. However, local groundwater flow patterns are greatly influenced by local topography and nearby surface water features.

The Hawthorn Group acts as the upper confining layer to the Floridan aquifer system. The clayey sand and sandy clay act as an aquiclude and greatly inhibit the flow of groundwater from the surficial aquifer system to the Floridan aquifer system.

The Florida aquifer system is the major source of potable water in northeast Florida. The geologic units that comprise the Floridan aquifer are the Ocala Group, the Avon Park Limestone, the Lake City Limestone and the Oldsmar Limestone. These four units consist mainly of massive limestone and dolomite. The Floridan aquifer system is approximately 300 to 350 feet below msl and is estimated to be between 1,000 to 1,800 feet thick in western Duval County. Recharge of the Floridan aquifer is in western Putnam County, southwestern Clay County, eastern Alachua County, and Bradford County west of Duval County. The upper confining unit in these areas is usually thin or absent and allows downward recharge from the surficial aquifer. An average estimated transmissivity for the upper permeable zone of the Floridan aquifer in Duval County is on the order of 8×10^4 ft^2/day.

3.2 Building No. 900 Area

3.2.1 General Description

Building No. 900 is located on Avenue D between 6th and 9th Streets. The building was constructed in 1969 and was formerly used as the NAS Cecil Field bowling alley. The building also had a snack bar and game room. The building is currently closed and not in use. The structure is a prefabricated metal building with an area of approximately 14,852 square feet and dimensions of approximately 150 feet by 100 feet.

3.2.2 Summary From the Environmental Baseline Survey Report

The EBS Report (ABB, 1994) included a tank inventory which indicated that a 2,000-gallon UST was located at the site that was used to store fuel oil for the boiler. Reportedly, this steel tank was installed in 1968 with no leak detection system. The EBS Report did not indicate that evidence of a release from the UST had been observed or reported for the site; however, no soil or groundwater testing was reported. No indication that the UST had been removed or closed in-place was included in the EBS Report.

Materials handled associated with operation of the bowling alley included approximately 110 gallons per year of solvent degreaser for equipment cleaning. Storage, handling, and

disposal procedures for solvent materials and solvent wastes were not mentioned in the EBS Report.

The SAO (ABB, October 1995) for Building No. 900 reported that no vent pipe for the UST was located during a site inspection; however, review of facility plans confirmed that a 2,000-gallon fuel oil UST was installed at the south end of the building. A small area of stressed vegetation was reported at the southeast corner of the building in the vicinity of the UST. However, the SAO concluded that Phase II assessment sampling was not recommended for the facility, as potential environmental issues relating to the UST would be addressed under a separate program.

The CSR (ABB, November 1997) reported that the UST was installed during 1968, and that a Contamination Assessment Plan for the assessment of soil and groundwater at Building No. 900 was prepared by ABB in November 1996. During the confirmatory sampling program, ABB installed three soil borings in the vicinity of the UST. Two of the boring encountered refusal within the upper few feet of the ground surface, and one boring was advanced to the water table at a depth of 7.0 feet. Soil samples were screened with an OVA for headspace concentrations of VOCs. Reportedly, no excessively contaminated soil (based on FDEP definitions for contaminated soil in Chapter 62-770 F.A.C.) was identified. However, the one soil boring advanced to the water table had elevated soil headspace concentrations at a depth of 7.0 feet compared to results from shallower intervals in the three borings, which may suggest petroleum constituents were present in groundwater at the water table but not present at significant concentrations in shallow soil. No groundwater sampling was performed during the CSR investigation.

3.2.3 Summary of the Golder Associates Site Inspection

Golder Associates conducted an inspection of the Building No. 900 area during October 1997. Building No. 900 was a bowling alley which is now closed. A raised concrete slab was observed on the south end of the building which is used as a foundation for an insulated transformer and two heat pump units. The 2,000-gallon UST for heating oil identified in the EBS Report and the SAO and CSR is reportedly near the south end of the building. Removal

of the UST was not documented in the previous ABB reports. One monitoring well was observed at the south end of Building No. 900 immediately east of the concrete slab. Inside the maintenance room adjacent to the slab, two PVC pipes discharging liquid into a floor drain were observed, which may have been condensate from the HVAC units. A transformer containing PCBs was located in the southwest corner of the parking lot. No evidence of a leak from the transformer was observed during the site inspection. A small PVC pipe coming out of the south side of the building was observed dripping water. A small metal building and a small storage shed for flammable liquids were located at the north end of the building. The flammable storage shed was empty during the site inspection.

3.2.4 Summary of Aerial Photograph Review

Aerial photographs were reviewed for the following years: 1968, 1977, 1988, 1993, and 1995. Building No. 900 was built around 1969. The area in 1968 was a cleared patch of land, about 150 feet by 400 feet, with very little vegetation. The land surrounding the area had very sparse tree coverage. The asphalt road which encircles the area was in place. By 1977, Building No. 900 had been constructed along with the surrounding parking areas. A road connecting the drive of Building No. 900 to a parking lot southeast of the area was observed. The trailer park across the street to the west of the area was completed. Thick trees east of the building and a small patch of trees to the north were also observed. In the 1988 aerial photograph, three distinct objects were observed on the south end of the building which correspond to the locations of the transformer and two heat pump units. The trees north of the building had been cleared and the McDonald's restaurant had been constructed. Most of the trees to the east were removed and the parking lot that had been southeast of the building was expanded. The road from the drive to the parking lot was also gone. There was not much change noted in the 1993 aerial photograph except two small rectangular structures directly north of the building were observed. These are probably the metal shed and flammable liquids storage cabinet. No changes were observed in the 1995 aerial photograph.

3.2.5 Facilities Within 1,000-Feet with Potential Environmental Concerns

Based on information presented in the EBS Report, the following buildings were identified which stored hazardous materials or hazardous wastes or petroleum products within 1,000 feet of Building No. 900.

Building No.	Building Identification (year built)	Recognized Environmental Condition
49	Trans. and Fuel Management (1942)	USTs
80	Auto Maintenance and Repair Shop (1952)	Haz. materials and waste; USTs (3)
80C	Battery Shop (1953)	Haz. materials and waste; AST
81	FD Maintenance Building (1953)	Haz. matr. and waste; UST/ASTs (3)
100	FD Services Storage Building (1961)	PCBs; hazardous materials
101	Pesticide Building (1975)	Pesticide storage
108	Grounds Maintenance Equip. Shed (1945)	Hazardous materials storage
178	Refuel Vehicle Maintenance Shelter (1961)	Hazardous materials storage
180	Old and New Filling Stations (1952)	USTs
199	Family Service Center (1957)	UST
201	Public Works Storage Building (1945)	Hazardous materials storage
356	North Transformer Substation Pad (1978)	PCBs
384	Automobile Shop (1961)	AST
498	Gymnasium (1964)	UST
558	Standby Generator Building (1964)	UST
584	Transformer Pad (1952)	PCBs
800	Memorial Chapel	PCBs; UST
905	Exchange Building (1971)	UST

Of the off-site facilities located within 1,000-feet of the Building No. 900 area listed above, the locations which represent the greatest potential concern are the former fueling area at Building No. 180, located approximately 300 feet north of the Building No. 900 area, and the former hazardous materials and hazardous waste staging area located near Building No. 81 approximately 600 feet northeast of the Building No. 900 area.

4.0 FIELD INVESTIGATIVE PROCEDURES

4.1 Overview

As a result of the site inspection and information reviewed, a field investigation program was undertaken in the Building No. 900 area. In general, the program included collection of soil and groundwater samples for chemical analyses to determine potential impacts of past operational practices at the facility. Specifics of the field program are highlighted below.

- One deep soil boring was drilled at the main base area and one deep soil boring was drilled at the Yellow Water Weapons area. Both borings were drilled to the top of the Hawthorn Group to establish the stratigraphy in the two areas of the site and were used to refine details of the subsequent sampling program.

- Two soil borings were installed at the UST location at Building No. 900 to evaluate the potential for impacts to soil from the storage of petroleum products at the site. Two soil samples (one from each boring) were analyzed for petroleum constituents identified in Chapter 62-770 F.A.C.; specifically, EPA Method 8020, EPA Method 8100, and petroleum range organics by the FL-PRO method. In addition, appropriate QA samples were collected and analyzed.

- One composite shallow soil sample was collected in the vicinity of the PCB-containing transformer located on the west side of the building. A second shallow composite soil sample was collected adjacent to the transformer at the south end of the building. The soil samples were analyzed by EPA Method 8080 for PCBs.

- One composite soil sample was collected in the vicinity of the flammable storage locker located on the north side of the building. The soil sample was analyzed by EPA Method 8260 for VOCs.

- Two pairs of temporary monitoring wells were installed at the UST location at Building No. 900 to evaluate the potential for impacts to groundwater from the storage of petroleum products at the site. One shallow and one deep groundwater sample were collected from each pair of wells and analyzed for petroleum constituents and lead identified in Chapter 62-770 F.A.C.; specifically, EPA Method 8010, EPA Method 8020, EPA Method 8100, EPA Method 200.7, and petroleum range organics by the FL-PRO method. In addition, appropriate QA samples were collected and analyzed.

- Surface soil samples (to depths of approximately 2 feet) were collected from each temporary monitoring well at the UST site. The samples were initially tested with a organic vapor analyzer (OVA) equipped with a photoionization detector (PID) to measure soil headspace concentrations of VOCs. The sample from the interval with the highest OVA reading was collected and analyzed for VOCs by EPA Method 8260, semi-volatile organic compounds (SVOCs) by EPA Method 8270, and the eight RCRA metals by EPA Method 6010/7470.

- Four pairs of temporary monitoring wells were installed (one located approximately at each of the four corners of the property) to evaluate the potential for groundwater impacts from adjacent facilities. One shallow and one deep groundwater sample were collected from both TMW-3 and TMW-6 (located on the northwest and southeast corners, respectively), and were analyzed for the parameters listed in 40 CFR, Part 264, Appendix IX. One shallow and one deep groundwater sample were collected from both TMW-4 and TMW-5 (located on the northeast and southwest corners, respectively), and were analyzed for a broad range of constituents including VOCs by EPA Method 8260, SVOCs by EPA Method 8270, PCBs by EPA Method 8080, and eight RCRA metals by EPA Method 6010/7470. In addition, appropriate QA samples were collected and analyzed.

- Surface soil samples (to depths of approximately 2 feet) were collected from the four temporary monitoring well locations at the four corners of the Building No. 900 area. The samples were screened with the OVA for soil headspace concentrations of VOCs. The sample from the interval with the highest OVA reading was collected and analyzed for VOCs by EPA Method 8260, SVOCs by EPA Method 8270, and eight RCRA metals by EPA Method 6010/7470.

A more comprehensive description of the investigative procedures is presented in the sections that follow. Sampling locations are shown on Figure 3. A summary of the soil sampling program is presented in Table 1. A summary of the groundwater sampling program is presented in Table 2. Sampling forms, boring logs, and other field documentation are provided in Appendix A. All field sampling work was performed in general accordance with the Golder Associates FDEP-approved Comprehensive Quality Assurance Plan (CompQAP). The laboratory contractor, Savannah Labs, is under a general services contract with NGC and performed their portion of the work under their own FDEP-approved CompQAP. The laboratory analytical reports are presented in Appendix B.

4.2 Deep Soil Borings

Two deep soil borings were drilled at NAS Cecil Field to characterize the lithology of the surficial aquifer underlying the site. The two borings were advanced from the ground surface through the subsurface soils until reaching the underlying marl layer, which represents the base of the surficial aquifer. The location of the boring advanced in the main base area is shown on Figure 3, and the boring log is included in Appendix A.

The borings were advanced using a CME-55 drill rig, mounted on an All Terrain Vehicle (ATV), supplied and operated by Wolff Drilling, Inc. of Jacksonville, Florida. The rig was equipped with an automatic drop hammer to perform Standard Penetration Testing (SPT) in accordance with ASTM Standard D 1586. The borings were advanced using mud rotary drilling with split spoon sampling from the ground surface until boring termination.

The field activities were documented by personnel from Golder Associates' staff who also located the borings in the field, logged the observed soil and groundwater conditions, recorded the results of the field testing, and cared for the samples obtained.

In boring B-1 (on the Yellow Water Weapons Compound area), SPT and split spoon sampling was performed at 2.5-foot intervals until boring termination at 85 feet below ground surface. In boring B-2 (in the main base area), SPT and split spoon sampling was performed at 2.5-foot intervals until about 115 feet below ground surface, and at 5-foot intervals thereafter until boring termination at a depth of 130 feet below ground surface. After completion of each boring, the borehole was grouted with a cement grout up to the ground surface.

The borings were drilled in areas believed to be unimpacted by previous site activity. Consequently, the drilling equipment was not decontaminated between soil borings. Additionally, given that the deep soil borings were installed in remote, reportedly unimpacted areas of the base, soil cuttings and drilling mud were placed directly onto the ground surface in the general vicinity of each soil boring at the completion of drilling activities.

4.3 Soil Sampling

Five soil samples (900-SB-1 through 900-SB-5) were collected for chemical analyses in the Building No. 900 area at the locations shown on Figure 3. SB-1 and SB-2 were collected adjacent to the concrete slab in the vicinity of the UST located south of Building No. 900. These samples were collected from a depth range of 2 to 4 feet below ground surface and were analyzed for petroleum constituents in Chapter 62-770 F.A.C. by EPA Method 8020, EPA Method 8100, and petroleum range organics by the FL-PRO method. SB-3 was collected adjacent to the flammable storage locker north of Building No. 900 at a depth range from ground surface to 1.5 feet below

ground surface. This sample was analyzed for VOCs by EPA Method 8260. SB-4 and SB-5 were collected adjacent to the transformers west and south of Building No. 900, respectively. These two samples were collected from a depth of 0 to 2 feet below ground surface and were analyzed for PCBs by EPA Method 8080.

The soil borings were advanced with a stainless steel hand auger. The soil samples collected from the soil borings were packaged on ice and shipped to the contract laboratory to be analyzed.

Five soil samples (900-TMW-2-SL through 900-TMW-6-SL) were collected for chemical analyses at the temporary well locations in the Building No. 900 area shown on Figure 3. No soil sample was collected and analyzed from the soil boring at the TMW-1 location. At each of the sample locations, the soil borings were advanced, and the soil samples were collected with a stainless steel hand auger. Soil samples were generally collected from two depths (ground surface to 1.0 feet below ground surface, and 1.0 to 2.0 feet below ground surface) at each location. The samples were placed in glass jars and VOC concentrations in the sample container headspace were recorded using an OVA. At each location, soil from the interval with the highest headspace VOC concentration was collected and shipped to Savannah Labs to be analyzed for VOCs by EPA Method 8260, SVOCs by EPA Method 8270, and the eight RCRA metals by EPA Method 6010/7470. If no readings or the same readings were detected using the OVA, then a composite soil sample was collected and analyzed. Sample collection logs for each of the soils samples are presented in Appendix A. The analytical results are presented in Appendix B.

All tools potentially contacting the soil samples were decontaminated prior to the initiation of each soil boring. The decontamination process included a rinse with tap water, a scrubbing with laboratory-grade detergent (Alconox), and a deionized (DI) water rinse. An isopropanol rinse was used following the DI water rinse on the stainless steel equipment. The equipment was allowed to air dry, if practical, otherwise a final DI water rinse was performed. Soil cuttings generated from the boreholes, which were not retained as sample materials, were returned to the borehole. No containerization of soil cuttings was performed.

4.4 Monitoring Well Installation

Six temporary monitoring well pairs were installed with a DPT rig operated by Probe Domain of Jacksonville, Florida at the locations shown on Figure 3. The temporary well pairs were generally completed at two depths (generally 15 feet below ground surface and 50 feet below ground surface) at each location. Installation of the temporary monitoring wells was conducted by advancing a nominal 2-inch diameter decontaminated steel probe with hollow rods and an expendable tip, using a Geoprobe DPT rig to push and pneumatically hammer to a targeted depth. The 1.25-inch diameter PVC well (0.10-inch slot screen and Schedule 40 flush threaded casing) was assembled and lowered through the center of the rods to the bottom of the probe. As the steel rods were retracted, the steel expendable tip was expelled by force of the PVC temporary well. The rods were slowly removed, leaving the PVC temporary well in the ground at the targeted depth. As the rods were withdrawn, the formation collapsed around the screen and riser, such that no sand pack or bentonite seal were installed.

All DPT tools potentially contacting the groundwater sample were decontaminated prior to the initiation of each well. The decontamination process included a rinse with tap water, a scrubbing with laboratory-grade detergent (Alconox), and a DI water rinse. An isopropanol rinse was used following the DI water rinse. The equipment was allowed to air dry, if practical, otherwise a final DI water rinse was performed.

4.5 Groundwater Sampling and Analysis

Following installation of each temporary monitoring well, dedicated polyethylene tubing was installed inside the well to the screened interval, and a peristaltic pump was connected to the discharge end of the tubing. The temporary well point was purged under low flow conditions for 15 minutes, or until a minimum of three well volumes had been removed, to attempt to remove fine-grained sediment materials from the screened interval and assure representative formational groundwater was sampled. During purging, pH, specific conductance, temperature, and turbidity of the purge water was measured and recorded. After the field parameters stabilized, the flow rate of the pump was adjusted down and the sample aliquots for SVOCs, pesticides/PCBs, and inorganic parameters were collected. The pump was then turned

off and the tubing removed. The sample aliquot for VOCs was collected using a dedicated disposable bailer. Following sample collection, the sample aliquots were placed in a laboratory shuttle and cooled with ice in plastic bags.

A total of twelve temporary well points were sampled during the groundwater sampling event. Additionally, quality assurance sampling (i.e., one duplicate sample, one equipment blank, matrix spike and matrix spike duplicate (MS/MSD) samples, trip blanks) was performed during the sampling event. Groundwater and quality assurance samples were shipped to the contract laboratory to be analyzed for a wide variety of analytical parameters. Specific sample identification along with a summary of the analyses performed is provided in Table 2. The groundwater analytical results are included in Appendix B.

4.6 Groundwater Elevations

The position of all temporary monitoring wells was surveyed by Holland & Bassett Surveyors, Inc. of Jacksonville, Florida, a licensed surveyor in the State of Florida. The horizontal locations were surveyed to an accuracy of 1.0 feet and were tied into the State Planar Coordinate system. The vertical locations (ground surface and top of casing elevations) were surveyed to an accuracy of 0.01 feet referenced to msl.

Water level measurements were recorded from the monitoring wells following well completion and prior to the groundwater sampling event. In addition, a complete circuit of water level measurements was made on December 20, 1997. Water level measurements were recorded to an accuracy of 0.01 feet and groundwater elevations were calculated to an accuracy of 0.01 feet referenced to msl. Table 3 presents the water level measurements made on December 20, 1997 and corresponding groundwater elevations recorded from each temporary monitoring well.

5.0 INVESTIGATIVE FINDINGS

5.1 Site Geology in the Building No. 900 Area

Results of the deep soil borings indicate the Building No. 900 area is underlain by approximately 128 feet of sediments which comprise the surficial aquifer above the Hawthorn Group, which is a low permeability confining unit at the base of the surficial aquifer. In general, the upper 100 feet of the surficial aquifer is comprised of fine to medium grained silty sand. From 100 to 128 feet below ground surface, the lower surficial aquifer is comprised of medium to coarse grained sand with some gravel size particles and shells with a trace of silt and clay. No sediment materials consistent with the lithology typically representative of the rock aquifer, locally present at the base of the surficial aquifer system, were encountered. At 128 feet below ground surface, the surficial aquifer was underlain by marl with phosphatic material. This phosphatic marl typically represents the top of the Hawthorn Group, which is the confining unit underlying the surficial aquifer.

Lithology encountered in the deep boring on the main base area differed substantially from the boring installed in the Yellow Water Weapons Compound area, where the surficial aquifer extended to a depth of 81 feet below ground surface and was underlain by the Hawthorn Group. The rock aquifer was encountered at a depth from approximately 74 to 81 feet below ground surface in the Yellow Water Weapons Compound area. The elevation of the ground surface in the two areas is roughly the same. The increased depth to the top of the Hawthorn Group at the main base area, and the absence of the rock aquifer, may indicate the presence of a post-Miocene erosional channel which incised the top of the Hawthorn Group prior to deposition of the sediments of the surficial aquifer.

5.2 Groundwater Flow in the Surficial Aquifer

A total of 6 monitoring well clusters were installed in the Building No. 900 area during the baseline characterization investigation. At each well cluster, one well was installed to a depth of approximately 15 feet below ground surface in the upper surficial aquifer and one well was installed to a depth of approximately 50 feet below ground surface lower in the surficial aquifer. Each well was surveyed to determine the horizontal coordinates to an accuracy of 1.0 foot and the elevation to an accuracy of 0.01 foot relative to msl. Groundwater elevations were

measured in each well on December 20, 1997. Groundwater elevation data are presented in Table 3. A potentiometric map for the upper surficial aquifer is shown on Figure 4, and a potentiometric map for the lower surficial aquifer is shown on Figure 5. The potentiometric maps were used to characterize the direction of groundwater flow underlying the Building No. 900 area.

5.2.1 Upper Surficial Aquifer Groundwater Flow

In the upper surficial aquifer, groundwater elevations were generally highest in the southeastern corner of the Building No. 900 area, with shallow groundwater toward the west as shown on Figure 4. An area of standing water resulting from heavy rains during early December 1997 was located southeast and south of the area. Groundwater elevations descended by 0.8 feet from east to west along the southern boundary of the area at a horizontal hydraulic gradient of approximately 3.3×10^{-3}. A westward groundwater flow of the upper surficial aquifer is consistent with surface water drainage in the area to the west toward Rowell Creek.

5.2.2 Lower Surficial Aquifer Groundwater Flow

In the lower surficial aquifer (i.e., approximately 50 feet below ground surface), groundwater flow is generally toward the south to southwest as shown on Figure 5. The highest groundwater elevations in this interval were measured along the northern boundary of the Building No. 900 area. Groundwater elevations descended by 0.2 feet from northeast to southwest at a horizontal hydraulic gradient of approximately 5.5×10^{-4}.

Downward vertical hydraulic gradients exist between the upper and lower units of the surficial aquifer. Given the southward flow direction in the 50-foot depth interval, the Building No. 900 area could be downgradient of the former fueling facility at Building No. 180 located approximately 300 feet to the north, and groundwater underlying the Building No. 900 area could be adversely impacted if contaminants in the fueling area have migrated vertically downward to the 50-foot depth interval.

5.3 Soil Analytical Results

Soil analytical results for the Building No. 900 area are summarized in Table 4 and shown on Figure 6. Results of the baseline soil characterization indicate detectable concentrations of several metals in the samples collected in the Building No. 900 area. Specifically, barium, chromium, lead, and mercury were reported at concentrations which exceeded analytical MDLs. None of the reported metals in soil in the Building No. 900 area exceeded soil clean-up goals established by FDEP.

In addition to metals, benzene, toluene, and xylenes were reported in one soil sample at the TMW-6 location at concentrations which exceeded the analytical MDLs. The reported concentrations of benzene, toluene, and xylenes were below the FDEP soil clean-up goals for industrial facilities. Benzene was reported at a concentration of 8.6 micrograms per kilogram (μg/kg), which exceeds the Florida leachability-based clean-up goal for benzene of 3.0 μg/kg in soil. However, benzene was not detected in shallow groundwater at the TMW-6 location, and the leachability-based clean-up goals are applicable for sites with groundwater contamination or if there was a recent discharge; therefore, the leachability-based clean-up goals may not be currently applicable to the Building No. 900 area.

5.4 Groundwater Analytical Results

Groundwater analytical results for the Building No. 900 area are summarized in Table 5 and shown on Figure 7 for the shallow surficial aquifer and on Figure 8 for the deeper surficial aquifer. Results of the baseline groundwater characterization in the Building No. 900 area indicate arsenic, barium, chromium, cobalt, lead, nickel, vanadium, and zinc were reported in groundwater at concentrations which exceeded analytical MDLs. Lead was reported in five deep (i.e., 50-feet) groundwater samples at concentrations which exceeded the Florida MCL of 0.015 mg/l for lead. The maximum concentration of lead reported in groundwater in the Building No. 900 area was 0.085 mg/l. No elevated lead concentrations were reported for groundwater collected from shallow monitoring wells in the Building No. 900 area.

Chromium was reported in two deep groundwater samples at concentrations which exceeded the Florida MCL of 0.1 mg/l for chromium. The maximum concentration of chromium reported in groundwater in the Building No. 900 area was 0.120 mg/l. No elevated chromium concentrations were reported for groundwater collected from shallow monitoring wells in the Building No. 900 area.

Vanadium was reported in one deep groundwater sample at a concentration which exceeded the Florida guidance concentration of 0.049 mg/l for vanadium. The maximum concentration of vanadium reported in deep groundwater in the Building No. 900 area was 0.11 mg/l. No elevated vanadium concentrations were reported for groundwater collected from shallow monitoring wells in the Building No. 900 area.

No other metals were reported at concentrations exceeding Florida MCLs in groundwater samples collected in the Building No. 900 area.

Bromodichloromethane was reported in three deep groundwater samples collected from the Building No. 900 area at concentrations that ranged from 1.2 μg/l to 4.7 μg/l, which exceeded the Florida MCL of 0.6 μg/l for bromodichloromethane. Dibromochloromethane was reported in one deep groundwater sample collected from the Building No. 900 area at a concentration of 1.8 μg/l, which exceeded the Florida guidance concentration of 1.0 μg/l for dibromochloromethane. Chloroform was reported in four deep groundwater samples collected from the Building No. 900 area at concentrations that ranged from 2.1 μg/l to 15 μg/l, which included one sample (at a concentration of 15 μg/l) which exceeded the Florida guidance concentration of 6.0 μg/l for chloroform. Concentrations of all three of these constituents above Florida guidance concentrations were reported in the deep groundwater sample collected from TMW-3D, which is located at the upgradient property boundary of the Building No. 900 area for the 50-foot depth interval based on groundwater elevation data collected during the baseline characterization investigation.

No concentrations of bromodichloromethane, dibromochloromethane, or chloroform above laboratory MDLs were reported for groundwater collected from shallow monitoring wells in the Building No. 900 area.

Carbon disulfide was reported in three groundwater samples collected from the Building No. 900 area at concentrations that ranged from 2.1 μg/l to 14 μg/l, which is less than the Florida guidance concentration of 700 μg/l for carbon disulfide. No other targeted constituents were reported above the respective analytical MDL in groundwater samples collected from the Building No. 900 area.

6.0 CONCLUSIONS AND RECOMMENDATIONS

Previous investigations performed by ABB, the U.S. Navy's contractor, indicated that review of facility plans confirmed that a 2,000-gallon fuel oil UST was installed during 1968 at the south end of the building. Reportedly, the UST is inactive but has not been removed, and no closure report was obtained from BRAC records during performance of the current investigation. A small area of stressed vegetation was reported at the southeast corner of the building in the vicinity of the UST by ABB. During the confirmatory sampling program conducted during 1997, ABB installed a soil boring in the vicinity of the UST to the water table at a depth of 7.0 feet. Soil samples were screened for headspace concentrations of VOCs. Reportedly, no excessively contaminated soil (based on the FDEP definition for contaminated soil in Chapter 62-770 F.A.C.) was identified. However, higher soil headspace concentrations were reported at a depth of 7.0 feet than concentrations reported from shallower intervals, which may suggest petroleum constituents were present in groundwater at the water table but not present at significant concentrations in shallow soil. Fuel oil generally has low volatility, which could explain the lack of elevated soil headspace VOC concentrations. Reportedly, no groundwater sampling was performed by ABB in the Building No. 900 area.

Results of the preliminary baseline characterization investigation conducted by Golder Associates did not identify substantial soil or groundwater impacts in the vicinity of the UST. Low concentrations of certain metals were reported in soil. Benzene, toluene, and xylenes were reported at low concentrations in soil at the TMW-6 location approximately 100 feet from the UST, but it is uncertain these constituents in soil are associated with the UST. No MCL violations were reported in shallow groundwater. Concentrations of lead above MCLs were reported in deeper groundwater; however, lead concentrations in this area were consistent with background concentrations reported for lead throughout the deeper groundwater interval.

Groundwater samples collected in the Building No. 900 area during this preliminary baseline characterization investigation had elevated turbidity measurements, which may have resulted from suspended sediments in groundwater samples, potentially resulting in increased metals concentrations reported by the laboratory. Lead was reported in all six deep groundwater samples, and lead concentrations from five of the six deep groundwater samples exceeded the

Florida MCL for of 0.015 mg/l for lead. The consistently elevated lead concentrations in deep groundwater samples may indicate groundwater impacts have occurred to the aquifer underlying the area from past activities at the base, or it may indicate elevated concentrations of lead are representative of background conditions in the Building No. 900 area. The elevated lead concentrations may have resulted from the effects of suspended sediments in the groundwater samples on laboratory analyses. It may be appropriate to collect confirmatory samples from selected monitoring wells which had MCL exceedences reported for metals, filter the samples in accordance with FDEP criteria, and reanalyze the samples for metals of concern.

Exceedences of Florida guidance concentrations for bromodichloromethane, dibromochloromethane, and chloroform were reported for one or more deep groundwater sample, including wells that are located at the apparent upgradient boundary of the Building No. 900 area based on groundwater elevation measurements recorded during the current investigation. These substances may be associated with industrial activities; however, they may be artifacts of the sampling program or laboratory analyses. It may be appropriate to perform confirmatory sampling and analysis to confirm the presence of these constituents in groundwater in the Building No. 900 area.

Benzene, toluene, and xylenes were detected in one soil sample, including a benzene concentration reported above the Florida leachability-based soil clean-up goals. Benzene was not reported in groundwater at the location where the soil sample was collected, which suggests leaching may not be occurring. However, given that only one soil sample was collected in this area, it is not possible to determine if the detection of benzene constituents a small isolated release or whether the sample was collected from the outer perimeter of an area where a substantial release occurred.

Groundwater flow in the deeper surficial aquifer (i.e., 50-feet) was determined to be toward the south. Consequently, certain U.S. Navy operations located north of Building No. 900 may be hydraulically upgradient of the Building No. 900 area. Most notable potential upgradient source areas include the former vehicle fueling operations at Building No. 180, located approximately 300 feet north of the Building No. 900 area, and former hazardous materials and hazardous waste storage areas located approximately 600 feet northeast of the Building No. 900 area.

GOLDER ASSOCIATES INC.

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Table 1
Soil Sampling Program Summary
Main Base Area - Building No. 900
Northrop Grumman Corporation - NAS Cecil Field Project
Jacksonville, Florida

Sample Point ID	Depth of Boring (ft)	Sample Interval[1]	Analytical Parameters							
			Method 8080	Head Space VOCs	Method 8260	Method 8020	Method 6010/7470	Method 8270	Method 8100	Method FL-PRO
900-SB-1	5	2 - 4 ft				X			X	X
900-SB-2	6	2 - 4 ft				X			X	X
900-SB-3	1.5	0 -1.5 ft			X					
900-SB-4	2	0 - 2 ft	X							
900-SB-5	2	0 - 2 ft	X							
900-TMW-2-SL	4	2 - 4 ft		X	X	X	X	X		
900-TMW-3-SL	2	1 - 2 ft		X	X	X	X	X		
900-TMW-4-SL	2	1 - 2 ft		X	X	X	X	X		
900-TMW-5-SL	2	0 - 2 ft		X	X	X	X	X		
900-TMW-6-SL	2	0 - 1 ft		X	X	X	X	X		

Note: (1) Soil samples were composited from the referenced interval.
No mixing or stirring of the VOC fraction was performed.

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Table 2
Groundwater Sampling Program Summary
Main Base Area - Building No. 900
Northrop Grumman Corporation - NAS Cecil Field Project
Jacksonville, Florida

		Field Parameters					Analytical Parameters									
Sample Point ID	Date Sampled	Volume Purged (gallons)	pH	Temp. ° F	Specific Conductivity (mmho)	Turbidity (NTU)	Method 8260	Method 8010	Method FL-PRO	Method 8080	Method 6010/7470	Method 8020	Method 200.7	Method Appendix IX	Method 8270	Method 8100
900 TMW-1S	3-Dec-97	5	6.09	76	279	36		X	X			X	X			X
900 TMW-1D	3-Dec-97	10	5.48	76	86	70		X	X			X	X			X
900 TMW-2S[1]	3-Dec-97	NR	NR	NR	NR	162		X	X			X	X			X
900 TMW-2D	3-Dec-97	8	5.43	NR	101	NR		X	X			X	X			X
900 TMW-3S	3-Dec-97	7	5.36	82	47	NR								X		
900TMW-3D	3-Dec-97	10	5.69	76	128	NR								X		
900 TMW-4S	2-Dec-97	5	5.48	72	129	18	X			X	X				X	
900 TMW-4D	2-Dec-97	10	4.9	71	91	160	X			X	X				X	
900 TMW-5S	3-Dec-97	6	5.64	78	99	60	X			X	X				X	
900 TMW-5D	3-Dec-97	10	5.27	80	68	160	X			X	X				X	
900 TMW-6S	2-Dec-97	7	4.78	72	115	44								X		
900 TMW-6D	2-Dec-97	10	4.77	71	72	160								X		

Notes: 1. Well purged dry twice.
NR = Not Recorded

FN:DISK\973-3778\900\900GWSUM.XLS

Table 3
Surficial Aquifer Groundwater Elevation Data
Main Base Area - Building No. 900
Northrop Grumman Corporation - NAS Cecil Field Project
Jacksonville, Florida

Sample Point ID	Date Sampled	Shallow Monitoring Wells					Deep Monitoring Wells				
		Well Elevation (ft)	Distance Above Ground Level (ft)	Depth to Water (ft)	Ground Water Elevation (ft)	Total Depth of Well (ft)	Well Elevation (ft)	Distance Above Ground Level (ft)	Depth to Water (ft)	Ground Water Elevation (ft)	Total Depth of Well (ft)
900-TMW-1S	20-Dec-97	78.00	0.02	1.47	76.53	14.82	-	-	-	-	-
900-TMW-1D	20-Dec-97	-	-	-	-	-	78.23	0.18	2.69	75.54	49.53
900-TMW-2S	20-Dec-97	78.24	0.00	1.73	76.51	14.83	-	-	-	-	-
900-TMW-2D	20-Dec-97	-	-	-	-	-	78.24	0.03	2.70	75.54	49.42
900-TMW-3S	20-Dec-97	78.35	0.04	2.41	75.94	14.43	-	-	-	-	-
900-TMW-3D	20-Dec-97	-	-	-	-	-	78.26	-0.04	2.60	75.66	48.97
900-TMW-4S	20-Dec-97	78.89	0.02	2.67	76.22	14.79	-	-	-	-	-
900-TMW-4D	20-Dec-97	-	-	-	-	-	78.82	0.00	3.13	75.69	49.55
900-TMW-5S	20-Dec-97	77.28	0.05	1.49	75.79	14.80	-	-	-	-	-
900-TMW-5D	20-Dec-97	-	-	-	-	-	77.17	0.04	1.70	75.47	49.55
900-TMW-6S	20-Dec-97	77.62	0.15	1.01	76.61	14.46	-	-	-	-	-
900-TMW-6D	20-Dec-97	-	-	-	-	-	77.41	0.00	1.86	75.55	49.53

Note: (1) All elevation data referenced to Mean Sea Level (MSL).

FN:DISK\973-3778\900\900GWLEV.XLS

Table 4
Summary of Soil Laboratory Analytical Data - Detected Parameters
Main Base - Building 900
Northrop Grumman Corporation - NAS Cecil Field Project
Jacksonville, Florida

Analyte	FDEP Goals (1) (IND)	FDEP Goals (1) (Leach)	RL (2)	Location 900-SB-1 (2 -4 ft)	900-SB-2 (2 -4 ft)	900-SB-3 (0 -1.5 ft)	900-SB-4 (0 -2 ft)	900-SB-5 (0 -2 ft)	900-TMW 2-SL (1 - 2 ft)	900-TMW 3-SL (1 - 2 ft)	900-TMW 4-SL (0 - 1 ft)	900-TMW 5-SL (1 -2 ft)	900-TMW 6-SL (0 -1 ft)
Inorganics (mg/kg)													
Barium	84,000	NC	1.0	--	4	--	--	--	12	4.5	1.6	2.8	8.0
Chromium	430 (4)	NC	1.0	--	3.9	--	--	--	5.4	4.6	--	1.8	9.3
Lead	1,000	NC	0.50	--	5.6	--	--	--	16	4.9	2.0	2.1	26
Mercury	480	NC	0.010	--	0.024	--	--	--	0.029	0.027	--	--	0.025
Volatile Organics (µg/kg)													
Benzene	2,000	3.0	6.0	--	--	--	--	--	--	--	--	--	8.6
Toluene	3,500,000	200	6.0	--	--	--	--	--	--	--	--	--	14
Xylene	92,000,000	100	6.0	--	--	--	--	--	--	--	--	--	15

Notes:
(1) FDEP Goals = Soil clean-up goals per FDEP memorandum dated Sept. 29, 1995.
Industrial (IND) and Leaching (Leach) goals are shown.
(2) RL = Reportable Limit, as defined by the laboratory for specific analytical methods.
(3) NC = Leaching goal not calculated by FDEP for inorganic and some organic parameters.
(4) Clean-up goal for hexavalent chromium.
(5) -- indicates parameter not detected above laboratory reporting limit.

FN:DISK\973-3778\900\900_SL.XLS

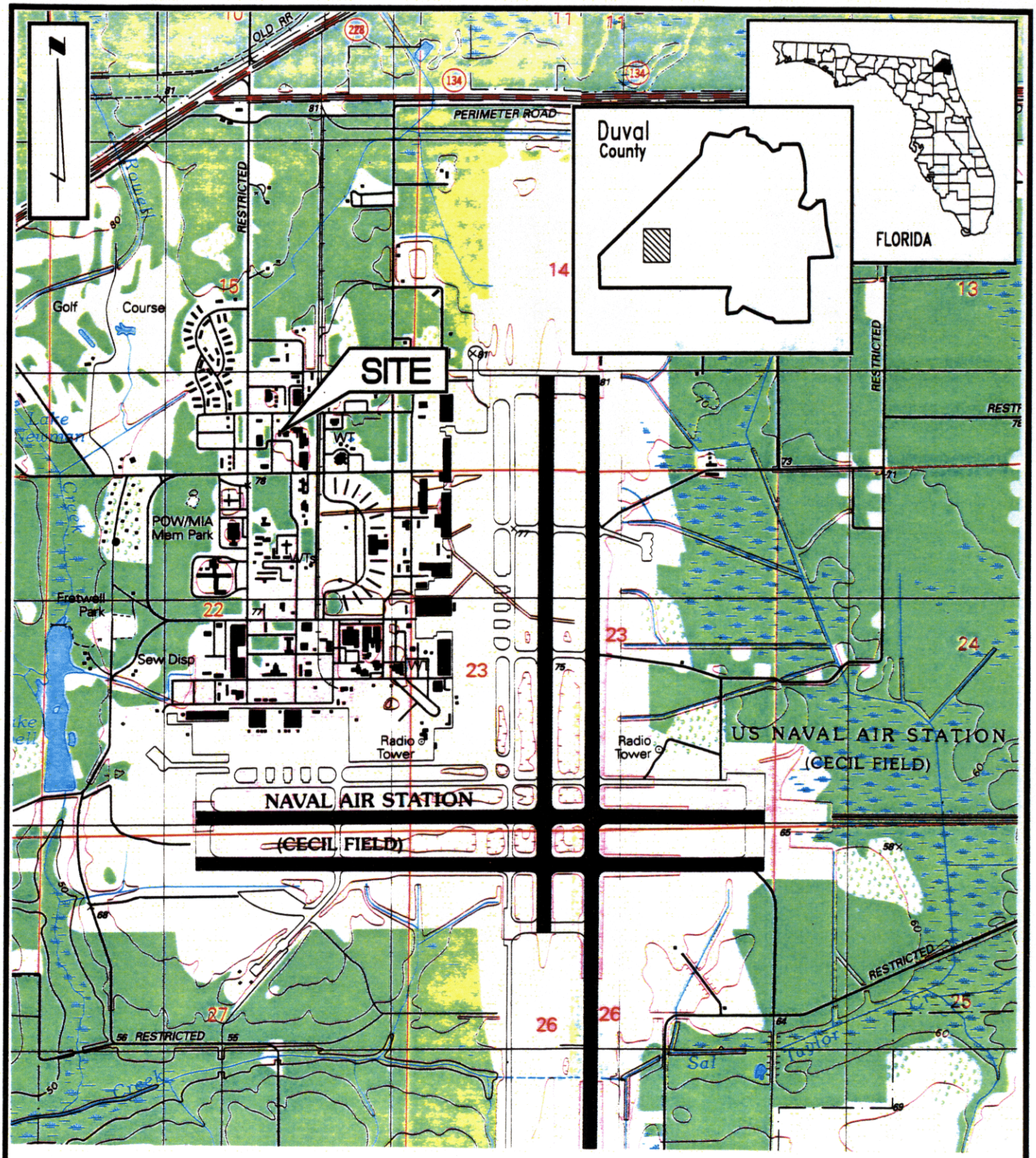
Table 5
Summary of Groundwater Laboratory Analytical Data - Detected Parameters
Main Base - Building 900
Northrop Grumman Corporation - NAS Cecil Field Project
Jacksonville, Florida

Analyte	Regulatory Standard	RL (4)	Location						
			900-TMW 1(S)	900-TMW 1(D)	900-TMW 2(S)	900-TMW 2(D)	900-TMW 3(S)	Duplicate 900-4	EQ Blank 900-5
Inorganics (mg/l)									
Barium	2 (1)	0.01	--	--	--	--	0.015	0.014	--
Cobalt	Not regulated	0.01	--	--	--	--	--	--	--
Lead	0.015 (1)	0.005	0.0055	**0.078**	0.011	**0.06**	--	--	--
Zinc	5 (2)	0.02	--	--	--	--	0.073	--	**190**
Volatile Organics (ug/l)									
Chloroform	6 (3)	1.0	--	--	--	5.9	--	--	--

Analyte	Regulatory Standard	RL (4)	Location						
			900-TMW 3(D)	900-TMW 4(S)	900-TMW 4(D)	900-TMW 5(S)	900-TMW 5(D)	900-TMW 6(S)	900-TMW 6(D)
Inorganics (mg/l)									
Arsenic	0.05 (1)	0.01	0.015	--	0.045	--	0.027	--	0.022
Barium	2 (1)	0.01	0.082	0.014	0.27	0.018	0.13	0.01	0.2
Chromium	0.1 (1)	0.01	0.035	--	**0.12**	--	0.046	--	**0.1**
Cobalt	Not regulated	0.01	--	--	--	--	--	--	0.037
Lead	0.015 (1)	0.005	0.014	--	**0.085**	--	**0.031**	--	**0.057**
Nickel	0.1(1)	0.04	--	--	--	--	--	--	0.071
Vanadium	0.049 (3)	0.01	0.042	--	--	--	--	--	**0.11**
Zinc	5 (2)	0.02	0.024	--	--	--	--	0.028	0.033
Volatile Organics (ug/l)									
Bromodichloromethane	0.6 (3)	1.0	**4.5**	--	--	--	**1.7**	--	**1.2**
Carbon Disulfide	700 (3)	1.0	--	--	10	--	--	2.1	14
Chloroform	6 (3)	1.0	**15**	--	--	--	3.8	--	2.1
Dibromochloromethane	1 (3)	1.0	**1.8**	--	--	--	--	--	--

Notes:
(1) Primary Drinking Water Standard.
(2) Secondary Drinking Water Standard.
(3) Guidance Standard
(4) RL = Reportable Limit, as defined by the laboratory for a specific analytical method.
(5) Duplicate-900-4 is a duplicate sample from 900-TMW-3(S).
(6) -- indicates parameter not detected above laboratory reportable limit.
(7) Bold, highlighted concentrations indicate reported detection is above the Florida Regulatory Standard.

FN:DISK\973-3778\900\900_GW.XLS



REFERENCE:

USGS TOPOGRAPHIC MAP, 7.5 MIN. SERIES, QUADRANGLE MAP: JACKSONVILLE HEIGHTS QUADRANGLE, DUVAL COUNTY, FLORIDA FIFTONE QUADRANGLE, DUVAL COUNTY, FLORIDA

SCALE IN FEET

0 2000 4000

JACKSONVILLE, FLORIDA

Golder Associates

TITLE

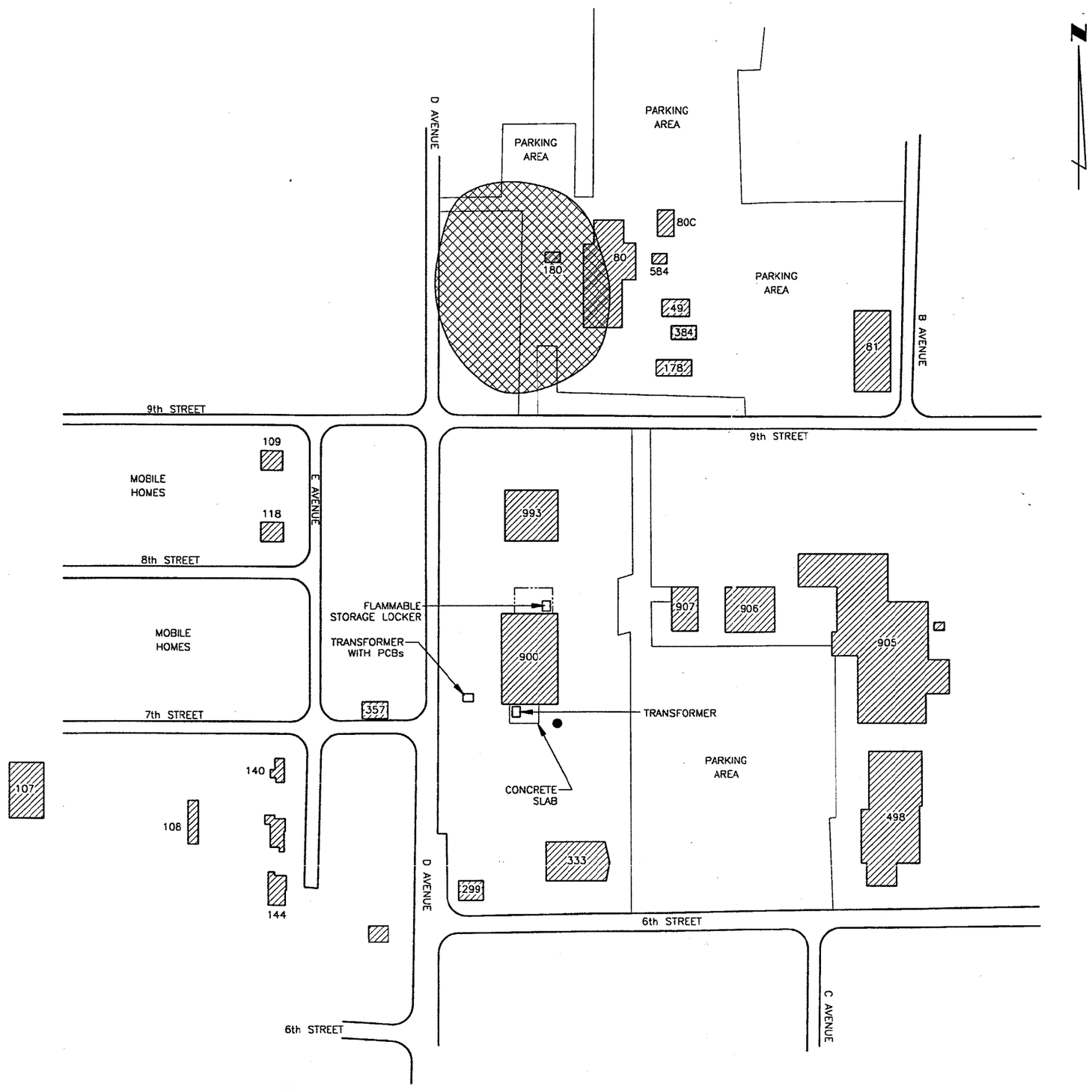
BUILDING NO. 900
SITE LOCATION MAP

CLIENT/PROJECT

NGC/CECIL FIELD/FL

DRAWN	TRG	DATE	12/18/97	JOB NO.	973-3778
CHECKED	MJJ	SCALE	AS SHOWN	DWG NO. 3778P	REV. NO.
REVIEWED	RTM	FILE NO.	973-3778	SUBTITLE	FIGURE NO. 1

04795001Y



LEGEND

- ● EXISTING MONITORING WELL LOCATION
- FENCE
- BUILDING
- SOIL AND GROUNDWATER PETROLEUM CONTAMINATION ASSOCIATED WITH NAVY FUELING OPERATION

SCALE IN FEET

0 200 400

Golder Associates JACKSONVILLE, FLORIDA

CLIENT/PROJECT

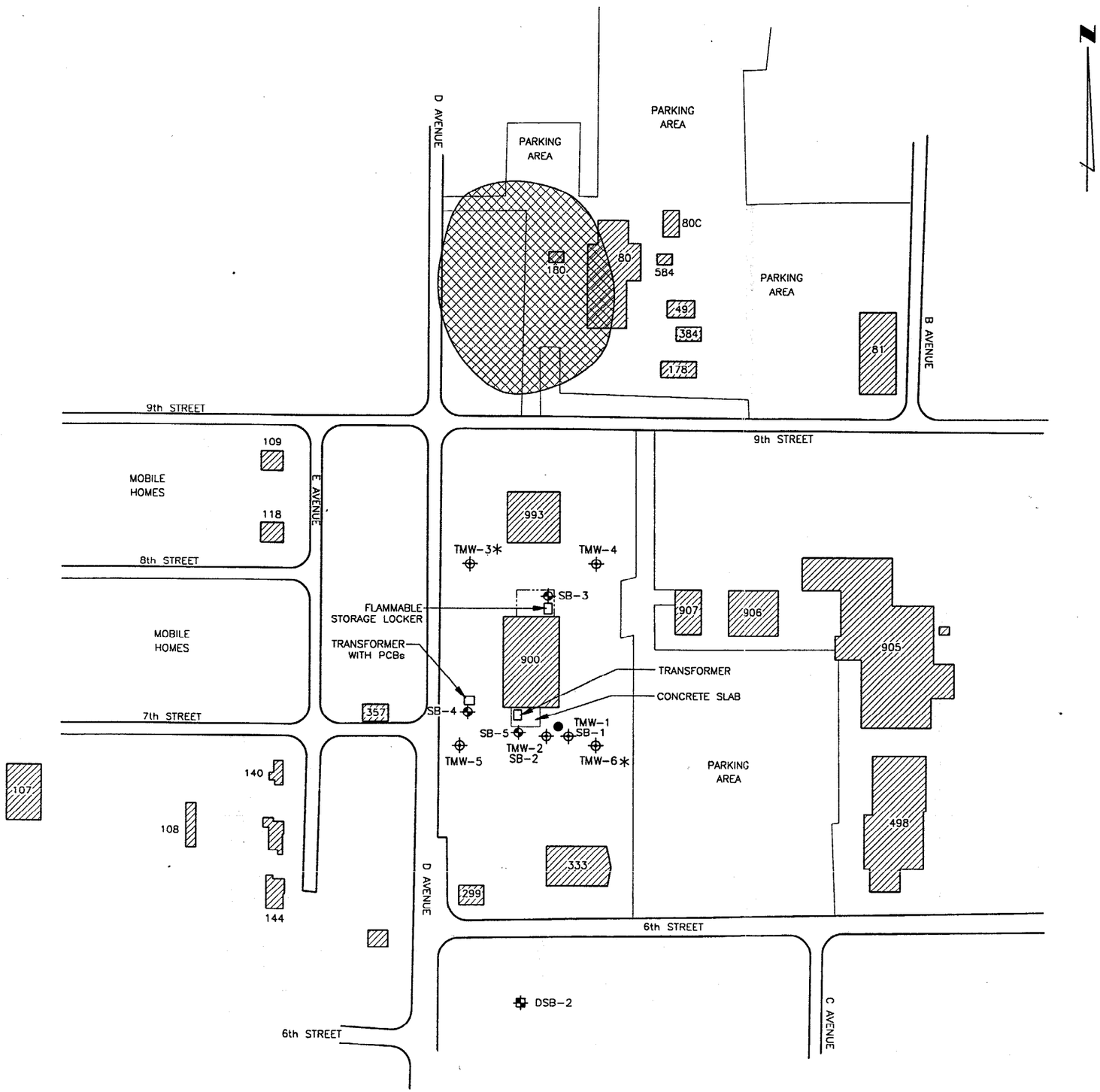
NGC/CECIL FIELD/FL

TITLE

BUILDING NO. 900
SITE MAP

DRAWN	TRG	DATE	1/5/97	JOB NO.	973-3778		
CHECKED	MJJ	SCALE	AS SHOWN	DWG. NO.	3778Q	REV. NO.	
REVIEWED	DJM	FILE NO.	973-3778	SUBTITLE		FIGURE NO.	2

04795ABJZ



LEGEND

TMW-1	TEMPORARY MONITORING WELL LOCATION
SB-1	SOIL BORING LOCATION
DSB-2	DEEP SOIL BORING LOCATION
●	EXISTING MONITORING WELL LOCATION
	FENCE
	BUILDING
	SOIL AND GROUNDWATER PETROLEUM CONTAMINATION ASSOCIATED WITH NAVY FUELING OPERATION

NOTES:

1. BUILDING No. 81 HAS BEEN IDENTIFIED BY THE INSTALLATION RESTORATION PROGRAM AS AREA OF INTEREST (AOI) No. 25 (TRANSFORMER STORAGE YARD), AOI No. 26 (DDT STORAGE AREA), AND AOI No. 27 (HAZMAT SHED).
2. * = SAMPLES ANALYZED FOR PARAMETERS LISTED IN 40 CFR, PART 264, APPENDIX IX.
3. ONE SHALLOW SOIL SAMPLE WAS COLLECTED AT EACH TEMPORARY MONITORING WELL LOCATION.
4. DEEP SOIL BORING DSB-2 WAS INSTALLED TO A DEPTH TO 130 FEET TO CHARACTERIZE THE SURFICIAL AQUIFER UNDERLYING THE SITE.

SCALE IN FEET

0 200 400

Golder Associates JACKSONVILLE, FLORIDA

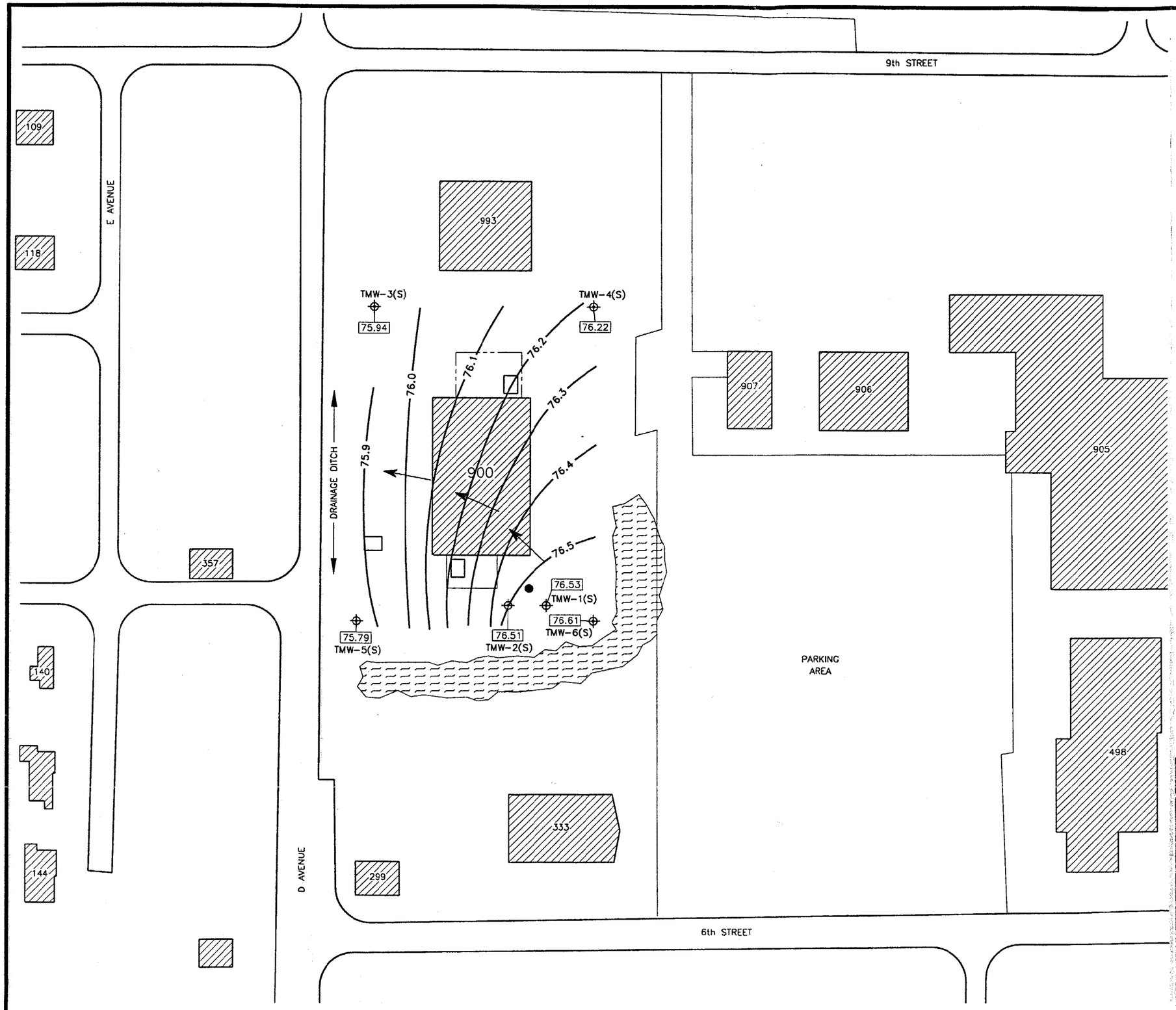
CLIENT/PROJECT

NGC/CECIL FIELD/FL

TITLE

BUILDING NO. 900
SAMPLING LOCATION MAP

DRAWN	TRG	DATE	1/5/97	JOB NO.	973-3778		
CHECKED	MJJ	SCALE	AS SHOWN	DWG. NO.	3778R	REV. NO.	
REVIEWED	DJM	FILE NO.	973-3778	SUBTITLE		FIGURE NO.	3



MONITORING WELLS	GROUNDWATER ELEVATIONS (ft. msl)
TMW-1(S)	76.53
TMW-2(S)	76.51
TMW-3(S)	75.94
TMW-4(S)	76.22
TMW-5(S)	75.79
TMW-6(S)	76.61

LEGEND

- TMW-1(S) — TEMPORARY SHALLOW MONITORING WELL LOCATION
- EXISTING MONITORING WELL LOCATION
- 76.33 — GROUNDWATER ELEVATION (ft. msl)
- 76.0 — POTENTIOMETRIC CONTOUR LINE
- GROUNDWATER FLOW DIRECTION
- FENCE
- BUILDING
- STANDING WATER (12/20/97)

NOTES:

1. BUILDING No. 81 HAS BEEN IDENTIFIED BY THE INSTALLATION RESTORATION PROGRAM AS AREA OF INTEREST (AOI) No. 25 (TRANSFORMER STORAGE YARD), AOI No. 26 (DDT STORAGE AREA), AND AOI No. 27 (HAZMAT SHED).
2. SHALLOW INTERVAL WELLS ARE SCREENED FROM 5 TO 15 FEET BELOW GROUND SURFACE.

SCALE IN FEET

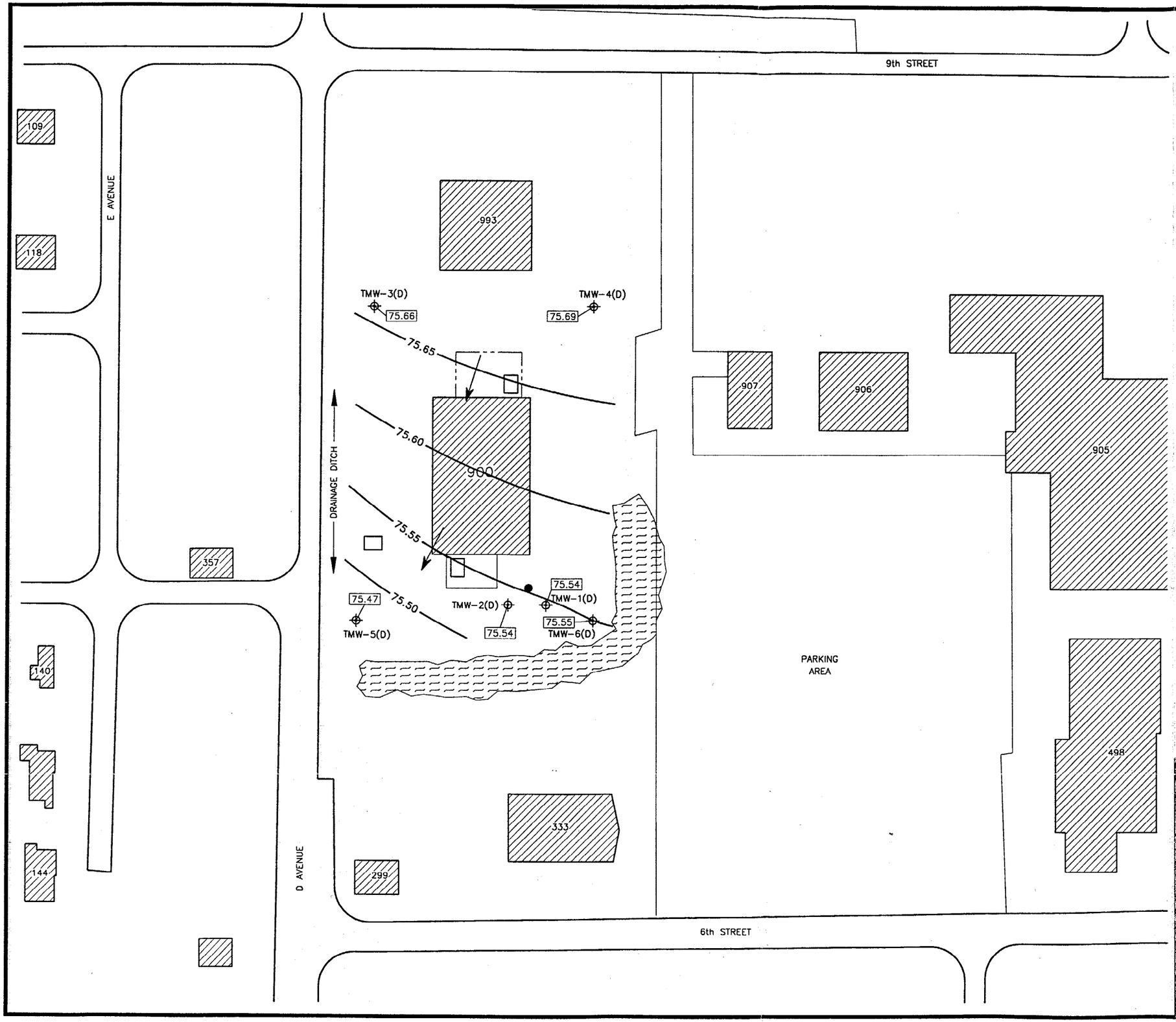
0 100 100

Golder Associates — JACKSONVILLE, FLORIDA

CLIENT/PROJECT: NGC/CECIL FIELD/FL

TITLE: BUILDING NO. 900
POTENTIOMETRIC CONTOUR SHALLOW INTERVAL
12/20/97

DRAWN	TRG	DATE	1/5/97	JOB NO.	973-3778
CHECKED	JJJ	SCALE	AS SHOWN	DWG. NO. 3778S	REV. NO.
REVIEWED	DJM	FILE NO.	973-3778	SUBTITLE	FIGURE NO. 4



MONITORING WELLS	GROUNDWATER ELEVATIONS (ft. msl)
TMW-1(D)	75.54
TMW-2(D)	75.54
TMW-3(D)	75.66
TMW-4(D)	75.69
TMW-5(D)	75.47
TMW-6(D)	75.55

LEGEND

- TMW-1(D) — TEMPORARY DEEP MONITORING WELL LOCATION
- EXISTING MONITORING WELL LOCATION
- 75.54 — GROUNDWATER ELEVATION (ft. msl)
- 75.55 — POTENTIOMETRIC CONTOUR LINE
- GROUNDWATER FLOW DIRECTION
- FENCE
- BUILDING
- STANDING WATER (12/20/97)

NOTES:

1. BUILDING No. 81 HAS BEEN IDENTIFIED BY THE INSTALLATION RESTORATION PROGRAM AS AREA OF INTEREST (AOI) No. 25 (TRANSFORMER STORAGE YARD), AOI No. 26 (DDT STORAGE AREA), AND AOI No. 27 (HAZMAT SHED).
2. DEEP INTERVAL WELLS ARE SCREENED FROM 45 TO 50 FEET BELOW GROUND SURFACE.

SCALE IN FEET

0 100 100

Golder Associates JACKSONVILLE, FLORIDA

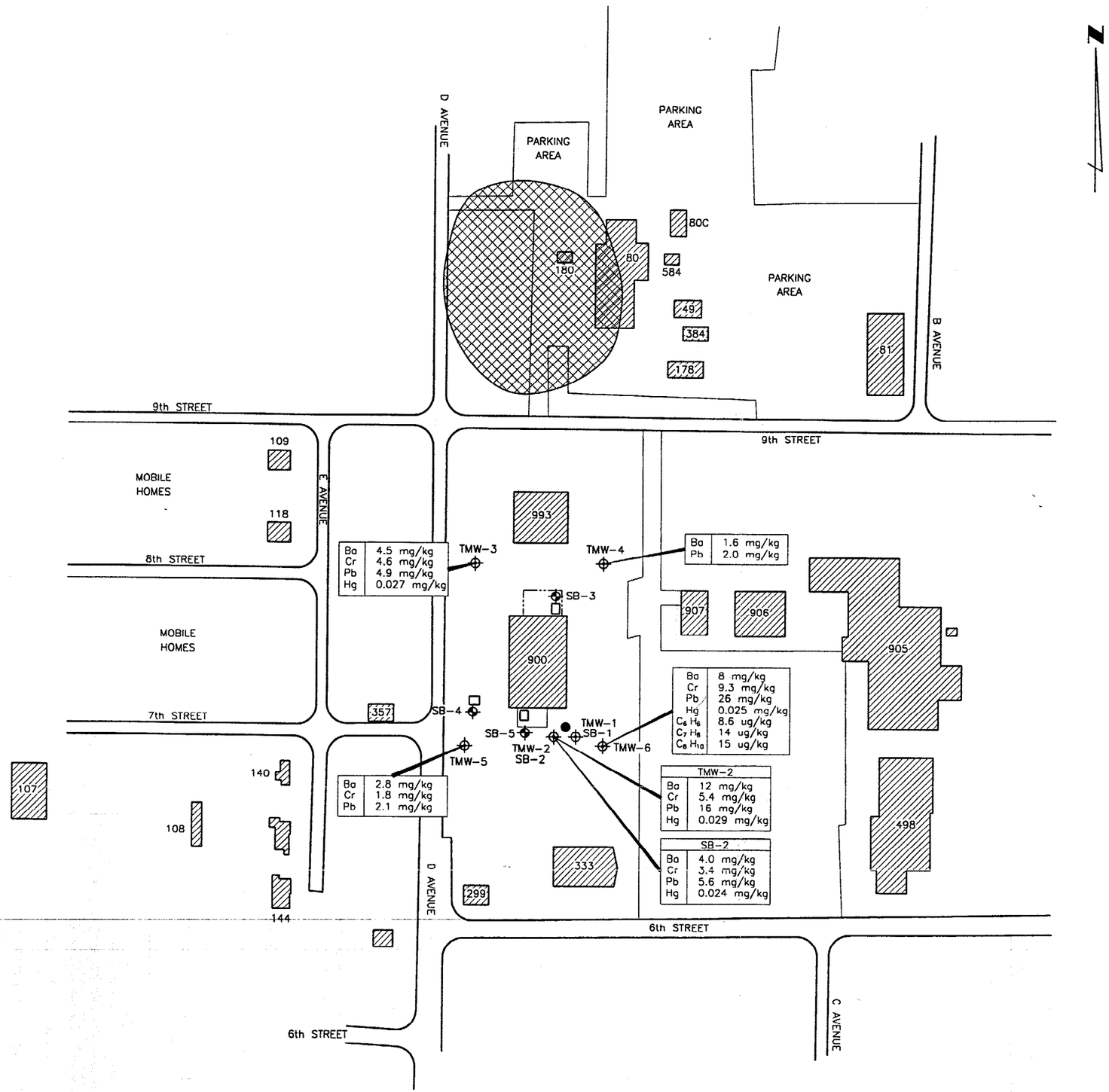
CLIENT/PROJECT

NGC/CECIL FIELD/FL

TITLE

BUILDING NO. 900
POTENTIOMETRIC CONTOUR DEEP INTERVAL
12/20/97

DRAWN	TRG	DATE	1/5/98	JOB NO.	973-3778		
CHECKED	MJJ	SCALE	AS SHOWN	DWG. NO.	3778T	REV. NO.	
REVIEWED	DTM	FILE NO.	973-3778	SUBTITLE		FIGURE NO.	5



KEY FOR PARAMETERS	
Ba	– BARIUM
Cr	– CHROMIUM
Pb	– LEAD
Hg	– MERCURY
C_6H_6	– BENZENE
C_8H_{10}	– TOLUENE
C_7H_8	– XYLENE

LEGEND

- TMW-1 — TEMPORARY MONITORING WELL LOCATION
- SB-1 — SOIL BORING LOCATION
- EXISTING MONITORING WELL LOCATION
- FENCE
- BUILDING
- SOIL AND GROUNDWATER PETROLEUM CONTAMINATION ASSOCIATED WITH NAVY FUELING OPERATION

NOTES:

1. BUILDING No. 81 HAS BEEN IDENTIFIED BY THE INSTALLATION RESTORATION PROGRAM AS AREA OF INTEREST (AOI) No. 25 (TRANSFORMER STORAGE YARD), AOI No. 26 (DDT STORAGE AREA), AND AOI No. 27 (HAZMAT SHED).
2. ONE SHALLOW SOIL SAMPLE WAS COLLECTED AT EACH TEMPORARY MONITORING WELL LOCATION.
3. NO TARGETED PARAMETERS WERE DETECTED AT SOIL BORINGS SB-1, SB-3, SB-4, AND SB-5.

SCALE IN FEET

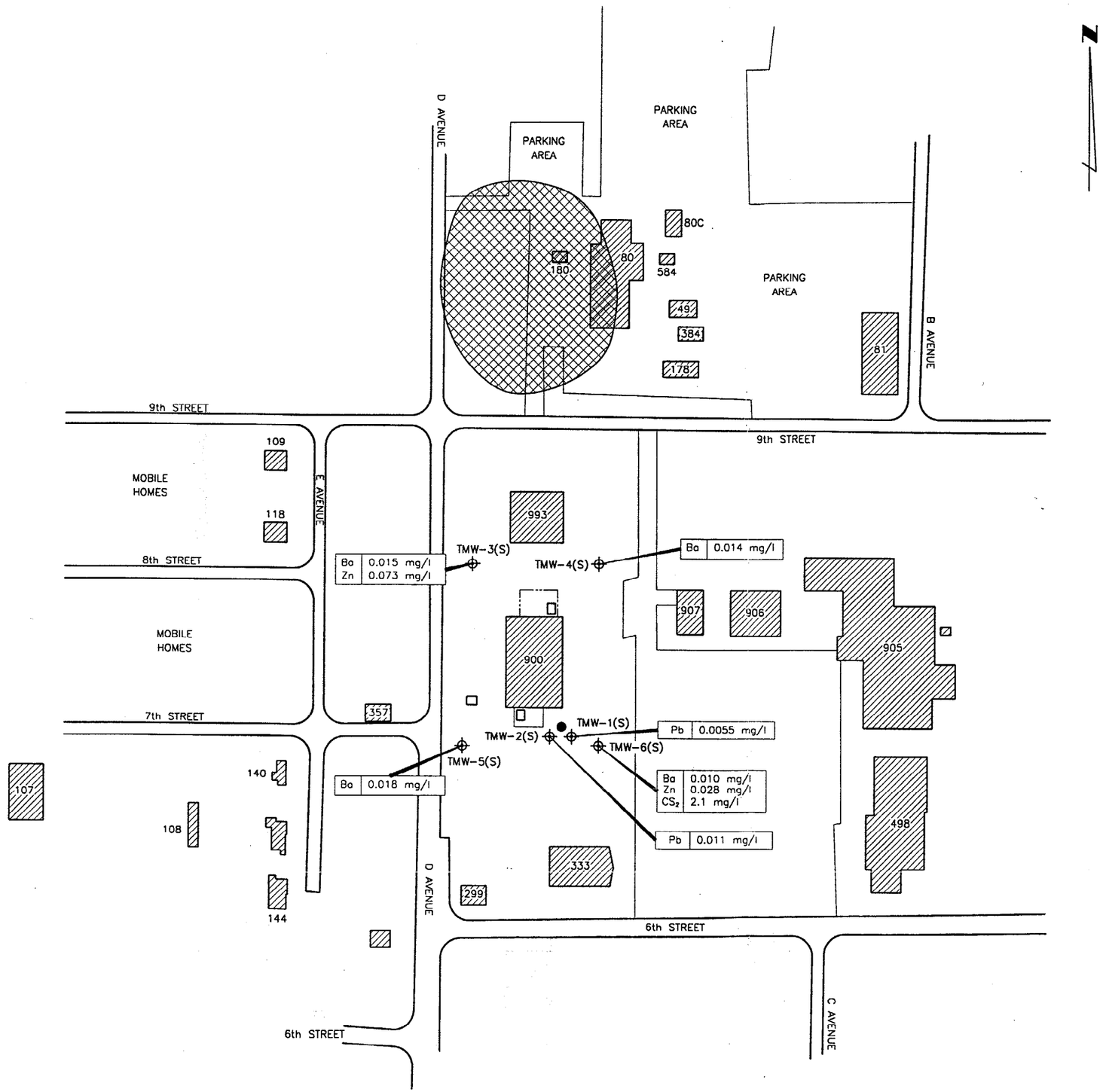
0 200 400

Golder Associates — JACKSONVILLE, FLORIDA

CLIENT/PROJECT: NGC/CECIL FIELD/FL

TITLE: BUILDING NO. 900 DETECTED PARAMETERS IN SOIL

DRAWN	TRG	DATE	1/5/98	JOB NO.	973-3778
CHECKED	MJJ	SCALE	AS SHOWN	DWG. NO. 3778U	REV. NO.
REVIEWED	DJM	FILE NO.	973-3778	SUBTITLE	FIGURE NO. 6



KEY FOR PARAMETERS	
Ba	– BARIUM
Pb	– LEAD
Zn	– ZINC
CS_2	– CARBON DISULFIDE

LEGEND

- TMW-1 — TEMPORARY SHALLOW MONITORING WELL LOCATION
- EXISTING MONITORING WELL LOCATION
- FENCE
- BUILDING
- SOIL AND GROUNDWATER PETROLEUM CONTAMINATION ASSOCIATED WITH NAVY FUELING OPERATION

NOTE:

1. BUILDING No. 81 HAS BEEN IDENTIFIED BY THE INSTALLATION RESTORATION PROGRAM AS AREA OF INTEREST (AOI) No. 25 (TRANSFORMER STORAGE YARD), AOI No. 26 (DDT STORAGE AREA), AND AOI No. 27 (HAZMAT SHED).

SCALE IN FEET

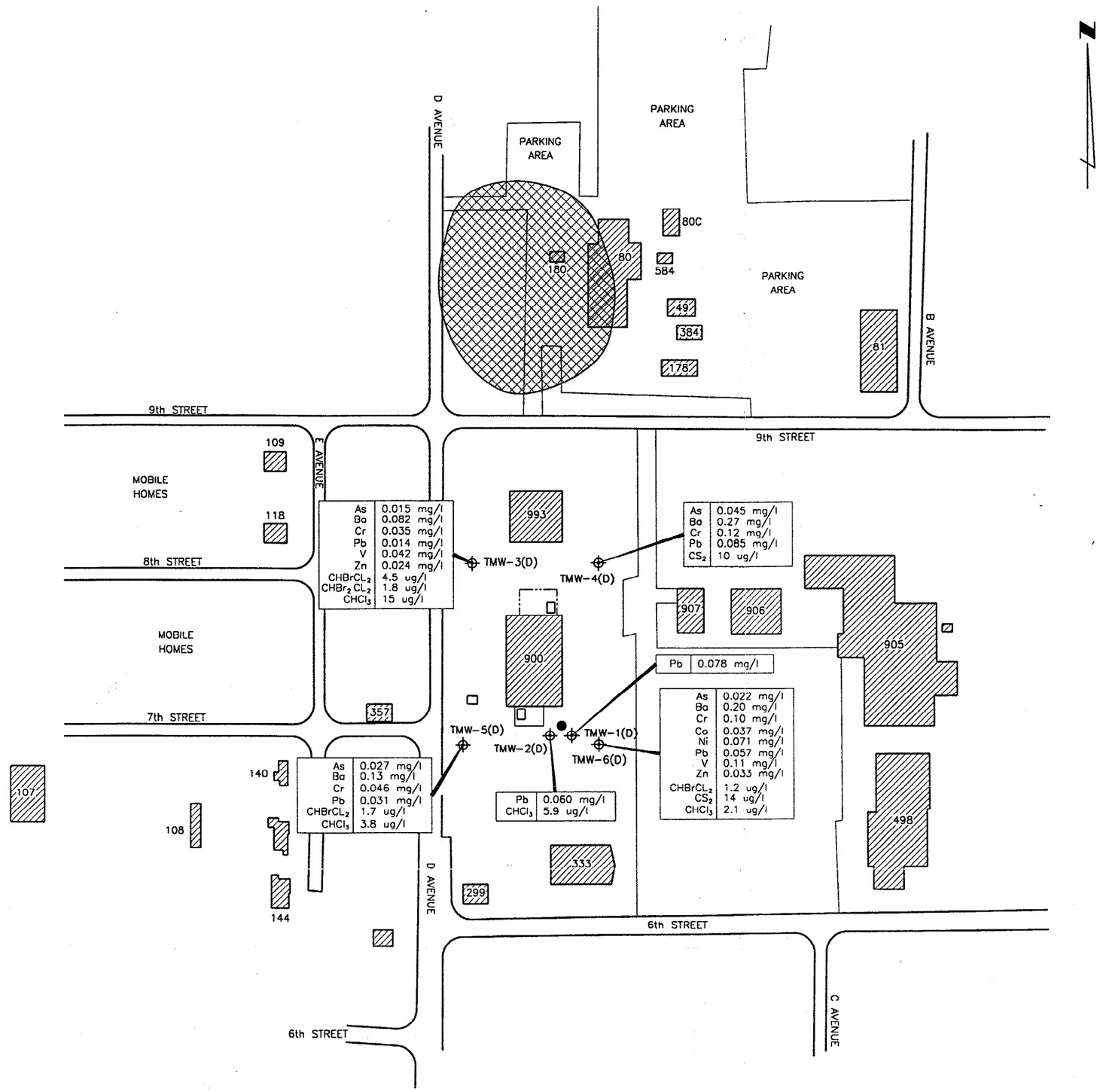
0 200 400

Golder Associates — JACKSONVILLE, FLORIDA

CLIENT/PROJECT: NGC/CECIL FIELD/FL

TITLE: BUILDING NO. 900
DETECTED PARAMETERS IN SHALLOW GROUNDWATER
(15-FOOT DEPTH)

DRAWN	TRG	DATE	1/5/97	JOB NO.	973-3778		
CHECKED	MJJ	SCALE	AS SHOWN	DWG. NO.	3778V	REV. NO.	
REVIEWED	DJM	FILE NO.	973-3778	SUBTITLE		FIGURE NO.	7



KEY FOR PARAMETERS	
As	– ARSENIC
Ba	– BARIUM
Co	– COBALT
Cr	– CHROMIUM
Ni	– NICKEL
Pb	– LEAD
V	– VANADIUM
Zn	– ZINC
$CHBrCl_2$	– BROMODICHLOROMETHANE
CS_2	– CARBON DISULFIDE
CBr_2Cl_2	– DIBROMODICHLOROMETHANE
$CHCl_3$	– CHLOROFORM

LEGEND

- TMW-1 — TEMPORARY DEEP MONITORING WELL LOCATION
- EXISTING MONITORING WELL LOCATION
- FENCE
- BUILDING
- SOIL AND GROUNDWATER PETROLEUM CONTAMINATION ASSOCIATED WITH NAVY FUELING OPERATION

NOTE:

1. BUILDING No. 81 HAS BEEN IDENTIFIED BY THE INSTALLATION RESTORATION PROGRAM AS AREA OF INTEREST (AOI) No. 25 (TRANSFORMER STORAGE YARD), AOI No. 26 (DDT STORAGE AREA), AND AOI No. 27 (HAZMAT SHED).

SCALE IN FEET

0 200 400

Golder Associates — JACKSONVILLE, FLORIDA

CLIENT/PROJECT: NGC/CECIL FIELD/FL

TITLE: BUILDING NO. 900
DETECTED PARAMETERS IN DEEP GROUNDWATER
(50-FOOT DEPTH)

DRAWN	TRG	DATE	1/5/97	JOB NO.	973-3778		
CHECKED	MJJ	SCALE	AS SHOWN	DWG. NO.	3778W	REV. NO.	
REVIEWED	DTM	FILE NO.	973-3778	SUBTITLE		FIGURE NO.	8

APPENDIX A

Field Documentation

APPENDIX A-1

Deep Soil Boring Field Records

Field Boring Log NGC/NAS Cecil Field / FL

DEPTH HOLE 85'	JOB NO. 973-3778	PROJECT Cecil Field (yellow water compound)		BORING NO. B-1	
DEPTH SOIL DRILL	GA INSP. Samir Itani	DRILLING METHOD Hand auger & Mud Rotary Drilling		SHEET 1 OF 2	
DEPTH ROCK CORE	WEATHER Sunny	DRILLING COMPANY Wolf Drilling Inc		SURFACE ELEV.	
NO. DIST. SA. UD. SA.	TEMP. ~ 50 → 60°	DRILL RIG ATV-550 CME	DRILLER Mike Hazelton	DATUM	
DEPTH WL.	HRS. PROD.	WT. SAMPLER HAMMER 140#	DROP 18"	STARTED 10:45 / 11/17/92 (TIME / DATE)	
TIME WL.	HRS. DELAYED	WT. CASING HAMMER	DROP	COMPLETED 9:50 / 11/18/92	

SAMPLE TYPES

A.S.	AUGER SAMPLE	BL	BLACK
C.S.	CHUNK SAMPLE	BR	BROWN
D.O.	DRIVE OPEN	C	COARSE
D.S.	DENISON SAMPLE	CA	CASING
P.S.	PITCHER SAMPLE	CL	CLAY
R.C.	ROCK CORE	CLY	CLAYEY
S.T.	SLOTTED TUBE	F	FINE
T.O.	THIN-WALLED, OPEN	FRAG	FRAGMENTS
T.P.	THIN-WALLED, PISTON	GL	GRAVEL
W.S.	WASH SAMPLE	LYD	LAYERED
		LI	LITTLE

ABBREVIATIONS

M	MEDIUM	SA	SAMPLE
MIC	MICACEOUS	SAT	SATURATED
MOT	MOTTLED	SD	SAND
NP	NON-PLASTIC	SI	SILT
OG	ORANGE	SIY	SILTY
ORG	ORGANIC	SM	SOME
PH	PRESSURE-HYDRAULIC	TR	TRACE
PM	PRESSURE-MANUAL	WL	WATER LEVEL
R	RED	WH	WEIGHT OF HAMMER
RES	RESIDUAL	Y	YELLOW
RX	ROCK		

SOIL DESCRIPTION - RANGE OF PROPORTION

"TRACE" - 0 - 5% "SOME" 12 - 30%
"LITTLE" - 5 - 12% "AND" 30-50%

RELATIVE DENSITY		BLOWS	CONSISTENCY		FINGER PRESSURE
VERY LOOSE	VLS	0 4	VERY SOFT	VS	EXTRUDES
LOOSE	LS	4 10	SOFT	S	MOLDS EASILY
COMPACT	CP	10-30	FIRM	FM	MOLDS
DENSE	DN	30-60	STIFF	ST	THUMB INDENTS
VERY DENSE	VDN	50	VERY STIFF	VST	THUMBNAIL INDENT
			HARD	H	RESISTS THUMBNAIL

ELEV. / DEPTH	DESCRIPTION	BLOWS / FT		SAMPLES NO.	TYPE	HAMM. BLOWS PER 6 IN (FORCE)	REC / ATT	DEPTH	SAMPLE DESCRIPTION AND BORING NOTES
1	(10:55) Water level 1'2" below ground yellow fine silty sand			S-1	AS	—	—	1'	Hand auger from surface at 10:45 Sample S-1 at 1' below surface, wet yellow fine silty sand - upper 6" top soil (brownish sand)
3	very loose to compact brown to yellow and light grey medium to fine silty sand	(14)	3,5	S-2	D.O	3,4,10	18/18		Hand auger till 3' below surface Rotary auger from 3' - 3.5', SPT from 3.5' to 5' (3,4,10) Recovery 18"/18"
5		(10)	5 6	S-3	D.O	4,5,5	16/18		Sample S-2: compact greyish brown silty sand Sample saturated, upper 1" is yellow silty sand
10		(9)	7.5 8.5	S-4	D.O	4,4,5	13/18		Started mud drilling (rotary) from 5' to 6' at 11:05 SPT from 6' → 7.5' (4,5,5) recovery 16"/18"
10		(6)	10 11	S-5	D.O	3,3,3	18/18		Sample S-3: loose wet/saturated yellowish/light grey silty sand.
15		(5)	12.5 13.5	S-6	D.O	3,3,2	16/18		Mud drilling to 8.5', SPT 8.5-10' Sample S-4: SPT 4,4,5 recovery 13/18, Sample S-4: loose light grey to whitish silty sand. sample saturated.
		(6)	15 16	S-7	D.O	2,3,3	16/18		Mud Drilling to 11', SPT 11 → 12.5, 3,3,3 Recovery 18/18, sample S-5: loose light grey to yellow silty fine sand. sample saturated
20		(9)	17.5 18.5	S-8	D.O	3,4,5	15/18		Mud drilling to 13.5', SPT from 13.5 → 15', 2,2,2 recovery 16/18. Sample S-6: loose light grey to yellow fine silty sand. Sample saturated.
		(10)	20 21	S-9	D.O	5,5,5	5/18		Continue Mud drilling to 16', SPT from 16 → 17.5', 2,3,3 Recovery 16/18: Sample S-7: loose light grey fine silty sand
25		(4)	22.5 23.5	S-10	D.O	2,2,2	18/18		Mud Drilling to 18.5', SPT from 18.5' - 20', 2,4,5 (15/18) Sample S-8: light grey to yellow fine silty sand sample is loose and saturated.
		(5)	25 26	S-11	D.O	3,3,2	18/18		Mud drilling to 21', SPT 21' → 22.5', 5,5,5, (5/18) Sample S-9: loose light grey fine silty sand
30		(9)	27.5 28.5	S-12	D.O	4,5,4	18/18		(Had to replace core catcher - broke & yeilded low recovery) Mud drilling continue to 23.5', SPT from 23.5' → 25', 2,2,2
		(12)	30 31	S-13	D.O	5,5,7	17/18		recovery 18/18, sample S-10: very loose greyish fine silty sand, saturated
35		(6)	32.5 33.5	S-14	D.O	4,3,3	18/18		Advance mud drilling to 26', SPT: 26' - 27.5', 3,3,2 Recovery: 18/18: Sample S-11: loose greyish fine silty sand, saturated.
		(3)	35 36	S-15	D.O	3,1,2	18/18		Advance mud drilling to 28.5', SPT 28.5-30', 4,5,4, 18/18 Sample S-12: loose grey medium to fine silty sand
40		(8)	37.5 38.5	S-16	D.O	2,5,3	18/18		Mud drilling to 31', SPT 31 → 32.5', 5,5,7, 17/18 Sample S-13: loose to compact medium to fine silty sand sample saturated.
		(5)	40 41	S-17	D.O	2,3,2	18/18		Advance mud drilling to 33.5', SPT 33.5-35' (4,3,3) 18/18 Sample S-14: loose medium to fine greyish silty sand
43.5	very loose to very dense greyish green coarse to medium sand with some gravel aggregates, shells, little to trace silt and clay, trace of marl	(3)	42.5 43.5	S-18	D.O	3,1,2	14/18		Advance mud drilling to 36', SPT 36-37.5', 3,1,2, (18/18) Sample S-15: very loose grey medium to fine sand trace silt, saturated
45		(10)	45 46	S-19	D.O	3,5,5	18/18		Advance Drilling to 38.5' SPT 38.5 → 40' (2,5,3) 14/18 Sample S-16: loose grey medium to fine sand - saturated
		(18)	47.5 48.5	S-20	D.O	6,9,9	15/18		Mud Drilling to 41', SPT 41 → 42.5', 2,3,2, 18/18 Sample S-17: loose greyish medium to fine sand
50			50						Advance mud Drilling to 43.5', SPT 43.5 → 45', (3,1,2) 14/18 Sample S-18: mix of greyish sandy clay and white shells
									Advance mud drilling to 46', SPT 46 - 47.5', 3,5,5, 18/18 Sample S-19: loose mix of greyish medium to fine sand and broken yellow/white shells - saturated.
									Advance Drilling to 48.5', SPT 48.5 → 50', (6,9,9), 15/18 Sample S-20: Crushed shell with some grey course to medium sand.

04135QB3Z

Field Boring Log

NGC/NAS Cecil Field/FL

DEPTH HOLE 85'	JOB NO. 273-3778	PROJECT Cecil field (yellow water)		BORING NO. B-1	
DEPTH SOIL DRILL	GA INSP. SYI	DRILLING METHOD hand auger + mud drilling		SHEET 2 OF 2	
DEPTH ROCK CORE	WEATHER Sunny	DRILLING COMPANY Wolf Drilling Inc.		SURFACE ELEV.	
NO. DIST. SA. UD. SA.	TEMP.	DRILL RIG ATV-550 CME	DRILLER Mike Hazelton	DATUM	
DEPTH WL.	HRS. PROD.	WT. SAMPLER HAMMER	DROP	STARTED 10:45 (TIME) 11/17/97 (DATE)	
TIME WL.	HRS. DELAYED	WT. CASING HAMMER	DROP	COMPLETED 2:50 / 11/18/97	

SAMPLE TYPES

A.S.	AUGER SAMPLE
C.S.	CHUNK SAMPLE
D.O.	DRIVE OPEN
D.S.	DENISON SAMPLE
P.S.	PITCHER SAMPLE
R.C.	ROCK CORE
S.T.	SLOTTED TUBE
T.O.	THIN-WALLED, OPEN
T.P.	THIN-WALLED, PISTON
W.S.	WASH SAMPLE

ABBREVIATIONS

BL	BLACK	M	MEDIUM	SA	SAMPLE
BR	BROWN	MIC	MICACEOUS	SAT	SATURATED
C	COARSE	MOT	MOTTLED	SD	SAND
CA	CASING	NP	NON-PLASTIC	SI	SILT
CL	CLAY	OG	ORANGE	SIY	SILTY
CLY	CLAYEY	ORG	ORGANIC	SM	SOME
F	FINE	PH	PRESSURE-HYDRAULIC	TR	TRACE
FRAG	FRAGMENTS	PM	PRESSURE-MANUAL	WL	WATER LEVEL
GL	GRAVEL	R	RED	WH	WEIGHT OF HAMMER
LYD	LAYERED	RES	RESIDUAL	Y	YELLOW
LI	LITTLE	RX	ROCK		

SOIL DESCRIPTION - RANGE OF PROPORTION

"TRACE" - 0 - 5% "SOME" 12 - 30%
"LITTLE" - 5 - 12% "AND" 30-50%

RELATIVE DENSITY		BLOWS	CONSISTENCY		FINGER PRESSURE
VERY LOOSE	VLS	0 4	VERY SOFT	VS	EXTRUDES
LOOSE	LS	4 10	SOFT	S	MOLDS EASILY
COMPACT	CP	10-30	FIRM	FM	MOLDS
DENSE	DN	30-50	STIFF	ST	THUMB INDENTS
VERY DENSE	VDN	50	VERY STIFF	VST	THUMBNAIL INDENT
			HARD	H	RESISTS THUMBNAIL

ELEV. / DEPTH	DESCRIPTION	BLOWS / FT		SAMPLES NO.	TYPE	HAMM. BLOWS PER 6 IN (FORCE)	REC / ATT	DEPTH	SAMPLE DESCRIPTION AND BORING NOTES
50									Mud drilling to 51', SPT 51 → 52.5', (10, 7, 6), 14/18
		(13)	51	S-21	D.O	10, 7, 6	14/18		Sample S-21: A mix of crushed yellowish white shell and greyish green clayey Sand. Saturated.
55		(>100)	52.5 53.5 55	S-22	D.O	50/3"	0/3" 0/3"		Mud drilling continues to 53.5', SPT 53.5' → 53.75' 0/3"
									Sample S-22: very dense Cemented yellow shells
									Mud drilling advances to 56', SPT, 56 - 57.5, 17, 9, 12
		(21)	56 57.5	S-23	D.O	17, 9, 12	15/18		Sample S-23 is crushed shells, with gravels and greyish coarse Compact Sand.
60		(17)	58.5 60	S-24	D.O	5, 8, 9	12/18		Advanced Hole to 58.5', SPT 58.5 → 60', (5, 8, 9) 12/18
									Sample S-24: Compact greyish coarse to medium Sand with some gravel size particles
		(5)	61 62.5	S-25	D.O	4, 6, 3	11/18		Advance mud drilling to 61', SPT 61 → 62.5' (4, 6, 3)
									Recovery = 11/18
65		(32)	63.5 65	S-26	D.O	17, 14, 18	12/18		Sample S-25: Loose mix of crushed shell and greyish coarse to medium Sand with some gravel size particles
									Mud drilling to 63.5', SPT 63.5' → 65', (17, 14, 18) 12/18
		(47)	66 67.5	S-27	D.O	49, 16, 31	14/18		Sample S-26: Dense mix of crushed shells and greyish coarse to medium Sand, trace of silt, with some gravel size particles.
70		(16)	68.5 70	S-28	D.O	18, 10, 6	12/18		Advance mud drilling to 66', SPT: 66 → 67.5', 49, 16, 31
									Recovery = 14/18 Sample S-27: Dense grey Sand (Coarse) mixed with trace of hard material, Some gravel size particles
		(16)	71 72.5	S-29	D.O	7, 7, 9	12/18		Advance mud drilling to 68.5', SPT from 68.5'-70', 18, 10, 6
73.5	compact to very dense coarse to medium greyish to Brown Sand, Some limestone gravel size particles, some silt, trace of clay								Recovery: 12/18. Sample: S-28: compact mix of crushed shells and greyish coarse to medium Sand with some gravel size particles.
75		(64)	73.5 75	S-30	D.O	21, 16, 48	14/18		
		(20)	76 77.5	S-31	D.O	43, 17, 3	14/18		Advance mud drilling to 71', SPT: 71 → 72.5', (7, 7, 9), 12/18
									Samples-29: Yellowish to light grey crushed shell with some coarse grey sand. (mostly crushed shell Sample)
80		(>100)	78.5 80	S-32	D.O	50/2"	2"/2"		Advance mud drilling to 73.5', SPT 73.5' → 75', 21, 16, 48
									Recovery 14/18, Sample S-30: very dense limestone, coarse to medium sand (greyish brown) with gravel size particles some silt and trace clay.
81	light Brown Marl medium to fine sand with phosphate mineral (black spots	(18)	81 82.5	S-33	D.O	8, 8, 10	18/18		Advance Drilling to 76', SPT 76 - 77.5', (43, 17, 3), 14/18
85		(21)	83.5 85	S-34	D.O	7, 10, 11	18/18		Sample 31: Compact greyish green limestone, sample coarse to medium Sand with some gravel particle, trace clay
						Boring terminated.			Advance mud drilling to 78.5', SPT 78.5-78.7', 50/2", 2/2"
									Sample S-32: very dense brown medium to fine silty sand with large aggregate.
90									Advance Drilling to 81', ~~SPT 81→~~ Stopped Drilling for the day at 81' - Need more mud and lost circulation of fluid to surface (4:15) - Drilling continues 11/18/97 @ 8:15
									SPT 81 → 82.5', (8, 8, 10), Recovery 18/18
									Sample S-33: Compact light Brown marl with black phosphate spots. Sample has fine silty sand texture.
									Mud drilling continues to 83.5', SPT 83.5 → 85' 7, 10, 11, Recovery 18/18
									Sample S-34: Brown marl with phosphate black spots. Material has fine silty sand texture
									Boring terminated at 85' Below Ground Surface. Boring was grouted with a cement slurry to ground surface.

APPENDIX A-2

Temporary Monitoring Well Installation Logs

TEMPORARY WELL POINT INSTALLATION RECORD

SITE DESCRIPTION

Project Name: NGC / Cecil Field / FL
Project Number: 973-3778
Location: NAS - Cecil Field

WELL DESCRIPTION

Area of Investigation: Bld. 900

Well No.: TMW-1S&D
Date of Well Installation: 12/2 & 12/3
Total Depth: 15' & 50'
Screen Length: 10' & 5'
Time Started / Completed: —

WEATHER CONDITIONS

Temperature: 60s
Wind: light
recipitation: None

DPT Contractor: Probe Domain
Type of Rig: Geoprobe with GH-40 hammer
Operator: James Laymon
Type of Water Sampler: PVC Temporary Well Point

Interval: Shallow screened ~~15-20 ft~~ 5-15 FT Deep screened 45-50 ft
Type of Soil Samples: Stainless Steel Hand Auger

Interval:

COLUMN OF WATER IN WELL	Shallow		Deep
TOC relative to Ground Surface:	—	feet	0.2
TOC Elevation:		feet MSL	
Total Depth of Well :	15	feet BGS	50
Total Depth of Well :	15	feet TOC	50
Depth to Water:	2.15	feet TOC	3.86
Column of Water in Well:	12.85	feet TOC	46.14

PURGE VOLUME CALCULATION	Shallow		Deep
Casing Inside Diameter:	1	inches	1
Casing Volume:	0.045	gal./ft.	0.04
Column of Water in Well:	12.85	feet	46.1
Volume of Water in Well:	0.58	gallons	2.0
Purge Method:	Peristalic Pump		
Volume to Purge:	1.7		6.23
Well Pumped Dry? Yes	No		No

NOTES:

BLDG 900, TMW-1S & TMW-1D

- GW DATA COLLECTED DURING SAMPLING

Field Team Leader: J. Peace

Signature: [signature]

TEMPORARY WELL POINT INSTALLATION RECORD

SITE DESCRIPTION

Project Name: NGC / Cecil Field / FL
Project Number: 973-3778
Location: NAS - Cecil Field

WELL DESCRIPTION

Area of Investigation: Bld. 900

Well No.: TMW-2S&D
Date of Well Installation: 12/2 & 12/3
Total Depth: 15' & 50'
Screen Length: 10' & 5'
Time Started / Completed: —

WEATHER CONDITIONS

Temperature: 60s
Wind: light
recipitation: None

DPT Contractor: Probe Domain
Type of Rig: Geoprobe with GH-40 hammer
Operator: James Laymon
Type of Water Sampler: PVC Temporary Well Point

Interval: Shallow screened ~~15-20ft~~ 5-15 FT Deep screened 45-50ft
Type of Soil Samples: Stainless Steel Hand Auger

Interval:

COLUMN OF WATER IN WELL

			Shallow	Deep
TOC relative to Ground Surface:	—	feet		—
TOC Elevation:		feet MSL		
Total Depth of Well :	15	feet BGS		50
Total Depth of Well :	15	feet TOC		50
Depth to Water:	2.4	feet TOC		3.79
Column of Water in Well:	12.6	feet TOC		46.21

PURGE VOLUME CALCULATION

			Shallow	Deep
Casing Inside Diameter:	1	inches		1
Casing Volume:	0.045	gal./ft.		0.0
Column of Water in Well:	12.6	feet		46.
Volume of Water in Well:	0.57	gallons		2.
Purge Method:	Peristalic Pump			
Volume to Purge:	1.7			6.23
Well Pumped Dry?	(Yes) No			(NO)

NOTES:

BLDG 900, TMW-2S & TMW-2D

-GW DATA COLLECTED DURING SAMPLING

Field Team Leader: J. Peace

Signature: [signature]

TEMPORARY WELL POINT INSTALLATION RECORD

SITE DESCRIPTION

Project Name: NGC / Cecil Field / FL
Project Number: 973-3778
Location: NAS - Cecil Field

WEATHER CONDITIONS

Temperature: 60s
Wind: 0-5
recipitation: None

WELL DESCRIPTION

Area of Investigation: Bld. 900

Well No.: TMW-3 S&D
Date of Well Installation: 11/25
Total Depth: 15' & 50'
Screen Length: 10' & 5'
Time Started / Completed: —

DPT Contractor: Probe Domain
Type of Rig: Geoprobe with GH-40 hammer
Operator: James Laymon
Type of Water Sampler: PVC Temporary Well Point

Interval: Shallow Screened ~~15-20ft~~ 5-15FT Deep screened ~~25~~-50 ft
Type of Soil Samples: Stainless Steel Hand Auger

Interval:

COLUMN OF WATER IN WELL

			Shallow	Deep
TOC relative to Ground Surface:	0.10	feet		—
TOC Elevation:		feet MSL		
Total Depth of Well :	15	feet BGS		50
Total Depth of Well :	15	feet TOC		50
Depth to Water:	3.5	feet TOC	~~46.35~~ MD 3.65	
Column of Water in Well:	11.5	feet TOC	46.35	

PURGE VOLUME CALCULATION

			Shallow	Deep
Casing Inside Diameter:	1	inches		1
Casing Volume:	0.045	gal./ft.		0.045
Column of Water in Well:	11.5	feet		46.35
Volume of Water in Well:	0.52	gallons		2.08
Purge Method:	Peristaltic Pump			
Volume to Purge:	1.6			6.26
Well Pumped Dry?	Yes	(NO)		(NO)

NOTES:

BLDG 900, TMW-3S & TMW-3D

- GW DATA COLLECTED DURING SAMPLING

Field Team Leader: R. Keenen

Signature: [signature]

TEMPORARY WELL POINT INSTALLATION RECORD

SITE DESCRIPTION

Project Name: NGC / Cecil Field / FL
Project Number: 973-3778
Location: NAS - Cecil Field

WELL DESCRIPTION

Area of Investigation: Bld. 900

Well No.: TMW-4 SD
Date of Well Installation: 11/25
Total Depth: 15' & 50'
Screen Length: 10' & 5'
Time Started / Completed: —

WEATHER CONDITIONS

Temperature: 60s
Wind: light
recipitation: None

DPT Contractor: Probe Domain
Type of Rig: Geoprobe with GH-40 hammer
Operator: James Laymon
Type of Water Sampler: PVC Temporary Well Point

Interval: Shallow screened ~~15-20 ft~~ 5-15 ft Deep screened 45-50 ft
Type of Soil Samples: Stainless Steel Hand Auger

Interval:

COLUMN OF WATER IN WELL

	Shallow		Deep
TOC relative to Ground Surface:	—	feet	—
TOC Elevation:		feet MSL	
Total Depth of Well :	15	feet BGS	50
Total Depth of Well :	15	feet TOC	50
Depth to Water:	3.77	feet TOC	4.54
Column of Water in Well:	11.23	feet TOC	45.46

PURGE VOLUME CALCULATION

	Shallow		Deep
Casing Inside Diameter:	1	inches	1
Casing Volume:	0.045	gal./ft.	0.04
Column of Water in Well:	11.23	feet	45.
Volume of Water in Well:	0.5	gallons	2.0
Purge Method:	Peristaltic Pump		
Volume to Purge:	1.5		6.1
Well Pumped Dry?	Yes (No)		(NO)

NOTES:

BLDG 900, TMW-4S & TMW-4D

- GW DATA COLLECTED DURING SAMPLING

Field Team Leader: R. Keenen

Signature: [signature]

TEMPORARY WELL POINT INSTALLATION RECORD

SITE DESCRIPTION

Project Name: NGC / Cecil Field / FL
Project Number: 973-3778
Location: NAS - Cecil Field

WELL DESCRIPTION

Area of Investigation: Bld. 900

Well No.: TMW-5 S&D (5 mo)
Date of Well Installation: 11/25
Total Depth: 15' & 50'
Screen Length: 10' & 5'
Time Started / Completed: —

WEATHER CONDITIONS

Temperature: 60s
Wind: light
recipitation: None

DPT Contractor: Probe Domain
Type of Rig: Geoprobe with GH-40 hammer
Operator: James Laymon
Type of Water Sampler: PVC Temporary Well Point

Interval: Shallow ~~15-20 ft~~ 5-15 FT screened MD Deep ~~25~~ 45-50 ft screened MD
Type of Soil Samples: Stainless Steel Hand Auger

Interval:

COLUMN OF WATER IN WELL

			Shallow	Deep
TOC relative to Ground Surface:	—	feet		—
TOC Elevation:		feet MSL		
Total Depth of Well :	15	feet BGS	50	
Total Depth of Well :	15	feet TOC	50	
Depth to Water:	2.2	feet TOC	2.8	
Column of Water in Well:	12.8	feet TOC	47.2	

PURGE VOLUME CALCULATION

			Shallow	Deep
Casing Inside Diameter:	1	inches		1
Casing Volume:	0.045	gal./ft.		0.045
Column of Water in Well:	12.8	feet		47.2
Volume of Water in Well:	0.58	gallons		2.12
Purge Method:	Peristalic Pump			
Volume to Purge:	1.7			6.4
Well Pumped Dry? Yes ~~No~~				NO

NOTES:

BLDG 900, TMW-5S & TMW-5D

- GW DATA COLLECTED DURING SAMPLING

Field Team Leader: R. Keene

Signature: [signature]

TEMPORARY WELL POINT INSTALLATION RECORD

SITE DESCRIPTION

Project Name: NGC / Cecil Field / FL
Project Number: 973-3778
Location: NAS - Cecil Field

WEATHER CONDITIONS

Temperature: 60s
Wind: light
recipitation: None

WELL DESCRIPTION

Area of Investigation: Bld. 900

Well No.: TMW-6S&D
Date of Well Installation: 11/25
Total Depth: 15' & 50'
Screen Length: 10' & 5'
Time Started / Completed: —

DPT Contractor: Probe Domain
Type of Rig: Geoprobe with GH-40 hammer
Operator: James Laymon
Type of Water Sampler: PVC Temporary Well Point

Interval: Shallow screened ~~15-20ft~~ 5-15 FT Deep screened 45-50 ft
Type of Soil Samples: Stainless Steel Hand Auger

Interval:

COLUMN OF WATER IN WELL

	Shallow		Deep
TOC relative to Ground Surface:	0.2	feet	0.1
TOC Elevation:		feet MSL	
Total Depth of Well :	15	feet BGS	50
Total Depth of Well :	15	feet TOC	50
Depth to Water:	1.46	feet TOC	~~46.9~~ 3.10
Column of Water in Well:	13.54	feet TOC	46.9

PURGE VOLUME CALCULATION

	Shallow		Deep
Casing Inside Diameter:	1	inches	1
Casing Volume:	0.045	gal./ft.	0.045
Column of Water in Well:	13.54	feet	46.9
Volume of Water in Well:	0.61	gallons	2.11
Purge Method:	Peristalic Pump		
Volume to Purge:	1.8		6.33
Well Pumped Dry? Yes (No)			(NO)

NOTES:

BLDG 900 TMW-6S & TMW-6D

- GW DATA COLLECTED DURING SAMPLING

Field Team Leader: R. Keenen

Signature: [signature]

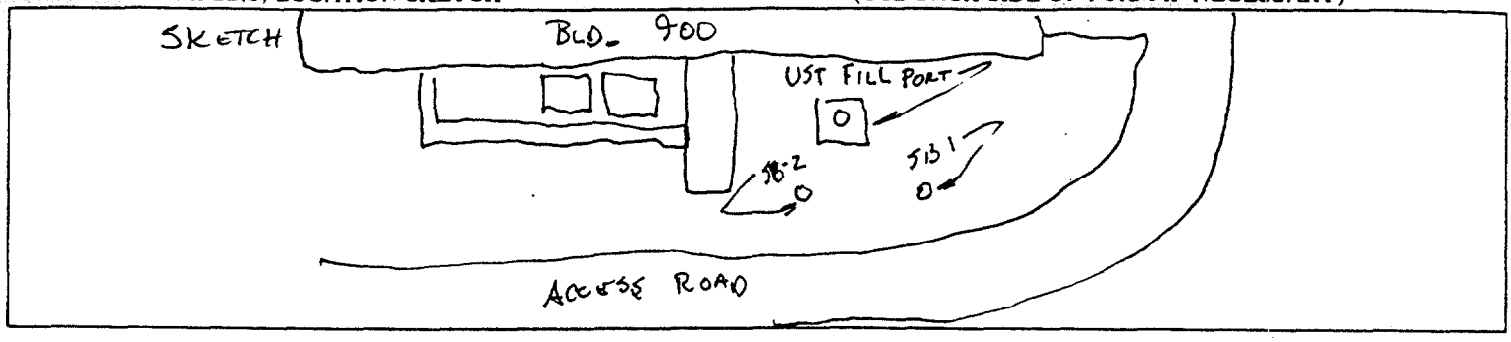
APPENDIX A-3

Soil Sample Logs

SOIL SAMPLE
FIELD COLLECTION REPORT

Project Name: NGK / CECIL FIELD / FL
Project Number: 973-3778
Date Collected: 2 DEC 97
Sample Location: BLDG 900; SB-1 (AT TMW-1) AND SE TMW-1, SL-1
Collected by: MJA

SAMPLE(S) LOCATION SKETCH (USE BACK SIDE OF FORM IF NECESSARY)



SAMPLE ID NUMBER	TIME COLLECTED	DEPTH OF SAMPLE	SOIL DESCRIPTION (Color, Composition, Staining, Odor, Field Measurements*)	
SB-1-2	1500	0-2	BROWN SILTY SANDS	PID = 9.7 PPM
SB-1-4	1500	2-4		41.9 PPM *
SB-1-5	1510	5'		9.0 PPM
			WATER TABLE ~ 5'	

Composite Sample? (No)
Composite Sample ID Number
Describe Compositing:

SAMPLE TYPES COLLECTED

TYPES(**)	VOLUME	PER SAMPLE?		PER COMPOSITE?	
8020		(YES)	NO	YES	NO
8100		YES	NO	YES	NO
FL-PRO		YES	NO	YES	NO
8260		YES	NO	YES	NO
8270					
6010 / 7470					

Number of Containers:
Date Received by Lab:
Laboratory: SAVANNAH LABS
Weather Conditions:

Remarks: SS-4 EQ BLANKS TAKEN @ SB-1 SAMPLES TAKEN @ 2-4' ZONE
THIS ZONE HAD HIGHEST PID READING

(*) Organic Vapor Analysis, Pocket Penetrometer, Etc.

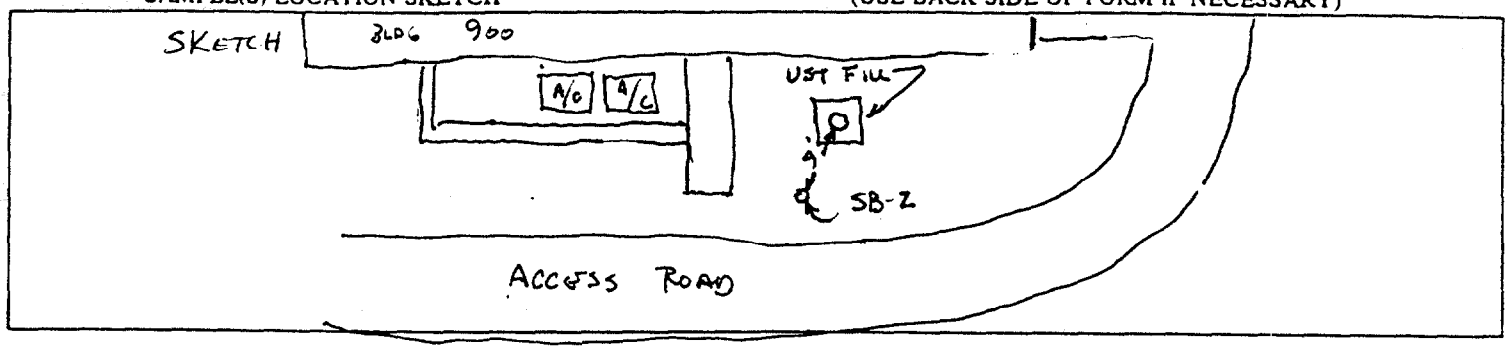
(**) Metals, VOA, Organics, Etc.

SAMPLEFRM.WK1(MA)grd

SOIL SAMPLE
FIELD COLLECTION REPORT

Project Name: NGC / CECIL FIELD / FL
Project Number: 973-3778
Date Collected: 03 DEC 97
Sample Location: BLDG 900: SB-2 (AT TMW-2) AND TMW-3, SL-1
Collected by: MJA

SAMPLE(S) LOCATION SKETCH (USE BACK SIDE OF FORM IF NECESSARY)



SAMPLE ID NUMBER	TIME COLLECTED	DEPTH OF SAMPLE	SOIL DESCRIPTION (Color, Composition, Staining, Odor, Field Measurements*)	
SB-2-2	1430	0-2 } 2 DEC 97	BROWN SILTY SANDS	PID= 10.3 PPM
SB-2-4	1430	2-4	WATER TABLE ~ 5'	10.8 PPM
SB-2-6	1440	4-6		9.6 PPM
900-SB-2	1340	2-4'		
900-TMW-2-34	1340	2-4'		

Composite Sample? YES ~~NO~~ N/A
Composite Sample ID Number N/A
Describe Compositing: REPRESENTATIVE SAMPLES TAKEN THROUGHOUT SAMPLE ZONE.

SAMPLE TYPES COLLECTED

TYPES(**)	VOLUME	PER SAMPLE?		PER COMPOSITE?	
8020		YES	NO	YES	NO
8100		YES	NO	YES	NO
FL-PRO		YES	NO	YES	NO
8260		YES	NO	YES	NO
8270					
6010/7470					

Number of Containers: 6
Date Received by Lab:
Laboratory: SAVANNAH LABS
Weather Conditions: CLEAR WARM

Remarks: SOIL SAMPLES TAKEN IN 2-4' ZONE. HAD HIGHEST PID READING

(*) Organic Vapor Analysis, Pocket Penetrometer, Etc.

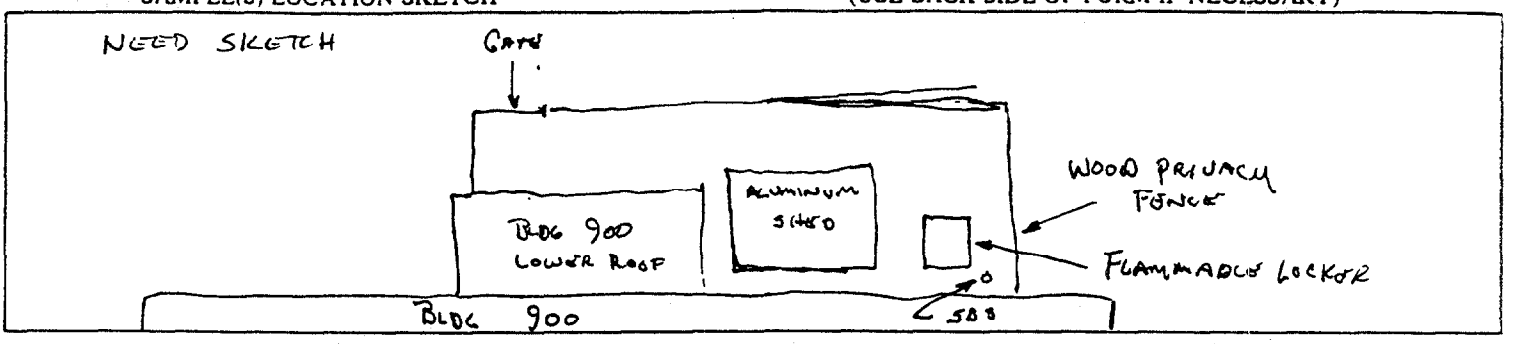
(**) Metals, VOA, Organics, Etc.

SAMPLEFRM.WK1\FA\gd

SOIL SAMPLE
FIELD COLLECTION REPORT

Project Name:	NGC / CECIL FIELD	Project Number:	973-3778
Date Collected:	3 DEC 97	Sample Location:	BLDG 900; SB-3 FLAMMABLES LOCKER
Collected by:	NJA		

SAMPLE(S) LOCATION SKETCH (USE BACK SIDE OF FORM IF NECESSARY)



SAMPLE ID NUMBER	TIME COLLECTED	DEPTH OF SAMPLE	SOIL DESCRIPTION (Color, Composition, Staining, Odor, Field Measurements*)
900-SB-3	1200 HRS	0-18"	BROWN TO WHITE TO DARK GRAY SANDS
			~~3A PID -> 3A - 5.0PPM RSH~~
			~~3B - 6.6PPM RSH~~

Composite Sample? YES No Composite Sample ID Number N/A

Describe Compositing: SMALL SAMPLES FROM 0-1.5'

SAMPLE TYPES COLLECTED

TYPES(**)	VOLUME	PER SAMPLE?		PER COMPOSITE?	
8260		(YES)	NO	YES	NO
		YES	NO	YES	NO
		YES	NO	YES	NO
		YES	NO	YES	NO

Number of Containers: 1

Date Received by Lab: Laboratory: SAVANNAH LABS

Weather Conditions: OVERCAST, 70°+

Remarks: SB3 TAKEN NE OF FLAMMABLE CABINET AT LOWEST AREA INSIDE WOODEN ENCLOSURE.

(*) Organic Vapor Analysis, Pocket Penetrometer, Etc.

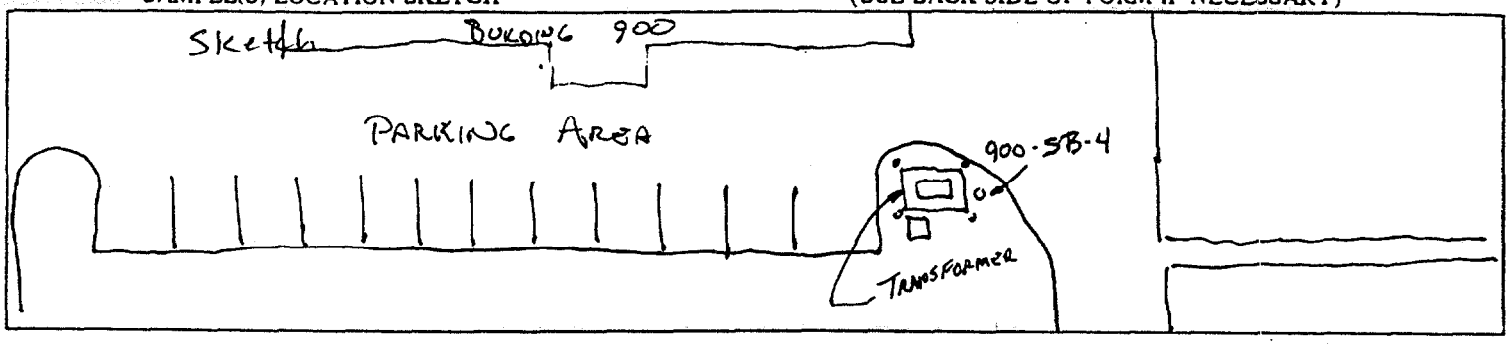
(**) Metals, VOA, Organics, Etc.

SAMPLEFRM.WK1/WA/KJ

SOIL SAMPLE
FIELD COLLECTION REPORT

Project Name: NGC / CECIL FIELD / FL
Project Number: 973-3778
Date Collected: 03 DEC 97
Sample Location: BLDG 900: SB-4 South west Transformer
Collected by: MJA

SAMPLE(S) LOCATION SKETCH (USE BACK SIDE OF FORM IF NECESSARY)



SAMPLE ID NUMBER	TIME COLLECTED	DEPTH OF SAMPLE	SOIL DESCRIPTION (Color, Composition, Staining, Odor, Field Measurements*)
900-SB-4	1230	0 - 2'	LIGHT GRAY TO BROWN DRY SAND
			PID → ~~HA = 62.5 PPM~~ PSH
			~~HB = 83.7 PPM~~ PSH

Composite Sample? Yes No Composite Sample ID Number N/A

Describe Compositing: REPRESENTATIVE SAMPLES TAKEN THROUGHOUT SAMPLE ZONE

SAMPLE TYPES COLLECTED

TYPES(**)	VOLUME	PER SAMPLE?		PER COMPOSITE?	
8080		(YES)	NO	YES	NO
		YES	NO	YES	NO
		YES	NO	YES	NO
		YES	NO	YES	NO

Number of Containers: 1

Date Received by Lab: Laboratory: SAVANNAH LABS

Weather Conditions: OVERCAST 75°

Remarks: EQ BLANK 900-SS-3

(*) Organic Vapor Analysis, Pocket Penetrometer, Etc.

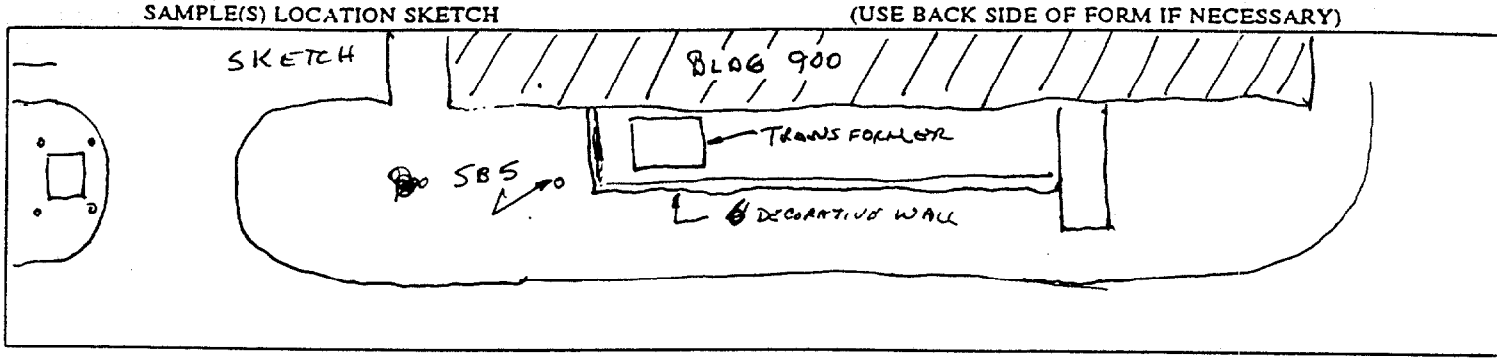
(**) Metals, VOA, Organics, Etc.

SAMPLEFRM.WK1\ZA\grd

SOIL SAMPLE
FIELD COLLECTION REPORT

Project Name: NGC / LGEIL FIELD / FL
Project Number: 973-3778
Date Collected: 3 DEC 97
Sample Location: BDG 900: SB-5 Southern Transforme
Collected by: MJR

SAMPLE(S) LOCATION SKETCH (USE BACK SIDE OF FORM IF NECESSARY)



SAMPLE ID NUMBER	TIME COLLECTED	DEPTH OF SAMPLE	SOIL DESCRIPTION (Color, Composition, Staining, Odor, Field Measurements*)
900-SB-5	1250	0 - 2'	DARK BROWN TO LIGHT BROWN SILTY SANDS
			~~PID => SA = 0.0 PPM~~ RSL
			~~SB = 0.0 PPM~~ RSL

Composite Sample? YES No Composite Sample ID Number

Describe Compositing: SAMPLES THROUGHOUT THE ZONE SAMPLED

SAMPLE TYPES COLLECTED

TYPES(**)	VOLUME	PER SAMPLE?		PER COMPOSITE?	
8080		YES	NO	YES	NO
		YES	NO	YES	NO
		YES	NO	YES	NO
		YES	NO	YES	NO

Number of Containers: 1

Date Received by Lab: Laboratory: SAVANNAH LABS

Weather Conditions: OVERCAST, 75°

Remarks: SAMPLE TAKEN ~ 1.5' SOUTH OF WALL BESIDE STAINED WOODEN PALLET

(*) Organic Vapor Analysis, Pocket Penetrometer, Etc.

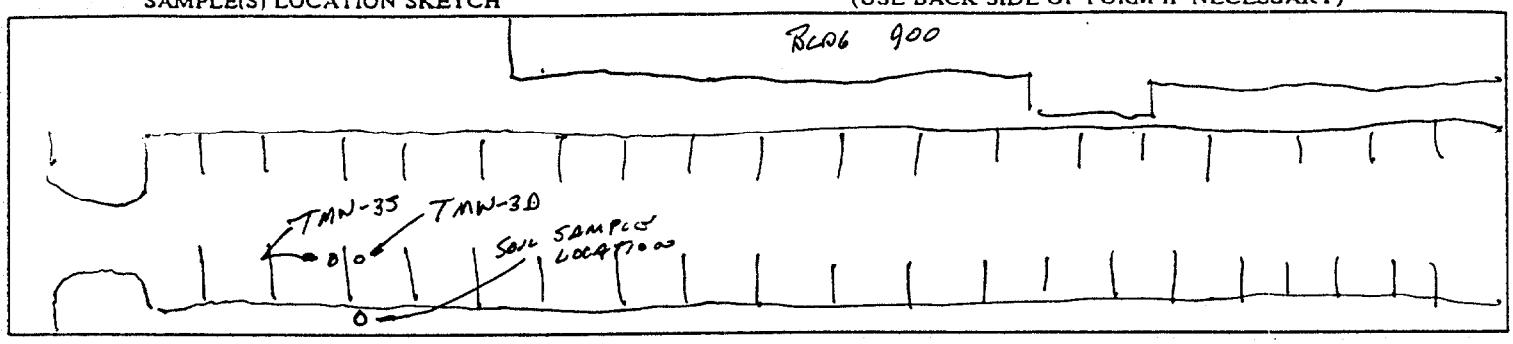
(**) Metals, VOA, Organics, Etc.

SAMPLEFRM.WK1\MA\gn

SOIL SAMPLE
FIELD COLLECTION REPORT

Project Name: NGC / CECIL FIELD / FL
Project Number: 973-3778
Date Collected: 3 DEC 97
Sample Location: BLDG 900: TMW-3 AT TMW-3
Collected by: MJA

SAMPLE(S) LOCATION SKETCH (USE BACK SIDE OF FORM IF NECESSARY)



SAMPLE ID NUMBER	TIME COLLECTED	DEPTH OF SAMPLE	PID	SOIL DESCRIPTION (Color, Composition, Staining, Odor, Field Measurements*)
900-TMW-3-SC	1556	1-2'		HIGH PID READING
900 TMW-3A	1500	0-1'	5.0PPM	BROWN SILTY SAND / SOME LIMEROCK FROM DRILL
900 TMW-3B	1507	1-2'	6.6PPM	BROWN SILTY SAND

Composite Sample? (No) Composite Sample ID Number

Describe Compositing:

SAMPLE TYPES COLLECTED

TYPES(**)	VOLUME	PER SAMPLE?		PER COMPOSITE?	
8260		(YES)	NO	YES	NO
8270		YES	NO	YES	NO
6010/7470		YES	NO	YES	NO
		YES	NO	YES	NO

Number of Containers: 3

Date Received by Lab: Laboratory: SAVANNAH LABS

Weather Conditions: OVERCAST 75° WINDS S 3-7MPH

Remarks: EQ BLANK SS-2

(*) Organic Vapor Analysis, Pocket Penetrometer, Etc.

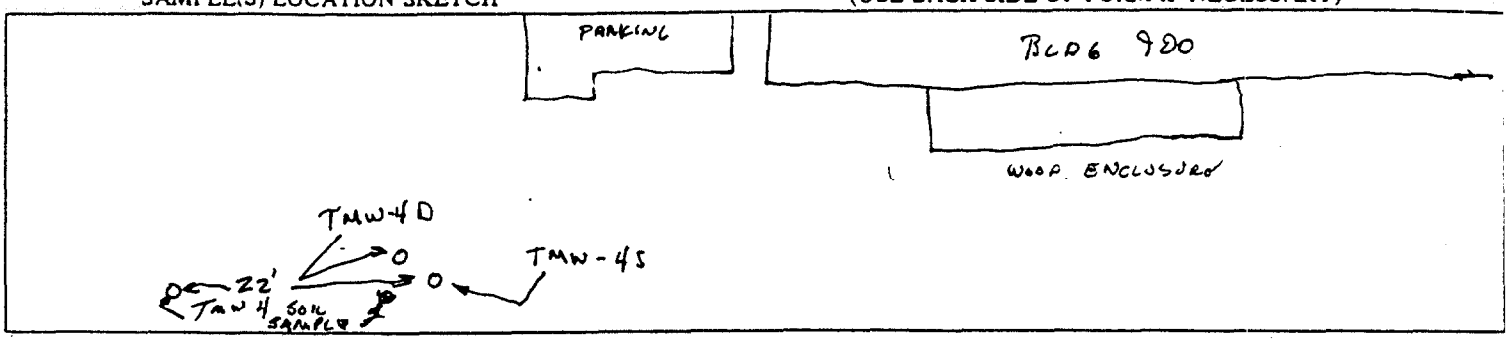
(**) Metals, VOA, Organics, Etc.

SAMPLEFRM.WK1/MA/gd

SOIL SAMPLE
FIELD COLLECTION REPORT

Project Name: NGC / CECIL FIELD / FL
Project Number: 973-3778
Date Collected: 03 DEC 93
Sample Location: BLDG 900; TMW-4 AT TMW-4
Collected by: MJA

SAMPLE(S) LOCATION SKETCH (USE BACK SIDE OF FORM IF NECESSARY)



SAMPLE ID NUMBER	TIME COLLECTED	DEPTH OF SAMPLE	PID	SOIL DESCRIPTION (Color, Composition, Staining, Odor, Field Measurements*)
900-TMW-4-A	1520	0-1'	62.5PPM	DARK GRAY SILTY SANDS
900-TMW-4-B	1525	1-2'	83.2PPM	LIGHT TO DARK GRAY SILTY SANDS
900-TMW-4-SC	1545	1-2'		HIGHEST PID READING

Composite Sample? No
Composite Sample ID Number
Describe Compositing:

SAMPLE TYPES COLLECTED

TYPES(**)	VOLUME	PER SAMPLE?		PER COMPOSITE?	
8260		YES	NO	YES	NO
8270		YES	NO	YES	NO
6010/7470		YES	NO	YES	NO
		YES	NO	YES	NO

Number of Containers: 3
Date Received by Lab:
Laboratory: SAVANNAH LABS
Weather Conditions: OVERCAST 75° F

Remarks: NOTE: PID READINGS OF 62.5 PPM IN 0-1' ZONE AND 83.2 IN 1-2' ZONE. SAMPLE TAKEN IN A AREA OF PINE TREES. ROOTS WERE CUT W/ AUGER DURING SAMPLING

(*) Organic Vapor Analysis, Pocket Penetrometer, Etc.

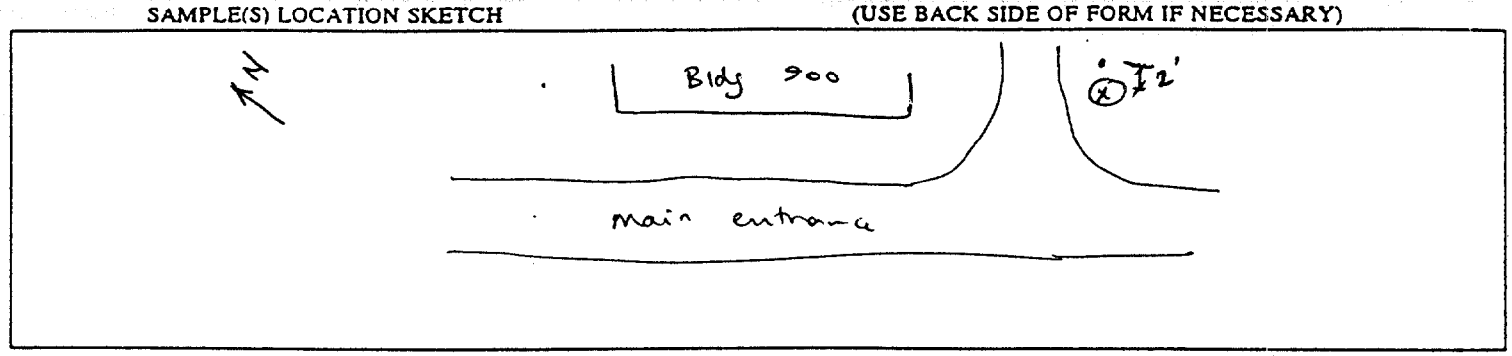
(**) Metals, VOA, Organics, Etc.

SAMPLEFRM WK1\MA\rd

SOIL SAMPLE
FIELD COLLECTION REPORT

Project Name: NGC / CECIL FIELD / FL
Project Number: 973-3778
Date Collected: 12/4/97
Sample Location: BLDG 900: TMW-5 AT TMW-5
Collected by: SYL/MWB

SAMPLE(S) LOCATION SKETCH (USE BACK SIDE OF FORM IF NECESSARY)



SAMPLE ID NUMBER	TIME COLLECTED	DEPTH OF SAMPLE	PID	SOIL DESCRIPTION (Color, Composition, Staining, Odor, Field Measurements*)
900 TMW5-SL/A	10:30	0-1	0.0PPM	Brown medium to fine sand, PID = 0.0
900 TMW5-SL/B	10:32	1-2	0.0PPM	" " " " PID = 0.0

Composite Sample? yes No Composite Sample ID Number

Describe Compositing:

mix soil from 0-1' with 1-2' BGS

SAMPLE TYPES COLLECTED

TYPES(**)	VOLUME	PER SAMPLE?		PER COMPOSITE?	
8260		YES	NO	YES	NO
8270		YES	NO	YES	NO
6010/7470		YES	NO	YES	NO
		YES	NO	YES	NO

Number of Containers: 3

Date Received by Lab: Laboratory: SAVANNAH LABS

Weather Conditions: cloudy

Remarks: Time collected = 10:55

(*) Organic Vapor Analysis, Pocket Penetrometer, Etc.

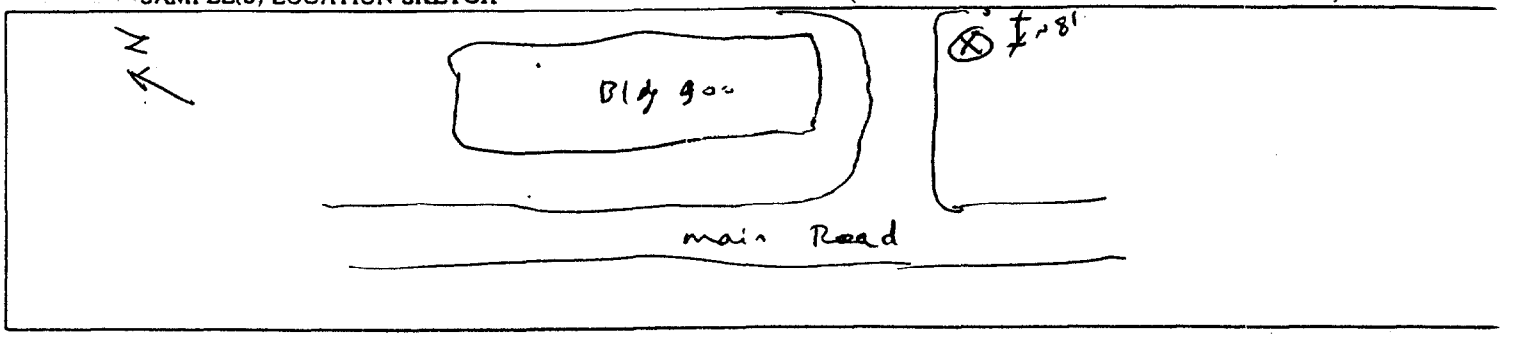
(**) Metals, VOA, Organics, Etc.

SAMPLEFRM.WK1\VA\rd

SOIL SAMPLE
FIELD COLLECTION REPORT

Project Name: NGC / CECIL FIELD / FL
Project Number: 973-3778
Date Collected: 12/4/97
Sample Location: BLDG 900; TMW-6 AT TMW-6
Collected by: SYE / MW B

SAMPLE(S) LOCATION SKETCH (USE BACK SIDE OF FORM IF NECESSARY)



SAMPLE ID NUMBER	TIME COLLECTED	DEPTH OF SAMPLE	PID	SOIL DESCRIPTION (Color, Composition, Staining, Odor, Field Measurements*)
900 TMW-6-SL/A	10:40	0 – 1'	4.3 PPM	Dark black to brown silty sand (Topsoil) PID = 4.3
900 TMW-6-SL/B	10:43	1 – 2'	0.6 PPM	Dark black to brown silty sand, PID = 0.6 p

Composite Sample? ~~yes~~ (No) Composite Sample ID Number

Describe Compositing:

~~mixed soil from 0 to 1' with some soil from 1' to 2' BGS~~ SYE

SAMPLE TYPES COLLECTED

TYPES(**)	VOLUME	PER SAMPLE?		PER COMPOSITE?	
8260		(YES)	NO	YES	NO
8270		YES	NO	YES	NO
6010 / 7470		YES	NO	YES	NO
		YES	NO	YES	NO

Number of Containers: 3

Date Received by Lab: Laboratory: SAVANNAH LABS

Weather Conditions: cloudy

Remarks: time collected ~~10:55~~ 11:15 AM SYE
sample collected from 0 – 1' interval – PID / Headspace
sample had some organics / Roots.

(*) Organic Vapor Analysis, Pocket Penetrometer, Etc.

(**) Metals, VOA, Organics, Etc.

SAMPLEFRM.WK1\WA\gid

APPENDIX A-4

Groundwater Sample Collection Records

GROUNDWATER SAMPLE COLLECTION FORM

SITE DESCRIPTION

Project Name: NGC / Cecil Field / FL
Project Number: 973-3778.102
Location: NAS Cecil Field

WEATHER CONDITIONS

Temperature: 60's
Wind: 0-5 mph
Precipitation: Sunny

SAMPLE DESCRIPTION

Sample ID: Bldg 900: TMW-1 S
Date: 12/3/97
Time at Well Site: 13:30
Time of Sample Collection: 14:10
Sampled by: JSP / MGD
Sampling Method: Bailer / Tubing
Type of Sampling Equipment: Polyethylene

FIELD BLANK NOTES

Field Blank Name: EQUIPMENT BLANK 900-6
Field Blank /Rinse Water type:
Lot Number:
Analyses: SAME AS Below

VOLUME OF WATER TO BE PURGED

Casing Inside Diameter: 1 inches
Casing Volume: 0.045 gal/ft
Column of Water in Well: 12.85 feet
Volume of Water in Well: 0.58 gallons
Well Volumes to Purge: 3
Min. Volume to be Purged: 1.7 gallons
Method of Purging: ~~Centrifugal Pump~~ Peristalic Pump MD
Well Purged Dry?: Yes (No)

COLUMN OF WATER IN WELL BEFORE PURGE

Total Depth of Well: 15 ft TOC
Depth to Water : 2.15 ft TOC
Column of Water in Well: 12.85 ft
Stickup: Flush ft

Appearance of Sample: Clear / Lt brown

WELL PURGE CONTROL

	Purge 1	Purge 2	Purge 3	Purge 4	Purge 5	Purge 6
Time:	14:07	14:09	14:11			
Volume Removed (gal.):	2.5	3.5	4.5			
pH:	6.00	6.05	6.09			
Specific Conductance (µmhos/cm):	297	275	279			
Temperature (Degrees ~~C~~ MDF):	76°F	76°F	76°F			
Turbidity (NTU):	Lt brown	Lt brown	Lt brown	35.6		
:						

Starting Purge Time: 14:07
Ending Purge Time: 14:12
Average Purge Rate: ~0.5 gal/min
Total Volume Purged: ~5.0 gallons

SAMPLE CONTAINERS REQUIRED

Analysis	Container Number, Type and Size	Filter	Preservative and Source
8010/8020	(3) 40-ml vial	NA	HCl - Lab
8100	(2) 1-Liter Amber Glass	NA	None
200.7	(1) 250 ml plastic	NA	HNO_3 - Lab
FL-PRO	(2) 1-Liter Amber Glass	NA	HCL - Lab

Chain of Custody #:
Shuttle ID:
Trip Blank ID: Trip 05 (900)
Lab Name: Savannah Labs
Air Bill #:

EMARKS:

Field Team Leader: Jane S Pope

GROUNDWATER SAMPLE COLLECTION FORM

SITE DESCRIPTION

Project Name: NGC / Cecil Field / FL
Project Number: 973-3778.102
Location: NAS Cecil Field

WEATHER CONDITIONS

Temperature: 60's
Wind: 0-5 mph
Precipitation: Sunny

SAMPLE DESCRIPTION

Sample ID: Bldg 900: TMW-1 D
Date: 12/3/97
Time at Well Site: 13:30
Time of Sample Collection: 14:30
Sampled by: JSP / MGD
Sampling Method: Bailer / Tubing
Type of Sampling Equipment: Polyethylene

FIELD BLANK NOTES

Field Blank Name:
Field Blank /Rinse Water type:

Lot Number:
Analyses:

VOLUME OF WATER TO BE PURGED

Casing Inside Diameter: 1 inches
Casing Volume: 0.045 gal/ft
Column of Water in Well: 46.14 feet
Volume of Water in Well: 2.07 gallons
Well Volumes to Purge: 3
Min. Volume to be Purged: 6.23 gallons
Method of Purging: Centrifugal Pump
Well Purged Dry?: Yes (No)

COLUMN OF WATER IN WELL BEFORE PURGE

Total Depth of Well: 50 ft TOC
Depth to Water : 3.86 ft TOC
Column of Water in Well: 46.14 ft
Stickup: 0.2 ft

Appearance of Sample: Lt Gray

WELL PURGE CONTROL

	Purge 1	Purge 2	Purge 3	Purge 4	Purge 5	Purge 6
Time:	14:13	14:17	14:22			
Volume Removed (gal.):	5.5	7.5	9.5			
pH:	5.54	5.81	5.48			
Specific Conductance (µmhos/cm):	90	110	086			
Temperature (Degrees ~~C~~ MDF):	76°F	76°F	76°F			
Turbidity (NTU):	GRAY	GRAY	GRAY	70.2		
:						

Starting Purge Time: 14:05
Ending Purge Time: 14:22

Average Purge Rate: 20.6 gal/min
Total Volume Purged: 9.5 gallons

SAMPLE CONTAINERS REQUIRED

Analysis	Container Number, Type and Size	Filter	Preservative and Source
8010/8020	(3) 40-ml vial	NA	HCl - Lab
8100	(3) 1-Liter Amber Glass	NA	
200.7	(1) 250 ml plastic	NA	HNO_3 - Lab
FL-PRO	(2) 1-Liter Amber Glass	NA	HCL - Lab

Chain of Custody #:
Shuttle ID:
Trip Blank ID: Trip 900-5
Lab Name: Savannah Labs
Air Bill #:

EMARKS:

Field Team Leader: James S Pace

GROUNDWATER SAMPLE COLLECTION FORM

SITE DESCRIPTION

Project Name: NGC / Cecil Field / FL
Project Number: 973-3778.102
Location: NAS Cecil Field

WEATHER CONDITIONS

Temperature: 60's
Wind: 0-5 mph
Precipitation: Overcast

SAMPLE DESCRIPTION

Sample ID: Bldg 900: TMW-2 S
Date: 12/3/97
Time at Well Site: 15:30
Time of Sample Collection: 16:00
Sampled by: JSP/MGD
Sampling Method: Bailer / Tubing
Type of Sampling Equipment: Polyethylene

FIELD BLANK NOTES

Field Blank Name: —
Field Blank /Rinse Water type:

Lot Number:
Analyses:

VOLUME OF WATER TO BE PURGED

Casing Inside Diameter: 1 inches
Casing Volume: 0.045 gal/ft
Column of Water in Well: 12.6 feet
Volume of Water in Well: 0.57 gallons
Well Volumes to Purge: 3
Min. Volume to be Purged: 1.7 gallons
Method of Purging: ~~Centrifugal Pump~~ Peristalic Pump
Well Purged Dry?: (Yes) No

COLUMN OF WATER IN WELL BEFORE PURGE

Total Depth of Well: 15 ft TOC
Depth to Water : 2.4 ft TOC
Column of Water in Well: 12.6 ft
Stickup: Flush ft

Appearance of Sample: Lt brown

WELL PURGE CONTROL

	Purge 1	Purge 2	Purge 3	Purge 4	Purge 5	Purge 6
Time:						
Volume Removed (gal.):						
pH:						
Specific Conductance (μmhos/cm):						
Temperature (Degrees C):						
Turbidity (NTU):				162		
:						

Starting Purge Time: 15:45
Ending Purge Time:
Average Purge Rate: gal/min
Total Volume Purged: gallons

SAMPLE CONTAINERS REQUIRED

Analysis	Container Number, Type and Size	Filter	Preservative and Source
8010/8020	(3) 40-ml vial	NA	HCl - Lab
8100	(3) 1-Liter Amber Glass	NA	None
200.7	(1) 250 ml plastic	NA	HNO_3 - Lab
FL-PRO	(2) 1-Liter Amber Glass	NA	HCL - Lab

Chain of Custody #:
Shuttle ID:
Trip Blank ID: Trip-900-5
Lab Name: Savannah Labs
Air Bill #:

EMARKS: Purged Dry 2 times

Field Team Leader: Jonas S Pence

Sampfrm3.xls

GOLDER ASSOCIATES INC.

GROUNDWATER SAMPLE COLLECTION FORM

SITE DESCRIPTION

Project Name: NGC / Cecil Field / FL
Project Number: 973-3778.102
Location: NAS Cecil Field

WEATHER CONDITIONS

Temperature: 60's
Wind: 0-5 mph
Precipitation: Overcast

SAMPLE DESCRIPTION

Sample ID: Bldg 900: TMW-2 D
Date: 12/3/97
Time at Well Site: 15:30
Time of Sample Collection: 14:15
Sampled by: JSP / MGD
Sampling Method: Bailer / Tubing
Type of Sampling Equipment: Polyethylene

FIELD BLANK NOTES

Field Blank Name: —
Field Blank /Rinse Water type:
Lot Number:
Analyses:

VOLUME OF WATER TO BE PURGED

Casing Inside Diameter: 1 inches
Casing Volume: 0.045 gal/ft
Column of Water in Well: 46.21 feet
Volume of Water in Well: 2.07 gallons
Well Volumes to Purge: 3
Min. Volume to be Purged: 6.23 gallons
Method of Purging: ~~Centrifugal Pump~~ Peristalic Pump MD
Well Purged Dry?: Yes ~~No~~

COLUMN OF WATER IN WELL BEFORE PURGE

Total Depth of Well: 50 ft TOC
Depth to Water : 3.79 ft TOC
Column of Water in Well: 46.21 ft
Stickup: Flush ft

Appearance of Sample: Gray

WELL PURGE CONTROL

	Purge 1	Purge 2	Purge 3	Purge 4	Purge 5	Purge 6
Time:	15:48	15:51	15:54			
Volume Removed (gal.):	2.5	5.0	7.5			
pH:	5.61	5.48	5.43			
Specific Conductance (µmhos/cm):	118	106	101			
MD Temperature (Degrees C):	—	—	—			
Turbidity (NTU):	GRAY	GRAY	GRAY			
:						

Starting Purge Time: 15:45
Ending Purge Time: 15:56
Average Purge Rate: ~0.74 gal/min
Total Volume Purged: 8.2 gallons

SAMPLE CONTAINERS REQUIRED

Analysis	Container Number, Type and Size	Filter	Preservative and Source
8010/8020	(3) 40-ml vial	NA	HCl - Lab
8100	(3) 1-Liter Amber Glass	NA	None
200.7	(1) 250 ml plastic	NA	HNO_3 - Lab
FL-PRO	(2) 1-Liter Amber Glass	NA	HCL - Lab

Chain of Custody #:
Shuttle ID:
Trip Blank ID: Trip 900-5
Lab Name: Savannah Labs
Air Bill #:

EMARKS:

Field Team Leader: James S Peace

GROUNDWATER SAMPLE COLLECTION FORM

SITE DESCRIPTION

Project Name: NGC / Cecil Field / FL
Project Number: 973-3778.102
Location: NAS Cecil Field

WEATHER CONDITIONS

Temperature: 60's
Wind: 0-5 mph
Precipitation: Sunny

SAMPLE DESCRIPTION

Sample ID: Bldg 900: TMW-3 S
Date: 12/3/97
Time at Well Site: 9:30
Time of Sample Collection: 10:20
Sampled by: SSP / MGD
Sampling Method: Bailer / Tubing
Type of Sampling Equipment: Polyethylene

FIELD BLANK NOTES

Field Blank Name: Equipment Blank 900-5
Field Blank /Rinse Water type: Duplicate 900-4
Lot Number:
Analyses: SAME AS Below

VOLUME OF WATER TO BE PURGED

Casing Inside Diameter: 1 inches
Casing Volume: 0.045 gal/ft
Column of Water in Well: 11.5 feet
Volume of Water in Well: 0.52 gallons
Well Volumes to Purge: 3
Min. Volume to be Purged: 1.6 gallons MD
Method of Purging: ~~Centrifugal Pump~~ Peristalic Pump
Well Purged Dry?: Yes (No)

COLUMN OF WATER IN WELL BEFORE PURGE

Total Depth of Well: 15 ft TOC
Depth to Water : 3.50 ft TOC
Column of Water in Well: 11.5 ft
Stickup: 0.10 ft

Appearance of Sample: Clear / Lt brown

WELL PURGE CONTROL

	Purge 1	Purge 2	Purge 3	Purge 4	Purge 5	Purge 6
Time:	10:05	10:11	10:15			
Volume Removed (gal.):	2.0	4.5	6.0			
pH:	5.47	5.47	5.36			
Specific Conductance (µmhos/cm):	66	52	47			
MD Temperature (Degrees F):	82°F	82°F	82°F			
Turbidity (NTU):	Lt brown	Clear	Clear			
:						

Starting Purge Time: 10:00
Ending Purge Time: 10:15
Average Purge Rate: ~0.43 gal/min
Total Volume Purged: 6.5 gallons

SAMPLE CONTAINERS REQUIRED

Analysis	Container Number, Type and Size	Filter	Preservative and Source
8260	(3) 40-ml vial	NA	HCl - Lab
8270/8080/8140/8150	(6) 1-Liter Amber Glass	NA	None
8280	(2) 1-Liter Amber Glass	NA	None
HG-L	(1) 250 ml Plastic	NA	HNO_3 - Lab
Metals	(1) 500 ml Plastic	NA	HNO_3 - Lab
H_2S	(1) 500 ml Plastic	NA	Zinc Acetate - Lab
Cn	(1) 500 ml Plastic	NA	NaOH - Lab

Chain of Custody #:
Shuttle ID:
Trip Blank ID: Trip 900-5
Lab Name: Savannah Labs
Air Bill #:

EMARKS: Appendix IX

Field Team Leader: James S Peace

GROUNDWATER SAMPLE COLLECTION FORM

SITE DESCRIPTION

Project Name: NGC / Cecil Field / FL
Project Number: 973-3778.102
Location: NAS Cecil Field

WEATHER CONDITIONS

Temperature: 60's
Wind: 0-5 mph
Precipitation: Sunny

SAMPLE DESCRIPTION

Sample ID: Bldg 900: TMW-3 D
Date: 12/3/97
Time at Well Site: 9:30
Time of Sample Collection: 10:25
Sampled by: JSP/MGD
Sampling Method: Bailer / Tubing
Type of Sampling Equipment: Polyethylene

FIELD BLANK NOTES

Field Blank Name: —
Field Blank /Rinse Water type:

Lot Number:
Analyses:

VOLUME OF WATER TO BE PURGED

Casing Inside Diameter: 1 inches
Casing Volume: 0.045 gal/ft
Column of Water in Well: ~~mp3~~ 46.35 feet
Volume of Water in Well: 2.08 gallons
Well Volumes to Purge: 3
Min. Volume to be Purged: 6.26 gallons MD
Method of Purging: ~~Centrifugal Pump~~ Peristalic Pump
Well Purged Dry?: Yes (No)

COLUMN OF WATER IN WELL BEFORE PURGE

Total Depth of Well: 50 ft TOC
Depth to Water : 3.65 ft TOC
Column of Water in Well: 46.35 ft
Stickup: Flush ft

Appearance of Sample: Lt Gray → Volitile Clear

WELL PURGE CONTROL

	Purge 1	Purge 2	Purge 3	Purge 4	Purge 5	Purge 6
Time:	10:07	10:16	10:22			
Volume Removed (gal.):	2.5	7.0	10.0			
pH:	5.77	5.52	5.69			
Specific Conductance (μmhos/cm):	152	132	178			
MD Temperature (Degrees F):	76°F	76°F	76°F			
Turbidity (NTU):	GRAY	Lt Gray	Lt GRAY			
:	Silty					

Starting Purge Time: 10:00
Ending Purge Time: 10:22
Average Purge Rate: ~0.5 gal/min
Total Volume Purged: 10.0 gallons

SAMPLE CONTAINERS REQUIRED

Analysis	Container Number, Type and Size	Filter	Preservative and Source
8260	(3) 40-ml vial	NA	HCl - Lab
8270/8080/8140/8150	(6) 1-Liter Amber Glass	NA	None
8280	(2) 1-Liter Amber Glass	NA	None
HG-L	(1) 250 ml Plastic	NA	HNO_3 - Lab
Metals	(1) 500 ml Plastic	NA	HNO_3 - Lab
H_2S	(1) 500 ml Plastic	NA	Zinc Acetate - Lab
Cn	(1) 500 ml Plastic	NA	NaOH - Lab

Chain of Custody #:
Shuttle ID:
Trip Blank ID: TRIP - 900 - 5
Lab Name: Savannah Labs
Air Bill #:

EMARKS: Appendix IX

Field Team Leader: James S Pearce

GROUNDWATER SAMPLE COLLECTION FORM

SITE DESCRIPTION

Project Name: NGC / Cecil Field / FL
Project Number: 973-3778.102
Location: NAS Cecil Field

WEATHER CONDITIONS

Temperature: 60's
Wind: 0-5 mph
Precipitation: Sunny

SAMPLE DESCRIPTION

Sample ID: Bldg 900: TMW-4 S
Date: 12/2/97
Time at Well Site: 13:50
Time of Sample Collection: 14:30
Sampled by: JSP / MOD
Sampling Method: Bailer / Tubing
Type of Sampling Equipment: Polyethylene

FIELD BLANK NOTES

Field Blank Name: EQUIPMENT BLANK #4
Field Blank /Rinse Water type:

Lot Number:
Analyses: SAME AS Below

VOLUME OF WATER TO BE PURGED

Casing Inside Diameter: 1 inches
Casing Volume: 0.045 gal/ft
Column of Water in Well: 11.23 feet
Volume of Water in Well: 0.5 gallons
Well Volumes to Purge: 3
Min. Volume to be Purged: 1.5 gallons
Method of Purging: ~~Centrifugal Pump~~ MD Peristaltic Pump
Well Purged Dry?: Yes (No)

COLUMN OF WATER IN WELL BEFORE PURGE

Total Depth of Well: 15 ft TOC
Depth to Water : 3.77 ft TOC
Column of Water in Well: 11.23 ft
Stickup: Flush ft

Appearance of Sample: Clear

WELL PURGE CONTROL

	Purge 1	Purge 2	Purge 3	Purge 4	Purge 5	Purge 6
Time:	14:15	14:17	14:20	14:22		
Volume Removed (gal.):	1.1	2.6	4.0	5.0		
pH:	6.22	6.05	5.67	5.48		
Specific Conductance (µmhos/cm):	225	168	137	129		
MJ Temperature (Degrees F):	73°F	72°F	72°F	72°F		
Turbidity (NTU):	Cloudy	Cloudy	Clear	Clear	17.49	
:	Silty					

Starting Purge Time: 14:17
Ending Purge Time: 14:22

Average Purge Rate: 0.5 gal/min
Total Volume Purged: 5.0 gallons

SAMPLE CONTAINERS REQUIRED

Analysis	Container Number, Type and Size	Filter	Preservative and Source
8260	(3) 40-ml vial	NA	HCl - Lab
8270	(2) 1-Liter Amber Glass	NA	None
HG-L	(1) 250 ml Plastic	NA	HNO_3 - Lab
Metals	(1) 500 ml Plastic	NA	HNO_3 - Lab
8080	(2) 1 Liter Amber	NA	None
	MD 1		

Chain of Custody #:
Shuttle ID:
Trip Blank ID: Trip 03
Lab Name: Savannah Labs
Air Bill #:

EMARKS:

Field Team Leader: James Peace

GROUNDWATER SAMPLE COLLECTION FORM

SITE DESCRIPTION

Project Name: NGC / Cecil Field / FL
Project Number: 973-3778.102
Location: NAS Cecil Field

WEATHER CONDITIONS

Temperature: 60's
Wind: 0-5 mph
Precipitation: Sunny

SAMPLE DESCRIPTION

Sample ID: Bldg 900: TMW-4 D
Date: 12/2/97
Time at Well Site: 13:50
Time of Sample Collection: 14:45
Sampled by: JSP/MGD
Sampling Method: Bailer / Tubing
Type of Sampling Equipment: Polyethylene

FIELD BLANK NOTES

Field Blank Name: —
Field Blank /Rinse Water type:
Lot Number:
Analyses:

VOLUME OF WATER TO BE PURGED

Casing Inside Diameter: 1 inches
Casing Volume: 0.045 gal/ft
Column of Water in Well: 45.46 feet
Volume of Water in Well: 2.05 gallons
Well Volumes to Purge: 3
Min. Volume to be Purged: 6.14 gallons MD
Method of Purging: ~~Centrifugal Pump~~ Peristalic Pump
Well Purged Dry?: Yes (No)

COLUMN OF WATER IN WELL BEFORE PURGE

Total Depth of Well: 50 ft TOC
Depth to Water : 4.54 ft TOC
Column of Water in Well: 45.46 ft
Stickup: Flush ft

Appearance of Sample: Gray - silty

WELL PURGE CONTROL

	Purge 1	Purge 2	Purge 3	Purge 4	Purge 5	Purge 6
Time:	14:19	14:24	14:27			
Volume Removed (gal.):	3.0	7.0	9.0			
pH:	5.82	5.14	4.90			
Specific Conductance (µmhos/cm):	99	97	91			
MD Temperature (Degrees F):	71°F	71°F	71°F			
Turbidity (NTU):	GRAY	Silty	53.2	160		
:	Silty		Cloudy			

Starting Purge Time: 14:14
Ending Purge Time: 14:28
Average Purge Rate: ~0.71 gal/min
Total Volume Purged: 10 gallons

SAMPLE CONTAINERS REQUIRED

Analysis	Container Number, Type and Size	Filter	Preservative and Source
8260	(3) 40-ml vial	NA	HCl - Lab
8270	(2) 1-Liter Amber Glass	NA	None
HG-L	(1) 250 ml Plastic	NA	HNO_3 - Lab
Metals	(1) 500 ml Plastic	NA	HNO_3 - Lab
8080	(1) 1-Liter Amber Glass	NA	None

Chain of Custody #:
Shuttle ID:
Trip Blank ID: Trip 03
Lab Name: Savannah Labs
Air Bill #:

EMARKS:

Field Team Leader: Jane S Peace

GROUNDWATER SAMPLE COLLECTION FORM

SITE DESCRIPTION

Project Name: NGC / Cecil Field / FL
Project Number: 973-3778.102
Location: NAS Cecil Field

WEATHER CONDITIONS

Temperature: 60's
Wind: 0-5mph
Precipitation: Sunny

FIELD BLANK NOTES

Field Blank Name: —
Field Blank /Rinse Water type:

Lot Number:
Analyses:

COLUMN OF WATER IN WELL BEFORE PURGE

Total Depth of Well: 15 ft TOC
Depth to Water : 2.2 ft TOC
Column of Water in Well: 12.8 ft
Stickup: Flush ft

SAMPLE DESCRIPTION

Sample ID: Bldg 900: TMW-5 S
Date: 12/3/97
Time at Well Site: 11:55
Time of Sample Collection: 12:20
Sampled by: JSP / MBD
Sampling Method: Bailer / Tubing
Type of Sampling Equipment: Polyethylene

VOLUME OF WATER TO BE PURGED

Casing Inside Diameter: 1 inches
Casing Volume: 0.045 gal/ft
Column of Water in Well: 12.8 feet
Volume of Water in Well: 0.58 gallons
Well Volumes to Purge: 3
Min. Volume to be Purged: 1.7 gallons MD
Method of Purging: ~~Centrifugal Pump~~ Peristalic Pump
Well Purged Dry?: Yes (No)

Appearance of Sample:

WELL PURGE CONTROL

	Purge 1	Purge 2	Purge 3	Purge 4	Purge 5	Purge 6
Time:	12:11	12:14	12:17			
Volume Removed (gal.):	2.5	4.0	5.2			
pH:	5.71	5.63	5.64			
Specific Conductance (µmhos/cm):	110	101	99			
MD Temperature (Degrees F):	78°F	78°F	78°F			
Turbidity (NTU):	Brown	Clear	Clear	60.0		
:	Silty					

Starting Purge Time: 12:05
Ending Purge Time: 12:18
Average Purge Rate: ~0.41 gal/min
Total Volume Purged: 5.3 gallons

SAMPLE CONTAINERS REQUIRED

Analysis	Container Number, Type and Size	Filter	Preservative and Source
8260	(3) 40-ml vial	NA	HCl - Lab
8270	(2) 1-Liter Amber Glass	NA	None
HG-L	(1) 250 ml Plastic	NA	HNO_3 - Lab
Metals	(1) 500 ml Plastic	NA	HNO_3 - Lab
8080	(2) 1-Liter Amber	NA	None
	MD 1		

Chain of Custody #:
Shuttle ID:
Trip Blank ID: TRIP 900-5
Lab Name: Savannah Labs
Air Bill #:

EMARKS:

Field Team Leader: James D Pence

GROUNDWATER SAMPLE COLLECTION FORM

SITE DESCRIPTION

Project Name: NGC / Cecil Field / FL
Project Number: 973-3778.102
Location: NAS Cecil Field

WEATHER CONDITIONS

Temperature: 60's
Wind: 0-5 mph
Precipitation: Sunny

SAMPLE DESCRIPTION

Sample ID: Bldg 900: TMW-5 D
Date: 12/3/97
Time at Well Site: 11:55
Time of Sample Collection: 12:25
Sampled by: JSP / MGD
Sampling Method: Bailer / Tubing
Type of Sampling Equipment: Polyethylene

FIELD BLANK NOTES

Field Blank Name: —
Field Blank /Rinse Water type:

Lot Number:
Analyses:

VOLUME OF WATER TO BE PURGED

Casing Inside Diameter: 1 inches
Casing Volume: 0.045 gal/ft
Column of Water in Well: 47.2 feet
Volume of Water in Well: 2.12 gallons
Well Volumes to Purge: 3
Min. Volume to be Purged: 6.4 gallons MD
Method of Purging: ~~Centrifugal Pump~~ Peristaltic Pump
Well Purged Dry?: Yes (No)

COLUMN OF WATER IN WELL BEFORE PURGE

Total Depth of Well: 50' ft TOC
Depth to Water : 2.8 ft TOC
Column of Water in Well: 47.2 ft
Stickup: flush ft

Appearance of Sample: GRAY

WELL PURGE CONTROL

	Purge 1	Purge 2	Purge 3	Purge 4	Purge 5	Purge 6
Time:	12:13	12:19	12:24			
Volume Removed (gal.):	3.0	6.5	9.2			
pH:	5.47	5.32	5.27			
Specific Conductance (µmhos/cm):	078	069	068			
MD Temperature (Degrees F):	82°F	80°F	80°F			
Turbidity (NTU):	GRAY	GRAY	Lt GRAY	160		
:						

Starting Purge Time: 12:08
Ending Purge Time: 12:25
Average Purge Rate: 0.55 gal/min
Total Volume Purged: ~9.3 gallons

SAMPLE CONTAINERS REQUIRED

Analysis	Container Number, Type and Size	Filter	Preservative and Source
8260	(3) 40-ml vial	NA	HCl - Lab
8270	(2) 1-Liter Amber Glass	NA	None
HG-L	(1) 250 ml Plastic	NA	HNO_3 - Lab
Metals	(1) 500 ml Plastic	NA	HNO_3 - Lab
8080	(2) 1 Liter Amber	NA	None
	MD 1		

Chain of Custody #:
Shuttle ID:
Trip Blank ID: Trip 900-5
Lab Name: Savannah Labs
Air Bill #:

EMARKS:

Field Team Leader: James S Pace

GROUNDWATER SAMPLE COLLECTION FORM

SITE DESCRIPTION

Project Name: NGC / Cecil Field / FL
Project Number: 973-3778.102
Location: NAS Cecil Field

WEATHER CONDITIONS

Temperature: 60's
Wind: 0-5 mph
Precipitation: Sunny

SAMPLE DESCRIPTION

Sample ID: Bldg 900: TMW-6 S
Date: 12/2/97
Time at Well Site: 15:30
Time of Sample Collection: 16:30
Sampled by: JSP - MCD
Sampling Method: Bailer / Tubing
Type of Sampling Equipment: Polyethylene

FIELD BLANK NOTES

Field Blank Name: —
Field Blank /Rinse Water type:

Lot Number:
Analyses:

VOLUME OF WATER TO BE PURGED

Casing Inside Diameter: 1 inches
Casing Volume: 0.045 gal/ft
Column of Water in Well: 13.54 feet
Volume of Water in Well: 0.61 gallons
Well Volumes to Purge: 3
Min. Volume to be Purged: 1.8 gallons
Method of Purging: ~~Centrifugal Pump~~ Peristaltic Pump
Well Purged Dry?: Yes No

COLUMN OF WATER IN WELL BEFORE PURGE

Total Depth of Well: 15 ft TOC
Depth to Water : 1.46 ft TOC
Column of Water in Well: 13.54 ft
Stickup: 0.2 ft

Appearance of Sample: Clear / Cloudy

WELL PURGE CONTROL

	Purge 1	Purge 2	Purge 3	Purge 4	Purge 5	Purge 6
Time:	15:48	15:53	15:58			
Volume Removed (gal.):	1.5	4.0	7.0			
pH:	5.61	5.06	4.78			
Specific Conductance (μmhos/cm):	167	129	115			
MD Temperature (Degrees F):	72°F	72°F	72°F			
Turbidity (NTU):	Brown	Lt Brown	Clear/	43.5		
:	Silty		Lt Brown			

Starting Purge Time: 15:45
Ending Purge Time: 15:58
Average Purge Rate: ~0.54 gal/min
Total Volume Purged: 7.0 gallons

SAMPLE CONTAINERS REQUIRED

Analysis	Container Number, Type and Size	Filter	Preservative and Source
8260	(3) 40-ml vial	NA	HCl - Lab
8270/8080/8140/8150	(6) 1-Liter Amber Glass	NA	None
8280	(2) 1-Liter Amber Glass	NA	None
HG-L	(1) 250 ml Plastic	NA	HNO_3 - Lab
Metals	(1) 500 ml Plastic	NA	HNO_3 - Lab
H_2S	(1) 500 ml Plastic	NA	Zinc Acetate - Lab
Cn	(1) 500 ml Plastic	NA	NaOH - Lab

Chain of Custody #:
Shuttle ID:
Trip Blank ID: Trip 03
Lab Name: Savannah Labs
Air Bill #:

EMARKS: Appendix IX

Field Team Leader: Jon Pence

GROUNDWATER SAMPLE COLLECTION FORM

SITE DESCRIPTION

Project Name: NGC / Cecil Field / FL
Project Number: 973-3778.102
Location: NAS Cecil Field

WEATHER CONDITIONS

Temperature: 60's
Wind: 0-5 mph
Precipitation: Sunny

SAMPLE DESCRIPTION

Sample ID: Bldg 900: TMW-6 D
Date: 12/2/97
Time at Well Site: [redacted] 15:30
Time of Sample Collection: 16:40
Sampled by: JSP / MGD
Sampling Method: Bailer / Tubing
Type of Sampling Equipment: Polyethylene

FIELD BLANK NOTES

Field Blank Name: —
Field Blank /Rinse Water type:
Lot Number:
Analyses:

VOLUME OF WATER TO BE PURGED

Casing Inside Diameter: 1 inches
Casing Volume: 0.045 gal/ft
Column of Water in Well: 46.9 feet
Volume of Water in Well: 2.11 gallons
Well Volumes to Purge: 3
Min. Volume to be Purged: 6.33 gallons
Method of Purging: ~~Centrifugal Pump~~ MP Peristalic Pump
Well Purged Dry?: Yes (No)

COLUMN OF WATER IN WELL BEFORE PURGE

Total Depth of Well: 50 ft TOC
Depth to Water : 3.10 ft TOC
Column of Water in Well: 46.9 ft
Stickup: 0.1 ft

Appearance of Sample: Gray Silty

WELL PURGE CONTROL

	Purge 1	Purge 2	Purge 3	Purge 4	Purge 5	Purge 6
Time:	15:50	15:56	15:59			
Volume Removed (gal.):	4.0	6.5	9.1			
pH:	5.74	4.84	4.77			
Specific Conductance (µmhos/cm):	80	72	72			
MD Temperature (Degrees F):	71°F	71°F	71°F			
Turbidity (NTU):	GRAY	Gray	GRAY	159.9		
:	Silty	Silty				

Starting Purge Time: 15:47
Ending Purge Time: 16:00
Average Purge Rate: ~0.77 gal/min
Total Volume Purged: ~10.0 gallons

SAMPLE CONTAINERS REQUIRED

Analysis	Container Number, Type and Size	Filter	Preservative and Source
8260	(3) 40-ml vial	NA	HCl - Lab
8270/8080/8140/8150	(6) 1-Liter Amber Glass	NA	None
8280	(2) 1-Liter Amber Glass	NA	None
HG-L	(1) 250 ml Plastic	NA	HNO_3 - Lab
Metals	(1) 500 ml Plastic	NA	HNO_3 - Lab
H_2S	(1) 500 ml Plastic	NA	Zinc Acetate - Lab
Cn	(1) 500 ml Plastic	NA	NaOH - Lab

Chain of Custody #:
Shuttle ID:
Trip Blank ID: Trip 03
Lab Name: Savannah Labs
Air Bill #:

EMARKS: Appendix IX

Field Team Leader: Jane Peace

APPENDIX A-5

Daily Equipment Calibration Records

DAILY EQUIPMENT CALIBRATION LOG

WEATHER CONDITIONS

Temperature: 60's
Wind: 0-5 mph
Precipitation: Sunny

SITE DESCRIPTION

Project Name: NGC / Cecil Field / FL
Project Number: 973-3778.102
Location: NAS Cecil Field
Date: 12/2/97

pH Meter Calibration Log

Golder Associates Equipment No.:
Manufacturer: HANNAH
Make/Model: HI - 9023

Buffer Solution Brand: Cole Palmer
Lot Numbers: 4.01 - 6-1084
7.00 - 6-1222

TIME	pH BUFFER SOLUTION USED	METER READING	NOTES
10:45	pH Buffer 4.01	4.07	
	pH Buffer 7.00	6.99	
	pH Buffer 10.00		
15:00	pH Buffer 4.01	3.84	
	pH Buffer 7.00	6.95	
	pH Buffer 10.00		
17:07	pH Buffer 4.01	3.87	
	pH Buffer 7.00	6.97	
	pH Buffer 10.00		
	pH Buffer 4.01		
	pH Buffer 7.00		
	pH Buffer 10.00		

Specific Conductance Meter Calibration Log

Golder Associates Equipment No.:
Manufacturer: HANNAH
Make/Model: HI - 9033

Buffer Solution Brand: Cole Palmer
Lot Number:

TIME	BUFFER SOLUTION USED	METER READING	NOTES
10:45	Buffer 46.7 (µmhos)		
	Buffer 445 (µmhos)	462	CAL. TO 445
	Buffer: (µmhos)		
15:00	Buffer 46.7 (µmhos)	451	
	Buffer 445 (µmhos)		Cal. to 445
	Buffer: (µmhos)		
17:07	Buffer 46.7 (µmhos)		
	Buffer 445 (µmhos)	445	
	Buffer: (µmhos)		
	Buffer 46.7 (µmhos)		
	Buffer 445 (µmhos)		
	Buffer: (µmhos)		

Recommendations:

Printed Name: JAMES S. PEACE
Signature: James S Peace

Calibfm.xls

GOLDER ASSOCIATES INC.

DAILY EQUIPMENT CALIBRATION LOG

WEATHER CONDITIONS

Temperature: 60s
Wind: 0-5 mph
Precipitation: Overcast

SITE DESCRIPTION

Project Name: NGC/Cecil Field/FL
Project Number: 973-3788.102
Location: Jacksonville, FL
Date: 12/3/97

pH Meter Calibration Log

Golder Associates Equipment No.:
Manufacturer: HANNAH
Make/Model: HI- 9023

Buffer Solution Brand: Cole Palmer
Lot Numbers: 4.01 - 6-1054
7.00 - 6-1222

TIME	pH BUFFER SOLUTION USED	METER READING	NOTES
9:00	pH Buffer 4.01	4.01	
	pH Buffer 7.00	7.00	
	pH Buffer 10.00		
12:45	pH Buffer 4.01	4.01	
	pH Buffer 7.00	6.85	CAL to 7.0
	pH Buffer 10.00		
16:40	pH Buffer 4.01	4.01	
	pH Buffer 7.00	7.01	
	pH Buffer 10.00		
	pH Buffer 4.01		
	pH Buffer 7.00		
	pH Buffer 10.00		

Specific Conductance Meter Calibration Log

Golder Associates Equipment No.:
Manufacturer: HANNAH
Make/Model: HI - 9033

Buffer Solution Brand: Cole Palmer
Lot Number:

TIME	BUFFER SOLUTION USED	METER READING	NOTES
9:02	Buffer 46.7 (μmhos)		
	Buffer 445 (μmhos)	445	
	Buffer: (μmhos)		
12:45	Buffer 46.7 (μmhos)		
	Buffer 445 (μmhos)	445	
	Buffer: (μmhos)		
16:40	Buffer 46.7 (μmhos)		
	Buffer 445 (μmhos)	445	
	Buffer: (μmhos)		
	Buffer 46.7 (μmhos)		
	Buffer 445 (μmhos)		
	Buffer: (μmhos)		

Recommendations: → Put in new solutions in pH containers
→ TURBIDITY METER CALIBRATED BEFORE EACH FIELD MEASUREMENT TO 40 NTU OR 1.0 NTU STANDARD

Printed Name: JAMES Pope
Signature: James S Pope

Calibfm.xls

GOLDER ASSOCIATES INC.

APPENDIX A-6

Surveyor's Report of Monitoring Well, Piezometer, and Soil Boring Locations and Elevations

POINT NO.	NORTHING	EASTING	ELEVATION	DESCRIPTION
105	13387.860	10067.742	77.583	SB+4-B900
106	13344.847	10073.686	77.283	MW+5S-B900
107	13343.685	10073.680	77.172	MW+5D-B900
108	13609.689	10063.320	78.351	MW+3S-B900
109	13608.186	10063.188	78.261	MW+3D-B900
110	13550.907	10217.402		BDC+IBC-900
111	13551.038	10123.508		BDC+IBC-900
112	13559.646	10203.599	78.566	SB+3-B900
113	13612.126	10262.944	78.888	MW+4S-B900
114	13611.060	10264.136	78.824	MW+4D-B900
115	13393.230	10217.370		BDC+B1C-900
116	13377.848	10204.863	77.996	MW+1S-B900
117	13377.622	10205.901	78.231	MW+1D-B900
118	13375.937	10189.665	78.239	MW+2S-B900
119	13375.438	10190.906	78.241	MW+2D-B900
120	13355.533	10264.310	77.616	MW+6S-B900
121	13355.405	10263.045	77.405	MW+6D-B900
122	13380.659	10132.422	78.491	SB5-B900
124	12883.869	10169.140	75.711	DSB1
126	9942.963	10059.386	76.501	BM+5-EL. 76.50
127	10036.360	9936.403	75.965	MW+5S-B68
128	10035.977	9938.445	75.987	MW+5D-B68
130	10177.614	9935.158	76.462	MW+1S-B68
131	10170.962	9934.836	76.566	SB+2-B68
132	10188.531	9935.004	76.548	SB+1-B68

APPENDIX B

Laboratory Analytical Report

APPENDIX B-1

Positive Results Summary Report

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

5102 LaRoche Avenue • Savannah, GA 31404 • (912) 354-7858 • Fax (912) 352-0165

LOG NO: S7-76788B
Received: 03 DEC 97
Reported: 11 DEC 97

Mr. Mark Jordana
Golder Associates, Inc.
8933 Western Way, Suite 12
Jacksonville, FL 32256

CC: Rick Doria (Grumman-St)

Project: 973-3778/Grumman Cecil Field
Sampled By: Client
Code: 174571211

POSITIVE RESULTS SUMMARY REPORT

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE/ TIME SAMPLED
76788B-11	900-SB-1	12-02-97/1530

PARAMETER	76788B-11
Percent Solids (160.3), %	87

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

5102 LaRoche Avenue • Savannah, GA 31404 • (912) 354-7858 • Fax (912) 352-0165

LOG NO: S7-76788B
Received: 03 DEC 97
Reported: 11 DEC 97

Mr. Mark Jordana
Golder Associates, Inc.
8933 Western Way, Suite 12
Jacksonville, FL 32256

CC: Rick Doria (Grumman-St)

Project: 973-3778/Grumman Cecil Field
Sampled By: Client
Code: 174571211

POSITIVE RESULTS SUMMARY REPORT

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE/ TIME SAMPLED
76788B-1	900-TMW-4(S)	12-02-97/1430
76788B-2	900-TMW-4(D)	12-02-97/1445

PARAMETER	76788B-1	76788B-2
Volatiles by GC/MS (8260)		
Carbon disulfide, ug/l	---	10
Arsenic (6010)		
Arsenic, mg/l	---	0.045
Barium (6010)		
Barium, mg/l	0.014	0.27
Chromium (6010)		
Chromium, mg/l	---	0.12
Lead (6010)		
Lead, mg/l	---	0.085

SL SAVANNAH LABORATORIES & ENVIRONMENTAL SERVICES, INC.

5102 LaRoche Avenue • Savannah, GA 31404 • (912) 354-7858 • Fax (912) 352-0165

LOG NO: S7-76788B
Received: 03 DEC 97
Reported: 11 DEC 97

Mr. Mark Jordana
Golder Associates, Inc.
8933 Western Way, Suite 12
Jacksonville, FL 32256

CC: Rick Doria (Grumman-St)

Project: 973-3778/Grumman Cecil Field
Sampled By: Client
Code: 174571211

POSITIVE RESULTS SUMMARY REPORT

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE/ TIME SAMPLED
76788B-3	900-TMW-6(S)	12-02-97/1630
76788B-5	900-TMW-6(D)	12-02-97/1640

PARAMETER	76788B-3	76788B-5
Volatile Organic Compounds (8260)		
Bromodichloromethane, ug/l	---	1.2
Carbon disulfide, ug/l	2.1	14
Chloroform, ug/l	---	2.1
Metals (6010)		
Arsenic, mg/l	---	0.022
Barium, mg/l	0.010	0.20
Chromium, mg/l	---	0.10
Cobalt, mg/l	---	0.037
Nickel, mg/l	---	0.071
Lead, mg/l	---	0.057
Vanadium, mg/l	---	0.11
Zinc, mg/l	0.028	0.033

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LOG NO: S7-76788B
Received: 03 DEC 97
Reported: 11 DEC 97

Mr. Mark Jordana
Golder Associates, Inc.
8933 Western Way, Suite 12
Jacksonville, FL 32256

CC: Rick Doria (Grumman-St)

Project: 973-3778/Grumman Cecil Field
Sampled By: Client
Code: 174571211

POSITIVE RESULTS SUMMARY REPORT

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE/ TIME SAMPLED
76788B-7	PUB-DI	12-02-97/1410

PARAMETER	76788B-7
Volatile Organic Compounds (8260)	
Chloroform, ug/l	1.3

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Project: 973-3778/Grumman Cecil Field
Sampled By: Client
Code: 174571211

POSITIVE RESULTS SUMMARY REPORT

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE/ TIME SAMPLED
76788B-12	900-SB-2	12-02-97/1520

PARAMETER	76788B-12
Barium (6010)	
Barium, mg/kg dw	4.0
Chromium (6010)	
Chromium, mg/kg dw	3.9
Lead (6010)	
Lead, mg/kg dw	5.6

Steven J. White

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LOG NO: S7-76820
Received: 04 DEC 97
Reported: 12 DEC 97

Mr. Mark Jordana
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CC: Rick Doria (Grumman-St)

Project: 973-3778/Grumman Cecil Field
Sampled By: Client
Code: 171471212

POSITIVE RESULTS SUMMARY REPORT

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE/ TIME SAMPLED
76820-1	900-TMW-3(S)	12-03-97/1020
76820-2	Equipment Blank 900-5	12-03-97/0945
76820-3	Duplicate 900-4	12-03-97/1030
76820-4	900-TMW-3(D)	12-03-97/1025

PARAMETER	76820-1	76820-2	76820-3	76820-4
Volatile Organic Compounds (8260)				
Bromodichloromethane, ug/l	---	---	---	4.5
Dibromochloromethane, ug/l	---	---	---	1.8
Chloroform, ug/l	---	---	---	15
Metals (6010)				
Arsenic, mg/l	---	---	---	0.015
Barium, mg/l	0.015	---	0.014	0.082
Chromium, mg/l	---	---	---	0.035
Lead, mg/l	---	---	---	0.014
Vanadium, mg/l	---	---	---	0.042
Zinc, mg/l	0.073	190	---	0.024

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POSITIVE RESULTS SUMMARY REPORT

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE/ TIME SAMPLED
76820-5	900-TMW-1(S)	12-03-97/1410
76820-6	900-TMW-1(D)	12-03-97/1430
76820-8	900-TMW-2(S)	12-03-97/1600
76820-9	900-TMW-2(D)	12-03-97/1530

PARAMETER	76820-5	76820-6	76820-8	76820-9
Purgeable Halocarbons (8010)				
Chloroform, ug/l	---	---	---	5.9
Lead (200.7)				
Lead, mg/l	0.0055	0.078	0.011	0.060

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Code: 171471212

POSITIVE RESULTS SUMMARY REPORT

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE/ TIME SAMPLED
76820-10	900-TMW-5(S)	12-03-97/1220
76820-11	900-TMW-5(D)	12-03-97/1225

PARAMETER	76820-10	76820-11
Volatiles by GC/MS (8260)		
Chloroform, ug/l	---	3.8
Bromodichloromethane, ug/l	---	1.7
Arsenic (6010)		
Arsenic, mg/l	---	0.027
Barium (6010)		
Barium, mg/l	0.018	0.13
Chromium (6010)		
Chromium, mg/l	---	0.046
Lead (6010)		
Lead, mg/l	---	0.031

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Sampled By: Client
Code: 171471212

POSITIVE RESULTS SUMMARY REPORT

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE/ TIME SAMPLED
76820-17	900-SB-2	12-03-97/1340

PARAMETER	76820-17
Percent Solids (160.3), %	80

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CC: Rick Doria (Grumman-St)

Project: 973-3778/Grumman Cecil Field
Sampled By: Client
Code: 171471212

POSITIVE RESULTS SUMMARY REPORT

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE/ TIME SAMPLED
76820-18	900-SB-3	12-03-97/1200

PARAMETER	76820-18
Percent Solids (160.3), %	87

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CC: Rick Doria (Grumman-St)

Project: 973-3778/Grumman Cecil Field
Sampled By: Client
Code: 171471212

POSITIVE RESULTS SUMMARY REPORT

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE/ TIME SAMPLED
76820-19	900-SB-4	12-03-97/1230
76820-20	900-SB-5	12-03-97/1250

PARAMETER	76820-19	76820-20
Percent Solids (160.3), %	88	88

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Reported: 12 DEC 97

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CC: Rick Doria (Grumman-St)

Project: 973-3778/Grumman Cecil Field
Sampled By: Client
Code: 171471212

POSITIVE RESULTS SUMMARY REPORT

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE/ TIME SAMPLED
76820-21	900-TMW-3-SL	12-03-97/1556
76820-22	900-TMW-4-SL	12-03-97/1545
76820-23	900-TMW-2-SL	12-03-97/1340

PARAMETER	76820-21	76820-22	76820-23
Barium (6010)			
Barium, mg/kg dw	4.5	1.6	12
Chromium (6010)			
Chromium, mg/kg dw	4.6	---	5.4
Lead (6010)			
Lead, mg/kg dw	4.9	2.0	16
Mercury (7471)			
Mercury, mg/kg dw	0.027	---	0.029

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LOG NO: S7-76867A
Received: 05 DEC 97
Reported: 15 DEC 97

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CC: Rick Doria (Grumman-St)

Project: 973-3778/Grumman Cecil Field
Sampled By: Client
Code: 091371216

POSITIVE RESULTS SUMMARY REPORT

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE/ TIME SAMPLED
76867A-1	900-TMW-6-SL	12-04-97/1115
76867A-2	900-TMW-5-SL	12-04-97/1055

PARAMETER	76867A-1	76867A-2
Volatiles by GC/MS (8260)		
Benzene, ug/kg dw	8.6	---
Toluene, ug/kg dw	14	---
Xylenes, ug/kg dw	15	---
Barium (6010)		
Barium, mg/kg dw	8.0	2.8
Chromium (6010)		
Chromium, mg/kg dw	9.3	1.8
Lead (6010)		
Lead, mg/kg dw	26	2.1
Mercury (7471)		
Mercury, mg/kg/dw	0.025	---

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APPENDIX B-2

Computer Disk with
Soil and Groundwater Analytical Data