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DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 27th FIGHTER WING (ACC)
CANNON AIR FORCE BASE, NEW MEXICO

SWMUs 104 + 105

27 MAR 1995

Christopher S. Long, Colonel, USAF
Commander, 27th Support Group
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Mr. William Honker
U.S. Environmental Protection Agency Region VI
1445 Ross Avenue Suite 1200
Dallas TX 75202-2733

Dear Mr. Honker

The draft RFI Phase II Report for Landfills 3 and 4 is attached for your review and approval. As previously explained in our 20 Jan 95 letter, construction difficulties delayed completion of this report. After approval, we will issue a final report.

My point of contact for this matter is Mr. John Constantine or Mr. Sanford Hutsell at (505) 784-4348.

Sincerely

CHRISTOPHER S. LONG, Colonel, USAF
Commander, 27th Support Group

Attachment:
Draft RFI Phase II Report for Landfills 3 & 4

cc:
NMED (B. Hoditschek)
NMED - Groundwater Bureau w/o Atch (D. Morgan)
HQ ACC CES/ESVW (M. Calvert)
COE Omaha District w/o Atch (D. Mellema)

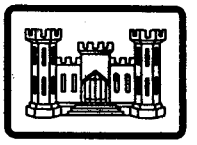
DRAFT RFI REPORT

SWMUs 104+105



# PHASE II RCRA FACILITY INVESTIGATION LANDFILLS 3 AND 4 SWMUs 105 AND 104

## CANNON AIR FORCE BASE, NEW MEXICO



Prepared for
U.S. Department of the Army
Corps of Engineers, Omaha District
Omaha, Nebraska

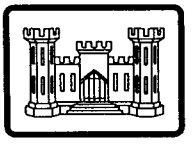
March 1995

C3M11QQ

DRAFT RFI REPORT

# PHASE II RCRA FACILITY INVESTIGATION LANDFILLS 3 AND 4 SWMUs 105 AND 104

## CANNON AIR FORCE BASE, NEW MEXICO



Prepared for
U.S. Department of the Army
Corps of Engineers, Omaha District
Omaha, Nebraska

March 1995

C3M11QQ

## TABLE OF CONTENTS

LIST OF TABLES



LIST OF FIGURES



LIST OF APPENDIXES

## LIST OF ACRONYMS

| | |
|---|---|
| ACC | Air Combat Command |
| AFB | Air Force Base |
| CL | Clay |
| COCs | Chemicals of Concern |
| DQCRs | Daily Quality Control Reports |
| EPA | U.S. Environmental Protection Agency |
| FSP | Field Sampling Plan |
| GM | Gravel |
| GRO | Gasoline Range Organics |
| HSP | Health and Safety Plan |
| HSWA | Hazardous and Solid Waste Amendments |
| IDW | Investigation-Derived Waste |
| LNPLS | Light Nonaqueous-Phase Liquids |
| MCL | Maximum Contaminant Levels |
| ML | Silt |
| NMED | New Mexico Environment Department |
| NMWQCC | New Mexico Water Quality Control Commission |
| OVA | Organic Vapor Analyzer |
| PCB | Polychlorinated Biphenyl |
| ppb | part per billion |
| QA/QC | Quality Assurance/Quality Control |
| QAPP | Quality Assurance Project Plan |
| RCRA | Resource Conservation and Recovery Act of 1976 |
| RFA | RCRA Facility Assessment |
| RFI | RCRA Facility Investigation |
| SM | Silty Sand |
| SP | Sand |
| SVOC | Semivolatile Organic Compound |
| SWMU | Solid Waste Management Unit |
| TAL | Total Analyte List |
| TCO | Total Chromatographable Organics |

| | |
|---|---|
| TFW | Tactical Fighter Wing |
| TIC | Tentatively Identified Compound |
| TPH | Total Petroleum Hydrocarbons |
| TRPH | Total recoverable petroleum hydrocarbons |
| USACE | U.S. Army Corps of Engineers |
| USAF | United States Air Force |
| UTL | Upper Tolerance Limit |
| VOC | Volatile Organic Compound |
| W-C | Woodward-Clyde |
| WP | Work Plan |

# 1.0
# INTRODUCTION

## 1.1 BACKGROUND AND AUTHORITY

Cannon Air Force Base (AFB) (Figure 1-1) is a permitted Resource Conservation and Recovery Act (RCRA) facility operating in accordance with the terms of a permit issued jointly by the U.S. Environmental Protection Agency (EPA) and the New Mexico Environment Department (NMED) effective October 3, 1989. This permit sets forth the conditions within which Cannon AFB can be operated as a hazardous waste facility. The authority for regulation of hazardous waste activities at Cannon AFB through this permit is derived from RCRA and its reauthorization in the form of the Hazardous and Solid Waste Amendments of 1984 (HSWA) as well as the New Mexico Hazardous Waste Management Act.

A portion of this permit governs the investigation and, where required, the implementation of corrective measures to mitigate the effects on the environment of releases of petroleum products and other chemicals that may have been released from various Solid Waste Management Units (SWMUs) at the Base. One hundred twenty-eight SWMUs were identified at Cannon AFB during the RCRA Facility Assessment (RFA) completed in 1988 for the EPA by A. T. Kearney. Seventy-three of the SWMUs were identified for further investigation and were divided into three groups (Appendix I through III). Appendix II and Appendix III SWMUs have been investigated under other programs. Two of the Appendix I SWMUs (SWMUs 104 and 105) were further investigated and are the subject of this Phase II RCRA Facility Investigation (RFI) report. The locations of the SWMUs are shown on Figure 1-2.

These regulatory considerations notwithstanding, the United States Air Force (USAF) has in place an independent program to manage its waste generation and disposal activities. Compliance with the terms of the RCRA Permit is a portion of the overall environmental management program at Cannon AFB.

This Phase II RFI was authorized and funded by the USAF through the United States Army Corps of Engineers (USACE).

This Phase II RFI has been completed in accordance with the work plan prepared by the Environmental Management Branch, Civil Engineering Squadron, Cannon AFB, as approved by the Environmental Protection Agency (EPA) in Region VI with recommendations. This work is directed at compliance with the terms of the RCRA Permit for Cannon AFB dated October 3, 1989.

## 1.2 PURPOSE AND SCOPE OF REPORT

The purpose of the Phase II RFI at SWMUs 104 and 105 is to obtain the data necessary to assess whether SWMU-specific chemicals of concern (COCs) have impacted the groundwater. The data collected during the Phase II RFI was used to determine whether a significant release has occurred at a SWMU, and if a release has occurred, make a recommendation on the next course of action.

The USACE Omaha District, has been tasked by Cannon AFB to complete Phase II of an RFI covering Landfill Nos. 3 and 4, which are also known as SWMU Nos. 105 and 104, respectively. These landfills were originally included in the list of SWMUs known as Appendix I. After Phase I of these investigations was completed, the EPA, Region VI determined that a Phase II investigation must be completed to ascertain if a corrective measures program will be required at any of these SWMUs.

This report for Landfills 3 and 4 is submitted as an addendum to the Phase I RFI Reports for Landfills 3 and 4 submitted by Radian Corp. (February and March 1994).

The Field Sampling Plan (FSP) was prepared as Part I of the Work Plan (WP) for the sampling of production wells and/or the installation and sampling of monitoring wells downgradient from Landfills 3 and 4 at Cannon Air Force Base near Clovis, New Mexico. Parts II and III were the Quality Assurance Project Plan (QAPP) Addendum and Health and Safety Plan (HSP) Addendum, respectively.

## 1.3 CANNON AFB OPERATIONAL HISTORY

Cannon AFB is located in Curry County, New Mexico, approximately 7 miles west of the City of Clovis. The base is situated on approximately 4,320 acres of land. The vicinity map

of Cannon AFB is shown on Figure 1-1, and the site map of Cannon AFB is shown on Figure 1-2. Off-Base facilities include the Melrose Bombing Range.

Cannon AFB dates to 1929, when Portair Field was established on the site. Portair Field was a civilian passenger terminal for early commercial transcontinental flights. In 1942, the Army Air Corps took control of the civilian airfield, and it became known as the Clovis Army Air Base. In early 1945, the Base was renamed Clovis Army Air Field. Flying, bombing, and gunnery classes continued through the end of World War II. By mid-1946, however, the airfield was placed on a reduced operational status and flying activities decreased. The installation was deactivated in May 1947. The types of aircraft stationed at Cannon AFB from 1942 to 1947 included B-17, B-24, and B-29 heavy bombers.

The Base was reassigned to the Tactical Air Command in July 1951. The first unit, the 140th Fighter-Bomber Wing, arrived in October of that year. The airfield was formally reactivated in November 1951 as Clovis Air Force Base. Between 1952 and 1957, the 50th and 388th Fighter-Bomber Wings were activated, and, upon their transfer, were replaced by the 312th and 474th Groups. Predominant aircraft stationed at Cannon AFB from 1951 to 1957 included the P-51 "Mustang" fighter and the F-86 "Sabre" fighter jet.

In June 1957, the Base became a permanent installation and was renamed Cannon Air Force Base in honor of the late General John K. Cannon, a former commander of the Tactical Air Command. In October 1957, the 312th and 474th Fighter-Bomber Groups were redesignated tactical fighter wings and the 832nd Air Division was activated to oversee their activities.

In 1959, the 312th Tactical Fighter Wing (TFW) was deactivated and replaced at Cannon AFB by the 27th TFW. In December 1965, the Base's mission changed to that of a replacement training unit, and the 27th TFW became the largest such unit in the Tactical Air Command. The predominant aircraft stationed at Cannon AFB from 1957 to 1965 was the F-100 "Super Sabre" fighter jet.

The 832nd Air Division was deactivated in July 1975, leaving the 27th TFW the principal Air Force unit at Cannon AFB. In early 1981, the 27th TFW was designated a Rapid Deployment Joint Task Force member.

The primary mission of Cannon AFB has remained relatively unchanged since 1965; i.e., to develop and maintain an F-111 tactical fighter wing capable of day, night, and all-weather combat operations and to provide replacement training of combat aircrews for tactical organizations worldwide. Aircraft stationed at Cannon AFB since 1965 include the F-100 "Super Sabre" fighter jet (1957-1969), the F-111A (1969), the F-111E (1969-1971) and the F-111D (1971-present). There are approximately 70 F-111D aircraft assigned to Cannon AFB. The total work force on Cannon AFB numbers approximately 4,000, which includes 3,500 military and 450 civil service.

In 1992, Cannon AFB became part of the Air Combat Command (ACC) as the result of the overall realignment of Air Force Commands and the ongoing downsizing of the U. S. Military.

## 1.4 PREVIOUS INVESTIGATIONS

Prior to this Phase II RFI, investigative activities completed at Cannon AFB included the following:

- IRP Records Search - CH2M Hill - 1983
- Preliminary Review/VSI Report - RCRA Facility Assessment - A.T. Kearney - 1987
- RCRA Facility Investigation Work Plan for 27 SWMUs - Lee Wan and Associates, Inc. - 1990
- RI Investigation - Appendix I SWMUs - W-C - 1991-1992 (18 SWMUs called "First Third")
- RFI (Phase I) - Landfills 1 and 2 - W-C - 1992-1993
- RFI (Phase I) - Appendix II SWMUs - through USACE, Albuquerque, NM - 1993

- RFI (Phase I) - Appendix III SWMUs - W-C - 1993
- RFI (Phase II) - Old Entomology Rinse Area and Landfill 5 - W-C
- RFI (Phase I) - Landfills 3 and 4 - Radian - 1992-1994

## 1.5 ORGANIZATION OF REPORT

The report is organized as shown in the table of contents, reporting activities and recommendations essentially in the order they were completed. The discussion of results and recommendations for each individual SWMU are presented (one site per section) in Sections 4.0 and 5.0, and the recommendations are recapped in summary form in Section 6.0.

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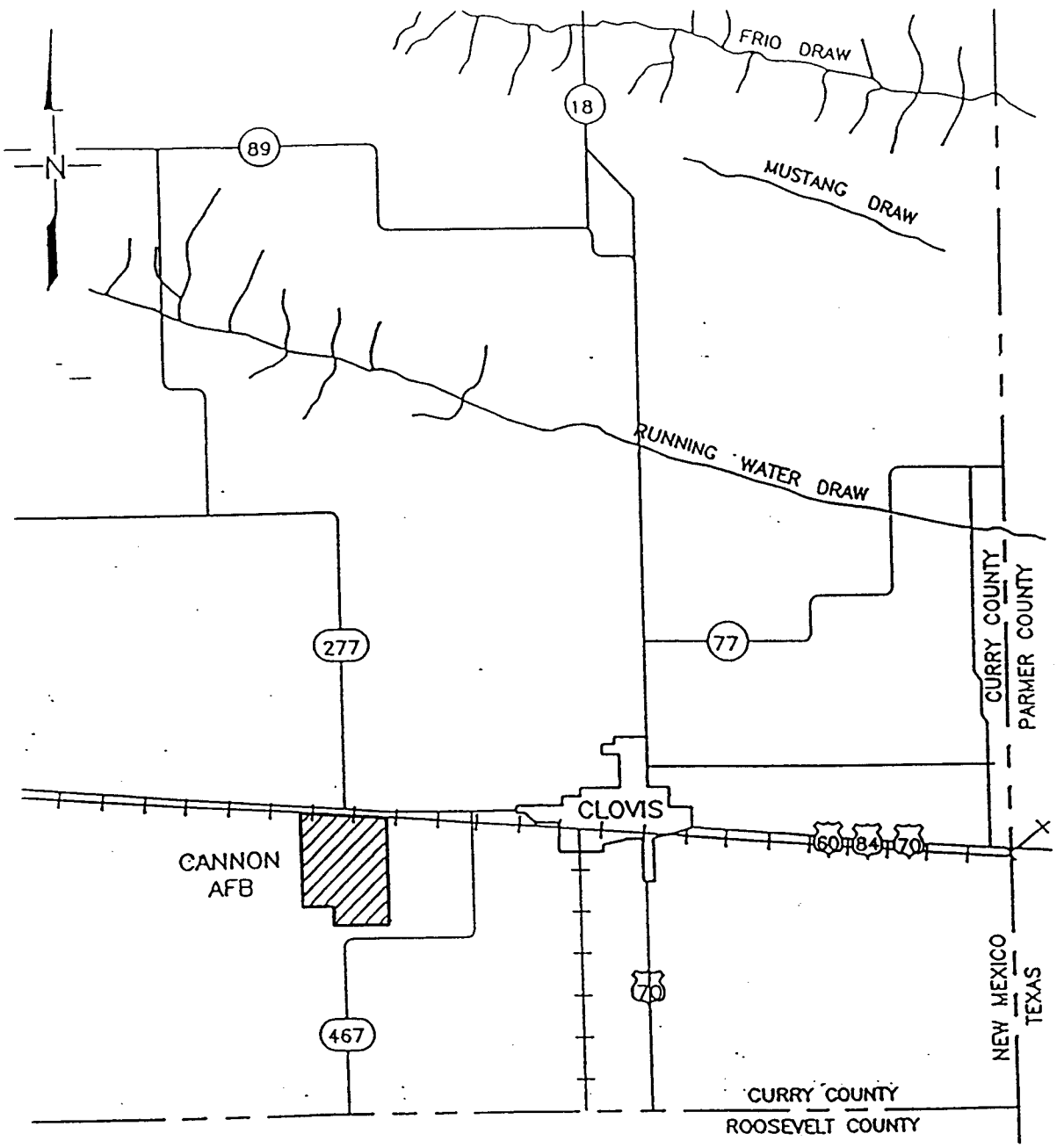



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SCALE IN MILES

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| DRN BY SCR | DATE 06/21/94 | REGIONAL MAP<br>CANNON AIR FORCE BASE NEW MEXICO | PROJECT No. | FIG. No. |
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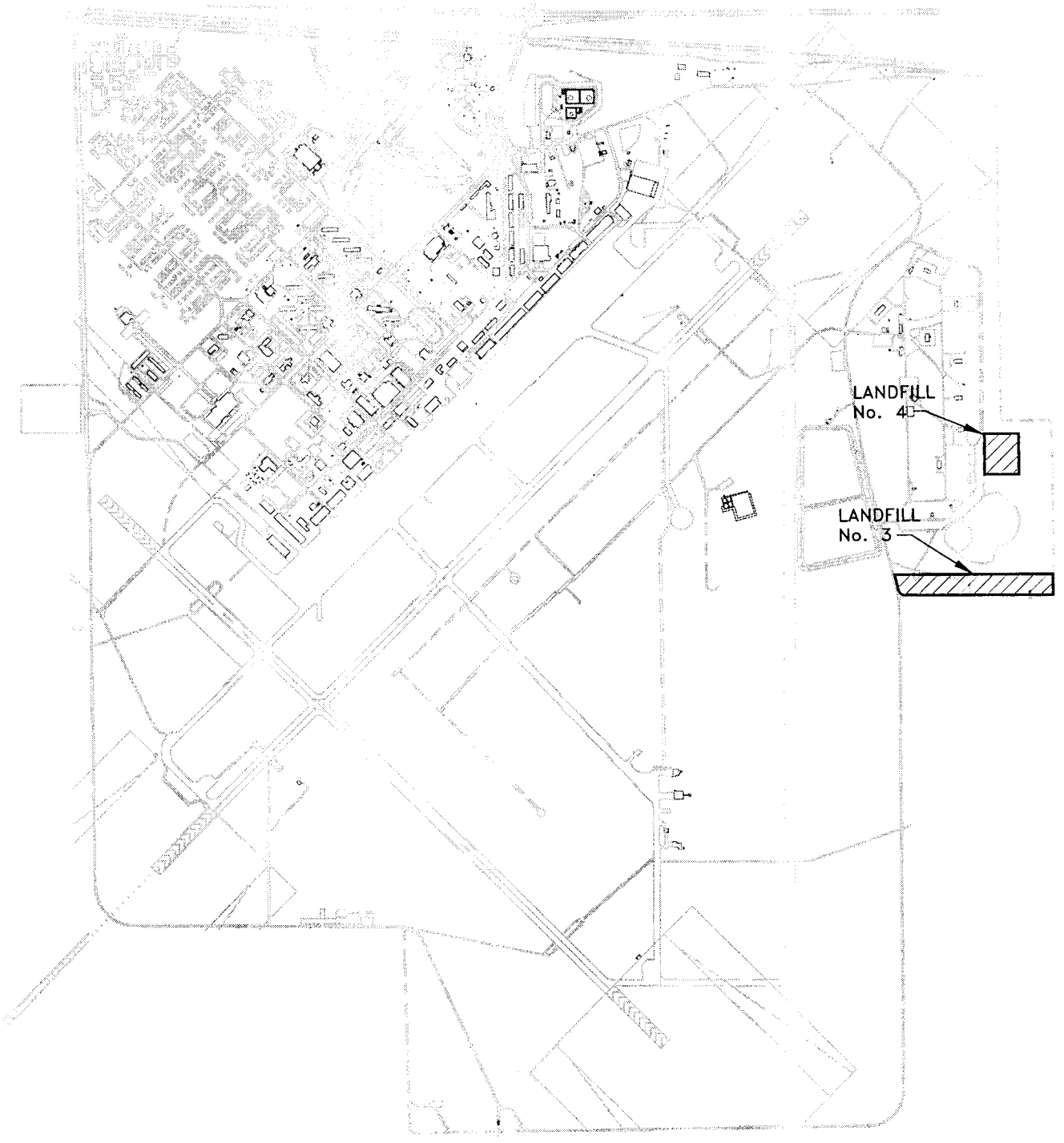


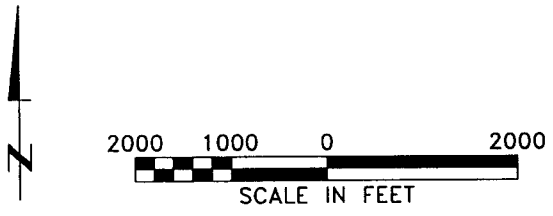


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# 2.0
# RCRA FACILITY INVESTIGATION APPROACH

The overall intent of this Phase II RFI is to obtain the additional data necessary to sufficiently characterize the presence or absence of contamination in groundwater. The specific objectives of this Phase II RFI completed at Cannon AFB are:

- To assess whether contaminants from Landfills 3 and 4 (SWMUs 105 and 104) have impacted the regional groundwater at the SWMUs.

- Develop recommendations for each SWMU regarding further evaluations or no further action.

The Phase II RFI has been completed in accordance with EPA Guidance outlined in "RCRA Facility Investigation (RFI) Guidance, Volumes 1-4, EPA 530/SW-89-031, May 1989".

The waste management practices that relate to the Phase II, Appendix I SWMUs which are the subject of this report can placed into the following category:

- Two Landfill Sites (SWMUs 104 and 105) where domestic solid wastes, waste oils, solvents, paint thinners and strippers, pesticide containers, and various empty cans and drums were burned in trenches and buried the following day. The objective is to investigate the potential groundwater contamination that could have resulted from leaching of contaminants from the landfills.

This waste disposal practice will be discussed further in Sections 4 and 5.

# 3.0
# FIELD INVESTIGATION

## 3.1 PRODUCTION WELL EVALUATION

Before the drilling and installation of the two monitoring wells, existing production wells adjacent to the two landfills were inspected to determine their suitability as monitoring points. The findings of this review were presented in detail in a technical memorandum submitted by W-C on September 20, 1994 (W-C September 1994). This information is summarized in this section. A review of available state records for selected irrigation wells in the Curry County Basin was undertaken at the New Mexico State Engineer's Office in Santa Fe, New Mexico on August 30, 1994. The review of state well files was followed by a field inspection of two irrigation wells located within the Curry county Basin. Particular attention was given to those wells located southeast, or downgradient, of the landfills in T2N, R35E, Sections 20, 29, 30 and 32.

Results of the review indicated that the registration of irrigation wells in the Curry County Water Basin is probably incomplete and that insufficient information exists within the state water well records to technically support the use of existing irrigation wells for groundwater monitoring purposes. An unknown screen interval would make it difficult to relate analytical results to a specific horizon within the aquifer. It is also possible that analytes of concern (i.e., Light Nonaqueous-Phase Liquids [LNAPLs]) may be missed due to the depth of the screen or the pump location. The inability to determine types of metal used in screens and casings would also compromise metals analysis.

Field inspection of the wells also showed that sample quality from these wells may have been compromised due to heavy petroleum staining around the wells and the fact that cooling water for the gasoline or natural gas powered engines was piped from the well casing and reinjected into the discharge piping. The possibility of oil or fuel vapors migrating through microfractures in the engine into the coolant was also considered. Additionally, the heavy pumping action of the high-capacity pumps could possibly affect volatile compound analysis by promoting volatilization and introduction of air into the sample.

For the above stated reasons it was recommended that irrigation wells were not suitable for use as monitoring points. The installation of a downgradient monitoring well at each SWMU was recommended as the preferred action.

## 3.2 MONITORING WELL DRILLING AND SOIL SAMPLING

The soil borings for monitoring well installation were drilled using a Drill Systems AP-1000 dual-wall, reverse circulation percussion hammer rig. This type of rig is well suited to installation of environmental monitoring wells in loose sediments. The reasons for this are because no water is used during the drilling process and the hole is cased as the drill-bit progresses preventing cross-contamination. The drill rig uses a 9-inch bit and outer diameter pipe through which the monitoring well is installed.

Soil samples were collected at 10-foot intervals by driving a 2.5-inch I.D. by 2-foot-long stainless steel split-spoon sampler through the targeted depth interval. Blow counts were recorded to provide standard penetration test data for each interval sampled. The sampler was retrieved from the boring and opened for sample recovery. Samples were retained for headspace analysis, lithologic logging, and geotechnical index property testing purposes only. Samples for geotechnical analysis were collected from the screened intervals of the monitoring wells. Boring logs for the monitoring wells are located in Appendix A of this Phase II RFI report.

All sampling equipment was decontaminated between sample intervals with a liquinox/water solution wash, potable water rinse and a final double rinse of deionized water sprayed liberally over the equipment. All drilling equipment was steam-cleaned prior to the commencement of drilling activities.

Monitoring well MW-N required abandonment and redrilling twice before a successful well was installed. The first attempted well resulted in a possible collapsed screen or casing which resulted in a pump being stuck in the well. The second attempted well, which was drilled about 10 feet south of the original boring, was damaged when the outer drill pipe was inadvertently grouted in the boring. Attempts to retrieve the pipe resulted in well damage beyond usability. Both of these wells were subsequently abandoned by placing sand inside the well through the screened interval, followed by placing hydrated bentonite pellets above

the sand for several feet, followed by cement/bentonite grout to the surface. After removing the surface completions a concrete pad was placed over the well locations. All well abandonment procedures were approved by the New Mexico Water Quality Control Commission (NMWQCC). The third attempted well, drilled and installed about 50 feet north of the original well boring, was successful. This boring and the second attempted boring were not sampled for lithologic description due to its proximity to the original well boring.

## 3.3 MONITORING WELL COMPLETION AND DEVELOPMENT

After completion of the drilling and sampling, the monitoring wells were constructed through the drill casing. The construction of the monitoring wells generally followed the procedures outlined in sections 5.3.2 through 5.3.4 of the FSP (W-C, 1994). One deviation included the addition of various quantities of Base potable water to the well borings. This was necessary to prevent heaving of saturated fine-grained sands into the drill casing. Approximately 100 gallons of water was required for MW-N, while MW-O required only about 25 gallons. The well casing and screen consisted of 4-inch I.D. schedule 80 PVC. The screen type is 10-slot of 30-foot length. The screen for MW-O is continuous wrap while the screen for MW-N is factory slotted. The screens were placed at a depth so that about 5 feet of screen remained above the water table. All joints are flush-mount, threaded type with O-ring seals. Filter pack consists of #20-40 environmental grade colorado silica sand. The filter pack was placed to a depth of about 7 feet above the top of the screened interval. Bentonite pellets to a thickness of about 3 feet were used for the seal above the filter pack. The pellets were hydrated with about 10 gallons of water. The pellets were allowed to hydrate for several hours before grouting was commenced. Before grouting, the well was checked for straightness by lowering a 10-foot by 3.5-inch pipe down the well to check for binding or blockage. The remaining portion of the boring annulus was grouted with a cement/bentonite grout mixture. The grout was poured to about 5 feet below the ground surface. The well surface completion included a 3 by 3-foot concrete pad with a steel, hinged and lockable riser protective casing. Guard posts were also installed around the well riser. Monitoring well construction logs are included in Appendix A of this Phase II RFI report.

After completion of the monitoring wells and allowing sufficient time for the grout to set, the wells were developed to 1) remove sediment from the screened area and the formation around the well so that water turbidity is decreased and well silting does not occur, 2) to allow free

movement of groundwater through the screened area and provide representative groundwater samples, and 3) to remove any water which was introduced during the well construction. Well development was initiated by surging the screen area with a surge-block followed by using a bailer to remove the coarser-grained sediments. After the initial bailing, the wells were further developed using a 3/4-horsepower submersible pump. Water quality parameters were checked periodically during the well development to assess the effectiveness of the development process. The wells were developed until approximately 5 to 12 well casing volumes were removed. Water quality parameters collected during well development are summarized on Table 3-1. Well development field logs are contained in Appendix A of this Phase II RFI report.

## 3.4 GROUNDWATER SAMPLING

After well installation and development the monitoring wells were sampled. A minimum of two weeks was allowed to elapse between the time of well development and well sampling. The time between development and sampling is required to allow the aquifer surrounding the well to reach a state of equilibrium before sampling takes place. The sampling procedures generally followed those described in section 5.6 of the FSP. Deviations are discussed later in this section. The groundwater samples were analyzed for the following Appendix IX constituents:

- Volatile organic compounds (VOCs), EPA Method 8240
- Semivolatile organic compounds (SVOCs), EPA Method 8270
- Organochlorine pesticides, EPA Method 8080
- Polychlorinated biphenyls (PCBs), EPA Method 8080
- Herbicides, EPA Method 8150
- Total metals, EPA Method 6010

Other testing included:

- Total Petroleum Hydrocarbons (TPH), modified EPA Method 8015 (GRO/TCO).
- Total Recoverable Petroleum Hydrocarbons (TRPH), EPA Method 418.1

Appendix IX dioxins and furans were not included because they were not expected to be contaminants of concern.

A summary of samples collected is shown on Table 3-2. Sample containers, preservatives, and holding times are shown on Table 3-3. The samples were collected by first obtaining a manual water level measurement in the well. From this data, and knowing the well construction details, the length of the water column and consequent well casing volume were calculated. The wells were purged to remove stagnant water and to pull representative formation water into the screened area of the well. Purging was done with a decontaminated submersible pump. Water quality parameters of pH, temperature, specific conductance, and turbidity were collected during the purging to determine whether representative formation water was present in the well for sampling. After aquifer equilibrium had been reached, sampling commenced with the submersible pump. All analytes, except VOCs (including gasoline range organics) and SVOCs, listed above were collected using the submersible pump. The samples were collected in the order given beginning with pesticides and PCBs. After collection of these samples, the pump assembly was removed from the well, and a dedicated, single-check valve, disposable Teflon bailer was used to collect the VOC and SVOC samples. VOCs and SVOCs were sampled last because the pump was required to properly developed the wells, and it was decided that collection of the VOC and SVOC samples from the pump would have compromised the sample integrity.

The samples were immediately placed into iced sample coolers pending shipment to the laboratory for analysis. Sample collection field sheets and chain-of-custody forms were completed for the samples and are located in Appendix A of this Phase II RFI report.

## 3.5 MONITORING WELL SLUG TESTING

After the completion of groundwater sampling in the monitoring wells, the wells were slug tested to assess the hydraulic conductivity of the aquifer surrounding the well screens. Hermit automatic dataloggers and pressure transducers were used to record changes in water levels during the slug testing. The "slug" inserted into the wells during the tests consisted of a 4-foot-long, 3-inch-diameter, solid PVC rod. General procedures used to conduct the tests were described in the FSP (W-C, 1994).

The slug tests were performed by first obtaining a manual water level measurement in the well being tested. The decontaminated pressure transducer was then lowered into the well until the transducer was submerged properly. The datalogger was then calibrated with the transducer submerged. The datalogger was set to a logarithmic recording interval before the falling-head test was started. Upon "instantaneously" submerging the decontaminated slug into the well, the datalogger was started. Water levels were recorded, and periodic manual measurements were taken, until the water level had recovered to 90 percent of its pre-test level. To perform the rising-head test, the falling-head test was stopped, the datalogger was started again, and the slug was "instantaneously" removed from the well. The recording intervals and other procedures used for the falling-head test remained the same for the rising-head test.

Upon completion of the slug tests, the dataloggers were downloaded to a personal computer to assess the quality and completeness of the data. The data were used to develop time-drawdown curves which were further used in straight-line matching techniques. The data were analyzed by the method proposed by Bouwer and Rice (1976). Hydraulic conductivity values (K) were derived from the test data. Output files and drawdown curves are contained in Appendix B.

## 3.6 DECONTAMINATION PROCEDURES

Decontamination procedures generally followed those specified in section 5.8 of the FSP (W-C, 1994). All large equipment, well materials, and large sampling tools were decontaminated by spraying with a hot-water, high pressure cleaner before use. Small sampling utensils were decontaminated by washing with a liquinox/potable water wash, followed by a potable water wash, and finally a double deionized water rinse. Due to the impracticality of hand decontamination of the submersible pump lift pipe segments by hand, they were decontaminated by spraying them at a commercial coin-op car wash facility. All decontamination fluids from potentially contaminated equipment was placed into 55-gallon drums as described in section 3.7.

## 3.7 IDW HANDLING PROCEDURES

Handling of Investigative Derived Waste (IDW) generally followed the procedures described in section 5.9 of the FSP (W-C, 1994). Development and purge water, and decontamination fluids were placed into 55-gallon drums and accumulated at the designated staging area. Soil cuttings were placed into large steel hoppers pending laboratory analysis. Once laboratory analysis had confirmed that the soils contained no hazardous constituents, the soil was removed from the hoppers and spread over the sites.

A diesel leak that resulted from a leaking fuel tank on the drill rig while drilling MW-O resulted in contamination of soils at the site. The fuel contaminated soil was subsequently dug up by hand and placed into barrels. Soils were removed from the spill site until nondetect headspace readings were obtained using an Organic Vapor Analyzer (OVA). About twenty 55-gallon drums of diesel fuel-contaminated soil were collected and placed into the staging area. It is planned to chemically profile the soil in these drums and to properly dispose of the soil at a later date. Clean soil from the hoppers mentioned above was used to backfill the excavation.

## 3.8 SURVEY OF MONITORING WELLS

After the completion of the field activities, the locations of the monitoring wells were accurately surveyed in terms of northing, easting, and elevation relative to the Cannon AFB coordinate system. The top of the PVC riser pipe was surveyed for elevation. All survey work was performed by a surveyor licensed by the state of New Mexico. The data generated during this site survey were used to accurately depict the locations of the monitoring wells in figures found elsewhere within this document. A table containing the actual survey data is provided in Appendix C to this Phase II RFI report.

# TABLE 3-1

## MONITORING WELL DEVELOPMENT FIELD PARAMETERS

| Date | Time | Gallons Pumped | pH | Conductivity (μmhos/cm) | Temp. (of) | Turbidity (NTUs) | Purge Method |
|---|---|---|---|---|---|---|---|
| MW-N | | | | | | | |
| 12-14-94 | 1225 | 0 | 8.39 | 4.73 | 53.4 | 71 | Pump |
| | 1235 | 45 | 8.26 | 6.28 | 62.3 | >100 | |
| | 1310 | 90 | 8.02 | 7.95 | 65.2 | 78 | |
| | 1320 | 120 | 7.85 | 7.75 | 63.1 | 59 | |
| | 1910 | 140 | 8.05 | 7.43 | 52.1 | 19 | |
| | 1935 | 190 | 7.81 | 6.79 | 49.5 | 13 | |
| | 1950 | 250 | 7.34 | 6.79 | 49.7 | 8.8 | |
| | 2015 | 350 | 7.01 | 6.79 | 48.3 | 3.3 | |
| | 2030 | 400 | 6.97 | 6.78 | 48.5 | 3.2 | |
| | 2055 | 500 | 6.93 | 6.83 | 48.3 | 3.3 | |
| MW-O | | | | | | | |
| 11-2-94 | 0755 | 1 | 7.40 | 16.12 | 61.6 | >100 | Pump |
| 11-3-94 | 1030 | 12 | 7.40 | 18.14 | 68.0 | >100 | |
| | 1356 | 25 | 7.55 | 18.97 | 67.7 | >100 | |
| | 1405 | 50 | 7.30 | 17.99 | 64.7 | 30 | |
| | 1410 | 75 | 7.28 | 17.94 | 63.7 | 23 | |
| | 1418 | 100 | 7.23 | 17.89 | 61.9 | 27 | |
| | 1427 | 125 | 7.23 | 17.70 | 62.2 | 23 | |
| | 1433 | 150 | 7.29 | 17.90 | 61.7 | 20 | |
| | 1439 | 175 | 7.33 | 17.80 | 62.0 | 15 | |
| | 1445 | 200 | 7.31 | 17.85 | 62.0 | 8 | |

NTUs = Nephelometric turbidity units

# TABLE 3-2

## SUMMARY OF ANALYTICAL AND QA/QC SAMPLING
## LANDFILLS 3 AND 4 (SWMU NOs. 105 AND 104)
## CANNON AFB, NEW MEXICO

| Sample Location | Sample Identification Number | QA/QC Type | Sample Matrix | Analytical Parameters | | | | | | Sample Containers | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | VOCs | SVOCs | Pesticides/ PCBs | Chlorinated Herbicides | TAL Metals | TPH | 40 ml | 1 L amber | 1 L poly |
| WELL N | CAN104-MW0N-01 | | Water | X | X | X | X | X | X | 3 | 6 | 1 |
| | CAN104-MW0N-02 | FD | Water | X | X | X | X | X | X | 3 | 6 | 1 |
| WELL O | CAN105-MW0O-01 | | Water | X | X | X | X | X | X | 3 | 6 | 1 |
| | CAN105-MW0O-03 | MRD | Water | X | X | X | X | X | X | 3 | 6 | 1 |

FD = Field duplicate
MRD = COE split

# TABLE 3-3

## GROUNDWATER SAMPLING SPECIFICATIONS
## LANDFILLS 3 AND 4 (SWMUs 105 AND 104)
## CANNON AFB, NEW MEXICO

| EPA Method | Parameter | Type of Container[1] | No. of Field Samples | No. of QC Field Replicates | Total W-C Samples | No. of QA Splits | Total No. of Samples Collected | Minimum Sample Size | Preservation | Holding Time |
|---|---|---|---|---|---|---|---|---|---|---|
| 8240 | Volatile organic compounds[2] | 3 - 40 ml glass VOA vials | 2 | 1 | 3 | 1 | 4 | 40 ml | 4°C<br>HCl to pH<2 | 14 days |
| 8270 | Semivolatile organic compounds | 1 - 1 L amber glass bottle | 2 | 1 | 3 | 1 | 4 | 1 L | 4°C | Extract - 7 days<br>Analyze - 40 days |
| 6010 | Total metals | 1 - 1 L plastic bottle | 2 | 1 | 3 | 1 | 4 | 100 ml | 4°C<br>$HNO_3$ to pH<2 | 6 months<br>Hg - 28 days |
| 8080 | Pesticides/PCBs | 1 - 1 L amber glass bottle | 2 | 1 | 3 | 1 | 4 | 1 L | 4°C | Extract - 7 days<br>Analyze - 40 days |
| 8150 | Herbicides | 1 - 1 L amber glass bottle | 2 | 1 | 3 | 1 | 4 | 1 L | 4°C | Extract - 7 days<br>Analyze - 40 days |
| 418.1 | Petroleum hydrocarbons | 1 - 1 L glass bottle | 2 | 1 | 3 | 1 | 4 | 1 L | 4°C<br>$H_2SO_4$ to pH<2 | 28 days |
| 8015 | Modified TCO | 1 - 1 L amber glass bottle | 2 | 1 | 3 | 1 | 4 | 40 ml | 4°C | 28 days |
| 8015 | Modified GRO | 3 - 40 ml glass VOA vials | 2 | 1 | 3 | 1 | 4 | 1 L | 4°C<br>HCl to pH<2 | 14 days |

[1] All containers have Teflon-lined lids except VOA vials, which have Teflon-lined septa.
[2] A trip blank accompanied each shipment with samples for VOC analysis.

## 4.1 SITE BACKGROUND

### 4.1.1 Site Description

Landfill No. 3 at Cannon AFB is located in the east-central portion of the base (Figure 1-2). It is a rectangular area, approximately 1,960 feet by 300 feet (13.5 acres). The site is bounded on the north by the road leading to the transmitter tower, on the south and east by barbed wire fences and agricultural fields, and on the west by Perimeter Road. At the present time, it appears to be an open field covered with native vegetation. The topography at the site is gently sloped toward the north and the playa lake. Remnant depressions observed at the surface are probably the locations of former disposal trenches in which settlement has occurred.

### 4.1.2 Site History

Landfill No. 3 was active between 1959 and 1967. Domestic solid wastes, waste oils, solvents, paints, paint thinners and strippers, pesticide containers, and various empty cans and drums were burned in trenches and buried the following day. As trenches filled, new trenches were excavated in adjacent areas and subsequently filled.

### 4.1.3 Previous Investigations

Nine borings were drilled and sampled at Landfill No. 3 in 1985. Three samples were collected from each borehole -- one at 0 to 4 feet bgs, one at 7 to 11.5 feet, and one at 55.5 to 59.5 feet. The samples were analyzed for halogenated volatile organics, aromatic volatile organics, metals, and oil and grease.

Twelve additional borings were drilled and sampled in 1992. Six to twelve samples were generated at depth intervals ranging from 20 to 61 feet for each boring. Three surface soil samples were also collected. The resulting 144 samples were analyzed for organochlorine

pesticides, polychlorinated biphenyls (PCBs), volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), total recoverable petroleum hydrocarbons (TRPH), and total analyte list (TAL) metals. Forty-one of the samples were also analyzed for total extractable hydrocarbons (diesel, jet fuel, kerosene), total purgeable hydrocarbons (gasoline and its components), and chlorinated herbicides.

The results of analyses for metals from 1985 and 1992 were compared with Upper Tolerance Limits (UTLs) calculated from background concentrations from samples collected in areas adjacent to Landfill No. 2 (W-C 1992). Approximately 30 percent of the Landfill No. 3 samples exceeded the UTL for barium. Aluminum, beryllium, calcium, chromium, cobalt, copper, iron, magnesium, nickel, potassium, selenium, vanadium, and zinc concentrations also exceeded the UTLs in one to eleven of the field samples.

None of the target compounds for halogenated and aromatic volatile organics were detected in the 1985 samples, which had reporting limits of 1 $\mu$g/kg for all target compounds. Several organochlorine pesticides and PCBs were detected in one or more of the samples collected in 1992. Detected compounds included 4,4-DDD, 4,4-DDE, 4,4-DDT, aldrin, dieldrin, endrin, endrin aldehyde, heptachlor epoxide, methoxychlor, beta-BHC, delta-BHC, gamma-BHC, PCB-1254, and PCB-1260.

Diesel, TRPH, acetone, methylene chloride, toluene, xylenes, and bis(2-ethylhexyl)phthalate were detected in one or more of the 1992 samples. The following tentatively-identified compounds (TICs) were detected: acetonitrile, ethyl acetate, tetrahydrofuran, cyclohexanone, and trichloropropene(s). The acetone, diesel, and TRPH detected in the 1992 samples were assumed to be laboratory contaminants due to their presence in a majority of the field and equipment blanks.

Toluene, methylene chloride, xylenes, and bis(2-ethylhexyl)phthalate were detected in part per billion (ppb) concentrations in 15 percent or less of the 1992 samples.

## 4.2 FIELD INVESTIGATION AND DATA COLLECTION

The field investigation and data collection activities at Landfill 3 were as described in section 3.0 of this Phase II RFI report and are summarized as follows:

- One monitoring well (MW-O) was installed and developed downgradient of the landfill (Figure 4-1).
- Geotechnical index parameter samples were collected from the screened interval of the monitoring well.
- A groundwater sample was collected from the completed and developed monitoring well. The sample was analyzed for VOCs, SVOCs, pesticides/PCBs, herbicides, metals, TPH, and TRPH.
- The monitoring well was slug tested to estimate the hydraulic conductivity of the aquifer surrounding the well.
- The well was surveyed for horizontal and vertical control.

A description of these activities follows.

### 4.2.1 Monitoring Well Installation and Soil Sampling

As discussed in section 3.2 and 3.3, one monitoring well (MW-O) was installed and developed downgradient of Landfill 3 (Figure 4-1). The total depth of the boring was 304.3 feet. The screened interval was placed from 273.9 feet to 303.9 feet below ground surface. The depth to water at the time of well construction was approximately 278 feet to 280 feet below ground surface. The specific well construction details are described in section 3.3 and are shown on the monitoring well construction diagram in Appendix A of this report.

Soil samples for geotechnical index property analysis were collected within the screened interval of the well boring at depths of 280, 290 and 300 feet. The results of the geotechnical

analysis are presented in Appendix A of this Phase II RFI report. No samples for chemical analysis were collected from the monitoring well borings.

The soils encountered in the boring were field screened for headspace information during drilling. No headspace readings over 0.3 ppm were observed. It is likely that the low readings are a result of soil moisture and not an indication of VOC contamination in the soils.

### 4.2.2 Geologic Summary of Boring Log

The boring log for MW-O indicates that the formation at this location consists mainly of reddish-yellow silty sand (USCS symbol SM). This silty sand is typically described as very fine to fine-grained, poorly graded, with subangular to rounded grains of quartz and occasional inclusions of various amounts of gravel. Occasional lenses and layers of sand (USCS symbol SP), clay (USCS symbol CL), and silt (USCS symbol ML) were encountered at various depth intervals throughout the boring. These materials also formed various admixtures with the silty sand in certain discrete zones. Calcium carbonate nodules and caliche cemented zones were common throughout the entire depth of the boring.

### 4.2.3 Groundwater Sampling

As described in section 3.4, monitoring well MW-O was sampled after installation and development. The sample was collected using the procedures described in Section 3.4 and in the FSP (W-C 1994). The sample was analyzed for the parameters listed in Section 4.2 and shown on Table 3-2.

### 4.2.4 Slug Testing

The monitoring well was slug tested as described in Section 3.5. The hydraulic conductivity (K) of the formation was estimated by using the curve matching techniques of Bouwer and Rice (1976). Data from the slug test is contained in Appendix B of this Phase II RFI report. The hydraulic conductivities estimated from the three slug tests on the well were all on the order of $3 \times 10^{-3}$ cm/sec.

## 4.3 CHEMICAL INVESTIGATION RESULTS

A summary of analytical results is shown in Table 4-1. The only VOCs detected were carbon tetrachloride and toluene in concentrations of 1.6 μg/L and 6.8 μg/L, respectively. The only SVOC reported was bis(2-ethylhexyl)phthalate at an estimated concentration of 2 μg/L. However, this compound is a common laboratory artifact and is probably not indicative of true sample contamination. No other organic compounds were reported for the sample. Metals with reported concentrations included arsenic (0.022 mg/L), barium (0.064 mg/L), selenium (0.0025 mg/L), and vanadium (0.018 mg/L).

Gasoline range organics were also reported in the sample at a concentration of 16 μg/L (Table 4-1).

## 4.4 SWMU-SPECIFIC DATA ASSESSMENT

An assessment of the Landfill 3 (SWMU 105) data was done to identify quality issues that could potentially affect the use of the data for the decision making process.

### 4.4.1 Sampling Issues

A review of the data contained in the Daily Quality Control Reports (DQCRs) indicates that there were no sampling issues that would significantly impact data usability.

### 4.4.2 Data Validation Issues

For the laboratory chemical data, quality assurance/quality control (QA/QC) criteria for the evaluation of the groundwater samples were specified in the Quality Assurance Project Plan Addendum (W-C October 1994). The criteria were used as indicators of the quality necessary to support the identification and quantitation of the analytes. The data was validated using the criteria and guidance from the National Functional Guidelines for Organic Data Review (EPA 1994) and the Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses (EPA 1994).

The QA/QC parameters were within the evaluation criteria, except the matrix spike recovery for the gasoline range organics. The matrix spike and matrix spike duplicate were nonclient samples; therefore, no qualifications were judged to be necessary based on outlying accuracy or precision parameters.

### 4.4.3 Reporting Limits

Reporting limits for lead and thallium were elevated for sample CAN105-MW0O-01. A 10 x dilution was required for the thallium analysis due to matrix interferences. Reporting limits were raised 2 x QAPP limits for the lead due to matrix interference though dilutions were not required. Lead was qualified as estimated nondetect **UJ** based on matrix interference.

### 4.4.4 Summary of Data Usability

Overall, groundwater data generated for SWMU 105 were determined to meet quality criteria. In conjunction with the analytical data validation, other information, including field observations, data were judged to be acceptable.

## 4.5 SUMMARY

One monitoring well, MW-0 (Figure 4-1), was drilled, installed, developed and sampled. One groundwater sample CAN105-MW0O-01, was collected from the monitoring well and analyzed for VOCs, SVOCs, pesticides, and PCBs, herbicides, metals, and TPH. Relatively low concentrations of carbon tetrachloride and toluene were reported in the sample (Table 4-1). The SVOC compound bis(2-ethylhexyl)phthalate was also reported at a low concentration. Metals that were detected included arsenic, barium, selenium, and vanadium. Gasoline range organics were reported at a concentration of 16 $\mu$g/L.

# TABLE 4-1

## SUMMARY OF COMPOUNDS DETECTED IN GROUNDWATER SAMPLES COLLECTED AT SWMU 105 CANNON AFB LANDFILL 3

| LOCATOR | CAN105-MW00-01 | | |
|---|---|---|---|
| LAB SAMPLE NUMBER | 0401990001SA | | |
| COLLECT DATE | 01/16/95 | | |
| | Result | RL | Qual |
| **Volatile Organics (µg/L)** | | | |
| Carbon tetrachloride | 1.6 | 5 | J |
| Toluene | 6.8 | 5 | |
| **Semivolatile Organics (µg/L)** | | | |
| bis(2-Ethylhexyl)phthalate | 2 | 10 | J |
| **Metals (mg/L)** | | | |
| Arsenic | 0.002 | 0.005 | J |
| Barium | 0.064 | 0.01 | |
| Selenium | 0.003 | 0.005 | J |
| Vanadium | 0.018 | 0.01 | |
| **TPH (µg/L)** | | | |
| Gasoline-Range Organics | 16 | 10 | |

Results presented here are only those chemicals which were detected at least once at this SWMU and have passed data re

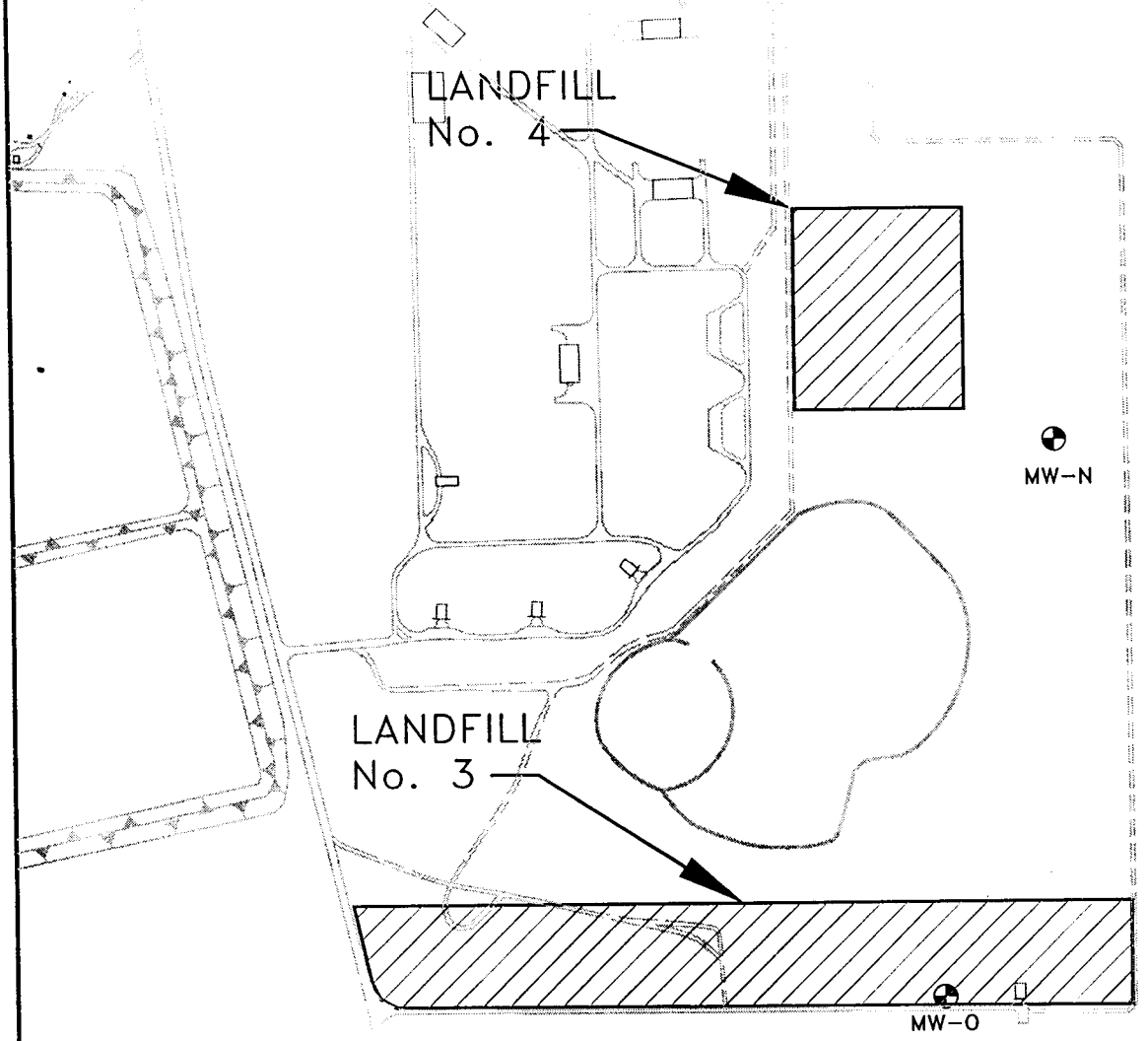
J = Estimated value.

R = Rejected value.

U = Nondetected value.

D = Sample was diluted for analysis.

RL = Reporting Limit.




LEGEND

NEW MONITORING WELL

N

500 0 500

SCALE IN FEET

| | | | | | |
|---|---|---|---|---|---|
| DRN BY SCR | DATE 03/13/95 | NEW MONITORING WELL LOCATIONS<br>CANNON AIR FORCE BASE NEW MEXICO | PROJECT No. | FIG. No. |
| CHK'D BY | REVISIONS: 0 | | C3M11QQ | 4-1 |

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C311QQ01.DWG

## 5.1 SITE BACKGROUND

### 5.1.1 Site Description

Landfill No. 4 at Cannon AFB is located in the east-central portion of the base (Figure 1-2). It is a rectangular area, approximately 573 feet by 479 feet (6.3 acres). The site is bounded on the north by an unused portion of Perimeter Road, on the west by a barbed wire fence, on the east by a vacant field, and on the south by the playa lake. At the present time, it appears to be an open field covered with native vegetation. The topography at the site is gently sloped toward the south and the playa lake. Remnant depressions observed at the surface are probably the locations of former disposal trenches in which settlement has occurred.

### 5.1.2 Site History

Landfill No. 4 was active in 1967 and 1968. Domestic solid wastes, waste oils, solvents, paints, paint thinners and strippers, pesticide containers, and various empty cans and drums were burned in trenches and buried each following day. As trenches filled, new trenches were excavated in adjacent areas and subsequently filled.

### 5.1.3 Previous Investigations

Seven borings were drilled and sampled at Landfill No. 4 in 1985. Three soil samples were collected from each borehole, generally with one at 1 to 4.5 feet bgs, one at 7 to 11 feet, and one deeper than 52.5 feet. One boring was not sampled at the deepest sample interval, and one boring was sampled at 1.5 to 3 feet, 15 to 17 feet, 27.5 to 28.5 feet, and 47.5 to 49 feet. The soil samples were analyzed for halogenated volatile organics, aromatic volatile organics, metals, and oil and grease.

Ten additional borings were drilled and sampled in 1992. Ten to twelve soil samples were collected at depth intervals ranging from 15 to 62 feet for each boring. Six surface soil samples were also collected. The resulting 130 soil samples were analyzed for organochlorine pesticides, PCBs, VOCs, SVOCs, TRPH, and TAL metals. Forty-nine of the samples were also analyzed for total extractable hydrocarbons (diesel, jet fuel, kerosene), total purgeable hydrocarbons (gasoline and its components), and chlorinated herbicides.

The results of analyses for metals from 1985 and 1992 were compared with UTLs calculated from background concentrations from samples collected in areas adjacent to Landfill No. 2 (W-C 1992). Approximately 50 percent of the soil samples exceeded the UTLs for zinc. At least 20 percent of the samples exceeded UTLs for barium and cobalt. UTLs were also exceeded for aluminum, beryllium, cadmium, chromium, copper, iron, mercury, potassium, selenium, and vanadium in more than 10 percent of the samples.

None of the target compounds for halogenated and aromatic volatile organics were detected in the 1985 soil samples, which had reporting limits of 1 µg/kg for all target compounds. Several organochlorine pesticides and PCBs were detected in one or more of the soil samples collected in 1992, including 4,4-DDD, 4,4-DDE, 4,4-DDT, aldrin, endosulfan II, endrin, heptachlor epoxide, beta-BHC, delta-BHC, gamma-BHC, and PCB-1260.

Diesel, TRPH, 2,4,5-TP, dichloroprop, MCCP, acetone, methylene chloride, toluene, and xylenes were detected in one or more of the 1992 soil samples. The following TICs were detected: ethyl acetate, 2-ethyl-1-hexanol, 2-propanol, decanal, methyl acetate, nonanal, bromocyclodexane, cyclohexanone, 1,2-cyclohexanediol, trichloropropene(s), alpha-pinene, DDD, and hydroxymethyl pentanone. The acetone, diesel, and TRPH detected in the 1992 samples were assumed to be laboratory contaminants due to their presence in a majority of the field and equipment blanks.

## 5.2 FIELD INVESTIGATION AND DATA COLLECTION

The field investigation and data collection activities at SWMU No. 104 were as described in section 3.0 of this Phase II RFI report and are summarized as follows:

- One monitoring well (MW-N) was installed and developed downgradient of Landfill 4 (Figure 5-1).

- Geotechnical index parameter samples were collected from the screened interval of the monitoring well.

- A groundwater sample was collected from the completed and developed monitoring well. The sample was analyzed for VOCs, SVOCs, pesticides/PCBs, herbicides, metals, TPH, and TRPH.

- The monitoring well was slug tested to estimate the hydraulic conductivity of the aquifer surrounding the well.

- The well was surveyed for horizontal and vertical control.

A description of these activities follows.

### 5.2.1 Monitoring Well Installation and Soil Sampling

As discussed in section 3.2 and 3.3, one monitoring well (MW-N) was installed and developed downgradient of Landfill 4 (Figure 4-1) after two initial attempts at drilling and well installation were unsuccessful. The total depth of the boring was 299 feet. The screen was installed at the depth interval of 268 feet to 297.5 feet below ground surface. The depth to groundwater at the time of well construction was about 272.76 feet below ground surface. The specific well construction details are described in section 3.3 and are shown on the monitoring well construction diagram in Appendix A of this Phase II RFI report.

Soil samples for geotechnical index property analysis were collected within the screened interval of the well boring at depths of 270, 280 and 290 feet. The results of the geotechnical analysis are presented in Appendix A of this Phase II RFI report. No samples for chemical analysis were collected from the monitoring well borings.

The soils encountered in the boring were field screened for headspace information during drilling. No headspace readings over 1.7 ppm were observed. It is likely that the low readings are a result of soil moisture and not an indication of VOC contamination in the soils.

### 5.2.2 Geologic Summary of Boring Log

The boring log for MW-N indicates that the formation at this location consists mainly of reddish-yellow, reddish-brown and brown silty sand (USCS symbol SM) and sand (USCS symbol SP). This silty sand is typically described as soft to hard, very fine to fine-grained, poorly graded, with subangular to rounded grains of quartz and occasional inclusions of various amounts of gravel. Occasional lenses and layers of clay (USCS symbol CL), silt (USCS symbol ML), and gravel (USCS symbol GM) were encountered at various depth intervals throughout the boring. These materials also formed various admixtures with the silty sand and sand in certain discrete zones. The interval between 200 and 240 feet contained a large amount of gravel and gravel/sand mixtures. Calcium carbonate nodules and caliche cemented zones were common throughout the entire depth of the boring.

### 5.2.3 Groundwater Sampling

As described in section 3.4, monitoring well MW-N was sampled after installation and development. The sample was collected using the procedures described in Section 3.4 and in the FSP (W-C, 1994). The sample was analyzed for the parameters listed in Section 5.2 and shown on Table 3-2.

### 5.2.4 Slug Testing

The monitoring well was slug tested as described in Section 3.5. The hydraulic conductivity (K) of the formation was estimated by using the curve matching techniques of Bouwer and Rice (1976). Data from the slug test is contained in Appendix B of this Phase II RFI report. The hydraulic conductivities estimated from the three slug tests on this well were all on the order of $3 \times 10^{-3}$ cm/sec.

## 5.3 CHEMICAL INVESTIGATION RESULTS

A summary of the analytical results is shown on Table 5-1. Other than acetone and methylene chloride, which are probable laboratory contaminants, the only VOC reported was toluene at a concentration of 5.7 μg/L. The duplicate sample showed a toluene concentration of 6.4 μg/L. SVOCs reported include acetophenone at 2.7 μg/L (2.9 μg/L duplicate) and bis(2-ethylhexyl)phthalate at 51 μg/L (59 μg/L duplicate). Bis(2-ethylhexyl)phthalate is common laboratory contaminant and is probably not indicative of sample contamination. No other organic compounds were reported for the sample or the duplicate.

Metals with reported concentrations included arsenic (0.0033 μg/L), barium (0.047 μg/L), copper (0.0059 μg/L), selenium (0.0068 μg/L), tin (0.32 μg/L), vanadium (0.019 μg/L), and zinc (0.013 μg/L).

Gasoline range organics were also detected in the sample and duplicate sample at estimated concentrations of 17 μg/L and 14 μg/L, respectively.

## 5.4 SWMU-SPECIFIC DATA ASSESSMENT

An assessment of the Landfill 4 (SWMU 104) data was done to identify quality issues that could potentially affect the use of the data for the decision making process.

### 5.4.1 Sampling Issues

A review of the data contained in the DQCRs indicates that there were no sampling issues that would impact significantly data usability.

### 5.4.2 Data Validation Issues

For the laboratory chemical data, QA/QC criteria for the evaluation of the groundwater samples were specified in the Quality Assurance Project Plan Addendum (W-C October 1994). The criteria were used as indicators of the quality necessary to support the identification and quantitation of the analytes. The data was validated using the criteria and guidance from the National Functional Guidelines for Organic Data Review (EPA 1994) and

the Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses (EPA 1994).

The QA/QC parameters were within the evaluation criteria, except the matrix spike recovery for the gasoline range organics and the post-digestion spike for selenium. The matrix spike and matrix spike duplicate were nonclient samples; therefore, no qualifications were judged to be necessary for the gasoline range organic data. Selenium was qualified as estimated for sample CAN105-MW0O-01 based on the outlying post-digestion spike recovery.

### 5.4.3 Reporting Limits

Reporting limits for selenium, lead, arsenic, and thallium were elevated for sample CAN104-MW0N-01. A 2 x dilution was required for the selenium analysis due to matrix interferences. Reporting limits were raised 2 x QAPP limits for the lead, arsenic, and thallium due to matrix interference though dilutions were not required. Lead and thallium data were qualified as estimated nondetect **UJ** based on matrix interference. Arsenic did not require qualification because the post digestion spike recovery was with evaluation criteria.

### 5.4.4 Summary of Data Usability

Overall, groundwater data generated for SWMU 104 were determined to meet quality criteria. In conjunction with the analytical data validation, other information, including field observations, data were judged to be acceptable.

## 5.5 SUMMARY

One monitoring well, MW-N (Figure 4-1), was drilled, installed, developed, and sampled. One groundwater sample, CAN104-MWON-01, and a duplicate sample CAN104-MWON-02, were collected from the monitoring well and analyzed for VOCs, SVOCs, pesticides and PCBs, herbicides, metals, and TPH. Relatively low concentrations of acetone, methylene chloride and toluene were reported in the sample and the duplicate (Table 5-1). The SVOC compounds acetophenone and bis(2-ethylhexyl)phthalate were also reported in low concentrations in both the sample and duplicate. Metals that were detected include arsenic,

barium, copper, selenium, tin, vanadium, and zinc. Gasoline range organics were also detected at estimated concentrations of 17 $\mu$g/L (sample) and 14 $\mu$g/L (duplicate).

# TABLE 5-1

## SUMMARY OF COMPOUNDS DETECTED IN GROUNDWATER SAMPLES COLLECTED AT SWMU 104 CANNON AFB LANDFILL 4

| LOCATOR | CAN104-MW0N-01 | | | CAN104-MW0N-02 | | |
|---|---|---|---|---|---|---|
| LAB SAMPLE NUMBER | 0401810001SA | | | 0401810002SA | | |
| COLLECT DATE | 01/15/95 | | | 01/15/95 | | |
| | Result | RL | Qual | Result | RL | Qual |
| **Volatile Organics (µg/L)** | | | | | | |
| Acetone | 25 | 10 | | 22 | 10 | |
| Methylene chloride | 2.1 | 5 | J | 1.7 | 5 | J |
| Toluene | 5.7 | 5 | | 6.4 | 5 | |
| **Semivolatile Organics (µg/L)** | | | | | | |
| Acetophenone | 2.7 | 10 | J | 2.9 | 10 | J |
| bis(2-Ethylhexyl)phthalate | 51 | 10 | | 59 | 10 | |
| **Metals (mg/L)** | | | | | | |
| Arsenic | 0.003 | 0.01 | J | 0.003 | 0.01 | J |
| Barium | 0.047 | 0.01 | | 0.049 | 0.01 | |
| Copper | 0.006 | 0.02 | J | 0.006 | 0.02 | J |
| Selenium | 0.007 | 0.01 | J | 0.005 | 0.01 | J |
| Tin | 0.32 | 0.1 | | < | 0.1 | U |
| Vanadium | 0.019 | 0.01 | | 0.021 | 0.01 | |
| Zinc | 0.013 | 0.02 | J | 0.015 | 0.02 | J |
| **TPH (µg/L)** | | | | | | |
| Gasoline Range Organics | 17 | 10 | J | 14 | 10 | J |

Results presented here are only those chemicals which were detected at least once at this SWMU and have passed data review.

J = Estimated value.
R = Rejected value.
U = Nondetected value.
D = Sample was diluted for analysis.
RL = Reporting Limit.

# 6.0
# SUMMARY AND RECOMMENDATIONS

## 6.1 SUMMARY

The monitoring wells (MW-N and MW-O) were installed at the respective landfills (LF4 and LF3, SWMUs 104 and 105) to assess whether chemicals of concern had impacted site groundwater under the landfills. The monitoring wells were installed and sampled using the procedures described in Sections 4.0 and 5.0. Low levels of contaminants were detected; however, single data points can not confirm they are site related.

## 6.2 RECOMMENDATIONS

Table 6-1 compares the compounds detected in groundwater samples collected from downgradient wells installed during this field effort to MCLs (maximum contaminant levels). Typical laboratory contaminants acetone, methylene chloride and bis(2-ethylhexyl)phthalate were detected. Only bis(2-ethylhexyl)phthalate exceeded the MCL, but may be a laboratory contaminant and not site related. Carbon tetrachloride and toluene were detected, but were below MCLs. Arsenic, barium, copper, and selenium were also detected, but below MCLs.

TPH, as gasoline range organics, was detected at very low levels. However, the compounds of concern that are typical of gasoline range organics (i.e., benzene, toluene, ethylbenzene, xylenes, etc.) were analyzed for as part of the VOC and SVOC list of compounds.

Based on the above, one additional round of sampling is recommended. If future sampling indicates that MCLs are exceeded and the compounds are not probable laboratory contaminants then further evaluation of the site may be warranted.

# TABLE 6-1

## COMPARISON OF COMPOUNDS DETECTED IN GROUNDWATER SAMPLES TO MCLs SWMUS 104 AND 105, CANNON AFB

| | Landfill 4 SWMU 104 | | | Landfill 4 SWMU 104 | | | Landfill 3 SWMU 105 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| LOCATION | **CAN104-MW0N-01** | | | **CAN104-MW0N-02** | | | **CAN105-MW00-01** | | | | |
| LAB SAMPLE NUMBER | 0401810001SA | | | 0401810002SA | | | 0401990001SA | | | MCLs | Are MCLS |
| COLLECT DATE | 01/15/95 | | | 01/15/95 | | | 01/16/95 | | | (µg/L) | Exceeded |
| | Result | RL | Qua | Result | RL | Qual | Result | RL | Qual | | |
| **Volatile Organics (µg/L)** | | | | | | | | | | | |
| Acetone | 25 | 10 | | 22 | 10 | | < | 10 | U | NA | NA |
| Carbon tetrachloride | < | 5 | U | < | 5 | U | 1.6 | 5 | J | 5 | NO |
| Methylene chloride | 2.1 | 5 | J | 1.7 | 5 | J | < | 5 | U | 5 | NO |
| Toluene | 5.7 | 5 | | 6.4 | 5 | | 6.8 | 5 | | 1000 | NO |
| **Semivolatile Organics (µg/L)** | | | | | | | | | | | |
| Acetophenone | 2.7 | 10 | J | 2.9 | 10 | J | < | 10 | U | NA | NO |
| bis(2-Ethylhexyl)phthalate | 51 | 10 | | 59 | 10 | | 2 | 10 | J | 6 | **YES** |
| **Metals (mg/L)** | | | | | | | | | | | |
| Arsenic | 0.0033 | 0.01 | J | 0.0034 | 0.01 | J | 0.0022 | 0.005 | J | 50 | NO |
| Barium | 0.047 | 0.01 | | 0.049 | 0.01 | | 0.064 | 0.01 | | 2000 | NO |
| Copper | 0.0059 | 0.02 | J | 0.0056 | 0.02 | J | < | 0.02 | U | 1300 | NO |
| Selenium | 0.0068 | 0.01 | J | 0.0054 | 0.01 | J | 0.0025 | 0.005 | J | 50 | NO |
| Tin | 0.32 | 0.1 | | < | 0.1 | U | < | 0.1 | U | NA | NA |
| Vanadium | 0.019 | 0.01 | | 0.021 | 0.01 | | 0.018 | 0.01 | | NA | NA |
| Zinc | 0.013 | 0.02 | J | 0.015 | 0.02 | J | < | 0.02 | U | NA | NA |
| **TPH (µg/L)** | | | | | | | | | | | |
| Gasoline Range Organics | 17 | 10 | J | 14 | 10 | J | 16 | 10 | | NA | NA |

Results presented here are only those chemicals which were detected at least once at this SWMU and have passed

J = Estimated value.
R = Rejected value.
U = Nondetected value.
A=Action Level
D = Sample was diluted for analysis.
RL = Reporting Limit.
NA = Not Applicable

# 7.0
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# APPENDIX A
# FIELD DATA

# APPENDIX A
# FIELD DATA

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A.1 BORING LOGS

A.2 GEOTECHNICAL RESULTS

A.3 WELL CONSTRUCTION LOGS

A.4 WELL DEVELOPMENT LOGS

A.5 SAMPLE COLLECTION FIELD SHEETS

A.6 CHAIN-OF-CUSTODIES

# APPENDIX A.1
# BORING LOGS

# HTW DRILLING LOG

HOLE NO. MW-N

| | |
|---|---|
| 1. COMPANY NAME: Woodward-Clyde Federal Services | 2. DRILLING SUBCONTRACTOR: Layne Environmental |
| SHEET 1 OF 32 SHEETS | |
| 3. PROJECT: Cannon AFB LF-3 & 4 RFI Ph II | 4. LOCATION: Cannon AFB, Clovis, NM |
| 5. NAME OF DRILLER: Benny Bludworth | 6. MANUFACTURER'S DESIGNATION OF DRILL: AP-1000 Percussion Air Hammer, Rev. Circ. |
| 7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 9" Dual Wall Pipe - 10' Sec.; 9 3/4" x 1.5' Open Face Bit.; 2" ID Split Spoon (Calif. tube) | 8. HOLE LOCATION: Appx 600' SE of LF-4 (MSA, LF-4) |
| | 9. SURFACE ELEVATION: 4267.59 |
| | 10. DATE STARTED: 10/21/94 — 11. DATE COMPLETED: 12/14/94 * |
| 12. OVERBURDEN THICKNESS: N/A | 15. DEPTH GROUNDWATER ENCOUNTERED: ≈ 273' BGS |
| 13. DEPTH DRILLED INTO ROCK: N/A | 16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: 271.9' BGS 2 hrs |
| 14. TOTAL DEPTH OF HOLE: 299.8 | 17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY) |

| 18. GEOTECHNICAL SAMPLES | DISTURBED | UNDISTURBED | 19. TOTAL NUMBER OF CORE BOXES |
|---|---|---|---|
| | 3 | | NA |

| 20. SAMPLES FOR CHEMICAL ANALYSIS | VOC | METALS | OTHER (SPECIFY) | OTHER (SPECIFY) | OTHER (SPECIFY) | 21. TOTAL CORE RECOVERY |
|---|---|---|---|---|---|---|
| None | | | | | | % |

| 22. DISPOSITION OF HOLE | BACKFILLED | MONITORING WELL | OTHER (SPECIFY) | 23. SIGNATURE OF INSPECTOR |
|---|---|---|---|---|
| | | MW-N | | |

| ELEV. a. | DEPTH b. | DESCRIPTION OF MATERIALS c. | FIELD SCREENING RESULTS d. | GEOTECH SAMPLE OR CORE BOX NO. e. | ANALYTICAL SAMPLE NO. f. | BLOW COUNTS g. | REMARKS h. |
|---|---|---|---|---|---|---|---|
| | 0 | Cuttings: | Calib. PID to Benzene R.F. (57ppm) w/ 100 ppm isobutylene | | | | Alluvium |
| | 1 | 0-5: Silty Sand (SM), fine to v. fine, poorly graded sand and silt. Strong brown (7.5 YR 4/4) Subangular to rounded grains of qtz. Very hard and dense based on drill action. | B.G = 0.0 | | | | Log is from orig. attempt at drilling/ installing MW-N. Final site of MW-N Located Appx 50' N25W from the site reflected in this log. Consistency btwn MW-N & MW-O Stratigraphy indicates little change in lithol. will occur over this distance. |
| | 2 | Dry. | LEL Calib to Ambient air LEL = 0%, $H_2S$ = 0% | | | | |
| | 3 | | | | | | Start Shift 10/21/94 @ 11:00 (Rig just returned from Shop in Amarillo). |
| | 4 | | | | | | |
| | 5 | | | | | | |

# HTW DRILLING LOG

HOLE NO. MW-N

PROJECT: CAFB LF-3/4 RFI Ph II

INSPECTOR: Roxie G. Rady

SHEET 2 OF 32 SHEETS

| ELEV. a. | DEPTH b. | DESCRIPTION OF MATERIALS c. | FIELD SCREENING RESULTS d. | GEOTECH SAMPLE OR CORE BOX NO e. | ANALYTICAL SAMPLE NO. f. | BLOW COUNTS g. | REMARKS h. |
|---|---|---|---|---|---|---|---|
| | 5 | Cuttings: 5-9' | | | | | Alluvium |
| | | Caliche - Fine sand as above with heavy matrix of pink (5YR 8/3) caliche. Dry. | | | | | |
| | 6 | | | | | | |
| | 7 | | | | | | |
| | 8 | | | | | | |
| | 9 | Core | B.H. = 0.0 | | | 20 | Sampled @ 1130 |
| | | 9-9.8: Silty sand (SM) with abnt $CaCO_3$ in matrix. Very fine sand and silt, Yellowish red (5YR 5/6) Dry. | H.S. = 1.4 | | | 41 | Rec = .8'/2.0' |
| | 10 | $CaCO_3$ occurs as both disseminated blebs and pervasive in matrix | | | | 41 | N = 82 |
| | | | | | | 25 | |
| | 11 | Cuttings | | | | | |
| | | 10-14': Caliche, as above. Dry, reddish yellow SM w/ $CaCO_3$ matrix cementing grains | | | | | |
| | 12 | | | | | | |
| | | 14-19': SM, lighter in color, less well cemented with $CaCO_3$ (reflected by increased drill speed) | | | | | |
| | 13 | | | | | | |
| | 14 | | | | | | |

# HTW DRILLING LOG

HOLE NO. MW-N

PROJECT: CAFB LF-3/4 RFI Ph II

INSPECTOR: [signature]

SHEET 3 OF 32 SHEETS

| ELEV. a. | DEPTH b. | DESCRIPTION OF MATERIALS c. | FIELD SCREENING RESULTS d. | GEOTECH SAMPLE OR CORE BOX NO e. | ANALYTICAL SAMPLE NO. f. | BLOW COUNTS g. | REMARKS h. |
|---|---|---|---|---|---|---|---|
| | 15 | SAME: silty SAND (SM) as above | | | | | Alluvium |
| | 16 | | | | | | |
| | 17 | | | | | | |
| | 18 | | | | | | |
| | 19 | Core<br>19-21: Silty Sand (SM). Fine, subangular-subround qtz sand with abnt silt. $CaCO_3$ matrix. Yellowish red, (5YR 5/6). Trace localized ~~zones~~ blebs of intense $CaCO_3$. Trace $MnO_x$ dendrites. Soft, unconsolidated, dry. | BZ = 0.0<br>H.S. = 0.0 | | | 8<br>10<br>8<br>7 | Sampled @ 1150<br>N = 18<br>Recov = 2.0/2.0 |
| | 20 | | | | | | |
| | 21 | | | | | | |
| | 22 | | | | | | |
| | 23 | | | | | | |
| | 24 | | | | | | |

# HTW DRILLING LOG

HOLE NO. MW-N

PROJECT: CAFB LF-3/4 RFI Ph II

INSPECTOR: [signature]

SHEET 4 OF 32 SHEETS

| ELEV. a. | DEPTH b. | DESCRIPTION OF MATERIALS c. | FIELD SCREENING RESULTS d. | GEOTECH SAMPLE OR CORE BOX NO e. | ANALYTICAL SAMPLE NO. f. | BLOW COUNTS g. | REMARKS h. |
|---|---|---|---|---|---|---|---|
| | 24 | SAME: Silty SAND (sm) as above | | | | | Alluvium |
| | 25 | Cuttings 25-26: Thin zone of more intense, heavier $CaCO_3$. Soil same as above - SM - soft & dry. yellow red. | | | | | |
| | 26 | | | | | | |
| | 27 | | | | | | |
| | 28 | | | | | | |
| | 29 | Core 29-31.6': SM. Lt. reddish brown (5 YR 6/4), fine grained sand w/ $CaCO_3$ (caliche) cementing grains, locally quite heavily. Soft & Chalky. Dry. | BZ = 0.0 HS = 0.0 | | | 17 17 12 10 | Sample @ 1235 N = 29 Rec = 1.6/2.0' |
| | 30 | Upper portion of cuttings and sample show a well indurated sandy Limestone, v. hard & fine grained (freshwater LS?) | | | | | Limestone described v. similar to east shoreline of playa Lake |
| | 31 | | | | | | |
| | 32 | Silty SAND and SAND (SM/SP) | | | | | Alluvium |
| | 33 | | | | | | |

# HTW DRILLING LOG

HOLE NO. MW-N

PROJECT: CAFB LF 3/4 RFI PH II

INSPECTOR: [signature]

SHEET 5 OF 32 SHEETS

| ELEV. a. | DEPTH b. | DESCRIPTION OF MATERIALS c. | FIELD SCREENING RESULTS d. | GEOTECH SAMPLE OR CORE BOX NO e. | ANALYTICAL SAMPLE NO. f. | BLOW COUNTS g. | REMARKS h. |
|---|---|---|---|---|---|---|---|
| | 34 | Cuttings 32-39 : SM/SP, Salmon or yellowish red w/ abnt $CaCO_3$ as cement or void fill. Occ. clasts of LS as described above may be stuck in hose. | | | | | Alluvium |
| | 35 | | | | | | |
| | 36 | | | | | | |
| | 37 | silty SAND (SM) | | | | | Alluvium |
| | 38 | | | | | | |
| | 39 | Core<br>39-40.7 : SM, pinkish wht to pink (5YR 8/2 - 7/4), w/ fine, subround - subangular clasts, $CaCO_3$ infilling around grains. Bottom of Run has some chips of a yellow-red (5YR 4/6) clay with a caliche-like coating. | BZ = 0.0<br>H.S. = 0.0 | | | 23<br>35<br>32<br>32 | Sample @ 1305<br>N = 67<br>Rec = 1.7/2.0 |
| | 40 | Clay is non-calcic, w/ a smooth, greasy streak. | | | | | |
| | 41 | | | | | | |
| | 42 | | | | | | |
| | 43 | | | | | | |

# HTW DRILLING LOG

HOLE NO. MW-N

PROJECT: CAFB LF 3/4 RFI Ph II

INSPECTOR: Brian J. Cody

SHEET 6 OF 32 SHEETS

| ELEV. a. | DEPTH b. | DESCRIPTION OF MATERIALS c. | FIELD SCREENING RESULTS d. | GEOTECH SAMPLE OR CORE BOX NO e. | ANALYTICAL SAMPLE NO. f. | BLOW COUNTS g. | REMARKS h. |
|---|---|---|---|---|---|---|---|
| | | Silty SAND (SM) same as above Cuttings 43-44: Thin zone of possible freshwater Limestone. Sandy and brittle, pinkish white (5YR 8/2), with fine angular to subround grains suspended in a calcic matrix. | | | | | Alluvium |
| | 44 | | | | | | |
| | 45 | 44-49: Soft SM, pink (5YR 7/4), dry. | | | | | |
| | 46 | | | | | | |
| | 47 | Silty SAND and SAND (SM and SP) | | | | | Alluvium |
| | 48 | | | | | | |
| | 49 | Core 49-50.9: SM/SP, As above, pink (5YR 7/3), fine sand, subround to subangular with $CaCO_3$ matrix. Qtz rich, soft, dry. unconsolidated. | BZ = 0.0 H.S. = 0.0 | | | 11 28 29 25 | Sampled @ 1335 N=57 Rec = 1.9/2.0' |
| | 50 | | | | | | |
| | 51 | Cuttings 51-55': Same as above SM/SP - V. soft drilling. | | | | | |
| | 52 | | | | | | |

# HTW DRILLING LOG

HOLE NO. MW-N

PROJECT: CAFB LF 3/4 RFI Ph II

INSPECTOR: Brian J. Ruby

SHEET 7 OF 32 SHEETS

| ELEV. a. | DEPTH b. | DESCRIPTION OF MATERIALS c. | FIELD SCREENING RESULTS d. | GEOTECH SAMPLE OR CORE BOX NO e. | ANALYTICAL SAMPLE NO. f. | BLOW COUNTS g. | REMARKS h. |
|---|---|---|---|---|---|---|---|
| | 53 | silty SAND and SAND (sm and SP) same as above | | | | | Alluvium |
| | 54 | silty SAND (SM) | | | | | Alluvium |
| | 55 | | | | | | |
| | 56 | Cuttings: 56-59'<br>SM, fine to med grained, sub-angular to subround sand. Appx 10% med grained. Calcite, dry. Pink (5YR 7/4) | | | | | |
| | 57 | | | | | | |
| | 58 | | | | | | |
| | 59 | Core:<br>59-61: Same as entry above, SM, w/ local zones of more intense $CaCO_3$ flooding matrix. Very qtz rich. | BZ = 0.0<br>H.S. = 0.1 | | | 19<br>18<br>19<br>24 | Sample @ 1400<br>N = 37<br>Rec = 2.0/2.0 |
| | 60 | | | | | | |
| | 61 | | | | | | |
| | 62 | | | | | | |

# HTW DRILLING LOG

HOLE NO. MW-N

PROJECT: CAFB LF 3/4 RFI Ph II

INSPECTOR: [signature]

SHEET 8 OF 32 SHEETS

| ELEV. a. | DEPTH b. | DESCRIPTION OF MATERIALS c. | FIELD SCREENING RESULTS d. | GEOTECH SAMPLE OR CORE BOX NO e. | ANALYTICAL SAMPLE NO. f. | BLOW COUNTS g. | REMARKS h. |
|---|---|---|---|---|---|---|---|
| | 62 | Cuttings | | | | | Alluvium |
| | | 61-70: Poorly graded sand (SP). Fine, subang-round, with 20% med grain fraction, which is well rounded. QTZ, Pink in color (7.5 YR 7/4), Dry. | | | | | |
| | 63 | | | | | | |
| | 64 | | | | | | |
| | 65 | | | | | | |
| | 66 | | | | | | |
| | 67 | | | | | | |
| | 68 | | | | | | |
| | 69 | | | | | | |
| | | Core | | | | | |
| | 70 | 70-70.6: Poorly graded sand (SP). Very clean, fine-medium sand, 10% med. grained, is well rounded. Dry non-calcic, Red-yellow (7.5 YR 7/6). | B.Z. = 0.0 | | | 26 | Sampled @ 1455 |
| | | | H.S. = 0.0 | | | 31 | N = 63 |
| | 71 | 70.6-71.6 - Similar sand, but has calcic interstitial fill. Wht to pink | | | | 32 | Rec = 1.6/2.0 |
| | | | | | | 40 | |

# HTW DRILLING LOG

HOLE NO. MW-N

PROJECT: CAFB LF 3/4 RFI Ph II

INSPECTOR: Brian J. Kelly

SHEET 9 OF 32 SHEETS

| ELEV. a. | DEPTH b. | DESCRIPTION OF MATERIALS c. | FIELD SCREENING RESULTS d. | GEOTECH SAMPLE OR CORE BOX NO e. | ANALYTICAL SAMPLE NO. f. | BLOW COUNTS g. | REMARKS h. |
|---|---|---|---|---|---|---|---|
| | 72 | (7.5 YR 7/4), Dry. Soft. SAND (SP), same as above | | | | X | Alluvium |
| | 73 | | | | | | |
| | 74 | | | | | | |
| | 75 | | | | | | |
| | 76 | | | | | | |
| | 77 | | | | | | |
| | 78 | | | | | | |
| | 79 | | | | | | |
| | 80 | Core: 80-82: SP, poorly graded, fine, subround-subangular qtz sand with local zones of $CaCO_3$ filling interstitial space. Soft | B.Z. = 0.0 H.S. = 0.0 | | | 12 18 25 | Sample @ 1525 N = 43 Rec = 1.8/2.0 |
| | 81 | | | | | | |

# HTW DRILLING LOG

HOLE NO. MW-N

PROJECT CAFB LF 3/4 RFI Ph II

INSPECTOR Brian J. Cody

SHEET 10 OF 32 SHEETS

| ELEV. a. | DEPTH b. | DESCRIPTION OF MATERIALS c. | FIELD SCREENING RESULTS d. | GEOTECH SAMPLE OR CORE BOX NO e. | ANALYTICAL SAMPLE NO. f. | BLOW COUNTS g. | REMARKS h. |
|---|---|---|---|---|---|---|---|
| | 81 | Unconsolidated. Very clean, pink (7.5 YR 7/4), Dry. SAND (SP) same as above | | | | 27 | Alluvium |
| | 82 | | | | | | |
| | | Cuttings | | | | | |
| | 83 | 82-90: Clean, fine grained, poorly graded sand (SP). Subround - round qtz, Pink (5 YR 7/4). Slightly damp. | | | | | |
| | 84 | | | | | | |
| | 85 | | | | | | |
| | 86 | | | | | | |
| | 87 | | | | | | |
| | 88 | | | | | | |
| | 89 | | | | | | |
| | | Core: | | | | | |
| | 90 | 90-91.6: Poorly graded sand (SP). Fine, round to subround | BZ = 0.0 | | | 7 | Sample @ 1610 |

# HTW DRILLING LOG

HOLE NO. MW-N

PROJECT: CAFB LF 3/4 RFI Ph II

INSPECTOR: Brian J. Pohl

SHEET 11 OF 32 SHEETS

| ELEV. a. | DEPTH b. | DESCRIPTION OF MATERIALS c. | FIELD SCREENING RESULTS d. | GEOTECH SAMPLE OR CORE BOX NO e. | ANALYTICAL SAMPLE NO. f. | BLOW COUNTS g. | REMARKS h. |
|---|---|---|---|---|---|---|---|
| | 91 | qtz. Very clean w/ occ. blebs of MnOx disseminated in matrix. Soft, non-calcic. Dry. Reddish yellow (5YR 7/6). SAND (SP) same as above | | | | 17<br>24<br>30 | Alluvium<br>N=65<br>Rec = 1.6/2.0 |
| | 92 | | | | | X | |
| | 93 | | | | | | |
| | 94 | 92-100: Cuttings show some clasts of weakly cemented zones ($CaCO_3$) of sand similar to last entry. | | | | | |
| | 95 | | | | | | |
| | 96 | | | | | | |
| | 97 | | | | | | |
| | 98 | | | | | | |
| | 99 | | | | | | |
| | 100 | | | | | | |

# HTW DRILLING LOG

HOLE NO. MW-N

PROJECT: CAFB LF 3/4 RFI PhII

INSPECTOR: Brian Gradley

SHEET 12 OF 32 SHEETS

| ELEV. a. | DEPTH b. | DESCRIPTION OF MATERIALS c. | FIELD SCREENING RESULTS d. | GEOTECH SAMPLE OR CORE BOX NO e. | ANALYTICAL SAMPLE NO. f. | BLOW COUNTS g. | REMARKS h. |
|---|---|---|---|---|---|---|---|
| | 100 | Core SAND(SP) same as above | | | | 18 | Alluvium |
| | | 100-102: SP as above. | | | | | Sampled @ 1625 |
| | | Pink to wht, very fine to fine, | BZ = 0.0 | | | 28 | N = 65 |
| | 101 | well rounded qtz, w/ local | HS = 0.0 | | | 37 | Rec = 2.0/2.0 |
| | | zones of caliche-like cement, | | | | 50 | |
| | | elsewhere unconsolidated. | | | | | |
| | 102 | Dry. | | | | | |
| | 103 | | | | | | |
| | 104 | | | | | | |
| | 105 | | | | | | |
| | 106 | 106: Cuttings indicate thin | | | | | |
| | | zone of $CaCO_3$ cemented | | | | | |
| | | sand @ 106', pink, lightly | | | | | |
| | | cemented, friable. | | | | | |
| | 107 | | | | | | |
| | 108 | | | | | | |
| | 109 | | | | | | |

# HTW DRILLING LOG

HOLE NO. MW-N

PROJECT: CAFB LF 3/4 RFI Ph II

INSPECTOR: Brian Q. Colby

SHEET 13 OF 32 SHEETS

| ELEV. a. | DEPTH b. | DESCRIPTION OF MATERIALS c. | FIELD SCREENING RESULTS d. | GEOTECH SAMPLE OR CORE BOX NO e. | ANALYTICAL SAMPLE NO. f. | BLOW COUNTS g. | REMARKS h. |
|---|---|---|---|---|---|---|---|
| | 110 | SAND (SP) same as above<br>Core<br>110-111.4: SP, clean, fine grained, rounded qtz sand. Soft, unconsolidated, Reddish yellow (7.5YR 6/6). Trace of MnOx as disseminations. | BZ = 0.0<br>H.S. = 0.0 | | | 6<br>19<br>35<br>47 | Alluvium<br>Sample @ 1650<br>N = 54<br>Rec = 1.4/2.0 |
| | 111 | | | | | | |
| | 112 | | | | | | |
| | 113 | | | | | | |
| | 114 | | | | | | |
| | 115 | | | | | | |
| | 116 | Cuttings: Appx 116-120': Sand as above, but more strongly cemented w/ CaCO3. | | | | | |
| | 117 | | | | | | |
| | 118 | | | | | | |
| | 119 | | | | | | |

# HTW DRILLING LOG

HOLE NO. MW-N

PROJECT CAFB LF 3/4 RFI # Ph II

INSPECTOR Brian G. Ruby

SHEET 14 OF 32 SHEETS

| ELEV. a. | DEPTH b. | DESCRIPTION OF MATERIALS c. | FIELD SCREENING RESULTS d. | GEOTECH SAMPLE OR CORE BOX NO e. | ANALYTICAL SAMPLE NO. f. | BLOW COUNTS g. | REMARKS h. |
|---|---|---|---|---|---|---|---|
| | | SAND (SP) same as above | | | | | Alluvium |
| | 120 | Core: | | | | | |
| | | 120 - 121.4: Poorly graded sand, fine subangular to round qtz grains. Non-calcic, very clean. Unconsolidated, soft & dry | BZ = 0.0<br>HS = 0.0 | | | 19<br>40<br>50<br>NA | Sample @ 1745<br>N = 90<br>Rec. = 1.9/1.5 |
| | 121 | | | | | | |
| | 122 | | | | | | |
| | 123 | | | | | | |
| | 129 | | | | | | |
| | 125 | | | | | | |
| | 126 | | | | | | |
| | 127 | | | | | | |
| | 128 | | | | | | |

# HTW DRILLING LOG

HOLE NO. MW-N

PROJECT CAFB LF 3/4 RFI Ph II

INSPECTOR Brian J. Cady

SHEET 15 OF 32 SHEETS

| ELEV. a. | DEPTH b. | DESCRIPTION OF MATERIALS c. | FIELD SCREENING RESULTS d. | GEOTECH SAMPLE OR CORE BOX NO e. | ANALYTICAL SAMPLE NO. f. | BLOW COUNTS g. | REMARKS h. |
|---|---|---|---|---|---|---|---|
| | 129 | SAND (SP) same as above | | | | | Alluvium |
| | 130 | Core | | | | | |
| | | 130-131.3: SP as above, fine, poorly graded, well-rounded to subround grains. Very clean Trace $CaCO_3$. Soft, dry, unconsolidated. | | | | 16<br>41<br>50<br>NA | Sample @ 1800<br>N = 91<br>Rec. = 1.3/1.5' |
| | 131 | | | | | | |
| | 132 | 132-140 - Cuttings becoming damper, same lithology as above. | | | | | |
| | 133 | | | | | | |
| | 134 | | | | | | |
| | 135 | | | | | | |
| | 136 | | | | | | |
| | 137 | | | | | | |
| | 138 | | | | | | |

# HTW DRILLING LOG

HOLE NO. MW-N

PROJECT CAFB LF 3/4 RFI PH II

INSPECTOR

SHEET 16 OF 32 SHEETS

| ELEV. a. | DEPTH b. | DESCRIPTION OF MATERIALS c. | FIELD SCREENING RESULTS d. | GEOTECH SAMPLE OR CORE BOX NO e. | ANALYTICAL SAMPLE NO. f. | BLOW COUNTS g. | REMARKS h. |
|---|---|---|---|---|---|---|---|
| | | SAND (SP) same as above | | | | | Alluvium |
| | 139 | | | | | | 1815 - At 139.5' End of Shift 10/21/94 |
| | | Core 139.5-141: SP, very | Calib. PID to Benzene RF w/ 100ppm isobutylene. | | | 13 | Begin Shift 10/22/94 @ 715. |
| | 140 | fine to fine grained sand, | | | | 27 | N = 77 |
| | | round - subround qtz sand. | BG = 0.0 | | | 50 | Rec. = 1.4/1.5 |
| | | Clean. Reddish yellow (5YR | LEL = 0.0 | | | NA | Sample @ 750 |
| | 141 | 7/6). Dry, non-calcic. | $H_2S$ = 0.0 | | | | |
| | | V. soft, unconsolidated. | BZ = 0.0 | | | | |
| | | | $H_2S$ = 0.1 | | | | |
| | | Silty SAND (SM) | | | | | |
| | | Cuttings: 141-149: SM. | | | | | |
| | 142 | Sand as above with increasing | | | | | |
| | | silt content. Damp. | | | | | |
| | 143 | | | | | | |
| | 144 | | | | | | |
| | 145 | | | | | | |
| | 146 | | | | | | |
| | 147 | | | | | | |

# HTW DRILLING LOG

HOLE NO. MW-N

PROJECT: CAFB LF-3/4 RFI Ph II

INSPECTOR: Brian G. Purdy

SHEET 17 OF 32 SHEETS

| ELEV. a. | DEPTH b. | DESCRIPTION OF MATERIALS c. | FIELD SCREENING RESULTS d. | GEOTECH SAMPLE OR CORE BOX NO e. | ANALYTICAL SAMPLE NO. f. | BLOW COUNTS g. | REMARKS h. |
|---|---|---|---|---|---|---|---|
| | 148 | Silty SAND (SM) same as above | | | | | Alluvium |
| | 149 | Core: | | | | | |
| | | 149 - 150.5: SM; Silty, fine to very fine sand, round to subangular qtz. Reddish yellow (5YR 6/6). Loosely consolidated (easily crumbled in fingers). Damp. Appx 20% silt w/ Mnox disseminated. | BZ = 0.0<br>H.S. = 0.1 | | | 19<br>33<br>50 | Sampled @ 815<br>N = 83<br>Rec. = 1.5/1.5 |
| | 150 | | | | | | |
| | 151 | Cuttings: 151 - 159: Show increased degree of induration and cementation. Friable, moderately consolidated. | | | | | |
| | 152 | | | | | | |
| | 153 | | | | | | |
| | 154 | | | | | | |
| | 155 | | | | | | |
| | 156 | | | | | | |
| | 157 | | | | | | |

# HTW DRILLING LOG

HOLE NO. MW-N

PROJECT CAFB LF 3/4 RFI Ph II

INSPECTOR Brian J. Cody

SHEET 19 OF 32 SHEETS

| ELEV. a. | DEPTH b. | DESCRIPTION OF MATERIALS c. | FIELD SCREENING RESULTS d. | GEOTECH SAMPLE OR CORE BOX NO e. | ANALYTICAL SAMPLE NO. f. | BLOW COUNTS g. | REMARKS h. |
|---|---|---|---|---|---|---|---|
| | 157 | Silty SAND (SM) same as above | | | | | Alluvium |
| | 158 | | | | | | |
| | 159 | Core | | | | | |
| | | 159-160 Poorly graded sand (SP). Very clean, fine, rounded qtz w/ occasional blebs of $CaCO_3$. Generally non-calcic & unconsolidated. Lt. reddish yellow (7.5 YR 7/6) Dry. | BZ = 0.1<br>HS = 0.1 | | | 19<br>50 | Alluvium<br>Sample @ 895<br>N = 50<br>Rec. = 1.0/1.0 |
| | 160 | | | | | | |
| | 161 | | | | | | |
| | 162 | | | | | | |
| | 163 | | | | | | |
| | 164 | | | | | | |
| | 165 | | | | | | |
| | 166 | | | | | | |

# HTW DRILLING LOG

HOLE NO. MW-N

PROJECT CAFB LF 3/4 RFI Ph II

INSPECTOR [signature]

SHEET 19 OF 32 SHEETS

| ELEV. a. | DEPTH b. | DESCRIPTION OF MATERIALS c. | FIELD SCREENING RESULTS d. | GEOTECH SAMPLE OR CORE BOX NO e. | ANALYTICAL SAMPLE NO. f. | BLOW COUNTS g. | REMARKS h. |
|---|---|---|---|---|---|---|---|
| | 167 | SAND (SP) same as above | | | | | Alluvium |
| | 168 | | | | | | |
| | 169 | | | | | | |
| | 170 | Core: | | | | | |
| | | 170 - 171.5: SP: well sorted fine sand, qtz, subangular to round, very clean, soft and unconsolidated. Damp, non-calcic Reddish yellow (7.5YR 7/6). | BZ = 0.0<br>H.S. = 0.0 | | | 7<br>35<br>50 | Sampled @ 910<br>N = 85<br>Rec. = 1.4/1.5' |
| | 171 | | | | | | |
| | 172 | | | | | | |
| | 173 | | | | | | |
| | 174 | | | | | | |
| | 175 | | | | | | |
| | 176 | | | | | | |

# HTW DRILLING LOG

HOLE NO. MW-N

PROJECT: CAFB LF 3/4 RFI Ph II

INSPECTOR: Brian G. Lindley

SHEET 20 OF 32 SHEETS

| ELEV. a. | DEPTH b. | DESCRIPTION OF MATERIALS c. | FIELD SCREENING RESULTS d. | GEOTECH SAMPLE OR CORE BOX NO e. | ANALYTICAL SAMPLE NO. f. | BLOW COUNTS g. | REMARKS h. |
|---|---|---|---|---|---|---|---|
| | 176 | SAND (SP) same as above | | | | | Alluvium |
| | 177 | | | | | | |
| | 178 | | | | | | |
| | 179 | | | | | | |
| | 180 | | | | | | |
| | | Core: | | | | | |
| | 181 | 180.5 - 181.9: SP very clean, round - subround fine sand, Reddish yellow (7.5YR 7/6), non calcic, dry | BZ = 0.1<br>HS = 0.0 | | | 7<br>32<br>50/5" | Sample @ 9:45<br>N = 82<br>Rec = 1.4/1.5 |
| | 182 | | | | | | |
| | 183 | | | | | | |
| | 184 | | | | | | |
| | 185 | | | | | | |

# HTW DRILLING LOG

HOLE NO. MW-N

PROJECT: CAFB LF-3/4 RFI Ph II

INSPECTOR: Brian J. Purdy

SHEET 21 OF 32 SHEETS

| ELEV. a. | DEPTH b. | DESCRIPTION OF MATERIALS c. | FIELD SCREENING RESULTS d. | GEOTECH SAMPLE OR CORE BOX NO e. | ANALYTICAL SAMPLE NO. f. | BLOW COUNTS g. | REMARKS h. |
|---|---|---|---|---|---|---|---|
| | 186 | SAND (SP) same as above<br>Cuttings: 186-190: Sandstone | | | | | Alluvium |
| | 187 | Well indurated, well sorted, fine grain ss. Very similar in all respects to unconsolidated sand above, except stong $CaCO_3$ Cement. Recovered clasts have poorly to well developed dissolution texture. Pink (5YR 7/3) w/ | | | | | |
| | 188 | trace matics (2%) & mn oxides. | | | | | |
| | 189 | | | | | | |
| | 190 | Core 190.5<br>190-~~192~~ - Same well cemented Sandston described above. | B.2. = 0.4<br>H.S. = 0.0 | | | 7<br>37<br>50 | Sample @ 1205<br>N = 87<br>Rec = 1.2/1.5 |
| | 191 | ~~192~~<br>190.5 - 191.2: Reddish Yellow (7.5 YR 6/6), very fine - fine, silty sand (SM). Occ. clasts of cemented sand as above. Overall, soft and unconsolidated. Noticeably finer sand than seen from 160' → 190'. | | | | | Alluvium |
| | 192 | | | | | | 1215: Rig leaking Hydraulic Oil. Shutdown to fix. |
| | 193 | | | | | | |
| | 194 | | | | | | 1315: Restart Drilling |
| | 195 | | | | | | |

PROJECT: CAFB LF 3/4 ph II

HOLE NO. MW-N

# HTW DRILLING LOG

HOLE NO. MW-N

PROJECT CAFB LF 3/4 RFI Ph II

INSPECTOR Brian J. Rabbe

SHEET 22 OF 32 SHEETS

| ELEV. a. | DEPTH b. | DESCRIPTION OF MATERIALS c. | FIELD SCREENING RESULTS d. | GEOTECH SAMPLE OR CORE BOX NO e. | ANALYTICAL SAMPLE NO. f. | BLOW COUNTS g. | REMARKS h. |
|---|---|---|---|---|---|---|---|
| | 195 | silty SAND (SM) same as above | | | | | Alluvium |
| | 196 | | | | | | |
| | 197 | | | | | | |
| | 198 | silty SAND with cobbles (SM w/GM) | | | | | Alluvium |
| | 199 | | | | | | |
| | 200 | 200-201.5 - Core: SM/GM | BZ = 0.4 | | | 16 | sample @ 1350 |
| | | Fine sand and silt as above | HS = 0.4 | | | | N = 100 |
| | 201 | w/ large (up to 1" diam.) clasts & cobbles of calcic cemented fine sandstone. Damp, reddish yellow (5YR 6/6). Appearance of clasts | | | | 50 | Rec. = 1.4/1.8 |
| | | suspended in sand/silt imply possible depositional origin of clasts, rather than | | | | 50 | |
| | 202 | weathering of more cemented units as ~~digg~~ diagnostic effect. | | | | 50/4" | |
| | 203 | | | | | | |
| | 204 | | | | | | |

# HTW DRILLING LOG

HOLE NO. MW-N

PROJECT: CAFB LF 3/4 RFI PH II

INSPECTOR: Brian G. Rudy

SHEET 23 OF 32 SHEETS

| ELEV. a. | DEPTH b. | DESCRIPTION OF MATERIALS | FIELD SCREENING RESULTS d. | GEOTECH SAMPLE OR CORE BOX NO e. | ANALYTICAL SAMPLE NO. f. | BLOW COUNTS g. | REMARKS h. |
|---|---|---|---|---|---|---|---|
| | | Silty SAND w/ cobbles (SM w/ GM) same as above | | | | | Alluvium |
| | 205 | Cuttings 201-210: Lrg gravels and cobbles to .3' diam. suspended in fine-v. fine silty sand. Sand is round-subangular qtzose. Cobbles are well cemented (CaCO3), moderately friable fine sand to stone, w/ well developed dissolution structures and cavities. MnOx on weathered face as blebs. Some possible worm burrows (GM) | | | | | Alluvium |
| | 206 | | Recal. PID to 57 ppm w/ 100 ppm Isobutylene | | | | Recal @ 1430 |
| | 207 | | | | | | |
| | 208 | | | | | | |
| | 209 | | | | | | |
| | 210 | Core 210-212: GM as above, gravel content decreasing below 211'. Matrix is fine silty sand, unconsolidated and non-calcic, fine to very fine, round to subround qtz, v. well sorted. | Bz - 0.0 H.S. = 0.0 | | | 15 38 46 50 | S Sample @ 1435 N = 84 Rec = 1.8/2.0 |
| | 211 | | | | | | |
| | 212 | | | | | | |
| | 213 | | | | | | |
| | 214 | | | | | | |

# HTW DRILLING LOG

HOLE NO. MW-N

PROJECT CAFB LF 3/4 RFI Ph II

INSPECTOR Brian J. Lichy

SHEET 24 OF 32 SHEETS

| ELEV. a. | DEPTH b. | DESCRIPTION OF MATERIALS c. | FIELD SCREENING RESULTS d. | GEOTECH SAMPLE OR CORE BOX NO e. | ANALYTICAL SAMPLE NO. f. | BLOW COUNTS g. | REMARKS h. |
|---|---|---|---|---|---|---|---|
| | 215 | silty GRAVEL (Gm) same as above | | | | | Alluvium |
| | 216 | | | | | | |
| | 217 | | | | | | |
| | 218 | | | | | | |
| | 219 | | | | | | |
| | 220 | Core: 220-221.5 | | | | | |
| | | Gm as above - Silty sand with gravel of calcic SS, V. fine silt to fine grained sand matrix, Soft, Unconsolidated, damp. Reddish Yellow, grains are slightly more Angular - Subangular than previously seen | BZ = 0.0<br>H.S. = 0.0 | | | 12<br>36<br>50<br>50 | Sample @ 1505<br>N = ~~80~~ 86<br>Rec = 1.5/2.0 |
| | 221 | | | | | | |
| | 222 | | | | | | |
| | 223 | | | | | | |

# HTW DRILLING LOG

HOLE NO. MW-N

PROJECT: CAFB LF 3/4 RFI Ph II

INSPECTOR: Brian Jerkatis

SHEET 25 OF 32 SHEETS

| ELEV. a. | DEPTH b. | DESCRIPTION OF MATERIALS c. | FIELD SCREENING RESULTS d. | GEOTECH SAMPLE OR CORE BOX NO e. | ANALYTICAL SAMPLE NO. f. | BLOW COUNTS g. | REMARKS h. |
|---|---|---|---|---|---|---|---|
| | | Silty GRAVEL (Gm) same as above | | | | | Alluvium |
| | 224 | Cuttings 222-230: Same as above; fine sand and silt with gravel. GM | | | | | |
| | 225 | | | | | | |
| | 226 | | | | | | |
| | 227 | | | | | | |
| | 228 | silty GRAVEL and sandy GRAVEL (Gm and GP) | | | | | Alluvium |
| | 229 | | | | | | |
| | 230 | Core 230 - 231.3: | | | | | |
| | | Sand and gravel as above to 230.9', then hard, well indurated & cemented SS w/ calcic cement, Possibly a cobble which was driven into ~~BOR~~ split spoon. (GM/GP) | BZ = 0.0<br>H.S. = 0.0 | | | 3<br>29<br>50/4" | Sample @ 1540<br>N = 79<br>Rec. = 1.3/1.3 |
| | 232 | sandy GRAVEL (Gm) with very fine sand | | | | | Alluvium |
| | 233 | | | | | | |

# HTW DRILLING LOG

PROJECT: CAFB LF 3/4 RFI Ph II

INSPECTOR: Ryan J. Rodgers

HOLE NO.: MW-N

SHEET 26 OF 32 SHEETS

| ELEV. a. | DEPTH b. | DESCRIPTION OF MATERIALS c. | FIELD SCREENING RESULTS d. | GEOTECH SAMPLE OR CORE BOX NO e. | ANALYTICAL SAMPLE NO. f. | BLOW COUNTS g. | REMARKS h. |
|---|---|---|---|---|---|---|---|
| | | | | | | | Alluvium |
| | | Cuttings 232-240: | | | | | |
| | 234 | Cobbly, fine sand with increasing moisture content. Round-subround qtz, sand clasts as described in entries above. | | | | | |
| | 235 | (GM) same as above | | | | | |
| | 236 | | | | | | |
| | 237 | | | | | | |
| | 238 | | | | | | |
| | 239 | | | | | | |
| | 240 | Core 240-241.5: | | | | | |
| | | Clean, poorly graded, fine qtz sand (SP), with appx 10% silt. Yellow red (7.5YR, 6/8). With increasing moisture. No cobbles or gravel. Sand is well rounded to subround qtz, soft and unconsolidated. | BZ = 0.0<br>HS = 0.0 | | | 6<br>25<br>43<br>50/3" | Alluvium<br>Sample @ 1620<br>N = 68<br>Rec = 1.5'/1.5' |
| | 241 | | | | | | |
| | 242 | | | | | | |

# HTW DRILLING LOG

HOLE NO. MW-N

PROJECT: CAFB LF 3/4 RFI Ph II

INSPECTOR: [signature]

SHEET 27 OF 32 SHEETS

| ELEV. a. | DEPTH b. | DESCRIPTION OF MATERIALS c. | FIELD SCREENING RESULTS d. | GEOTECH SAMPLE OR CORE BOX NO e. | ANALYTICAL SAMPLE NO. f. | BLOW COUNTS g. | REMARKS h. |
|---|---|---|---|---|---|---|---|
| | 243 | SAND (SP) same as above<br><br>Cuttings 242-250:<br>Cuttings are similar to sand described above, but cobbles upto 4" of calcic, well-indurated fine SS. Cobbles are slightly friable. Local blebs of white calcite in sand matrix. Drill action indicates a layer of these cobbles @ 246-247', which is then underlain by soft sand. | | | | | Alluvium |
| | 244 | | | | | | |
| | 245 | | | | | | |
| | 246 | | | | | | |
| | 247 | | | | | | |
| | 248 | | | | | | |
| | 249 | | | | | | |
| | 250 | Core 250 - 251.5 :<br>Probable sluff of fine silty sand with gravel ~~cat~~ clasts to 1" diameter. | BZ = 0.0<br>H.S = 0.0 | | | 4<br>2<br>2<br>2<br>33 | N = 4<br>Rec = 1.5/2.5'<br>Driller thinks boring caved some while lifting drill pipe in attempt to clean hole. Take extra 6" drive. |
| | 251 | | | | | | |
| | 252 | | | | | | |

# HTW DRILLING LOG

HOLE NO. MW-N

PROJECT CAFB LF 3/4 RFI Ph II

INSPECTOR Brian A. Cook

SHEET 28 OF 32 SHEETS

| ELEV. a. | DEPTH b. | DESCRIPTION OF MATERIALS c. | FIELD SCREENING RESULTS d. | GEOTECH SAMPLE OR CORE BOX NO e. | ANALYTICAL SAMPLE NO. f. | BLOW COUNTS g. | REMARKS h. |
|---|---|---|---|---|---|---|---|
| | | SAND (SP) same as above | | | | | Alluvium SAMPLE CONTINUED FROM ABOVE |
| | 253 | Cuttings 253-260: Clayey sand, Reddish brown (10YR, 4/4). Fine grained qtz, round - subround with Appx 20% Clay. Low plasticity, damp. SC | | | | | Alluvium |
| | 254 | | | | | | |
| | 255 | | | | | | |
| | 256 | | | | | | |
| | 257 | | | | | | |
| | 258 | Core: 258-260' Well sorted, yellow-red, fine grained sand as above. Soft Unconsolidated, damp. | BZ = 0.0 H.S. = 0.0 | | | 9 23 33 50/4" | Sample @ 1745 N = 56 Rec = 2/2, upper .7' = Stuff. |
| | 259 | | | | | | |
| | 260 | | | | | | |
| | 261 | | | | | | |

PROJECT CAFB CF-3/4 Ph II HOLE NO. MW-N

# HTW DRILLING LOG

HOLE NO. MW-N
SHEET 29 OF 32 SHEETS

PROJECT: CAFB LF 3/4 RFI Ph II
INSPECTOR: [signature]

| ELEV. a. | DEPTH b. | DESCRIPTION OF MATERIALS c. | FIELD SCREENING RESULTS d. | GEOTECH SAMPLE OR CORE BOX NO e. | ANALYTICAL SAMPLE NO. f. | BLOW COUNTS g. | REMARKS h. |
|---|---|---|---|---|---|---|---|
| | 262 | clayey SAND (SC) same cs cSand<br>Cuttings 260-270- SC-<br>Net interbedded fine sand, as above, with thin layers of dark reddish brown sandy clay. Drill action gives no indication how thick the clay units are, Only seen in cuttings. | | | | | Alluvium<br>1805 - Ck water level @ 270'. Not encountered. |
| | 263 | | | | | | |
| | 264 | | | | | | |
| | 265 | | | | | | |
| | 266 | | | | | | |
| | 267 | | | | | | |
| | 268 | | | | | | |
| | 269 | | | | | | |
| | 270 | Core 270-271.5 | | | | | |
| | 271 | Poorly graded fine sand, round-Subround qtz, soft unconsolidated Reddish Yellow (5YR 6/8)<br>270.5-271: Sandy clay, yellow (SP) | BZ=0.0<br>HS=0.0 | MW-N 270 | | 27<br>34<br>51 | Alluvium Sampled @ 1830<br>N=85<br>Rec = 2/2 (.5' Stuff) |

PROJECT: CAFB LF 3/4 Ph II | HOLE NO. MW-N

# HTW DRILLING LOG

PROJECT: CAFB LF 3/4 RFI PH II

INSPECTOR: Brian G. Rudy

HOLE NO.: MW-N

SHEET 30 OF 32 SHEETS

| ELEV. a. | DEPTH b. | DESCRIPTION OF MATERIALS | FIELD SCREENING RESULTS d. | GEOTECH SAMPLE OR CORE BOX NO e. | ANALYTICAL SAMPLE NO. f. | BLOW COUNTS g. | REMARKS h. |
|---|---|---|---|---|---|---|---|
| | | SAND (SP) same as above - red (5 YR 5/6), moderate plasticity, wet, w/ MnOx dendrites. | | | | | Alluvium 1835 - End of shift. |
| | 272 | 271 - 271.5 : SP; poorly graded fine sand, round - subround, with occ. med size angular frags. Unconsolidated, wet. | Calib. PID to 57ppm Benzene R.F w/ 100 ppm isobutylene | | | | 10/23/94 - Start Shift 7:15. |
| | 273 | Top of Water very close. | B.G = 0.0 | | | | |
| | | Cuttings 272-280: Fine, poorly graded sand, (SP). Brown, (7.5 YR 5/4), wet, well rounded and sorted, with apparent thin interbeds of drk red (2.5YR 3/6) claystone. Claystone is clean with a waxy luster, & MnOx on Fxs. | | | | | |
| | 274 | | | | | | |
| | 275 | | | | | | |
| | 276 | | | | | | |
| | 277 | | | | | | |
| | 278 | | | | | | |
| | 279 | | | | | | |
| | 280 | Core: 280-282 Poorly graded sand (SP). Fine, well rounded qtz grains. Reddish | BZ = 0.0 | MW-N-280 | | 16 | Sample @ 0800 |

PROJECT: CAFB LF 3/4 PH II | HOLE NO.: MW-N

# HTW DRILLING LOG

PROJECT: CAFB LF 3/4 RFI Ph II
INSPECTOR: Brian G. Rudy
HOLE NO.: MW-N
SHEET 31 OF 32 SHEETS

| ELEV. a. | DEPTH b. | DESCRIPTION OF MATERIALS c. | FIELD SCREENING RESULTS d. | GEOTECH SAMPLE OR CORE BOX NO e. | ANALYTICAL SAMPLE NO. f. | BLOW COUNTS g. | REMARKS |
|---|---|---|---|---|---|---|---|
| | 281 | brown (5YR 5/4) w/ locally lighter zones of $CaCO_3$. Soft & unconsolidated. Occ. clasts of consolidated SS w/ calcic cement. Saturated SAND (SP) same as above | H.S. = 1.7 | | | 48<br>46<br>40 | Alluvium<br>BR<br>S<br>N = 94<br>Rec = 2.0/2.0<br>Start Rising Head test @ 820 |
| | 282 | | | | | | |
| | | Cutting; 282-289: SP | | | | | 1020 - Water @ 271.9' BGS |
| | 283 | as above, w/ some clasts of dark, red claystone as at 272-280' and calcic cement SS cobbles up to .4' long. | | | | | 1040 - Continue Drilling. |
| | 284 | | | | | | |
| | 285 | | | | | | |
| | 286 | | | | | | |
| | 287 | | | | | | |
| | 288 | | | | | | |
| | | Core 289 - 290.5 | | | | | |
| | 289 | Poorly graded fine sand (SP) Well rounded qtz, v. dense, wet but water appears to have drained from pore space. Brown (7.5YR 5/4) | Bz = 0.1<br>H = 1.3 | MW-N-290 | | 25<br>49 | Sample @ 1150<br>N = 99<br>Rec = 2.0/1.5 |
| | 290 | | | | | | |

PROJECT: CAFB LF 3/4 ph II
HOLE NO.: MW-N

# HTW DRILLING LOG

PROJECT: CAFB LF 3/4 RFI

INSPECTOR: Brian J. Rudy

HOLE NO.: MW-N

SHEET 32 OF 32 SHEETS

| ELEV. a. | DEPTH b. | DESCRIPTION OF MATERIALS c. | FIELD SCREENING RESULTS d. | GEOTECH SAMPLE OR CORE BOX NO e. | ANALYTICAL SAMPLE NO. f. | BLOW COUNTS g. | REMARKS h. |
|---|---|---|---|---|---|---|---|
| | | Local zones of weak $CaCO_3$ cementation. | | | | 50 | Alluvium |
| | 291 | SAND (SP) same as above | | | | | |
| | 292 | | | | | | |
| | 295 | | | | | | |
| | 294 | | | | | | |
| | 295 | Cutting 5-295: Dark red siltstone w/ mn Ox. damp. | | | | | Alluvium |
| | 296 | | | | | | |
| | 297 | | | | | | |
| | 298 | | | | | | Note: Monitoring well set 50 feet to north in new boring as this boring had to be abandoned. |
| | 299 | T.D. = 299' | | | | | Bottom of boring at 299.0 feet. |

PROJECT: CAFB LF3/4 ph II

HOLE NO.: MW-N

# HTW DRILLING LOG

HOLE NO. MW-0

| | |
|---|---|
| 1. COMPANY NAME: Woodward-Clyde Federal Services | 2. DRILLING SUBCONTRACTOR: LAYNE ENVIRONMENTAL |
| 3. PROJECT: LF-3 & LF-4 RFI Phase II | 4. LOCATION: CANNON AFB, N.M. |
| 5. NAME OF DRILLER: Ben Bludworth | 6. MANUFACTURER'S DESIGNATION OF DRILL: AP-1000 Percussion Hammer Rig |
| 7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 9" O.D. 6" ID Dual Wall Pipe (10'); 9 3/4" O.D. Open Face Bit (1.5' long); 2" California Tube Sampler | 8. HOLE LOCATION: S. side of LF-3 (LF-3) |
| | 9. SURFACE ELEVATION: 4271.00 |
| | 10. DATE STARTED: 10/25/94 — 11. DATE COMPLETED: 10/30/94 |
| 12. OVERBURDEN THICKNESS: N/A | 15. DEPTH GROUNDWATER ENCOUNTERED: 280' |
| 13. DEPTH DRILLED INTO ROCK: N/A | 16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: 278.3' BGS 13 hrs |
| 14. TOTAL DEPTH OF HOLE: 304.3' | 17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY) |

| 18. GEOTECHNICAL SAMPLES | DISTURBED | UNDISTURBED | 19. TOTAL NUMBER OF CORE BOXES |
|---|---|---|---|
| | 3 | | |

| 20. SAMPLES FOR CHEMICAL ANALYSIS | VOC | METALS | OTHER (SPECIFY) | OTHER (SPECIFY) | OTHER (SPECIFY) | 21. TOTAL CORE RECOVERY % |
|---|---|---|---|---|---|---|
| None | | | | | | |

| 22. DISPOSITION OF HOLE | BACKFILLED | MONITORING WELL | OTHER (SPECIFY) | 23. SIGNATURE OF INSPECTOR |
|---|---|---|---|---|
| | | MW-0 | | Brian A. Ruby |

| ELEV. a. | DEPTH b. | DESCRIPTION OF MATERIALS c. | FIELD SCREENING RESULTS d. | GEOTECH SAMPLE OR CORE BOX NO. e. | ANALYTICAL SAMPLE NO. f. | BLOW COUNTS g. | REMARKS h. |
|---|---|---|---|---|---|---|---|
| | 0 | 0-90% Cuttings: Silty sand (SM). Red (2.5YR 4/8) V. fn-fine, well rounded qtz grading to yellowish red fine sand @ 5' (SP) dry fine sand. | PID cal. w/ 100 ppm Isobutylene to Benzene R.F. B.G. = 0.0<br>LEL/$H_2S$ calib. to ambient air<br>LEL = 0%<br>$H_2S$ = 0 ppm | | | | Alluvium |
| | 1 | | | | | | |
| | 2 | | | | | | |
| | 3 | | | | | | |
| | 4 | | | | | | |
| | 5 | | | | | | |

PROJECT: CAFB LF 3/4 ph II — HOLE NO. MW-0

# HTW DRILLING LOG

HOLE NO. MW-0

PROJECT: CAFB LF-3/4 RFI Ph II

INSPECTOR: Brian J. Rudy

SHEET 2 OF 33 SHEETS

| ELEV. a. | DEPTH b. | DESCRIPTION OF MATERIALS c. | FIELD SCREENING RESULTS d. | GEOTECH SAMPLE OR CORE BOX NO e. | ANALYTICAL SAMPLE NO. f. | BLOW COUNTS g. | REMARKS h. |
|---|---|---|---|---|---|---|---|
| | 5 | Silty SAND (SM) same as above | | | | | Alluvium |
| | 6 | | | | | | |
| | 7 | | | | | | Alluvium |
| | 8 | | | | | | |
| | 9 | Core (SP)<br>9-9.8': Yellow red, poorly graded fine round sand with clasts of caliche floating in sandy matrix. | B.Z. = 0.0<br>BH = 0.0<br>H.S. = 0.0 | | | 10<br>12<br>15<br>14 | Sample @ 1220<br>N = 27<br>Rec = 2.0' |
| | 10 | 9.8 - 11' Caliche; fine round qtz sand w/ $CaCO_3$ cement, soft, dry, easily broken with fingers, continues to 19' | | | | | |
| | 11 | | | | | | |
| | 12 | | | | | | |
| | 13 | | | | | | |
| | 14 | | | | | | |

# HTW DRILLING LOG

HOLE NO. MW-D

PROJECT: CAFB LF 3/4 RFI

INSPECTOR: Brian J. Cady

SHEET 3 OF 53 SHEETS

| ELEV. a. | DEPTH b. | DESCRIPTION OF MATERIALS c. | FIELD SCREENING RESULTS d. | GEOTECH SAMPLE OR CORE BOX NO e. | ANALYTICAL SAMPLE NO. f. | BLOW COUNTS g. | REMARKS h. |
|---|---|---|---|---|---|---|---|
| | 15 | SAND (SP) same as above | | | | | Alluvium |
| | 16 | | | | | | |
| | 17 | | | | | | |
| | 18 | | | | | | |
| | 19 | Core: 19.5-20.5: Clay (CL) clean reddish yellow (7.5 YR 6/8) mod. plasticity, Dry. | BZ = 0.0<br>H.S = 0.0 | | | 23<br>47<br>50/5" | Sample @ 1810<br>Rec = 1.2'/1.5'<br>N = 97 |
| | 20 | 20.5-21: Caliche; fine sand w/ heavy $CaCO_3$ cement pink (7.5 YR 8/3) Dry. | | | | | |
| | 21 | silty SAND (SM), red-yellow (5YR 6/6) w/ fine, subangular qtz grains. caliche pebbles floating | | | | | Alluvium |
| | 22 | | | | | | |
| | 23 | | | | | | |
| | 24 | | | | | | |

# HTW DRILLING LOG

HOLE NO. MW-0

PROJECT: CAFB LF-3/4 RFI Ph II

INSPECTOR: Brian G. Kelly

SHEET 4 OF 33 SHEETS

| ELEV. a. | DEPTH b. | DESCRIPTION OF MATERIALS c. | FIELD SCREENING RESULTS d. | GEOTECH SAMPLE OR CORE BOX NO e. | ANALYTICAL SAMPLE NO. f. | BLOW COUNTS g. | REMARKS h. |
|---|---|---|---|---|---|---|---|
| | 24 | silty SAND (SM) same as above | PID cal. w/ 100 ppm isobutylene to Benzene R.F. BG = 0.0 BZ = 0.0 H.S. = 0.1 | | | | Alluvium Begin shift 7:00 10/26/94 |
| | 25 | Cuttings: 25-29' - Red yellow (5YR 6/6) silty sand (SM) with fine, sub-angular qtz grains. Caliche pebbles floating. | | | | | |
| | 26 | | | | | | |
| | 27 | | | | | | |
| | 28 | | | | | | |
| | 29 | Core 29 - 30.5 - Interbedded fine sand and silt (SM) with thin caliche layers (up to .9'). Sand is yellowish red (5YR 7/4), caliche is reddish yellow (5YR 7/6) and cements silty sand. Some hard unt clasts of caliche as stuff indicate more massive caliche zones also present. | | | | 43<br>45<br>50/4" | Sample @ 740<br>N = 95<br>Rec = 1.3/1.3 |
| | 30 | | | | | | |
| | 31 | | | | | | |
| | 32 | | | | | | |
| | 33 | | | | | | |

# HTW DRILLING LOG

PROJECT: CAFB LF 3/4 RFI PhII

INSPECTOR: Brian J. Kelly

HOLE NO.: MW-D

SHEET 5 OF 33 SHEETS

| ELEV. a. | DEPTH b. | DESCRIPTION OF MATERIALS c. | FIELD SCREENING RESULTS d. | GEOTECH SAMPLE OR CORE BOX NO e. | ANALYTICAL SAMPLE NO. f. | BLOW COUNTS g. | REMARKS h. |
|---|---|---|---|---|---|---|---|
| | 34 | Silty SAND (SM) same as above<br><br>Cuttings<br>30.5 - 39: Varigated zone of soft unconsolidated silty sand (SM) with massive, hard ~~caliche~~ to soft and chalky caliche layers. Sand is pink with $CaCO_3$ dendrites, fx filling and void filling. | | | | | Alluvium |
| | 35 | | | | | | |
| | 36 | | | | | | |
| | 37 | | | | | | |
| | 38 | | | | | | |
| | 39 | Core<br>39-41: Silty sand (SM) v. similar to 29-30.5' interval. Reddish yellow, fine - v. fine sand, with locally heavy $CaCO_3$ cement. | BZ = 0.0<br>H.S. = 0.0 | | | 26<br>29<br>25<br>20 | Sample @ 800<br>N = 54<br>R = 1.5/2.0 |
| | 40 | | | | | | |
| | 41 | | | | | X | |
| | 42 | | | | | | |
| | 43 | | | | | | |

# HTW DRILLING LOG

HOLE NO. MW-O

PROJECT: CAFB LF 3/4 RFI PH II

INSPECTOR: Brian A. Ruby

SHEET 6 OF 33 SHEETS

| ELEV. a. | DEPTH b. | DESCRIPTION OF MATERIALS c. | FIELD SCREENING RESULTS d. | GEOTECH SAMPLE OR CORE BOX NO e. | ANALYTICAL SAMPLE NO. f. | BLOW COUNTS g. | REMARKS h. |
|---|---|---|---|---|---|---|---|
| | | silty SAND (Sm) same as above | | | | | Alluvium |
| | 44 | | | | | | |
| | 45 | | | | | | |
| | 46 | Cuttings: | | | | | |
| | | 46-47: Pinkish gray, sandy limestone cobbles, then reddish yellow (5YR 6/6) silty sand as above. | | | | | |
| | 47 | | | | | | |
| | 48 | | | | | | |
| | 49 | Core | | | | | |
| | | 49-50.1: Fragments of sandy LS cobbles in silty sand matrix. Abnt $CaCO_3$ in matrix, but soft and dry. Red-yellow as above. | B.Z. = 0.0<br>H.S. = 0.0 | | | 5<br>8<br>27<br>26 | Sample @ 820<br>Rec. = 1.1<br>N = 35 |
| | 50 | (SM) | | | | | Alluvium |
| | | Cuttings | | | | | |
| | | 50-59: Gravelly sand (SP), Cobbles of limey sand/sandy LS coming up w pink silty sand. | | | | | |
| | 51 | | | | | | |
| | 52 | | | | | | |

# HTW DRILLING LOG

HOLE NO. MW-0

PROJECT: CAFB LF 3/4 RFI Ph II

INSPECTOR: Brian J. Cody

SHEET 7 OF 33 SHEETS

| ELEV. a. | DEPTH b. | DESCRIPTION OF MATERIALS c. | FIELD SCREENING RESULTS d. | GEOTECH SAMPLE OR CORE BOX NO e. | ANALYTICAL SAMPLE NO. f. | BLOW COUNTS g. | REMARKS h. |
|---|---|---|---|---|---|---|---|
| | 53 | gravelly SAND (SP) same as above | | | | | Alluvium |
| | 54 | | | | | | |
| | 55 | | | | | | |
| | 56 | | | | | | |
| | 57 | | | | | | |
| | 58 | | | | | | |
| | 59 | CORE<br>59-60.6: Silty sand (SM) reddish yellow (5 YR 6/6). Angular-subround, soft unconsolidated, fine to V. fine qtz sand. Non-calcic | B.Z = 0.0<br>H.S. = 0.0 | | | 7<br>11<br>12<br>15 | Alluvium<br>59' - Possible top of Ogallala?<br>Sample @ 840<br>N = 23<br>Rec. = 1.6/2.0 |
| | 60 | | | | | | |
| | 61 | silty SAND (SM), V. soft, unconsolidated, v. fine to fine qtz. sand | | | | X | Alluvium |
| | 62 | | | | | | |

# HTW DRILLING LOG

PROJECT: CAFB LF 3/4 RFI Ph II | INSPECTOR: Brian J. Reilly | HOLE NO.: MW-O | SHEET 8 OF 53 SHEETS

| ELEV. a. | DEPTH b. | DESCRIPTION OF MATERIALS c. | FIELD SCREENING RESULTS d. | GEOTECH SAMPLE OR CORE BOX NO e. | ANALYTICAL SAMPLE NO. f. | BLOW COUNTS g. | REMARKS h. |
|---|---|---|---|---|---|---|---|
| | 62 | Silty SAND (SM) same as above | | | | | Alluvium |
| | | Cuttings | | | | | |
| | | 61-69': Silty sand (SM) | | | | | |
| | 63 | V. soft, unconsolidated, V. fine to fine ~~sand.~~ qtz sand. | | | | | |
| | 64 | | | | | | |
| | 65 | | | | | | |
| | 66 | | | | | | |
| | 67 | | | | | | |
| | 68 | | | | | | |
| | | Core | | | | | |
| | 69 | 69-70.5: Silty sand (SM) | | | | 6 | Sample @ 85θ |
| | | brown (7.5 YR 5/4) Round - subang, | BZ = 0.0 | | | 13 | N = 28 |
| | | fine - med grain qtz. More | BH = 0.0 | | | 15 | Rec = 1.5/2.0 |
| | 70 | pronounced quantity of well | H.S. = 0.0 | | | 27 | |
| | | rounded, clear qtz grains. Damp. | | | | | |
| | | Non-calcic, soft, unconsolidated, | | | | | |
| | | with occ. clasts of moderately | | | | | |
| | | cemented calcic sand. | | | | | |
| | 71 | | | | | | |

# HTW DRILLING LOG

HOLE NO. MW-0

PROJECT CAFB LF 3/4 RFI Ph II

INSPECTOR Brian J. Ruby

SHEET 9 OF 33 SHEETS

| ELEV. a. | DEPTH b. | DESCRIPTION OF MATERIALS c. | FIELD SCREENING RESULTS d. | GEOTECH SAMPLE OR CORE BOX NO e. | ANALYTICAL SAMPLE NO. f. | BLOW COUNTS g. | REMARKS h. |
|---|---|---|---|---|---|---|---|
| | 72 | Silty SAND (SM) same as above | | | | | Alluvium |
| | 73 | | | | | | |
| | 74 | | | | | | |
| | 75 | | | | | | |
| | 76 | | | | | | |
| | 77 | | | | | | |
| | 78 | | | | | | |
| | 79 | Core<br>79-81: Poorly graded sand (SP) Fine to v. fine sand, reddish yellow (5 YR 6/6), soft, unconsolidated. Subang-subround qtz, non-calcrc. Cobbles of calcic cemented fine sand floating in soft matrix. Damp. | BZ = 0.0<br>BH = 0.0<br>H.S. = 0.0 | | | 6<br>11<br>19<br>36 | Alluvium<br>Sample @ 91B<br>N = 30<br>Rec = 1.8/2.0 |
| | 80 | | | | | | |
| | 81 | | | | | | |

PROJECT CAFB LF 3/4 RFI ph II HOLE NO. MW-0

# HTW DRILLING LOG

HOLE NO. MW-0

PROJECT: CAFB LF 3/4 RFI Ph II

INSPECTOR: [signature]

SHEET 10 OF 53 SHEETS

| ELEV. a. | DEPTH b. | DESCRIPTION OF MATERIALS c. | FIELD SCREENING RESULTS d. | GEOTECH SAMPLE OR CORE BOX NO e. | ANALYTICAL SAMPLE NO. f. | BLOW COUNTS g. | REMARKS h. |
|---|---|---|---|---|---|---|---|
| | 81 | SAND (SP) Same as above<br><br>Cuttings: 81-89 - Same as above | | | | | Alluvium |
| | 82 | | | | | | |
| | 83 | | | | | | |
| | 84 | | | | | | |
| | 85 | | | | | | |
| | 86 | | | | | | |
| | 87 | | | | | | |
| | 88 | | | | | | |
| | 89 | Core<br>89-90.5: Poorly graded sand (SP), V. fine - fine qtz, Round to subangular. Reddish yellow (7.5YR 6/6). Soft, unconsolidated, damp, non-calcrc. | BZ = 0.0<br>BH = 0.0<br>H.S.: 0.0 | | | 10<br>19<br>27<br>35 | Sample @ 925<br>N = 46<br>Rec = 1.5/2.0 |
| | 90 | | | | | | |

PROJECT CAFB LF 3/4 ph II RFI HOLE NO. MW-0

# HTW DRILLING LOG

HOLE NO. MW-O

PROJECT: CAFB LF 3/4 RFI Ph II

INSPECTOR: Brian J. Parks

SHEET 11 OF 33 SHEETS

| ELEV. a. | DEPTH b. | DESCRIPTION OF MATERIALS c. | FIELD SCREENING RESULTS d. | GEOTECH SAMPLE OR CORE BOX NO e. | ANALYTICAL SAMPLE NO. f. | BLOW COUNTS g. | REMARKS h. |
|---|---|---|---|---|---|---|---|
| | | SAND (SP) Same as above | | | | | Alluvium |
| | 91 | Cuttings: | | | | | |
| | | 90.5-99: Same as above | | | | | |
| | 92 | | | | | | |
| | 93 | | | | | | |
| | 94 | | | | | | |
| | 95 | | | | | | |
| | 96 | | | | | | |
| | 97 | | | | | | |
| | 98 | | | | | | |
| | | Core: | | | | | |
| | 99 | 99-100.6 - Silty sand (SM). Fine, round-subround qtz sand, w/ Appx 25% silt. Soft, unconsolidated, non-calcic and damp. Red-Yellow (7.5 YR 6/6) | BZ = 0.0<br>BH = 0.0<br>H.S. = 0.0 | | | 11<br>18<br>25<br>39 | Sample @ 945<br>N = 43<br>Rec = 1.6/2.0 |
| | 100 | | | | | | |

# HTW DRILLING LOG

| PROJECT | INSPECTOR | HOLE NO. | SHEET | OF |
|---|---|---|---|---|
| CAFB LF 3/4 RFI Ph II | Brian G. Hurley | MW-O | 12 | 33 SHEETS |

| ELEV. a. | DEPTH b. | DESCRIPTION OF MATERIALS c. | FIELD SCREENING RESULTS d. | GEOTECH SAMPLE OR CORE BOX NO e. | ANALYTICAL SAMPLE NO. f. | BLOW COUNTS g. | REMARKS h. |
|---|---|---|---|---|---|---|---|
| | 100 | silty SAND (SM) same as above | | | | | Alluvium sample continued from above |
| | 101 | Cuttings 101-109: Same as above, w/ zones of moderately consolidated sand or cobbles with $CaCO_3$ Cement. | | | | | |
| | 102 | | | | | | |
| | 103 | | | | | | |
| | 104 | | | | | | |
| | 105 | | | | | | |
| | 106 | | | | | | |
| | 107 | | | | | | |
| | 108 | | | | | | |
| | 109 | SAND (SP) see description below | | | | 5 | Alluvium |

# HTW DRILLING LOG

PROJECT: CAFB LF 3/4 RFI PH II

INSPECTOR: Brian J. Busby

HOLE NO. MW-0

SHEET 13 OF 33 SHEETS

| ELEV. a. | DEPTH b. | DESCRIPTION OF MATERIALS c. | FIELD SCREENING RESULTS d. | GEOTECH SAMPLE OR CORE BOX NO e. | ANALYTICAL SAMPLE NO. f. | BLOW COUNTS g. | REMARKS h. |
|---|---|---|---|---|---|---|---|
| | 110 | ~~SAND (SP) same as above~~ Core: 109-110.5' - Poorly graded Sand (SP). Very well sorted fine sand, well rounded to Subround qtz, very clean, non-calcrc. Reddish yellow (7.5YR 6/8). Soft and unconsolidated, damp. | BZ = 0.0<br>H.S = 0.0<br>BH = 0.0 | | | 16<br>32<br>50 | ~~Alluvium~~<br>Sample @ 1010<br>N = 48<br>Rec = 1.5/2.0 |
| | 111 | | | | | | |
| | 112 | | | | | | 1040: Early lunch - Compressor solenoid breaks, drillers go purchase parts. |
| | 113 | | | | | | |
| | 114 | | | | | | |
| | 115 | | | | | | |
| | 116 | | | | | | |
| | 117 | | | | | | |
| | 118 | | | | | | |
| | 119 | | | | | | |

# HTW DRILLING LOG

HOLE NO. MW-O

PROJECT: CAFB LF 3/4 RFI # PhII

INSPECTOR: Brian A. Conley

SHEET 14 OF 33 SHEETS

| ELEV. a. | DEPTH b. | DESCRIPTION OF MATERIALS | FIELD SCREENING RESULTS d. | GEOTECH SAMPLE OR CORE BOX NO e. | ANALYTICAL SAMPLE NO. f. | BLOW COUNTS g. | REMARKS h. |
|---|---|---|---|---|---|---|---|
| | 119 | SAND (SP) same as above | | | | | Alluvium |
| | | Core 119-120.7 - Poorly graded sand (SP), fine, sub-round - subangular qtz, with localized $CaCO_3$ dissemination and clasts of $CaCO_3$ cemented fine sandstone, v. similar to host sand. Damp. Reddish yellow, soft. | | | | 9 | Sampled @ 1300 |
| | | | | | | 23 | Rec. = 1.7'/1.7' |
| | 120 | | HS = 0.3 | | | 48 | N = 71 |
| | | | | | | 50/3" | |
| | 121 | | | | | | |
| | 122 | | | | | | |
| | 123 | | | | | | |
| | 124 | | | | | | |
| | 125 | | | | | | |
| | 126 | | | | | | |
| | 127 | | | | | | |
| | 128 | | | | | | |

# HTW DRILLING LOG

PROJECT: CAFB ~~#~~ LF 3/4 RFI Ph II

INSPECTOR: Brian Gilday

HOLE NO.: MW-0

SHEET 15 OF 33 SHEETS

| ELEV. a. | DEPTH b. | DESCRIPTION OF MATERIALS c. | FIELD SCREENING RESULTS d. | GEOTECH SAMPLE OR CORE BOX NO e. | ANALYTICAL SAMPLE NO. f. | BLOW COUNTS g. | REMARKS h. |
|---|---|---|---|---|---|---|---|
| | | SAND(SP) same as above | | | | | Alluvium |
| | 129 | Core: | | | | | |
| | | 129-130.5 - Silty Sand (SM). V. fine - fine grain qtz, sub-angular to subround with $CaCO_3$. Soft, damp, unconsolidated w/ occ. clasts of $CaCO_3$ cemented SS. Reddish yellow (7.5 YR 6/6) | B.Z.= 0.0<br>H.S.= 0.1 | | | 11<br>25<br>44<br>50/5" | Alluvium<br>Sampled @ 1330<br>N=69<br>Rec. = 1.5'/1.9' |
| | 130 | | | | | | |
| | 131 | | | | | | |
| | 132 | | | | | | |
| | 133 | | | | | | |
| | 134 | | | | | | |
| | 135 | | | | | | |
| | 136 | | | | | | |
| | 137 | | | | | | |
| | 138 | | | | | | |

# HTW DRILLING LOG

HOLE NO. MW-0

PROJECT: CAFB LF 3/4 RFI PhII

INSPECTOR: Brian [illegible]

SHEET 16 OF 33 SHEETS

| ELEV. a. | DEPTH b. | DESCRIPTION OF MATERIALS c. | FIELD SCREENING RESULTS d. | GEOTECH SAMPLE OR CORE BOX NO e. | ANALYTICAL SAMPLE NO. f. | BLOW COUNTS g. | REMARKS h. |
|---|---|---|---|---|---|---|---|
| | | Silty SAND (SM) same as above | | | | | Alluvium |
| | | Core | | | | | Alluvium |
| | 139 | 139-140.7: Poorly graded sand (SP). Very fine - fine grained qtz, round - subangular, soft, damp. No clasts, v. clean. Reddish yellow (7.5 YR 6/6) | BZ = 0.0<br>H.S. = 0.2<br>BH = 0.1 | | | 9<br>25<br>50<br>50/5" | Sampled @ 1345<br>N = 75<br>Rec = 1.7/1.8' |
| | 140 | Trace MnOx as disseminations | | | | | |
| | 141 | | | | | | |
| | 142 | | | | | | |
| | 143 | Cuttings 141-149 - Same as above | | | | | |
| | 144 | | | | | | |
| | 145 | | | | | | |
| | 146 | | | | | | |
| | 147 | | | | | | |

# HTW DRILLING LOG

| PROJECT | INSPECTOR | HOLE NO. | SHEET |
|---|---|---|---|
| CAFB LF-3/4 RFI Ph II | Brian J. Rudy | MW-0 | 17 OF 33 SHEETS |

| ELEV. a. | DEPTH b. | DESCRIPTION OF MATERIALS c. | FIELD SCREENING RESULTS d. | GEOTECH SAMPLE OR CORE BOX NO e. | ANALYTICAL SAMPLE NO. f. | BLOW COUNTS g. | REMARKS h. |
|---|---|---|---|---|---|---|---|
| | 148 | SAND (SP) Same as above | | | | | Alluvium |
| | 149 | Core | | | | | |
| | | 149 - 150.5: Poorly graded fine sand (SP). Round - subangular qtz with occ. clasts of $CaCO_3$ cemented sandstone floating in matrix. Non-calcic, soft and damp, with MnOx disseminations. | BZ = 0.0<br>BH = 0.0<br>H.S. = 0.0 | | | 8<br>44<br>50/4" | Sampled @ 1420<br>Rec = 1.4/1.4<br>N = 94 |
| | 150 | | | | | | |
| | 151 | | | | | | |
| | 152 | | | | | | |
| | 153 | | | | | | |
| | 154 | | | | | | |
| | 155 | | | | | | |
| | 156 | | | | | | |
| | 157 | | | | | | |

# HTW DRILLING LOG

HOLE NO. MW-O

PROJECT: CAFB LF 3/4 RFI Ph II

INSPECTOR: Brian J. Rudy

SHEET 19 OF 33 SHEETS

| ELEV. a. | DEPTH b. | DESCRIPTION OF MATERIALS c. | FIELD SCREENING RESULTS d. | GEOTECH SAMPLE OR CORE BOX NO e. | ANALYTICAL SAMPLE NO. f. | BLOW COUNTS g. | REMARKS h. |
|---|---|---|---|---|---|---|---|
| | 157 | SAND (SP) same as above | | | | | Alluvium |
| | 158 | | | | | | |
| | | Core | | | | | |
| | 159 | 159-160.4: Poorly graded sand (SP), similar in all respects to interval above. Damp | | | | 6<br>45<br>50/4" | Sampled @ 1445,<br>N = 95<br>Rec. = 1.4'/1.4' |
| | 160 | | | | | | |
| | 161 | Cuttings | | | | | |
| | | 161-169: More abnt cobbles of calcic cemented sandstone. This sandstone is a densely packed, well rounded, fine sand, with distinct dissolution features on the weathered exterior. Reddis Yellow (7.5 YR 6/6) Damp. | | | | | Are cobbles w/ dissolution features a depositional feature, or calcic beds affected by percolating groundwater? |
| | 162 | | | | | | |
| | 163 | | | | | | |
| | 164 | | | | | | |
| | 165 | | | | | | |
| | 166 | | | | | | |

# HTW DRILLING LOG

HOLE NO. MW-0

PROJECT: CAFB LF 3/4 RFI Ph II

INSPECTOR: Brian J. Smith

SHEET 19 OF 33 SHEETS

| ELEV. a. | DEPTH b. | DESCRIPTION OF MATERIALS c. | FIELD SCREENING RESULTS d. | GEOTECH SAMPLE OR CORE BOX NO e. | ANALYTICAL SAMPLE NO. f. | BLOW COUNTS g. | REMARKS h. |
|---|---|---|---|---|---|---|---|
| | 167 | SAND (SP) same as above | | | | | Alluvium |
| | 168 | | | | | | |
| | 169 | Core 169 - 170.4 : Poorly graded sand (SP). well sorted, fine qtz, slightly calcic locally, soft, reddish yellow (7.5YR 6/6) V. clean, damp. | BZ = 0.0<br>B.H. = 0.1<br>H.S. = 0.0 | | | 10<br>32<br>50/4" | Sampled @ 1520<br>N = 82<br>Rec = 1.4/1.4' |
| | 170 | | | | | | |
| | 171 | Cuttings 171-179 : (SP) As above, v. clean fine sand, soft with occ. cobbles of $CaCO_3$ cemented ss, fine grained, w/ dissolution features (worm burrows, stems etc.) Damp reddish yellow. | | | | | |
| | 172 | | | | | | |
| | 173 | | | | | | |
| | 174 | | | | | | |
| | 175 | | | | | | |
| | 176 | | | | | | |

# HTW DRILLING LOG

HOLE NO. MW-D

PROJECT CAFB LF 3/4 RFI PH II

INSPECTOR [signature]

SHEET 20 OF 33 SHEETS

| ELEV. a. | DEPTH b. | DESCRIPTION OF MATERIALS c. | FIELD SCREENING RESULTS d. | GEOTECH SAMPLE OR CORE BOX NO e. | ANALYTICAL SAMPLE NO. f. | BLOW COUNTS g. | REMARKS h. |
|---|---|---|---|---|---|---|---|
| | 176 | SAND (SP) same as above | | | | | Alluvium |
| | 177 | silty SAND (SM) see description below | | | | | Alluvium |
| | 178 | | | | | | |
| | 179 | Core<br>179 - 180.4: Silty sand (SM). V. fine - fine grained, round - sub-angular qtz. Soft, unconsolidated. Reddish yellow (5YR 6/6). Damp, w/ clast of well indurated, fine ~~SS~~ grained, carbonate cemented SS recovered (1.25" x 3") | B.Z. = 0.0<br>H.S. = 0.0 | | | 6<br>20<br>50/5" | Sample @ 1545<br>N = 70<br>Rec = 1.4/1.4' |
| | 180 | | | | | | |
| | 181 | | | | | | |
| | 182 | | | | | | |
| | 183 | | | | | | |
| | 184 | | | | | | |
| | 185 | | | | | | |

# HTW DRILLING LOG

HOLE NO. MW-0

PROJECT: CAFB LF-3/4 RFI Ph II

INSPECTOR: Brian J. Purdy

SHEET 21 OF 33 SHEETS

| ELEV. a. | DEPTH b. | DESCRIPTION OF MATERIALS c. | FIELD SCREENING RESULTS d. | GEOTECH SAMPLE OR CORE BOX NO e. | ANALYTICAL SAMPLE NO. f. | BLOW COUNTS g. | REMARKS h. |
|---|---|---|---|---|---|---|---|
| | 186 | Silty SAND (SM) same as above | | | | | Alluvium |
| | 187 | | | | | | |
| | 188 | | | | | | |
| | 189 | | | | | | |
| | 190 | Core<br>190-191.4: Silty Sand (SM) Reddish yellow (5YR 6/6). Moist V. fine-fine grained qtz, round to subangular, soft, unconsolidated, non-calcrc. | BZ = 0.0<br>H.S. = 0.0<br>BH = 0.0 | | | 14<br>33<br>50/4" | Sample @ 1615<br>N = 83<br>Rec = 1.4/1.4 |
| | 191 | | | | | | |
| | 192 | | | | | | |
| | 193 | | | | | | |
| | 194 | | | | | | |
| | 195 | | | | | | |

# HTW DRILLING LOG

HOLE NO. MW-0

PROJECT: CAFB LF 3/4 RFI Ph II

INSPECTOR: Brian J. Purdy

SHEET 22 OF 33 SHEETS

| ELEV. a. | DEPTH b. | DESCRIPTION OF MATERIALS c. | FIELD SCREENING RESULTS d. | GEOTECH SAMPLE OR CORE BOX NO e. | ANALYTICAL SAMPLE NO. f. | BLOW COUNTS g. | REMARKS h. |
|---|---|---|---|---|---|---|---|
| | 195 | Silty SAND (SM) same as above | | | | | Alluvium |
| | | Cuttings 194-200': Cuttings continue to show cobbles and clasts of $CaCO_3$ cemented, fine, rounded ss. | | | | | |
| | 196 | | | | | | |
| | 197 | | | | | | |
| | 198 | | | | | | |
| | 199 | | | | | | |
| | 200 | Core | | | | | |
| | | 200 - 201.6: Silty sand (SM) as above, with erratic pebbles and gravel of lime cemented fine ss at 200.4'-200.8' & @ 201 - 201.6. moist, soft & unconsolidated. | HS = 0.0 | | | 12<br>35<br>50/5" | Sampled @ 1640<br>N = 85<br>Rec = 1.6/1.5' |
| | 201 | | | | | | |
| | 202 | | | | | | |
| | 203 | | | | | | |
| | 204 | | | | | | |

# HTW DRILLING LOG

HOLE NO. MW-0

PROJECT: CAFB LF 3/4 RFI PhII

INSPECTOR: Brian J. Kelly

SHEET 23 OF 33 SHEETS

| ELEV. a. | DEPTH b. | DESCRIPTION OF MATERIALS c. | FIELD SCREENING RESULTS d. | GEOTECH SAMPLE OR CORE BOX NO e. | ANALYTICAL SAMPLE NO. f. | BLOW COUNTS g. | REMARKS h. |
|---|---|---|---|---|---|---|---|
| | 205 | silty SAND(SM) same as above<br>202-210: Cuttings show erratic cobbles and gravel of limey sandstone in soft, silty sand as above. | | | | | Alluvium |
| | 206 | | | | | | |
| | 207 | | | | | | |
| | 208 | | | | | | |
| | 209 | | | | | | |
| | 210 | Core<br>210-211.5: Silty sand (SM) Strong brown (7.5 YR 5/6). Non-calcic, damp, subangular with some rounded grains. V. soft. Unconsolidated. | BZ = 0.0<br>HS = 0.0 | | | 6<br>24<br>39<br>47 | Sampled @ 1720<br>N = 63<br>Rec = 1.5/2.0 |
| | 211 | | | | | | |
| | 212 | | | | | | |
| | 213 | | | | | | |
| | 214 | | | | | | |

# HTW DRILLING LOG

PROJECT: CAFB LF 3/4 RFI Ph II

INSPECTOR: Brian G. Rich

HOLE NO. MW-0

SHEET 24 OF 33 SHEETS

| ELEV. a. | DEPTH b. | DESCRIPTION OF MATERIALS c. | FIELD SCREENING RESULTS d. | GEOTECH SAMPLE OR CORE BOX NO e. | ANALYTICAL SAMPLE NO. f. | BLOW COUNTS g. | REMARKS h. |
|---|---|---|---|---|---|---|---|
| | | silty SAND (SM) same as above | | | | | Alluvium |
| | 215 | | | | | | |
| | 216 | | | | | | |
| | 217 | | | | | | |
| | 218 | | | | | | |
| | 219 | | | | | | |
| | | Core | | | | | |
| | 220 | 220-221.3: Sandy silt as above (SM). Damp with clasts of sandstone occurring every .3-.4' in core. Sandstone is similar to unconsolidated sand matrix, except has $CaCO_3$ cement. | B.Z. = 0.0<br>H.S = 0.0 | | | 28<br>47<br>50/4" | Sampled @ 1745<br>N = 97<br>Rec = 1.3/1.4 |
| | 221 | | | | | | |
| | 222 | | | | | | |
| | 223 | | | | | | |

# HTW DRILLING LOG

PROJECT: CAFB LF 3/4 RFI Ph II

INSPECTOR: [signature]

HOLE NO.: MW-0

SHEET 25 OF 33 SHEETS

| ELEV. a. | DEPTH b. | DESCRIPTION OF MATERIALS c. | FIELD SCREENING RESULTS d. | GEOTECH SAMPLE OR CORE BOX NO e. | ANALYTICAL SAMPLE NO. f. | BLOW COUNTS g. | REMARKS h. |
|---|---|---|---|---|---|---|---|
| | 224 | silty SAND (SM) same as above<br>221-230: SM as above, from cuttings. | | | | | Alluvium |
| | 225 | | | | | | |
| | 226 | | | | | | |
| | 227 | | | | | | |
| | 228 | | | | | | |
| | 229 | | | | | | |
| | 230 | Core<br>230-231.5: Sandy Silt (SM) with erratic limey cobbles as above. Matrix is fine - v. fine, subround to subangular qtz. Calcic only near clasts, as they appear to be weathering. Soft, Damp. | B.Z. = 0.0<br>H.S. = 0.0 | | | 16<br>30<br>48<br>44 | Sampled @ 1815<br>N = 78<br>Rec = 1.5/2.0<br>END of SHIFT |
| | 231 | | | | | | |
| | 232 | | | | | | |
| | 233 | | | | | | |

# HTW DRILLING LOG

HOLE NO. MW-O

PROJECT: CAFB LF 3/4 RFI Ph II

INSPECTOR: Brian G. Hurley

SHEET 26 OF 33 SHEETS

| ELEV. a. | DEPTH b. | DESCRIPTION OF MATERIALS c. | FIELD SCREENING RESULTS d. | GEOTECH SAMPLE OR CORE BOX NO e. | ANALYTICAL SAMPLE NO. f. | BLOW COUNTS g. | REMARKS h. |
|---|---|---|---|---|---|---|---|
| | | silty SAND(SM) same as above | | | | | Alluvium |
| | 234 | | | | | | |
| | 235 | | | | | | |
| | 236 | | | | | | |
| | 237 | | | | | | |
| | 238 | | PID cal. to 57 ppm (Benzene R.F) w/ 100 ppm isobutylene. | | | | Start Shift @ 1415, 10/27/94 after digging up diesel spill. |
| | 239 | | B.G. = 0.1<br>B.Z. = 0.1 | | | | |
| | 240 | Core<br>240 - 241.7: Upper .3' is Calcic cemented fine grained SS, V. dense. Lower 1.5' is Silty Sand (SM), red yellow (7.5YR 6/6), soft and unconsolidated. Sand is round to subangular qtz, V. Similar to all sand drilled to this depth. | B.Z. = 0.1<br>H.S. = 0.2 | | | 11 | Sampled @ 1430 |
| | 241 | | B.H. = 0.1 | | | 18<br>33<br>50/5" | N = 51<br>Rec. = 1.7/1.9' |
| | 242 | | | | | | |

# HTW DRILLING LOG

HOLE NO. MW-0

PROJECT: CAFB LF 3/4 RFI Ph II

INSPECTOR: Brian J. Parks

SHEET 27 OF 33 SHEETS

| ELEV. a. | DEPTH b. | DESCRIPTION OF MATERIALS c. | FIELD SCREENING RESULTS d. | GEOTECH SAMPLE OR CORE BOX NO e. | ANALYTICAL SAMPLE NO. f. | BLOW COUNTS g. | REMARKS h. |
|---|---|---|---|---|---|---|---|
| | | Silty SAND (SM) same as above | | | | | Alluvium |
| | 243 | | | | | | |
| | 244 | | | | | | |
| | 245 | 245 - Cuttings show thicker bed of calcic ss with dissolution textures, .5-1.0' thick at this depth. Paleocaliche, or lakebed, or calcic member? | | | | | |
| | 246 | | | | | | |
| | 247 | | | | | | |
| | 248 | | | | | | |
| | 249 | | | | | | |
| | 250 | Core<br>250 - 251.8: Silty sand (SM), as above. Reddish yellow (7.5 YR 6/6). Calcic ss clast 2" x 2" @ 250 - 250.1', followed by .8' of soft sand and silt with abnt chalky wht $CaCO_3$ matrix (caliche?) | BZ = 0.2<br>H.S = 0.1 | | | 17<br>27<br>35<br>36 | Sample @ 1510<br>N = 62<br>Rec = 1.8/2.0 |
| | 251 | 250.8 - 251.8 - Sandy silt, (SM) non-calcic, v. fine - fine, subangular to round qtz grains soft, unconsolidated DAMP. | | | | | |
| | 252 | | | | | | |

PROJECT: CAFB LF 3/4 pt II RFI | HOLE NO. MW-0

# HTW DRILLING LOG

HOLE NO. MW-O

PROJECT: CAFB LF 3/4 RFI Ph II

INSPECTOR: Brian G. Purdy

SHEET 28 OF 33 SHEETS

| ELEV. a. | DEPTH b. | DESCRIPTION OF MATERIALS c. | FIELD SCREENING RESULTS d. | GEOTECH SAMPLE OR CORE BOX NO e. | ANALYTICAL SAMPLE NO. f. | BLOW COUNTS g. | REMARKS h. |
|---|---|---|---|---|---|---|---|
| | | Silty SAND (SM) same as above | | | | | Alluvium |
| | 253 | | | | | | |
| | 254 | | | | | | |
| | 255 | | | | | | |
| | 256 | | | | | | |
| | 257 | | | | | | |
| | 258 | Core<br>258-259.7': Silty Sand (SM) w/ erratic sandstone cobbles. Light brown (7.5 YR 6/4), v. fine to fine sand w/ subangular to round grains. Equal parts sand to silt. Soft, non-calcic except for clasts and cobbles. | BZ = 0.2<br>HS = 0.0 | | | 14<br>34<br>45<br>50 | Sample @ 1550<br>N = 79<br>Rec = 1.7/2.0 |
| | 259 | | | | | | |
| | 260 | | | | | | |
| | 261 | | | | | | |

# HTW DRILLING LOG

HOLE NO. MW-0

PROJECT: CAFB LF 3/4 RFI PH II

INSPECTOR: Brian Q. Rich

SHEET 29 OF 33 SHEETS

| ELEV. a. | DEPTH b. | DESCRIPTION OF MATERIALS c. | FIELD SCREENING RESULTS d. | GEOTECH SAMPLE OR CORE BOX NO e. | ANALYTICAL SAMPLE NO. f. | BLOW COUNTS g. | REMARKS h. |
|---|---|---|---|---|---|---|---|
| | 262 | silty SAND(SM) same as above | | | | | Alluvium |
| | 263 | | | | | | |
| | 264 | | | | | | |
| | 265 | SAND(SP) see description below | | | | | Alluvium |
| | 266 | | | | | | |
| | 267 | | | | | | |
| | 268 | Core | | | | | |
| | | 268 - 269.5: Poorly graded sand, fine, w/ sharp contact w/ med. grained, well rounded, soft sand @ 268.8: Very clean, <5% silt, non-calcic, v. well sorted. Clast of weak red claystone @ 268.5 - 268.8. | BZ = 0.0<br>H.S. = 0.0 | | | 14<br>34<br>50/4" | Sample @ 1632<br>N = 84<br>Rec = 1.5/1.3' |
| | 269 | | | | | | |
| | 270 | | | | | | |
| | 271 | | | | | | |

# HTW DRILLING LOG

HOLE NO. MW-0

PROJECT: CAFB LF 3/4 RFI Ph II

INSPECTOR: Brian J. Dehy

SHEET 30 OF 33 SHEETS

| ELEV. a. | DEPTH b. | DESCRIPTION OF MATERIALS c. | FIELD SCREENING RESULTS d. | GEOTECH SAMPLE OR CORE BOX NO e. | ANALYTICAL SAMPLE NO. f. | BLOW COUNTS g. | REMARKS h. |
|---|---|---|---|---|---|---|---|
| | | SAND (SP) same as above | | | | | Alluvium |
| | | Cuttings | | | | | |
| | 272 | 270-279: Poorly graded sand (SP). Very well sorted, fine, pink (7.5YR 8/2) sand with occ. | | | | | |
| | 273 | clasts of claystone up to 3" diameter, apparently floating in the sand matrix. Claystone is weak red. Damp. | | | | | |
| | 274 | | | | | | |
| | 275 | | | | | | |
| | 276 | | | | | | |
| | 277 | | | | | | |
| | 278 | | | | | | Water level @ 278.2' after taking 279-281' sample. Stabilized @ 278.3 after 13 hrs |
| | | Core | | | | | |
| | 279 | 279.1-289.1: Fine to med. grained, poorly graded sand (SP) w/ Appx 10% Silt. Round-subang. Qtz grains. Brown (7.5 YR 5/4). | BZ = 0.0 | | | | Sample @ 1710 |
| | | | BH = 0.0 | MW-0 | | 10 | N = 56 |
| | | | HS = 0.0 | 280 | | 23 | Rec = 2.0/2.0' |
| | 280 | Erratic clasts of $CaCO_3$ cemented SS at top of run. | | | | 33 | |
| | | Saturated: | | | | 39 | |

# HTW DRILLING LOG

PROJECT: CAFB LF 3/4 RFI Ph II

INSPECTOR: Brian J. Rooney

HOLE NO.: MW-0

SHEET 31 OF 33 SHEETS

| ELEV. a. | DEPTH b. | DESCRIPTION OF MATERIALS c. | FIELD SCREENING RESULTS d. | GEOTECH SAMPLE OR CORE BOX NO e. | ANALYTICAL SAMPLE NO. f. | BLOW COUNTS g. | REMARKS h. |
|---|---|---|---|---|---|---|---|
| | 281 | SAND (SP) Same as above | | | | | Alluvium sample continued from above |
| | 282 | | | | | | |
| | 283 | | | | | | |
| | 284 | | | | | | |
| | 285 | | | | | | |
| | 286 | | | | | | |
| | 287 | Core<br>287.7-289.9: Poorly graded sand (SP). Very well sorted med. grained sand, clean. Round- | BZ = 0.0 | | | | |
| | 288 | to subround qtz, Reddish brown (5 YR 5/4). Soft, unconsolidated, Wet (saturated). Dark red brown | H.S. = 0.0 | MW-0 | | 6 | Sample @ 1820 |
| | | | | 290 | | 18 | Rec = 2.2/2.0 |
| | | | | | | 31 | N = 49 |
| | 289 | clay @ 289.5-289.6 (.1'), difficult to determine if clay is a clast or a lens. | | | | 50/5" | |
| | | | | | | | END of Shift @ 1830. Rising head test will cont. overnight. |
| | 290 | | | | | | |

# HTW DRILLING LOG

HOLE NO. MW-0
SHEET 32 OF 33 SHEETS

PROJECT: CAFB LF 3/4 RFI
INSPECTOR: Brian J. Kirby

| ELEV. a. | DEPTH b. | DESCRIPTION OF MATERIALS c. | FIELD SCREENING RESULTS d. | GEOTECH SAMPLE OR CORE BOX NO e. | ANALYTICAL SAMPLE NO. f. | BLOW COUNTS g. | REMARKS h. |
|---|---|---|---|---|---|---|---|
| | | SAND (SP) same as above | PID calib. to 57 ppm Benzene R.F. w/ 100ppm isobotylene. BG = 0.0 BZ = 0.0 | | | | Alluvium 10/28/94 - Start Shift @ 720 |
| | 291 | | | | | | |
| | 292 | | | | | | |
| | 295 | | | | | | |
| | 294 | | | | | | |
| | 295 | | | | | | |
| | 296 | | | | | | |
| | 297 | | | | | | |
| | 298 | | | | | | |
| | 299 | Core 299-299.5: Poorly graded Sand, (SP) med. grained, reddish brown (5YR 5/4). Saturated, soft, Round-subangular; C1st cobbles & chests in Sample | HS = 0.1 | MW-0 300 | | 19 50/4" | Sample @ 920 N = 50+ Rec = 2.0 w/ 1.5' stuff. |

PROJECT: CAFB LF 3/4, II RFI
HOLE NO. MW-0

# HTW DRILLING LOG

HOLE NO. MW-0

PROJECT CAFB ~~MW~~ LF 3/4 RFI Ph II

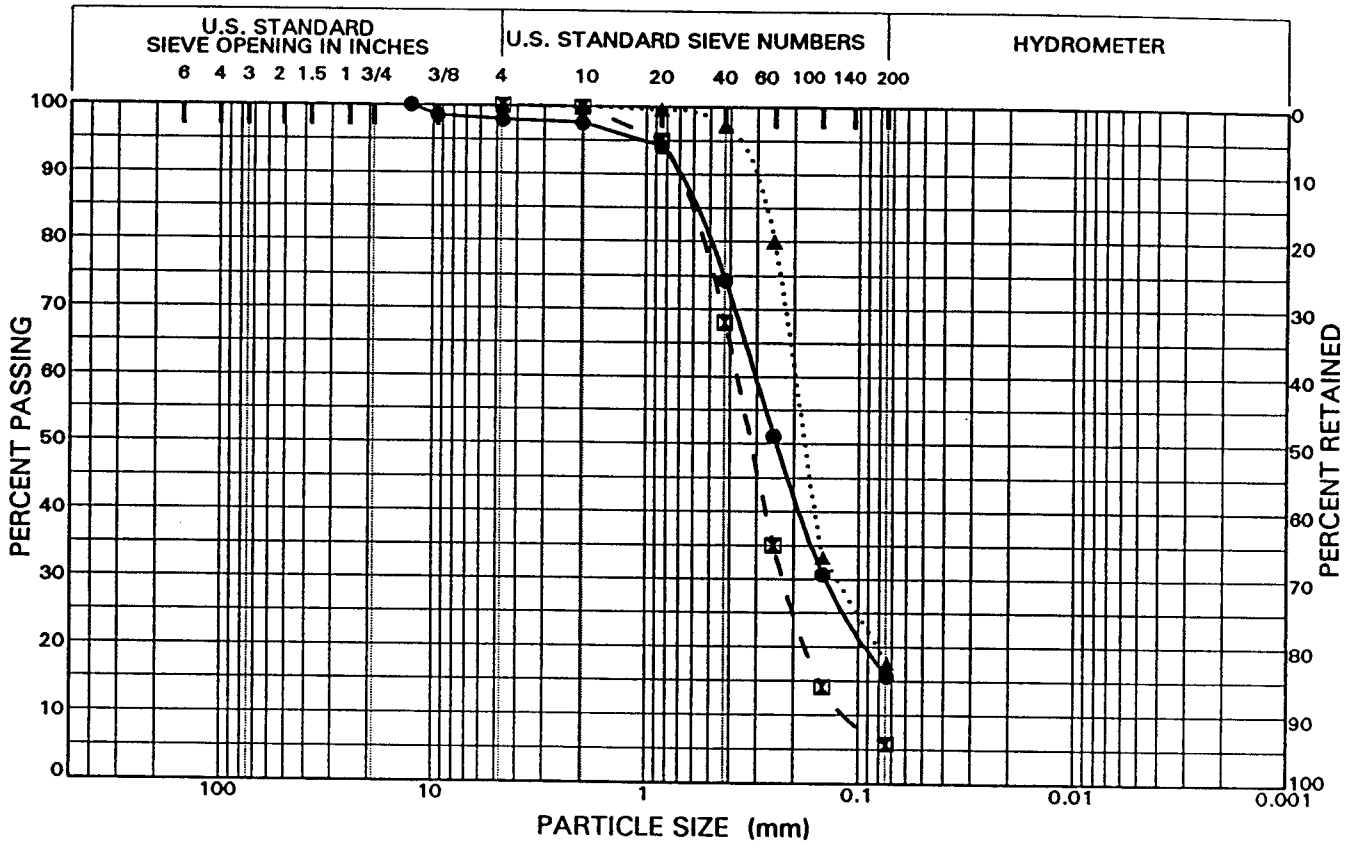
INSPECTOR Brian Q. Rich

SHEET 33 OF 33 SHEETS

| ELEV. a. | DEPTH b. | DESCRIPTION OF MATERIALS c. | FIELD SCREENING RESULTS d. | GEOTECH SAMPLE OR CORE BOX NO e. | ANALYTICAL SAMPLE NO. f. | BLOW COUNTS g. | REMARKS h. |
|---|---|---|---|---|---|---|---|
| | | SAND (SP) same as above Cuttings | | | | | Alluvium |
| | 300 | 299.5 - 303.5: Sand (SP) as above, grading to a coarse, well graded sand w/ pebbles to .3". Color as above | | | | | |
| | 301 | Thin red clay appx 4" @ 302, then sharp contact w/ fine, poorly graded sand. | | | | | Fine, saturated sand heaving to 300-301. Must repeatedly blow hole and condition with water to hold hole open. (Appx 50 gals used) |
| | 302 | | | | | | |
| | 303 | | | | | | |
| | 304 | T.D @ 304.3' | | | | | |
| | | | | | | | Bottom of boring at 304.3 feet |

# APPENDIX A.2
# GEOTECHNICAL RESULTS

| COBBLES | GRAVEL | | SAND | | | SILT OR CLAY |
|---|---|---|---|---|---|---|
| | coarse | fine | coarse | medium | fine | |




| Boring Number | Depth (feet) | Symbol | LL | PI | Description |
|---|---|---|---|---|---|
| MW-N | 270.0 | ● | | | Silty SAND (SM) |
| MW-N | 280.0 | ⊠ | | | Poorly graded SAND with Silt (SP-SM) |
| MW-N | 290.0 | ▲ | | | Silty SAND (SM) |
| | | | | | |

Checked by:

Project: CANNON AFB LF 3/4 RFI

Project Number: C3M11QQ

**PARTICLE SIZE DISTRIBUTION CURVES**

Figure 1

Woodward-Clyde Consultants

SNA 3/6/95 2SIEVE1 M11QQ

Woodward Clyde Consultants
Omaha, Nebraska

| | DATE | TIME |
|---|---|---|
| At printing | JAN1895 | 14:09 |
| Last update | JAN1895 | 14:02 |

PROJECT ID M11QQ
POINT ID MW-N____
DEPTH __270.00

Sieve Analysis - ADDRESS 2305

'With unsplit specimens use COARSE '
'fields. With splitting supply TOTAL'
'SPC WT or WT PASSING split sieve. '

{01}TOTAL SPECIMEN WEIGHT 289.66_
WT PASSING SPLIT SIEVE 45.56__
FINE WEIGHT TESTED _____

' MC OF WTS ABOVE ' ' SV TARE WTs '

| | {02} COARSE | {02} FINE | {03} COARSE | {03} FINE |
|---|---|---|---|---|
| WT+T | _____ | _____ | 8.21___ | 0_____ |
| DY+T | _____ | _____ | NON-PLAST?(X) _ | |
| TARE | _____ | 0_____ | | |
| : % | _____ | _____ | | |

{04}NORMALIZE TO 3"(X) X WT METH(CI) C
SPLIT ON _____ mm SIEVE
SIEVING MC (W/D) Coarse D Fine D

| | NAME | SIZE mm | SOIL+TARE | %FINER |
|---|---|---|---|---|
| {05} | 1/2__ | _12.700 | 8.21___ | 100.0 |
| {06} | 3/8__ | __9.510 | 12.43__ | _98.5 |
| {07} | 4____ | __4.699 | 14.34__ | _97.9 |
| {08} | 10___ | __2.000 | 15.49__ | _97.5 |
| {09} | 20___ | __0.850 | 25.35__ | _94.1 |
| {10} | 40___ | __0.425 | 82.72__ | _74.3 |
| {11} | 60___ | __0.250 | 149.99_ | _51.1 |
| {12} | 100__ | __0.147 | 208.98_ | _30.7 |
| {13} | 200__ | __0.074 | 252.31_ | _15.7 |
| {14} | | | | |
| {15} | | | | |
| {16} | | | | |
| {17} | | | | |
| {18} | | | | |
| {19} | | | | |
| {20} | | | | |

PARTICLE-SIZE ANALYSIS : by Sieving using Soil Sieve Sizes & with Water Content

ASTM D 422 - 63 (1990), C 136 - 92, C 117 - 90 and D 2216 - 92

Project Number: C3M11QQ Task Number: _____ Exploration No.: MW-N-270

Project Name: Capon AFB LF 3/4 RFI Assignment No.: _____ Sample No.: _____

Project Engineer: Steve Cox Depth (ft): _____

Initial Visual Description: ☐ See Visual Description Form (S-103) or _____

**SPECIMEN:** **Tested From:**

Bulk Sample ☐ Thin-Walled Tube ☐

SPT Sample ☐ Engr. Property Test

Mod Calif. Sample ☐ Specimen's WC ☐

Other: _____

☐ See Bulk Sample Processing Information Form (S-106)

**Selection Method:**

_____ Sieves (1) - whole sample used

_____ Sieves (1) - partial sample used & selected by Method(s) _____ &

_____ Sieves (1) - partial sample used & selected by Method(s) _____ &

Methods: (a): Splitter; (use for dry soils or that which will segregate)

(b): Quartering; (use for dry soils or that which will segregate)

(c) : Representative scoop after mixing, or slice of intact sample. (use for moist soils or that which will not segregate)

**Preparation:**

**Sample/Specimen:** Oven-Dried ☐ Air Dried ☐ As-Received State ☐

**Oven-Dried Soil Broken Up Before:**

Selecting partial sample: No ☐ ; Yes ☐

Seiving 1st Sieve Series: No ☐ ; Yes ☐

Seiving 2nd Sieve Series: No ☐ ; Yes ☐

Seiving 3rd Sieve Series: No ☐ ; Yes ☐

**By:** Mortar & Pestle ☐ Pulverizer ☐ Hand ☐ Other _____

Remarks: _____

**Washing:**

| | No | Yes |
|---|---|---|
| Whole Specimen Washed on No. 200 sieve ? | ☐ | ☐ |
| Retained Fraction: 1st Split Washed ? | ☐ | ☐ |
| Fine Fraction Washed on No. 200 sieve ? | ☐ | ☐ |

and Soil Soaked for _____ hrs.

; 2nd Split Washed ? No ☐ ; Yes ☐

and Soil Soaked for _____ hrs.

**MASS OF TEST SPECIMEN (g)**

| | Total Test Specimen | Partial Test Specimen 1st Split | Partial Test Specimen 2nd Split | Soil Retained (after washing) 2nd Split | Soil Retained (after washing) +200 | Water Content As Recieved or | |
|---|---|---|---|---|---|---|---|
| Min.sieve size in sieving sequence (1) | | | | | | Container No. | B:49 |
| Container Number | | | | | | Wet, M1 (g) | 338,49 |
| Mass of Container and Dry Soil, (g) | | | | | 253,79 | Dry, M2 (g) | 297,87 |
| Mass of Container, (g) | | | | | 8,21 | Cont.,M3 (g) | 8,21 |
| Dry Soil, Ws (g) | | | | | | Water Content (%) | |
| Mass of Dry Soil from Hydrometer, Ws (g) | | | | | | | |

**SIEVING RESULTS**

| See (2) | Sieve No. | Cum. Mass Retained (g) | % Finer than Sieve ____ | Total Specimen % Finer N' |
|---|---|---|---|---|
| | 3" | | | |
| | 2" | | | |
| | 1 1/2" | | | |
| | 1" | | | |
| | 3/4" | | | |
| | 1/2" | | | |
| | 3/8" | | | |
| | 4 | | | |
| | Pan | | XXXXXXXX | XXXXXXXXXX |

| Req. Mass of Test Spec. for 1% (kg) |
|---|
| 3"= 70 |
| 1 1/2"=10 |
| 3/4"= 1.1 |
| 3/8"= 0.25 |
| #4 = 0.1 |
| #10 = 0.1 |

| Sieve No. / (3) | Cum. Mass Retained (g) | % Finer than Sieve ____ | Total Specimen % Finer N' |
|---|---|---|---|
| | | | |
| | | | |
| 1/2 | 8,21 | | |
| 3/8" | 12,43 | | |
| 4 / 325 | 14,34 | | 97.9 |
| 10 / 180 | 15,49 | | |
| 20 / 115 | 24,35 | | |
| 40 / 75 | 82,72 | | |
| 60 / 60 | 149,99 | | |
| 100* / 40 | 208,98 | | |
| 140 / 30 | ——— | | |
| 200 / 20 | 252,31 | | 15.7 |
| Pan | 254,19 | XXXXXXXX | XXXXXXXXXX |

Notes: (1) Sieve size given, denotes min. sieve size used in the appropriate sieving sequence.

(2) X in box denotes sieve on which split was made. (3) Proposed alowable amount of soil retained on 8" sieve.

**SUMMARY: Shape, Filter, & etc. Parameters**

% COBBLES _____ D60 _____ D85 _____

% GRAVEL _____ D30 _____ D15 _____

% SAND _____ D10 _____ D50 _____

% FINES _____ Cu = _____ Cc = _____

Mica Noted: No ☐ ; Yes ☐ Amount Adjective: _____

Remarks: _____

Coefficient of Uniformity, Cu = D60 / D10 Coefficient of Curvature, Cc = D30^2 / (D60 * D10)

Note: The above values D## denotes particle size (mm) at the corresponding percent passing. * Denotes sieve added to better define gradation curve

| | SET-UP BY: | DRY MASS BY: | WASHED BY: | |
|---|---|---|---|---|
| COARSE FRACTION: | | | | CALCULATED BY: |
| FINE FRACTION: | | | | CHECKED BY: |
| DATE: | | | | SPOT CHECKED BY: |
| | | | | REVIEWED BY: |

Woodward Clyde Consultants
Omaha, Nebraska

| | DATE | TIME |
|---|---|---|
| At printing | JAN1895 | 14:08 |
| Last update | JAN1895 | 14:05 |

PROJECT ID M11QQ
POINT ID MW-N____
DEPTH __280.00

Sieve Analysis - ADDRESS 2305

'With unsplit specimens use COARSE '
'fields. With splitting supply TOTAL'
'SPC WT or WT PASSING split sieve. '

{01}TOTAL SPECIMEN WEIGHT 267.96_
WT PASSING SPLIT SIEVE 15.52__
FINE WEIGHT TESTED _____

' MC OF WTS ABOVE ' ' SV TARE WTs '

| | {02} COARSE | {02} FINE | {03} |
|---|---|---|---|
| WT+T | _____ | _____ | COARSE 8.33___ |
| DY+T | _____ | _____ | FINE 0_____ |
| TARE | _____ | 0_____ | NON-PLAST?(X) _ |
| : % | _____ | _____ | |

{04}NORMALIZE TO 3"(X) X WT METH(CI) C
SPLIT ON _____ mm SIEVE
SIEVING MC (W/D) Coarse D Fine D

| | NAME | SIZE mm | SOIL+TARE | %FINER |
|---|---|---|---|---|
| {05} | 4____ | __4.699 | 8.33___ | 100.0 |
| {06} | 10___ | __2.000 | 8.98___ | _99.8 |
| {07} | 20___ | __0.850 | 21.73__ | _95.0 |
| {08} | 40___ | __0.425 | 94.15__ | _68.0 |
| {09} | 60___ | __0.250 | 182.44_ | _35.0 |
| {10} | 100__ | __0.147 | 238.38_ | _14.1 |
| {11} | 200__ | __0.074 | 260.77_ | __5.8 |
| {12} | | | | |
| {13} | | | | |
| {14} | | | | |
| {15} | | | | |
| {16} | | | | |
| {17} | | | | |
| {18} | | | | |
| {19} | | | | |
| {20} | | | | |

PARTICLE-SIZE ANALYSIS : by Sieving using Soil Sieve Sizes & with Water Content

ASTM D 422 - 63 (1990), C 136 - 92, C 117 - 90 and D 2216 - 92 or 208 ?

Project Number: C3M11QQ Task Number: _____ Exploration No.: MWM-280

Project Name: Cannon AFB LF 3/4 RFI Assignment No.: _____ Sample No.: _____

Project Engineer: Steve Cox Depth (ft): _____

Initial Visual Description: ☐ See Visual Description Form (S-103) or _____

**SPECIMEN:** **Tested From:**

Bulk Sample ☐ Thin-Walled Tube ☐

SPT Sample ☐ Engr. Property Test

Mod Calif. Sample ☐ Specimen's WC ☐

Other: _____

☐ See Bulk Sample Processing Information Form (S-106)

**Selection Method:**

_____ Sieves (1) - whole sample used

_____ Sieves (1) - partial sample used & selected by Method(s) _____ &

_____ Sieves (1) - partial sample used & selected by Method(s) _____ &

Methods: (a): Splitter; (use for dry soils or that which will segregate)

(b): Quartering; (use for dry soils or that which will segregate)

(c) : Representative scoop after mixing, or slice of intact sample. (use for moist soils or that which will not segregate)

**Preparation:**

Sample/Specimen: Oven-Dried ☐ Air Dried ☐ As-Received State ☐

**Oven-Dried Soil Broken Up Before:**

Selecting partial sample: No ☐ ; Yes ☐

Seiving 1st Sieve Series: No ☐ ; Yes ☐

Seiving 2nd Sieve Series: No ☐ ; Yes ☐

Seiving 3rd Sieve Series: No ☐ ; Yes ☐

**By:** Mortar & Pestle ☐ Pulverizer ☐ Hand ☐ Other _____

Remarks: _____

**Washing:**

| | No | Yes | |
|---|---|---|---|
| Whole Specimen Washed on No. 200 sieve ? | ☐ | ☐ | and Soil Soaked for _____ hrs. |
| Retained Fraction: 1st Split Washed ? | ☐ | ☐ | ; 2nd Split Washed ? No ☐ ;Yes ☐ |
| Fine Fraction Washed on No. 200 sieve ? | ☐ | ☐ | and Soil Soaked for _____ hrs. |

**MASS OF TEST SPECIMEN (g)**

| | Total Test Specimen | Partial Test Specimen 1st Split | Partial Test Specimen 2nd Split | Soil Retained (after washing) 2nd Split | Soil Retained (after washing) +200 |
|---|---|---|---|---|---|
| Min.sieve size in sieving sequence (1) | | | | | |
| Container Number | | | | | |
| Mass of Container and Dry Soil, (g) | | | | | 262.17 |
| Mass of Container, (g) | | | | | 8.33 |
| Dry Soil, Ws (g) | | | | | |
| Mass of Dry Soil from Hydrometer, Ws (g) | | | | | |

**Water Content** As Recieved or

| | |
|---|---|
| Container No. | WILDCATS |
| Wet, M1 (g) | 318.03 |
| Dry, M2 (g) | 276.29 |
| Cont.,M3 (g) | 8.33 |
| Water Content (%) | |

**SIEVING RESULTS**

| See (2) | Sieve No. | Cum. Mass Retained (g) | % Finer than Sieve ____ | Total Specimen % Finer N' |
|---|---|---|---|---|
| | 3" | | | |
| | 2" | | | |
| | 1 1/2" | | | |
| | 1" | | | |
| | 3/4" | | | |
| | 1/2" | | | |
| | 3/8" | | | |
| | 4 | | | |
| | Pan | | XXXXXXXX | XXXXXXXXXX |

| Req. Mass of Test Spec. for 1% (kg) |
|---|
| 3"= 70 |
| 1 1/2"=10 |
| 3/4"= 1.1 |
| 3/8"= 0.25 |
| #4 = 0.1 |
| #10 = 0.1 |

| Sieve No. / (3) | Cum. Mass Retained (g) | % Finer than Sieve ____ | Total Specimen % Finer N' |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| 3/8" | | | |
| 4 / 325 | 8.33 | | 100 |
| 10 / 180 | 8.98 | | |
| 20 / 115 | 21.73 | | |
| 40 / 75 | 94.15 | | |
| 60 / 60 | 182.94 | | |
| 100* / 40 | 238.38 | | |
| ~~140 / 30~~ | | | |
| 200 / 20 | 260.77 | | 5.8 |
| Pan | 262.27 | XXXXXXXX | XXXXXXXXXX |

Notes: (1) Sieve size given, denotes min. sieve size used in the appropriate sieving sequence.

(2) X in box denotes sieve on which split was made. (3) Proposed alowable amount of soil retained on 8" sieve.

**SUMMARY: Shape, Filter, & etc. Parameters**

% COBBLES _____ D60 _____ D85 _____

% GRAVEL _____ D30 _____ D15 _____

% SAND _____ D10 _____ D50 _____

% FINES _____ Cu = _____ Cc = _____

Mica Noted: No ☐ ; Yes ☐ Amount Adjective: _____

Remarks: _____

Coefficient of Uniformity, Cu = D60 / D10 Coefficient of Curvature, Cc = D30^2 / (D60 * D10)

Note: The above values D## denotes particle size (mm) at the corresponding percent passing. * Denotes sieve added to better define gradation curve

| | SET-UP BY: | DRY MASS BY: | WASHED BY: | |
|---|---|---|---|---|
| COARSE FRACTION: | | | | CALCULATED BY: |
| FINE FRACTION: | | | | CHECKED BY: |
| DATE: | | | | SPOT CHECKED BY: |
| | | | | REVIEWED BY: |

Woodward Clyde Consultants
Omaha, Nebraska

| | DATE | TIME |
|---|---|---|
| At printing | JAN1895 | 14:07 |
| Last update | JAN1895 | 14:07 |

PROJECT ID M11QQ
POINT ID MW-N____
DEPTH __290.00

Sieve Analysis - ADDRESS 2305

'With unsplit specimens use COARSE '
'fields. With splitting supply TOTAL'
'SPC WT or WT PASSING split sieve. '

{01}TOTAL SPECIMEN WEIGHT 250.22_
WT PASSING SPLIT SIEVE 44.31__
FINE WEIGHT TESTED _____

' MC OF WTS ABOVE ' ' SV TARE WTs '

| | {02} COARSE | {02} FINE | {03} |
|---|---|---|---|
| WT+T | _____ | _____ | COARSE 7.89___ |
| DY+T | _____ | _____ | FINE 0_____ |
| TARE | _____ | 0_____ | NON-PLAST?(X) _ |
| % | _____ | _____ | |

{04}NORMALIZE TO 3"(X) X WT METH(CI) C
SPLIT ON _____ mm SIEVE
SIEVING MC (W/D) Coarse D Fine D

| | NAME | SIZE mm | SOIL+TARE | %FINER |
|---|---|---|---|---|
| {05} | 4____ | __4.699 | 7.89___ | 100.0 |
| {06} | 10___ | __2.000 | 8.07___ | _99.9 |
| {07} | 20___ | __0.850 | 9.02___ | _99.5 |
| {08} | 40___ | __0.425 | 14.88__ | _97.2 |
| {09} | 60___ | __0.250 | 57.81__ | _80.0 |
| {10} | 100__ | __0.147 | 174.96_ | _33.2 |
| {11} | 200__ | __0.074 | 213.80_ | _17.7 |
| {12} | | | | |
| {13} | | | | |
| {14} | | | | |
| {15} | | | | |
| {16} | | | | |
| {17} | | | | |
| {18} | | | | |
| {19} | | | | |
| {20} | | | | |

PARTICLE-SIZE ANALYSIS : by Sieving using Soil Sieve Sizes & with Water Content

ASTM D 422 - 63 (1990), C 136 - 92, C 117 - 90 and D 2216 - 92

Project Number: C3M110Q Task Number: _____ Exploration No.: MW-N 290

Project Name: Canon AFB LF 3/4 RFI Assignment No.: _____ Sample No.: _____

Project Engineer: Steve Cox Depth (ft): _____

Initial Visual Description: ☐ See Visual Description Form (S-103) or _____

**SPECIMEN:** **Tested From:**

Bulk Sample ☐ Thin-Walled Tube ☐

SPT Sample ☐ Engr. Property Test

Mod Calif. Sample ☐ Specimen's WC ☐

Other: _____

☐ See Bulk Sample Processing Information Form (S-106)

**Selection Method:**

_____ Sieves (1) - whole sample used

_____ Sieves (1) - partial sample used & selected by Method(s) _____ &

_____ Sieves (1) - partial sample used & selected by Method(s) _____ &

Methods: (a): Splitter; (use for dry soils or that which will segregate)

(b): Quartering; (use for dry soils or that which will segregate)

(c) : Representative scoop after mixing, or slice of intact sample. (use for moist soils or that which will not segregate)

**Preparation:**

**Sample/Specimen:** Oven-Dried ☐ Air Dried ☐ As-Received State ☐

**Oven-Dried Soil Broken Up Before:**

Selecting partial sample: No ☐ ; Yes ☐

Seiving 1st Sieve Series: No ☐ ; Yes ☐

Seiving 2nd Sieve Series: No ☐ ; Yes ☐

Seiving 3rd Sieve Series: No ☐ ; Yes ☐

**By:** Mortar & Pestle ☐ Pulverizer ☐ Hand ☐ Other _____

Remarks: _____

**Washing:**

| | No | Yes |
|---|---|---|
| Whole Specimen Washed on No. 200 sieve ? | ☐ | ☐ |
| Retained Fraction: 1st Split Washed ? | ☐ | ☐ |
| Fine Fraction Washed on No. 200 sieve ? | ☐ | ☐ |

and Soil Soaked for _____ hrs.

; 2nd Split Washed ? No ☐ ; Yes ☐

and Soil Soaked for _____ hrs.

**MASS OF TEST SPECIMEN (g)**

| | Total Test Specimen | Partial Test Specimen 1st Split | Partial Test Specimen 2nd Split | Soil Retained (after washing) 2nd Split | Soil Retained (after washing) +200 | Water Content As Recieved or | |
|---|---|---|---|---|---|---|---|
| Min.sieve size in sieving sequence (1) | | | | | | Container No. | 42 |
| Container Number | | | | | | Wet, M1 (g) | 313,87 |
| Mass of Container and Dry Soil, (g) | | | | | 215.40 | Dry, M2 (g) | 258.11 |
| Mass of Container, (g) | | | | | 7,89 | Cont.,M3 (g) | 7,89 |
| Dry Soil, Ws (g) | | | | | | Water Content (%) | |
| Mass of Dry Soil from Hydrometer, Ws (g) | | | | | | | |

**SIEVING RESULTS**

| See (2) | Sieve No. | Cum. Mass Retained (g) | % Finer than Sieve | Total Specimen % Finer N' |
|---|---|---|---|---|
| | 3" | | | |
| | 2" | | | |
| | 1 1/2" | | | |
| | 1" | | | |
| | 3/4" | | | |
| | 1/2" | | | |
| | 3/8" | | | |
| | 4 | | | |
| | Pan | | XXXXXXXX | XXXXXXXXXX |

| Req. Mass of Test Spec. for 1% (kg) |
|---|
| 3"= 70 |
| 1 1/2"=10 |
| 3/4"= 1.1 |
| 3/8"= 0.25 |
| #4 = 0.1 |
| #10 = 0.1 |

| Sieve No. / (3) | Cum. Mass Retained (g) | % Finer than Sieve | Total Specimen % Finer N' |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| 3/8" | | | |
| 4 / 325 | 7,89 | | 100 |
| 10 / 180 | 8,07 | | |
| 20 / 115 | 9,02 | | |
| 40 / 75 | 14,88 | | |
| 60 / 60 | 57,81 | | |
| 100* / 40 | 174.96 | | |
| ~~140 / 30~~ | | | |
| 200 / 20 | 213.80 | | 17.7 |
| Pan | 215,43 | XXXXXXXX | XXXXXXXXXX |

Notes: (1) Sieve size given, denotes min. sieve size used in the appropriate sieving sequence.

(2) X in box denotes sieve on which split was made. (3) Proposed alowable amount of soil retained on 8" sieve.

**SUMMARY: Shape, Filter, & etc. Parameters**

% COBBLES _____ D60 _____ D85 _____

% GRAVEL _____ D30 _____ D15 _____

% SAND _____ D10 _____ D50 _____

% FINES _____ Cu = _____ Cc = _____

Mica Noted: No ☐ ; Yes ☐ Amount Adjective: _____

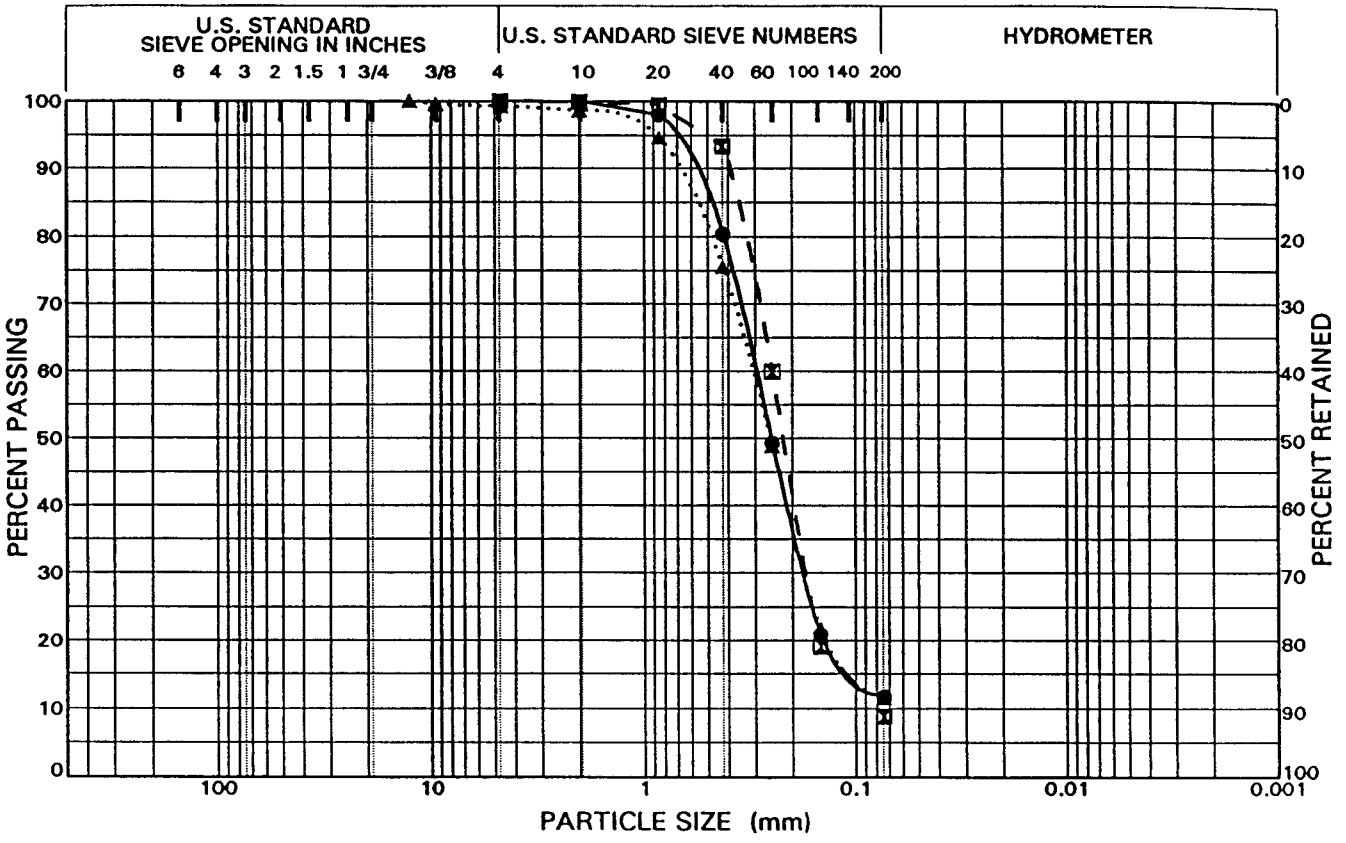
Remarks: _____

Coefficient of Uniformity, Cu = D60 / D10 Coefficient of Curvature, Cc = D30^2 / (D60 * D10)

Note: The above values D## denotes particle size (mm) at the corresponding percent passing. * Denotes sieve added to better define gradation curve

| | SET-UP BY: | DRY MASS BY: | WASHED BY: | |
|---|---|---|---|---|
| COARSE FRACTION: | | | | CALCULATED BY: |
| FINE FRACTION: | | | | CHECKED BY: |
| DATE: | | | | SPOT CHECKED BY: |
| | | | | REVIEWED BY: |

| COBBLES | GRAVEL | | SAND | | | SILT OR CLAY |
|---|---|---|---|---|---|---|
| | coarse | fine | coarse | medium | fine | |




| Boring Number | Depth (feet) | Symbol | LL | PI | Description |
|---|---|---|---|---|---|
| MW-O | 280.0 | ● | | | Silty SAND (SM) |
| MW-O | 290.0 | ⊠ | | | Poorly graded SAND with SILT (SP-SM) |
| MW-O | 300.0 | ▲ | | | Silty SAND (SM) |
| | | | | | |

Checked by:

Project: CANNON AFB LF 3/4 RFI

Project Number: C3M11QQ

# PARTICLE SIZE DISTRIBUTION CURVES

Figure 2

Woodward-Clyde Consultants

SNA 3/6/95 2SIEVE1 M11QQ

Woodward Clyde Consultants
Omaha, Nebraska

| | DATE | TIME |
|---|---|---|
| At printing | JAN1895 | 14:12 |
| Last update | JAN1895 | 14:12 |

PROJECT ID M11QQ
POINT ID MW-O____
DEPTH __280.00

Sieve Analysis - ADDRESS 2305

'With unsplit specimens use COARSE '
'fields. With splitting supply TOTAL'
'SPC WT or WT PASSING split sieve. '

{01}TOTAL SPECIMEN WEIGHT 211.62_
WT PASSING SPLIT SIEVE 24.74__
FINE WEIGHT TESTED _____

| ' MC OF WTS ABOVE ' | | ' SV TARE WTs ' | |
|---|---|---|---|
| {02} | | {03} | |
| COARSE | FINE | COARSE | 8.43___ |
| WT+T _____ | _____ | FINE | 0_____ |
| DY+T _____ | _____ | NON-PLAST?(X) | _ |
| TARE _____ | 0_____ | | |
| ' % _____ | _____ | | |

{04}NORMALIZE TO 3"(X) X WT METH(CI) C
SPLIT ON _____ mm SIEVE
SIEVING MC (W/D) Coarse D Fine D

| | NAME | SIZE mm | SOIL+TARE | %FINER |
|---|---|---|---|---|
| {05} | 4____ | __4.699 | 8.43___ | 100.0 |
| {06} | 10___ | __2.000 | 8.56___ | _99.9 |
| {07} | 20___ | __0.850 | 12.59__ | _98.0 |
| {08} | 40___ | __0.425 | 49.90__ | _80.4 |
| {09} | 60___ | __0.250 | 115.74_ | _49.3 |
| {10} | 100__ | __0.147 | 175.84_ | _20.9 |
| {11} | 200__ | __0.074 | 195.31_ | _11.7 |
| {12} | | | | |
| {13} | | | | |
| {14} | | | | |
| {15} | | | | |
| {16} | | | | |
| {17} | | | | |
| {18} | | | | |
| {19} | | | | |
| {20} | | | | |

PARTICLE-SIZE ANALYSIS : by Sieving using Soil Sieve Sizes & with Water Content

ASTM D 422 - 63 (1990), C 136 - 92, C 117 - 90 and D 2216 - 92

Project Number: C3M11QQ  Task Number: _____  Exploration No.: MW0 280

Project Name: Cannon AFB LF 3/4 RFI  Assignment No.: _____  Sample No.: _____

Project Engineer: Steve Cook  Depth (ft): _____

Initial Visual Description: ☐ See Visual Description Form (S-103) or _____

**SPECIMEN:** **Tested From:**
Bulk Sample ☐ Thin-Walled Tube ☐
SPT Sample ☐ Engr. Property Test
Mod Calif. Sample ☐ Specimen's WC ☐
Other: _____

☐ See Bulk Sample Processing Information Form (S-106)

**Selection Method:**
_____ Sieves (1) - whole sample used
_____ Sieves (1) - partial sample used & selected by Method(s) _____ &
_____ Sieves (1) - partial sample used & selected by Method(s) _____ &

**Methods:** (a): Splitter; (use for dry soils or that which will segregate)
(b): Quartering; (use for dry soils or that which will segregate)
(c) : Representative scoop after mixing, or slice of intact sample. (use for moist soils or that which will not segregate)

**Preparation:**
**Sample/Specimen:** Oven-Dried ☐ Air Dried ☐ As-Received State ☐

**Oven-Dried Soil Broken Up Before:**
Selecting partial sample: No ☐ ; Yes ☐
Seiving 1st Sieve Series: No ☐ ; Yes ☐
Seiving 2nd Sieve Series: No ☐ ; Yes ☐
Seiving 3rd Sieve Series: No ☐ ; Yes ☐

**By:** Mortar & Pestle ☐ Pulverizer ☐ Hand ☐ Other _____

Remarks: _____

**Washing:**

| | No | Yes |
|---|---|---|
| Whole Specimen Washed on No. 200 sieve ? | ☐ | ☐ |
| Retained Fraction: 1st Split Washed ? | ☐ | ☐ |
| Fine Fraction Washed on No. 200 sieve ? | ☐ | ☐ |

and Soil Soaked for _____ hrs.
; 2nd Split Washed ? No ☐ ;Yes ☐
and Soil Soaked for _____ hrs.

**MASS OF TEST SPECIMEN (g)**

| | Total Test Specimen | Partial Test Specimen 1st Split | Partial Test Specimen 2nd Split | Soil Retained (after washing) 2nd Split | Soil Retained (after washing) +200 |
|---|---|---|---|---|---|
| Min.sieve size in sieving sequence (1) | | | | | |
| Container Number | | | | | |
| Mass of Container and Dry Soil, (g) | | | | | 196,33 |
| Mass of Container, (g) | | | | | 8.43 |
| Dry Soil, Ws (g) | | | | | |
| Mass of Dry Soil from Hydrometer, Ws (g) | | | | | |

**Water Content** As Recieved or

| | |
|---|---|
| Container No. | Brian |
| Wet, M1 (g) | 256,27 |
| Dry, M2 (g) | 220.85 |
| Cont.,M3 (g) | 8.43 |
| Water Content (%) | |

**SIEVING RESULTS**

| See (2) | Sieve No. | Cum. Mass Retained (g) | % Finer than Sieve | Total Specimen % Finer N' |
|---|---|---|---|---|
| | 3" | | | |
| | 2" | | | |
| | 1 1/2" | | | |
| | 1" | | | |
| | 3/4" | | | |
| | 1/2" | | | |
| | 3/8" | | | |
| | 4 | | | |
| | Pan | | XXXXXXXX | XXXXXXXXXX |

| Req. Mass of Test Spec. for 1% (kg) |
|---|
| 3"= 70 |
| 1 1/2"=10 |
| 3/4"= 1.1 |
| 3/8"= 0.25 |
| #4 = 0.1 |
| #10 = 0.1 |

| Sieve No. / (3) | Cum. Mass Retained (g) | % Finer than Sieve | Total Specimen % Finer N' |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| 3/8" | 8,43 | | |
| 4 / 325 | 8,43 | | 100 |
| 10 / 180 | 8,56 | | |
| 20 / 115 | 12,59 | | |
| 40 / 75 | 49,90 | | |
| 60 / 60 | 115,74 | | |
| 100* / 40 | 175,84 | | |
| 140 / 30 | ——— | | |
| 200 / 20 | 195,31 | | 11.7 |
| Pan | 196,53 | XXXXXXXX | XXXXXXXXXX |

Notes: (1) Sieve size given, denotes min. sieve size used in the appropriate sieving sequence.
(2) X in box denotes sieve on which split was made. (3) Proposed alowable amount of soil retained on 8" sieve.

**SUMMARY: Shape, Filter, & etc. Parameters**

% COBBLES _____ D60 _____ D85 _____
% GRAVEL _____ D30 _____ D15 _____
% SAND _____ D10 _____ D50 _____
% FINES _____ Cu = _____ Cc = _____

Mica Noted: No ☐ ; Yes ☐  Amount Adjective: _____

Remarks: _____

Coefficient of Uniformity, Cu = D60 / D10  Coefficient of Curvature, Cc = D30^2 / (D60 * D10)

Note: The above values D## denotes particle size (mm) at the corresponding percent passing.  * Denotes sieve added to better define gradation curve

| | SET-UP BY: | DRY MASS BY: | WASHED BY: |
|---|---|---|---|
| COARSE FRACTION: | | | |
| FINE FRACTION: | | | |
| DATE: | | | |

CALCULATED BY: _____
CHECKED BY: _____
SPOT CHECKED BY: _____
REVIEWED BY: _____

Woodward Clyde Consultants
Omaha, Nebraska

| | DATE | TIME |
|---|---|---|
| At printing | JAN1895 | 14:33 |
| Last update | JAN1895 | 14:33 |

PROJECT ID M11QQ
POINT ID MW-O____
DEPTH __290.00

## Sieve Analysis - ADDRESS 2305

'With unsplit specimens use COARSE '
'fields. With splitting supply TOTAL'
'SPC WT or WT PASSING split sieve. '

{01}TOTAL SPECIMEN WEIGHT 518.59_
WT PASSING SPLIT SIEVE 45.8___
FINE WEIGHT TESTED _____

' MC OF WTS ABOVE ' ' SV TARE WTs '

| | {02} COARSE | FINE |
|---|---|---|
| WT+T | _____ | _____ |
| DY+T | _____ | _____ |
| TARE | _____ | 0_____ |
| % | _____ | _____ |

| {03} | |
|---|---|
| COARSE | 8.31___ |
| FINE | 0_____ |
| NON-PLAST?(X) | _ |

{04}NORMALIZE TO 3"(X) X WT METH(CI) C
SPLIT ON _____ mm SIEVE
SIEVING MC (W/D) Coarse D Fine D

| | NAME | SIZE mm | SOIL+TARE | %FINER |
|---|---|---|---|---|
| {05} | 4____ | __4.699 | 8.31___ | 100.0 |
| {06} | 10___ | __2.000 | 8.77___ | _99.9 |
| {07} | 20___ | __0.850 | 11.33__ | _99.4 |
| {08} | 40___ | __0.425 | 42.76__ | _93.4 |
| {09} | 60___ | __0.250 | 216.45_ | _59.9 |
| {10} | 100__ | __0.147 | 428.05_ | _19.1 |
| {11} | 200__ | __0.074 | 481.1__ | __8.8 |
| {12} | | | | |
| {13} | | | | |
| {14} | | | | |
| {15} | | | | |
| {16} | | | | |
| {17} | | | | |
| {18} | | | | |
| {19} | | | | |
| {20} | | | | |

PARTICLE-SIZE ANALYSIS : by Sieving using Soil Sieve Sizes & with Water Content

ASTM D 422 - 63 (1990), C 136 - 92, C 117 - 90 and D 2216 - 92

Project Number: C3M11QQ  Task Number: _____  Exploration No.: MW-0-290

Project Name: Canon AFB LF 3/4 RFI  Assignment No.: _____  Sample No.: _____

Project Engineer: Steve Cook  Depth (ft): _____

Initial Visual Description: ☐ See Visual Description Form (S-103) or _____

**SPECIMEN:** **Tested From:**

Bulk Sample ☐ Thin-Walled Tube ☐

SPT Sample ☐ Engr. Property Test

Mod Calif. Sample ☐ Specimen's WC ☐

Other: _____

☐ See Bulk Sample Processing Information Form (S-106)

**Selection Method:**

_____ Sieves (1) - whole sample used

_____ Sieves (1) - partial sample used & selected by Method(s) _____ &

_____ Sieves (1) - partial sample used & selected by Method(s) _____ &

**Methods:** (a): Splitter; (use for dry soils or that which will segregate)

(b): Quartering; (use for dry soils or that which will segregate)

(c) : Representative scoop after mixing, or slice of intact sample. (use for moist soils or that which will not segregate)

**Preparation:**

**Sample/Specimen:** Oven-Dried ☐ Air Dried ☐ As-Received State ☐

**Oven-Dried Soil Broken Up Before:**

Selecting partial sample: No ☐ ; Yes ☐

Seiving 1st Sieve Series: No ☐ ; Yes ☐

Seiving 2nd Sieve Series: No ☐ ; Yes ☐

Seiving 3rd Sieve Series: No ☐ ; Yes ☐

**By:** Mortar & Pestle ☐ Pulverizer ☐ Hand ☐ Other _____

Remarks: _____

**Washing:**

| | No | Yes | |
|---|---|---|---|
| Whole Specimen Washed on No. 200 sieve ? | ☐ | ☐ | and Soil Soaked for _____ hrs. |
| Retained Fraction: 1st Split Washed ? | ☐ | ☐ | ; 2nd Split Washed ? No ☐ ;Yes ☐ |
| Fine Fraction Washed on No. 200 sieve ? | ☐ | ☐ | and Soil Soaked for _____ hrs. |

**MASS OF TEST SPECIMEN (g)**

| | Total Test Specimen | Partial Test Specimen 1st Split | Partial Test Specimen 2nd Split | Soil Retained (after washing) 2nd Split | Soil Retained (after washing) +200 | Water Content As Recieved or | |
|---|---|---|---|---|---|---|---|
| Min.sieve size in sieving sequence (1) | | | | | | Container No. | Cowboys |
| Container Number | | | | | | Wet, M1 (g) | 609.8 |
| Mass of Container and Dry Soil, (g) | | | | | 488.0 | Dry, M2 (g) | 526.9 |
| Mass of Container, (g) | | | | | 8.31 | Cont.,M3 (g) | 8.31 |
| Dry Soil, Ws (g) | | | | | | Water Content (%) | |
| Mass of Dry Soil from Hydrometer, Ws (g) | | | | | | | |

**SIEVING RESULTS**

| See (2) | Sieve No. | Cum. Mass Retained (g) | % Finer than Sieve ____ | Total Specimen % Finer N' |
|---|---|---|---|---|
| | 3" | | | |
| | 2" | | | |
| | 1 1/2" | | | |
| | 1" | | | |
| | 3/4" | | | |
| | 1/2" | | | |
| | 3/8" | | | |
| | 4 | | | |
| | Pan | | XXXXXXXX | XXXXXXXXXX |

| Req. Mass of Test Spec. for 1% (kg) |
|---|
| 3"= 70 |
| 1 1/2"=10 |
| 3/4"= 1.1 |
| 3/8"= 0.25 |
| #4 = 0.1 |
| #10 = 0.1 |

| Sieve No. / (3) | Cum. Mass Retained (g) | % Finer than Sieve ____ | Total Specimen % Finer N' |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| 3/8" | | | |
| 4 / 325 | 8.31 | | 100 |
| 10 / 180 | 8.77 | | |
| 20 / 115 | 11.33 | | |
| 40 / 75 | 42.76 | | |
| 60 / 60 | 216.45 | | |
| 100* / 40 | 428.05 | | |
| 140 / 30 | | | |
| 200 / 20 | 481.1 | | 8.8 |
| Pan | 487.9 | XXXXXXXX | XXXXXXXXXX |

Notes: (1) Sieve size given, denotes min. sieve size used in the appropriate sieving sequence.

(2) X in box denotes sieve on which split was made. (3) Proposed alowable amount of soil retained on 8" sieve.

**SUMMARY: Shape, Filter, & etc. Parameters**

% COBBLES _____ D60 _____ D85 _____

% GRAVEL _____ D30 _____ D15 _____

% SAND _____ D10 _____ D50 _____

% FINES _____ Cu = _____ Cc = _____

Note: The above values D## denotes particle size (mm) at the corresponding percent passing.

**Mica Noted:** No ☐ ; Yes ☐ Amount Adjective: _____

Remarks: _____

Coefficient of Uniformity, Cu = D60 / D10  Coefficient of Curvature, Cc = D30^2 / (D60 * D10)

* Denotes sieve added to better define gradation curve

| | SET-UP BY: | DRY MASS BY: | WASHED BY: | |
|---|---|---|---|---|
| COARSE FRACTION: | | | | CALCULATED BY: |
| FINE FRACTION: | | | | CHECKED BY: |
| DATE: | | | | SPOT CHECKED BY: |
| | | | | REVIEWED BY: |

Woodward Clyde Consultants
Omaha, Nebraska

| | DATE | TIME |
|---|---|---|
| At printing | JAN1895 | 14:37 |
| Last update | JAN1895 | 14:37 |

PROJECT ID M11QQ
POINT ID MW-O____
DEPTH __300.00

## Sieve Analysis - ADDRESS 2305

'With unsplit specimens use COARSE '
'fields. With splitting supply TOTAL'
'SPC WT or WT PASSING split sieve. '

{01}TOTAL SPECIMEN WEIGHT 304.14_
WT PASSING SPLIT SIEVE 34.92__
FINE WEIGHT TESTED _____

' MC OF WTS ABOVE ' ' SV TARE WTs '

| | {02} COARSE | {02} FINE | {03} COARSE | {03} FINE |
|---|---|---|---|---|
| WT+T | _____ | _____ | 7.91___ | 0_____ |
| DY+T | _____ | _____ | NON-PLAST?(X) _ | |
| TARE | _____ | 0_____ | | |
| % | _____ | _____ | | |

{04}NORMALIZE TO 3"(X) X WT METH(CI) C
SPLIT ON _____ mm SIEVE
SIEVING MC (W/D) Coarse D Fine D

| | NAME | SIZE mm | SOIL+TARE | %FINER |
|---|---|---|---|---|
| {05} | 1/2__ | _12.700 | 7.91___ | 100.0 |
| {06} | 3/8__ | __9.510 | 9.49___ | _99.5 |
| {07} | 4____ | __4.699 | 10.20__ | _99.2 |
| {08} | 10___ | __2.000 | 12.06__ | _98.6 |
| {09} | 20___ | __0.850 | 24.32__ | _94.6 |
| {10} | 40___ | __0.425 | 82.53__ | _75.5 |
| {11} | 60___ | __0.250 | 163.56_ | _48.8 |
| {12} | 100__ | __0.147 | 245.85_ | _21.8 |
| {13} | 200__ | __0.074 | 277.13_ | _11.5 |
| {14} | | | | |
| {15} | | | | |
| {16} | | | | |
| {17} | | | | |
| {18} | | | | |
| {19} | | | | |
| {20} | | | | |

PARTICLE-SIZE ANALYSIS : by Sieving using Soil Sieve Sizes & with Water Content

ASTM D 422 - 63 (1990), C 136 - 92, C 117 - 90 and D 2216 - 92

Project Number: C3M11QQ  Task Number: _____  Exploration No.: MW-0-300

Project Name: Cangn AFB LF 3/4 RFI  Assignment No.: _____  Sample No.: _____

Project Engineer: Steve Coy  Depth (ft): _____

Initial Visual Description: ☐ See Visual Description Form (S-103) or _____

**SPECIMEN:** **Tested From:**
Bulk Sample ☐ Thin-Walled Tube ☐
SPT Sample ☐ Engr. Property Test
Mod Calif. Sample ☐ Specimen's WC ☐
Other: _____

☐ See Bulk Sample Processing Information Form (S-106)

**Selection Method:**
_____ Sieves (1) - whole sample used
_____ Sieves (1) - partial sample used & selected by Method(s) _____ &
_____ Sieves (1) - partial sample used & selected by Method(s) _____ &
**Methods:** (a): Splitter; (use for dry soils or that which will segregate)
(b): Quartering; (use for dry soils or that which will segregate)
(c) : Representative scoop after mixing, or slice of intact sample. (use for moist soils or that which will not segregate)

**Preparation:**
**Sample/Specimen:** Oven-Dried ☐ Air Dried ☐ As-Received State ☐

**Oven-Dried Soil Broken Up Before:**
Selecting partial sample: No ☐ ; Yes ☐
Seiving 1st Sieve Series: No ☐ ; Yes ☐
Seiving 2nd Sieve Series: No ☐ ; Yes ☐
Seiving 3rd Sieve Series: No ☐ ; Yes ☐

**By:** Mortar & Pestle ☐ Pulverizer ☐ Hand ☐ Other _____

Remarks: _____

**Washing:**

| | No | Yes |
|---|---|---|
| Whole Specimen Washed on No. 200 sieve ? | | |
| Retained Fraction: 1st Split Washed ? | | |
| Fine Fraction Washed on No. 200 sieve ? | | |

and Soil Soaked for _____ hrs.
; 2nd Split Washed ? No ☐ ; Yes ☐
and Soil Soaked for _____ hrs.

**MASS OF TEST SPECIMEN (g)**

| | Total Test Specimen | Partial Test Specimen 1st Split | Partial Test Specimen 2nd Split | Soil Retained (after washing) 2nd Split | Soil Retained (after washing) +200 |
|---|---|---|---|---|---|
| Min.sieve size in sieving sequence (1) | | | | | |
| Container Number | | | | | |
| Mass of Container and Dry Soil, (g) | | | | | 278.88 |
| Mass of Container, (g) | | | | | |
| Dry Soil, Ws (g) | | | | | |
| Mass of Dry Soil from Hydrometer, Ws (g) | | | | | |

**Water Content** As Recieved or

| | |
|---|---|
| Container No. | Venice |
| Wet, M1 (g) | 370.43 |
| Dry, M2 (g) | 312.05 |
| Cont.,M3 (g) | 7.91 |
| Water Content (%) | |

**SIEVING RESULTS**

| See (2) | Sieve No. | Cum. Mass Retained (g) | % Finer than Sieve | Total Specimen % Finer N' |
|---|---|---|---|---|
| | 3" | | | |
| | 2" | | | |
| | 1 1/2" | | | |
| | 1" | | | |
| | 3/4" | | | |
| | 1/2" | | | |
| | 3/8" | | | |
| | 4 | | | |
| | Pan | | XXXXXXXX | XXXXXXXXXX |

| Req. Mass of Test Spec. for 1% (kg) |
|---|
| 3"= 70 |
| 1 1/2"=10 |
| 3/4"= 1.1 |
| 3/8"= 0.25 |
| #4 = 0.1 |
| #10 = 0.1 |

| Sieve No. / (3) | Cum. Mass Retained (g) | % Finer than Sieve | Total Specimen % Finer N' |
|---|---|---|---|
| | | | |
| | | | |
| 1/2 | 7.91 | | |
| 3/8" | 9.49 | | |
| 4 / 325 | 10.20 | | |
| 10 / 180 | 12.06 | | |
| 20 / 115 | 24.32 | | |
| 40 / 75 | 82.53 | | |
| 60 / 60 | 163.56 | | |
| 100* / 40 | 245.85 | | |
| 140 / 30 | ~~8~~ | | |
| 200 / 20 | 277.13 | | |
| Pan | 278.86 | XXXXXXXX | XXXXXXXXXX |

Notes: (1) Sieve size given, denotes min. sieve size used in the appropriate sieving sequence.
(2) X in box denotes sieve on which split was made. (3) Proposed alowable amount of soil retained on 8" sieve.

**SUMMARY: Shape, Filter, & etc. Parameters**

% COBBLES _____ D60 _____ D85 _____
% GRAVEL _____ D30 _____ D15 _____
% SAND _____ D10 _____ D50 _____
% FINES _____ Cu = _____ Cc = _____

Mica Noted: No ☐ ; Yes ☐ Amount Adjective: _____

Remarks: _____

Coefficient of Uniformity, Cu = D60 / D10  Coefficient of Curvature, Cc = D30^2 / (D60 * D10)

Note: The above values D## denotes particle size (mm) at the corresponding percent passing.  * Denotes sieve added to better define gradation curve

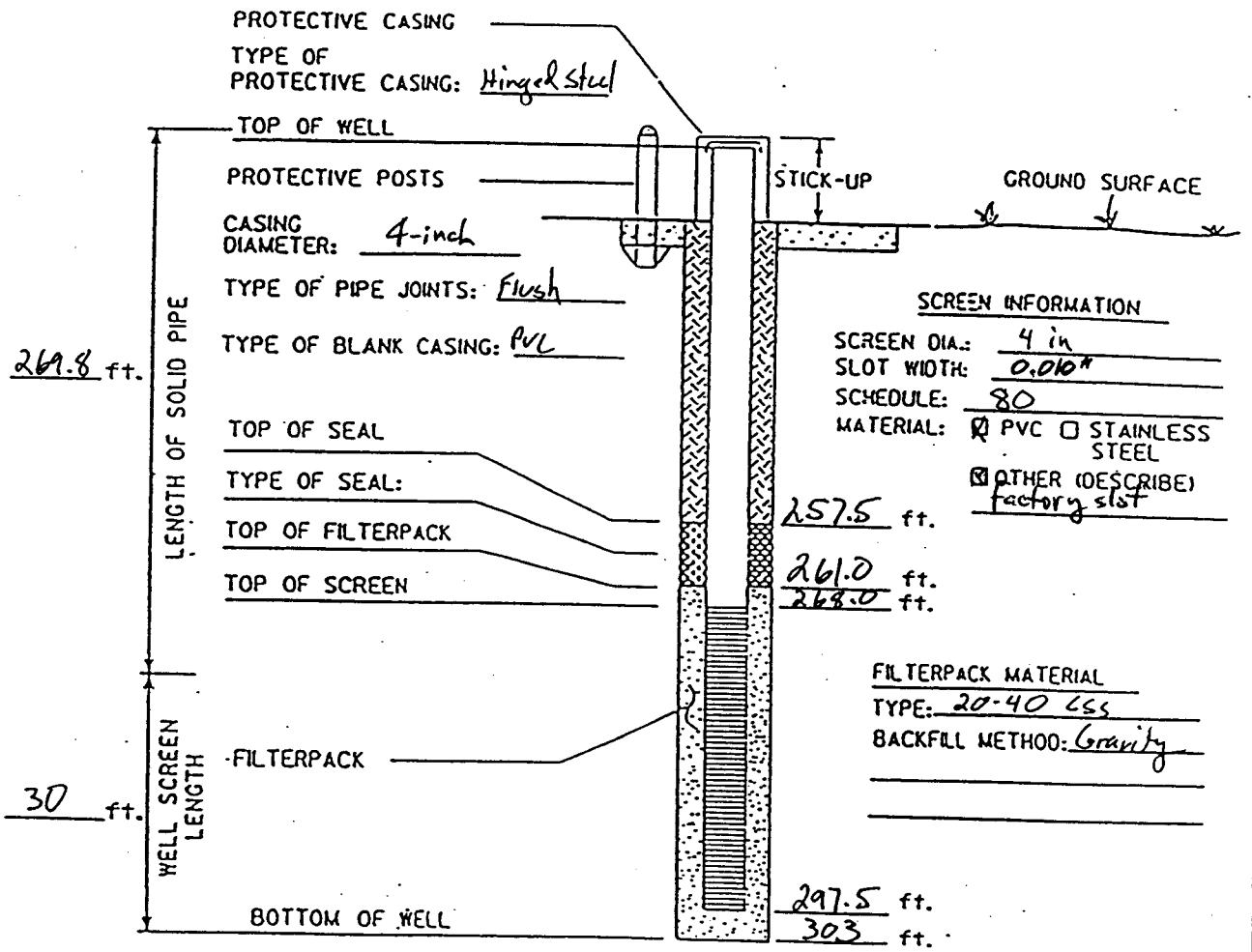
| | SET-UP BY: | DRY MASS BY: | WASHED BY: | |
|---|---|---|---|---|
| COARSE FRACTION: | | | | CALCULATED BY: |
| FINE FRACTION: | | | | CHECKED BY: |
| DATE: | | | | SPOT CHECKED BY: |
| | | | | REVIEWED BY: |

# APPENDIX A.3
# WELL CONSTRUCTION LOGS

| | | | |
|---|---|---|---|
| ELEVATION GROUND WATER 3996.94 FT. MSL | | | PROJECT Cannon AFB |
| DATE INSTALLED 12-13-94 | STARTED 12-10-94 | COMPLETED 12-13-94 | LOCATION (Coordinates or Station) N=234249.19 E=813037.28 |
| ELEVATION TOP OF HOLE 4267.59 GS 4269.7 TOC | | | SIGNATURE OF INSPECTOR Joseph A. Watson |
| TOTAL DEPTH OF HOLE ~303' BGS | | | HOLE NO. MW-4 |

# MONITORING WELL CONSTRUCTION DIAGRAM

(ALL MEASUREMENTS FROM GROUND SURFACE)




SCREEN INFORMATION

SCREEN DIA.: 4 in
SLOT WIDTH: 0.010"
SCHEDULE: 80
MATERIAL: ☒ PVC ☐ STAINLESS STEEL
☒ OTHER (DESCRIBE) factory slot

FILTERPACK MATERIAL

TYPE: 20-40 Lss
BACKFILL METHOD: Gravity

WELL DEVELOPMENT

METHOD: Gross-Bailer/Final - 3/4 HP Sub. Pump
TIME SPENT DEVELOPING: 3.0 Hrs ±
VOLUME OF WATER REMOVED: ~500 gallons
VOLUME OF WATER ADDED: N/A
DESCRIPTION OF PREDEVELOPMENT WATER:
Semi-Clear
DESCRIPTION OF POST DEVELOPMENT WATER:
Clear

WATER LEVEL SUMMARY

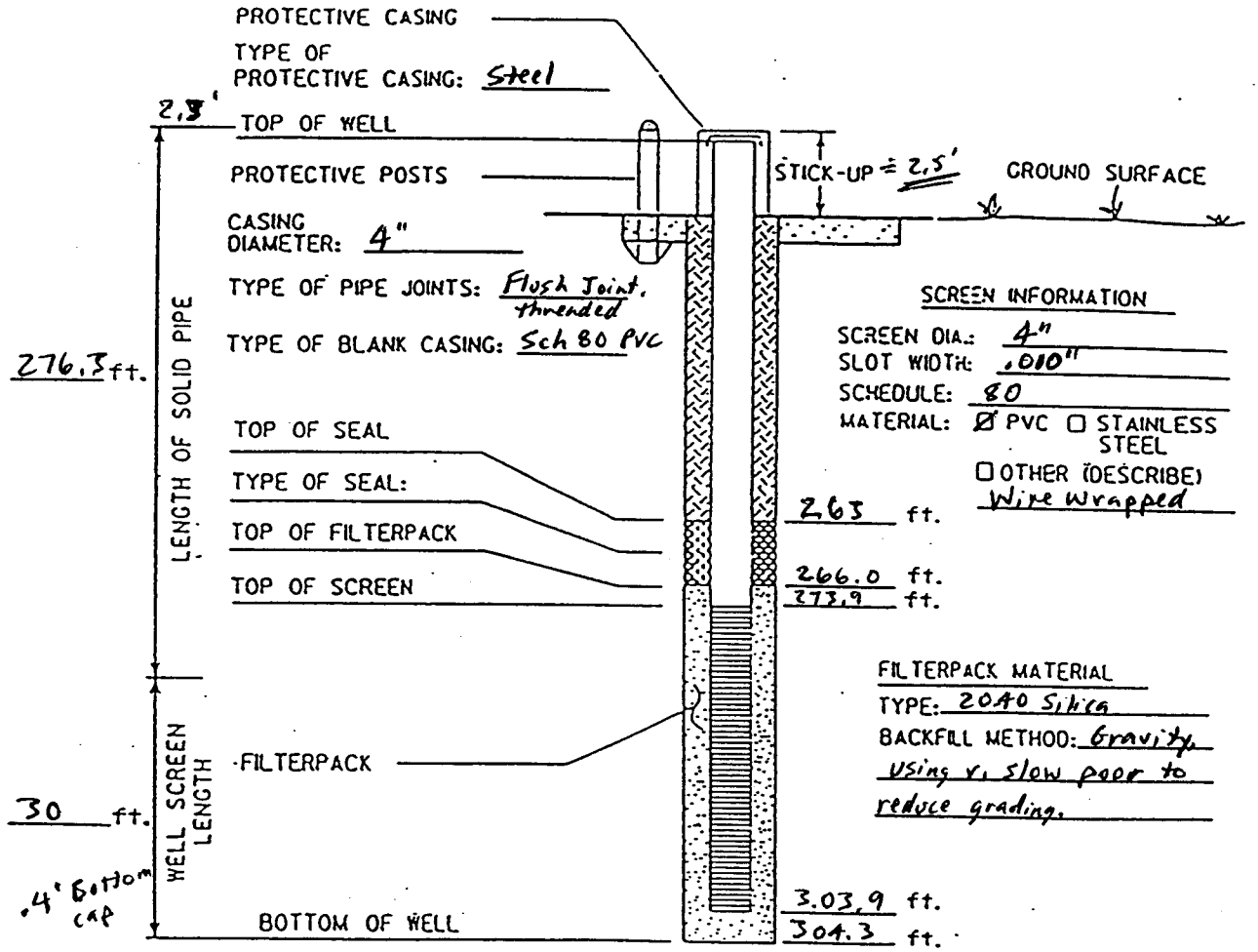
WATER LEVEL MEASUREMENTS
DATE/TIME/LEVEL 12-14-94
1000 Hrs
272.76' BTOC

DEPTH FROM TOP CASING AFTER DEVELOPMENT: 299.8'

| | | | |
|---|---|---|---|
| ELEVATION GROUND WATER ~3994.80 FT. MSL | | | PROJECT CANNON AFB |
| DATE INSTALLED 10-30-94 | STARTED 10/28/94 | COMPLETED 10/30/94 | LOCATION (Coordinates or Station) N = 232439.95 E = 812733.51 |
| ELEVATION TOP OF HOLE 4271.00 GS 4273.1 TOC | | | SIGNATURE OF INSPECTOR Brian Q. Parks |
| TOTAL DEPTH OF HOLE 304.3 BGS | | | HOLE NO. MW-10 |

# MONITORING WELL CONSTRUCTION DIAGRAM

(ALL MEASUREMENTS FROM GROUND SURFACE)




SCREEN INFORMATION

SCREEN DIA.: 4"
SLOT WIDTH: .010"
SCHEDULE: 80
MATERIAL: ☒ PVC ☐ STAINLESS STEEL
☐ OTHER (DESCRIBE) Wire Wrapped

FILTERPACK MATERIAL

TYPE: 2040 Silica
BACKFILL METHOD: Gravity, using rig slow pour to reduce grading.

## WELL DEVELOPMENT

METHOD: Bailing & Pumping
TIME SPENT DEVELOPING: Appx 2 hrs
VOLUME OF WATER REMOVED: 200 Gals
VOLUME OF WATER ADDED: NA
DESCRIPTION OF PREDEVELOPMENT WATER: Reddish Brown, Silty.
DESCRIPTION OF POST DEVELOPMENT WATER: Clear & bright, 8 NTU

## WATER LEVEL SUMMARY

WATER LEVEL MEASUREMENTS
DATE/TIME/LEVEL 11/2-3/94 280.09 TOC
~~10/28/94 278.3 BGS~~
10/28/94 278.3 BGS
10/27/94 278.2 BGS

DEPTH FROM TOP CASING AFTER DEVELOPMENT: 280.09 TOC

# APPENDIX A.4
# WELL DEVELOPMENT LOGS

## WELL DEVELOPMENT LOG

Project: Cannon AFB
Project No: C3M1MM
Well No: MW-N
Date: 12-14-94

### WELL MEASUREMENTS

Well inside diameter: 3.826 "
Depth of well casing: 299.8 ft.
Initial water level: 272.76 ft. below MP
Measuring point (MP): TOC
Fluid well casing volume: 17.8gal x 5 = 89 g Borehole annulus = 104.5 gal.
Air temperature: 25-35°
Weather conditions: Clear, mild, winds 15-25 mph

### SAMPLING MEASUREMENTS

**DISCHARGE**

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Water level (ft. BMP) | 272.76 | | | | | | | | | | |
| Time | 1225 | 1235 | 1310 | 1320 | 1910 | 1935 ~~1950~~ TW | 1950 ~~2015~~ TW | 2015 ~~2030~~ TW | 2030 | 2055 | |
| Discharge (Gal.) | Initial | 45 | 90 | 120 | 140 | 190 | 250 | 350 | 400 | 500 | |

**WATER QUALITY DATA**

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| pH | 8.39 | 8.26 | 8.02 | 7.85 | 8.05 | 7.81 | 7.34 | 7.01 | 6.97 | 6.93 | |
| Conductivity (µMHOS/cm) | 4.73 | 6.28 | 7.95 | 7.75 | 7.43 | 6.79 | 6.79 | 6.79 | 6.78 | 6.83 | |
| Temperature (C) | 53.4 | 62.3 | 65.2 | 63.1 | 52.1 | 49.5 | 49.7 | 48.3 | 48.5 | 46.3 | |
| Color | Clear | Lt. Rust | Clear | " | " | " | " | " | " | " | |
| Odor | None | " | " | " | " | " | " | " | " | " | |
| Turbidity | 71 | 7100 | 78 | 59 | 19 | 13 | 8.8 | 3.3 | 3.2 | 3.3 | |

Total discharge: ~500 gallons
Casing volumes removed: 5+
Method of disposal of discharged water: Drummed

### QUALITY ASSURANCE

Sampling Method: ~~Bailer~~ or pump
Method to measure water level: Solinst
Bailer ropes new or cleaned? N/A
pH meter no: Cambridge 910 Calibrated: ✓ 12-14-94
Conductivity meter no. " " Calibrated: ✓ 12-14-94
Comments: ~100 gallons used during construction ∴ 300 gallons removed

Collected by: JAW

# WELL DEVELOPMENT LOG

Project: C3M11QQ CANNON AFB Well No: MW-0
Project No: C3M11QQ Date: 11-2-94

## WELL MEASUREMENTS

Well inside diameter: BJR 106.29' (.66 gal/ft) ft.
Depth of well casing: 306.66 ft.
Initial water level: 280.09 ft.Below MP
Measuring point (MP): TOC
Fluid well casing volume: 17.54 gal.
Air temperature: MID 60's
Weather conditions: CLEAR, DRY, WINDY

## SAMPLING MEASUREMENTS

### DISCHARGE

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Water level (ft. BMP) | 280.09 | | | | | | | | | |
| Time | 755 | 11-3 1030 | 1356 | 1405 | 1410 | 1418 | 1427 | 1433 | 1439 | 1445 |
| Discharge (Gal.) | 1 | 12 | 25 | 50 | 75 | 100 | 125 | 150 | 175 | 200 |

### WATER QUALITY DATA

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| pH | 7.40 | 7.40 | 7.55 | 7.30 | 7.28 | 7.23 | 7.23 | 7.29 | 7.33 | 7.31 |
| Conductivity (uMHOS/cm) | 16.12 | 18.14 | 18.97 | 17.99 | 17.94 | 17.89 | 17.70 | 17.90 | 17.80 | 17.85 |
| Temperature (C) F | 61.6 | 68.0 | 67.7 | 64.7 | 63.7 | 61.9 | 62.2 | 61.7 | 62.0 | 62.0 |
| Color | TAN | TAN | TAN | CLEAR | CLEAR | CLEAR | CLEAR | CLEAR | CLEAR | CLEAR |
| Odor | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE | NONE |
| Turbidity NTU | >100 | >100 | >100 | 30 | 23 | 27 | 23 | 20 | 15 | 8 NTU |

Total discharge: 200 Casing volumes removed: 11.40
Method of disposal of discharged water: PLACED IN DRUMS IN THE DRUM STORAGE AREA

## QUALITY ASSURANCE

Sampling Method: BAILER OR PUMP
Method to measure water level: SOUNDER WATER LEVEL
Bailer ropes new or cleaned? N/A
pH meter no: CAMBRIDGE 910 Calibrated: 7.00 - 10.00
Conductivity meter no. " " Calibrated:
Comments:

Collected by: Dan

# APPENDIX A.5
# SAMPLE COLLECTION FIELD SHEETS

# WATER SAMPLE COLLECTION FIELD SHEET

SITE NAME LF-4 MW-N CANNON AFB
PROJECT NO. C3m11QQ
SAMPLE NO. CAN104-MWON-01
WELL NO. MW-N
DATE/TIME COLLECTED 1/15/95
PERSONNEL Brian Ruby, Ryan Herold
SAMPLE METHOD AND DEPTH Pumping & Bailing
SAMPLE MEDIA (Circle 1): (Groundwater) Surface Water
SAMPLE SPLIT (Circle 1): (Yes) No
SPLIT SAMPLE NUMBER CAN104-MWON-03
FIELD DUPLICATE (Circle 1): (Yes) No
DUPLICATE SAMPLE NUMBER CAN104-MWON-02

| Sample Container | Preservative | Analysis Requested |
|---|---|---|
| 1 l Amber | ~~No~~ 4°C | Pest/PCB, SVOC (2) Herb ~~TPH~~ TCO, |
| 1l Poly | 4° $H_2NO_3$ | TAL metals |
| 1l Amber | 4° $H_2SO_4$/HCl | ~~TPH~~ TPH |
| 40ml Vial | 4° HCl | ~~TOA~~ VOC, TPH/GRO |

## WELL PURGING

Date 1/15/95
HNu/OVA Measurements NA
Background NA
Well Head NA
Breathing Zone NA
Time Started 820
Time Completed 940

Well Depth (TOC) 298.9'
Depth to Water (TOC) 272.8'
Water Column Length 26
4" Casing
Volume of Water in Well 17 Gals
Casing Volumes to Purge Min of 3
Minimum Water to Purge 51.5 Gals

Comments No PID headspace performed on well due to depth to water and lack of readings during drilling.

## FIELD MEASUREMENTS

| Time | Amount Purged (gal) | pH | Temp. (°C) | Conductivity (µMHOS/cm) | Color | Odor | Turbidity |
|---|---|---|---|---|---|---|---|
| 820 | 0 | 10.35 | 55.3 | 1160 | Clear | None | 11 NTU |
| 825 | 20 | 9.61 | 59.1 | 733 | clear | None | 11 NTU |
| 830 | 40 | 8.85 | 60.1 | 753 | clr | None | * Turbidity meter malfunction |
| 835 | 60 | 8.35 | 60.2 | 744 | clr | None | * NA malfunction Stop using. |
| 840 | 70 | 8.2 | 62.9 | 730 | clr | None | NA |
| 845 | 80 | 8.03 | 60.5 | 755 | clr | None | NA |
| 910 | 90 | 8.0 | 62.3 | 753 | clr | None | NA |
| 925 | 100 | 8.01 | 62.1 | 735 | clr | None | NA |
| | | | | | | | |
| | | | | | | | |

## FIELD EQUIPMENT AND CALIBRATION

| Instrument Model | Calibration |
|---|---|
| Water Level Indicator Slope | |
| Conductivity Meter Hydac 910 | NA |
| pH Meter " | Before 7.0 After 6.45 |

Comments Turbidity Meter (Hach) immediately malfunctioned in field after calibrating in trailer. This consisted of no response to the same standard used to calib. machine

# WATER SAMPLE COLLECTION FIELD SHEET

SITE NAME CAFB LF-3 Cannon AFB N. M. PROJECT NO. C3M11QQ

SAMPLE NO. CAN105-MW00-01 WELL NO. MW-0

DATE/TIME COLLECTED 1/16/95 1200 & 1345 PERSONNEL BRian Ruby

SAMPLE METHOD AND DEPTH Pump & Bailer (VOC & TPH/GRO only) Ryan Herold

SAMPLE MEDIA (Circle 1): (Groundwater) Surface Water

SAMPLE SPLIT (Circle 1): Yes No SPLIT SAMPLE NUMBER _____

FIELD DUPLICATE (Circle 1) (Yes) No DUPLICATE SAMPLE NUMBER CAN105-MW00-

| Sample Container | Preservative | Analysis Requested |
|---|---|---|
| 1 l Amber glass | 4° C | Pest/PCB, TCO, SVOC (2) Herbs. |
| 1 l Poly | $H_2NO_3$ | TAL Metals |
| 1 l Amber | 4° & HCl | TPH (418.1) |
| 40 ml VOA vial | 4° & HCl | VOC TPH/GRO |

## WELL PURGING

Date 1/16/95

HNu/OVA Measurements NA

Background NA

Well Head NA

Breathing Zone NA

Time Started 920

Time Completed 1700

Well Depth (TOC) 306.7' BTOC

Depth to Water (TOC) 279.8' BTOC

Water Column Length 27'

4" Casing Sch 80 PVC Wire Wrap

Volume of Water in Well 17.8 Gals

Casing Volumes to Purge Min - 3 Vol. x 53.4

Minimum Water to Purge Purge 5 - 89 Gals.

Comments _____

## FIELD MEASUREMENTS

| Time | Amount Purged (gal) | pH | Temp. (°C) | Conductivity (μMHOS/cm) | Color | Odor | Turbidity |
|---|---|---|---|---|---|---|---|
| 1045 | 0 | 7.45 | 58.9 | 2390 | clr | None | 21 NTU |
| | 20 | 7.25 | 55.4 | 2114 | clr | None | 15 NTU |
| | 40 | 7.15 | 62.9 | 2110 | clr | None | 5 NTU |
| | 60 | 7.25 | 60.1 | 2750 | clr | None | 2.5 NTU |
| | 80 | 7.23 | 60.1 | 2270 | clr | None | 2.0 NTU |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

## FIELD EQUIPMENT AND CALIBRATION

| Instrument Model | Calibration |
|---|---|
| Water Level Indicator Slope | NA |
| Conductivity Meter Hydac 910 | |
| pH Meter " & " | Before 7.01 After & NA |

Comments _____

# APPENDIX A.6
# CHAIN-OF-CUSTODIES

**Woodward-Clyde**
101 South 108 Avenue, Omaha, NE 8154 (402) 334-8181 Fax (402) 334-1984

# CHAIN OF CUSTODY RECORD

Page ____ of ____

| Project Name | Project No. |
|---|---|
| Cannon AFB LF 3/4 RFI | C3M11QQ |
| **Project Location** | **Project Manager** |
| Cannon AFB N.M. | Steve Cox |
| **Sampler(s)** | |
| Ryan Herald, BRian Ruby | |

| Sample Date | Sample Time | Type Comp. | Type Grab | Sample Identification | Matrix | Containers No. | Containers Type | 8240 VOC | 8270 SVOC | 6010 TAL metals | MR&I TPH | 8080 Pest/PCB | 418.1 | 8015 Mod. TCD | 8015 Mod GCD | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | X | CANIOS-MW80-03 | Water | 3 | 40 ml vials | X | | | | | | | | 4° HCl |
| | | | X | " " " | " | 2 1 | 1 l Amber | | X | | | | | | | 4°-2 ml Bt1. Broken in rep. |
| | | | X | " " " | " | 1 | 1 l Poly | | | X | | | | | | 4° $H_2NO_3$ |
| | | | X | " " " | " | 1 | 1 l Amber | | | | X | | | | | 4° $H_2SO_4$ |
| | | | X | " " " | " | 1 | 1 l Amber | | | | | X | | | | 4° |
| | | | X | " " " | " | 1 | 1 l AMBER | | | | | | X | | | 4° |
| | | | X | " " " | " | 1 | 1 l Amber | | | | | | | X | | 4° |
| | | | X | " " " | " | 3 | 40 ml Vials | | | | | | | | X | 4° HCl |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
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| | | | | | | | | | | | | | | | | |

| Signatures | Date | Time | Shipping Details | Special Instructions |
|---|---|---|---|---|
| Relinquished by: Brian J. Ruby | 1/11/95 | 12:00 | Method of Shipment FedEx | LIMS # 2551 |
| Received by: | | | Airbill No. | |
| Relinquished by: | | | Lab Address USACE-MRD LAB 420 S. 18th St. Omaha NE 68102 Attn Sample mgr | |
| Received for Laboratory by: | | | | |

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No 112532

**Woodward-Clyde**
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# CHAIN OF CUSTODY RECORD

Page 1 of 1

| Project Name | Project No. |
|---|---|
| CANNON AFB LF 3/4 RFI | C3M11QQ |
| **Project Location** | **Project Manager** |
| Cannon AFB N.M. | Steve Cox |
| **Sampler(s)** | |
| BRian Roby Ryan Herold | |

| Sample Date | Sample Time | Type Comp. | Type Grab | Sample Identification | Matrix | Containers No. | Containers Type | 8240 VOC | 8270 SVOC | 6010 TAL metal | ANG TPH | 8080 PCB/Pest | 8150 Herbs | 8015 (DTCO2 modified) | 8015 GRO | | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | X | CAN105-MW80-01 | Water | 3 | 40 ml Vials | X | | | | | | | | | 4° HCl |
| | | | X | " " " | " | 2 | 1l Amber | | X | | | | | | | | 4° |
| | | | X | " " " | " | 1 | 1l Poly | | | X | | | | | | | 4° $H_2NO_3$ |
| | | | X | " " " | " | 1 | 1l Amber | | | | X | | | | | | 4° $H_2SO_4$ |
| | | | X | " " " | " | 1 | 1l Amber | | | | | X | | | | | 4° |
| | | | X | " " " | " | 1 | 1l Amber | | | | | | X | | | | 4° |
| | | | X | " " " | " | 1 | 1l Amber | | | | | | | X | | | 4° |
| | | | X | " " " | " | 3 | 40ml Vials | | | | | | | | X | | 4° W/ ~~HCl~~ HCl |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
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| | | | | | | | | | | | | | | | | | |

| Signatures | Date | Time | Shipping Details | Special Instructions |
|---|---|---|---|---|
| Relinquished by: Brian J. Roby | 11/7/95 | 12:00 | Method of Shipment: Fed Ex | Attn: Tony Ciacco |
| Received by: | | | Airbill No.: 662398080 1 | |
| Relinquished by: | | | Lab Address: Quanterra LABS, 4955 Yarrow St, Arvada CO 80002, (303) 421-6611 | |
| Received for Laboratory by: | | | | |

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# CHAIN OF CUSTODY RECORD



| Project Name | Project No. |
|---|---|
| CANNON AFB LF 3/4 EFI | C3M11QQ |
| **Project Location** | **Project Manager** |
| CANNON AFB, N.M. | Steve Cox |
| **Sampler(s)** | |
| BRIAN Ruby Ryan Herold | |

| Sample Date | Sample Time | Type Comp. | Type Grab | Sample Identification | Matrix | Containers No. | Containers Type | Mod 8015 GRO | TAL Metals 6010 | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|
| 1/15/95 | 730 | | X | CAN 104-MW04-02 | Water | 3 | 40 ml Vials | X | | 4°C w/ HCl |
| " | " | | X | " " " " | " | 1 | 1L Poly | | X | 4° w/ $HNO_3$ |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
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| | | | | | | | | | | |
| | | | | | | | | | | |

Analytical Parameters

| Signatures | Date | Time | Shipping Details | Special Instructions |
|---|---|---|---|---|
| Relinquished by: Ryan R. Herold | 1-16-95 | 1200 | Method of Shipment: Fed Ex | |
| Received by: | | | Airbill No.: 3849586333 | |
| Relinquished by: | | | Lab Address: QAL, 4955 Yarrow, Arvada CO 80002, (303) 421-6611 | |
| Received for Laboratory by: | | | | |

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No. 112250

**Woodward-Clyde**
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# CHAIN-OF CUSTODY RECORD



| | |
|---|---|
| Project Name: CANNON AFB LF 3/4 RFI | Project No.: C3M11QQ |
| Project Location: CANNON AFB Clovis, New Mexico | Project Manager: Steve COX |
| Sampler(s): R. Herold E. RUBY | |

| Sample Date | Sample Time | Type Comp. | Type Grab | Sample Identification | Matrix | Containers No. | Containers Type | 8240 VOC | 8270 SVOC's | 8080 Pest/PCB's | 418.1 TPH | Herbs | TCLP TCE | GRO | TAL Metals Gold | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1/15/95 | 1345 | | X | CAN104-MW0N-01 | WATER | 3 RN | 40 ml | X | | | | | | | | 4° HCL |
| | 1638 | | X | | " | 2 | 1 l AMBER | | X | | | | | | | 4° |
| | ~~0945~~ 0945 | | X | | " | 1 | | | | X | | | | | | 4° ~~HT~~ BR |
| | 0945 | | X | | " | 1 | | | | | X | | | | | 4° W/ $H_2SO_4$ |
| | 0945 | | X | | " | 1 | | | | | | X | | | | 4° |
| | 0945 | | X | | " | ~~BR~~ 3 | 40 ml | | | | | | ~~BR~~ X | X | | 4° W/ HCl |
| | 0945 | | X | | " | 1 | 1 l Amber | | | | | | X | | | 4° |
| | 0945 | | X | | " | 1 | 1 l Poly | | | | | | | X | | $H_2NO_3$ @ 4°C |
| 1/15/95 | 7:30 | | X | CAN104-MW0N-02 | " | 3 | 40 ml | X | | | | | | | | 4° HCl |
| | | | X | | " | 2 | 1-l Amber | | X | | | | | | | 4° |
| | | | X | | " | 1 | " " " | | | X | | | | | | |
| | | | X | | " | 1 | " " " | | | | X | | | | | 4° W/ $H_2SO_4$ |
| | | | X | | " | 1 | " " " | | | | | X | | | | 4° |
| | | | X | | " | 1 | " " " | | | | | | X | | | 4° |

| Signatures | Date | Time | Shipping Details | Special Instructions |
|---|---|---|---|---|
| Relinquished by: Ryan R. Herold | 1-16-95 | 1200 | Method of Shipment: Fed Ex | Attn: Tony Ciacco |
| Received by: | | | Airbill No.: 3849586333 | |
| Relinquished by: | | | Lab Address: QAL, 4955 Yarrow St, Arvada, CO 80002, (303) 421-6611 | |
| Received for Laboratory by: | | | | |

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# CHAIN OF CUSTODY RECORD



| | |
|---|---|
| Project Name: CANNON AFB LF 3/4 RFI | Project No.: C3M11QQ |
| Project Location: CANNON AFB Clovis New Mexico | Project Manager: Steve COX |
| Sampler(s): Ryan Herold BRIAN RUBY | |

| Sample Date | Sample Time | Type Comp. | Type Grab | Sample Identification | Matrix | Containers No. | Containers Type | 8240 VOC's | 8270 SVOC | 6010 TAL metals | Mod 8015 GRO | Mod 8015 DRO | 8080 Pest/PCBs | 8150 Herbs | 418.1 TPH | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1/15/95 | 1345 | | X | CAN104-MW0N-03 | WATER | 2 3 | 40 ml VOA | X | | | | | | | | 4° HCL |
| | 1630 | | X | " " " | " | 2 | 1l Amber | | X | | | | | | | 4° |
| | 9:45 | | X | " " " | " | 1 | 1l Poly | | | X | | | | | | W/ HaNO3 - 4° |
| | 9:45 | | X | " " " | " | 3 | 40 ml VOA | | | | X | | | | | 4° HCl |
| | 9:45 | | X | " " " | " | 1 | 1l Amber | | | | | X | | | | 4° |
| | 9:45 | | X | " " " | " | 1 | | | | | | | X | | | 4° |
| | 9:45 | | X | " " " | " | 1 | | | | | | | | X | | 4° |
| | 9:45 | | X | " " " | " | 1 | | | | | | | | | X | W/ H2SO4 |

| Signatures | Date | Time | Shipping Details | Special Instructions |
|---|---|---|---|---|
| Relinquished by: Ryan R. Herold | 1/16/95 | 1200 | Method of Shipment: Fed Ex | LIMS # 2551 |
| Received by: | | | Airbill No.: 3849586381 | |
| Relinquished by: | | | Lab Address: USACE MRD LAB 420 S. 18th St. Omaha NE 68102 402-444-4302 | |
| Received for Laboratory by: | | | | |

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# CHAIN OF CUSTODY RECORD

Page 1 of 1

| Project Name | Project No. |
|---|---|
| CANNON AFB LF 3/4 RSI | C3M11QQ |
| **Project Location** | **Project Manager** |
| CANNON AFB N.M. | Steve Cox |
| **Sampler(s)** | |
| Ryan Herald BRian Ruby | |

| Sample Date | Sample Time | Type Comp. | Type Grab | Sample Identification | Matrix | Containers No. | Containers Type | 8080 PCB/Pest | 8150 Herbs | 418.1 TPH | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1/15/95 | 9:45 | | X | CAN104-MWBN-03 | Water | 1 | 1 L Amber | X | | | 4° |
| 1/15/95 | 9:45 | | X | " " " | | 1 | " " " | | X | | 4° |
| 1/15/95 | 9:45 | | X | " " " | | 1 | " " " | | | X | 4° |

| Signatures | Date | Time | Shipping Details | Special Instructions |
|---|---|---|---|---|
| Relinquished by: Ryan R. Herald | 1/16/95 | 1200 | Method of Shipment: FedEx | LIMS # 2551 |
| Received by: | | | Airbill No.: 3849586381 | |
| Relinquished by: | | | Lab Address: USACE MRD LAB | |
| Received for Laboratory by: | | | | |

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ND 112520

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# CHAIN OF CUSTODY RECORD

Page 1 of 1

| Project Name | Project No. |
|---|---|
| CAFB LF3 & LF4 RFI Ph II | C3M11QQ 2C #20 |
| **Project Location** | **Project Manager** |
| CANNON AFB NM | Steve Cox |
| **Sampler(s)** | |
| BRIAN RUBY | |

| Sample Date | Sample Time | Type Comp. | Type Grab | Sample Identification | Matrix | Containers No. | Containers Type | TCLP VOA | TCLP SVOC, Pest, Herb | metals | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 10/5/94 | ~~0930~~ | | X | Decon Water CAFB LF3+LF4 | Water | 2 | 8 oz glass | X | | | One Sample |
| | 0930 | BJR X | X | ~~—~~ RFI | | 2 | 32 oz Amber | | X | | |
| 11/2/94 | 0830 | X | | MW-O Drill Cuttings CAFB LF3 | Soil | 2 | 4 oz glass | X | | | one sample |
| | | | | ~~Ref~~ BJR LF4 RFI | | ~~1~~ BJR | ~~32 oz Amber~~ | | ~~X~~ | | |
| | | | | " " " | Soil | 1 | 32 oz AMB. | | X | | |
| 11/2/94 | 0915 | X | | MW-N Drill Cuttings | Soil | 2 | 4 oz Glass | X | | | One sample |
| | | | | CAFB LF-3 & 4 RFI | | | | | | | |
| | | | BJR | " " " | Soil | 1 | 32 oz Amber | | X | | |
| | | | | EMPTY | | 3 | 32 oz | | | | |
| | | | | EMPTY | | 1 | 4 oz | | | | |
| | | | | BJR | | | | | | | |

| Signatures | Date | Time | Shipping Details | Special Instructions |
|---|---|---|---|---|
| Relinquished by: Brian J. Ruby | 11/2/94 | 12:00 | Method of Shipment Fed-Ex | All samples for total TCLP Contact Tony Scirocco. |
| Received by: | | | Airbill No. 6623980856 | Note: Aged Water Samples, process immediately |
| Relinquished by: | | | Lab Address Quanterra 4955 YARROW St Arvada, CO 80002 | |
| Received for Laboratory by: | | | | |

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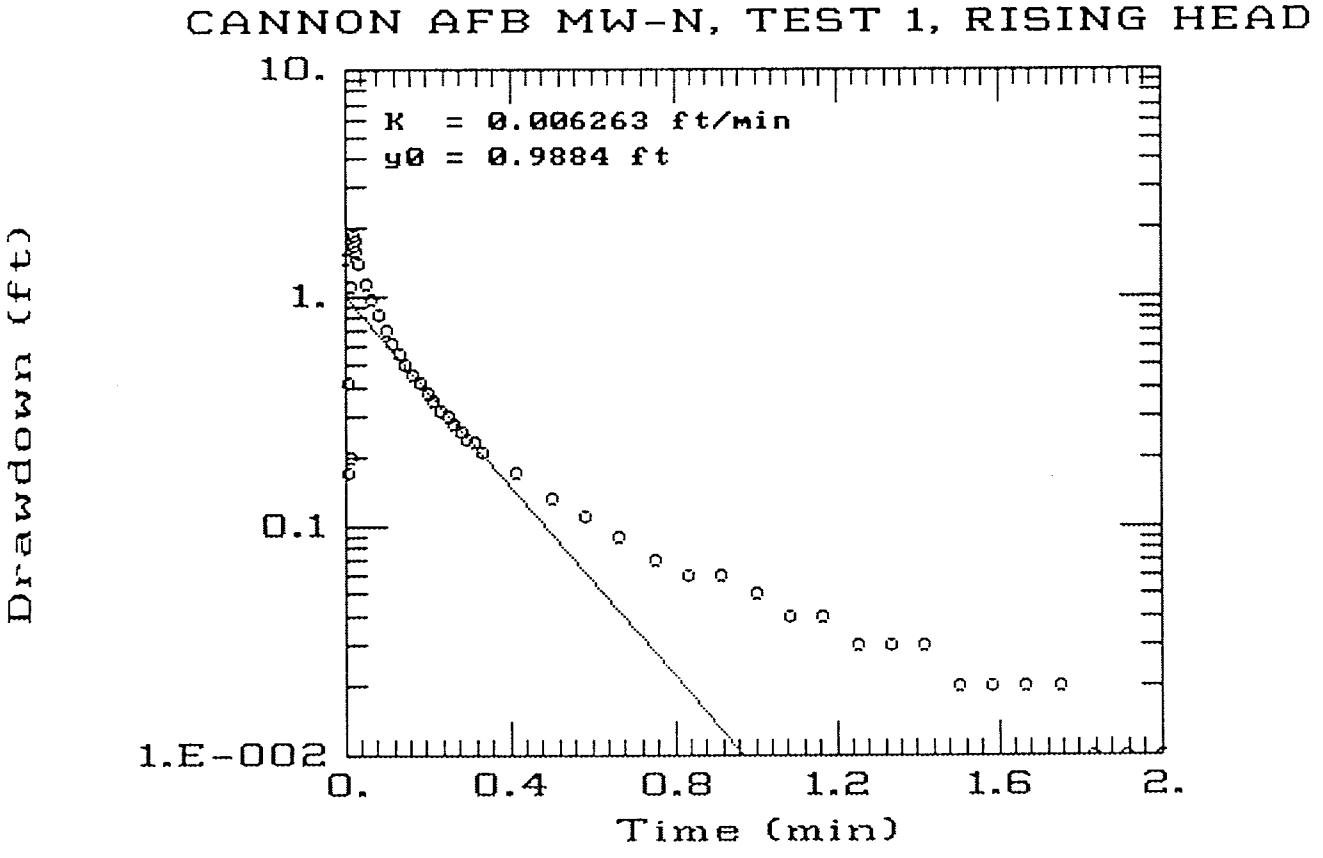
# APPENDIX B
# SLUG TEST DATA


CANNON AFB MW-N, TEST 1, RISING HEAD
K = 0.006263 ft/min
y0 = 0.9884 ft
Drawdown (ft)
10.
1.
0.1
1.E-002
0.
0.4
0.8
1.2
1.6
2.
Time (min)

SE1000B
Environmental Logger
02/08 11:15

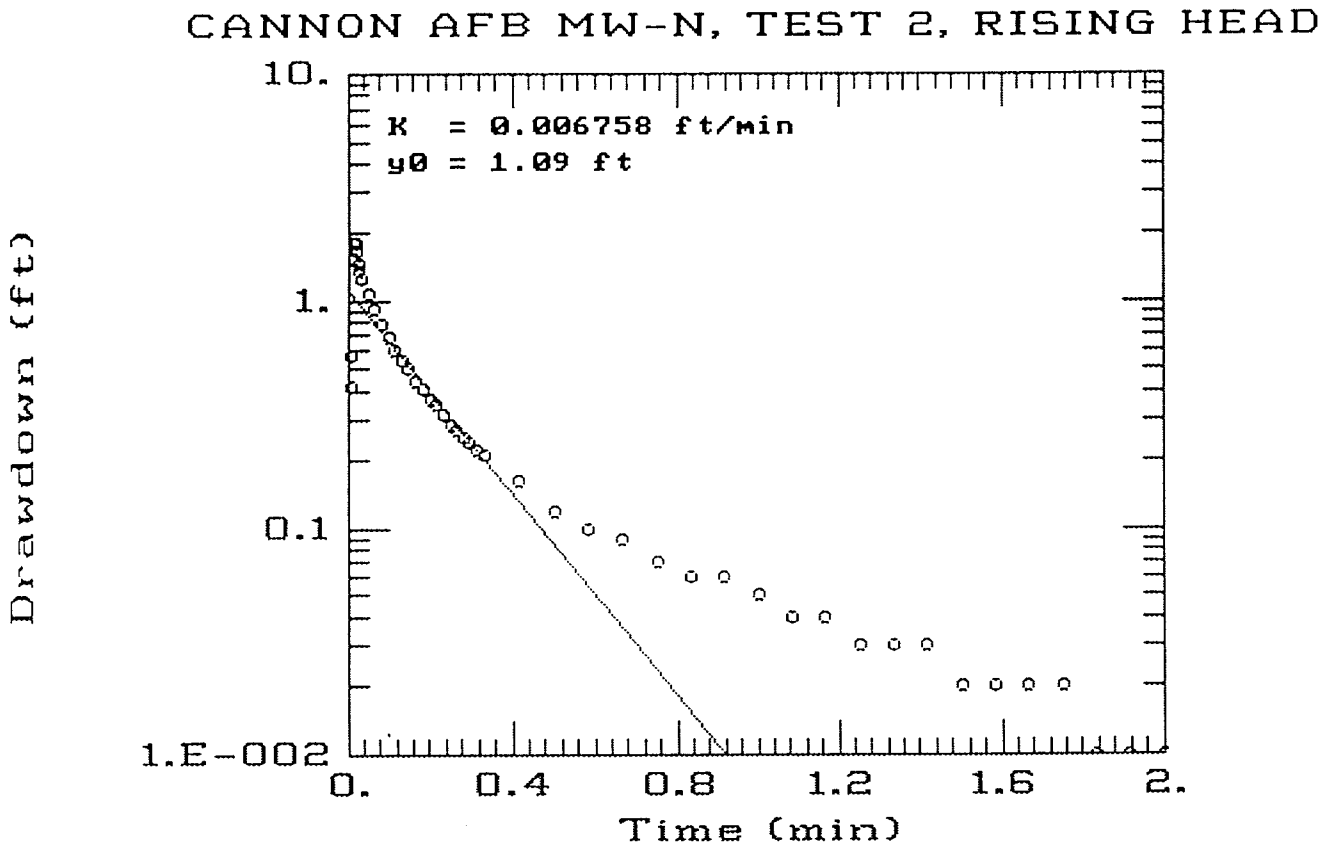
Unit# 00333 Test# 0

INPUT 1: Level (F) TOC

| | |
|---|---|
| Reference | 0.00 |
| Scale factor | 10.01 |
| Offset | 0.00 |

Step# 0 01/19 13:12

| Elapsed Time | Value |
|---|---|
| 0.0000 | 0.98 |
| 0.0033 | 0.87 |
| 0.0066 | 0.80 |
| 0.0099 | 0.73 |
| 0.0133 | 0.68 |
| 0.0166 | 0.63 |
| 0.0200 | 0.61 |
| 0.0233 | 0.56 |
| 0.0266 | 0.55 |
| 0.0300 | 0.52 |
| 0.0333 | 0.49 |
| 0.0500 | 0.40 |
| 0.0666 | 0.34 |
| 0.0833 | 0.29 |
| 0.1000 | 0.24 |
| 0.1166 | 0.22 |
| 0.1333 | 0.19 |
| 0.1500 | 0.17 |
| 0.1666 | 0.15 |
| 0.1833 | 0.13 |
| 0.2000 | 0.12 |
| 0.2166 | 0.11 |
| 0.2333 | 0.10 |
| 0.2500 | 0.09 |
| 0.2666 | 0.08 |
| 0.2833 | 0.08 |
| 0.3000 | 0.07 |
| 0.3166 | 0.07 |
| 0.3333 | 0.06 |
| 0.4167 | 0.05 |
| 0.5000 | 0.03 |
| 0.5833 | 0.02 |
| 0.6667 | 0.02 |
| 0.7500 | 0.01 |
| 0.8333 | 0.01 |
| 0.9167 | 0.01 |
| 1.0000 | 0.00 |
| 1.0833 | 0.00 |
| 1.1667 | 0.00 |
| 1.2500 | 0.00 |
| 1.3333 | 0.00 |
| 1.4166 | 0.00 |
| 1.5000 | -0.00 |
| 1.5833 | -0.00 |
| 1.6667 | -0.00 |
| 1.7500 | -0.00 |
| 1.8333 | -0.00 |
| 1.9167 | -0.00 |
| 2.0000 | -0.00 |
| 2.5000 | -0.00 |
| 3.0000 | -0.00 |
| 3.5000 | -0.01 |
| 4.0000 | -0.01 |
| 4.5000 | -0.01 |
| 5.0000 | -0.01 |
| 5.5000 | -0.01 |
| 6.0000 | -0.01 |
| 6.5000 | -0.01 |
| 7.0000 | -0.01 |
| 7.5000 | -0.01 |
| 8.0000 | -0.01 |
| 8.5000 | -0.01 |
| 9.0000 | -0.01 |
| 9.5000 | -0.01 |
| 10.0000 | -0.01 |
| 12.0000 | -0.01 |
| 14.0000 | -0.01 |
| 16.0000 | -0.02 |


CANNON AFB MW-N, TEST 2, RISING HEAD
K = 0.006758 ft/min
y0 = 1.09 ft
Drawdown (ft)
10.
1.
0.1
1.E-002
0.
0.4
0.8
1.2
1.6
2.
Time (min)

SE1000B
Environmental Logger
02/08 11:16

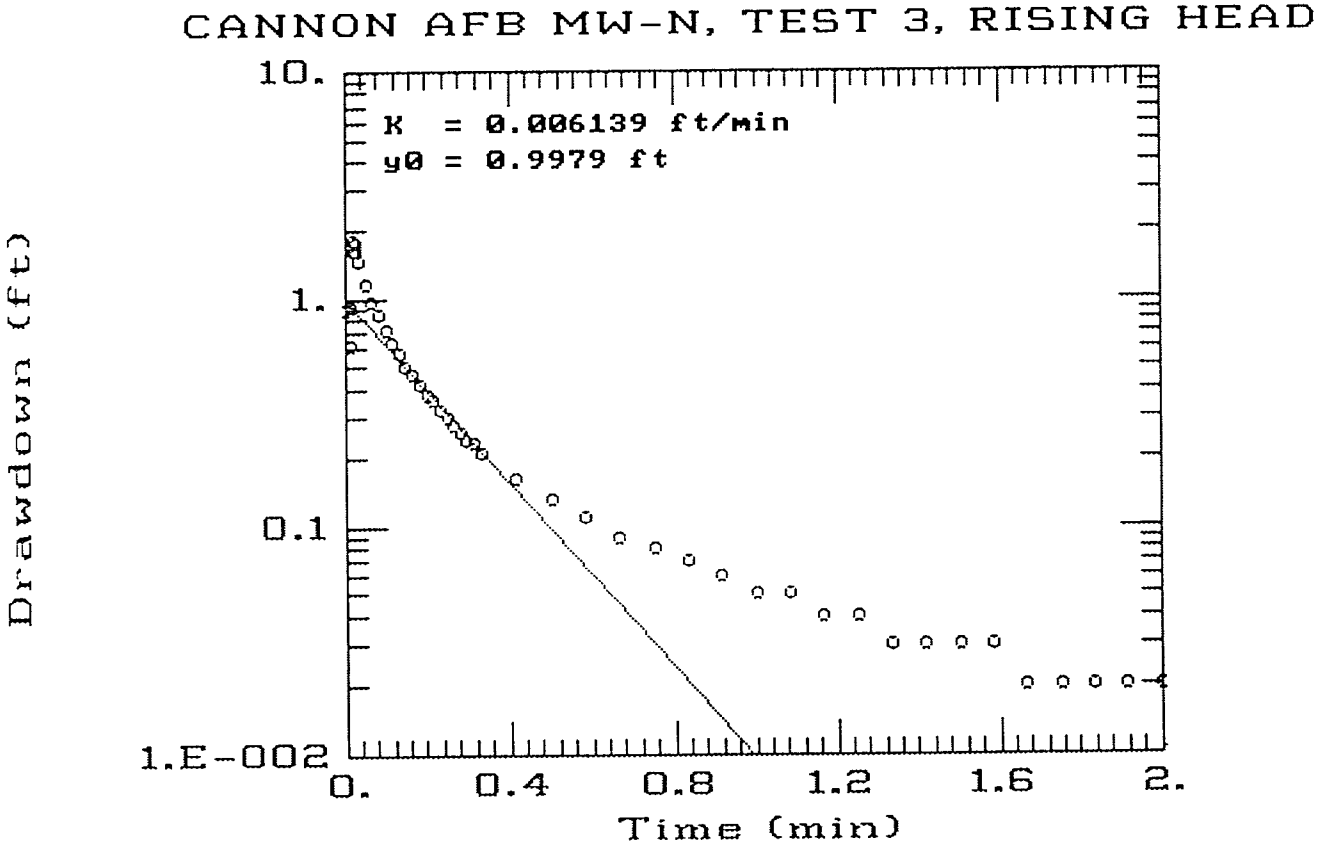
Unit# 00333 Test# 1

INPUT 1: Level (F) TOC

| | |
|---|---|
| Reference | 0.00 |
| Scale factor | 10.01 |
| Offset | 0.00 |

Step# 0 01/19 14:18

| Elapsed Time | Value |
|---|---|
| 0.0000 | 1.90 |
| 0.0033 | 0.25 |
| 0.0066 | 0.41 |
| 0.0099 | 1.36 |
| 0.0133 | 1.36 |
| 0.0166 | 1.26 |
| 0.0200 | 1.16 |
| 0.0233 | 1.11 |
| 0.0266 | 1.03 |
| 0.0300 | 0.94 |
| 0.0333 | 0.87 |
| 0.0500 | 0.72 |
| 0.0666 | 0.60 |
| 0.0833 | 0.51 |
| 0.1000 | 0.45 |
| 0.1166 | 0.39 |
| 0.1333 | 0.35 |
| 0.1500 | 0.31 |
| 0.1666 | 0.28 |
| 0.1833 | 0.25 |
| 0.2000 | 0.23 |
| 0.2166 | 0.21 |
| 0.2333 | 0.19 |
| 0.2500 | 0.18 |
| 0.2666 | 0.17 |
| 0.2833 | 0.15 |
| 0.3000 | 0.14 |
| 0.3166 | 0.13 |
| 0.3333 | 0.13 |
| 0.4167 | 0.10 |
| 0.5000 | 0.08 |
| 0.5833 | 0.06 |
| 0.6667 | 0.05 |
| 0.7500 | 0.04 |
| 0.8333 | 0.03 |
| 0.9167 | 0.03 |
| 1.0000 | 0.02 |
| 1.0833 | 0.02 |
| 1.1667 | 0.02 |
| 1.2500 | 0.01 |
| 1.3333 | 0.01 |
| 1.4166 | 0.01 |
| 1.5000 | 0.00 |
| 1.5833 | 0.00 |
| 1.6667 | 0.00 |
| 1.7500 | 0.00 |
| 1.8333 | 0.00 |
| 1.9167 | 0.00 |
| 2.0000 | 0.00 |
| 2.5000 | -0.00 |
| 3.0000 | -0.00 |
| 3.5000 | -0.00 |
| 4.0000 | -0.00 |
| 4.5000 | -0.00 |
| 5.0000 | -0.00 |
| 5.5000 | -0.00 |
| 6.0000 | -0.01 |
| 6.5000 | -0.01 |
| 7.0000 | -0.01 |
| 7.5000 | -0.01 |
| 8.0000 | -0.01 |
| 8.5000 | -0.01 |
| 9.0000 | -0.01 |
| 9.5000 | -0.01 |
| 10.0000 | -0.01 |


CANNON AFB MW-N, TEST 3, RISING HEAD
K = 0.006139 ft/min
y0 = 0.9979 ft
Drawdown (ft)
10.
1.
0.1
1.E-002
0.
0.4
0.8
1.2
1.6
2.
Time (min)

SE1000B
Environmental Logger
02/08 11:18

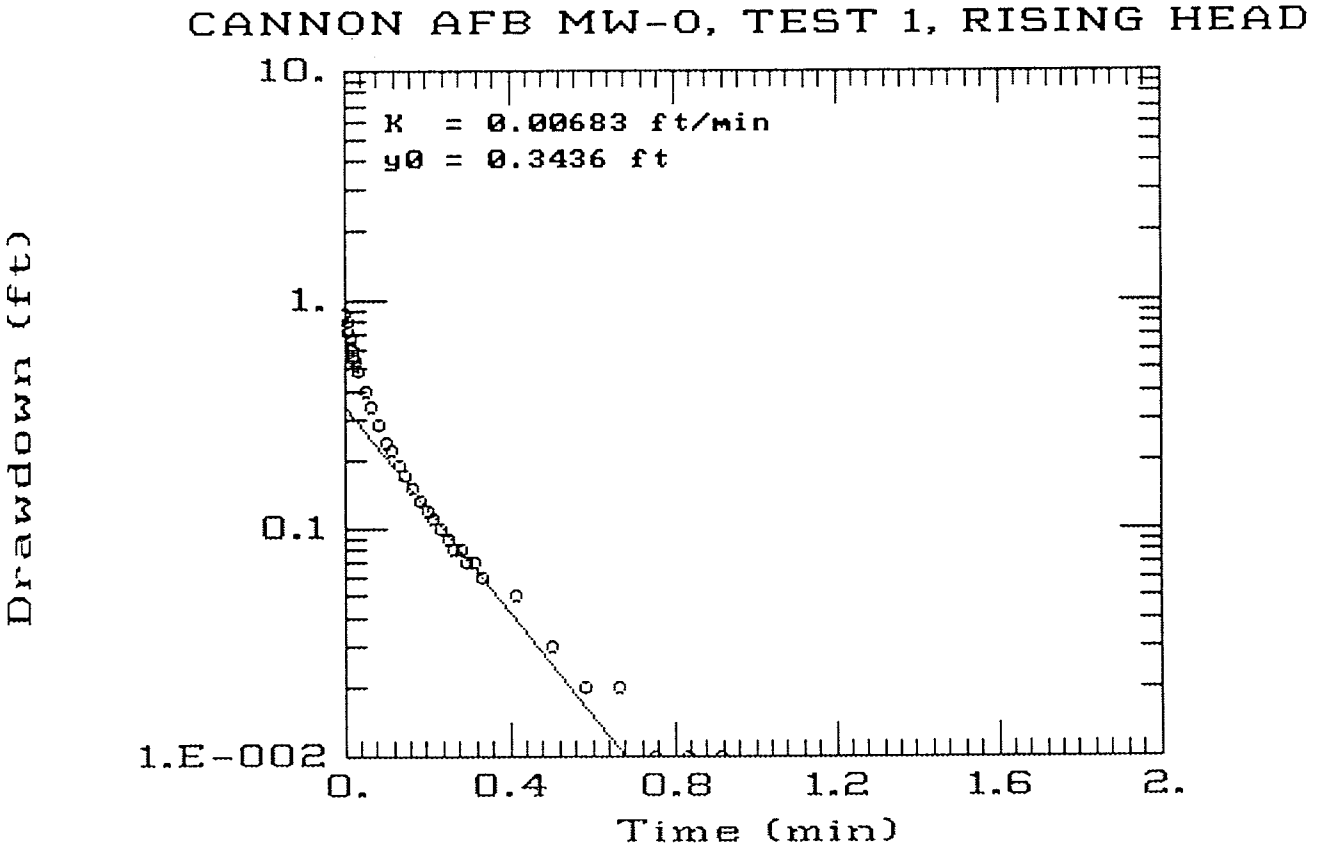
Unit# 00333 Test# 2

INPUT 1: Level (F) TOC

| | |
|---|---|
| Reference | 0.00 |
| Scale factor | 10.01 |
| Offset | 0.00 |

Step# 0 01/19 15:10

| Elapsed Time | Value |
|---|---|
| 0.0000 | 1.80 |
| 0.0033 | 0.30 |
| 0.0066 | 0.00 |
| 0.0099 | 0.53 |
| 0.0133 | 1.12 |
| 0.0166 | 1.36 |
| 0.0200 | 1.30 |
| 0.0233 | 1.23 |
| 0.0266 | 1.10 |
| 0.0300 | 0.99 |
| 0.0333 | 0.91 |
| 0.0500 | 0.74 |
| 0.0666 | 0.63 |
| 0.0833 | 0.54 |
| 0.1000 | 0.47 |
| 0.1166 | 0.42 |
| 0.1333 | 0.37 |
| 0.1500 | 0.34 |
| 0.1666 | 0.30 |
| 0.1833 | 0.28 |
| 0.2000 | 0.25 |
| 0.2166 | 0.23 |
| 0.2333 | 0.21 |
| 0.2500 | 0.19 |
| 0.2666 | 0.18 |
| 0.2833 | 0.17 |
| 0.3000 | 0.16 |
| 0.3166 | 0.14 |
| 0.3333 | 0.13 |
| 0.4167 | 0.10 |
| 0.5000 | 0.08 |
| 0.5833 | 0.07 |
| 0.6667 | 0.06 |
| 0.7500 | 0.05 |
| 0.8333 | 0.04 |
| 0.9167 | 0.04 |
| 1.0000 | 0.03 |
| 1.0833 | 0.03 |
| 1.1667 | 0.02 |
| 1.2500 | 0.02 |
| 1.3333 | 0.02 |
| 1.4166 | 0.01 |
| 1.5000 | 0.01 |
| 1.5833 | 0.01 |
| 1.6667 | 0.01 |
| 1.7500 | 0.01 |
| 1.8333 | 0.00 |
| 1.9167 | 0.00 |
| 2.0000 | 0.00 |
| 2.5000 | 0.00 |
| 3.0000 | 0.00 |
| 3.5000 | 0.00 |
| 4.0000 | 0.00 |
| 4.5000 | -0.00 |
| 5.0000 | -0.00 |
| 5.5000 | -0.00 |
| 6.0000 | -0.00 |
| 6.5000 | -0.00 |
| 7.0000 | -0.00 |
| 7.5000 | -0.00 |
| 8.0000 | -0.00 |
| 8.5000 | -0.00 |
| 9.0000 | -0.00 |
| 9.5000 | -0.00 |
| 10.0000 | -0.00 |


CANNON AFB MW-O, TEST 1, RISING HEAD
K = 0.00683 ft/min
y0 = 0.3436 ft
Drawdown (ft)
10.
1.
0.1
1.E-002
0.
0.4
0.8
1.2
1.6
2.
Time (min)

SE1000B
Environmental Logger
02/08 11:19

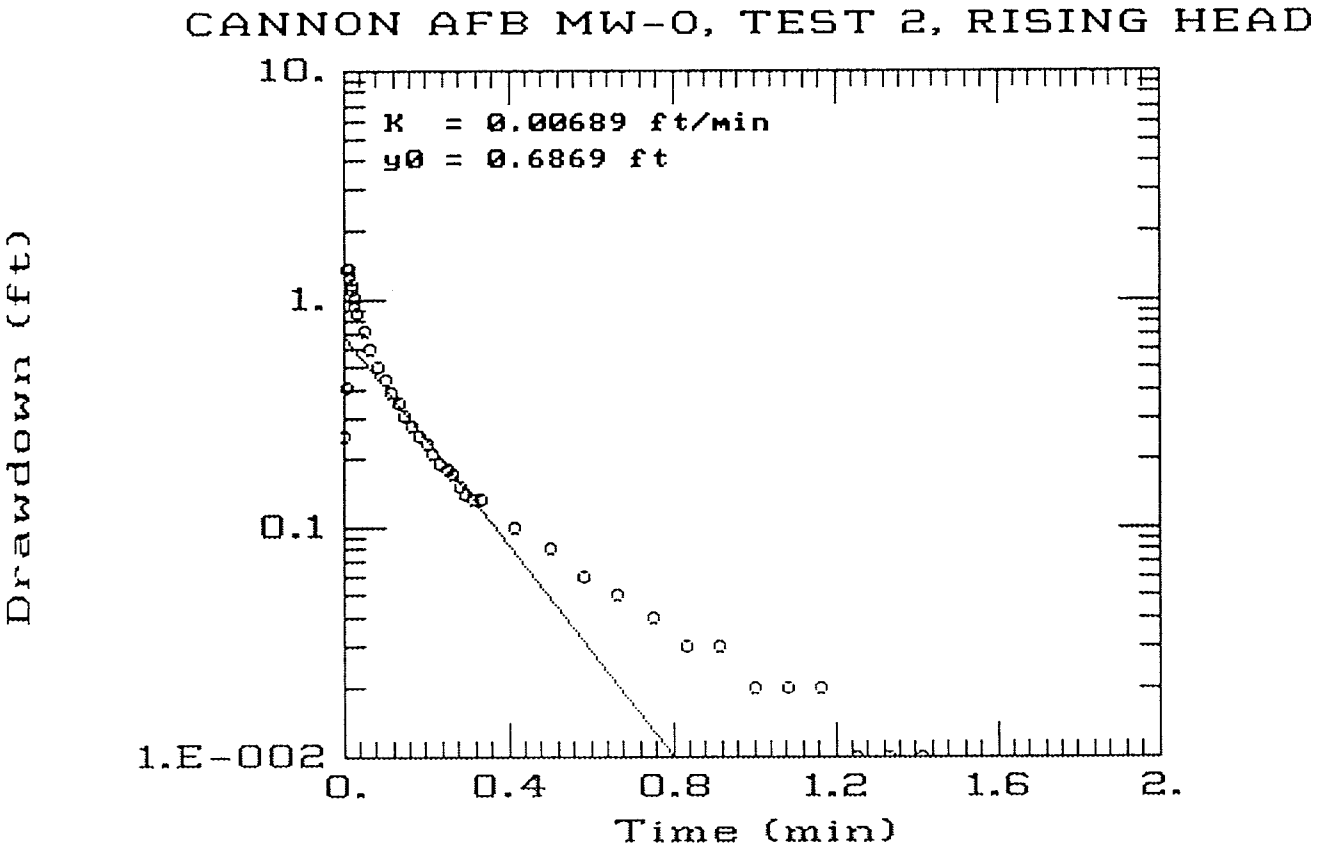
Unit# 00333 Test# 3

INPUT 1: Level (F) TOC

| | |
|---|---|
| Reference | 0.00 |
| Scale factor | 10.01 |
| Offset | 0.00 |

Step# 0 01/19 17:25

| Elapsed Time | Value |
|---|---|
| 0.0000 | 1.99 |
| 0.0033 | 1.47 |
| 0.0066 | 0.17 |
| 0.0099 | 0.42 |
| 0.0133 | 0.20 |
| 0.0166 | 1.10 |
| 0.0200 | 1.67 |
| 0.0233 | 1.84 |
| 0.0266 | 1.75 |
| 0.0300 | 1.57 |
| 0.0333 | 1.40 |
| 0.0500 | 1.14 |
| 0.0666 | 0.97 |
| 0.0833 | 0.83 |
| 0.1000 | 0.71 |
| 0.1166 | 0.62 |
| 0.1333 | 0.56 |
| 0.1500 | 0.51 |
| 0.1666 | 0.46 |
| 0.1833 | 0.42 |
| 0.2000 | 0.38 |
| 0.2166 | 0.35 |
| 0.2333 | 0.32 |
| 0.2500 | 0.30 |
| 0.2666 | 0.28 |
| 0.2833 | 0.26 |
| 0.3000 | 0.24 |
| 0.3166 | 0.23 |
| 0.3333 | 0.21 |
| 0.4167 | 0.17 |
| 0.5000 | 0.13 |
| 0.5833 | 0.11 |
| 0.6667 | 0.09 |
| 0.7500 | 0.07 |
| 0.8333 | 0.06 |
| 0.9167 | 0.06 |
| 1.0000 | 0.05 |
| 1.0833 | 0.04 |
| 1.1667 | 0.04 |
| 1.2500 | 0.03 |
| 1.3333 | 0.03 |
| 1.4166 | 0.03 |
| 1.5000 | 0.02 |
| 1.5833 | 0.02 |
| 1.6667 | 0.02 |
| 1.7500 | 0.02 |
| 1.8333 | 0.01 |
| 1.9167 | 0.01 |
| 2.0000 | 0.01 |
| 2.5000 | 0.00 |
| 3.0000 | 0.00 |
| 3.5000 | 0.00 |
| 4.0000 | 0.00 |
| 4.5000 | -0.00 |
| 5.0000 | -0.00 |
| 5.5000 | -0.00 |
| 6.0000 | -0.00 |
| 6.5000 | -0.00 |
| 7.0000 | -0.00 |
| 7.5000 | -0.00 |
| 8.0000 | -0.00 |
| 8.5000 | -0.00 |
| 9.0000 | -0.00 |
| 9.5000 | -0.00 |
| 10.0000 | -0.00 |


CANNON AFB MW-O, TEST 2, RISING HEAD
K = 0.00689 ft/min
y0 = 0.6869 ft
Drawdown (ft)
10.
1.
0.1
1.E-002
0.
0.4
0.8
1.2
1.6
2.
Time (min)

SE1000B
Environmental Logger
02/08 11:20

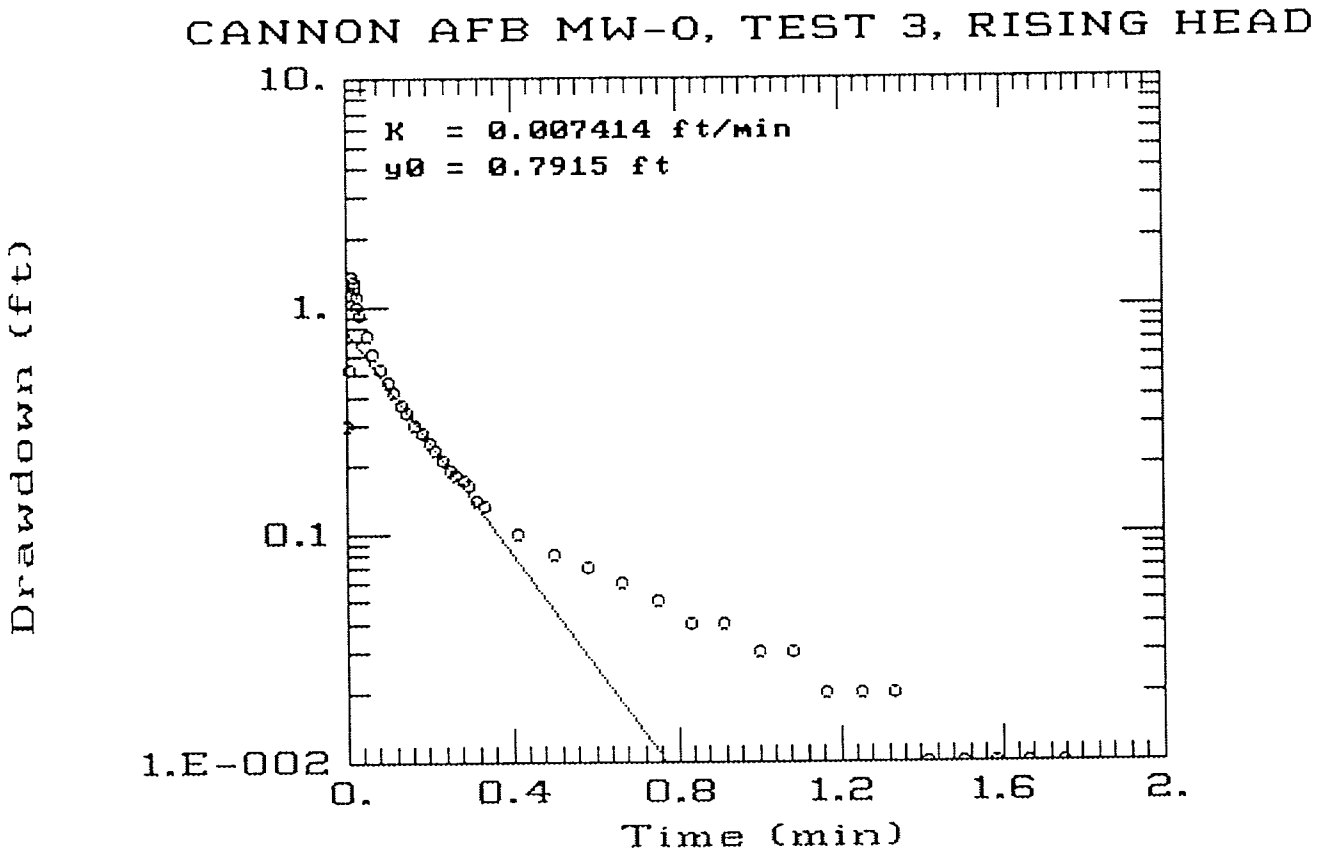
Unit# 00333 Test# 4

INPUT 1: Level (F) TOC

Reference 0.00
Scale factor 10.01
Offset 0.00

Step# 0 01/19 18:11

| Elapsed Time | Value |
|---|---|
| 0.0000 | 1.08 |
| 0.0033 | -0.11 |
| 0.0066 | 0.42 |
| 0.0099 | 0.57 |
| 0.0133 | 1.53 |
| 0.0166 | 1.80 |
| 0.0200 | 1.81 |
| 0.0233 | 1.66 |
| 0.0266 | 1.47 |
| 0.0300 | 1.34 |
| 0.0333 | 1.26 |
| 0.0500 | 1.07 |
| 0.0666 | 0.91 |
| 0.0833 | 0.79 |
| 0.1000 | 0.69 |
| 0.1166 | 0.60 |
| 0.1333 | 0.55 |
| 0.1500 | 0.50 |
| 0.1666 | 0.45 |
| 0.1833 | 0.41 |
| 0.2000 | 0.37 |
| 0.2166 | 0.35 |
| 0.2333 | 0.32 |
| 0.2500 | 0.29 |
| 0.2666 | 0.27 |
| 0.2833 | 0.25 |
| 0.3000 | 0.24 |
| 0.3166 | 0.22 |
| 0.3333 | 0.21 |
| 0.4167 | 0.16 |
| 0.5000 | 0.12 |
| 0.5833 | 0.10 |
| 0.6667 | 0.09 |
| 0.7500 | 0.07 |
| 0.8333 | 0.06 |
| 0.9167 | 0.06 |
| 1.0000 | 0.05 |
| 1.0833 | 0.04 |
| 1.1667 | 0.04 |
| 1.2500 | 0.03 |
| 1.3333 | 0.03 |
| 1.4166 | 0.03 |
| 1.5000 | 0.02 |
| 1.5833 | 0.02 |
| 1.6667 | 0.02 |
| 1.7500 | 0.02 |
| 1.8333 | 0.01 |
| 1.9167 | 0.01 |
| 2.0000 | 0.01 |
| 2.5000 | 0.00 |
| 3.0000 | 0.00 |
| 3.5000 | 0.00 |
| 4.0000 | 0.00 |
| 4.5000 | 0.00 |
| 5.0000 | 0.00 |
| 5.5000 | -0.00 |
| 6.0000 | -0.00 |
| 6.5000 | -0.00 |
| 7.0000 | -0.00 |
| 7.5000 | -0.00 |
| 8.0000 | -0.00 |
| 8.5000 | -0.00 |
| 9.0000 | -0.00 |
| 9.5000 | -0.00 |
| 10.0000 | -0.00 |
| 12.0000 | -0.00 |


CANNON AFB MW-O, TEST 3, RISING HEAD
K = 0.007414 ft/min
y0 = 0.7915 ft
10.
1.
0.1
1.E-002
Drawdown (ft)
0.
0.4
0.8
1.2
1.6
2.
Time (min)

SE1000B
Environmental Logger
02/08 11:21

Unit# 00333 Test# 5

INPUT 1: Level (F) TOC

| | |
|---|---|
| Reference | 0.00 |
| Scale factor | 10.01 |
| Offset | 0.00 |

Step# 0 01/19 18:45

| Elapsed Time | Value |
|---|---|
| 0.0000 | 1.15 |
| 0.0033 | 0.90 |
| 0.0066 | -0.03 |
| 0.0099 | -0.15 |
| 0.0133 | 0.62 |
| 0.0166 | 0.93 |
| 0.0200 | 1.63 |
| 0.0233 | 1.81 |
| 0.0266 | 1.77 |
| 0.0300 | 1.62 |
| 0.0333 | 1.46 |
| 0.0500 | 1.17 |
| 0.0666 | 0.98 |
| 0.0833 | 0.85 |
| 0.1000 | 0.73 |
| 0.1166 | 0.64 |
| 0.1333 | 0.57 |
| 0.1500 | 0.51 |
| 0.1666 | 0.47 |
| 0.1833 | 0.42 |
| 0.2000 | 0.38 |
| 0.2166 | 0.36 |
| 0.2333 | 0.33 |
| 0.2500 | 0.30 |
| 0.2666 | 0.28 |
| 0.2833 | 0.26 |
| 0.3000 | 0.24 |
| 0.3166 | 0.23 |
| 0.3333 | 0.21 |
| 0.4167 | 0.16 |
| 0.5000 | 0.13 |
| 0.5833 | 0.11 |
| 0.6667 | 0.09 |
| 0.7500 | 0.08 |
| 0.8333 | 0.07 |
| 0.9167 | 0.06 |
| 1.0000 | 0.05 |
| 1.0833 | 0.05 |
| 1.1667 | 0.04 |
| 1.2500 | 0.04 |
| 1.3333 | 0.03 |
| 1.4166 | 0.03 |
| 1.5000 | 0.03 |
| 1.5833 | 0.03 |
| 1.6667 | 0.02 |
| 1.7500 | 0.02 |
| 1.8333 | 0.02 |
| 1.9167 | 0.02 |
| 2.0000 | 0.02 |
| 2.5000 | 0.01 |
| 3.0000 | 0.00 |
| 3.5000 | 0.00 |
| 4.0000 | 0.00 |
| 4.5000 | 0.00 |
| 5.0000 | 0.00 |
| 5.5000 | 0.00 |
| 6.0000 | 0.00 |
| 6.5000 | 0.00 |
| 7.0000 | 0.00 |
| 7.5000 | 0.00 |
| 8.0000 | 0.00 |
| 8.5000 | 0.00 |
| 9.0000 | 0.00 |
| 9.5000 | 0.00 |
| 10.0000 | 0.00 |

# APPENDIX C
# SURVEY REPORT

# Landfill 3 and 4 (SWMUs 105 and 104) Survey Data

| WELL | NORTHING (FT.) | EASTING (FT.) | ELEVATION (FT MSL) * | ELEVATION (FT MSL) ** |
|---|---|---|---|---|
| **MW-N** | 234249.19 | 813037.28 | 4269.72 | 4267.59 |
| **MW-O** | 232439.95 | 812733.51 | 4273.06 | 4271.00 |

* Elevation is to top of PVC riser
**Elevation is top of concrete pad