



CAF B 05
DEPARTMENT OF THE AIR FORCE
27TH CIVIL ENGINEER SQUADRON (ACC)
CANNON AIR FORCE BASE NEW MEXICO

5 Apr 05

Lieutenant Colonel Alexander P. Karibian
Commander
506 N DL Ingram Blvd
Cannon AFB NM 88103-5003

Mr. David Cobrain
Hazardous Waste Bureau
New Mexico Environment Department
2905 Rodeo Dr E Building 1
Santa Fe NM 87505-6303

Dear Mr. Cobrain

Enclosed for your review are two copies of the Final Construction Completion Report for the Remedial Action at Solid Waste Management Unit 101—Sewage Lagoons Cannon Air Force Base, New Mexico, dated Mar 05.

This Construction Completion Report documents the design and construction of a cover system for the Sewage Lagoons as part of a voluntary corrective measure to close the site. Tetra Tech EC, Inc. (TtEC) conducted the remedial action and prepared this report in accordance with the United States Environmental Protection Agency Resource Conservation and Recovery Act Corrective Action Plan Guidance (EPA, 1994).

If you have any questions regarding this information, please contact Mrs. Sheila Newman, Environmental Flight, at (505) 784-6391 or email sheila.newman@cannon.af.mil.

Sincerely

ALEXANDER P. KARIBIAN, Lt Col, USAF

Attachment:

Final Construction Completion Report for the Remedial Action at SWMU 101—Sewage Lagoons Cannon Air Force Base, New Mexico (2 cys)



**Draft Construction Completion Report for the Closure of SWMU 101–Sewage Lagoons
Cannon Air Force Base, New Mexico
October 2004**

Comment No.	Page/Section	Comment	Response
Reviewer: Pete Zamie – Restoration Project Manager, Cannon AFB			
1.		Mr. Zamie had no comments on the report.	
Reviewer: Brad Jones – Project Engineer, USACE, Omaha District			
1.	General	Include figure showing typical cross section of cover system for reference with paragraphs 3.1.4 – 3.1.7.	The text was revised and a figure was added to provide the general schematic cross-section of the cover system as requested.
2.	General	Include discussion of as-built soil cover being smaller than shown on design drawings due to sludge thickness being less than anticipated. How were final grades and grading limits revised to accommodate this change?	TtEC revised the discussions in 3.1.2, 3.1.3, and 3.1.4 to clarify. The associated FCR and DCN were referenced.
3.	Paragraph 3.1.3, Excavation and Handling of Contaminated Material	The first paragraph states 70,000 cubic yards of material was to be removed from Area B and placed in Area A (per the TtFW Work Plan, 2003). The second paragraph states an additional (unexpected) sludge volume amounting to 13,200 cubic yards was encountered in a trench in the southern section of Area B. The last sentence of the paragraph states the total volume of material placed in Area A is 73,400 cubic yards. Please clarify volumes because 70,000 + 13,200 does not equal 73,400.	Text was added to clarify the volumes of materials placed as requested.
4.	Paragraph 3.1.4, Sludge Consolidation and Random Fill	State total sludge volume and volume of random fill material placed in Area A.	Text was added to clarify the volumes of materials placed as requested.
5.	Paragraph 3.1.5, Soil Barrier Layer Construction	State total volume of soil barrier layer material placed in Area A.	TtEC added text and the volumes for clarification.
6.	Paragraph 3.1.7, Erosion/Vegetation Layer Construction	Specify “offsite location” for obtaining erosion/vegetation layer.	Text was added to clarify that the borrow source was located 8 miles north of Melrose, NM.
7.	Paragraph 3.1.8, Site Revegetation and Fence Construction	Include table with seed mix (species and pounds of seed).	TtEC added a table providing the seed mix as requested.
8.	Paragraph 3.4.2, Concrete Debris	Was concrete debris used for biota barrier material?	Only concrete debris from an offsite source was used for biota barrier material. Text was added to clarify the use and sources of concrete used during the construction of the soil cover system.
9.	General	The report must include a detailed discussion of the numerous problems encountered during hydraulic conductivity testing of the soil barrier layer performed by the Contractors QC Laboratory. In addition to a discussion of the problems, the report should address how these problems were overcome. Does the report include all hydraulic conductivity test results or only those test results that are valid?	A detailed discussion cannot be provided as requested by USACE because TtEC personnel have been barred by the TtEC Legal Counsel from providing information related to the problems associated with the Contractor’s QC Laboratory which could interfere with pending and/or unresolved litigation between our subcontractor and their subcontractor geotechnical laboratory.

**Draft Construction Completion Report for the Closure of SWMU 101–Sewage Lagoons
Cannon Air Force Base, New Mexico
October 2004**

Comment No.	Page/Section	Comment	Response
			The cooperative effort conducted by TtEC, USACE, and subcontractors resulted in acceptable data which supported the Submittals eventually approved by USACE. All aspects of the constructed soil cover system currently meet the Construction Specifications required for this project as shown in Appendix A of the report.
Reviewer: Donna Russell – USACE, Albuquerque District			
1.	Ms. Russell's comments were covered under the comment submitted by Brad Jones.		

LIBRARY COPY

**Final Construction Completion Report for the
Remedial Action at SWMU 101—Sewage Lagoons
Cannon Air Force Base, New Mexico**

March 2005



Prepared for:

**27 CE/CEV
Cannon Air Force Base
New Mexico**



CAFB
SWMU 101

June 1, 2005

Mr. David Cobrain
State of New Mexico Environment Department
Hazardous Waste Bureau
2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505-6303

RE: Work Assignment No. 06110.330.002; State of New Mexico Environment Department, Santa Fe, New Mexico; General Permit Support Contract; RCRA Engineering Design Support for Cannon Air Force Base, Task 2 Deliverable

Dear Mr. Cobrain,

Enclosed please find the deliverable for the above referenced work assignment. The deliverable consists of an engineering review of the landfill cover for SWMU 101 (Sewage C Lagoons).

Given the annual average rainfall in Clovis of 17 inches (plus 5 inches of snow per year) (ref <http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?nmcv13>), the limited solubility of the constituents of concern, the shallow slopes of the completed cover (3%), and the low hydraulic conductivity of the 18-inch thick cover soil barrier, it is our opinion that the design and subsequent construction of the final cover are appropriately protective of human health and the environment.

Our only area of concern is that there was no separation layer (either soil or geosynthetic filter) placed between the 6-inch vegetative soil layer and the biotic barrier. The biotic barrier consists of an 18-inch thickness of 3- to 6-inch pieces of broken concrete, although the lower 9-inches of this material apparently contains a substantial amount of smaller particles. The pore spaces in the concrete layer are likely more than sufficient to hold all of the soil contained in the vegetative layer. Hence, over time the vegetative layer may sink or infiltrate into the biotic barrier. To assess whether this is occurring, the Air Force should periodically survey the vegetative cover. As the landfill will also be settling due to consolidation of the landfill materials and underlying soils, the survey will have to be conducted by "potholing" at 4 to 8 locations in the cover surface. We recommend conducting the survey at 1 year and then every 5 years thereafter unless the first survey shows either extensive loss of the vegetative cover or no loss. This requirement could be placed in the Post-Closure Operations and Maintenance Plan for the former sewage lagoon.

The document is formatted in Word. The deliverable was emailed to you on June 1, 2005 at david_cobrain@nmenv.state.nm.us and to Ms. Cheryl Frischkorn at cheryl_frischkorn@nmenv.state.nm.us. A formalized hard (paper) copy of this deliverable will be sent via mail. If you have any questions, please feel free to contact me at (303) 763-7188 or Mr. Greg Starkebaum at (303) 973-0072.

Sincerely,

June K. Dreith
Program Manager

Enclosure

cc: Ms. Cheryl Frischkorn
Mr. Greg Starkebaum
Denver Files

TASK 2 DELIVERABLE

**ENGINEERING DESIGN SUPPORT FOR
CANNON AIR FORCE BASE, SWMU 101; SEWAGE LAGOONS**

Submitted by:

**TechLaw, Inc.
560 Golden Ridge Road, Suite 130
Golden, CO 80401**

Submitted to:

**Mr. David Cobrain
State of New Mexico Environment Department
Hazardous Waste Bureau
2905 Rodeo Park Drive East
Building 1
Santa Fe, New Mexico 87505**

In response to:

Work Assignment No. 06110.330

June 2005

General Comment

The Introduction to the Final Construction Completion Report (Report) states that the Report was prepared in accordance with requirements outlined in the Environmental Protection Agency (EPA) Resource Conservation and Recovery Act (RCRA) Corrective Action Plan Guidance. However, the Report text does not explain whether the SWMU 101 site investigation and corrective measures study, completed in 1992 and 2001, respectively, or the cover construction work in 2003, were actually performed in accordance with the guidance. Previous reports, work plans and construction specifications, and contaminant data, were not reviewed as part of this assignment.

The following criteria from the Corrective Action Plan guidance were used to examine the adequacy of the Report, and apparent deficiencies are discussed in specific comments:

Chapter V, Section VI: Construction Completion Report

The Permittee/Respondent shall prepare a Construction Completion (CC) Report which documents how the completed project is consistent with the Final Plans and Specifications. A CC Report shall be submitted to the implementing agency when the construction and any operational tests have been completed. The CC Report shall, at a minimum, include the following elements:

1. Purpose;
2. Synopsis of the corrective measure, design criteria, and certification that the corrective measure was constructed in accordance with the Final Plans and Specifications;
3. Explanation and description of any modifications to the Final Plans and Specifications and why these were necessary for the project;
4. Results of any operational testing and/or monitoring, indicating how initial operation of the corrective measure compares to the design criteria;
5. Summary of significant activities that occurred during construction. Include a discussion of problems encountered and how they were addressed;
6. Summary of any inspection findings (include copies of key inspection documents in appendices);
7. As built drawings or photographs; and
8. Schedule indicating when any treatment systems will begin full scale operations.

Specific Comments

- 3/22 ✓
1. The purpose of the SWMU 101 remedial action is not clearly explained in the Report. Although Section 2.3 (page 2-2) mentions the need to “prevent exposure to ecological receptors” as the reason for constructing the engineered cover and biotic barrier, the specific ecological receptors and contaminants that present unacceptable risks are not identified. A wide range of parameters is listed in discussion of groundwater monitoring (page 2-2), and additional

chemicals are identified in several reports of soil sample analyses (Appendix A). The purpose of the remedial action, however, is not described in any further detail. The Report should identify the specific ecological receptors and hazardous constituents (and their concentrations) that resulted in the decision to consolidate contaminated sludge and soil, and construct the cover system.

2. The first sentence in Section 3 (page 3-1) states a different purpose for the cover system, contradicting Section 2.3. Section 2.3 states that "No risk to human health was identified from exposure to surface or subsurface soil or sludge at the site." Section 3, however, says that "The Sewage Lagoons cover system was designed to minimize potential threat to human health and the environment..." This statement indicates that a potential threat to human health would exist if the remedial action was not implemented. These two statements are incompatible. The statement of purpose in Section 3 should be revised to identify the specific ecological receptors at risk, rather than human health.

3. The Report provides a reasonably complete description of the construction of the corrective measure, but design criteria are not provided. For example, the Report does not provide required hydraulic conductivity and USCS classification of the soil barrier, thicknesses and tolerances for the soil barrier, biota barrier and erosion/vegetation layer, compaction requirements for sludge and contaminated soil from the North Lagoon, etc. The Report should provide a summary of the design criteria for the project, as specified in the guidance.

4. The Report does not provide a certification that the corrective measure was constructed in accordance with the Final Plans and Specifications. The Report should provide this certification, as specified in the guidance.

5. Section 3.2.7 (page 3-6) states that no nonconformance reports were filed in regard to this project. This statement appears to be at odds with the description of construction of the biota barrier in Section 3.1.6 (page 3-4), which states that half of the crushed concrete (16,000 cubic yards) did not meet the grain size requirements of Specification 02115. The discussion in Section 3.1.6 does not explain whether the size of this concrete was too small or too large to meet the specification. The referenced Field Change Request (FCR) No. 6 (in Appendix B of the Report) indicates that "...fine material in the crushed concrete stockpile at SWMU 97" is the problem, but does not mention any size problems with "Keel material" (left over from runway work), which is proposed for use in FCR No. 9. Finally, Design Change Notice (DCN) No. 2 (in Appendix B of the Report), approving use of the undersized material from SWMU 97, states that "Changed specification will be reflected in record drawings and completion report". The changed specification is not mentioned in Section 3.1.6 or on the drawings provided in the Report (Figure 3-1, page 3-9), or elsewhere in the Report. Section 3.1.6 should be revised to clarify why the SWMU 97 and Keel materials did not meet specification 02115, and explain how the specification was changed.

6. Section 3.1.6 states that the first lift of the biota barrier layer consisted of the SWMU 97 and Keel materials, and the second lift was 3- to 6-inch crushed concrete from an unspecified offsite source. The Excavation and Handling Plan for Biota Barrier Layer (in Appendix A of the Report), however, states that the offsite material will be placed first, and the second lift will be

Refer to page 4-1 make sure...

offsite

the on-site (SWMU 97 and Keel) materials. This procedure is confirmed in DCN No. 2. Section 3.1.6 should be revised to correct the description of the upper and lower lifts of crushed concrete materials. If the current description in Section 3.1.6 is actually correct, this is an apparent nonconformance with the above plan and DCN No.2. The offsite source of crushed concrete should also be identified.

7. The 6-inch thick erosion/vegetation soil is not separated from the biota barrier by soil or synthetic filter material. The absence of a filter raises the concern that soil may eventually infiltrate into the coarse broken concrete biota barrier. The infiltration of soil may occur whether the coarse or fine concrete biota barrier material was placed immediately below the erosion/vegetation soil. The Report does not explain or justify the lack of a filter material.

8. DCN Nos. 1 and 3 identify additional changes in the project specifications that are not mentioned in the Report. These changes (eliminating the berm between the North and South Lagoons, and modification of soil permeability test conditions) should be described in the body of the Report, and the reasons they were necessary for the project should be explained.

9. Future maintenance and protection of the cover system are not addressed in the Report. Periodic mowing is apparently already occurring (photographs of the mowed cover are included in Appendix C), but erosion repair is not addressed. Exposure of the biota barrier could result in increased infiltration, reduced vegetation growth, and decreased evapotranspiration. Access restrictions described in the Report are limited to fencing. If additional restrictions are proposed or have been implemented, such as warning signs, Commander's Orders, or other forms of institutional controls, they should be identified and described. These subjects are important parts of the design criteria, which should be summarized in the Report.



BILL RICHARDSON
GOVERNOR

State of New Mexico
ENVIRONMENT DEPARTMENT

Hazardous Waste Bureau
2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505-6303
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RON CURRY
SECRETARY

DERRITH WATCHMAN-MOORE
DEPUTY SECRETARY

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

December 23, 2005

Colonel John D. Posner
Commander 27th Fighter Wing
100 D.L. Ingram Boulevard
Cannon Air Force Base, New Mexico 88103-5214

SUBJECT: NOTICE OF DEFICIENCY
FINAL CONSTRUCTION COMPLETION REPORT REMEDIAL
ACTION AT SWMU 101-SEWAGE LAGOONS
CANNON AIR FORCE BASE, NEW MEXICO
CANNON AIR FORCE BASE
EPA ID NO. NM7572124454
CAFB-05-006

Dear Colonel Posner:

The New Mexico Environment Department (NMED) has completed its review of Cannon Air Force Base's (CAFB's) 2005 "*Final Construction Completion Report Remedial Action*". NMED also reviewed CAFB's April 2001 *Revised Final Corrective Measures Study Report SWMU 101-Sewage Lagoons*, and the February 2003 *Final Work Plan for the closure of SWMU 101-Sewage Lagoons*". Before this report can be approved CAFB must supply additional information and clarification as follows.

General Comments

1. The purpose of the SWMU 101 remedial action is not clearly explained in the report. Although Section 2.3 (page 2-2) mentions the need to "prevent exposure to ecological

receptors” as the reason for constructing the engineered cover and biotic barrier, the specific ecological receptors and contaminants that present unacceptable risks are not identified. A wide range of parameters is listed in discussion of groundwater monitoring (page 2-2), and additional chemicals are identified in several reports of soil sample analyses (Appendix A). The purpose of the remedial action, however, is not described in any further detail. CAFB must identify the specific ecological receptors and hazardous constituents (and their concentrations), and any other factors that resulted in the decision to consolidate contaminated sludge and soil and to construct the cover system.

2. While the report provides a reasonably complete description of the construction of the corrective measure, design criteria are not provided. For example, the report does not provide required hydraulic conductivity and Unified Soil Classification System (USCS) classification of the soil barrier, thicknesses and tolerances of the soil barrier, biota barrier and erosion/vegetation layer, compaction requirements for sludge and contaminated soil from the North Lagoon. CAFB must provide a summary of the design criteria for the project.
3. The 6-inch thick erosion/vegetation soil cover is not separated from the biota barrier by soil or synthetic filter material. The absence of a filter raises the concern that soil may eventually infiltrate into the coarse broken concrete biota barrier. The infiltration of soil may occur whether or not the coarse or fine concrete biota barrier material was placed immediately below the erosion/vegetation soil cover. CAFB must explain or justify the lack of filter material or include one in the final design.
4. Future inspection, maintenance and protection of the cover system are not addressed in the report. Periodic mowing is apparently already occurring (photographs of the mowed cover are included in Appendix C), but erosion repair is not addressed. Exposure of the biota barrier could result in increased infiltration, reduced vegetation growth, and decreased evapotranspiration. Access restrictions described in the report are limited to fencing. If additional restrictions are proposed or have been implemented, such as warning signs, Commander’s Orders, or other forms of institutional controls, they must be identified and described.

Specific Comments

1. **Project Description (Section 3), page 3-1, paragraph 1;** This section states that “the Sewage Lagoons cover system was designed to minimize potential threat to human health and the environment...”

NMED Comment: The statement in Section 3 indicates that a potential threat to human health would exist if the remedial action was not implemented. CAFB must identify the specific ecological receptors at risk, in addition to addressing human health.

5. **Nonconformance, page 3-6**

NMED Comment: This section states that no nonconformance reports were filed in regards to this project. This statement conflicts with the description of construction of the biota barrier in Section 3.1.6 (page 3-4), which states that half of the crushed concrete (16,000 cubic yards) did not meet the grain size requirements of Specification 02115. The discussion in Section 3.1.6 does not explain whether the grain size of this concrete was smaller or larger than specification. The referenced Field Change Request (FCR) No. 6 (in Appendix B of the Report) indicates that “fine material in the crushed concrete stockpile at SWMU 97” did not meet the specifications, but does not mention any size problems with “Keel material” (left over from runway work), which is proposed for use in FCR No. 9. Finally, Design Change Notice (DCN) No. 2 (in Appendix B of the Report), approving use of the undersized material from SWMU 97, states that “Changed specification will be reflected in record drawings and completion report”. The changed specification is not mentioned in Section 3.1.6 or on the drawings provided in the Report (Figure 3-1, page 3-9), or elsewhere in the Report. CAFB must clarify why the SWMU 97 and Keel materials did not meet specification 02115, and explain how the specification was changed and any potential effects from using off specification material.

6. **Biota Barrier Construction, page 3-3**

NMED Comment: This section states that the first lift of the biota barrier layer consisted of the SWMU 97 and Keel materials, and the second lift was 3- to 6-inch crushed concrete from an unspecified offsite source. The Excavation and Handling Plan for Biota Barrier Layer (in Appendix A of the Report), however, states that the offsite material will be placed first, and the second lift will be the on-site (SWMU 97 and Keel) materials. This procedure is confirmed in DCN No. 2. CAFB must clarify the description of the upper and lower lifts of crushed concrete materials. If the current description in Section 3.1.6 is correct, this is an apparent nonconformance with the above plan and DCN No.2. The offsite source of crushed concrete must also be identified.

8. **Design Change Notice (DCN) Log, Appendix B, page B-1**

NMED Comment: DCN Nos. 1 and 3 identify additional changes in the project specifications that are not mentioned in the Report. CAFB must identify and describe these changes (i.e., eliminating the berm between the North and South Lagoons, and modification of soil permeability test conditions), and provide the reasons for their implementation.

Colonel John D. Posner
December 23, 2006
Page 4

9. **Previous Investigations and Evaluations, page 2-2, paragraph 1;** The report states that “Currently, groundwater monitoring is conducted annually at the Sewage Lagoons to comply with RCRA requirements.”

NMED Comment: The last reported groundwater data was presented in the report entitled *October 2002 Cannon Air Force Base, New Mexico RCRA Ground Water-Monitoring at Sewage Lagoons and at Landfill 5, Analytical Results of Samples Collected March 12-14 2002* and *February 2005 Cannon Air Force Base, New Mexico RCRA Ground-Water Monitoring at Sewage Lagoons, Landfill 5, and Perimeter Wells Analytical Results for Samples Collected June 14-16, 2004*. CAFB must explain why there was no data collected for 2003.

CAFB must provide the information listed above within 90 days of receipt of this letter.

If you have any questions concerning this letter, please contact Tammy Diaz of my staff at 505-428-2552.

Sincerely,

James P. Bearzi
Chief
Hazardous Waste Bureau

BRZ:td

cc: *J. Kieling, NMED HWB
Dave Cobrain
Tammy Diaz
C. Frischkorn, NMED HWB
L. King, EPA Region 6 (6PD-N)
Pete Zamie, CAFB
File: Reading File & CAFB 2005 File

**CONSTRUCTION COMPLETION REPORT FOR THE
REMEDIAL ACTION AT SWMU 101—SEWAGE LAGOONS
CANNON AIR FORCE BASE, NEW MEXICO**

Prepared for:

27 CE/CEV
Cannon Air Force Base, New Mexico
and
HQ ACC/CEV
Langley Air Force Base, Virginia

Prepared by:

Tetra Tech EC, Inc.
6605 Uptown Boulevard N.E., Suite 220
Albuquerque, New Mexico 87110

Under Contract No. DACW45-94-D-0003

Delivery Order 35 Work Authorization Directive 1

U.S. Army Corps of Engineers
Omaha District
Omaha, Nebraska

March 2005

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LIST OF ACRONYMS AND ABBREVIATIONS

ACI	Arrowhead Contracting, Inc.
AFB	Air Force Base
Area A	South Lagoon Area
Area B	North Lagoon Area
CMS	Corrective Measures Study
COPEC	chemical of potential ecological concern
cy	cubic yards
DCN	Design Change Notice
DQCR	Daily Quality Control Report
EPA	U.S. Environmental Protection Agency
ERP	Environmental Restoration Program
FCR	Field Change Request
Foster Wheeler Environmental	Foster Wheeler Environmental Corporation, Inc.
ft	foot, feet
IRP	Installation Restoration Program
NMED	New Mexico Environment Department
NPDES	National Pollutant Discharge Elimination System
OSHA	Occupational Safety and Health Administration
PPE	personal protective equipment
PVC	polyvinyl chloride
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
SBL	soil barrier layer
SWMU	Solid Waste Management Unit
SWPPP	Stormwater Pollution Prevention Plan
TtEC	Tetra Tech EC, Inc.
USACE	U.S. Army Corps of Engineers

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2. SITE HISTORY AND PREVIOUS INVESTIGATIONS

This section presents a brief description and history of Cannon AFB and SWMU 101, and summarizes the results of previous investigations conducted for the Sewage Lagoons.

2.1 Cannon AFB Description and History

Cannon AFB occupies approximately 4,000 acres south of U.S. Highway 60/84 in Curry County, New Mexico. The Base is 6 miles west of the city of Clovis, near the border between New Mexico and Texas (Figure 2-1). The area surrounding Cannon AFB is used mainly for farming and ranching. Cannon AFB also maintains several satellite facilities.

In 1942, the Department of Defense established Clovis Army Air Base, a training facility for B-17, B-24, and B-29 aircrews. In 1945, the Base was renamed Clovis Army Airfield, which was closed in 1947. The facility was reactivated in 1951 and reassigned to the Tactical Air Command; in 1957 it was renamed Cannon AFB. In 1975, the 27th Tactical Fighter Wing became the principal U.S. Air Force unit at Cannon AFB. In 1992, the Base was reassigned to the Air Combat Command, which currently maintains a combat-ready force and provides replacement training of combat aircrews for worldwide tactical organizations.

2.2 Sewage Lagoons Description and History

The Sewage Lagoons were identified as SWMU 101 in the Cannon AFB Hazardous Waste permit dated November 14, 1989. The Sewage Lagoons, which were constructed in 1966, consisted of two unlined surface impoundments, operating in series, that received combined sanitary and industrial wastewater from Base facilities. The north and south lagoon areas had concrete-lined banks and unlined earthen bottoms, operated in series, and had a combined surface area of approximately 39 acres (Figure 2-2). In 1998, a new wastewater treatment plant was put in operation at Cannon AFB. Although sewage discharge to the lagoons stopped in 1998, the Base continued to discharge treated wastewater to the lagoons in order to prevent direct exposure to the underlying sludge. In early 1998, the Base stopped discharging treated wastewater to the lagoons and allowed them to dry.

2.3 Previous Investigations and Evaluations

In 1992, SWMU 101 was investigated during the Appendix I RCRA Facility Investigation (RFI) (Woodward-Clyde, 1992). The results of the RFI indicated that the thickness of the sludge in the north and south lagoons was approximately 2 feet (ft) and the average water depth ranged from 3.5 to 4.5 ft (Woodward-Clyde, 1992; E&E, 1998).

Based on the results of the RFI, the Sewage Lagoons were recommended for continued annual groundwater monitoring for volatile organic compounds, metals, pesticides, nitrate, sulfate, and total dissolved solids. An interim monitoring program was implemented to support site closure until Cannon AFB, EPA, and the New Mexico Environment Department (NMED) could resolve the applicable regulatory framework. Even though SWMU 101 was not included on the Cannon AFB RCRA Part B permit (issued in 1989) at that time, Cannon AFB chose to carry SWMU 101 through the RCRA process. The Base understood that at some point the lagoons would be added to the permit. Currently, groundwater monitoring is conducted annually at the Sewage Lagoons to comply with RCRA requirements.

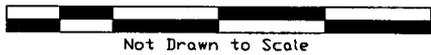
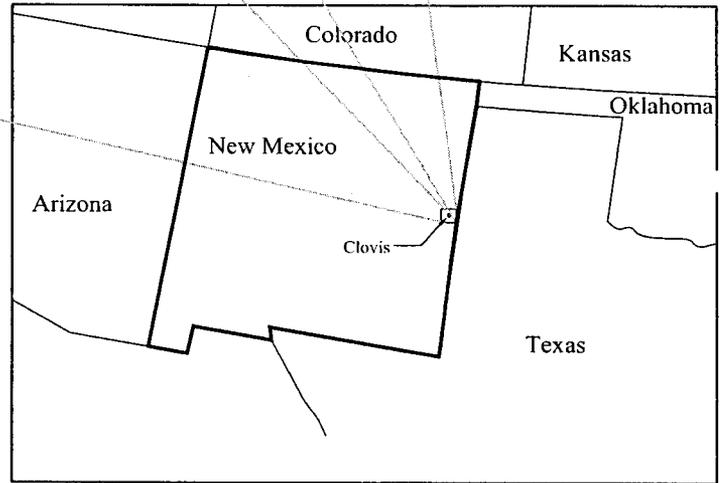
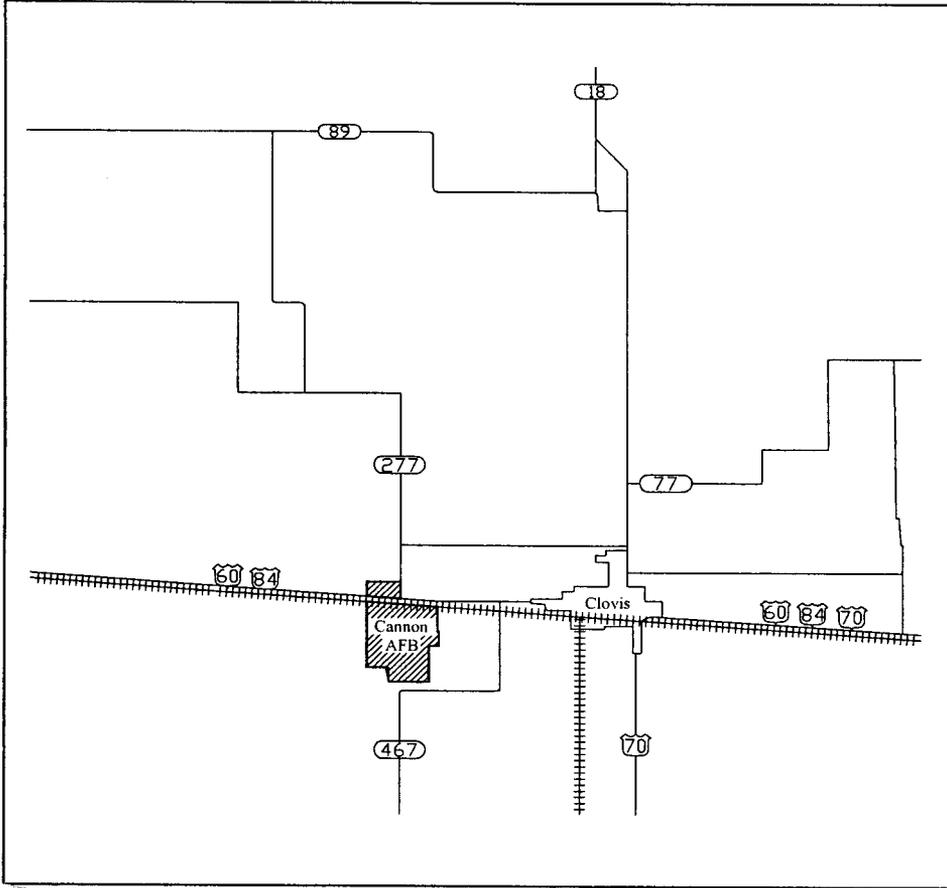
A Corrective Measures Study (CMS) for closure of SWMU 101 identified and evaluated potential corrective actions (Foster Wheeler Environmental, 2001). Human health and ecological risk assessments were conducted as part of the CMS to determine the requirements for contaminant containment and source control. An ecological survey was also conducted. No risk to human health was identified from exposure to surface or subsurface soil or sludge at the site. However, concentrations of inorganic chemicals produced elevated ecological screening values for potential ecological receptors. The results of the ecological risk characterization precluded the need to prevent exposure to lagoon sludge for ecological receptors. A summary of the ecological risk characterization is presented below:

- The ecological risk characterization for measurement receptors from potential exposure to COPECs in north lagoon sludge, south lagoon soil, and south lagoon sludge found that pesticides produced elevated risks for the deer mouse and least shrew. However, there were limited toxicity data available for terrestrial invertebrates and plants and risk could not be quantified for the majority of the pesticides (Foster Wheeler, Environmental 2001).
- Concentrations of VOCs did not produce elevated risk for any of the measurement receptors at any of the areas of concern. Concentrations of PCBs produced elevated risks for the deer mouse and least shrew in north lagoon sludge. This is the only area of concern in which PCBs were detected.
- Concentrations of metals produced elevated risks for all measurement receptors. Ecological screening quotients (ESQs) ranged from 1.1 for terrestrial invertebrates from lead exposure to 5,300 for plants from silver exposure. Many of these ESQs are likely overestimated because of the presence of naturally high concentrations of metals. Most of the metals were detected at concentrations only slightly higher than background and would pose risk to potential receptors even at background concentrations.

- The SLERA was designed to evaluate potential risk to representative receptors from multiple trophic levels present at the site as well as wildlife temporarily visiting the site. The risk characterization indicated that there might be risk for multiple trophic-level species from COPECs present in lagoon sludge and the underlying soil.

- To prevent exposure to ecological receptors, sludge removal from the former north lagoon, in-place consolidation in the former south lagoon, and closure using an engineered cover with a biotic barrier were selected as the corrective actions for closing the lagoons.

The Phase III Sludge Management, Compliance Evaluation, and Requirements Identification report (E&E, 1998) and the Sewage Lagoons Closure Final Specifications (USACE, 2002) concurred that dewatering, consolidation, and compaction of the contaminated material, followed by the placement of a protective cover, was an economical solution to close the lagoons permanently. The construction activities documented in this Construction Completion Report—excavation of contaminated sludge and soil, in-place consolidation of the material, and construction of an engineered cover—are considered a voluntary corrective measure. The cover design assumed that the contaminated media at the site consisted of approximately 2 ft of sludge overlying a 1-ft-thick layer of soil.



Not Drawn to Scale



TETRA TECH EC, INC.

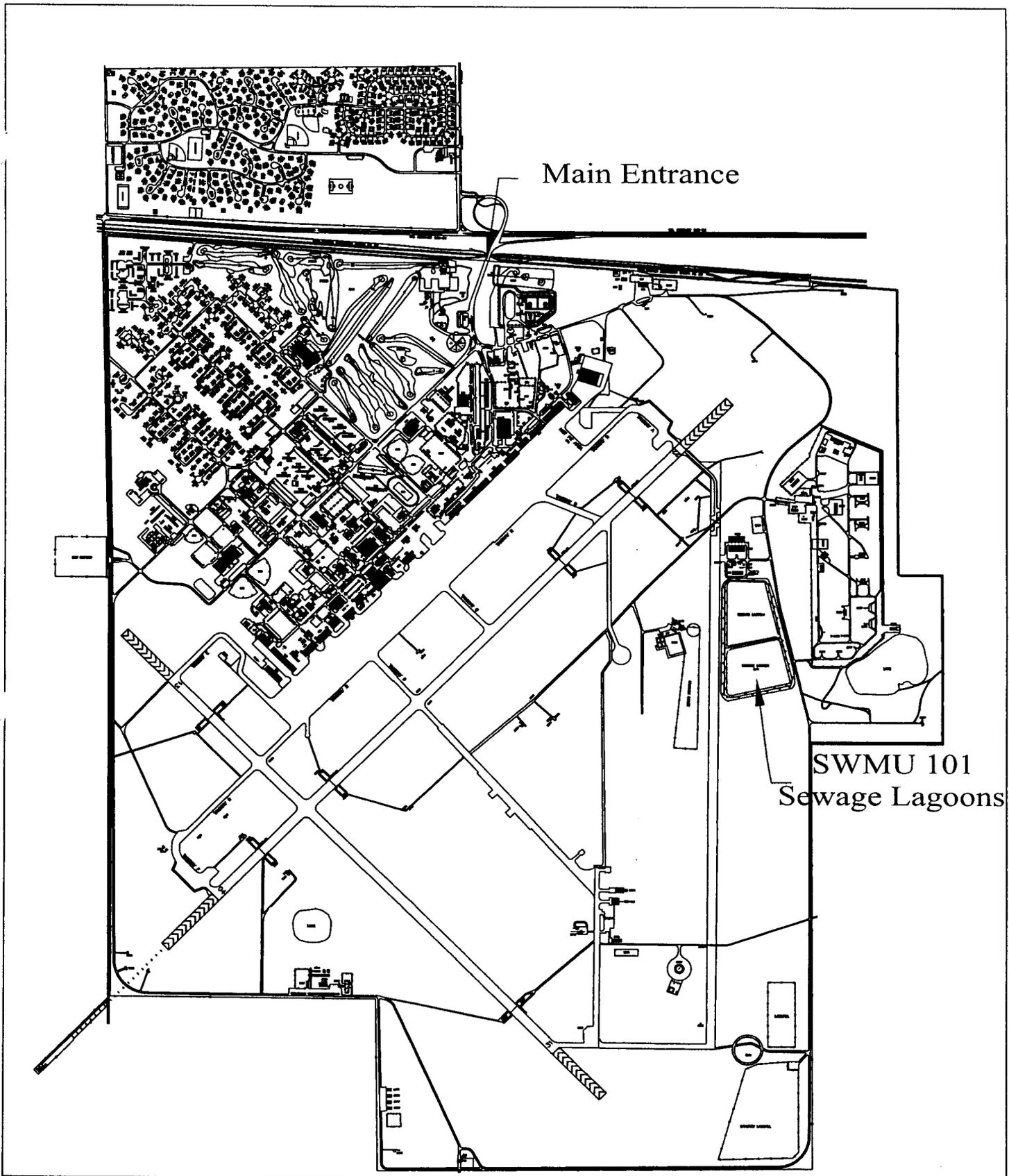
Closure of
SWMU 101 - Sewage Lagoon
Cannon Air Force Base, New Mexico
U.S. Army Corps of Engineers, Omaha District

Base Location Map

Date: 01/30/03

File Name: Fig 2-1_Final.dwg

Figure 2-1



TETRA TECH EC, INC.

Closure of
SWMU 101 - Sewage Lagoons
Cannon Air Force Base, New Mexico
U.S. Army Corps of Engineers, Omaha District

Sewage Lagoons Site
Location Map

Date: 11/05/02

File Name: Fig 2-2_Final.dwg

Figure 2-2

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3. PROJECT DESCRIPTION

The Sewage Lagoons cover system was designed to minimize potential threat to human health and the environment by removing the sludge and underlying contaminated soil from the former north lagoon, referred to as the North Lagoon Area, consolidating the excavated material into the former south lagoon, referred to as the South Lagoon Area, grading and compacting the sludge and soil material to prepare the substrate, and constructing a 42-inch-thick engineered earthen cover system. Specific results of the human health and ecological risk evaluations are presented in the CMS (Foster Wheeler Environmental, 2001). Section 2.3 of this report presents a summary of the ecological risk characterization.

Construction activities conducted for the remediation of the sewage lagoons included the following:

- Grading and drainage construction
- Demolition and removal of concrete and piping
- Excavation and handling of contaminated material from the North Lagoon Area
- In-place consolidation of excavated material, random fill, and grading in the South Lagoon Area
- Construction of a 20-acre, 42-inch-thick engineered earthen cover (soil barrier layer)
- Installation of the biota barrier and erosion/vegetation layers
- Site revegetation and fencing

In submittals and other interim deliverables referred to in this report, the South Lagoon Area is referred to as Area A and the North Lagoon Area, Area B.

Mobilization began on March 5, 2003, and the major field construction activities were completed on December 18, 2003. Temporary erosion control measures were implemented in early January 2004 and maintained until revegetation was accomplished in April 2004.

3.1 Construction Activities

The following subsections describe the construction activities that were performed at SWMU 101 by the TtEC subcontractor, Arrowhead Contracting Inc. (ACI) of Overland Park, Kansas. For this project, TtEC provided construction management support and did not self-perform any construction work. Table 3-1 presents a summary of the design specifications and criteria implemented on this project.

3.1.1 Grading and Drainage

ACI constructed temporary soil erosion control measures along the southern and southeastern borders of SWMU 101 to prevent storm water runoff from leaving the site. Additionally, temporary soil erosion and sediment control measures (i.e., straw bales and silt fences) were installed at two drop-inlets and one culvert on the east side of the entire unit during construction and post-construction activities.

3.1.2 Demolition and Removal

To prepare the site for demolition activities, ACI constructed access roads into the lagoons and trimmed tree limbs hanging over the perimeter fence to remove the safety hazard. The overburden (e.g., tumbleweeds, brush) was then removed and disposed along with the cleared tree limbs as clean construction waste at an approved offsite facility. Demolition involved removing concrete structures, slabs, steel and polyvinyl chloride (PVC) piping, and associated components from the North Lagoon Area. These materials were then used as fill in the South Lagoon Area.

The Work Plan (Foster Wheeler Environmental, 2003) required complete removal of the concrete-lined banks of the former south lagoon and removal of the piping only from the former north lagoon (i.e., the concrete-lined banks left intact). Instead, the concrete slabs covering the earthen banks of the southern half of the North Lagoon Area were also removed. Materials from the exposed earthen berms in the North Lagoon Area and the earthen berms surrounding the South Lagoon Area, approximately 20,000 cubic yards (cy), were used to construct the soil-barrier layer (SBL) of the cover system, resulting in cost savings to the project. The berm material was tested and approved using the same requirements as offsite materials. TtEC prepared Field Change Request (FCR) No. 3 (Appendix B) and Design Change Notice (DCN) No. 1 (Appendix B) to implement these changes. The USACE reviewed and approved all FCRs and DCNs prior to implementation. Due to the removal of the earthen berms, the resulting landfill cap is slightly smaller than shown on the original design drawings.

3.1.3 Excavation and Handling of Contaminated Material

According to the work plan (Foster Wheeler Environmental, 2003), approximately 70,000 cy of contaminated material was to be excavated from the North Lagoon Area and placed in the South Lagoon Area. However, the thickness of the sludge and the layers of underlying contaminated soil were less than anticipated, resulting in approximately 60,200 cy. The variance in depth was attributed to evaporation of the lagoons, beginning in 1999 through the initiation of construction. The sludge contained relatively little moisture and was consolidated without the need for dewatering. FCR No. 2 (Appendix B) was prepared to eliminate the task of drying the sludge.

Table 3-1. Design Criteria Summary

Specification	Design/Specification Summary*	Changes from Original Specification
Section 02111—Excavation and Handling of Contaminated Material		
General	The work shall consist of excavating approximately 70,000 cubic yards of sludge from the north lagoon and placing this material in the south lagoon. Depending on the moisture content and apparent shear strength of north lagoon sludge, tilling and drying of north lagoon sludge prior to placement in the south lagoon may be required.	FCRs No. 2, 4, and 7 approved for eliminating dewatering (sludge was dry), removing sludge encountered at below 1 ft, and backfilling over-excavated area to remove deeper sludge.
Existing Structures and Utilities	The Base Civil Engineering Office at Cannon AFB shall obtain all utility clearances and digging permits prior to construction. Take all necessary precautions to ensure no damage occurs to existing structures and utilities. Monitoring Wells F, G, and H and their associated purge tanks shall be protected from damage during construction.	No changes. Implemented as written.
Subgrade Preparation	Prior to receiving sludge from the north lagoon, sludge in the south lagoon shall be loosened to a depth of 24 inches and allowed to dry for a minimum period of 48 hours during dry weather conditions. After the upper 24 inches of sludge has been loosened and dried in the south lagoon, the subgrade shall be compacted by a minimum of 3 passes using a footed roller with a minimum weight of 40,000 pounds. Additional passes shall be made until the subgrade is firm, exhibiting not more than 1 inch of deflection during a pass of the footed roller. No density testing shall be performed.	No changes. Implemented as written.
Contaminated Material Removal	Sludge from the north lagoon shall be excavated and placed in the south lagoon after sludge in the south lagoon has been dried and compacted. Sludge from the north lagoon shall be allowed to dry before being removed and transported to the south lagoon. The drying process shall consist of using a tiller, or other approved equipment, to loosen the upper 12 inches of sludge in a given area. A 12-inch lift of the tilled area shall then be allowed to dry for a minimum period of 48 hours during dry weather conditions prior to removal and placement in the south lagoon. The maximum total depth of sludge to be removed from the north lagoon is approximately 24 inches.	No changes. Implemented as written.
Confirmation Sampling and Analysis	Confirmation samples shall be collected after all sludge and underlying subgrade material has been removed, and analyzed for contaminants. Confirmation samples shall be collected at a frequency of one per 40,000 square feet from the bottom and side slopes of the excavated area in the north lagoon.	No changes. Implemented as written.
Placement	No backfill material shall be placed in the north lagoon. Sludge from the north lagoon shall be placed in the south lagoon in 12-inch lifts. Sludge shall be compacted by 3 passes of a footed roller with a minimum weight of 40,000 lbs. No density testing shall be performed.	FCR #5 approved to allow backfilling of over-excavated areas in North Lagoon.

Table 3-1. Design Criteria Summary (Continued)

Specification	Design/Specification Summary*	Changes from Original Specification
Section 02115—Biota Barrier Layer		
General	Excavation of onsite recycled concrete and placement on the south lagoon for use as a biota barrier layer to discourage small, burrowing rodents from penetrating the soil barrier layer. <u>Addendum to Specification:</u> Under SD-06, Test Reports, the Contractor shall submit for approval a gradation curve and engineering description of all off-site materials proposed for use as biota barrier material, according to ASTM D 422 and ASTM D 2487, respectively.	Implemented as amended.
Biota Barrier Material	Biota barrier layer material shall consist of crushed (recycled) concrete obtained from onsite sources, or may consist of rock or stones obtained from off-site sources with a minimum dimension of 3 inches and a maximum dimension of 6 inches. Crushed concrete shall be obtained from the stockpile located east of the lagoons, consisting of crushed concrete from the former Landfill 25. Recycled concrete used for the biota barrier shall consist of reasonably clean, durable, angular particles that are reasonably free of organic matter; soft particles; friable particles; and other objectionable materials.	FCRs #6 and #8, and DCN #2 approve to allow offsite materials to be used.
Existing Structures and Placement	Site utilities shall be field located prior to construction. Damage to existing structures and utilities are not allowed.	No changes. Implemented as written.
Placement	Biota barrier layer material shall be placed in a single lift above the soil barrier layer. The completed biota barrier layer shall be a minimum of 15 inches and a maximum of 18 inches in thickness.	FCRs #6 and #8, and DCN #2 approved to allow offsite materials to be used.
Compaction	Biota barrier material shall be compacted using a 10-ton smooth drum roller. Compaction shall consist of 2 passes over all areas.	No changes. Implemented as written.
Section 02140—Erosion/Vegetation Layer		
Erosion/Vegetation Layer Soil Product	Erosion/vegetation layer soil shall consist of natural, friable soil that is representative of soils in the vicinity that produce heavy growths of crops, grass, or other vegetation. In addition, erosion/vegetation layer soil shall be reasonably free from underlying subsoil; clay lumps; weeds; brush; litter; matted roots; toxic substances; or any material that might be harmful to plant growth or be a hindrance to grading, planting, or maintenance operations. Erosion/vegetation layer soil shall comply with criteria listed in Table 1 of the specification.	No changes. Implemented as written.
Borrow Source Assessment	Assessment tests shall be performed on each principal type or combination of materials proposed for use to ensure compliance with specified requirements. At least one set of tests shall be performed on each borrow source proposed. <u>Classification Testing:</u> A set of borrow source assessment tests shall consist of Atterberg limits, particle size analysis excluding hydrometer, and moisture content. <u>Erosion/Vegetation Layer Material:</u> Testing shall consist of grain-size analysis, pH, and organic content.	FCR #11 approved to delay testing for moisture content until reseeding in Spring 2004.

Table 3-1. Design Criteria Summary (Continued)

Specification	Design/Specification Summary*	Changes from Original Specification
	<u>Chemical Contamination Testing:</u> Borrow used for the erosion/vegetation layer shall be free of contamination. Each borrow source shall be sampled and analyzed for chemical contamination.	
Installation	Erosion/vegetation layer material shall be uniformly placed in a single lift and traffic compacted by 1 pass of compaction equipment. The completed thickness shall be 6 inches. Soil shall be placed within a range of 2 percent dry to 3 percent wet of optimum moisture content.	No changes. Implemented as written.
Construction Tolerances	Finished surfaces shall be uniformly graded and shall be free from depressions, mounds, or windrows. The top surface of the erosion/vegetation layer shall be no greater than 0.15 feet above the grades shown on the drawings.	No changes. Implemented as written.
Construction Tests	<p>Each day that material is placed, a minimum of 3 standard moisture content tests shall be performed for correlation with nuclear moisture test data. Standard tests shall be performed at locations that are as close as possible to nuclear density test locations.</p> <p><u>Erosion/Vegetation Layer Material:</u> During construction, representative samples shall be taken for testing from the borrow source at the frequencies listed in Table 2 of the specification.</p> <p><u>Moisture Content of In-Place Erosion/Vegetation Layer Material:</u> Moisture content tests shall be performed in accordance with Table 3 of the specification.</p> <p><u>Nuclear Moisture Content Tests:</u> The nuclear gauge calibration checks shall be made at the beginning of a job, on each different type of placement material. Nuclear moisture content gauges shall be standardized daily.</p>	No changes. Implemented as written.
Protection	Erosion rills that exceed 1 inch in depth or other damage resulting in depressions that exceed 1 inch in depth shall be repaired and grades re-established until the time of seed placement.	No changes. Implemented as written.
Section 02210—Earthwork/Grading		
General	Includes removal of the existing soil berm surrounding the south lagoon and placement of random fill within the south lagoon.	FCR #3 and DCN #1 approved to allow demolition of the central berm on the north side of the south lagoon to facilitate construction of the soil cover.
Borrow Material	Borrow material shall be selected to meet requirements and conditions of the particular fill for which it is to be used. Necessary clearing, grubbing, disposal of debris, and satisfactory drainage of borrow pits shall be performed as incidental operations to the borrow excavation.	No changes. Implemented as written.
Excavation	Excavation shall be performed to the lines and grades shown on construction drawings. Suitable excavated material shall be transported to and placed in fill areas within the limits of the work. Satisfactory drainage shall be provided at all times.	FCR #5 approved to remove sludge encountered deeper than planned.

Table 3-1. Design Criteria Summary (Continued)

Specification	Design/Specification Summary*	Changes from Original Specification
	Following excavation and removal of north lagoon sludge, the subgrade in the north lagoon shall be graded to minimize ponding of water.	
Utilization of Excavated Materials	Suitable material removed from required excavation under this section shall be utilized in the formation of the cover system provided the material complies with all specification requirements. Material authorized to be wasted shall be disposed of in such manner as not to obstruct the flow characteristics of any existing ditch or channel, or impair the efficiency or appearance of any structure.	No changes. Implemented as written.
Preparation of Ground Surface for Random Fill	All vegetation, such as roots, brush, heavy sods, heavy growth of grass, and all decayed vegetable matter, rubbish, and other unsuitable material within the area upon which fill is to be placed, shall be stripped or otherwise removed before the fill is started. Stumps, logs and roots more than 1-1/2 inch in diameter shall be excavated and removed to a depth not less than 18 inches below the original ground surface. Sloped ground surfaces steeper than one vertical to four horizontal on which fill is to be placed shall be uniformly scarified to a depth of 1-2 inches to promote bonding of fill material with the existing subgrade. The subgrade shall be wetted or dried to obtain the specified moisture content and density prior to placement of fill.	No changes. Implemented as written.
Random Fill	Random fill shall be placed within the south lagoon as shown on construction drawings. Suitable material removed from excavation areas may be used as random fill. Material shall be placed in loose lifts not to exceed 8 inches in thickness for the full width of the cross section. Each layer shall be compacted before placing the next (overlying) lift.	No changes. Implemented as written.
Compaction	Each layer of fills constructed shall be compacted to at least 90 percent of maximum density. Cohesive soils shall be at a moisture content between 1 percent below and 4 percent above optimum moisture when compacted, without the occurrence of bulking.	No changes. Implemented as written.
Placing Topsoil	Reference specification section 02140, Erosion/Vegetation Layer.	No changes. Implemented as written.
Field Testing Control	Quality control sampling and testing shall be performed in accordance with specification section 01451, Contractor Quality Control. <u>Moisture-Density Determinations:</u> Testing shall include Atterberg limits, grain size determinations and specific gravity. <u>Density Control:</u> One test shall be made for each 1,500 square yards or less for each layer of specified depth.	No changes. Implemented as written.

Table 3-1. Design Criteria Summary (Continued)

Specification	Design/Specification Summary*	Changes from Original Specification
Finished Excavation and Fill Areas	All areas covered by the project shall be uniformly smooth graded. The finished surface shall be compacted and free from irregular surface changes. The finished surface shall be not more than 0.15 foot above or below the established grade and shall be free of depressed areas where water would pond. All ditches shall drain readily.	No changes. Implemented as written.
Protection	During construction, embankments and excavations shall be kept shaped and drained. Existing ditches and channels shall be maintained to drain effectively at all times. The subgrade shall be brought to grade where ruts exceed 1 inch in depth occur and recompacted prior to placement of overlying materials. Newly graded areas shall be protected from traffic and from erosion.	No changes. Implemented as written.
Section 02220—Demolition		
General South Lagoon Items	<ol style="list-style-type: none"> 1. Concrete dike surrounding the lagoon on all 4 sides 2. Concrete gate structure, associated piping, water valves and meters in the southeast corner 3. 15-inch diameter steel discharge pipe-northwest corner 4. 15-inch diameter steel overflow pipe-northwest corner 5. 15-inch diameter steel overflow pipe-northeast corner 6. 6-inch diameter PVC diffuser pipe located adjacent to concrete gate structure, southeast corner 7. Concrete slab approximately 12 feet by 10 feet, 6-inches thick, with No. 8 reinforcing steel 12" on center each face-northwest corner 8. Five soil access roads shall be pushed into the south lagoon and used as random fill beneath the cover system 	No changes. Implemented as written.
General North Lagoon Items	15-inch diameter steel discharge pipe located at the north end	No changes. Implemented as written.
Dust Control	The amount of dust resulting from demolition shall be controlled to prevent the spread of dust to occupied portions of the construction site and to avoid creation of a nuisance in the surrounding area.	No changes. Implemented as written.
Protection	<p><u>Protection of Personnel:</u> Evaluate site conditions prior to and during demolition work and take necessary precautions to protect personnel working in and around the demolition area at all times.</p> <p><u>Protection of Existing Structures:</u> Avoid damage to Monitoring Wells F, G, and H during construction. Purge tanks, located adjacent to these wells, shall be removed prior to construction. These tanks shall be replaced in their original locations after construction.</p> <p><u>Protection of Existing Trees:</u> One Elm tree is located along the west side of the south lagoon, along the fence separating the lagoons from the abandoned runway.</p>	No changes. Implemented as written.

Table 3-1. Design Criteria Summary (Continued)

Specification	Design/Specification Summary*	Changes from Original Specification
Existing Fence	Sections of the existing fence along the south and west sides of the lagoons may be removed to provide access to the site. Sections of fence removed shall be reinstalled in their original locations at completion of the project.	FCR #8 approved to construct a fence around the perimeter of the south lagoon soil cover.
Disposition of Material	All removal items shall be placed in random fill areas of the south lagoon. Concrete dikes shall be broken into pieces not to exceed 36 inches in any dimension. Removal items shall be covered with at least 24 inches of random fill prior to placement of the soil barrier layer.	No changes. Implemented as written.
Section 02377—Soil Barrier Layer		
General	Soil barrier layer material shall be obtained from an offsite source. Alternatively, native soil excavated beneath the keel section for the runway improvement project at Cannon AFB may be used. Keel subgrade material grain-size distribution is approximately between 5 and 15 percent passing the No. 200 sieve. The layer shall provide an in-place hydraulic conductivity of 1.5×10^{-4} centimeters per second (cm/s), or less.	FCRs #3 and #10 and DCN #3 approved to allow use of central berm material based on meeting testing criteria. Based on testing, Keel material did not meet specification and was used for the biota barrier instead.
Soil Barrier Layer Product	Soil shall be free of roots, debris, organic or frozen material, and shall have a maximum clod size of 2 inches at the time of compaction. Soil barrier layer material shall comply with criteria listed in Table 1 of the specification.	No changes. Implemented as written.
Borrow Source Assessment	Tests shall be performed on each principal type or combination of materials from all sources proposed for use in the soil barrier layer. A minimum of one set borrow assessment tests shall be performed for each borrow source proposed. A set of borrow source assessment tests shall consist of classification testing, moisture-density (compaction) testing, and hydraulic conductivity testing.	No changes. Implemented as written.
Installation	<p><u>Soil Barrier Placement:</u> Soil shall be placed in 2 equal loose lifts, resulting in a thickness of 18 inches after compaction. Where hand operated tampers are used, the loose lift thickness shall not exceed 4 inches. Holes left by grade stakes shall be backfilled and compacted.</p> <p><u>Moisture Control:</u> The minimum allowable moisture content shall be no less than optimum moisture content. The moisture content shall be maintained uniform throughout each lift.</p> <p><u>Compaction:</u> Soil shall be compacted by at least 3 passes of the equipment to meet the density requirements of each lift.</p> <p><u>Scarification:</u> Uniformly scarify each lift to a depth of 2 inches. The final lift of soil barrier layer material shall not be scarified.</p> <p><u>Repair of Voids:</u> Voids created in the soil barrier layer during construction shall be repaired by removing sand or other non-cohesive material, placing soil infiltration layer backfill in lifts no thicker than 3 inches and tamping each lift with a steel rod.</p>	No changes. Implemented as written.

Table 3-1. Design Criteria Summary (Continued)

Specification	Design/Specification Summary*	Changes from Original Specification
	Each lift shall be tamped a minimum of 25 times altering the location of the rod within the void for each blow. Other ruts and depressions in the surface of the lifts shall be scarified, filled, and then compacted to grade.	
Construction Tolerances	The top surface of the soil barrier layer shall be no greater than 2 inches above the grades shown on the drawings. No minus tolerance will be permitted.	FCR #10 approved to allow 2-inch (+/-) for soil barrier layer.
Construction Tests	<p><u>Soil Barrier Layer Material Tests:</u> Samples shall be taken at frequencies listed in Table 2 of the specification from onsite stockpiles or after a loose lift of soil barrier layer material has been placed.</p> <p><u>Moisture Content and Density Tests of In-Place Soil Barrier Layer:</u> Testing shall be performed in a grid pattern that is staggered for successive lifts so that sampling points are not at the same location in each lift. Moisture content and density tests shall be performed in accordance with Table 3 of the specification.</p> <p><u>Rapid Tests:</u> Each day that soil barrier layer material is compacted, a minimum of one set of moisture content and density tests shall be performed using standard procedures. Rapid tests shall be checked at the frequencies shown in Table 3 of the specification. Standard tests shall be performed at locations that are as close as possible to the location of rapid tests being checked.</p> <p><u>Nuclear Density and Moisture Content Tests:</u> Nuclear density readings shall be taken in the direct transmission mode. The nuclear gauge calibration checks shall be made at the beginning of a job, on each different type of placement material. Nuclear density and moisture content gauges shall be standardized daily.</p> <p><u>Hydraulic Conductivity Tests of In-Place Soil Barrier Layer Material:</u> A minimum of 5 undisturbed samples shall be taken for hydraulic conductivity testing for each lift of soil barrier layer material placed and compacted. Each undisturbed sample shall be tested for hydraulic conductivity. If any test result is greater than 1.5×10^{-4} cm/s, modifications shall be proposed and approved prior to placement of additional soil barrier layer material of that type. If the hydraulic conductivity of any test is more than 7.5×10^{-4} cm/s, 3 additional tests shall be performed near the location of the original failed test. If any of the retests fail, the area shall be repaired out to the limits defined by passing hydraulic conductivity tests. The area shall then be retested as directed.</p>	No changes. Implemented as written.
Protection	<p><u>Moisture Content:</u> After placement, moisture content shall be maintained or adjusted to comply with acceptable zone criteria.</p> <p><u>Erosion:</u> Erosion rills in excess of 1 inch in depth that occur in the soil barrier layer shall be repaired and grades re-established. The method of repair shall not decrease the minimum required thickness of the soil barrier layer.</p> <p><u>Retests:</u> Areas that require repair shall be retested as directed.</p>	No changes. Implemented as written.

Table 3-1. Design Criteria Summary (Continued)

Specification	Design/Specification Summary*	Changes from Original Specification
Section 02921—Seeding		
Seed Product	<p><u>Seed Classification:</u> State-certified seed of the latest season's crop shall be provided in original sealed packages bearing the producer's guaranteed analysis for percentages of mixture, purity, germination, hard seed, weed seed content, and inert material.</p> <p><u>Permanent Seed Species and Mixtures:</u> Permanent seed species shall be proportioned by weight.</p> <p><u>Quality:</u> Weed seed shall be a maximum 1 percent by weight of the total mixture.</p> <p><u>Seed Mixing:</u> The seed supplier may mix the seed prior to delivery or on site, if directed.</p> <p><u>Substitutions:</u> Substitutions will not be allowed without written request and approval.</p>	FCRs #11, #12, and #13 approved to delay seeding effort, install erosion protection, and revise the seed mix.
Fertilizer Product	Fertilizer shall be controlled release commercial grade, free flowing, uniform in composition, and consist of a nitrogen-phosphorus-potassium ratio. Fertilizer shall be derived from sulphur-coated urea, urea formaldehyde, plastic or polymer coated pills, or isobutylenediurea. Fertilizer shall be balanced with the inclusion of trace minerals and micronutrients.	No changes. Implemented as written.
Mulch Product	Mulch shall be free from weeds, mold, and other deleterious materials. Mulch materials shall be native to the region. The material selected for mulch shall be either straw, hay, wood cellulose fiber or paper fiber	No changes. Implemented as written.
Water	Water shall not contain elements toxic to plant life.	No changes. Implemented as written.
Installing Seed Time and Conditions	Seeding shall occur between 1 June and 1 September. Seeding operations shall be performed only during periods when beneficial results can be obtained. When drought, excessive moisture, or other unsatisfactory conditions prevail, the work shall be stopped when directed.	FCR #11 approved on 9/26/2003 to delay seeding until Spring 2004.
Site Preparation	<p><u>Finished Grade:</u> Verify that finished grades for the erosion/ vegetation layer are as shown on the drawings prior to seeding.</p> <p><u>Application of Fertilizer:</u> Fertilizer shall be incorporated into the soil to a maximum 4-inch depth or may be incorporated as part of the tillage or hydroseeding operation.</p> <p><u>Prepared Surface:</u> The prepared surface shall be a maximum 1-inch below the adjoining grade. New surfaces shall be blended to existing areas. The prepared surface shall be completed with a light raking to remove debris and protected from compaction or damage by vehicular or pedestrian traffic and surface erosion. Debris and stones larger than 1-inch in any dimension shall be removed. Erosion rills greater than 1-inch in depth shall be repaired prior to seeding.</p>	No changes. Implemented as written.

Table 3-1. Design Criteria Summary (Continued)

Specification	Design/Specification Summary*	Changes from Original Specification
Installation	Seeding method shall be drill seeding or hydroseeding and result in uniform coverage over the entire area to be seeded. Gravity feed applicators that drop seed directly from a hopper onto the prepared soil shall not be used.	No changes. Implemented as written.
Restoration and Cleanup	Existing turf areas and pavements that have been damaged from the seeding operation shall be restored. Excess and waste material shall be removed and disposed of offsite. Adjacent paved areas shall be clean.	No changes. Implemented as written.
Protection of Installed Areas	The area shall be protected against traffic or other use upon completion of seeding by erecting barricades and providing signage.	No changes. Implemented as written.
Seed Establishment Period	The seed establishment period to obtain a healthy stand of grass plants shall begin on the first day of work and end 60 days after the last day of seeding. The seed establishment period may be modified for inclement weather, shut down periods, or for other reasons as directed.	No changes. Implemented as written.

* Specifications and design criteria are provided for Division 2 of the project specifications presented in the Final Work Plan for the Closure of SWMU 101, Sewage Lagoons Cannon Air Force Base (Foster Wheeler Environmental 2003).

During the excavation of the southern section of the North Lagoon Area, a subgrade “trench” of sludge trending east-west was discovered below the established limits of the contaminated soil layer. This material, approximately 13,200 cy, was placed in the South Lagoon Area at no additional cost to the project under FCR No. 5 (Appendix B). The over-excavated area was backfilled with stockpiled material left over from former runway work under FCR No. 7 (Appendix B). This stockpile is commonly referred to as the Keel material and was located adjacent and west of SWMU 101. TtEC conducted post-excavation confirmation soil sampling. Hagar & Associates, P.C. Land Surveyors completed the post-excavation topographical and sample location surveys. According to the sludge layer as-built survey, the total amount of fill materials placed in the South Lagoon Area, including concrete rubble, piping, sludge and contaminated sludge and soil, was 73,400 cy.

3.1.4 Sludge Consolidation and Random Fill

ACI excavated approximately 60,200 cy of sludge and contaminated soil materials from the North Lagoon Area and consolidated this with the South Lagoon Area material, as illustrated in Figure 3-1. The 13,200 cy of additional sludge material excavated from the North Lagoon Area (Section 3.1.3) was used as random fill in the South Lagoon Area in place of the Keel material specified in the final Work Plan (Foster Wheeler Environmental, 2003) and resulted in cost savings to the project. The consolidated material and random fill was graded from 1 to 3 percent, per DCN No. 3 (Appendix B), and surveyed to document as-built conditions. The Record Drawings document the final contours and grade of the consolidated material and random fill.

3.1.5 Soil Barrier Layer Construction

The SBL is approximately 43,500 cy of an 18- to 21-inch-thick earthen cover system composed of clean, approved soil, that was placed on top of the sludge and random fill layer (Figure 3-1). The purpose of the SBL is to reduce infiltration of moisture into the underlying layer of contaminated material. Both onsite (20,000 cy) and offsite (23,500 cy) sources were used for the SBL; all source material was tested in accordance with Specification 02377 (Appendix A). To limit infiltration, the permeability criteria for the SBL required in Specification 02377 is 1.5×10^{-4} centimeters per second. The onsite soils came from the former earthen berms around the southern half of the North Lagoon Area and the berms surrounding the South Lagoon Area (Section 3.1.2). The remaining soils came from an approved offsite source located near Melrose, New Mexico, approximately 20 miles west of the Base. A post-construction survey completed on the SBL by Lydick Engineers and Surveyors (Appendix A) indicated that subcontractor miscalculations had caused the cover to be thicker (up to 21 inches) than the requirements in Specification 02377, which calls for only 18 inches. The additional material was approved in FCR No. 10 (Appendix B).

3.1.6 Biota Barrier Construction

The biota barrier consists of 18 inches of recycled, crushed concrete placed on top of the SBL (Figure 3-1). The purpose of this layer is to prevent animals from burrowing into the SBL. Three sources were used to provide the material required to construct the biota barrier. Approximately 8,000 cy of material came from the crushed concrete stockpile at SWMU 97, Landfill 25; an additional 8,000 cy consisted of extra, unused Keel material (FCR No. 9, Appendix B); and another 16,000 cy of 3- to 6-inch crushed concrete from an offsite source (FCR No. 6 and DCN No. 2, Appendix B). Because the grain size of the SWMU 97 and Keel material sources did not meet the requirements of Specification 02115 (Appendix A), DCN No. 2 was submitted for approval. The design change revised the placement of materials for the biota barrier layer in two lifts. The first (bottom) lift consisted of 9 inches of 3- to 6-inch crushed concrete from an offsite source (FCR No. 6 and DCN No. 2, Appendix B). The second (top) lift consisted of the finer SWMU 97 and Keel material. Using a two-layer approach to constructing the biota barrier layer allows the top layer to perform as a filter layer between the topsoil cover material and the lower layer of 3-inch to 6-inch crushed concrete. The upper portion of the biota barrier, because of its finer gradation and gravel and sand sized particles, will mitigate against infiltration of the topsoil cover into the bottom of the biota barrier layer. Placement of the finer biota barrier layer material on top of the coarser material precluded the need for a filter material to be placed beneath the erosion/vegetation layer.

3.1.7 Erosion/Vegetation Layer Construction

The 6-inch erosion/vegetation layer was completed in mid-December 2003 (Figure 3-1). Approximately 12,800 cy of material was imported from a borrow area located 8 miles north of the Village of Melrose, New Mexico (Submittal 02140-2 in Appendix A) to construct this layer. Topsoil layer placement was not completed by the specified September 1, 2003, deadline necessary to ensure that seedlings are established before winter. This delay in the revegetation effort was addressed in FCRs No. 11 and No. 12. The USACE approved an interim soil stabilization plan to crimp-mulch the existing topsoil and implement erosion control measures specified in the Stormwater Pollution Prevention Plan (SWPPP). Rocky Mountain Reclamation crimp-mulched the site in early January 2004. A post-construction survey was completed prior to the crimp-mulch operations. A complete survey is presented in the Appendix A.

3.1.8 Site Revegetation and Fence Construction

Rocky Mountain Reclamation returned in April 2004 and revegetated the South Lagoon Area, 23 acres, by seeding with native species using an approved seed mix (see Table 3-2 and FCR No. 13, Appendix B). A copy of the seed mix certification is provided in Appendix A. TtEC installed a five-strand barbed-wire fence on the northern boundary of the capped area to separate the North and South Lagoon Areas and to

prohibit access (FCR No. 8, Appendix B). This fence was tied-in with the existing fencing that was around the other sides of the site.

Table 3-2. Seed Mix Details

Common Name Seed Mix (Botanical Name)	Pounds Pure Live Seed per Acre	Total Pounds Seed Mix Used
Sideouts gramma (Vaughn variety) (<i>Bouteloua curtipendula</i>)	1.75	40.25
Blue gramma (Halchita variety) (<i>Bouteloua gracilis</i>)	0.50	11.50
Little bluestem (Pastura variety) (<i>Schizachyrium scoparium</i>)	1.35	31.05
Indiangrass (Lanno variety) (<i>Sorghastrum nutans</i>)	2.00	46.00
Switchgrass (Blackwell variety) (<i>Panicum virgatum</i>)	1.00	23.00
Purple prairie clover (<i>Petalostemum purpureum</i>)	1.50	34.50
Fourwing Saltbrush (<i>Atriplex confertifolia</i>)	3.90	89.70
Total:	12 pounds per acre	276 pounds used

3.2 Construction Documentation

3.2.1 Record Drawings

The Record Drawings for this project are presented on Figures 3-2 through 3-4. Figures 3-2 and 3-3 illustrate the pre-construction topography of the South and North Lagoon Areas, respectively. Figure 3-4 illustrates the final topography of the site after completion of construction activities. All other approved interim drawings are presented in Appendix A as submittals. Several partial surveys were performed to allow concurrent construction activities.

3.2.2 Health and Safety Inspections

The Site Superintendent performed weekly health and safety inspections. Periodic inspections were also conducted by the Project Manager (or designee) or the Project Environmental Safety Manager per TtEC standard operating procedures. Copies of all these inspections and final inspection report are retained in the project files.

3.2.3 FCRs and DCNs

There were 13 FCRs and 3 associated DCNs generated during the construction project. Table 3-3 presents a summary of the FCRs and DCNs submitted for approval by USACE relative to Divisions 1 and 2 of the project specifications. All FCRs and DCNs relate to changes required for Division 2 of the project

specifications regarding construction with the exception of FCR No. 1. FCR No. 1 was approved for Division 1, Specification 01351 requiring a change to the project health and safety plan clarifying project personnel responsibilities, personnel protection, and project duration.

Table 3-3. Field Change Requests and Design Change Notices

Number	Content	Date Approved
Field Change Requests		
1	Specification 01351—Revisions to Site Safety and Health Plan based on site conditions, duration of project, and personnel responsibilities.	3/19/03
2	Specification 02111—Modifications to eliminate sludge drying and subgrade preparation. Sludge was dry. Dewatering not necessary.	3/27/03
3	Specification 02377—Removal of central berm for use as soil barrier layer. Prepared in conjunction with DCN 1.	3/31/03
4	Specification 02111—Request to remove sludge outside of project boundary.	3/31/03 Rejected—No sludge removal outside project boundaries.
5	Specification 01450—Excavation of additional sludge material in North Lagoon. Sludge found deeper in some areas that required removal.	5/21/03
6	Specification 02115—Placement of offsite and onsite biota barrier materials in two lifts. Three sources of material available of different size. Prepared in conjunction with DCN 2.	6/18/03
7	Specification 02111—Backfill of North Lagoon. Backfill of over-excavated areas identified in FCR #5 required to bring area to grade.	6/18/03
8	Fence installation. Cannon AFB requested construction of a fence surrounding the area of the south lagoon soil cover.	9/24/03
9	Specification 02115—Use of Keel material for biota barrier. Need for additional source of material for biota barrier with Keel Section material proposed for use.	8/21/03
10	Specification 02377—Adjust specification for thickness of soil barrier layer by allowing a 2-inch variance. Prepared in conjunction with DCN 3.	9/22/03
11	Specifications 02140 and 02921—Delay of reseeding effort and in soil moisture testing to encourage optimum growth with reseeding to take place in Spring 2004.	9/26/03
12	Specification 02921—Revision to reseeding specification and erosion protection over winter based on reseeding delay until Spring 2004.	12/2/03
13	Specification 02921—Revision to reseeding specification for amount of seeding and seed mix. Specification revised based on actual conditions of the site.	4/3/04
Design Change Notices		
1	Eliminate the berm between the north and south lagoons. Associated with FCR #3. Berms between south and north lagoon required removal to allow for construction of soil cover in area of south lagoon.	5/21/03
2	Specification 02115—Biota barrier, offsite and SWMU material placement, including lifts. Multiple sources of material approved for use. Coarser crushed concrete to be placed in first lift with finer Keel Section material to be placed in second lift in order to fill in voids left within the first lift. Onsite material included crushed concrete and Keel Section material. Offsite material included crushed concrete. Associated with FCR #6.	6/18/03
3	Specification 02377—Change wording of Specification 02377, Part 3, Section 3.1.3 regarding the testing required for soil barrier material at optimum moisture content and revising test for 1-3% of optimum moisture rather than a minimum of 2% optimum moisture. Associated with FCR #10.	9/19/03

A summary of the design specifications and criteria with their applicable FCRs and DCNs are presented in Table 3-1. Appendix B provides a copy of the FCRs and DCNs for this project.

3.2.4 Manufacturers' Certifications

Mulch and seed certifications are presented in the project submittals in Appendix A.

3.2.5 Laboratory Testing

Geotechnical and analytical soil test results are presented in Appendix A as part of the submittals. Submittal 01450 covers laboratory testing for the borrow materials. Submittal 02111 covers testing for confirmation sampling.

3.2.6 Site Inspection and Quality Control Reporting

All three-phase inspections (preparatory, initial, and follow-up) were performed for each definable feature of work and are presented in Appendix D. Completion inspections for major tasks are also included in Appendix D. TtEC prepared Daily Quality Control Reports (DQCRs) during construction. Copies of the DQCRs are available at the USACE Resident Engineer's office at Cannon AFB, and electronic files are available within the USACE Resident Management System. TtEC retains copies of all DQCRs in the project file.

3.2.7 Nonconformance

There were no nonconformance reports filed in regard to this construction project.

3.2.8 Site Photographs

Representative site photographs, which were taken during the course of construction, are presented in Appendix C.

3.2.9 Certified Payroll

Copies of the certified payroll are available at the USACE office at Cannon AFB. TtEC retains copies of the certified payroll in the project file.

3.3 Regulatory Framework

Cannon AFB is conducting an Environmental Restoration Program (ERP) at the Base, which was initially managed under the U.S. Air Force Installation Restoration Program (IRP). The IRP was subsequently integrated with the EPA RCRA corrective action program. This site has been included under the Base's ERP as SWMU 101, the Sewage Lagoons. ERP activities are implemented at the Base in accordance with

the Comprehensive Environmental Response, Compensation and Liability Act of 1980 and response procedures consistent with the National Contingency Plan.

3.3.1 Permits

The following permits were completed for construction activities at SWMU 101:

- National Pollutant Discharge Elimination System Stormwater Construction Permit (NPDES)—The construction area at SWMU 101 was greater than 5 acres, thus requiring a Title 40 Code of Federal Regulations 122.26 NPDES permit for construction activity, including clearing, grading, and excavation activities. Construction activities were performed under the NPDES permit No. NMR10B863.
- SWPPP—TtEC prepared an SWPPP specifically for the construction activities at SWMU 101. The plan was followed during construction. The SWPPP is presented in the final Work Plan (Foster Wheeler Environmental 2003). The NPDES permit and Notice of Intent and Notice of Termination are presented in Appendix E.

3.4 Project Waste Descriptions

This section describes the waste streams that were generated during corrective action activities and how the waste was managed. The waste streams included:

- Tumbleweeds and brush
- Concrete debris (slope slabs, gate structures, etc.)
- Demolition debris (PVC and steel piping)
- Personal protective equipment (PPE)

These waste streams and their ultimate disposal or recycling are described in the following subsections.

3.4.1 Tumbleweeds and Brush

Both lagoons contained an abundance of dried tumbleweeds and brush that had accumulated over time. ACI placed these items in roll-off containers and disposed them as clean construction waste at a local municipal landfill.

3.4.2 Concrete Debris

ACI removed, demolished and sized approximately 2,000 cy of concrete rubble from the lagoon berm slopes in accordance with Specification 02220, (Appendix A). They recycled this concrete as fill and stabilization material in the South Lagoon Area. The concrete material taken from the berms was not used as biota barrier material.

3.4.3 Demolition Debris

Approximately 20 tons of PVC and steel piping was removed from the North Lagoon Area and recycled as fill material in the South Lagoon Area in accordance with Specification 02220 (Appendix A). Offsite recycling of the piping was not feasible because the piping could have potentially been contaminated with sludge.

3.4.4 Personal Protective Equipment

PPE, such as gloves, were disposed as nonhazardous solid waste in a local municipal landfill.

3.5 Reporting Spills and Releases

Precautions were taken to prevent oil and fuel spills, including daily inspections by site personnel of equipment, structures, and containers. One reported spill and release occurred during the construction activities: A subcontractor vehicle leaked hydraulic fluid outside SWMU 101 on the former runway, adjacent to and west of the site. The spill was reported according to Base procedures and the material was picked up and disposed of by a subcontractor. The spill was not a state-reportable incident. A copy of the waste manifest is provided in Appendix F.

3.6 Training/Certification Requirements

TtEC field personnel, ACI field personnel, and craft labor completed Occupational Safety and Health Administration (OSHA) 40-hour Hazardous Waste Operator training and annual updates. No additional training or certifications were required for field employees or craft labor.

3.7 Updates to the Regulatory Compliance Plan

No changes or updates were made to the Regulatory Compliance Plan.

6. INSPECTION AND MAINTENANCE

TtEC performed monthly SWPPP inspections until revegetation was completed and the Notice of Termination from EPA (Appendix F) was approved. Copies of SWPPP inspections are retained in the project files. Periodic maintenance of the soil cover and monitoring will continue as described below.

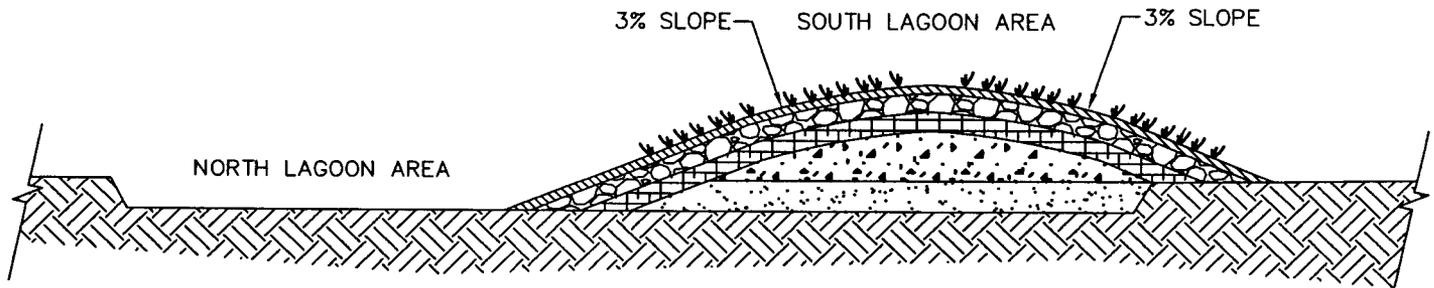
6.1 Cover Maintenance and Monitoring

Periodic visual inspections of the installed cover are proposed as part of the routine operations and maintenance program for the soil cover system at SWMU 101 to ensure that the cover integrity is maintained. Inspections consist of a site walkover and should occur a minimum of once every 6 months for the first 5 years, and then annually. Typical repairs may include cleaning drainage channels, replanting vegetation, and replacing cover soil. Side slopes should be inspected for erosion damage and repaired or fortified as needed. Additional inspection of the site should be performed after significant rainfall events, and inspection results will be documented and managed by Cannon AFB personnel. Inspection observations should note any differential settlement, surface cracking, erosion, ponding, biointrusion, or other potential concerns that could affect the integrity of the landfill cover.

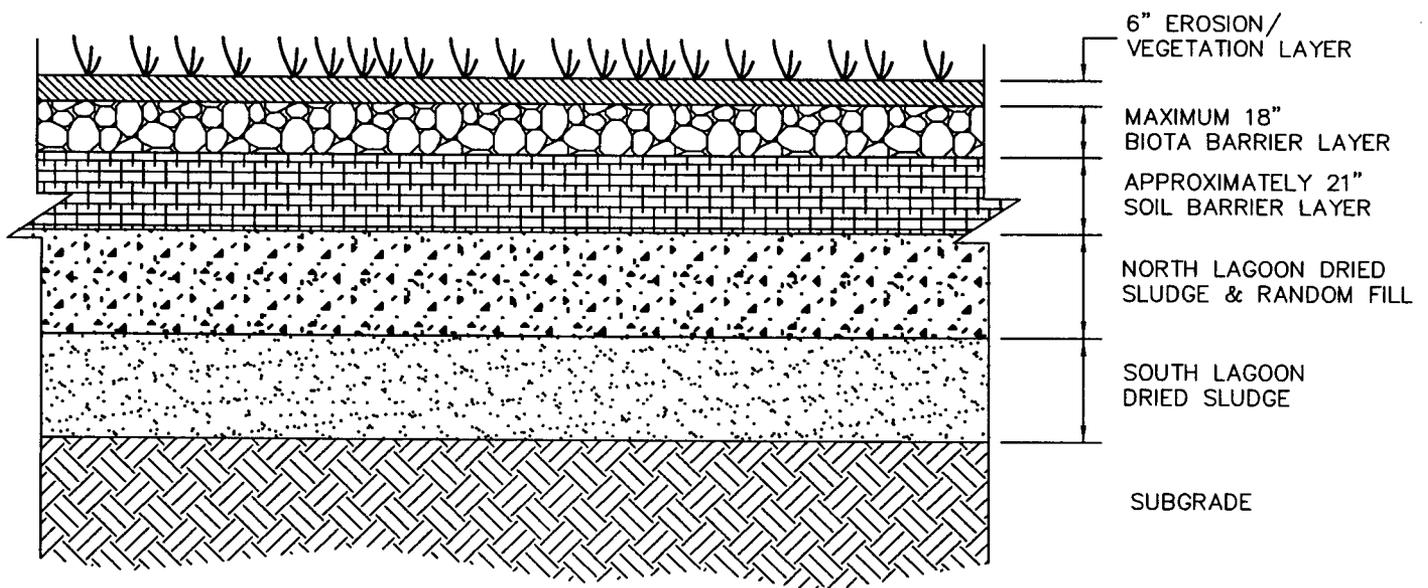
6.2 Institutional Controls

Perimeter fencing around the soil cover was installed to prevent intrusion to the site. Groundwater monitoring is currently being conducted at SWMU 101 and will continue in accordance with long-term groundwater monitoring program requirements.

There is no anticipated future land use for the site and it will be withdrawn from future consideration. Site access will be limited to long-term groundwater monitoring program sampling and soil cover maintenance activities.



NORTH AND SOUTH LAGOON CROSS SECTION
NOT TO SCALE



SOUTH LAGOON AREA COVER SYSTEM
NOT TO SCALE



TETRA TECH EC, INC.

Closure of
SWMU 101 - Sewage Lagoon
Cannon Air Force Base, New Mexico
U.S. Army Corps of Engineers, Omaha District

CURRENT CONDITIONS AT SWMU 101

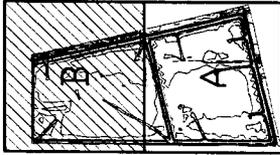
Date: 03/08/05

File Name: FIG 3-1 Final.dwg

Figure 3-1

NOTES:

1. THE TOPOGRAPHIC SURVEY WAS PERFORMED BY THE U.S. ARMY CORPS OF ENGINEERS, WASHINGTON, D.C. AND WAS COMPLETED IN 1960. THE SURVEY IS BASED ON THE 1985 MEAN SEA LEVEL DATUM AND THE 1985 NAD 83 VERTICAL DATUM.
2. BASED ON REVIEW OF BUREAU OF REVENUE PLANS, UTILITY DRAWINGS AND RECORDS, THE EXISTING UTILITIES AND STRUCTURES ARE SHOWN AS LOCATED AT THE TIME OF THE SURVEY. THE EXISTING UTILITIES ARE ALL POTENTIAL UTILITIES PRIOR TO CONSTRUCTION.



KEY PLAN



SCALE: 1"=400'

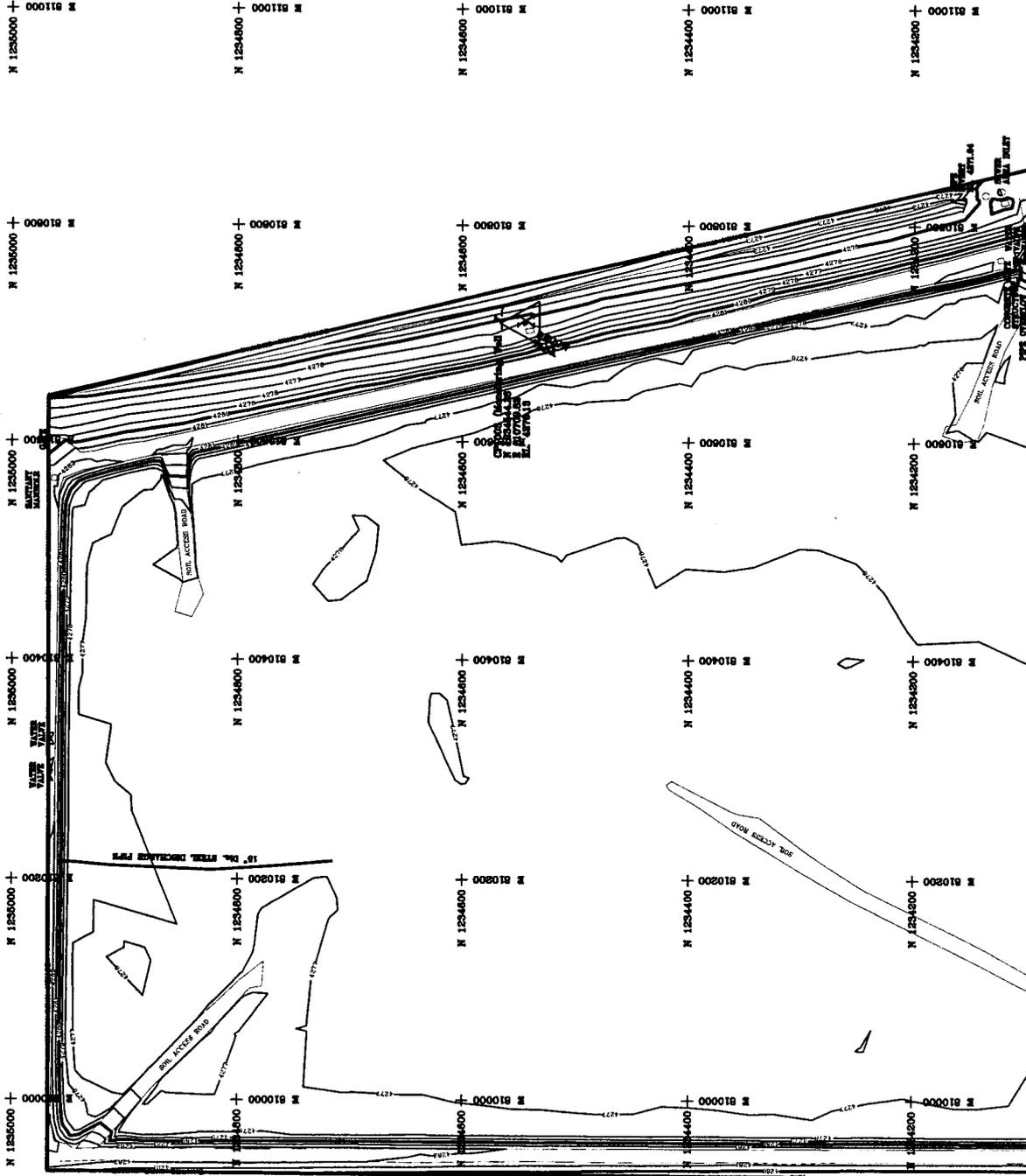
ALL ELEVATIONS SHOWN ARE BASED ON A STANDARD MEANING SIZE OF 847.1' AS AN MEANING SIZE OF 847.1' FROM THE CENTER OF THE EARTH. THE CENTER OF THE EARTH IS PLACED AT THE CENTER OF THE EARTH. THE CENTER OF THE EARTH IS PLACED AT THE CENTER OF THE EARTH.

\$\$ - THINK VALUE ENGINEERING - \$\$

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DER154-400 C-3

**TO VIEW THE MAP AND/OR
MAPS WITH THIS DOCUMENT,
PLEASE CALL THE
HAZARDOUS WASTE BUREAU
AT 505-476-6000 TO MAKE AN
APPOINTMENT**

4. QUALITY ASSURANCE PROJECT PLAN

TtEC prepared a Quality Assurance Project Plan in accordance with Specification 01451 (Appendix A), and provided it in the final Work Plan (Foster Wheeler Environmental, 2003).

Confirmation sampling was performed at SWMU 101 in the North Lagoon Area after excavation activities were completed in accordance with Specification 02111. Offsite borrow sources were sampled prior to delivery, in accordance with Specification 01450. Copies of analytical test data are provided in Appendix A.

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5. HEALTH AND SAFETY

Health and safety activities were conducted in accordance with the SWMU 101 Site Safety and Health Plan (Foster Wheeler Environmental, 2003), the Cannon AFB Base-Wide Health and Safety Plan (USAF, 2000), and USACE Engineers Manual 385-1-1 (USACE, 2003). All site workers, including subcontractors, were required to review, comply with, and sign-off on the project health and safety requirements and procedures.

No OSHA-recordable health and safety incidents occurred during the SWMU 101 field effort. Table 5-1 summarizes non-reportable incidences that occurred onsite.

Table 5-1. Incident Summary

Incident Date	Description/Summary
June 3, 2003	Operator of the nuclear gauge was not wearing a radiation detection badge.
June 25, 2003	Dump truck leaked 15 to 20 gallons of hydraulic fluid in the excavation area (Section 3.5).
December 10, 2003	Subcontractor vehicle struck a military vehicle in the parking lot.
December 16, 2003	Theft of a John Deere 4x2 utility vehicle (Gator).

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6. INSPECTION AND MAINTENANCE

TtEC performed monthly SWPPP inspections until revegetation was completed and the Notice of Termination from EPA (Appendix F) was approved. Copies of SWPPP inspections are retained in the project files. Periodic maintenance of the soil cover and monitoring will continue as described below.

6.1 Cover Maintenance and Monitoring

Periodic visual inspections of the installed cover are proposed as part of the routine operations and maintenance program for the soil cover system at SWMU 101 to ensure that the cover integrity is maintained. Inspections consist of a site walkover and should occur a minimum of once every 6 months for the first 5 years, and then annually. Typical repairs may include cleaning drainage channels, replanting vegetation, and replacing cover soil. Side slopes should be inspected for erosion damage and repaired or fortified as needed. Additional inspection of the site should be performed after significant rainfall events, and inspection results will be documented and managed by Cannon AFB personnel. Inspection observations should note any differential settlement, surface cracking, erosion, ponding, biointrusion, or other potential concerns that could affect the integrity of the landfill cover.

6.2 Institutional Controls

Perimeter fencing around the soil cover was installed to prevent intrusion to the site. Groundwater monitoring is currently being conducted at SWMU 101 and will continue in accordance with long-term groundwater monitoring program requirements.

There is no anticipated future land use for the site and it will be withdrawn from future consideration. Site access will be limited to long-term groundwater monitoring program sampling and soil cover maintenance activities.

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7. REFERENCES

E&E (Ecology and Environment, Inc.)

1998 *Sludge Management Compliance Evaluation and Requirements Identification Phase III Customer Concept Document*. July 1998.

EPA (U.S. Environmental Protection Agency)

1994. Resource Conservation and Recovery Act (RCRA) Correct Action Plan Guidance.

Foster Wheeler Environmental (currently Tetra Tech EC, Inc.)

2003 *Final Work Plan for the Closure of SWMU 101, Sewage Lagoons Cannon Air Force Base*. February 2003.

2001 *Revised Final Corrective Measures Study Report for SWMU 101—Sewage Lagoons*. April 2001.

USACE (U.S. Army Corps of Engineers)

2003 *U.S. Army Corps of Engineers Engineering Manual 385-1-1, Safety and Health Requirements Manual*. 2003 Update.

2002 *Sewage Lagoons Closure Final Specifications*. U.S. Army Corps of Engineers, Omaha District. September

USAF (U.S. Air Force)

2000 *Final Base-Wide Health and Safety Plan for Cannon Air Force Base*. Cannon Air Force Base, New Mexico. February 2000.

Woodward-Clyde Consultants

1992 *Remedial Investigation Report for 18 Solid Waste Management Units*. Cannon Air Force Base, Clovis, New Mexico. October 1992.

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Appendix A

Submittals

SUBMITTAL REGISTER				(ER 415-1-10)				TITLE AND LOCATION U 101 - Sewage Lagoons, Cannon AFB				DATE 24 04			
				CONTRACTOR Foster Wheeler Environmental C				CONTRACT NUMBER DACW45-94-D-0003 0035							
ACTIVITY No.	TRANS-MITTAL No.	ITEM No.	SPEC PARAGRAPH No.	DESCRIPTION OF SUBMITTAL	TYPE OF SUBMITTAL	CLASSIFICATION	CONTRACTOR REVIEWER	CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION		GOVERNMENT ACTION		
								FIO or GA	SUBMIT NEEDED BY	APPROVAL NEEDED BY	MATERIAL NEEDED BY	CODE	CORPS RECEIVED DATE	CODE	CORPS RETURNED DATE
SECTION - 01351 Safety, Health & Emer Response-HTRW/UST															
	1	1	01351 1.27.1	work zone	SHOP DRAWINGS	GA	JAM						14 Mar 03	B	19 Mar 03
	1	2	01351 1.28.1	decontamination facilities	SHOP DRAWINGS	GA							14 Mar 03	A	19 Mar 03
	1	3	01351 1.14	exposure monitoring /Air sampling	PRODUCT DATA	FIO							14 Mar 03	A	19 Mar 03
	1	4	01351 1.27.2	site control loc	PRODUCT DATA	GA							14 Mar 03	A	19 Mar 03
	6	5	01351 1.11.1	HAZWOPER QUALIFICATIONS CERTS	CERTIFICATES	GA	JAM				A		30 Apr 03	A	01 May 03
SECTION - 01450 Chemical Data Quality Control															
	1	1	01450 3.4	Sampling & Analysis Plan	PRODUCT DATA	GA	JAM				A		07 Apr 03	A	18 Apr 03
	2	2	01450 3.2.2	Analytical Data Package- Field test	TEST REPORTS	GA	JAM				A		16 Apr 03	A	25 Apr 03
	1	3	01450 1.5	Lab Approval	CERTIFICATES	GA	JAM				A		07 Apr 03	A	18 Apr 03
	1	4	01450 3.3.1	Field analytical data Coord. (FADC)	CERTIFICATES	GA	JAM				A		07 Apr 03	A	18 Apr 03
SECTION - 02111 Excavation & Handling Contaminated Mat'l															
	1	1	02111	Excavation and Handling Plan	TEST REPORTS	GA					B		14 Mar 03	B	19 Mar 03
	2	2	02111 1.3	Topo Survey	SHOP DRAWINGS	FIO	JAM				A		31 Mar 03	F	01 Apr 03
	4	3	02111 3.1.4	Confirmation Sampling and Analysis	TEST REPORTS	GA	SysAdmin				A		16 Jun 03	A	18 Jun 03
	3	4	02111 1.3	TOPO - Post Excavation and Sample Points	SHOP DRAWINGS	FIO	JAM				A		05 Jun 03	A	06 Jun 03
SECTION - 02115 Biota Barrier Layer															
	1	1	02115 1.4	Exc & Hndng Plan for Biota Bar Layer	TEST REPORTS	GA					A		21 Apr 03	B	25 Apr 03
	3	2	02115 1.3	Topo Survey Post South	SHOP DRAWINGS	GA	JAM				A		18 Sep 03	A	22 Sep 03
	2	3	02115 1.4	Revised Biota Material Handling Plan	TEST REPORTS	GA	JAM				A		07 Aug 03	A	07 Aug 03
	5	4	02115 1.3	TOPO Survey Post North Biota NW Final	SHOP DRAWINGS	GA	JAM						30 Dec 03	A	09 Jan 04
	4	5	02115 1.3	TOPO Survey Post East	SHOP DRAWINGS	GA	JAM				B		05 Nov 03	B	07 Nov 03
	6	6	02115 1.3	TOPO Survey Post North Slope (East)	SHOP DRAWINGS	GA	JAM				B		20 Nov 03	B	04 Dec 03
SECTION - 02140 Erosion/Vegetation Layer															
	1	1	02140	Mat'l Hndng Pln - Erosion/Veg. Layer	TEST REPORTS	GA					A		21 Apr 03	B	25 Apr 03
	4	2	02140 1.3.1	Topo	SHOP DRAWINGS	FIO	JAM						05 Jan 04	A	07 Jan 04
	3	3	02140 3.4.	Erosion Vegetation Material Testing	TEST REPORTS	GA	JAM				B		31 Oct 03	B	31 Oct 03
	2	4	02140 1.3	Borrow Source Assessment Rpt	TEST REPORTS	GA	JAM						18 Sep 03	A	24 Sep 03
	5	5	02140 3.4	Erosion/Veg Layer Material pH422.Organic	TEST REPORTS	GA							05 Jan 04	A	07 Jan 04
SECTION - 02210 Earthwork/grading															
	1	1	02210 1.3.4	TOPO-Post Over Excavation Backfill	SHOP DRAWINGS	GA	JAM				A		20 Nov 03	A	06 Jan 04
	2	2	02210 3.1	Disposal Facility	TEST REPORTS	FIO	JAM						19 Mar 03	A	26 Mar 03
	4	3	02210 1.3.1	Suitable material	TEST REPORTS	GA	JAM				A		05 May 03	A	06 May 03
	3	5	02210 3.9	Field testing Control	CERTIFICATES	GA	JAM				A		28 Apr 03	A	30 Apr 03
SECTION - 02220 Demolition															

RANGE : ALL

SORT : SECTION & ITEM

SUBMITTAL REGISTER				(ER 415-1-10)				TITLE AND LOCATION SWMU 101 - Sewage Lagoons, Cannon AFB				DATE 24 Aug 2004			
				CONTRACTOR Foster Wheeler Environmental C				CONTRACT NUMBER DACW45-94-D-0003 0035							
ACTIVITY No.	TRANS-MITTAL No.	ITEM No.	SPEC PARAGRAPH No.	DESCRIPTION OF SUBMITTAL	TYPE OF SUBMITTAL	CLASSIFICATION	CONTRACTOR REVIEWER	CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION		GOVERNMENT ACTION		
								FIO or GA	CONTRACTOR REVIEWER	SUBMIT NEEDED BY	APPROVAL NEEDED BY	MATERIAL NEEDED BY	CODE	CORPS RECEIVED DATE	CODE
1	1	1	02220 1.3	Work Plan-Demo	TEST REPORTS	GA	JAM						20 Mar 03	A	20 Mar 03
SECTION - 02377 Soil Barrier Layer															
	4	1	02377 1.5	TOPO-Post Excavation and Sampling Points	SHOP DRAWINGS	GA	JAM						29 May 03	A	02 Jun 03
	2.1	2	02377 3.1	Borrow Source Assessment Test	TEST REPORTS	GA	JAM						29 May 03	B	29 May 03
	10	3	02377 3.4.2	Moisture Content, Dens Soil Barrier-1st	TEST REPORTS	GA	JAM				B		31 Jul 03	B	07 Aug 03
	6.1	4	02377 3.4.3	Hvdraulic Conductvty Soil Barrier-1st	TEST REPORTS	GA	JAM				B		25 Jul 03	B	25 Jul 03
	1	5	02377 3.1.6	Commerical Testina Lab	CERTIFICATES	FIO	JAM				A		28 Apr 03	F	30 Apr 03
	20	6	02377 3.1	Borrow Source Assmt Berm Material-2nd 65	TEST REPORTS	GA					A		23 Sep 03	B	01 Oct 03
	5	7	02377 3.1.1	Borrow Source Assmnt- Off Site-1st 6500	TEST REPORTS	GA	JAM				A		09 Jun 03	A	12 Jun 03
	9	8	02377 3.1	Assessment Tests - Gr Size, PI,LL,Proc	TEST REPORTS	GA					A		31 Jul 03	B	07 Aug 03
	12	9	02377 3.4.2	Moisture Densiv-2nd lift	TEST REPORTS	GA					A		08 Aug 03	A	12 Aug 03
	14	10	02377 3.4.3	Hydraulic Conductv SBL-2nd lift 3 of 5	TEST REPORTS	GA					A		08 Aug 03	B	12 Aug 03
	8.1	11	02377 3.1	Borrow Source Offsite-2nd 6500	TEST REPORTS	GA					B		23 Sep 03	A	25 Sep 03
	21	12	02377	Borrow Offsite-3rd 6500	TEST REPORTS	GA					B		12 Sep 03	A	25 Sep 03
	11	13	02377 1.5	TOPO-POST SBL PLACEMENT SOUTH	TEST REPORTS	FIO	JAM				A		07 Aug 03	B	07 Aug 03
	13	14	02377 3.1	2nd Set Assessment Test 1st & 2nd lift	TEST REPORTS	GA	JAM				A		08 Aug 03	A	12 Aug 03
	17	15	02377 3.4.2	Moisture Densiv 2nd lift final group	TEST REPORTS	GA	JAM				A		23 Sep 03	B	25 Sep 03
	19	16	02377 3.4.3	Hvdraulic cond 2nd lift final 2 of 5	TEST REPORTS	GA	JAM				A		23 Sep 03	A	01 Oct 03
	16	17	02377 1.5	TOPO Post SBL North Half	TEST REPORTS	GA	JAM				B		18 Sep 03	A	22 Sep 03
	18	18	02377 3.4.3	Retest of #1 Hvd Cond Lift 1 Berm Mat	TEST REPORTS	GA	JAM				A		23 Sep 03	B	25 Sep 03
	23	19	02377 3.1	Borrow Source Assessment 3rd 6500 berms	TEST REPORTS	GA					A		23 Sep 03	B	02 Oct 03
	22	20	02377 3.4.1	Final Assessment test Gr.PI,LL	TEST REPORTS	GA	JAM				B		23 Sep 03	B	25 Sep 03
SECTION - 02921 Seeding															
	2	1	02921 2.1	Seeding	CERTIFICATES	FIO	JAM						27 Apr 04	F	29 Apr 04
	3	2	02921 2.3	Fertilizer	CERTIFICATES	FIO	JAM				A		29 Apr 04	F	29 Apr 04
	1	3	02921 2.4	Mulch	CERTIFICATES	FIO	JAM						09 Jan 04	F	04 Feb 04
	6	4	02921	O&M-Data	O&M DATA	FIO	JAM				A		17 Aug 04	F	24 Aug 04
	5	5	02921 3.6.3.3	Maintenance record	O&M DATA	FIO	JAM				A		08 Jul 04	F	03 Aug 04
	4	6	02921 1.3 C	Mulch- 2nd Installation for seeding	CERTIFICATES	FIO	JAM				A		29 Apr 04	F	29 Apr 04

RANGE : ALL

SORT : SECTION & ITEM

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES OR
MANUFACTURER'S CERTIFICATES OF COMPLIANCE

DATE

03/13/2003

TRANSMITTAL NO.

01351-1

(Read instructions on the reverse side prior to initiating this form)

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS

(This section will be initiated by the contractor)

TO: Cannon AFB Resident Office
US Army Corps of Engineers
201 N. Perimeter Rd.
Cannon AFB, NM 88103

FROM: Foster Wheeler Environmental C
6605 Updown Blvd, NE, Suite 220
Albuquerque, NM 87110

CONTRACT NO.

DACW45-94-D-0003 0035

CHECK ONE:

THIS IS A NEW TRANSMITTAL
 THIS IS A RESUBMITTAL OF
TRANSMITTAL

SPECIFICATION SEC. NO. (Cover only one section with each
transmittal) 01351

PROJECT TITLE AND LOCATION

SWMU 101 - Sewage Lagoons Cannon AFB

CHECK ONE: THIS TRANSMITTAL IS
FOR FIG GOV'T. APPROVAL

ITEM NO.	DESCRIPTION OF ITEM SUBMITTED (Type size, model number/etc.)	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. (See instruction no. 8)	NO. OF COPIES	CONTRACT REFERENCE DOCUMENT		FOR CONTRACTOR USE CODE	VARIATION (See Instruction No. 6)	FOR CE USE CODE
				SPEC. PARA. NO.	DRAWING SHEET NO.			
a.	b.	c.	d.	e.	f.	g.	h.	i.
1	work zone	SHOP DRAWINGS	4	1.27.1	Figure E-3	A		B
2	decontamination facilities	SHOP DRAWINGS	4	1.28.1		A		A
3	exposure monitoring (Air sampling)	PRODUCT DATA	4	1.14		A		A
4	site control log	PRODUCT DATA	4	1.27.2		A		A

REMARKS

IT WOULD BE GREATLY APPRECIATED ^{IF} EXPEDITED TO FACILITATE SUBCONTRACTOR START-UP.
ON FIG E-3, CONFIRM THAT SMOKING IS NOT AUTHORIZED WITHIN THE OFFICE TRAILOR, EAST OF "SMOKING LINE."

I certify that the above submitted items have been reviewed in detail and are correct and in the strict conformance with the contract drawings and specifications except as otherwise stated.

Karen D... 3-13-03
NAME AND SIGNATURE OF CONTRACTOR

SECTION II - APPROVAL ACTION

ENCLOSURES RETURNED (List by item No.)

NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY

Ma a Pesto

DATE

3-19-03

No. 0370 P. 1/5

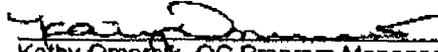
Mar. 19. 2003 11:01AM

SUBMITTAL REVIEW VERIFICATION SHEET

Date: March 13, 2003

Submittal No.: 01351-1

Foster Wheeler Environmental Corporation Stamp

SWMU 101 Sewage Lagoons Closure, Cannon AFB, NM Certified for approval as indicated below:	
<input checked="" type="radio"/> A -	Approved as submitted
<input type="radio"/> B -	Approved except as noted on the drawings and/or attached sheets.
It is hereby certified that the (equipment) (material) shown and marked in this submittal is that proposed to be incorporated into Contract Number DACW45-84-D-0003, Delivery Order No. 35, Work Authorization Directive 1 is in compliance with the contract drawings and specifications, can be installed in the allocated spaces, and is submitted for Government approval.	
Reviewed/Certified By:	 Kathy Omerik, QC Program Manager
Description of items reviewed: SD-02, Shop Drawings—Work Zones	

U.S. Army Corps of Engineers Stamp

U.S. Army Engineer District, Albuquerque Corps of Engineers Certified for approval as indicated below:	
<input type="radio"/> A -	Approved as submitted.
<input checked="" type="radio"/> B -	Approved except as noted on the drawings and/or attached sheet(s). Resubmission not required.
<input type="radio"/> C -	Approved except as noted on the drawings and/or attached sheet(s). Resubmission required.
<input type="radio"/> D -	Will be returned by separate correspondence.
<input type="radio"/> E -	Disapproved; see comments on attached sheet.
<input type="radio"/> F -	Receipt acknowledged.
<input type="radio"/> G -	Other: Specify.
Note:	Items approved as to general layout only. Dimensions and quantities checked. Approval does not relieve contractor of responsibilities for errors that may exist, as contractor shall be responsible for dimensions and design of adequate corrections. Details and satisfactory construction of work.
Signature: 	Date: 18 MAR 03

Reviewer's Signature: _____

SUBMITTAL REVIEW VERIFICATION SHEET

Date: March 13, 2003

Submittal No.: 01351-2

Foster Wheeler Environmental Corporation Stamp

SWMU 101 Sewage Lagoons Closure, Cannon AFB, NM Certified for approval as indicated below:	
<input checked="" type="radio"/> A -	Approved as submitted
<input type="radio"/> B -	Approved except as noted on the drawings and/or attached sheets.
It is hereby certified that the (equipment) (material) shown and marked in this submittal is that proposed to be incorporated into Contract Number DACW45-94-D-0003, Delivery Order No. 35. Work Authorization Directive 1 is in compliance with the contract drawings and specifications, can be installed in the allocated spaces, and is submitted for Government approval.	
Reviewed/Certified By:	 Kathy Omerik, QC Program Manager
Description of items reviewed: SD-02, Shop Drawings—Decontamination Facilities	

U.S. Army Corps of Engineers Stamp

U.S. Army Engineer District, Albuquerque Corps of Engineers Certified for approval as indicated below:	
<input checked="" type="radio"/> A -	Approved as submitted.
<input type="radio"/> B -	Approved except as noted on the drawings and/or attached sheet(s). Resubmission not required.
<input type="radio"/> C -	Approved except as noted on the drawings and/or attached sheet(s). Resubmission required.
<input type="radio"/> D -	Will be returned by separate correspondence.
<input type="radio"/> E -	Disapproved; see comments on attached sheet.
<input type="radio"/> F -	Receipt acknowledged.
<input type="radio"/> G -	Other: Specify.
Note: Items approved as to general layout only. Dimensions and quantities checked. Approval does not relieve contractor of responsibilities for errors that may exist, as contractor shall be responsible for dimensions and design of adequate corrections. Details and satisfactory construction of work.	
Signature: 	Date: 18 MAR 03

Reviewer's Signature: _____

SUBMITTAL REVIEW VERIFICATION SHEET

Date: March 13, 2003

Submittal No.: 01351-3

Foster Wheeler Environmental Corporation Stamp

SWMU 101 Sewage Lagoons Closure, Cannon AFB, NM Certified for approval as indicated below:	
<input checked="" type="radio"/> A -	Approved as submitted
<input type="radio"/> B -	Approved except as noted on the drawings and/or attached sheets.
It is hereby certified that the (equipment) (material) shown and marked in this submittal is that proposed to be incorporated into Contract Number DACW45-94-D-0003, Delivery Order No. 35. Work Authorization Directive 1 is in compliance with the contract drawings and specifications, can be installed in the allocated spaces, and is submitted for Government approval.	
Reviewed/Certified By:	 Kathy Omerik, QC Program Manager
Description of items reviewed: SD-03, Product Data—Exposure Monitoring/Air Sampling Program	

U.S. Army Corps of Engineers Stamp

U.S. Army Engineer District, Albuquerque Corps of Engineers Certified for approval as indicated below:	
<input checked="" type="radio"/> A -	Approved as submitted.
<input type="radio"/> B -	Approved except as noted on the drawings and/or attached sheet(s). Resubmission not required.
<input type="radio"/> C -	Approved except as noted on the drawings and/or attached sheet(s). Resubmission required.
<input type="radio"/> D -	Will be returned by separate correspondence.
<input type="radio"/> E -	Disapproved; see comments on attached sheet.
<input type="radio"/> F -	Receipt acknowledged.
<input type="radio"/> G -	Other: Specify.
Note: Items approved as to general layout only. Dimensions and quantities checked. Approval does not relieve contractor of responsibilities for errors that may exist, as contractor shall be responsible for dimensions and design of adequate corrections. Details and satisfactory construction of work.	
Signature: 	Date: 18 MAR 03

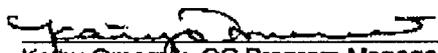
Reviewer's Signature: _____

SUBMITTAL REVIEW VERIFICATION SHEET

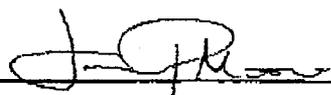
Date: March 13, 2003

Submittal No.: 01351-4

Foster Wheeler Environmental Corporation Stamp

SWMU 101 Sewage Lagoons Closure, Cannon AFB, NM Certified for approval as indicated below:	
<input checked="" type="radio"/> A -	Approved as submitted
<input type="radio"/> B -	Approved except as noted on the drawings and/or attached sheets.
It is hereby certified that the (equipment) (material) shown and marked in this submittal is that proposed to be incorporated into Contract Number DACW45-94-D-0003, Delivery Order No. 35, Work Authorization Directive 1 is in compliance with the contract drawings and specifications, can be installed in the allocated spaces, and is submitted for Government approval.	
Reviewed/Certified By:	 Kathy Omerik, QC Program Manager
Description of items reviewed: SD-03, Product Data—Site Control Log	

U.S. Army Corps of Engineers Stamp

U.S. Army Engineer District, Albuquerque Corps of Engineers Certified for approval as indicated below:	
<input checked="" type="radio"/> A -	Approved as submitted.
<input type="radio"/> B -	Approved except as noted on the drawings and/or attached sheet(s). Resubmission not required.
<input type="radio"/> C -	Approved except as noted on the drawings and/or attached sheet(s). Resubmission required.
<input type="radio"/> D -	Will be returned by separate correspondence.
<input type="radio"/> E -	Disapproved; see comments on attached sheet.
<input type="radio"/> F -	Receipt acknowledged.
<input type="radio"/> G -	Other: Specify.
Note: Items approved as to general layout only. Dimensions and quantities checked. Approval does not relieve contractor of responsibilities for errors that may exist, as contractor shall be responsible for dimensions and design of adequate corrections. Details and satisfactory construction of work.	
Signature: 	Date: 18 March 03

Reviewer's Signature: _____

SUBMITTAL REVIEW VERIFICATION SHEET

Date: 3/19/03

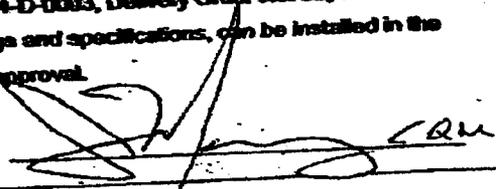
Submittal No.: 01351-5

Foster Wheeler Environmental Corporation Stamp

SWMU 101 Sewage Lagoons Closure, Cannon AFB, NM
Certified for approval as indicated below:

A- Approved as submitted
 B- Approved except as noted on the drawings and/or attached sheets.

It is hereby certified that the (equipment) (material) shown and marked in this submittal is that proposed to be incorporated into Contract Number DACW45-94-D-0083, Delivery Order No. 35, Work Authorization Directive 1 is in compliance with the contract drawings and specifications, can be installed in the allocated spaces, and is submitted for Government approval.

Reviewed/Certified By: 

Description of Items reviewed: HAZWOPER Certs - 1351-1.11.1
SD07

U.S. Army Corps of Engineers Stamp

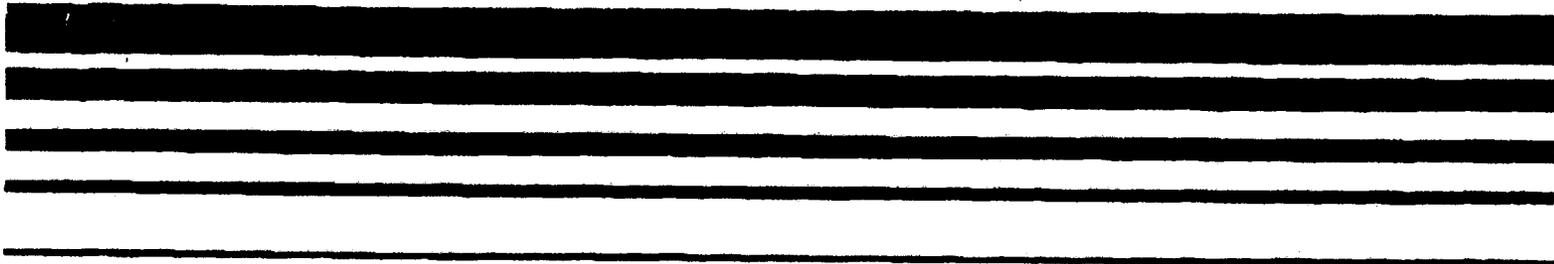
U.S. Army Engineer District, Albuquerque Corps of Engineers
Certified for approval as indicated below:

A- Approved as submitted.
B- Approved except as noted on the drawings and/or attached sheet(s). Resubmission not required.
 C- Approved except as noted on the drawings and/or attached sheet(s). Resubmission required.
D- Will be returned by separate correspondence.
E- Disapproved; see comments on attached sheet.
F- Receipt acknowledged.
G- Other: Specify.

Note: Items approved as to general layout only. Dimensions and quantities checked. Approval does not relieve contractor of responsibility for errors that may exist, as contractor shall be responsible for dimensions and design of adequate corrections. Details and satisfactory construction of work.

Signature:  Date: 24 MAR 03

Reviewer's Signature: _____



TRAINING CERTIFICATION

This certifies that
Walter Migdal

has successfully completed the following training:

OSHA 1910.120 (e)(8) REFRESHER TRAINING

Date(s) March 28, 2002 Instructor(s) *Roger M. Margotto*
Location Albuquerque, NM Roger Margotto, CIH
(14572)

FOSTER  WHEELER
FOSTER WHEELER ENVIRONMENTAL CORPORATION



International Union of Operating Engineers
 Hazmat Training Program



Local 953

This is to certify that
Jimmy Broadstreet
 has successfully completed the 40-hour
 Hazardous Waste Training Program
 specifically designed for workers in
 accordance with OSHA at
 29 CFR 1910.120.

Date Completed: 3/20/94



8-1-89

[Signature]
 Certified Instructor

EXPIRES

REFRESHER
 EXPIRATION DATE

200217116

NOV

200316680

200014138

2000

Oct 2002

Date Completed: 12/22/02

International Union of Operating Engineers
 Hazmat Training Program

Local 953



This is to certify that
DANNY BAKER
 has successfully completed the 40-hour
 Hazardous Waste Training Program
 specifically designed for workers in
 accordance with OSHA at
 29 CFR 1910.120.



Receipt # 95536

[Signature]
 Certified Instructor

Certificate of Training

This certificate acknowledges that

Ben Williams

has successfully completed the following:

**HAZARDOUS WASTE OPERATIONS
AND EMERGENCY RESPONSE**

8-HOUR HAZWOPER TRAINING

Per OSHA 29 CFR 1910.120

Course Date: November 1, 2002

Course Location: Overland Park, Kansas



Scott Siegwald, REM, CHMM

Instructor

Arrowhead Contracting, Inc.

Certificate of Training

This certificate acknowledges that

Aaron Mathena

has successfully completed the following:

**HAZARDOUS WASTE OPERATIONS
AND EMERGENCY RESPONSE**

8-HOUR HAZWOPER TRAINING

Per OSHA 29 CFR 1910.120

Course Date: November 1, 2002

Course Location: Overland Park, Kansas



Scott Siegwald, REM, CHMM

Instructor

Arrowhead Contracting, Inc.

Certificate of Training

This certificate acknowledges that

Terry Thompson

has successfully completed the following:

**HAZARDOUS WASTE OPERATIONS
AND EMERGENCY RESPONSE**

8-HOUR HAZWOPER TRAINING

Per OSHA 29 CFR 1910.120

Course Date: November 1, 2002

Course Location: Overland Park, Kansas



Scott Siegwald, REM, CHMM

Instructor

Arrowhead Contracting, Inc.

Certificate of Training

This certificate acknowledges that

Andrew Arnold

has successfully completed the following:

**HAZARDOUS WASTE OPERATIONS
AND EMERGENCY RESPONSE**

8-HOUR HAZWOPER TRAINING

Per OSHA 29 CFR 1910.120

Course Date: November 1, 2002

Course Location: Overland Park, Kansas



Scott Siegwald, REM, CHMM
Instructor
Arrowhead Contracting, Inc.

Certificate of Training

This certificate acknowledges that

Greg Wallace

has successfully completed the following:

**HAZARDOUS WASTE OPERATIONS
AND EMERGENCY RESPONSE**

8-HOUR HAZWOPER TRAINING

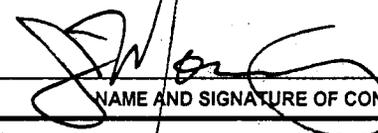
Per OSHA 29 CFR 1910.120

Course Date: November 1, 2002

Course Location: Overland Park, Kansas



Scott Siegwald, REM, CHMM
Instructor
Arrowhead Contracting, Inc.

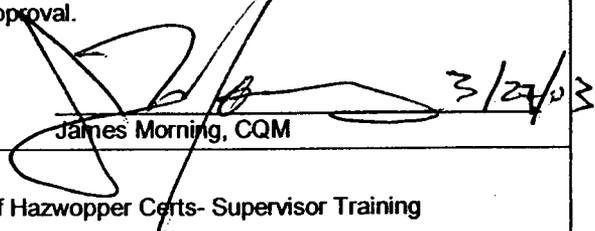
TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SPECIFICATIONS, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE <small>(Read Instructions on the reverse side prior to initiating this form)</small>				DATE 03/27/2003		TRANSMITTAL NO. 01351-001		
SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS <small>(This section will be initiated by the contractor)</small>								
TO: Cannon AFB Resident Office US Army Corps of Engineers 201 N. Perimeter Rd. Cannon AFB, NM 88103			FROM: Foster Wheeler Environmental C 6605 Uptown Blvd, NE Suite 220 Albuquerque, NM 87110		CONTRACT NO. DACW45-94-D-0003 0035		CHECK ONE: <input type="checkbox"/> THIS IS A NEW TRANSMITTAL <input checked="" type="checkbox"/> THIS IS A RESUBMITTAL OF TRANSMITTAL 01351-5	
SPECIFICATION SEC. NO. (Cover only one section with each transmittal) 01351			PROJECT TITLE AND LOCATION SWMU 101 - Sewage Lagoons Cannon AFB			CHECK ONE: THIS TRANSMITTAL IS FOR <input type="checkbox"/> FIO <input checked="" type="checkbox"/> GOVT. APPROVAL		
ITEM NO.	DESCRIPTION OF ITEM SUBMITTED <small>(Type size, model number/etc.)</small>	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. <small>(See instruction no. 8)</small>	NO. OF COPIES	CONTRACT REFERENCE DOCUMENT		FOR CONTRACTOR USE CODE	VARIATION <small>(See instruction No. 6)</small>	FOR CE USE CODE
				SPEC. PARA. NO.	DRAWING SHEET NO.			
a.	b.	c.	d.	e.	f.	g.	h.	i.
5	HAZWOPER QUALIFICATIONS CERTS	CERTIFICATES	5	1.11.1		A		A
REMARKS					I certify that the above submitted items have been reviewed in detail and are correct and in the strict conformance with the contract drawings and specifications except as otherwise stated.			
					 NAME AND SIGNATURE OF CONTRACTOR			
SECTION II - APPROVAL ACTION								
ENCLOSURES RETURNED (List by item No.)			NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY				DATE	
			 COR				4-8-03	

SUBMITTAL REVIEW VERIFICATION SHEET

Date: March 27, 2003

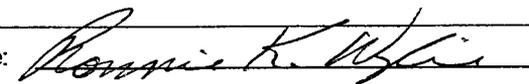
Submittal No.: 01351-5.1

Foster Wheeler Environmental Corporation Stamp

SWMU 101 Sewage Lagoons Closure, Cannon AFB, NM Certified for approval as indicated below:	
A -	Approved as submitted
B -	Approved except as noted on the drawings and/or attached sheets.
It is hereby certified that the (equipment) (material) shown and marked in this submittal is that proposed to be incorporated into Contract Number DACW45-94-D-0003, Delivery Order No. 35, Work Authorization Directive 1 is in compliance with the contract drawings and specifications, can be installed in the allocated spaces, and is submitted for Government approval.	
Reviewed/Certified By:	 James Morning, CQM 3/27/03
Description of items reviewed: SD-07- Re-submittal of Hazwopper Certs- Supervisor Training	

U.S. Army Corps of Engineers Stamp

U.S. Army Engineer District, Albuquerque Corps of Engineers Certified for approval as indicated below:	
A -	Approved as submitted.
B -	Approved except as noted on the drawings and/or attached sheet(s). Resubmission not required.
C -	Approved except as noted on the drawings and/or attached sheet(s). Resubmission required.
D -	Will be returned by separate correspondence.
E -	Disapproved; see comments on attached sheet.
F -	Receipt acknowledged. G - Other: Specify.
Note: Items approved as to general layout only. Dimensions and quantities checked. Approval does not relieve contractor of responsibilities for errors that may exist, as contractor shall be responsible for dimensions and design of adequate corrections. Details and satisfactory construction of work.	
Signature: _____	Date: _____

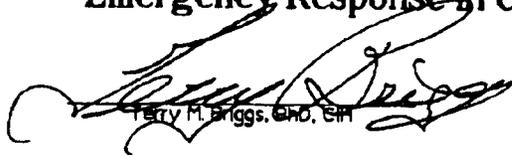
Reviewer's Signature: 

Certificate of Completion

JACOBS ENGINEERING GROUP INC.

Walter Migdal

has satisfactorily completed 8-hour H&S Supervisor and
Management Training for Hazardous Waste Site Operations and
Emergency Response in compliance with OSHA 29 CFR 1910.120.



Terry M. Briggs, PhD, SM

October 15, 1992

Certificate of Training

This certificate acknowledges that

BEN WILLIAMS

has successfully completed the following:

**HAZARDOUS WASTE OPERATIONS
AND EMERGENCY RESPONSE**

8-HOUR MANAGEMENT & SUPERVISOR

Per OSHA 29 CFR 1910.120(e)(4)

Course Date: September 6, 2000

Course Location: Overland Park, Kansas



Scott Siegwald, REM, CHMM

Instructor

Arrowhead Contracting, Inc.

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAFETY DATA SHEETS, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE (Read instructions on the reverse side prior to initiating this form)	DATE 04/30/2003	TRANSMITTAL NO. 01351-6
---	--------------------	----------------------------

APR 30 2003

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS (This section will be initiated by the contractor)

TO: Cannon AFB Resident Office US Army Corps of Engineers 201 N. Perimeter Rd. Cannon AFB, NM 88103	FROM: Foster Wheeler Environmental C 6605 Uptown Blvd, NE Suite 220 Albuquerque, NM 87110	CONTRACT NO. DACW45-94-D-0003 0035	CHECK ONE: <input checked="" type="checkbox"/> THIS IS A NEW TRANSMITTAL <input type="checkbox"/> THIS IS A RESUBMITTAL OF TRANSMITTAL _____
---	--	--	---

SPECIFICATION SEC. NO. (Cover only one section with each transmittal) 01351	PROJECT TITLE AND LOCATION SWMU 101 - Sewage Lagoons Cannon AFB	CHECK ONE: THIS TRANSMITTAL IS FOR <input type="checkbox"/> FID <input checked="" type="checkbox"/> GOV'T. APPROVAL
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ITEM NO.	DESCRIPTION OF ITEM SUBMITTED (Type size, model number/etc.)	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. (See instruction no. 8)	NO. OF COPIES	CONTRACT REFERENCE DOCUMENT		FOR CONTRACTOR USE CODE	VARIATION (See Instruction No. 6)	FOR CE USE CODE
				SPEC. PARA. NO.	DRAWING SHEET NO.			
a.	b.	c.	d.	e.	f.	g.	h.	i.
5	HAZWOPER QUALIFICATIONS CERTS	CERTIFICATES	5	1.11.1		A		A

REMARKS Hazwopper certs for additional Operating Engineer employee recently hired. An OSHA 10 hour training certification is being submitted in place of an 8 Hour refresher certification per section (e) 9- other training 29 CFR 1910.120	I certify that the above submitted items have been reviewed in detail and are correct and in the strict conformance with the contract drawings and specifications except as otherwise stated. <div style="text-align: right;"> NAME AND SIGNATURE OF CONTRACTOR </div> <div style="text-align: right; margin-top: 10px;"> 4/30/03 </div>
---	---

SECTION II - APPROVAL ACTION

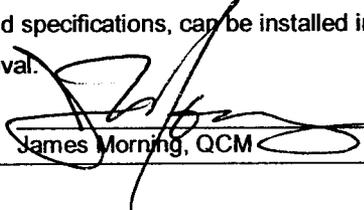
ENCLOSURES RETURNED (List by item No.)	NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY <div style="text-align: center;"> </div>	DATE <div style="text-align: center;"> 5-1-03 </div>
---	---	--

SUBMITTAL REVIEW VERIFICATION SHEET

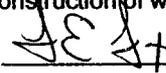
Date: April 30, 2003

Submittal No.: 01351-6

Foster Wheeler Environmental Corporation Stamp

SWMU 101 Sewage Lagoons Closure, Cannon AFB, NM	
Certified for approval as indicated below:	
A -	Approved as submitted
B -	Approved except as noted on the drawings and/or attached sheets.
It is hereby certified that the (equipment) (material) shown and marked in this submittal is that proposed to be incorporated into Contract Number DACW45-94-D-0003, Delivery Order No. 35, Work Authorization Directive 1 is in compliance with the contract drawings and specifications, can be installed in the allocated spaces, and is submitted for Government approval.	
Reviewed/Certified By:	 4/30/03 James Morning, QCM
Description of items reviewed: Hazwopper Certs	

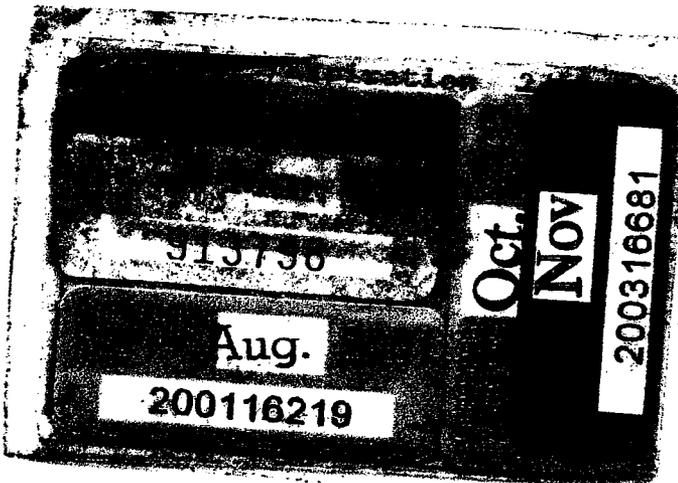
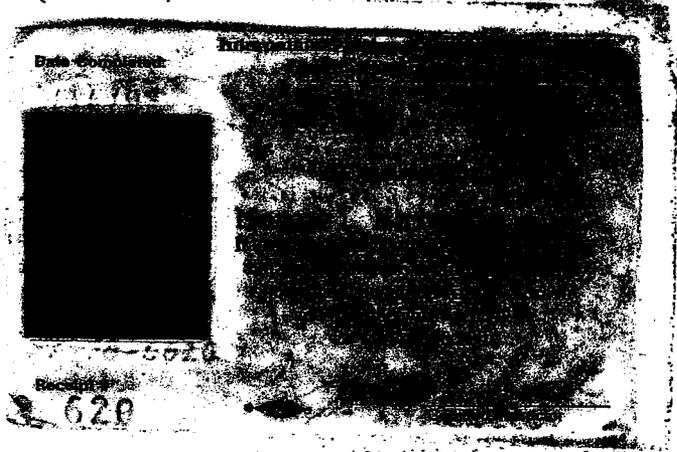
U.S. Army Corps of Engineers Stamp

U.S. Army Engineer District, Albuquerque Corps of Engineers	
Certified for approval as indicated below:	
A -	Approved as submitted.
B -	Approved except as noted on the drawings and/or attached sheet(s). Resubmission not required.
C -	Approved except as noted on the drawings and/or attached sheet(s). Resubmission required.
D -	Will be returned by separate correspondence.
E -	Disapproved; see comments on attached sheet.
F -	Receipt acknowledged.
G -	Other: Specify.
Note: Items approved as to general layout only. Dimensions and quantities checked. Approval does not relieve contractor of responsibilities for errors that may exist, as contractor shall be responsible for dimensions and design of adequate corrections. Details and satisfactory construction of work.	
Signature: 	Date: 5-1-03

Reviewer's Signature: _____

Renewed/Certified - 
1/14/93 4/30/03

MANUEL NATVAIZ



OSHA

000044787



U.S. Department of Labor
Occupational Safety and Health Administration

MANEUL G. ORTIZ

has successfully completed a 10-hour Occupational Safety and Health
Training Course in

Construction Safety & Health

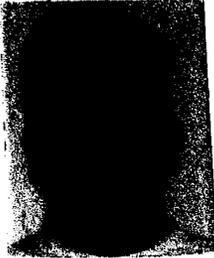
Ray Banks
(Trainer)

2-2-03
(Date)

(E) #9

Date Completed:

6/24/01



Receipt #

91231

**International Union of Operating Engineers
Hazmat Training Program**

Local 953



This is to certify that

Manuel G. Ortiz

has successfully completed the 40-hour
Hazardous Waste Training Program
specifically designed for workers in
accordance with OSHA at
29 CFR 1910.120.

[Signature]
Certified Instructor

29 CFR part 20

expose them to hazardous substances shall be trained in how to respond to such expected emergencies.

(8) *Refresher training.* Employees specified in paragraph (e)(1) of this section, and managers and supervisors specified in paragraph (e)(4) of this section, shall receive eight hours of refresher training annually on the items specified in paragraph (e)(2) and/or (e)(4) of this section, any critique of incidents that have occurred in the past year that can serve as training examples of related work, and other relevant topics.

(X) (9) *Equivalent training.* Employers who can show by documentation or certification that an employee's work experience and/or training has resulted in training equivalent to that training required in paragraphs (e)(1) through (e)(4) of this section shall not be required to provide the initial training requirements of those paragraphs to such employees and shall provide a copy of the certification or documentation to the employee upon request. However, certified employees or employees with equivalent training new to a site shall receive appropriate, site specific training before site entry and have appropriate supervised field experience at the new site. Equivalent training includes any academic training or the training that existing employees might have already received from actual hazardous waste site work experience.

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE <small>(Read instructions on the reverse side prior to filling in this form)</small>					DATE 04/14/2003	TRANSMITTAL NO. 01450-2		
SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS <small>(This section will be initialed by the contractor)</small>								
TO: Cannon AFB Resident Office US Army Corps of Engineers 201 N. Perimeter Rd. Cannon AFB, NM 89103			FROM: Foster Wheeler Environmental 8805 Uptown Blvd, NE Suite 220 Albuquerque, NM 87110		CONTRACTING: DACW45-94-D-0003 0035	CHECK ONE: <input checked="" type="checkbox"/> THIS IS A NEW TRANSMITTAL <input type="checkbox"/> THIS IS A RESUBMITTAL OF TRANSMITTAL _____		
SPECIFICATION SEC. NO. (Cover only one section with each transmittal) 01450			PROJECT TITLE AND LOCATION SWMU 101 - Sewage Lagoons Cannon AFB			CHECK ONE: THIS TRANSMITTAL IS FOR <input type="checkbox"/> FIO <input checked="" type="checkbox"/> GOVT. APPROVAL		
ITEM NO.	DESCRIPTION OF ITEM SUBMITTED (Type, size, model number, etc.)	INFO OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. (See instruction no. 8)	NO. OF COPIES	CONTRACT REFERENCE DOCUMENT		FOR CONTRACTOR USE CODE	VARIATION (See instruction No. 6)	FOR USE CODE
				SPEC. PARA. NO.	DRAWING SHEET NO.			
2	Analytical Data Package- Field test	TEST REPORTS	5	3.2.2		A		A
REMARKS					I certify that the above submitted items have been reviewed in detail and are correct and in the strict conformance with the contract drawings and specifications except as otherwise stated. <i>Walter Muzdal</i> <i>Walter Muzdal</i> NAME AND SIGNATURE OF CONTRACTOR			
SECTION II - APPROVAL ACTION								
ENCLOSURES RETURNED (List by item No.)			NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY			DATE		
			<i>Walter A. Pastor</i>			4-25-03		

DTIC/AF/2003 04/22/03 13:15 FAX 5057842863 40272217/048 → RC0037842863 U.S. ARMY CORPS NO. 543 P02 09

SUBMITTAL REVIEW VERIFICATION SHEET

Date: April 15, 2003

Submittal No.: 01450-2

Foster Wheeler Environmental Corporation Stamp

SWMU 101 Sewage Lagoons Closure, Cannon AFB, NM
Certified for approval as indicated below:

- A - Approved as submitted
- B - Approved except as noted on the drawings and/or attached sheets.

It is hereby certified that the (equipment) (material) shown and marked in this submittal is that proposed to be incorporated into Contract Number DACW45-04-D-0003, Delivery Order No. 35, Work Authorization Directive 1 in compliance with the contract drawings and specifications, can be installed in the allocated spaces, and is submitted for Government approval.

Reviewed/Certified By:

Walt Migdel for
Kathy Omernik, QC Program Manager

Description of items reviewed: SD-06, Analytical Data Package - Field Test

U.S. Army Corps of Engineers Stamp

U.S. Army Engineer District, Albuquerque Corps of Engineers
Certified for approval as indicated below:

- A - Approved as submitted.
- B - Approved except as noted on the drawings and/or attached sheet(s). Resubmission not required.
- C - Approved except as noted on the drawings and/or attached sheet(s). Resubmission required.
- D - Will be returned by separate correspondence.
- E - Disapproved; see comments on attached sheet.
- F - Receipt acknowledged.
- G - Other: Specify.

Note: Items approved as to general layout only. Dimensions and quantities checked. Approval does not relieve contractor of responsibilities for errors that may exist, as contractor shall be responsible for dimensions and design of adequate corrections. Details and satisfactory construction of work.

Signature: _____

[Handwritten Signature]

Date: _____

23 APR 03



FOSTER WHEELER ENVIRONMENTAL CORPORATION

April 15, 2003
TERC-035.001-03X-073

Ms. Donna Russell
U.S. Army Corps of Engineers
201 North Perimeter Road
Cannon AFB, New Mexico 88103

Subject: TERC No. DACW45-94-D-003, Delivery Order 35, WAD 1; Data Evaluation for Soil Samples Collected to Characterize On-site and Off-site Borrow Sources; Cannon Air Force Base, New Mexico

Dear Ms. Russell:

The purpose of this letter is to provide results of the risk screening evaluation for soil samples collected from on-site and off-site borrow sources for the purpose of constructing the soil cover at the Sewage Lagoons at Cannon Air Force Base (AFB) in January 2003. Evaluation of the data was completed following guidance from the New Mexico Environment Department (NMED) Hazardous Waste Bureau (HWB) (NMED 2000).

Six samples were collected on site from the berms currently in place at the Sewage Lagoons as indicated below:

- BA2-SLEB—Eastern berm of the South Lagoon
- BA2-NLEB—Eastern berm of the North Lagoon
- BA2-SLSB—Southern berm of the South Lagoon
- BA2-SLWB—Western berm of the South Lagoon
- BA2-NLWB—Western berm of the North Lagoon
- BA2-LB—Berm between the South and North Lagoons

One sample was collected off site (BA2-001) at a rural uninhabited location approximately 20 miles west of Cannon AFB, north of the village of Melrose.

All samples were analyzed for the parameters presented as chemicals of potential concern (COPC) in the risk assessment completed for the corrective measures study of the Sewage Lagoons (USAF, 2001) and included the following: pesticides, polychlorinated biphenyls, nitrate, and selected metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver). The attached tables present a summary of the analytical results for samples collected to characterize potential borrow sources.



Samples were collected and the data were evaluated according to the NMED-HWB soil-screening level (SSL) guidance (NMED, 2000) for analytes detected in soil samples. Residential SSLs were used to provide conservative estimates of risk. The NMED SSLs do not define unacceptable levels of contamination in soil and sediment rather they identify a level below which there is no need for further concern. Chemicals that do not have NMED SSLs were not included in the risk evaluation. COPCs are defined as the detected organic compounds and the metals detected above background values for Cannon AFB that have NMED SSLs.

For on-site samples, two metals (selenium and lead) were detected at concentrations greater than background values (Table 1). There is some uncertainty in the background values for Cannon AFB because the minimum background values between surface and subsurface soil were used to screen the data. Most often surface soil background values are less than subsurface soil background value and it is difficult to determine what depth of soil is represented in the berm material. Lead and selenium concentrations in on-site soil samples are less than the subsurface soil background values (U.S. Air Force [USAF], 1997, Table 6-3). No metals detected in the off-site sample were at concentrations greater than background for the vicinity of Clovis, New Mexico (USAF, 1997, Table 6-3) (Table 2). COPCs for on-site and off-site soil samples include the following:

<u>On-site Borrow Source</u>	<u>Off-site Borrow Source</u>
4,4'-DDD	4,4'-DDE
4,4'-DDE	Nitrate
4,4'-DDT	
alpha-Chlordane	
gamma-Chlordane	
Nitrate	

A ratio of the maximum detected concentration of each COPC and the NMED SSL was calculated, and the ratios for each toxicity endpoint, carcinogenic and noncarcinogenic, were summed. The attached table presents the calculated ratios for COPCs and the risk ratio sums based on the analytical results for soil samples.

Neither of the ratio sums for carcinogenic and noncarcinogenic COPCs in on-site or off-site soil samples exceed 1.0; and this indicates that soils present an acceptable risk and do not pose a risk based on direct exposure.

Based on the data evaluation, the soil is acceptable for use as borrow material for the construction of the soil cover at the Sewage Lagoons.

TERC-035.001-03X-073

April 15, 2003

Page 3 of 4

If you have any questions or comments, please contact me at (505) 878-8901 or Carol Bieniulis at (505) 878-8924. Thank you.

Sincerely,
Foster Wheeler Environmental Corporation

Walter Migdal, REM
Task Manager

Attachments

cc: T. Zink/USACE, Omaha
C. Bieniulis/FWENC, Albuquerque
J. Morning/FWENC, Cannon AFB
K. Omernik/FWENC, Denver
S. Seyedian/FWENC, Denver
G. Wallace/Arrowhead Contracting
A. Mathena/Arrowhead Contracting
TERC-4 Program File

References

- NMED, 2000. *Technical Background Document for Development of Soil Screening Levels, Hazardous Waste Bureau and Ground Water Quality Bureau Voluntary Remediation Program*. December 2000, with an update in January 2001 for SSLs of selected chemicals.
- USAF, 1997. *Naturally Occurring Concentrations of Inorganics and Background Concentrations of Pesticides at Cannon Air Force Base, New Mexico*, September 1997.

Table 1. Evaluation of On-site Borrow Source Soil for Cannon AFB Sewage Lagoons Remediation

On-site Borrow Source

Analyte	Toxicity Endpoint	Samples from Existing Lagoon Berms					
		BA2-SLEB	BA2-NLEB	BA2-SLSB	BA2-SLWB	BA2-NLWB	BA2-LB
4,4'-DDD	c	0.00139	ND	ND	ND	ND	0.000384
4,4'-DDE	c	0.00172	0.000731	0.00275	0.00133	0.0023	0.00102
4,4'-DDT	c	ND	0.00051	0.000589	0.000691	0.00193	0.000465
alpha-Chlordane	c	0.00126	0.00053	ND	ND	0.00038	0.000624
gamma-Chlordane	c	0.00112	0.000464	ND	ND	0.000471	0.000542
Nitrate	nc	11.9	6.92	10.7	22	18.4	6.9
Arsenic	c	3.75	3.55	3.1	3.2	3.21	3.35
Barium	nc	86.2	69.8	61.5	59.3	67.9	68
Chromium	nc	7.53	6.75	6.63	6.98	6.89	6.86
Lead	nc	12.7	12.8	8.14	8.95	10.3	9.88
Selenium	nc	ND	0.535	ND	ND	ND	0.39

* Background values taken from Naturally Occurring Concentrations of Inorganics and Background Concentrations of Pesticides at Cannon Air Force Base, New Mexico (USAF, 1997)

Note: Values in BOLD were quantitated at levels greater than the method reporting limit (MRL).

All other values were estimated at values less than the MRL.

c - carcinogen

mg/kg - milligrams per kilogram

nc - noncarcinogen

SSL - soil-screening level

Table 1. Evaluation of On-site Borrow Source Soil for Cannon AFB Sewage Lagoons Remediation

On-site Borrow Source

Analyte	Maximum Detected Concentration (mg/kg)	Cannon AFB Background Value (mg/kg)	Maximum > Background Value	NMED SSL (mg/kg)	Carcinogen Ratio	Noncarcinogen Ratio
4,4'-DDD	0.00139	--	--	24	0.000058	--
4,4'-DDE	0.00275	--	--	17	0.00016	--
4,4'-DDT	0.00193	--	--	17	0.00011	--
alpha-Chlordane	0.00126	--	--	16	0.000079	--
gamma-Chlordane	0.00112	--	--	16	0.00007	--
Nitrate	22	--	--	98000	--	0.00022
Arsenic	3.75	3.6	No	3.9	--	--
Barium	86.2	670	No	5200	--	--
Chromium	7.53	10.5	No	230	--	--
Lead	12.8	8.7	No	400	--	--
Selenium	0.535	0.26	No	380	--	--
Hazard Index					0.00048	0.000

* Background values taken from Naturally Occurring Concentrations of Inorganics and Background Concentrations of Pesticides at Cannon Air Force Base, New Mexico (USAF, 1997)

Note: Values in BOLD were quantitated at levels greater than the method reporting limit (MRL).

All other values were estimated at values less than the MRL.

c - carcinogen

mg/kg - milligrams per kilogram

nc - noncarcinogen

SSL - soil-screening level

Table 2. Evaluation of Off-site Borrow Source Soil for Cannon AFB Sewage Lagoons Remediation

Off-site Borrow Source

Analyte	Toxicity Endpoint	Off-site Sample	Clovis, NM Background Value *	Maximum > Background Value	NMED SSL (mg/kg)	Carcinogen Ratio	Noncarcinogen Ratio
		BA1-001	(mg/kg)				
4,4'-DDE	c	0.000685	--	--	17	0.000040	--
Nitrate	nc	3.35	--	--	98000	--	0.000034
Arsenic	c	3.5	6.5	No	3.9	--	--
Barium	nc	102	500	No	5200	--	--
Chromium	nc	7.87	30	No	230	--	--
Lead	nc	12.1	15	No	400	--	--
Hazard Index						0.000040	0.000034

* Background values taken from Naturally Occurring Concentrations of Inorganics and Background Concentrations of Pesticides at Cannon Air Force Base, New Mexico (USAF, 1997)

Note: All values were estimated at values less than the MRL.

c - carcinogen

mg/kg - milligrams per kilogram

nc - noncarcinogen

SSL - soil-screening level

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE <small>(Read instructions on the reverse side prior to initiating this form)</small>	DATE 04/04/2003	TRANSMITTAL NO. 01450-1
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SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS (This section will be initiated by the contractor)

TO: Cannon AFB Resident Office US Army Corps of Engineers 201 N. Perimeter Rd. Cannon AFB, NM 88103	FROM: Foster Wheeler Environmental C 6605 Uptown Blvd, NE Suite 220 Albuquerque, NM 87110	CONTRACT NO. DACW45-94-D-0003 0035	CHECK ONE <input checked="" type="checkbox"/> THIS IS A NEW TRANSMITTAL <input type="checkbox"/> THIS IS A RESUBMITTAL OF TRANSMITTAL _____
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SPECIFICATION SEC. NO. (Cover only one section with each transmittal) 01450	PROJECT TITLE AND LOCATION SWMU 101 - Sewage Lagoons Cannon AFB	CHECK ONE: THIS TRANSMITTAL IS FOR <input type="checkbox"/> FID <input checked="" type="checkbox"/> GOVT. APPROVAL
--	--	---

ITEM NO. <small>a.</small>	DESCRIPTION OF ITEM SUBMITTED <small>(Type size, model number, etc.)</small> <small>b.</small>	MFG OR CONTR. CAT. CURVE DRAWING OR BROCHURE NO. <small>(See instruction no. 8)</small> <small>c.</small>	NO. OF COPIES <small>d.</small>	CONTRACT REFERENCE DOCUMENT		FOR CONTRACTOR USE CODE <small>e.</small>	VARIATION <small>(See instruction No. 8)</small> <small>h.</small>	FOR CE USE CODE <small>i.</small>
				SPEC. PARA NO. <small>f.</small>	DRAWING SHEET NO.			
1	Sampling & Analysis Plan	PRODUCT DATA	5	3.4		A		
3	Lab Approval	CERTIFICATES	5	1.5		A		
4	Field analytical data Coord. (FADC)	CERTIFICATES	5	3.3.1		A		A

REMARKS	I certify that the above submitted items have been reviewed in detail and are correct and in the strict conformance with the contract drawings and specifications except as otherwise stated. <i>James H. Miller</i> NAME AND SIGNATURE OF CONTRACTOR
---------	---

SECTION II - APPROVAL ACTION

ENCLOSURES RETURNED (List by item No.)	NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY <i>Paula K. Beten</i>	DATE 4/18/03
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0007/77/1/0
CT:CT
U S ARMY CORPS OF ENGINEERS
000749/CORR 4 SWEETEN'S 4 CORR/04/2003
DU 004

SUBMITTAL REVIEW VERIFICATION SHEET

Date: April 4, 2003

Submittal No.: 01450-1

Foster Wheeler Environmental Corporation Stamp

SWMU 101 Sewage Lagoons Closure, Cannon AFB, NM	
Certified for approval as indicated below:	
<input checked="" type="radio"/> A-	Approved as submitted
<input type="radio"/> B-	Approved except as noted on the drawings and/or attached sheets.
It is hereby certified that the (equipment) (material) shown and marked in this submittal is that proposed to be incorporated into Contract Number DACW45-94-D-0003, Delivery Order No. 35, Work Authorization Directive 1 is in compliance with the contract drawings and specifications, can be installed in the allocated spaces, and is submitted for Government approval.	
Reviewed/Certified By:	<u>Pamela Mass</u> Pamela Mass, Project Chemist
Description of items reviewed: SAP3.4, Lab Approval 1.5, FADC 3.3.1	

U.S. Army Corps of Engineers Stamp

U.S. Army Engineer District, Albuquerque Corps of Engineers	
Certified for approval as indicated below:	
<input checked="" type="radio"/> A-	Approved as submitted.
<input type="radio"/> B-	Approved except as noted on the drawings and/or attached sheet(s). Resubmission not required.
<input type="radio"/> C-	Approved except as noted on the drawings and/or attached sheet(s). Resubmission required.
<input type="radio"/> D-	Will be returned by separate correspondence.
<input type="radio"/> E-	Disapproved; see comments on attached sheet.
<input type="radio"/> F-	Receipt acknowledged.
<input type="radio"/> G-	Other: Specify.
Note: Items approved as to general layout only. Dimensions and quantities checked. Approval does not relieve contractor of responsibilities for errors that may exist, as contractor shall be responsible for dimensions and design of adequate corrections. Details and satisfactory construction of work.	
Signature: <u>Paula K. Peter</u> ^{PS}	Date: <u>4/18/03</u>

Reviewer's Signature: Paula K. Peter

EXPERIENCE SUMMARY

Over 15 years of project management; environmental remediation; site reclamation; site investigation, and construction project and equipment experience. Directed multidisciplinary staffs in the planning, design, and clean-up of waste contamination sites; managed engineering studies to evaluate the extent of environmental waste, hazardous chemical contamination, and required remediation for federal installations; oversaw site Health and Safety, and performed radiological audits. Current projects include RCRA and CERCLA landfill corrective measure studies, designs, and construction activities. Prepares reports, bid documents, scopes of work, budgets, and schedules. Responsible for resource/staff allocation and technical requirements of each project. Interprets public policy and regulations for clients and general public.

Currently Delivery Order Manager and Task Manager supporting the U.S. Army Corps of Engineers, Total Environmental Restoration Contract (Southwest TERC) for the base-wide CERCLA driven Environmental Restoration program. Responsible for scope development, subcontractor procurement and management, regulatory compliance, cost and schedule controls, quality control oversight, client and regulator interface, document preparation and review, planning, coordinating, and implementing various investigation and remedial action projects on Kirtland AFB, Cannon AFB, and Holloman AFB, New Mexico.

EDUCATION

B.S. (Bachelor of Science), Chemistry, United States Air Force Academy, 1986
M.S. (Master of Science), Natural Resources, University of Texas at San Antonio, 1989
M.S. (Master of Science), Construction Engineering and Management, University of New Mexico,

REGISTRATIONS/CERTIFICATIONS

Certified Scientist
M, #282, Date of Issue: 07/25/00, Date of Expiration: 07/25/03
Registered Environmental Manager, CONUS
#REM07547, Date of Issue: 1995, Date of Expiration: 07/15/03

TRAINING

PM 300, Foster Wheeler Environmental, 2/23/02
PM 200, Foster Wheeler Environmental, 10/7/00
Construction Quality Management for Contractors, USACE-Albuquerque, 12/13/00
Sales Training, Foster Wheeler Environmental, 11/18/00
DOT HAZMAT Training, Foster Wheeler Environmental 12/19/00
Waste Management Training, Foster Wheeler Environmental 12/19/00
First Aid/CPR refresher training, Foster Wheeler Environmental 1/30/01
40-Hour OSHA Hazardous Waste Health and Safety Training, National Water Well Association, 9/15/89
8-Hour OSHA refresher training, Foster Wheeler Environmental, 03/07/01
8-Hour HAZWOPER supervisors refresher training, ACME Environmental, Inc., 7/30/99
Project Management, Jacobs Engineering Group, 4/11/95
10 Hr OSHA Construction Industry Outreach Training, Roy F. Weston, Inc, 10/27/97
Loss Control Management, Foster Wheeler Environmental, 10/4/00
Oral Presentation Skills, Foster Wheeler Environmental, 11/16/00
Project Management Bootcamp, PSMJ Resources, Inc., 10/8/99

FOSTER WHEELER ENVIRONMENTAL CORPORATION EXPERIENCE

USACE, SW TERC DACW45-94-D-000; Project Manager; Kirtland AFB and Cannon AFB, NM; 04/00-Present—Fulfill project management responsibilities in support of U.S. Army Corps of Engineers, Total Environmental Restoration Contract (Southwest TERC) for the base-wide CERCLA driven Environmental Restoration program. Responsibilities involve planning, coordination, and implementation of various investigation and remedial action projects on Kirtland AFB and Cannon AFB, New Mexico. Current Kirtland AFB projects include ongoing design and construction of three alternative earthen landfill covers, performed as voluntary corrective measures installation of drinking water disinfection systems, site assessments, and site characterization. Cannon AFB projects include the remedial action of a construction debris landfill. Responsibilities include scope development, subcontractor procurement and management, regulatory compliance, cost and schedule controls, quality control oversight, client and regulator interface, and document preparation and review.

PREVIOUS EXPERIENCE

Roy F Weston Inc., Albuquerque, NM; U.S. Forest Service; Mount Hamilton Heap Leach and Site Reclamation, Mount Hamilton, NV; Project Manager; 06/99-02/00—Provided project and site management and technical oversight for heap-leach chemical treatment and reclamation, site regrading, recontouring, hydrocarbon landfarm remediation, and hazardous waste profiling, collection, and disposal at the mill site. Responsibilities included planning and providing oversight for field activities and schedule budget control, as well as serving as client liaison with the U.S. Forest Service, BLM, and Nevada Department of Environmental Protection.

New Mexico Highway and Transportation Department; Site Investigation and Reclamation; Gallup, NM—Providing management and technical oversight for a site investigation and reclamation project for an abandoned NMSH&TD property located in Gallup, NM. Activities include monitoring well installation, sample collection, and data analysis. Responsibilities included planning and providing oversight for field activities and schedule budget control, as well as serving as client liaison with the NMSH&TD and New Mexico Environment Department.

Private Client; Site Investigation; Winslow, AZ—Providing management and technical oversight for a site investigation project for an abandoned property located in Winslow, AZ. Activities included monitoring well installation, sample collection, and data analysis, and UST investigation. Responsibilities include planning and providing oversight for field activities and schedule budget control, as well as serving as client liaison with the Arizona Department of Environmental Quality.

Golden Equipment Company; Asset Manager/Assistant Branch Manager/Rental Manager; Albuquerque, NM; 02/98-06/99—As Asset Manager, prepared equipment purchase plans and annual forecasting; devised business plans for a new company division, including detailed financial statements, provided revenue projections and staffing levels needed; developed and implemented departmental marketing and asset management plans; and developed procedures to track equipment for more efficient future purchases. As Rental Manager, was responsible for \$9,000,000 rental equipment inventory. In addition, supervised four rental and sales support personnel and maximized revenue while minimizing service costs by direct oversight of cost control procedures.

Project/Site Manager

Jacobs Engineering Group, Inc., Albuquerque, NM; Department of Energy (DOE); Uranium Mill Tailings Remedial Action (UMTRA) Project; Albuquerque, NM; 09/91-02/98—Served as Technical Assistance Contractor responsible for project teams who planned, designed, and evaluated work performed at three Uranium Mill Tailings Remedial Action (UMTRA) Project radioactive waste sites. Site activities included mill site demolition and removal, tailings stabilization and relocation, hazardous materials treatment and disposal, and debris removal in Arizona, Colorado, New Mexico, Texas, and Utah. As Vicinity Property Manager, was responsible for a program to clean up non-government owned properties. Activities included commercial and residential property demolition, removal, and renovation. Developed project baseline guidance and schedule, reported status, and operated the property database tracking system for over 5,000 properties in eight states.

Project Manager, US Air Force; Site Characterization and Remediation, Kirtland AFB, NM;—Managed an oil/water separator removal and testing of soil samples project at Kirtland Air Force Base (AFB), for the Air Force Center for Environmental Excellence (AFCEE). This was a voluntary corrective measure for Solid Waste Management Unit ST-66, Trestle Facility Vehicle Pit, and involved the removal of an oil/water separator and all associated piping and debris. In addition, performed a RCRA facility

WALTER MIGDAL, REM
SENIOR GEOSCIENTIST

investigation (RFI) field investigation to determine the presence or absence of contaminants in the soils underlying and surrounding the Trestle facility.

Project Manager, DOE; Groundwater Transition Support Contract, Grand Junction, CO—Served as Project Coordinator and Task Manager for general support activities on the Groundwater Transition Support contract. This contract provided the DOE Grand Junction Office with groundwater technical support while the project was transitioned to a new contractor. Served as focal point for all interactions and activities associated with supporting the Contract, and as Task Manager for general administrative and technical support.

Environmental Scientist; USACE; Sacramento District; Preliminary Assessment/Site Investigation (PA/SI); Travis AFB, CA—Conducted an historical research effort at a former Atomic Energy Commission facility. Provided key information to the client in response to media interviews and questions.

Environmental Scientist; US Forest Service; Land Application Permit for White King; Luck Lass Mine; Lakeview, OR—Served as primary author of the ecological assessment portion of this report prepared for the USDA Forest Service. The report was entitled "Supporting Information for a Land Application Permit for the Disposal of Pit Waters", and was a review of the White King and Lucky Lass Uranium Mine Rehabilitation Project located near Lakeview, OR.

Environmental Scientist; DOE; Soil Investigation; Pantex Plant; Amarillo, TX—Served as Sample Management Coordinator for a soil investigation of a high explosive (HE) waste treatment facility. Performed sampling and oversight activities to ensure that collection and analysis met quality assurance/quality control (QA/QC) requirements. Also co-developed the soil investigation report, interpreting the validated data, and developing conclusions and recommendations for necessary investigation and remedial action.

Environmental Scientist; DOE; Site Investigation; Pantex Plant; Amarillo, TX—Conducted a site investigation effort and decontamination/restoration of a RCRA storage facility. Co-developed the site-specific work plan, which included the sampling and analysis plan (SAP) and quality assurance project plan (QAPP). Performed sample identification, collection, packaging, and shipping activities, ensuring all regulatory and QA/QC requirements were achieved. Upon receipt of the analytical data, performed the actual decontamination activities at the site. At the conclusion of the restoration activities, co-developed the closure report for the investigation and decontamination of the RCRA storage facility, which received State of Texas approval for clean closure.

Environmental Scientist; DOE; Mixed Waste Characterization Plan; Pantex Plant; Amarillo, TX—Co-developed a mixed waste characterization plan, QAPP, and standard operating procedures (SOPs) for the Pantex Plant waste management department. The documents were prepared to ensure compliance with state and federal regulations and Nevada Test Site waste acceptance criteria.

Project Manager; United States Air Force; Kirtland AFB, NM; 06/90–09/91—Project Manager for the Air Force's Phillips Laboratory in a complex laser research and development effort. As Project Chemist, managed an experimental set-up for chemical laser diagnostics to enhance data collection, and prepared and evaluated site environmental assessments for NEPA compliance.

Environmental Chemist/Technical Project Manager; United States Air Force; Brooks AFB, TX; 06/86–06/90—Technical Project Manager on the Air Force IRP for all phases of CERCLA RI/FSs. The seven installations managed were in Alaska, California, Montana, and Texas. Directed the work efforts of contract engineers, scientists, and technicians, and coordinated the review of technical reports with Air Force Headquarters, and state and federal regulatory agencies. Ensured contract compliance, was responsible for field audits/surveillance, and oversight of all field activities, including sample collection. Reviewed all work plans, SAPs, QAPPs, and health and safety plans submitted by contractor personnel prior to field implementation. Prepared statements of work, contract modifications, and reviewed and evaluated cost proposals. As Environmental Chemist for the Air Force Occupational and Environmental Health Laboratory (OEHL). Enlisted Personnel Manager in charge of the trace organics section and responsible for 73 enlisted personnel. Section Chief responsible for organizing the section's workload and manpower. Engineered the laboratory's first fully automated analytical robotic system. Environmental Chemist responsible for chemical analysis of various environmental and occupation samples (i.e., soil, water, air, oils, other solids) utilizing EPA protocols specified in SW-846. Responsible for the section's QA/QC program, which included standards preparation, data validation, and equipment maintenance and troubleshooting. OEHL Safety Representative responsible for establishing perchlorination protocols for the analysis of polychlorinated biphenyls in drinking water, as mandated by the EPA.

ATTACHMENT 1

**FIELD SAMPLING PLAN
FOR
CLOSURE CONSTRUCTION
AT SEWAGE LAGOONS**

Prepared for:

27 CE/CEV
Cannon Air Force Base, NM
and
HQ ACC/CEV
Langley Air Force Base, VA

Prepared by:

Foster Wheeler Environmental Corporation
6605 Uptown Boulevard, Suite 220
Albuquerque, New Mexico 87110

Under Contract No. DACW45-94-D-0003

Delivery Order No. 35, Work Authorization Directive 1

U.S. Army Corps of Engineers
Omaha District
Omaha, Nebraska

February 2003

ATTACHMENT 2

**QUALITY ASSURANCE PROJECT PLAN
FOR
CLOSURE CONSTRUCTION
AT SEWAGE LAGOONS**

Prepared for:

27 CE/CEV
Cannon Air Force Base, NM
and
HQ ACC/CEV
Langley Air Force Base, VA

Prepared by:

Foster Wheeler Environmental Corporation
6605 Uptown Boulevard, Suite 220
Albuquerque, New Mexico 87110

Under Contract No. DACW45-94-D-0003

Delivery Order No. 35, Work Authorization Directive 1

U.S. Army Corps of Engineers
Omaha District
Omaha, Nebraska

February 2003



DEPARTMENT OF THE ARMY

**CORPS OF ENGINEERS
HTRW CENTER OF EXPERTISE
12565 WEST CENTER ROAD
OMAHA, NEBRASKA 68144-3869**

REPLY TO
ATTENTION OF:

January 31, 2003

Hazardous, Toxic and Radioactive Waste
Center of Expertise

Laucks Testing Laboratories, Inc.
ATTN: Harry Romberg
940 South Harney Street
Seattle, WA 98108

Gentlemen:

This correspondence addresses the ongoing validation status of Laucks Testing Laboratories, Inc. of Seattle, WA for the U.S. Army Corps of Engineers (USACE) for chemical analysis in support of the USACE Hazardous, Toxic and Radioactive Waste Program.

Laucks Testing Laboratories, Inc. of Seattle, WA is now validated for the parameters listed below:

<u>METHOD</u> ⁽¹⁾	<u>PARAMETERS</u>	<u>MATRIX</u> ⁽²⁾
300.0	Anions ⁽⁵⁾	Water ⁽³⁾
300.0	Anions ⁽⁵⁾	Solids
5030B/8021B	BTEX - Volatile Organics	Water ⁽³⁾
5030B/8021B	BTEX - Volatile Organics	Solids ⁽⁶⁾
9010B/9012A	Cyanide	Water ⁽³⁾
9013/9012A	Cyanide	Solids ⁽³⁾
8330	Explosives	Water ⁽³⁾
8330	Explosives	Solids ⁽³⁾
8151A	Herbicides	Water ⁽³⁾
8151A	Herbicides	Solids ⁽³⁾
413.1	Oil & Grease	Water ⁽³⁾
9071A/413.1	Oil & Grease	Solids
3510B/3520B/8081A	Organochlorine Pesticides	Water ⁽³⁾
3540B/3545/3550A 8081A	Organochlorine Pesticides	Solids ⁽³⁾
9065/9066	Phenolics	Water ⁽³⁾
9065/9066	Phenolics	Solids ⁽³⁾
3510B/3520B/8082	Polychlorinated Biphenyls	Water ⁽³⁾
3540B/3545/3550A/8082	Polychlorinated Biphenyls	Solids ⁽³⁾
3510B/3520B/ 8270C-SIM	Polynuclear Aromatic Hydrocarbons	Water ⁽³⁾

3540B/3545/ 3550A/8270C-SIM	Polynuclear Aromatic Hydrocarbons	Solids ⁽³⁾
3510B/3520B/8270C	Semivolatile Organics	Water ⁽³⁾
3540B/3545/ 3550A/8270C	Semivolatile Organics	Solids ⁽³⁾
3005A/3010A3015/6020	TAL Metals ⁽⁴⁾	Water ⁽³⁾
3050B/6020	TAL Metals ⁽⁴⁾	Solids ⁽³⁾
7470A	Mercury	Water ⁽²⁾
7471A	Mercury	Solids ⁽³⁾
9060	Total Organic Carbon	Water ⁽³⁾
9060M	Total Organic Carbon	Solids
3510B/3520B/Mod 8015	TPH - DRO	Water ⁽³⁾
3540B/3545/ 3550A/Mod 8015	TPH - DRO	Solids ⁽³⁾
5030B/Mod 8015	TPH - GRO	Water ⁽³⁾
5035/Mod 8015	TPH - GRO	Solids ⁽³⁾
AK101/102/103	TPH - GRO/DRO/RRO	Water ⁽³⁾
AK101/102/103	TPH - GRO/DRO/RRO	Solids ⁽³⁾
418.1	TRPH	Water ⁽³⁾
9071A/418.1	TRPH	Solids ⁽³⁾
5035/8260B	Volatile Organics	Water ⁽³⁾
5035/8260B	Volatile Organics	Solids ⁽³⁾

- Remarks:
- 1) Sample preparation methods have been added to reflect program policy change.
 - 2) 'Solids' includes soils, sediments, and solid waste.
 - 3) The laboratory has successfully analyzed a performance testing sample for this method/matrix.
 - 4) TAL Metals: Aluminum, antimony, arsenic, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, nickel, potassium, selenium, silver, sodium, thallium, vanadium, and zinc.
 - 5) Anions: Chloride, fluoride, sulfate, nitrate, nitrite, and ortho-phosphate.
 - 6) Approval for analysis of solids is limited to procedures using the "high concentration" methanol extract technique.

Based on the recent successful analysis of a NELAC PT sample for Explosives in soil by EPA 8330 your laboratory will continue to be validated for sample analysis by the methods listed above. The period of validation for all parameters has been previously established and expires on December 19, 2004.

The USACE reserves the right to conduct additional laboratory inspections or to suspend validation status for any or all of the listed parameters if deemed necessary. It should be noted that your laboratory may not subcontract USACE analytical work to any other laboratory location without the approval of this office. This laboratory validation does not guarantee the delivery of any analytical samples from a USACE Contracting Officer Representative.

Any questions or comments can be directed to Richard Kissinger at (402) 697-2569. General questions regarding laboratory validation may be directed to the Laboratory Validation Coordinator at (402) 697-2574.

Sincerely,


Marcia C. Davies, Ph.D.
Director, USACE Hazardous,
Toxic and Radioactive Waste
Center of Expertise



State of Florida
Department of Health, Bureau of Laboratories
This is to certify that

E87617

Laucks Testing Laboratories, Inc.
940 South Harney Street
Seattle, WA 98108

has complied with Florida Administrative Code 64E-1, for the examination of Environmental samples in the following categories:

SDWA - Group II Unregulated Contaminants, Other Regulated Contaminants, Synthetic Organic Contaminants

CWA - Extractable Organics, General Chemistry, Metals, Volatile Organics

RCRA/CERCLA - Extractable Organics, Volatile Organics, General Chemistry, Metals, Pesticides-Herbicides-PCB's

Continued certification is contingent upon successful on-going compliance with the NELAC Standards and FAC Rule 64E-1 regulations. Specific methods and analytes certified are on file at the Bureau of Laboratories, P. O. Box 210, Jacksonville, Florida 32231. Clients and customers are urged to verify with this agency the laboratory's certification status in Florida for particular methods and analytes.

EFFECTIVE JULY 1, 2002

THROUGH JUNE 30, 2003



A handwritten signature in black ink, appearing to read "Ming S. Chan".

Ming S. Chan, Ph.D.
Bureau Chief, Bureau of Laboratories
Florida Department of Health
DH Form 1697, 3/98

NON-TRANSFERABLE N5913E87617

Jeb Bush
Governor



John O. Agwunobi, M.D., M.B.A.
Secretary

Laboratory Scope of Accreditation

Page 1 of 26

THIS LISTING OF ACCREDITED ANALYTES SHOULD BE USED ONLY WHEN
ASSOCIATED WITH A VALID CERTIFICATE

State Laboratory ID: E87617

EPA Lab Code: WA00001

206-767-5060

E87617

Laucks Testing Laboratories, Inc.
940 South Harney Street
Seattle, WA 98108

Program SDWA

Analyte	Method	Category	Certification Type	Effective Date
1,1,1,2-Tetrachloroethane	EPA 524.2	Group II Unregulated Contaminants	NELAP	2/11/2002
1,1,1-Trichloroethane	EPA 524.2	Other Regulated Contaminants	NELAP	2/11/2002
1,1,2,2-Tetrachloroethane	EPA 524.2	Group II Unregulated Contaminants	NELAP	2/11/2002
1,1,2-Trichloroethane	EPA 524.2	Other Regulated Contaminants	NELAP	2/11/2002
1,1-Dichloroethane	EPA 524.2	Group II Unregulated Contaminants	NELAP	2/11/2002
1,1-Dichloroethylene	EPA 524.2	Other Regulated Contaminants	NELAP	2/11/2002
1,2,3-Trichlorobenzene	EPA 524.2	Group II Unregulated Contaminants	NELAP	2/11/2002
1,2,3-Trichloropropane	EPA 504.1	Group II Unregulated Contaminants	NELAP	2/11/2002
1,2,3-Trichloropropane	EPA 524.2	Group II Unregulated Contaminants	NELAP	2/11/2002
1,2,4-Trichlorobenzene	EPA 524.2	Other Regulated Contaminants	NELAP	2/11/2002
1,2-Dibromo-3-chloropropane (DBCP)	EPA 504.1	Synthetic Organic Contaminants	NELAP	2/11/2002
1,2-Dibromo-3-chloropropane (DBCP)	EPA 524.2	Group II Unregulated Contaminants	NELAP	2/11/2002
1,2-Dibromoethane (EDB, Ethylene dibromide)	EPA 504.1	Synthetic Organic Contaminants	NELAP	2/11/2002
1,2-Dibromoethane (EDB, Ethylene dibromide)	EPA 524.2	Group II Unregulated Contaminants	NELAP	2/11/2002
1,2-Dichlorobenzene	EPA 524.2	Other Regulated Contaminants	NELAP	2/11/2002
1,2-Dichloroethane	EPA 524.2	Other Regulated Contaminants	NELAP	2/11/2002
1,2-Dichloropropane	EPA 524.2	Other Regulated Contaminants	NELAP	2/11/2002
1,3-Dichlorobenzene	EPA 524.2	Group II Unregulated Contaminants	NELAP	2/11/2002
1,3-Dichloropropane	EPA 524.2	Group II Unregulated Contaminants	NELAP	2/11/2002
1,4-Dichlorobenzene	EPA 524.2	Other Regulated Contaminants	NELAP	2/11/2002
2,2-Dichloropropane	EPA 524.2	Group II Unregulated Contaminants	NELAP	2/11/2002
Benzene	EPA 524.2	Other Regulated Contaminants	NELAP	2/11/2002
Bromodichloromethane	EPA 524.2	Group II Unregulated Contaminants, Other Regulated Contaminants	NELAP	2/11/2002
Bromoforn	EPA 524.2	Other Regulated Contaminants, Group II Unregulated Contaminants	NELAP	2/11/2002
Carbon tetrachloride	EPA 524.2	Other Regulated Contaminants	NELAP	2/11/2002
Chlorobenzene	EPA 524.2	Other Regulated Contaminants	NELAP	2/11/2002
Chloroform	EPA 524.2	Other Regulated Contaminants, Group II Unregulated Contaminants	NELAP	2/11/2002
cis-1,2-Dichloroethylene	EPA 524.2	Other Regulated Contaminants	NELAP	2/11/2002
cis-1,3-Dichloropropene	EPA 524.2	Group II Unregulated Contaminants	NELAP	2/11/2002
Dibromochloromethane	EPA 524.2	Other Regulated Contaminants, Group II Unregulated Contaminants	NELAP	2/11/2002

"STATE" indicates certification for the analyte by the method specified. "NELAP" further indicates certification compliant with the NELAC Standards. Print Date 8/9/2002 2:08:09 PM

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940 South Harney Street
Seattle, WA 98108

Program SDWA

Analyte	Method	Category	Certification Type	Effective Date
Dibromomethane	EPA 524.2	Group II Unregulated Contaminants	NELAP	2/11/2002
Dichloromethane (DCM, Methylene chloride)	EPA 524.2	Other Regulated Contaminants	NELAP	2/11/2002
Ethylbenzene	EPA 524.2	Other Regulated Contaminants	NELAP	2/11/2002
Hexachlorobutadiene	EPA 524.2	Group II Unregulated Contaminants	NELAP	2/11/2002
Isopropylbenzene	EPA 524.2	Group II Unregulated Contaminants	NELAP	2/11/2002
Naphthalene	EPA 524.2	Group II Unregulated Contaminants	NELAP	2/11/2002
n-Butylbenzene	EPA 524.2	Group II Unregulated Contaminants	NELAP	2/11/2002
n-Propylbenzene	EPA 524.2	Group II Unregulated Contaminants	NELAP	2/11/2002
sec-Butylbenzene	EPA 524.2	Group II Unregulated Contaminants	NELAP	2/11/2002
Styrene	EPA 524.2	Other Regulated Contaminants	NELAP	2/11/2002
tert-Butylbenzene	EPA 524.2	Group II Unregulated Contaminants	NELAP	2/11/2002
Tetrachloroethylene (Perchloroethylene)	EPA 524.2	Other Regulated Contaminants	NELAP	2/11/2002
Toluene	EPA 524.2	Other Regulated Contaminants	NELAP	2/11/2002
Total trihalomethanes	EPA 524.2	Other Regulated Contaminants	NELAP	2/11/2002
trans-1,2-Dichloroethylene	EPA 524.2	Other Regulated Contaminants	NELAP	2/11/2002
trans-1,3-Dichloropropylene	EPA 524.2	Group II Unregulated Contaminants	NELAP	2/11/2002
Trichloroethene (Trichloroethylene)	EPA 524.2	Other Regulated Contaminants	NELAP	2/11/2002
Vinyl chloride	EPA 524.2	Other Regulated Contaminants	NELAP	2/11/2002
Xylene (total)	EPA 524.2	Other Regulated Contaminants	NELAP	2/11/2002

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Laucks Testing Laboratories, Inc.
940 South Harney Street
Seattle, WA 98108

Program CWA

Analyte	Method	Category	Certification Type	Effective Date
1,1,1-Trichloroethane	EPA 624	Volatile Organics	NELAP	2/11/2002
1,1,2,2-Tetrachloroethane	EPA 624	Volatile Organics	NELAP	2/11/2002
1,1,2-Trichloroethane	EPA 624	Volatile Organics	NELAP	2/11/2002
1,1-Dichloroethane	EPA 624	Volatile Organics	NELAP	2/11/2002
1,1-Dichloroethylene	EPA 624	Volatile Organics	NELAP	2/11/2002
1,2,4-Trichlorobenzene	EPA 625	Extractable Organics	NELAP	2/11/2002
1,2-Dibromo-3-chloropropane (DBCP)	EPA 504	Volatile Organics	NELAP	2/11/2002
1,2-Dibromoethane (EDB, Ethylene dibromide)	EPA 504	Volatile Organics	NELAP	2/11/2002
1,2-Dichlorobenzene	EPA 624	Volatile Organics	NELAP	2/11/2002
1,2-Dichlorobenzene	EPA 625	Extractable Organics	NELAP	2/11/2002
1,2-Dichloroethane	EPA 624	Volatile Organics	NELAP	2/11/2002
1,2-Dichloropropane	EPA 624	Volatile Organics	NELAP	2/11/2002
1,3-Dichlorobenzene	EPA 624	Volatile Organics	NELAP	2/11/2002
1,3-Dichlorobenzene	EPA 625	Extractable Organics	NELAP	2/11/2002
1,4-Dichlorobenzene	EPA 624	Volatile Organics	NELAP	2/11/2002
1,4-Dichlorobenzene	EPA 625	Extractable Organics	NELAP	2/11/2002
2,4,6-Trichlorophenol	EPA 625	Extractable Organics	NELAP	2/11/2002
2,4-Dichlorophenol	EPA 625	Extractable Organics	NELAP	2/11/2002
2,4-Dimethylphenol	EPA 625	Extractable Organics	NELAP	2/11/2002
2,4-Dinitrophenol	EPA 625	Extractable Organics	NELAP	2/11/2002
2,4-Dinitrotoluene (2,4-DNT)	EPA 625	Extractable Organics	NELAP	2/11/2002
2,6-Dinitrotoluene (2,6-DNT)	EPA 625	Extractable Organics	NELAP	2/11/2002
2-Chloroethyl vinyl ether	EPA 624	Volatile Organics	NELAP	2/11/2002
2-Chloronaphthalene	EPA 625	Extractable Organics	NELAP	2/11/2002
2-Chlorophenol	EPA 625	Extractable Organics	NELAP	2/11/2002
2-Methyl-4,6-dinitrophenol	EPA 625	Extractable Organics	NELAP	2/11/2002
2-Nitrophenol	EPA 625	Extractable Organics	NELAP	2/11/2002
3,3'-Dichlorobenzidine	EPA 625	Extractable Organics	NELAP	2/11/2002
4-Bromophenyl phenyl ether	EPA 625	Extractable Organics	NELAP	2/11/2002
4-Chloro-3-methylphenol	EPA 625	Extractable Organics	NELAP	2/11/2002
4-Chlorophenyl phenylether	EPA 625	Extractable Organics	NELAP	2/11/2002
4-Nitrophenol	EPA 625	Extractable Organics	NELAP	2/11/2002
Acenaphthene	EPA 625	Extractable Organics	NELAP	2/11/2002
Acenaphthylene	EPA 625	Extractable Organics	NELAP	2/11/2002

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EPA Lab Code: WA00001

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Laucks Testing Laboratories, Inc.
940 South Harney Street
Seattle, WA 98108

Program CWA

Analyte	Method	Category	Certification Type	Effective Date
Acrolein (Propenal)	EPA 624	Volatile Organics	NELAP	2/11/2002
Acrylonitrile	EPA 624	Volatile Organics	NELAP	2/11/2002
Alkalinity as CaCO3	EPA 310.1	General Chemistry	NELAP	2/11/2002
Aluminum	EPA 200.7	Metals	NELAP	2/11/2002
Aluminum	EPA 200.8	Metals	NELAP	2/11/2002
Ammonia as N	EPA 350.1	General Chemistry	NELAP	2/11/2002
Anthracene	EPA 625	Extractable Organics	NELAP	2/11/2002
Antimony	EPA 200.7	Metals	NELAP	2/11/2002
Antimony	EPA 200.8	Metals	NELAP	2/11/2002
Arsenic	EPA 200.7	Metals	NELAP	2/11/2002
Arsenic	EPA 200.8	Metals	NELAP	2/11/2002
Arsenic	EPA 6010	Metals	NELAP	2/11/2002
Arsenic	EPA 6020	Metals	NELAP	2/11/2002
Barium	EPA 200.7	Metals	NELAP	2/11/2002
Barium	EPA 200.8	Metals	NELAP	2/11/2002
Benzene	EPA 624	Volatile Organics	NELAP	2/11/2002
Benzo(a)anthracene	EPA 625	Extractable Organics	NELAP	2/11/2002
Benzo(a)pyrene	EPA 625	Extractable Organics	NELAP	2/11/2002
Benzo(b)fluoranthene	EPA 625	Extractable Organics	NELAP	2/11/2002
Benzo(g,h,i)perylene	EPA 625	Extractable Organics	NELAP	2/11/2002
Benzo(k)fluoranthene	EPA 625	Extractable Organics	NELAP	2/11/2002
Beryllium	EPA 200.7	Metals	NELAP	2/11/2002
Beryllium	EPA 200.8	Metals	NELAP	2/11/2002
Biochemical oxygen demand	EPA 405.1	General Chemistry	NELAP	2/11/2002
bis(2-Chloroethoxy)methane	EPA 625	Extractable Organics	NELAP	2/11/2002
bis(2-Chloroethyl) ether	EPA 625	Extractable Organics	NELAP	2/11/2002
bis(2-Chloroisopropyl) ether	EPA 625	Extractable Organics	NELAP	2/11/2002
bis(2-Ethylhexyl) phthalate (DEHP)	EPA 625	Extractable Organics	NELAP	2/11/2002
Bromide	EPA 300.0	General Chemistry	NELAP	2/11/2002
Bromodichloromethane	EPA 624	Volatile Organics	NELAP	2/11/2002
Bromoform	EPA 624	Volatile Organics	NELAP	2/11/2002
Butyl benzyl phthalate	EPA 625	Extractable Organics	NELAP	2/11/2002
Cadmium	EPA 200.7	Metals	NELAP	2/11/2002
Cadmium	EPA 200.8	Metals	NELAP	2/11/2002

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State Laboratory ID: E87617

EPA Lab Code: WA00001

206-767-5060

E87617

Laucks Testing Laboratories, Inc.
940 South Harney Street
Seattle, WA 98108

Program CWA

Analyte	Method	Category	Certification Type	Effective Date
Cadmium	EPA 6010	Metals	NELAP	2/11/2002
Cadmium	EPA 6020	Metals	NELAP	2/11/2002
Calcium	EPA 200.7	Metals	NELAP	2/11/2002
Calcium	LTL-7203	Metals	NELAP	2/11/2002
Carbon tetrachloride	EPA 624	Volatile Organics	NELAP	2/11/2002
Chemical oxygen demand	EPA 410.4	General Chemistry	NELAP	2/11/2002
Chloride	EPA 300.0	General Chemistry	NELAP	2/11/2002
Chlorobenzene	EPA 624	Volatile Organics	NELAP	2/11/2002
Chloroethane	EPA 624	Volatile Organics	STATE	2/11/2002
Chloroform	EPA 624	Volatile Organics	NELAP	2/11/2002
Chromium	EPA 200.7	Metals	NELAP	2/11/2002
Chromium	EPA 200.8	Metals	NELAP	2/11/2002
Chromium	EPA 6010	Metals	NELAP	2/11/2002
Chromium	EPA 6020	Metals	NELAP	2/11/2002
Chrysene	EPA 625	Extractable Organics	NELAP	2/11/2002
cis-1,3-Dichloropropene	EPA 624	Volatile Organics	NELAP	2/11/2002
Cobalt	EPA 200.7	Metals	NELAP	2/11/2002
Cobalt	EPA 200.8	Metals	NELAP	2/11/2002
Conductivity	EPA 120.1	General Chemistry	NELAP	2/11/2002
Copper	EPA 200.7	Metals	NELAP	2/11/2002
Copper	EPA 200.8	Metals	NELAP	2/11/2002
Copper	EPA 6010	Metals	NELAP	2/11/2002
Copper	EPA 6020	Metals	NELAP	2/11/2002
Cyanide	EPA 335.3	General Chemistry	NELAP	2/11/2002
Dibenz(a,h) anthracene	EPA 625	Extractable Organics	NELAP	2/11/2002
Dibromochloromethane	EPA 624	Volatile Organics	NELAP	2/11/2002
Diethyl phthalate	EPA 625	Extractable Organics	NELAP	2/11/2002
Dimethyl phthalate	EPA 625	Extractable Organics	NELAP	2/11/2002
Di-n-butyl phthalate	EPA 625	Extractable Organics	NELAP	2/11/2002
Di-n-octyl phthalate	EPA 625	Extractable Organics	NELAP	2/11/2002
Ethylbenzene	EPA 624	Volatile Organics	NELAP	2/11/2002
Fluoranthene	EPA 625	Extractable Organics	NELAP	2/11/2002
Fluorene	EPA 625	Extractable Organics	NELAP	2/11/2002
Iodide	EPA 300.0	General Chemistry	NELAP	2/11/2002

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Analyte	Method	Category	Certification Type	Effective Date
Hardness	EPA 130.2	General Chemistry	NELAP	2/11/2002
Hexachlorobenzene	EPA 625	Extractable Organics	NELAP	2/11/2002
Hexachlorobutadiene	EPA 625	Extractable Organics	NELAP	2/11/2002
Hexachlorocyclopentadiene	EPA 625	Extractable Organics	NELAP	2/11/2002
Hexachloroethane	EPA 625	Extractable Organics	NELAP	2/11/2002
Indeno(1,2,3-cd)pyrene	EPA 625	Extractable Organics	NELAP	2/11/2002
Iron	EPA 200.7	Metals	NELAP	2/11/2002
Iron	LTL-7203	Metals	NELAP	2/11/2002
Isophorone	EPA 625	Extractable Organics	NELAP	2/11/2002
Kjeldahl nitrogen - total	EPA 351.2	General Chemistry	NELAP	2/11/2002
Lead	EPA 200.7	Metals	NELAP	2/11/2002
Lead	EPA 200.8	Metals	NELAP	2/11/2002
Lead	EPA 6010	Metals	NELAP	2/11/2002
Lead	EPA 6020	Metals	NELAP	2/11/2002
Magnesium	EPA 200.7	Metals	NELAP	2/11/2002
Magnesium	LTL-7203	Metals	NELAP	2/11/2002
Manganese	EPA 200.7	Metals	NELAP	2/11/2002
Manganese	EPA 200.8	Metals	NELAP	2/11/2002
Manganese	EPA 6020	Metals	NELAP	2/11/2002
Mercury	EPA 245.1	Metals	NELAP	2/11/2002
Mercury	EPA 7470	Metals	NELAP	2/11/2002
Methyl bromide (Bromomethane)	EPA 624	Volatile Organics	STATE	2/11/2002
Methyl chloride (Chloromethane)	EPA 624	Volatile Organics	STATE	2/11/2002
Methylene chloride	EPA 624	Volatile Organics	NELAP	2/11/2002
Molybdenum	EPA 200.7	Metals	NELAP	2/11/2002
Molybdenum	EPA 6010	Metals	NELAP	2/11/2002
Naphthalene	EPA 625	Extractable Organics	NELAP	2/11/2002
Nickel	EPA 200.7	Metals	NELAP	2/11/2002
Nickel	EPA 200.8	Metals	NELAP	2/11/2002
Nickel	EPA 6010	Metals	NELAP	2/11/2002
Nickel	EPA 6020	Metals	NELAP	2/11/2002
Nitrate as N	EPA 300.0	General Chemistry	NELAP	2/11/2002
Nitrate as N	EPA 353.2	General Chemistry	NELAP	2/11/2002
Nitrate-nitrite	EPA 300.0	General Chemistry	NELAP	2/11/2002

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Analyte	Method	Category	Certification Type	Effective Date
Nitrate-nitrite	EPA 353.2	General Chemistry	NELAP	2/11/2002
Nitrite as N	EPA 300.0	General Chemistry	NELAP	2/11/2002
Nitrite as N	EPA 354.1	General Chemistry	NELAP	2/11/2002
Nitrobenzene	EPA 625	Extractable Organics	NELAP	2/11/2002
Nitrocellulose	LTL-9132	General Chemistry	NELAP	2/11/2002
n-Nitrosodimethylamine	EPA 625	Extractable Organics	NELAP	2/11/2002
n-Nitrosodi-n-propylamine	EPA 625	Extractable Organics	NELAP	2/11/2002
n-Nitrosodiphenylamine	EPA 625	Extractable Organics	NELAP	2/11/2002
Oil & Grease	EPA 413.1	General Chemistry	STATE	2/11/2002
Orthophosphate as P	EPA 300.0	General Chemistry	NELAP	2/11/2002
Orthophosphate as P	EPA 365.2	General Chemistry	NELAP	2/11/2002
Pentachlorophenol	EPA 625	Extractable Organics	NELAP	2/11/2002
pH	EPA 150.1	General Chemistry	NELAP	2/11/2002
Phenanthrene	EPA 625	Extractable Organics	NELAP	2/11/2002
Phenol	EPA 625	Extractable Organics	NELAP	2/11/2002
Phosphorus, total	EPA 365.2	General Chemistry	NELAP	2/11/2002
Potassium	EPA 200.7	Metals	NELAP	2/11/2002
Potassium	EPA 6010	Metals	NELAP	2/11/2002
Potassium	LTL-7203	Metals	NELAP	2/11/2002
Pyrene	EPA 625	Extractable Organics	NELAP	2/11/2002
Residue-filterable (TDS)	EPA 160.1	General Chemistry	NELAP	2/11/2002
Residue-nonfilterable (TSS)	EPA 160.2	General Chemistry	NELAP	2/11/2002
Residue-total	EPA 160.3	General Chemistry	NELAP	2/11/2002
Selenium	EPA 200.7	Metals	NELAP	2/11/2002
Selenium	EPA 6010	Metals	NELAP	2/11/2002
Silicon	EPA 200.7	Metals	NELAP	2/11/2002
Silver	EPA 200.7	Metals	NELAP	2/11/2002
Sodium	EPA 200.7	Metals	NELAP	2/11/2002
Sodium	LTL-7203	Metals	NELAP	2/11/2002
Sulfate	EPA 300.0	General Chemistry	NELAP	2/11/2002
Sulfide	EPA 376.1	General Chemistry	NELAP	2/11/2002
Tetrachloroethylene (Perchloroethylene)	EPA 624	Volatile Organics	NELAP	2/11/2002
Thallium	EPA 200.7	Metals	NELAP	2/11/2002
Toluene	EPA 624	Volatile Organics	NELAP	2/11/2002

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Analyte	Method	Category	Certification Type	Effective Date
Total organic carbon	EPA 415.1	General Chemistry	NELAP	2/11/2002
Total Petroleum Hydrocarbons (TPH)	EPA 418.1	General Chemistry	NELAP	2/11/2002
Total phenolics	EPA 420.2	General Chemistry	NELAP	2/11/2002
trans-1,2-Dichloroethylene	EPA 624	Volatile Organics	NELAP	2/11/2002
trans-1,3-Dichloropropylene	EPA 624	Volatile Organics	NELAP	2/11/2002
Trichloroethene (Trichloroethylene)	EPA 624	Volatile Organics	NELAP	2/11/2002
Vanadium	EPA 200.7	Metals	NELAP	2/11/2002
Zinc	EPA 200.7	Metals	NELAP	2/11/2002
Zinc	EPA 200.8	Metals	NELAP	2/11/2002
Zinc	EPA 6010	Metals	NELAP	2/11/2002
Zinc	EPA 6020	Metals	NELAP	2/11/2002

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Program RCRA/CERCLA

Analyte	Method	Category	Certification Type	Effective Date
1,1,1,2-Tetrachloroethane	EPA 8021	Volatile Organics	NELAP	2/11/2002
1,1,1,2-Tetrachloroethane	EPA 8260	Volatile Organics	NELAP	2/11/2002
1,1,1-Trichloroethane	EPA 8021	Volatile Organics	NELAP	2/11/2002
1,1,1-Trichloroethane	EPA 8260	Volatile Organics	NELAP	2/11/2002
1,1,1-Trichloroethane	OLM04.2	Volatile Organics	NELAP	2/11/2002
1,1,2,2-Tetrachloroethane	EPA 8021	Volatile Organics	NELAP	2/11/2002
1,1,2,2-Tetrachloroethane	EPA 8260	Volatile Organics	NELAP	2/11/2002
1,1,2,2-Tetrachloroethane	OLM04.2	Volatile Organics	NELAP	2/11/2002
1,1,2-Trichloroethane	EPA 8021	Volatile Organics	NELAP	2/11/2002
1,1,2-Trichloroethane	EPA 8260	Volatile Organics	NELAP	2/11/2002
1,1,2-Trichloroethane	OLM04.2	Volatile Organics	NELAP	2/11/2002
1,1-Dichloroethane	EPA 8021	Volatile Organics	NELAP	2/11/2002
1,1-Dichloroethane	EPA 8260	Volatile Organics	NELAP	2/11/2002
1,1-Dichloroethane	OLM04.2	Volatile Organics	NELAP	2/11/2002
1,1-Dichloroethylene	EPA 8021	Volatile Organics	NELAP	2/11/2002
1,1-Dichloroethylene	EPA 8260	Volatile Organics	NELAP	2/11/2002
1,1-Dichloroethylene	OLM04.2	Volatile Organics	NELAP	2/11/2002
1,1-Dichloropropene	EPA 8260	Volatile Organics	NELAP	2/11/2002
1,2,3-Trichlorobenzene	EPA 8260	Volatile Organics	NELAP	2/11/2002
1,2,3-Trichloropropane	EPA 8260	Volatile Organics	NELAP	2/11/2002
1,2,4,5-Tetrachlorobenzene	EPA 8270	Extractable Organics	NELAP	2/11/2002
1,2,4-Trichlorobenzene	EPA 8260	Volatile Organics	NELAP	2/11/2002
1,2,4-Trichlorobenzene	EPA 8270	Extractable Organics	NELAP	2/11/2002
1,2,4-Trichlorobenzene	OLM04.2	Extractable Organics	NELAP	2/11/2002
1,2,4-Trimethylbenzene	EPA 8260	Volatile Organics	NELAP	2/11/2002
1,2-Dibromo-3-chloropropane (DBCP)	EPA 8011	Volatile Organics	NELAP	2/11/2002
1,2-Dibromo-3-chloropropane (DBCP)	EPA 8260	Volatile Organics	NELAP	2/11/2002
1,2-Dibromo-3-chloropropane (DBCP)	OLM04.2	Volatile Organics	NELAP	2/11/2002
1,2-Dibromoethane (EDB, Ethylene dibromide)	EPA 8011	Volatile Organics	NELAP	2/11/2002
1,2-Dibromoethane (EDB, Ethylene dibromide)	EPA 8260	Volatile Organics	NELAP	2/11/2002
1,2-Dibromoethane (EDB, Ethylene dibromide)	OLM04.2	Volatile Organics	NELAP	2/11/2002
1,2-Dichlorobenzene	EPA 8021	Volatile Organics	NELAP	2/11/2002
1,2-Dichlorobenzene	EPA 8260	Volatile Organics	NELAP	2/11/2002
1,2-Dichlorobenzene	EPA 8270	Extractable Organics	NELAP	2/11/2002

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Program	RCRA/CERCLA	Analyte	Method	Category	Certification Type	Effective Date
		1,2-Dichlorobenzene	OLM04.2	Volatile Organics, Extractable Organics	NELAP	2/11/2002
		1,2-Dichloroethane	EPA 8021	Volatile Organics	NELAP	2/11/2002
		1,2-Dichloroethane	EPA 8260	Volatile Organics	NELAP	2/11/2002
		1,2-Dichloroethane	OLM04.2	Volatile Organics	NELAP	2/11/2002
		1,2-Dichloropropane	EPA 8021	Volatile Organics	NELAP	2/11/2002
		1,2-Dichloropropane	EPA 8260	Volatile Organics	NELAP	2/11/2002
		1,2-Dichloropropane	OLM04.2	Volatile Organics	NELAP	2/11/2002
		1,2-Diphenylhydrazine	EPA 8270	Extractable Organics	NELAP	2/11/2002
		1,3,5-Tnb (1,3,5-trinitrobenzene)	EPA 8270	Extractable Organics	NELAP	2/11/2002
		1,3,5-Tnb (1,3,5-trinitrobenzene)	EPA 8330	Extractable Organics	NELAP	2/11/2002
		1,3,5-Trimethylbenzene	EPA 8260	Volatile Organics	NELAP	2/11/2002
		1,3,5-Trinitroso-1,3,5-hexahydrotriazine (TNX)	LTL-8330 Rev. 10	Extractable Organics	NELAP	2/11/2002
		1,3-Dichlorobenzene	EPA 8021	Volatile Organics	NELAP	2/11/2002
		1,3-Dichlorobenzene	EPA 8260	Volatile Organics	NELAP	2/11/2002
		1,3-Dichlorobenzene	EPA 8270	Extractable Organics	NELAP	2/11/2002
		1,3-Dichlorobenzene	OLM04.2	Extractable Organics, Volatile Organics	NELAP	2/11/2002
		1,3-Dichloropropane	EPA 8260	Volatile Organics	NELAP	2/11/2002
		1,3-Dinitrobenzene (1,3-DNB)	EPA 8330	Extractable Organics	NELAP	2/11/2002
		1,4-Dichlorobenzene	EPA 8021	Volatile Organics	NELAP	2/11/2002
		1,4-Dichlorobenzene	EPA 8260	Volatile Organics	NELAP	2/11/2002
		1,4-Dichlorobenzene	EPA 8270	Extractable Organics	NELAP	2/11/2002
		1,4-Dichlorobenzene	OLM04.2	Volatile Organics, Extractable Organics	NELAP	2/11/2002
		1,4-Naphthoquinone	EPA 8270	Extractable Organics	NELAP	2/11/2002
		1,4-Phenylenediamine	EPA 8270	Extractable Organics	NELAP	2/11/2002
		1-Naphthylamine	EPA 8270	Extractable Organics	NELAP	2/11/2002
		1-Nitroso-3,5-dinitro-1,3,5-hexahydrotriazine (MNX)	LTL-8330 Rev. 10	Extractable Organics	NELAP	2/11/2002
		2,2', 3,3', 4,4', 5-Heptachlorobiphenyl	EPA 8082	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
		2,2', 3,4', 5,5', 6-Heptachlorobiphenyl	EPA 8082	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
		2,2', 3,4,4', 5,5'-Heptachlorobiphenyl	EPA 8082	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
		2,2', 3,4,4', 5'-Hexachlorobiphenyl	EPA 8082	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
		2,2', 3,5'-Tetrachlorobiphenyl	EPA 8082	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
		2,2', 4,5,5'-Pentachlorobiphenyl	EPA 8082	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
		2,2', 5,5'-Tetrachlorobiphenyl	EPA 8082	Pesticides-Herbicides-PCB's	NELAP	2/11/2002

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2,2', 5-Trichlorobiphenyl	EPA 8082	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl	EPA 8082	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
2,2',3,3',4,4',5,6-Octachlorobiphenyl (IUPAC 195)	LTL-8083 Rev. 0	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
2,2',3,3',4,4'-Hexachlorobiphenyl (IUPAC 128)	LTL-8083 Rev. 0	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
2,2',4,4',5,5'-Hexachlorobiphenyl	EPA 8082	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
2,2',6,6'-Tetranitro-4,4'-azoxytoluene	LTL-8330 Rev. 10	Extractable Organics	NELAP	2/11/2002
2,2-Dichloropropane	EPA 8260	Volatile Organics	NELAP	2/11/2002
2,3', 4,4'-Tetrachlorobiphenyl	EPA 8082	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
2,3,3',4,4',5,5'-Heptachlorobiphenyl (IUPAC 189)	LTL-8083 Rev. 0	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
2,3,3',4,4',5-Hexachlorobiphenyl (IUPAC 156)	LTL-8083 Rev. 0	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
2,3,3',4,4',5'-Hexachlorobiphenyl (IUPAC 157)	LTL-8083 Rev. 0	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
2,3,3',4,4'-Pentachlorobiphenyl (IUPAC 105)	LTL-8083 Rev. 0	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
2,3',4,4',5,5'-Hexachlorobiphenyl (IUPAC 167)	LTL-8083 Rev. 0	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
2,3',4,4',5-Pentachlorobiphenyl	EPA 8082	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
2,3,4,4',5-Pentachlorobiphenyl (IUPAC 114)	LTL-8083 Rev. 0	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
2,3,4,6-Tetrachlorophenol	EPA 8270	Extractable Organics	NELAP	2/11/2002
2,4,4'-Trichlorobiphenyl (IUPAC 28)	LTL-8083 Rev. 0	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
2,4,5-T	EPA 8151	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
2,4,5-Trichlorophenol	EPA 8270	Extractable Organics	NELAP	2/11/2002
2,4,5-Trichlorophenol	OLM04.2	Extractable Organics	NELAP	2/11/2002
2,4,6-Trichlorophenol	EPA 8270	Extractable Organics	NELAP	2/11/2002
2,4,6-Trichlorophenol	OLM04.2	Extractable Organics	NELAP	2/11/2002
2,4,6-Trinitrotoluene (2,4,6-TNT)	EPA 8330	Extractable Organics	NELAP	2/11/2002
2,4-D	EPA 8151	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
2,4-DB	EPA 8151	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
2,4-Diamino-6-nitrotoluene	LTL-8330 Rev. 10	Extractable Organics	NELAP	2/11/2002
2,4'-Dichlorobiphenyl (IUPAC 8)	LTL-8083 Rev. 0	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
2,4-Dichlorophenol	EPA 8270	Extractable Organics	NELAP	2/11/2002
2,4-Dichlorophenol	OLM04.2	Extractable Organics	NELAP	2/11/2002
2,4-Dimethylphenol	EPA 8270	Extractable Organics	NELAP	2/11/2002
2,4-Dimethylphenol	OLM04.2	Extractable Organics	NELAP	2/11/2002
2,4-Dinitrophenol	EPA 8270	Extractable Organics	NELAP	2/11/2002
2,4-Dinitrophenol	OLM04.2	Extractable Organics	NELAP	2/11/2002
4-Dinitrotoluene (2,4-DNT)	EPA 8270	Extractable Organics	NELAP	2/11/2002

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State Laboratory ID: E87617

EPA Lab Code: WA00001

206-767-5060

E87617

Laucks Testing Laboratories, Inc.
940 South Harney Street
Seattle, WA 98108

Program RCRA/CERCLA

Analyte	Method	Category	Certification Type	Effective Date
2,4-Dinitrotoluene (2,4-DNT)	EPA 8330	Extractable Organics	NELAP	2/11/2002
2,4-Dinitrotoluene (2,4-DNT)	OLM04.2	Extractable Organics	NELAP	2/11/2002
2,6-Diamino-4-nitrotoluene	LTL-8330 Rev. 10	Extractable Organics	NELAP	2/11/2002
2,6-Dichlorophenol	EPA 8270	Extractable Organics	NELAP	2/11/2002
2,6-Dinitrotoluene (2,6-DNT)	EPA 8270	Extractable Organics	NELAP	2/11/2002
2,6-Dinitrotoluene (2,6-DNT)	EPA 8330	Extractable Organics	NELAP	2/11/2002
2,6-Dinitrotoluene (2,6-DNT)	OLM04.2	Extractable Organics	NELAP	2/11/2002
2-Acetylaminofluorene	EPA 8270	Extractable Organics	NELAP	2/11/2002
2-Amino-4,6-dinitrotoluene (2-am-dnt)	EPA 8330	Extractable Organics	NELAP	2/11/2002
2-Butanone (Methyl ethyl ketone, MEK)	EPA 8260	Volatile Organics	NELAP	2/11/2002
2-Butanone (Methyl ethyl ketone, MEK)	OLM04.2	Volatile Organics	NELAP	2/11/2002
2-Chloroethyl vinyl ether	EPA 8260	Volatile Organics	NELAP	2/11/2002
2-Chloronaphthalene	EPA 8270	Extractable Organics	NELAP	2/11/2002
2-Chloronaphthalene	OLM04.2	Extractable Organics	NELAP	2/11/2002
2-Chlorophenol	EPA 8270	Extractable Organics	NELAP	2/11/2002
2-Chlorophenol	OLM04.2	Extractable Organics	NELAP	2/11/2002
2-Chlorotoluene	EPA 8260	Volatile Organics	NELAP	2/11/2002
2-Hexanone	EPA 8260	Volatile Organics	NELAP	2/11/2002
2-Hexanone	OLM04.2	Volatile Organics	NELAP	2/11/2002
2-Methyl-4,6-dinitrophenol	EPA 8270	Extractable Organics	NELAP	2/11/2002
2-Methyl-4,6-dinitrophenol	OLM04.2	Extractable Organics	NELAP	2/11/2002
2-Methylnaphthalene	EPA 8270	Extractable Organics	NELAP	2/11/2002
2-Methylnaphthalene	OLM04.2	Extractable Organics	NELAP	2/11/2002
2-Methylphenol (o-Cresol)	EPA 8270	Extractable Organics	NELAP	2/11/2002
2-Methylphenol (o-Cresol)	OLM04.2	Extractable Organics	NELAP	2/11/2002
2-Nitroaniline	EPA 8270	Extractable Organics	NELAP	2/11/2002
2-Nitroaniline	OLM04.2	Extractable Organics	NELAP	2/11/2002
2-Nitrophenol	EPA 8270	Extractable Organics	NELAP	2/11/2002
2-Nitrophenol	OLM04.2	Extractable Organics	NELAP	2/11/2002
2-Nitrotoluene	EPA 8330	Extractable Organics	NELAP	2/11/2002
2-Picoline (2-Methylpyridine)	EPA 8270	Extractable Organics	NELAP	2/11/2002
3,3',4,4',5,5'-Hexachlorobiphenyl (IUPAC 169)	LTL-8083 Rev. 0	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
3,3',4,4'-Tetrachlorobiphenyl (IUPAC 77)	LTL-8083 Rev. 0	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
3,3'-Dichlorobenzidine	EPA 8270	Extractable Organics	NELAP	2/11/2002

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Analyte	Method	Category	Certification Type	Effective Date
3,3'-Dichlorobenzidine	OLM04.2	Extractable Organics	NELAP	2/11/2002
3,3'-Dimethylbenzidine	EPA 8270	Extractable Organics	NELAP	2/11/2002
3,4,4',5-Tetrachlorobiphenyl (IUPAC 81)	LTL-8083 Rev. 0	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
3,5-Dinitroaniline	LTL-8330 Rev. 10	Extractable Organics	NELAP	2/11/2002
3-Methylcholanthrene	EPA 8270	Extractable Organics	NELAP	2/11/2002
3-Nitroaniline	EPA 8270	Extractable Organics	NELAP	2/11/2002
3-Nitroaniline	OLM04.2	Extractable Organics	NELAP	2/11/2002
3-Nitrotoluene	EPA 8330	Extractable Organics	NELAP	2/11/2002
4,4'-DDD	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
4,4'-DDD	OLM04.2	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
4,4'-DDE	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
4,4'-DDE	OLM04.2	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
4,4'-DDT	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
4,4'-DDT	OLM04.2	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
4-Amino-2,6-dinitrotoluene (4-am-dnt)	EPA 8330	Extractable Organics	NELAP	2/11/2002
4-Aminobiphenyl	EPA 8270	Extractable Organics	NELAP	2/11/2002
4-Bromophenyl phenyl ether	EPA 8270	Extractable Organics	NELAP	2/11/2002
4-Bromophenyl phenyl ether	OLM04.2	Extractable Organics	NELAP	2/11/2002
4-Chloro-3-methylphenol	EPA 8270	Extractable Organics	NELAP	2/11/2002
4-Chloro-3-methylphenol	OLM04.2	Extractable Organics	NELAP	2/11/2002
4-Chloroaniline	EPA 8270	Extractable Organics	NELAP	2/11/2002
4-Chloroaniline	OLM04.2	Extractable Organics	NELAP	2/11/2002
4-Chlorophenyl phenylether	EPA 8270	Extractable Organics	NELAP	2/11/2002
4-Chlorophenyl phenylether	OLM04.2	Extractable Organics	NELAP	2/11/2002
4-Chlorotoluene	EPA 8260	Volatile Organics	NELAP	2/11/2002
4-Dimethyl aminoazobenzene	EPA 8270	Extractable Organics	NELAP	2/11/2002
4-Methyl-2-pentanone (MIBK)	EPA 8260	Volatile Organics	NELAP	2/11/2002
4-Methyl-2-pentanone (MIBK)	OLM04.2	Volatile Organics	NELAP	2/11/2002
4-Methylphenol (p-Cresol)	EPA 8270	Extractable Organics	NELAP	2/11/2002
4-Methylphenol (p-Cresol)	OLM04.2	Extractable Organics	NELAP	2/11/2002
4-Nitroaniline	EPA 8270	Extractable Organics	NELAP	2/11/2002
4-Nitroaniline	OLM04.2	Extractable Organics	NELAP	2/11/2002
4-Nitrophenol	EPA 8270	Extractable Organics	NELAP	2/11/2002
4-Nitrophenol	OLM04.2	Extractable Organics	NELAP	2/11/2002

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4-Nitrotoluene	EPA 8330	Extractable Organics	NELAP	2/11/2002
5-Nitro-o-toluidine	EPA 8270	Extractable Organics	NELAP	2/11/2002
7,12-Dimethylbenz(a) anthracene	EPA 8270	Extractable Organics	NELAP	2/11/2002
a-a-Dimethylphenethylamine	EPA 8270	Extractable Organics	NELAP	2/11/2002
Acenaphthene	EPA 8270	Extractable Organics	NELAP	2/11/2002
Acenaphthene	EPA 8310	Extractable Organics	NELAP	2/11/2002
Acenaphthene	OLM04.2	Extractable Organics	NELAP	2/11/2002
Acenaphthylene	EPA 8270	Extractable Organics	NELAP	2/11/2002
Acenaphthylene	EPA 8310	Extractable Organics	NELAP	2/11/2002
Acenaphthylene	OLM04.2	Extractable Organics	NELAP	2/11/2002
Acetone	EPA 8260	Volatile Organics	NELAP	2/11/2002
Acetone	OLM04.2	Volatile Organics	NELAP	2/11/2002
Acetonitrile	EPA 8015	Volatile Organics	NELAP	2/11/2002
Acetophenone	EPA 8270	Extractable Organics	NELAP	2/11/2002
Acrolein (Propenal)	EPA 8260	Volatile Organics	NELAP	2/11/2002
Acrylonitrile	EPA 8260	Volatile Organics	NELAP	2/11/2002
Aldrin	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Aldrin	OLM04.2	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Allyl chloride (3-Chloropropene)	EPA 8260	Volatile Organics	NELAP	2/11/2002
alpha-BHC (alpha-Hexachlorocyclohexane)	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
alpha-BHC (alpha-Hexachlorocyclohexane)	OLM04.2	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
alpha-Chlordane	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Aluminum	EPA 6010	Metals	NELAP	2/11/2002
Aluminum	EPA 6020	Metals	NELAP	2/11/2002
Aluminum	ILM04.1	Metals	NELAP	2/11/2002
Aniline	EPA 8270	Extractable Organics	NELAP	2/11/2002
Aniline	OLM04.2	Extractable Organics	NELAP	2/11/2002
Anthracene	EPA 8270	Extractable Organics	NELAP	2/11/2002
Anthracene	EPA 8310	Extractable Organics	NELAP	2/11/2002
Anthracene	OLM04.2	Extractable Organics	NELAP	2/11/2002
Antimony	EPA 6010	Metals	NELAP	2/11/2002
Antimony	EPA 6020	Metals	NELAP	2/11/2002
Antimony	ILM04.1	Metals	NELAP	2/11/2002
Aramite	EPA 8270	Extractable Organics	NELAP	2/11/2002

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Analyte	Method	Category	Certification Type	Effective Date
Aroclor-1016 (PCB-1016)	EPA 8082	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Aroclor-1016 (PCB-1016)	OLM04.2	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Aroclor-1221 (PCB-1221)	EPA 8082	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Aroclor-1221 (PCB-1221)	OLM04.2	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Aroclor-1232 (PCB-1232)	EPA 8082	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Aroclor-1232 (PCB-1232)	OLM04.2	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Aroclor-1242 (PCB-1242)	EPA 8082	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Aroclor-1242 (PCB-1242)	OLM04.2	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Aroclor-1248 (PCB-1248)	EPA 8082	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Aroclor-1248 (PCB-1248)	OLM04.2	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Aroclor-1254 (PCB-1254)	EPA 8082	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Aroclor-1254 (PCB-1254)	OLM04.2	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Aroclor-1260 (PCB-1260)	EPA 8082	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Aroclor-1260 (PCB-1260)	OLM04.2	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Arsenic	EPA 6010	Metals	NELAP	2/11/2002
Arsenic	EPA 6020	Metals	NELAP	2/11/2002
Arsenic	ILM04.1	Metals	NELAP	2/11/2002
Azinphos-ethyl (Ethyl guthion)	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Azinphos-methyl (Guthion)	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Barium	EPA 6010	Metals	NELAP	2/11/2002
Barium	EPA 6020	Metals	NELAP	2/11/2002
Barium	ILM04.1	Metals	NELAP	2/11/2002
Benzene	EPA 8021	Volatile Organics	NELAP	2/11/2002
Benzene	EPA 8260	Volatile Organics	NELAP	2/11/2002
Benzene	OLM04.2	Volatile Organics	NELAP	2/11/2002
Benzo(a)anthracene	EPA 8270	Extractable Organics	STATE	2/11/2002
Benzo(a)anthracene	EPA 8310	Extractable Organics	STATE	2/11/2002
Benzo(a)pyrene	EPA 8270	Extractable Organics	NELAP	2/11/2002
Benzo(a)pyrene	EPA 8310	Extractable Organics	NELAP	2/11/2002
Benzo(a)pyrene	OLM04.2	Extractable Organics	NELAP	2/11/2002
Benzo(b)fluoranthene	EPA 8270	Extractable Organics	NELAP	2/11/2002
Benzo(b)fluoranthene	EPA 8310	Extractable Organics	NELAP	2/11/2002
Benzo(b)fluoranthene	OLM04.2	Extractable Organics	NELAP	2/11/2002
Benzo(g,h,i)perylene	EPA 8270	Extractable Organics	NELAP	2/11/2002

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Analyte	Method	Category	Certification Type	Effective Date
Benzo(g,h,i)perylene	EPA 8310	Extractable Organics	NELAP	2/11/2002
Benzo(g,h,i)perylene	OLM04.2	Extractable Organics	NELAP	2/11/2002
Benzo(k)fluoranthene	EPA 8270	Extractable Organics	STATE	2/11/2002
Benzo(k)fluoranthene	EPA 8310	Extractable Organics	STATE	2/11/2002
Benzoic acid	EPA 8270	Extractable Organics	NELAP	2/11/2002
Benzoic acid	OLM04.2	Extractable Organics	NELAP	2/11/2002
Benzyl alcohol	EPA 8270	Extractable Organics	NELAP	2/11/2002
Benzyl chloride	EPA 8021	Volatile Organics	NELAP	2/11/2002
Beryllium	EPA 6010	Metals	NELAP	2/11/2002
Beryllium	EPA 6020	Metals	NELAP	2/11/2002
Beryllium	ILM04.1	Metals	NELAP	2/11/2002
beta-BHC (beta-Hexachlorocyclohexane)	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
beta-BHC (beta-Hexachlorocyclohexane)	OLM04.2	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
beta-Naphthylamine	EPA 8270	Extractable Organics	NELAP	2/11/2002
bis(2-Chloroethoxy)methane	EPA 8270	Extractable Organics	NELAP	2/11/2002
bis(2-Chloroethoxy)methane	OLM04.2	Extractable Organics	NELAP	2/11/2002
bis(2-Chloroethyl) ether	EPA 8270	Extractable Organics	NELAP	2/11/2002
bis(2-Chloroethyl) ether	OLM04.2	Extractable Organics	NELAP	2/11/2002
bis(2-Chloroisopropyl) ether	EPA 8270	Extractable Organics	NELAP	2/11/2002
bis(2-Chloroisopropyl) ether	OLM04.2	Extractable Organics	NELAP	2/11/2002
bis(2-Ethylhexyl) phthalate (DEHP)	EPA 8270	Extractable Organics	NELAP	2/11/2002
bis(2-Ethylhexyl) phthalate (DEHP)	OLM04.2	Extractable Organics	NELAP	2/11/2002
Bolstar (Sulprofos)	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Boron	EPA 6010	Metals	NELAP	2/11/2002
Bromide	EPA 9056	General Chemistry	NELAP	2/11/2002
Bromobenzene	EPA 8021	Volatile Organics	NELAP	2/11/2002
Bromobenzene	EPA 8260	Volatile Organics	NELAP	2/11/2002
Bromochloromethane	EPA 8260	Volatile Organics	NELAP	2/11/2002
Bromochloromethane	OLM04.2	Volatile Organics	NELAP	2/11/2002
Bromodichloromethane	EPA 8021	Volatile Organics	NELAP	2/11/2002
Bromodichloromethane	EPA 8260	Volatile Organics	NELAP	2/11/2002
Bromodichloromethane	OLM04.2	Volatile Organics	NELAP	2/11/2002
Bromoform	EPA 8021	Volatile Organics	NELAP	2/11/2002
Bromoform	EPA 8260	Volatile Organics	NELAP	2/11/2002

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Analyte	Method	Category	Certification Type	Effective Date
Bromoform	OLM04.2	Volatile Organics	NELAP	2/11/2002
Butyl benzyl phthalate	EPA 8270	Extractable Organics	NELAP	2/11/2002
Butyl benzyl phthalate	OLM04.2	Extractable Organics	NELAP	2/11/2002
Cadmium	EPA 6010	Metals	NELAP	2/11/2002
Cadmium	EPA 6020	Metals	NELAP	2/11/2002
Cadmium	ILM04.1	Metals	NELAP	2/11/2002
Calcium	EPA 6010	Metals	NELAP	2/11/2002
Calcium	LTL-7202	Metals	NELAP	2/11/2002
Carbazole	EPA 8270	Extractable Organics	NELAP	2/11/2002
Carbazole	OLM04.2	Extractable Organics	NELAP	2/11/2002
Carbon disulfide	EPA 8260	Volatile Organics	NELAP	2/11/2002
Carbon tetrachloride	EPA 8021	Volatile Organics	NELAP	2/11/2002
Carbon tetrachloride	EPA 8260	Volatile Organics	NELAP	2/11/2002
Carbophenothion	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Chlorfenvinphos	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Chloride	EPA 9056	General Chemistry	NELAP	2/11/2002
Chlorobenzene	EPA 8021	Volatile Organics	NELAP	2/11/2002
Chlorobenzene	EPA 8260	Volatile Organics	NELAP	2/11/2002
Chlorobenzilate	EPA 8270	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Chloroethane	EPA 8021	Volatile Organics	NELAP	2/11/2002
Chloroethane	EPA 8260	Volatile Organics	NELAP	2/11/2002
Chloroform	EPA 8021	Volatile Organics	NELAP	2/11/2002
Chloroform	EPA 8260	Volatile Organics	NELAP	2/11/2002
Chloroprene	EPA 8260	Volatile Organics	NELAP	2/11/2002
Chlorpyrifos	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Chromium	EPA 6010	Metals	NELAP	2/11/2002
Chromium	EPA 6020	Metals	NELAP	2/11/2002
Chromium	ILM04.1	Metals	NELAP	2/11/2002
Chromium VI	EPA 7196	General Chemistry	NELAP	2/11/2002
Chrysene	EPA 8270	Extractable Organics	NELAP	2/11/2002
Chrysene	EPA 8310	Extractable Organics	NELAP	2/11/2002
Chrysene	OLM04.2	Extractable Organics	NELAP	2/11/2002
cis-1,2-Dichloroethylene	EPA 8021	Volatile Organics	NELAP	2/11/2002
cis-1,2-Dichloroethylene	EPA 8260	Volatile Organics	NELAP	2/11/2002

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cis-1,2-Dichloroethylene	OLM04.2	Volatile Organics	NELAP	2/11/2002
cis-1,3-Dichloropropene	EPA 8021	Volatile Organics	NELAP	2/11/2002
cis-1,3-Dichloropropene	EPA 8260	Volatile Organics	NELAP	2/11/2002
cis-1,3-Dichloropropene	OLM04.2	Volatile Organics	NELAP	2/11/2002
Cobalt	EPA 6010	Metals	NELAP	2/11/2002
Cobalt	EPA 6020	Metals	NELAP	2/11/2002
Cobalt	ILM04.1	Metals	NELAP	2/11/2002
Conductivity	EPA 9050	General Chemistry	NELAP	2/11/2002
Copper	EPA 6010	Metals	NELAP	2/11/2002
Copper	EPA 6020	Metals	NELAP	2/11/2002
Copper	ILM04.1	Metals	NELAP	2/11/2002
Corrosivity (pH)	EPA 1110	General Chemistry	NELAP	2/11/2002
Corrosivity (pH)	EPA 9040	General Chemistry	NELAP	2/11/2002
Coumaphos	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Dalapon	EPA 8151	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Decachlorobiphenyl	LTL-8083 Rev. 0	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
delta-BHC	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
delta-BHC	OLM04.2	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Demeton-o	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Diallate	EPA 8270	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Diazinon	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Dibenz(a,h) anthracene	EPA 8270	Extractable Organics	NELAP	2/11/2002
Dibenz(a,h) anthracene	EPA 8310	Extractable Organics	NELAP	2/11/2002
Dibenz(a,h) anthracene	OLM04.2	Extractable Organics	NELAP	2/11/2002
Dibenzofuran	EPA 8270	Extractable Organics	NELAP	2/11/2002
Dibenzofuran	OLM04.2	Extractable Organics	NELAP	2/11/2002
Dibromochloromethane	EPA 8021	Volatile Organics	NELAP	2/11/2002
Dibromochloromethane	EPA 8260	Volatile Organics	NELAP	2/11/2002
Dibromochloromethane	OLM04.2	Volatile Organics	NELAP	2/11/2002
Dibromomethane	EPA 8021	Volatile Organics	NELAP	2/11/2002
Dibromomethane	EPA 8260	Volatile Organics	NELAP	2/11/2002
Dicamba	EPA 8151	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Dichlorodifluoromethane	EPA 8021	Volatile Organics	NELAP	2/11/2002
Dichlorodifluoromethane	EPA 8260	Volatile Organics	NELAP	2/11/2002

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Analyte	Method	Category	Certification Type	Effective Date
Dichloroprop (Dichlorprop)	EPA 8151	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Dichlorovos (DDVP, Dichlorvos)	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Dieldrin	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Dieldrin	OLM04.2	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Diesel range organics (DRO)	AK-102	Extractable Organics	NELAP	2/11/2002
Diesel range organics (DRO)	EPA 8015	Extractable Organics	NELAP	2/11/2002
Diesel range organics (DRO)	NWTPH-D	Extractable Organics	NELAP	2/11/2002
Diethyl phthalate	EPA 8270	Extractable Organics	NELAP	2/11/2002
Diethyl phthalate	OLM04.2	Extractable Organics	NELAP	2/11/2002
Dimethoate	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Dimethoate	EPA 8270	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Dimethyl phthalate	EPA 8270	Extractable Organics	NELAP	2/11/2002
Dimethyl phthalate	OLM04.2	Extractable Organics	NELAP	2/11/2002
Di-n-butyl phthalate	EPA 8270	Extractable Organics	NELAP	2/11/2002
Di-n-butyl phthalate	OLM04.2	Extractable Organics	NELAP	2/11/2002
Di-n-octyl phthalate	EPA 8270	Extractable Organics	NELAP	2/11/2002
Di-n-octyl phthalate	OLM04.2	Extractable Organics	NELAP	2/11/2002
Dinoseb (2-sec-butyl-4,6-dinitrophenol, DNBP)	EPA 8151	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Dinoseb (2-sec-butyl-4,6-dinitrophenol, DNBP)	EPA 8270	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Endosulfan I	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Endosulfan I	OLM04.2	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Endosulfan II	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Endosulfan II	OLM04.2	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Endosulfan sulfate	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Endosulfan sulfate	OLM04.2	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Endrin	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Endrin	OLM04.2	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Endrin aldehyde	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Endrin aldehyde	OLM04.2	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Endrin ketone	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Endrin ketone	OLM04.2	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
EPN	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Ethion	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Ethoprop	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	2/11/2002

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Ethyl methacrylate	EPA 8260	Volatile Organics	NELAP	2/11/2002
Ethyl methanesulfonate	EPA 8270	Extractable Organics	NELAP	2/11/2002
Ethylbenzene	EPA 8021	Volatile Organics	NELAP	2/11/2002
Ethylbenzene	EPA 8260	Volatile Organics	NELAP	2/11/2002
Ethylbenzene	OLM04.2	Volatile Organics	NELAP	2/11/2002
Famphur	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Famphur	EPA 8270	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Fensulfothion	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Fenthion	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Fluoranthene	EPA 8270	Extractable Organics	NELAP	2/11/2002
Fluoranthene	EPA 8310	Extractable Organics	NELAP	2/11/2002
Fluoranthene	OLM04.2	Extractable Organics	NELAP	2/11/2002
Fluorene	EPA 8270	Extractable Organics	NELAP	2/11/2002
Fluorene	EPA 8310	Extractable Organics	NELAP	2/11/2002
Fluorene	OLM04.2	Extractable Organics	NELAP	2/11/2002
Fluoride	EPA 9056	General Chemistry	NELAP	2/11/2002
gamma-BHC (Lindane, gamma-Hexachlorocyclohexane)	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
gamma-BHC (Lindane, gamma-Hexachlorocyclohexane)	OLM04.2	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
gamma-Chlordane	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Gasoline range organics (GRO)	AK-101	Extractable Organics	NELAP	2/11/2002
Gasoline range organics (GRO)	EPA 8015	Extractable Organics	NELAP	2/11/2002
Gasoline range organics (GRO)	NWTPH-G	Extractable Organics	NELAP	2/11/2002
Heptachlor	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Heptachlor	OLM04.2	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Heptachlor epoxide	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Heptachlor epoxide	OLM04.2	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Hexachlorobenzene	EPA 8270	Extractable Organics	NELAP	2/11/2002
Hexachlorobenzene	OLM04.2	Extractable Organics	NELAP	2/11/2002
Hexachlorobutadiene	EPA 8260	Volatile Organics	NELAP	2/11/2002
Hexachlorobutadiene	EPA 8270	Extractable Organics	NELAP	2/11/2002
Hexachlorobutadiene	OLM04.2	Extractable Organics	NELAP	2/11/2002
Hexachlorocyclopentadiene	EPA 8270	Extractable Organics	NELAP	2/11/2002
Hexachlorocyclopentadiene	OLM04.2	Extractable Organics	NELAP	2/11/2002
Hexachloroethane	EPA 8270	Extractable Organics	NELAP	2/11/2002

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Hexachloroethane	OLM04.2	Extractable Organics	NELAP	2/11/2002
Hexachloropropene	EPA 8270	Extractable Organics	NELAP	2/11/2002
Ignitability	EPA 1010	General Chemistry	NELAP	2/11/2002
Indeno(1,2,3-cd)pyrene	EPA 8270	Extractable Organics	NELAP	2/11/2002
Indeno(1,2,3-cd)pyrene	EPA 8310	Extractable Organics	NELAP	2/11/2002
Indeno(1,2,3-cd)pyrene	OLM04.2	Extractable Organics	NELAP	2/11/2002
Iodomethane (Methyl iodide)	EPA 8260	Volatile Organics	NELAP	2/11/2002
Iron	EPA 6010	Metals	NELAP	2/11/2002
Iron	LTL-7202	Metals	NELAP	2/11/2002
Isobutyl alcohol (2-Methyl-1-propanol)	EPA 8015	Volatile Organics	NELAP	2/11/2002
Isodrin	EPA 8270	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Isophorone	EPA 8270	Extractable Organics	NELAP	2/11/2002
Isophorone	OLM04.2	Extractable Organics	NELAP	2/11/2002
Isopropylbenzene	EPA 8260	Volatile Organics	NELAP	2/11/2002
Isosafrole	EPA 8270	Extractable Organics	NELAP	2/11/2002
Keponc	EPA 8270	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Lead	EPA 6010	Metals	NELAP	2/11/2002
Lead	EPA 6020	Metals	NELAP	2/11/2002
Lead	ILM04.1	Metals	NELAP	2/11/2002
Leptophos	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Magnesium	EPA 6010	Metals	NELAP	2/11/2002
Magnesium	LTL-7202	Metals	NELAP	2/11/2002
Malathion	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Manganese	EPA 6010	Metals	NELAP	2/11/2002
Manganese	EPA 6020	Metals	NELAP	2/11/2002
Manganese	ILM04.1	Metals	NELAP	2/11/2002
MCPA	EPA 8151	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
MCPP	EPA 8151	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Mercury	EPA 6010	Metals	NELAP	2/11/2002
Mercury	EPA 7470	Metals	NELAP	2/11/2002
Mercury	EPA 7471	Metals	NELAP	2/11/2002
Mercury	ILM04.1	Metals	NELAP	2/11/2002
Merphos	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Methacrylonitrile	EPA 8260	Volatile Organics	NELAP	2/11/2002

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Analyte	Method	Category	Certification Type	Effective Date
Methapyrilene	EPA 8270	Extractable Organics	NELAP	2/11/2002
Methoxychlor	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Methoxychlor	OLM04.2	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Methyl bromide (Bromomethane)	EPA 8021	Volatile Organics	NELAP	2/11/2002
Methyl bromide (Bromomethane)	EPA 8260	Volatile Organics	NELAP	2/11/2002
Methyl bromide (Bromomethane)	OLM04.2	Volatile Organics	NELAP	2/11/2002
Methyl chloride (Chloromethane)	EPA 8021	Volatile Organics	NELAP	2/11/2002
Methyl chloride (Chloromethane)	EPA 8260	Volatile Organics	NELAP	2/11/2002
Methyl methacrylate	EPA 8260	Volatile Organics	NELAP	2/11/2002
Methyl methanesulfonate	EPA 8270	Extractable Organics	NELAP	2/11/2002
Methyl parathion (Parathion, methyl)	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Methyl parathion (Parathion, methyl)	EPA 8270	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Methylene chloride	EPA 8021	Volatile Organics	NELAP	2/11/2002
Methylene chloride	EPA 8260	Volatile Organics	NELAP	2/11/2002
Methylene chloride	OLM04.2	Volatile Organics	NELAP	2/11/2002
Mevinphos	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Molybdenum	EPA 6010	Metals	NELAP	2/11/2002
Naled	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Naphthalene	EPA 8260	Volatile Organics	NELAP	2/11/2002
Naphthalene	EPA 8270	Extractable Organics	NELAP	2/11/2002
Naphthalene	EPA 8310	Extractable Organics	NELAP	2/11/2002
Naphthalene	OLM04.2	Extractable Organics	NELAP	2/11/2002
n-Butylbenzene	EPA 8260	Volatile Organics	NELAP	2/11/2002
Nickel	EPA 6010	Metals	NELAP	2/11/2002
Nickel	EPA 6020	Metals	NELAP	2/11/2002
Nickel	ILM04.1	Metals	NELAP	2/11/2002
Nitrate	EPA 9056	General Chemistry	NELAP	2/11/2002
Nitrite	EPA 9056	General Chemistry	NELAP	2/11/2002
Nitrobenzene	EPA 8270	Extractable Organics	NELAP	2/11/2002
Nitrobenzene	EPA 8330	Extractable Organics	NELAP	2/11/2002
Nitrobenzene	OLM04.2	Extractable Organics	NELAP	2/11/2002
Nitroglycerin	LTL-8330 Rev. 10	Extractable Organics	NELAP	2/11/2002
Nitroquinoline-1-oxide	EPA 8270	Extractable Organics	NELAP	2/11/2002
n-Nitrosodiethylamine	EPA 8270	Extractable Organics	NELAP	2/11/2002

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n-Nitrosodimethylamine	EPA 8270	Extractable Organics	NELAP	2/11/2002
n-Nitroso-di-n-butylamine	EPA 8270	Extractable Organics	NELAP	2/11/2002
n-Nitrosodi-n-propylamine	EPA 8270	Extractable Organics	NELAP	2/11/2002
n-Nitrosodi-n-propylamine	OLM04.2	Extractable Organics	NELAP	2/11/2002
n-Nitrosodiphenylamine	EPA 8270	Extractable Organics	NELAP	2/11/2002
n-Nitrosodiphenylamine	OLM04.2	Extractable Organics	NELAP	2/11/2002
n-Nitrosomethylethylamine	EPA 8270	Extractable Organics	NELAP	2/11/2002
n-Nitrosomorpholine	EPA 8270	Extractable Organics	NELAP	2/11/2002
n-Nitrosopiperidine	EPA 8270	Extractable Organics	NELAP	2/11/2002
n-Nitrosopyrrolidine	EPA 8270	Extractable Organics	NELAP	2/11/2002
n-Propylbenzene	EPA 8260	Volatile Organics	NELAP	2/11/2002
o,o,o-Triethyl phosphorothioate	EPA 8270	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	EPA 8330	Extractable Organics	NELAP	2/11/2002
Orthophosphate as P	EPA 9056	General Chemistry	NELAP	2/11/2002
o-Toluidine	EPA 8270	Extractable Organics	NELAP	2/11/2002
Parathion, ethyl	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Parathion, ethyl	EPA 8270	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
p-Dioxane	EPA 8015	Volatile Organics	NELAP	2/11/2002
Pentachlorobenzene	EPA 8270	Extractable Organics	NELAP	2/11/2002
Pentachloronitrobenzene	EPA 8270	Extractable Organics	NELAP	2/11/2002
Pentachlorophenol	EPA 8151	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Pentachlorophenol	EPA 8270	Extractable Organics	NELAP	2/11/2002
Pentachlorophenol	OLM04.2	Extractable Organics	NELAP	2/11/2002
Pentaerythritoltetranitrate	LTL-8330 Rev. 10	Extractable Organics	NELAP	2/11/2002
pH	EPA 9040	General Chemistry	NELAP	2/11/2002
pH	EPA 9045	General Chemistry	NELAP	2/11/2002
Phenacetin	EPA 8270	Extractable Organics	NELAP	2/11/2002
Phenanthrene	EPA 8270	Extractable Organics	NELAP	2/11/2002
Phenanthrene	EPA 8310	Extractable Organics	NELAP	2/11/2002
Phenanthrene	OLM04.2	Extractable Organics	NELAP	2/11/2002
Phenol	EPA 8270	Extractable Organics	NELAP	2/11/2002
Phenol	OLM04.2	Extractable Organics	NELAP	2/11/2002
Phorate	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Phorate	EPA 8270	Pesticides-Herbicides-PCB's	NELAP	2/11/2002

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Analyte	Method	Category	Certification Type	Effective Date
Phosmet (Imidan)	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Picloram	EPA 8151	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Picramic acid	LTL-8303 Rev. 4	Extractable Organics	NELAP	2/11/2002
Picric acid	LTL-8303 Rev. 4	Extractable Organics	NELAP	2/11/2002
p-Isopropyltoluene	EPA 8260	Volatile Organics	NELAP	2/11/2002
Potassium	EPA 6010	Metals	NELAP	2/11/2002
Potassium	LTL-7202	Metals	NELAP	2/11/2002
Pronamide (Kerb)	EPA 8270	Extractable Organics	NELAP	2/11/2002
Propionitrile (Ethyl cyanide)	EPA 8015	Volatile Organics	NELAP	2/11/2002
Pyrene	EPA 8270	Extractable Organics	NELAP	2/11/2002
Pyrene	EPA 8310	Extractable Organics	NELAP	2/11/2002
Pyrene	OLM04.2	Extractable Organics	NELAP	2/11/2002
Pyridine	EPA 8270	Extractable Organics	NELAP	2/11/2002
Pyridine	OLM04.2	Extractable Organics	NELAP	2/11/2002
RDX (hexahydro-1,3,5-trinitro-1,3,5-triazine)	EPA 8330	Extractable Organics	NELAP	2/11/2002
Reactive cyanide	Sec. 7.3 SW-846	General Chemistry	NELAP	2/11/2002
Reactive sulfide	Sec. 7.3 SW-846	General Chemistry	NELAP	2/11/2002
Ronnel	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Safrole	EPA 8270	Extractable Organics	NELAP	2/11/2002
sec-Butylbenzene	EPA 8260	Volatile Organics	NELAP	2/11/2002
Selenium	EPA 6010	Metals	NELAP	2/11/2002
Selenium	ILM04.1	Metals	NELAP	2/11/2002
Selenium	LTL-7202	Metals	NELAP	2/11/2002
Silicon	EPA 6010	Metals	NELAP	2/11/2002
Silver	EPA 6010	Metals	NELAP	2/11/2002
Silver	EPA 6020	Metals	NELAP	2/11/2002
Silver	ILM04.1	Metals	NELAP	2/11/2002
Silvex (2,4,5-TP)	EPA 8151	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Stirofos	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Styrene	EPA 8260	Volatile Organics	NELAP	2/11/2002
Styrene	OLM04.2	Volatile Organics	NELAP	2/11/2002
Sulfate	EPA 9056	General Chemistry	NELAP	2/11/2002
Sulfide	EPA 9030/9034	General Chemistry	NELAP	2/11/2002
Sulfotep	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	2/11/2002

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Analyte	Method	Category	Certification Type	Effective Date
Sulfatepp	EPA 8270	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Synthetic Precipitation Leaching Procedure	EPA 1312	General Chemistry	NELAP	2/11/2002
Terbufos	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
tert-Butylbenzene	EPA 8260	Volatile Organics	NELAP	2/11/2002
Tetrachloroethylene (Perchloroethylene)	EPA 8021	Volatile Organics	NELAP	2/11/2002
Tetrachloroethylene (Perchloroethylene)	EPA 8260	Volatile Organics	NELAP	2/11/2002
Tetrachloroethylene (Perchloroethylene)	OLM04.2	Volatile Organics	NELAP	2/11/2002
Tetryl (methyl-2,4,6-trinitrophenylnitramine)	EPA 8330	Extractable Organics	NELAP	2/11/2002
Thallium	EPA 6010	Metals	NELAP	2/11/2002
Thallium	EPA 6020	Metals	NELAP	2/11/2002
Thallium	ILM04.1	Metals	NELAP	2/11/2002
Thionazin (Zinophos)	EPA 8270	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Tin	EPA 6010	Metals	NELAP	2/11/2002
Tin	LTL-7202	Metals	NELAP	2/11/2002
Tokuthion (Prothiophos)	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Toluene	EPA 8021	Volatile Organics	NELAP	2/11/2002
Toluene	EPA 8260	Volatile Organics	NELAP	2/11/2002
Toluene	OLM04.2	Volatile Organics	NELAP	2/11/2002
Total cyanide	EPA 9012	General Chemistry	NELAP	2/11/2002
Total cyanide	ILM04.1	General Chemistry	NELAP	2/11/2002
Total nitrate-nitrite	EPA 9056	General Chemistry	NELAP	2/11/2002
Total organic carbon	EPA 9060	General Chemistry	NELAP	2/11/2002
Total organic halides (TOX)	EPA 9020	General Chemistry	NELAP	2/11/2002
Total Petroleum Hydrocarbons (TPH)	AK-103	Extractable Organics	NELAP	2/11/2002
Total phenolics	EPA 9066	General Chemistry	NELAP	2/11/2002
Toxaphene (Chlorinated camphene)	EPA 8081	Pesticides-Herbicides-PCB's	STATE	2/11/2002
Toxicity Characteristic Leaching Procedure	EPA 1311	General Chemistry	NELAP	2/11/2002
trans-1,2-Dichloroethylene	EPA 8021	Volatile Organics	NELAP	2/11/2002
trans-1,2-Dichloroethylene	EPA 8260	Volatile Organics	NELAP	2/11/2002
trans-1,2-Dichloroethylene	OLM04.2	Volatile Organics	NELAP	2/11/2002
trans-1,3-Dichloropropylene	EPA 8021	Volatile Organics	NELAP	2/11/2002
trans-1,3-Dichloropropylene	EPA 8260	Volatile Organics	NELAP	2/11/2002
trans-1,3-Dichloropropylene	OLM04.2	Volatile Organics	NELAP	2/11/2002
trans-1,4-Dichloro-2-butene	EPA 8260	Volatile Organics	NELAP	2/11/2002

"STATE" indicates certification for the analyte by the method specified. "NELAP" further indicates certification compliant with the NELAC Standards.

Print Date 8/9/2002 2:08:09 PM

Jeb Bush
 Governor



John O. Agwunobi, M.D., M.B.A.
 Secretary

Laboratory Scope of Accreditation

Page 26 of 26

THIS LISTING OF ACCREDITED ANALYTES SHOULD BE USED ONLY WHEN
 ASSOCIATED WITH A VALID CERTIFICATE

State Laboratory ID: E87617

EPA Lab Code: WA00001

206-767-5060

E87617

Laucks Testing Laboratories, Inc.
 940 South Harney Street
 Seattle, WA 98108

Program RCRA/CERCLA

Analyte	Method	Category	Certification Type	Effective Date
Trichloroethene (Trichloroethylene)	EPA 8021	Volatile Organics	NELAP	2/11/2002
Trichloroethene (Trichloroethylene)	EPA 8260	Volatile Organics	NELAP	2/11/2002
Trichloroethene (Trichloroethylene)	OLM04.2	Volatile Organics	NELAP	2/11/2002
Trichlorofluoromethane	EPA 8021	Volatile Organics	NELAP	2/11/2002
Trichlorofluoromethane	EPA 8260	Volatile Organics	NELAP	2/11/2002
Trichloronate	EPA 8141	Pesticides-Herbicides-PCB's	NELAP	2/11/2002
Vanadium	EPA 6010	Metals	NELAP	2/11/2002
Vanadium	ILM04.1	Metals	NELAP	2/11/2002
Vanadium	LTL-7202	Metals	NELAP	2/11/2002
Vinyl acetate	EPA 8260	Volatile Organics	NELAP	2/11/2002
Vinyl chloride	EPA 8021	Volatile Organics	NELAP	2/11/2002
Vinyl chloride	EPA 8260	Volatile Organics	NELAP	2/11/2002
Vinyl chloride	OLM04.2	Volatile Organics	NELAP	2/11/2002
Xylene (total)	EPA 8021	Volatile Organics	NELAP	2/11/2002
Xylene (total)	EPA 8260	Volatile Organics	NELAP	2/11/2002
Xylene (total)	OLM04.2	Volatile Organics	NELAP	2/11/2002

"STATE" indicates certification for the analyte by the method specified. "NELAP" further
 indicates certification compliant with the NELAC Standards.

Print Date 8/9/2002 2:08:09 PM

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE (Read instructions on the reverse side prior to initiating this form)	DATE 03/13/2003	TRANSMITTAL NO. 02111-1
--	--------------------	----------------------------

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS (This section will be initiated by the contractor)

TO: Cannon AFB Resident Office US Army Corps of Engineers 201 N. Perimeter Rd. Cannon AFB, NM 88103	FROM: Foster Wheeler Environmental C 6605 Uptown Blvd, NE Suite 220 Albuquerque, NM 87110	CONTRACT NO. DACW45-94-D-0003 0035	CHECK ONE: <input checked="" type="checkbox"/> THIS IS A NEW TRANSMITTAL <input type="checkbox"/> THIS IS A RESUBMITTAL OF TRANSMITTAL _____
--	---	---------------------------------------	--

SPECIFICATION SEC. NO. (Cover only one section with each transmittal) 02111	PROJECT TITLE AND LOCATION SWMU 101 - Sewage Lagoons Cannon AFB	CHECK ONE: THIS TRANSMITTAL IS FOR <input type="checkbox"/> FIO <input checked="" type="checkbox"/> GOVT. APPROVAL
--	--	---

ITEM NO.	DESCRIPTION OF ITEM SUBMITTED (Type size, model number/etc.)	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. (See instruction no. 8)	NO. OF COPIES	CONTRACT REFERENCE DOCUMENT		FOR CONTRACTOR USE CODE	VARIATION (See Instruction No. 6)	FOR CE USE CODE
				SPEC. PARA. NO.	DRAWING SHEET NO.			
a.	b.	c.	d.	e.	f.	g.	h.	i.
1	Excavation and Handling Plan	TEST REPORTS	4			B		B

REMARKS B Code is a result of clarification of stockpile locations. It would be greatly appreciated if this submittal could be expedited to facilitated subcontractor start-up.	I certify that the above submitted items have been reviewed in detail and are correct and in the strict conformance with the contract drawings and specifications except as otherwise stated. <div style="text-align: right;"> 3-13-03 NAME AND SIGNATURE OF CONTRACTOR </div>
--	--

SECTION II - APPROVAL ACTION

ENCLOSURES RETURNED (List by item No.)	NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY <div style="text-align: center;"> NAME AND TITLE OF APPROVING AUTHORITY </div>	DATE 3-19-03
--	--	-----------------

SUBMITTAL REVIEW VERIFICATION SHEET

Date: March 13, 2003

Submittal No.: 02111-1

Foster Wheeler Environmental Corporation Stamp

SWMU 101 Sewage Lagoons Closure, Cannon AFB, NM

Certified for approval as indicated below:

- A - Approved as submitted
- B - Approved except as noted on the drawings and/or attached sheets.

It is hereby certified that the (equipment) (material) shown and marked in this submittal is that proposed to be incorporated into Contract Number DACW45-94-D-0003, Delivery Order No. 35, Work Authorization Directive 1 is in compliance with the contract drawings and specifications, can be installed in the allocated spaces, and is submitted for Government approval.

Reviewed/Certified By:


Kathy Omelnik, QC Program Manager

Description of items reviewed: SO-06, Test Reports—Excavation and Handling Plan

U.S. Army Corps of Engineers Stamp

U.S. Army Engineer District, Albuquerque Corps of Engineers

Certified for approval as indicated below:

- A - Approved as submitted.
- B - Approved except as noted on the drawings and/or attached sheet(s). Resubmission not required.
- C - Approved except as noted on the drawings and/or attached sheet(s). Resubmission required.
- D - Will be returned by separate correspondence.
- E - Disapproved; see comments on attached sheet.
- F - Receipt acknowledged.
- G - Other: Specify.

Note: Items approved as to general layout only. Dimensions and quantities checked. Approval does not relieve contractor of responsibilities for errors that may exist, as contractor shall be responsible for dimensions and design of adequate corrections. Details and satisfactory construction of work.

Signature: _____

Date: _____

Reviewer's Signature:


3/14/03

**EXCAVATION AND HANDLING PLAN OF CONTAMINATED MATERIALS
CLOSURE OF SEWAGE LAGOONS, SWMU 101
CANNON AIR FORCE BASE
CLOVIS, NEW MEXICO
(Revision 1)**

**FOSTER WHEELER ENVIRONMENTAL CORPORATION
SUBCONTRACT NO. 045962**

Submitted to:

**Foster Wheeler Environmental Corporation
6605 Uptown Boulevard N.E.
Suite 220
Albuquerque, New Mexico 87110**

Submitted by:



**Arrowhead Contracting, Inc.
12920 Metcalf Avenue, Suite 150
Overland Park, Kansas 66213**

MARCH 11, 2003

Introduction:

This plan describes the equipment and procedures proposed by Arrowhead Contracting, Inc. for the excavation and handling of contaminated material located in both the north and south lagoons. Arrowhead Contracting, Inc. reserves the right to adjust the listed equipment and described procedures in this plan if site conditions change or a more reasonable field tested method is approved by Foster Wheeler Environmental.

Excavation:

South Lagoon:

The subgrade in the south lagoon will be prepared prior to placement of sludge from the north lagoon. This will be accomplished by loosening the soil to a depth of 24-inches and allowed to dry for a minimum of 48 hours. The soil will be loosened using a 4WD tractor pulling a V-ripper attachment with 30-inch rippers. After the soil has sufficiently dried the subgrade will be compacted using a CAT 815F. Compaction efforts will reflect the requirements for compaction in paragraph 3.2 of spec section 02111 in the Final Work Plan.

North Lagoon:

Sludge from the north lagoon will be excavated in 12 inch increments and 12 inches below the bottom of the sludge. The anticipated depth of the sludge is a total of 24 inches. Soil will be loosened using a 4WD tractor pulling an off-set disc to a depth of 12 inches. Once the layer has been loosened and allowed to dry, the material will be stock piled with the use of a CAT D6R LGP dozer. From the stock pile a Komatsu 400 excavator will load articulating off-road dumps for transportation of contaminated material to the south lagoon. The same process will be used for the next anticipated two layers.

ALL STOCK PILES WILL REMAIN WITHIN LAGOON BOUNDARIES TO 3-13-03

Placement and Compaction of Sludge:

As sludge from the north lagoon is being dumped in the south lagoon from the articulating off-road dumps, a CAT D6R LGP dozer will be used to place the sludge as per drawing sheet C-6 of the Final Work Plan. The sludge will be placed in 12 inch lifts and compacted using a CAT 815F compactor. The compaction efforts will reflect the requirement for compaction as required in paragraph 3.5.2 of spec section 02111 of the Final Work Plan.

Safety Issues:

In the event that a piece of equipment is rendered stranded in the excavation, Arrowhead will use a tow cable or cables as required. The cables will be inspected prior to each use and will be rated for the proper capacity depending on the piece of equipment.

Confirmation Sampling and Analysis:

Confirmation samples shall be collected and analyzed according to requirements in paragraph 3.4 of Specification Section 02111 of the Final Work Plan.

MAR 12 2003 15:16

*Brad Jones
USACE-Omaha District
3/14/03*

505 439 0979

PAGE 05

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE <small>(Read instructions on the reverse side prior to initiating this form)</small>	DATE 03/28/2003	TRANSMITTAL NO. 02111-2
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SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS (This section will be initiated by the contractor)

TO: Cannon AFB Resident Office US Army Corps of Engineers 201 N. Perimeter Rd. Cannon AFB, NM 88103	FROM: Foster Wheeler Environmental C 6605 Uptown Blvd, NE Suite 220 Albuquerque, NM 87110 MAR 31 2003	CONTRACT NO. DACW45-94-D-0003_0035
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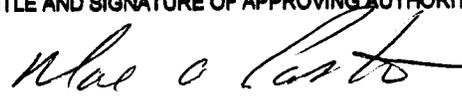
CHECK ONE:
 THIS IS A NEW TRANSMITTAL
 THIS IS A RESUBMITTAL OF TRANSMITTAL _____

SPECIFICATION SEC. NO. (Cover only one section with each transmittal) 02111	PROJECT TITLE AND LOCATION SWMU 101 - Sewage Lagoons Cannon AFB	CHECK ONE: THIS TRANSMITTAL IS FOR <input checked="" type="checkbox"/> FIO <input type="checkbox"/> GOVT. APPROVAL
--	--	---

ITEM NO. <small>a.</small>	DESCRIPTION OF ITEM SUBMITTED <small>(Type size, model number/etc.) b.</small>	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. <small>(See instruction no. 8) c.</small>	NO. OF COPIES <small>d.</small>	CONTRACT REFERENCE DOCUMENT		FOR CONTRACTOR USE CODE <small>g.</small>	VARIATION (See instruction No. 6) <small>h.</small>	FOR CE USE CODE <small>i.</small>
				SPEC. PARA. NO. <small>e.</small>	DRAWING SHEET NO. <small>f.</small>			
2	Topo Survey	SHOP DRAWINGS	3	1.3		A	N	F

REMARKS	<p>I certify that the above submitted items have been reviewed in detail and are correct and in the strict conformance with the contract drawings and specifications except as otherwise stated.</p> <p style="text-align: center;"> NAME AND SIGNATURE OF CONTRACTOR</p>
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SECTION II - APPROVAL ACTION

ENCLOSURES RETURNED (List by Item No.)	NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY 	DATE 01-Apr-03
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SUBMITTAL REVIEW VERIFICATION SHEET

Date: March 28, 2003

Submittal No.: 02111 1.3

Foster Wheeler Environmental Corporation Stamp

SWMU 101 Sewage Lagoons Closure, Cannon AFB, NM	
Certified for approval as indicated below:	
A -	Approved as submitted
B -	Approved except as noted on the drawings and/or attached sheets.
It is hereby certified that the (equipment) (material) shown and marked in this submittal is that proposed to be incorporated into Contract Number DACW45-94-D-0003, Delivery Order No. 35, Work Authorization Directive 1 is in compliance with the contract drawings and specifications, can be installed in the allocated spaces, and is submitted for Government approval.	
Reviewed/Certified By:	 James Morning, CQM
Description of items reviewed: SD-02- Topographic Survey- Pre Excavation Contaminated Soil	

U.S. Army Corps of Engineers Stamp

U.S. Army Engineer District, Albuquerque Corps of Engineers	
Certified for approval as indicated below:	
A -	Approved as submitted.
B -	Approved except as noted on the drawings and/or attached sheet(s). Resubmission not required.
C -	Approved except as noted on the drawings and/or attached sheet(s). Resubmission required.
D -	Will be returned by separate correspondence.
E -	Disapproved; see comments on attached sheet.
<input checked="" type="radio"/> F -	Receipt acknowledged. G - Other: Specify.
Note: Items approved as to general layout only. Dimensions and quantities checked. Approval does not relieve contractor of responsibilities for errors that may exist, as contractor shall be responsible for dimensions and design of adequate corrections. Details and satisfactory construction of work.	
Signature: <u> <i>Alfredo Pasoto</i> </u>	Date: <u> 1-Apr-03 </u>

Reviewer's Signature: _____

SUBMITTAL REVIEW VERIFICATION SHEET

Date: March 28, 2003

Submittal No.: 02111 1.3

Foster Wheeler Environmental Corporation Stamp

SWMU 101 Sewage Lagoons Closure, Cannon AFB, NM Certified for approval as indicated below:	
A -	Approved as submitted
B -	Approved except as noted on the drawings and/or attached sheets.
It is hereby certified that the (equipment) (material) shown and marked in this submittal is that proposed to be incorporated into Contract Number DACW45-94-D-0003, Delivery Order No. 35, Work Authorization Directive 1 is in compliance with the contract drawings and specifications, can be installed in the allocated spaces, and is submitted for Government approval.	
Reviewed/Certified By:	 James Morning, CQM
Description of items reviewed: SD-02- Topographic Survey- Pre Excavation Contaminated Soil	

U.S. Army Corps of Engineers Stamp

U.S. Army Engineer District, Albuquerque Corps of Engineers Certified for approval as indicated below:	
A -	Approved as submitted.
B -	Approved except as noted on the drawings and/or attached sheet(s). Resubmission not required.
C -	Approved except as noted on the drawings and/or attached sheet(s). Resubmission required.
D -	Will be returned by separate correspondence.
E -	Disapproved; see comments on attached sheet.
<input checked="" type="radio"/> F -	Receipt acknowledged. G - Other: Specify.
Note: Items approved as to general layout only. Dimensions and quantities checked. Approval does not relieve contractor of responsibilities for errors that may exist, as contractor shall be responsible for dimensions and design of adequate corrections. Details and satisfactory construction of work.	
Signature: 	Date: 1-Apr-03

Reviewer's Signature: _____

1007 117 2000 U S ARMY CORPS OF ENGINEERS 7 0303 (04-2003) 1007 102

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE <small>(Read instructions on the reverse side prior to initiating this form)</small>	DATE 05/29/2003	TRANSMITTAL NO. 02111-3
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SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS (This section will be initiated by the contractor)

TO: Cannon AFB Resident Office US Army Corps of Engineers 201 N. Perimeter Rd. Cannon AFB, NM 88103	FROM: Foster Wheeler Environmental G 6605 Uptown Blvd, NE Suite 220 Albuquerque, NM 87110	CONTRACT NO. DACW46-94-D-0003 0035 <div style="text-align: center; font-size: 1.2em; font-weight: bold;">JUN 05 2003</div>	CHECK ONE: <input checked="" type="checkbox"/> THIS IS A NEW TRANSMITTAL <input type="checkbox"/> THIS IS A RESUBMITTAL OF TRANSMITTAL
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SPECIFICATION SEC. NO. <small>(Cover only one section with each transmittal)</small> 02111	PROJECT TITLE AND LOCATION SWMU 101 - Sewage Lagoons Cannon AFB	CHECK ONE: THIS TRANSMITTAL IS FOR <input checked="" type="checkbox"/> FCO <input type="checkbox"/> GOVT. APPROVAL
--	---	--

ITEM NO.	DESCRIPTION OF ITEM SUBMITTED <small>(Type, size, model number, etc.)</small>	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. <small>(See instruction no. 8)</small>	NO. OF COPIES	CONTRACT REFERENCE DOCUMENT		FOR CONTRACTOR USE CODE	VARIATION <small>(See instruction No. 6)</small>	FOR CE USE CODE
				SPEC. PARA NO.	DRAWING SHEET NO.			
a.	b.	c.	d.	e.	f.	g.	h.	i.
4	TOPO - Post Excavation and Sample Points	SHOP DRAWINGS	25	1.3		A		A

REMARKS	I certify that the above submitted items have been reviewed in detail and are correct and in the strict conformance with the contract drawings and specifications except as otherwise stated. NAME AND SIGNATURE OF CONTRACTOR
----------------	---

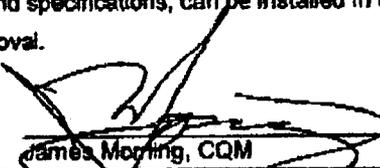
SECTION II - APPROVAL ACTION

ENCLOSURES RETURNED <small>(List by item No.)</small>	NAME/TITLE AND SIGNATURE OF APPROVING AUTHORITY Project Manager	DATE 6/6/03
--	---	-----------------------

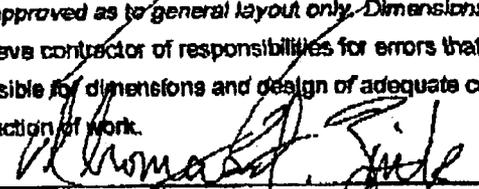
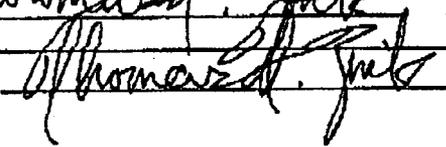
Date: May 29, 2003

Submittal No.: 02111-3

Foster Wheeler Environmental Corporation Stamp

SWMU 101 Sewage Lagoons Closure, Cannon AFB, NM Certified for approval as indicated below:	
A -	Approved as submitted
B -	Approved except as noted on the drawings and/or attached sheets.
It is hereby certified that the (equipment) (material) shown and marked in this submittal is that proposed to be incorporated into Contract Number DACW45-94-D-0003, Delivery Order No. 35, Work Authorization Directive 1 is in compliance with the contract drawings and specifications, can be installed in the allocated spaces, and is submitted for Government approval.	
Reviewed/Certified By:	 James Morning, CQM
Description of items reviewed: SD-02- Topographic Survey- Post Excavation/Sampling Pt's	

U.S. Army Corps of Engineers Stamp

U.S. Army Engineer District, Albuquerque Corps of Engineers Certified for approval as indicated below:	
<input checked="" type="radio"/> A -	Approved as submitted.
B -	Approved except as noted on the drawings and/or attached sheet(s). Resubmission not required.
C -	Approved except as noted on the drawings and/or attached sheet(s). Resubmission required.
D -	Will be returned by separate correspondence.
E -	Disapproved; see comments on attached sheet.
F -	Receipt acknowledged. G - Other: Specify.
Note: Items approved as to general layout only. Dimensions and quantities checked. Approval does not relieve contractor of responsibilities for errors that may exist, as contractor shall be responsible for dimensions and design of adequate corrections. Details and satisfactory construction of work.	
Signature: 	Date: 6/6/03
Reviewer's Signature: 	

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE <small>(Read instructions on the reverse side prior to initiating this form)</small>	DATE 08/14/2003	TRANSMITTAL NO. 02111-4
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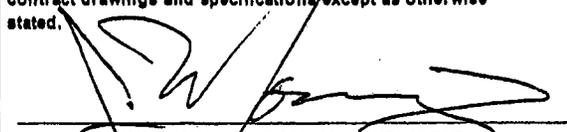
SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS (This section will be initiated by the contractor)

TO: Cannon AFB Resident Office US Army Corps of Engineers 201 N. Perimeter Rd. Cannon AFB, NM 88103	FROM: Foster Wheeler Environmental C 6605 Uptown Blvd, NE Suite 220 Albuquerque, NM 87110	CONTRACT NO. DACW45-94-D-0003 0035
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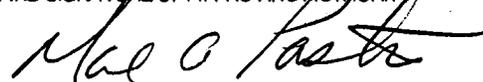
CHECK ONE:
 THIS IS A NEW TRANSMITTAL
 THIS IS A RESUBMITTAL OF TRANSMITTAL _____

SPECIFICATION SEC. NO. (Cover only one section with each transmittal) 02111	PROJECT TITLE AND LOCATION SWMU 101 - Sewage Lagoons Cannon AFB	CHECK ONE: THIS TRANSMITTAL IS FOR <input type="checkbox"/> FIO <input checked="" type="checkbox"/> GOV'T. APPROVAL
--	--	--

ITEM NO.	DESCRIPTION OF ITEM SUBMITTED <small>(Type size, model number/etc.)</small>	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. <small>(See instruction no. 8)</small>	NO. OF COPIES	CONTRACT REFERENCE DOCUMENT		FOR CONTRACTOR USE CODE	VARIATION <small>(See Instruction No. 6)</small>	FOR CE USE CODE
				SPEC. PARA. NO.	DRAWING SHEET NO.			
a.	b.	c.	d.	e.	f.	g.	h.	i.
3	Confirmation Sampling and Analysis	TEST REPORTS	5	3.1.4		A		A

REMARKS Letter Report on results of sampling of North Lagoon post excavation.	I certify that the above submitted items have been reviewed in detail and are correct and in the strict conformance with the contract drawings and specifications except as otherwise stated.  NAME AND SIGNATURE OF CONTRACTOR
--	--

SECTION II - APPROVAL ACTION

ENCLOSURES RETURNED (List by Item No.)	NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY 	DATE 6-18-03
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SUBMITTAL REVIEW VERIFICATION SHEET

Date: June 13, 2003

Submittal No.: 02111-4

Foster Wheeler Environmental Corporation Stamp

SWMU 101 Sewage Lagoons Closure, Cannon AFB, NM Certified for approval as indicated below:	
A - B -	<u>Approved as submitted</u> Approved except as noted on the drawings and/or attached sheets.
It is hereby certified that the (equipment) (material) shown and marked in this submittal is that proposed to be incorporated into Contract Number DACW45-94-D-0003, Delivery Order No. 35, Work Authorization Directive 1 is in compliance with the contract drawings and specifications, can be installed in the allocated spaces, and is submitted for Government approval.	
Reviewed/Certified By: <i>Carol Bieniujis</i> Carol Bieniujis - Technical Reviewer	
Description of items reviewed: SD-08 Test Report 02111- Confirmation sampling and Analysis	

U.S. Army Corps of Engineers Stamp

U.S. Army Engineer District, Albuquerque Corps of Engineers Certified for approval as indicated below:	
A - B - C - D - E - F - G -	Approved as submitted. Approved except as noted on the drawings and/or attached sheet(s). Resubmission not required. Approved except as noted on the drawings and/or attached sheet(s). Resubmission required. Will be returned by separate correspondence. Disapproved; see comments on attached sheet. Receipt acknowledged. Other. Specify.
Note: Items approved as to general layout only. Dimensions and quantities checked. Approval does not relieve contractor of responsibilities for errors that may exist, as contractor shall be responsible for dimensions and design of adequate corrections. Details and satisfactory construction of work.	
Signature: <u><i>James P. Moore</i></u> Date: 18 JUNE 2003 JAMES P. MOORE CENWA-ED-GI, (402) 271-7689	

Reviewer's Signature: *James P. Moore*



FOSTER WHEELER ENVIRONMENTAL CORPORATION

June 12, 2003
TERC-035.001-03X-095

Mr. Tom Zink
U.S. Army Corps of Engineers
Attn: CENWO-MD-HA, 9th Fl
106 South 15th Street
Omaha, NE 68102-1618

Subject: TERC No. DACW45-94-D-003, Delivery Order 35, WAD 1; Remedial Construction of SWMU 101-Sewage Lagoons; Data Evaluation for Confirmation Soil Samples Collected from the North Lagoon, Cannon Air Force Base, New Mexico

Dear Mr. Zink:

The purpose of this letter is to provide results of the risk screening evaluation for confirmation soil samples collected from the North Lagoon of the Sewage Lagoons at Cannon Air Force Base (AFB) in May 2003. Evaluation of the data was completed following guidance from the New Mexico Environment Department (NMED) Hazardous Waste Bureau (HWB) (NMED, 2000).

Sludge and the top 1 foot (ft) of soil was excavated from the North Lagoon from late-March through mid-May 2003. A total of 17 composite samples plus 3 field duplicate samples were collected to a depth of 1 ft within the North Lagoon per Specification 02111, Section 3.1.4. The last composite sample was collected in the southern portion of the lagoon area that was over-excavated to remove obvious contamination which extended deeper than anticipated.

All samples were analyzed for the parameters presented as chemicals of potential concern (COPC) in the risk assessment completed for the corrective measures study (CMS) of the Sewage Lagoons (Foster Wheeler Environmental Corporation [Foster Wheeler Environmental], 2001) and included the following analyses: pesticides, polychlorinated biphenyls, nitrate, and selected metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver). Attachment 1 presents a summary of the analytical results for samples collected to characterize the current conditions of the North Lagoon after the sludge removal effort.

Samples were collected and the data were evaluated according to the NMED-HWB soil-screening level (SSL) guidance (NMED, 2000) for analytes detected in soil samples. Residential SSLs were used to provide conservative estimates of risk. The NMED SSLs do not define unacceptable levels of contamination in soil and sediment rather they identify a level below which there is no need for further concern.



No metals were detected at concentrations greater than background values (Attachment 1). There is some uncertainty in the background values for Cannon AFB because data used to determine site-wide background values for Cannon AFB were not collected in the vicinity of the Sewage Lagoons. As presented in the Basewide background evaluation report (U.S. Air Force [USAF], 1997, Table 6-3), confirmation soil data were compared to background values presented for subsurface soil and soil in the vicinity of Clovis, New Mexico. Arsenic and chromium concentrations exceeded Basewide background values, but did not exceed their respective background values for Clovis. The range of detected concentrations of arsenic and chromium do not indicate anomalous levels attributable to a contaminant source within the former sewage lagoons. Of the metals detected in soil cadmium and silver do not have background values and were taken through the risk assessment process. COPCs for soil samples collected from within the North Lagoon include the following:

- 4,4'-DDD
- Arochlor-1260
- Cadmium
- Silver
- Nitrate

For the evaluation of direct exposure, a ratio of the maximum detected concentration of each COPC and the NMED SSL was calculated, and the ratios for each toxicity endpoint, carcinogenic and noncarcinogenic, were summed. The attached table presents the calculated ratios for COPCs and the risk ratio sums based on the analytical results for soil samples. Neither of the ratio sums for carcinogenic and noncarcinogenic COPCs in confirmation soil samples exceed 1.0; and this indicates that soils within the North Lagoon present an acceptable risk and that receptors will not be adversely affected based on direct exposure. The maximum concentration of nitrate was below the NMED SSL and shows there is no risk due to the presence of nitrate in soil at the present time.

For indirect exposure, the groundwater pathway is eliminated because there is no potential that analytes detected in soil will leach to groundwater under current conditions. A comparison to groundwater protection levels for soil, represented by the dilution-attenuation factor 20 (DAF 20) values, was completed and showed only lead and nitrate were detected at concentrations greater than DAF 20 values (Attachment 1). Concentrations of constituents in soil greater than DAF 20 values indicate a potential for leaching and groundwater quality impact assuming the water table is in contact with the contaminant source. DAF 20 values do not account for the vertical migration of leachate through the vadose zone.

Although lead was detected in soil at concentrations greater than the DAF 20 value, there is a very low probability that this metal will leach to groundwater because of its low solubility, limited mobility, and the depth to groundwater beneath the site. Nitrate is the most soluble and mobile COPC detected in soil at concentrations exceeding groundwater protection levels (DAF 20 values). As part of the CMS for the Sewage Lagoons (Foster Wheeler Environmental, 2001), vadose zone modeling indicated groundwater would not be impacted by leaching contaminants because of the lack of infiltration under realistic climatic conditions. Furthermore, modeling



results indicated that infiltration of leachate would only occur if standing water was stored in the lagoons for a period greater than 3 years. The modeling results indicate infiltration occurs at a rate of 5 feet per year under normal climatic conditions and native soil permeability with a depth to groundwater of 300 ft (Foster Wheeler Environmental, 2001). Based on historical groundwater monitoring data, nitrate concentrations decreased to levels below the regulatory standard for groundwater (10 milligrams per liter) after waste was no longer discharged to the Sewage Lagoons; and nitrate was no longer detected in monitoring wells at the Sewage Lagoons after the lagoons were allowed to dry in 1999. In addition, analytical data for samples collected during the CMS show nitrate concentrations in lagoon sludge and native soil decrease with depth.

Based on the data evaluation, the current condition of the North Lagoon does not impose a risk to human health and the environment and should be considered free of contamination due to previous activities at the site.

If you have any questions or comments, please contact me at (505) 878-8924 or Walt Migdal at (505) 878-8901. Thank you.

Sincerely,
Foster Wheeler Environmental Corporation



Carol L. Bieniulis
Delivery Order Manager

Attachments

cc: B. Jones/USACE, Omaha
M. Pastor/USACE, Cannon AFB
P. Zamie/USAF, Cannon AFB
W. Migdal/FWENC, Albuquerque
J. Morning/FWENC, Cannon AFB
K. Omerik/FWENC, Denver
S. Seyedian/FWENC, Denver
G. Wallace/Arrowhead Contracting
A. Mathena/Arrowhead Contracting
TERC-4 Program File



References

- Foster Wheeler Environmental, 2001. *Corrective Measures Study for SWMU 101—Sewage Lagoons, Cannon Air Force Base, New Mexico*. Revised Final, April 2001.
- NMED, 2000. *Technical Background Document for Development of Soil Screening Levels, Hazardous Waste Bureau and Ground Water Quality Bureau Voluntary Remediation Program*. December 2000, with an update in January 2001 for SSLs of selected chemicals.
- USAF, 1997. *Naturally Occurring Concentrations of Inorganics and Background Concentrations of Pesticides at Cannon Air Force Base, New Mexico*, September 1997.



Attachment 1. Summary of Analytical Results and Risk Evaluation for Soil Samples Collected from the North Lagoon

Chemicals of Potential Concern	Sample Detection Frequency	Background Values (mg/kg) ^a	NMED SSL (mg/kg) ^c	Toxicity Endpoint	Minimum Detected Concentration (mg/kg)	Maximum Detected Concentration (mg/kg)	Maximum > Bkgd?	Carcinogen Ratio of Maximum to NMED SSL	Noncarcinogen Ratio of Maximum to NMED SSL	DAF 20 Value (mg/kg)
Pesticides/PCBs										
4,4'-DDD	1/20	--	24	ca	0.0019	0.0019	--	0.00008		60
Aroclor-1260	1/20	--	1.1	nc	0.064	0.064	--		0.06	2
Metals and Nitrate										
Arsenic	20/20	3.6/6.5	3.9	ca	3.6	5.3	No	--	--	60
Barium	20/20	805/500	5200	nc	87.2	726	No	--	--	800
Cadmium	14/20	NA	70	nc	0.05	0.49	NA	--	0.007	20
Chromium	20/20	11.1/30	230	nc	10	18.7	No	--	--	20
Lead	20/20	7.1/15	400	nc	4.9	9.1	No	--	--	0.2
Mercury	20/20	0.082 ^b	23	nc	0.004	0.04	No	--	--	2
Nitrate	20/20	NA	98000	max	20	240	NA	--	< SSL	30
Selenium	3/20	1.1/0.3	380	nc	0.33	0.37	No	--	--	5
Silver	2/20	NA	380	nc	0.19	0.49	NA	--	0.001	8

Sum of Carcinogen Ratios	0.00008	--
Sum of Noncarcinogen Ratios	--	0.07

Notes:

- ^a Two background values are listed. The first value is specific to Cannon AFB (USAF, 1997). The second value represents Clovis, NM (USAF, 1997).
- ^b Clovis, NM background value (USAF, 1997).
- ^c Provided in guidance from NMED (2000).

Bkgd - Cannon AFB and/or Clovis, NM soil background value

ca - Carcinogen

DAF 20 - Dilution-attenuation factor 20

max - Maximum level allowed by EPA for low-toxicity contaminant (NMED, 2001)

mg/kg - Milligrams per kilogram

N/A - Value not available

nc - Noncarcinogen

SSL - Soil-screening level

SUBMITTAL REVIEW VERIFICATION SHEET

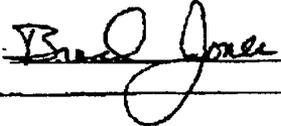
Date: April 16, 2003

Submittal No.: 02115-1

Foster Wheeler Environmental Corporation Stamp

SWMU 101 Sewage Lagoons Closure, Cannon AFB, NM Certified for approval as indicated below:	
A -	Approved as submitted
B -	Approved except as noted on the drawings and/or attached sheets.
It is hereby certified that the (equipment) (material) shown and marked in this submittal is that proposed to be incorporated into Contract Number DACW45-04-D-0003, Delivery Order No. 35, Work Authorization Directive 1 is in compliance with the contract drawings and specifications, can be installed in the allocated spaces, and is submitted for Government approval.	
Reviewed/Certified By:	 Kathy Omerik, QC Program Manager
Description of items reviewed: SD-06, Test Reports—Excavation and Handling Plan	

U.S. Army Corps of Engineers Stamp

U.S. Army Engineer District, Albuquerque Corps of Engineers Certified for approval as indicated below:	
A -	Approved as submitted.
B -	Approved except as noted on the drawings and/or attached sheet(s). Resubmission not required.
C -	Approved except as noted on the drawings and/or attached sheet(s). Resubmission required.
D -	Will be returned by separate correspondence.
E -	Disapproved; see comments on attached sheet.
F -	Receipt acknowledged.
G -	Other: Specify.
Note: Items approved as to general layout only. Dimensions and quantities checked. Approval does not relieve contractor of responsibilities for errors that may exist, as contractor shall be responsible for dimensions and design of adequate corrections. Details and satisfactory construction of work.	
Signature: 	Date: 4-23-03

Reviewer's Signature: _____

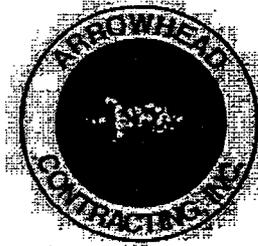
**EXCAVATION AND HANDLING PLAN FOR BIOTA BARRIER LAYER
CLOSURE OF SEWAGE LAGOONS, SWMU 101
CANNON AIR FORCE BASE
CLOVIS, NEW MEXICO
(Revision 0)**

**FOSTER WHEELER ENVIRONMENTAL CORPORATION
SUBCONTRACT NO. 045962**

Submitted to:

**Foster Wheeler Environmental Corporation
6605 Uptown Boulevard N.E.
Suite 220
Albuquerque, New Mexico 87110**

Submitted by:



**Arrowhead Contracting, Inc.
12920 Metcalf Avenue, Suite 150
Overland Park, Kansas 66213**

MARCH 5, 2003

Introduction:

This plan describes the equipment and procedures proposed by Arrowhead Contracting, Inc. for the placement of the biota barrier layer. Arrowhead Contracting, Inc. reserves the right to adjust the listed equipment and described procedures in this plan if site conditions change or a more reasonable field tested method is approved by Foster Wheeler Environmental.

Material:

The material for the Biota Barrier Layer will be comprised from the stockpile located east of the lagoons and supplemented by an offsite source. All material will meet the requirements as specified in the project work plan.

Transportation:

The material located in the stockpile east of the lagoons will be transported via articulating off-road dumps.

The material being provided by an off-site vendor will arrive in end-dump trucks. It is anticipated that the delivery of this material will begin prior to the completion of the soil barrier layer. The material will be placed as close to the south lagoon project area as possible in the Contractor's Staging Area or other approved location. From the stockpile the material will be transported to the project area via articulating off-road dumps. As the work on the Biota Barrier Layer progresses, the end-dumps may be able to back onto the previously placed base.

Placement:

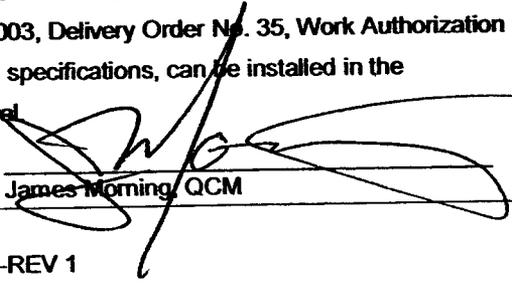
As the recycled concrete is delivered to the project work area in either articulating off-road dumps or end-dump trucks, a CAT D6R LGP Dozer will push the material into place. As per spec section 02115 in the Final Work Plan, the Biota Barrier Layer will be placed in one lift of a minimum thickness of 15 inches and maximum thickness of 18 inches. Following placement of the material, compaction will be performed using an Ingorsol Rand SD110 smooth drum compactor. Two passes will be made by the compactor to ensure the compaction requirements in spec section 02115 are met.

SUBMITTAL REVIEW VERIFICATION SHEET

Date: July 23, 2003

Submittal No.: 02115 1.4 Rev 1

Foster Wheeler Environmental Corporation Stamp

SWMU 101 Sewage Lagoons Closure, Cannon AFB, NM Certified for approval as indicated below:	
A -	Approved as submitted
B -	Approved except as noted on the drawings and/or attached sheets.
It is hereby certified that the (equipment) (material) shown and marked in this submittal is that proposed to be incorporated into Contract Number DACW45-94-D-0003, Delivery Order No. 35, Work Authorization Directive 1 is in compliance with the contract drawings and specifications, can be installed in the allocated spaces, and is submitted for Government approval	
Reviewed/Certified By:	 James Morning, QCM
Description of items reviewed: Biota Barrier Handling Plan-REV 1	

U.S. Army Corps of Engineers Stamp

U.S. Army Engineer District, Albuquerque Corps of Engineers Certified for approval as indicated below:	
A -	Approved as submitted.
B -	Approved except as noted on the drawings and/or attached sheet(s). Resubmission not required.
C -	Approved except as noted on the drawings and/or attached sheet(s). Resubmission required.
D -	Will be returned by separate correspondence.
E -	Disapproved; see comments on attached sheet.
F -	Receipt acknowledged.
G -	Other: Specify.
Note: Items approved as to general layout only. Dimensions and quantities checked. Approval does not relieve contractor of responsibilities for errors that may exist, as contractor shall be responsible for dimensions and design of adequate corrections. Details and satisfactory construction of work.	
Signature: _____	Date: _____

Reviewer's Signature: _____

Introduction:

This plan describes the equipment and procedures proposed by Arrowhead Contracting, Inc. for the placement of the biota barrier layer. Arrowhead Contracting, Inc. reserves the right to adjust the listed equipment and described procedures in this plan if site conditions change or a more reasonable field tested method is approved by Foster Wheeler Environmental.

Material:

The material for the Biota Barrier Layer will be comprised from the stockpile located east of the lagoons and supplemented by an offsite source. All material will meet the requirements as specified in the project work plan.

Transportation:

The material located in the stockpile east of the lagoons will be transported via articulating off-road dumps.

The material being provided by an off-site vendor will arrive in end-dump trucks. It is anticipated that the delivery of this material will begin prior to the completion of the soil barrier layer. The material will be placed as close to the south lagoon project area as possible in the Contractor's Staging Area or other approved location. From the stockpile the material will be transported to the project area via articulating off-road dumps. As the work on the Biota Barrier Layer progresses, the end-dumps may be able to back onto the previously placed base.

Placement:

As the recycled concrete is delivered to the project work area in either articulating off-road dumps or end-dump trucks, a CAT D6R LGP Dozer will push the material into place. As per spec section 02115 in the Final Work Plan, the Biota Barrier Layer will be placed in one lift of a minimum thickness of 15 inches and maximum thickness of 18 inches. Following placement of the material, compaction will be performed using an Ingorsol Rand SD110 smooth drum compactor. Two passes will be made by the compactor to ensure the compaction requirements in spec section 02115 are met.

TERC CONTRACT NO.: DACW45-94-D-0003

DELIVERY ORDER: 35

PROJECT TITLE AND LOCATION: Work Plan for the Closure of SWMU 101 - Sewage Lagoons, Cannon AFB

FIELD CHANGE REQUEST

PROJECT Closure of SWMU 101 Sewage Lagoons	PROJ. NO. 5155.0035.0001	FIELD CHANGE NO. 6
TO <u>Tom Zink</u>	DEPT. <u>USACE</u>	LOCATION <u>Omaha</u>
RE: DRAWING NO. _____	TITLE <u>Biota Barrier Layer</u>	DATE <u>6/16/03</u>
<input checked="" type="checkbox"/> SPEC NO. <u>02115</u>	TITLE _____	_____
<input type="checkbox"/> OTHER _____	_____	_____

DESCRIPTION (Items involved, submit sketch if applicable). Due to the amount of fine material in the crushed concrete stockpile at SWMU 97 (LF-25), imported material will be required to meet the 3 inch to 6 inch specification. The biota barrier will be placed in two lifts to facilitate the existing material. The bottom lift will consist of the 3 inch to 6-inch material and the top lift will consist of the SWMU 97 crushed concrete stockpile as discussed in DCN 2. It is anticipated that the additional cost of 2 lifts will be accomplished within the current project budget.

3. RECOMMENDED DISPOSITION MINOR CHANGE MAJOR CHANGE

Place crushed concrete from SWMU 97 (LF-25) stockpile and imported biota barrier material in two lifts, per DCN 2.

RESIDENT ENGINEER or designee (Signature)	DATE	PROJECT SUPV CONCURRENCE (Signature)	DATE
Max Pastor <i>M. Pastor</i>	6-18-03	James Morning <i>J. Morning</i>	6/18/03

5. DISPOSITION

NOT APPROVED (Give Reason)

CONSIDERED MINOR CHANGE - Approval per Recommended Disposition - Design Documents will not be normally revised; field to Maintain as-built records

CONSIDERED MAJOR CHANGE - Action will be taken as prescribed on DCN -

LEAD DISCIPLINE ENGINEER OR DESIGNEE (Signature)	DATE	PROJECT ENGR OR DESIGNEE (Signature)	DATE

Project Engineer signs and returns to LDE for transmittal to Resident Engineer with copies to:

- Cc:
- M. Pastor, USACE-Albuquerque
- J. Davey, USACE-Omaha
- C. Bieniulis/TTFWI, Albuquerque
- R. Ederer/TTFWI, Albuquerque
- W. Migdal/TTFWI, Albuquerque
- J. Morning/TTFWI, Cannon AFB
- K. Omernik/TTFWI, Denver
- SW TERC Project Files (DO 35 Wad 1)

Addendum

Material:

The material from the off-site source will meet the specification requirements. To ensure the off-site source meets specification requirements, including being free of objectionable material, a two-step procedure of manually picking out objectionable material as the product is produced at the production facility, and manually picking out objectionable material as it is placed on-site. By following this two-step procedure Arrowhead will be able to ensure the off-site material will meet specification requirements.

Placement:

A field change in the construction of the biota layer will be implemented to ensure proper coverage from both on-site and off-site material is achieved. The off-site material will be placed first in a 9" lift following the same procedure as described in the originally approved work plan for the construction of the Biota Layer. The on-site material will be placed in a 9" lift on top of the off-site material for a total depth of 18" for the Biota layer.

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE <small>(Read instructions on the reverse side prior to initiating this form)</small>		DATE 08/18/2003	TRANSMITTAL NO. 02115-3
---	--	--------------------	----------------------------

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS (This section will be initiated by the contractor)

TO: Cannon AFB Resident Office US Army Corps of Engineers 201 N. Perimeter Rd. Cannon AFB, NM 88103	FROM: Foster Wheeler Environmental C 6805 Uptown Blvd, NE Suite 220 Albuquerque, NM 87110	CONTRACT NO. DACW45-94-D-0003 0035	CHECK ONE: <input checked="" type="checkbox"/> THIS IS A NEW TRANSMITTAL <input type="checkbox"/> THIS IS A RESUBMITTAL OF TRANSMITTAL
--	---	---------------------------------------	--

SPECIFICATION SEC. NO. (Cover only one section with each transmittal) 02115	PROJECT TITLE AND LOCATION SWMU 101 - Sewage Lagoons Cannon AFB	CHECK ONE: THIS TRANSMITTAL IS FOR <input type="checkbox"/> FIG <input checked="" type="checkbox"/> GOVT. APPROVAL
--	--	--

ITEM NO.	DESCRIPTION OF ITEM SUBMITTED <small>(Type size, model number/etc.)</small>	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. <small>(See instruction no. 8)</small>	NO. OF COPIES	CONTRACT REFERENCE DOCUMENT		FOR CONTRACTOR USE CODE	VARIATION <small>(See instruction No. 8)</small>	FOR CE USE CODE
				SPEC. PARA. NO.	DRAWING SHEET NO.			
a.	b.	c.	d.	e.	f.	g.	h.	i.
2	Topo Survey Post South	SHOP DRAWINGS	3	1.3				A

REMARKS This is a partial survey of the Biota Barrier Layer- Know as the South half. North half to be submitted separately.	I certify that the above submitted items have been reviewed in detail and are correct and in the strict conformance with the contract drawings and specifications except as otherwise stated. JAMES MORNING OCM NAME AND SIGNATURE OF CONTRACTOR
--	---

SECTION II - APPROVAL ACTION

ENCLOSURES RETURNED (List by Item No.)	NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY Nate Roberts	DATE 9-22-03
--	--	-----------------

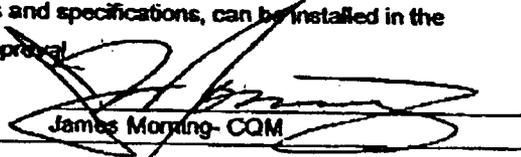
09/22/2003 10:20 402+221+7848 → 85057842663 NO. 899 P02

SUBMITTAL REVIEW VERIFICATION SHEET

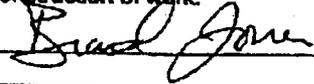
Date: Sept 18, 2003

Submittal No.: 02115-3

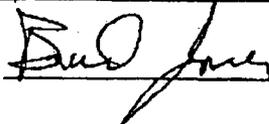
Foster Wheeler Environmental Corporation Stamp

SWMU 101 Sewage Lagoons Closure, Cannon AFB, NM Certified for approval as indicated below.	
<input checked="" type="radio"/> A -	Approved as submitted
<input type="radio"/> B -	Approved except as noted on the drawings and/or attached sheets.
It is hereby certified that the (equipment) (material) shown and marked in this submittal is that proposed to be incorporated into Contract Number DACW45-94-D-0003, Delivery Order No. 35, Work Authorization Directive 1 is in compliance with the contract drawings and specifications, can be installed in the allocated spaces, and is submitted for Government approval.	
Reviewed/Certified By:	 James Morning-CQM
Description of items reviewed: TOPO Post Biota Barrier Placement (South Half) - Test Reports SD06	

U.S. Army Corps of Engineers Stamp

U.S. Army Engineer District, Albuquerque Corps of Engineers Certified for approval as indicated below:	
<input checked="" type="radio"/> A -	Approved as submitted.
<input type="radio"/> B -	Approved except as noted on the drawings and/or attached sheet(s). Resubmission not required.
<input type="radio"/> C -	Approved except as noted on the drawings and/or attached sheet(s). Resubmission required.
<input type="radio"/> D -	Will be returned by separate correspondence.
<input type="radio"/> E -	Disapproved; see comments on attached sheet.
<input type="radio"/> F -	Receipt acknowledged.
<input type="radio"/> G -	Other: Specify.
Note: Items approved as to general layout only. Dimensions and quantities checked. Approval does not relieve contractor of responsibilities for errors that may exist, as contractor shall be responsible for dimensions and design of adequate corrections. Details and satisfactory construction of work.	
Signature: 	Date: 9-22-03

Reviewer's Signature:



TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE <small>(Read instructions on the reverse side prior to initiating this form)</small>	DATE 11/04/2003	TRANSMITTAL NO. 02115-4
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SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS (This section will be initiated by the contractor)

TO: Cannon AFB Resident Office US Army Corps of Engineers 201 N. Perimeter Rd. Cannon AFB, NM 88103	FROM: Foster Wheeler Environmental C 6605 Uptown Blvd, NE Suite 220 Albuquerque, NM 87110	CONTRACT NO. DACW45-94-D-0003 0035
--	---	---------------------------------------

CHECK ONE:
 THIS IS A NEW TRANSMITTAL
 THIS IS A RESUBMITTAL OF TRANSMITTAL _____

SPECIFICATION SEC. NO. (Cover only one section with each transmittal) 02115	PROJECT TITLE AND LOCATION SWMU 101 - Sewage Lagoons Cannon AFB
--	--

CHECK ONE: THIS TRANSMITTAL IS FOR FIO GOVT. APPROVAL

ITEM NO.	DESCRIPTION OF ITEM SUBMITTED <small>(Type size, model number/etc.)</small>	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. <small>(See instruction no. 8)</small>	NO. OF COPIES	CONTRACT REFERENCE DOCUMENT		FOR CONTRACTOR USE CODE	VARIATION <small>(See instruction No. 8)</small>	FOR GE USE CODE
				SPEC. PARA. NO.	DRAWING SHEET NO.			
a.	b.	c.	d.	e.	f.	g.	h.	i.
5	TOPO Survey Post East	SHOP DRAWINGS	3	1.3		B		B

REMARKS
 This is a partial survey being submitted for the EAST slope area. Previously approved partial survey was for South and West slopes.
 This partial surveys shows 2 elevations on the north end (high lighted) as being 1 ft and .07 short of cover when compared to Soil Barrier Survey.(elevations (4280.8 & 4283.8) This area is on the most northern section and was not completely covered during survey event. These 2 points (elevations) will be completed and included and in the North slope survey. Resulting with a " B Code "
 The purpose of the partial survey is to allow ongoing placement of erosion vegetation layer in order to expedite schedule. This

I certify that the above submitted items have been reviewed in detail and are correct and in the strict conformance with the contract drawings and specifications except as otherwise stated.
JAMES MORAN

 NAME AND SIGNATURE OF CONTRACTOR

SECTION II - APPROVAL ACTION

ENCLOSURES RETURNED (List by item No.)	NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY <i>Mae a Post</i>	DATE 11-7-03
--	---	-----------------

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR
MANUFACTURER'S CERTIFICATES OF COMPLIANCE

(Read instructions on the reverse side prior to initiating this form)

DATE

11/04/2003

TRANSMITTAL NO.

02115-4

SECTION I - REMARKS CONTINUED...

(This section will be initiated by the contractor)

area identified will not be covered with next layer until next survey is approved. The SE corner elevation of 4277.9 (high lighted) is located at the very outer corner and is not part of cover area.

USACE-Omaha Remarks

Biota barrier thickness insufficient along SE $\frac{1}{2}$ SW corners of the South Lagoon, as shown on the attached "Partial Biota Barrier Layer" Survey, dated 11-4-03. Minimum required thickness = 15" per Specification Section 02115.

Submittal approved for Topsoil placement only in areas where biota barrier thickness meets minimum thickness requirement. Areas where biota barrier thickness is insufficient must be corrected to meet Specification requirements before placing Topsoil.

Brad Jones

SECTION II - APPROVAL ACTION

ENCLOSURES RETURNED (List by Item No.)

NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY

DATE

SUBMITTAL REVIEW VERIFICATION SHEET

Date: Dec 29, 2003

Submittal No.: 02115-5

Foster Wheeler Environmental Corporation Stamp

SWMU 101 Sewage Lagoons Closure, Cannon AFB, NM

Certified for approval as indicated below:

- A - Approved as submitted
B - Approved except as noted on the drawings and/or attached sheets.

It is hereby certified that the (equipment) (material) shown and marked in this submittal is that proposed to be incorporated into Contract Number DACW45-94-D-0003, Delivery Order No. 35, Work Authorization Directive 1 is in compliance with the contract drawings and specifications, can be installed in the allocated spaces, and is submitted for Government approval.

Reviewed/Certified By:

Walter M. Sidel
Walt Sidel
James Morning- CQM

Description of items reviewed: TOPO Survey Post North Biota NW Final

U.S. Army Corps of Engineers Stamp

U.S. Army Engineer District, Albuquerque Corps of Engineers

Certified for approval as indicated below:

- A - Approved as submitted.
B - Approved except as noted on the drawings and/or attached sheet(s). Resubmission not required.
C - Approved except as noted on the drawings and/or attached sheet(s). Resubmission required.
D - Will be returned by separate correspondence.
E - Disapproved; see comments on attached sheet.
F - Receipt acknowledged.
G - Other: Specify.

Note: Items approved as to general layout only. Dimensions and quantities checked. Approval does not relieve contractor of responsibilities for errors that may exist, as contractor shall be responsible for dimensions and design of adequate corrections. Details and satisfactory construction of work.

Signature: *Brad Jones*

Date: 1-8-04

Reviewer's Signature: *Brad Jones*

SUBMITTAL REVIEW VERIFICATION SHEET

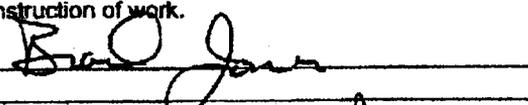
Date: Nov 20, 2003

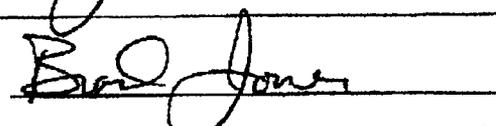
Submittal No.: 02115-6

Foster Wheeler Environmental Corporation Stamp

SWMLJ 101 Sewage Lagoons Closure, Cannon AFB, NM	
Certified for approval as indicated below:	
<input checked="" type="radio"/> B	Approved as submitted Approved except as noted on the drawings and/or attached sheets.
It is hereby certified that the (equipment) (material) shown and marked in this submittal is that proposed to be incorporated into Contract Number DACW45-94-D-0003, Delivery Order No. 35. Work Authorization Directive 1 is in compliance with the contract drawings and specifications, can be installed in the allocated spaces, and is submitted for Government approval.	
Reviewed/Certified By:	 James Morning - CQM
Description of Items reviewed: TOPO Survey Post North Slope East Blota	

U.S. Army Corps of Engineers Stamp

U.S. Army Engineer District, Albuquerque Corps of Engineers	
Certified for approval as indicated below:	
<input checked="" type="radio"/> B	Approved except as noted on the drawings and/or attached sheet(s). Resubmission not required.
C -	Approved except as noted on the drawings and/or attached sheet(s). Resubmission required.
D -	Will be returned by separate correspondence.
<input checked="" type="radio"/> E -	Disapproved; see comments on attached sheet. <i>(See Attached Comment)</i>
F -	Receipt acknowledged.
G -	Other: Specify.
Note: Items approved as to general layout only. Dimensions and quantities checked. Approval does not relieve contractor of responsibilities for errors that may exist, as contractor shall be responsible for dimensions and design of adequate corrections. Details and satisfactory construction of work.	
Signature: 	Date: 11-24-03

Reviewer's Signature: 

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE		DATE 12/04/2003	TRANSMITTAL NO. 02115-6
PROJECT TITLE	SWMU 101 - Sewage Lagoons	CONTRACT NO. DACW45-94-D-0003 0035	PAGE 1 of 1
LOCATION	Cannon AFB		

Item	Description	Variation	QA Code
6	TOPO Survey Post North Slope (East)	No	B

SECTION III - GOVERNMENT REVIEW REMARKS

Sent to Brad Jones - Omaha District COE

As-built survey shows inadequate thickness of biota barrier material in areas along the northeast, east, south, and west boundaries. Reference Partial Biota Barrier Layer Topographic Survey prepared by Hagar & Associates, P.C., dated 11/17/03.

Upon conversation with Contractor it is determined that the proper cover exists but there appears to be some confusion about the extents of the sludge layer. When the final as-builts are submitted the drawings shall depict where the boundaries of the sludge is.

**Sewage Lagoons Closure Project
Cannon AFB**

Transmittal No. 02115-6

Comment

As-built survey shows inadequate thickness of biota barrier material in areas along the northeast, east, south, and west boundaries. Reference Partial Biota Barrier Layer Topographic Survey prepared by Hagar & Associates, P.C., dated 11/17/03.

Brad Jones

SUBMITTAL REVIEW VERIFICATION SHEET

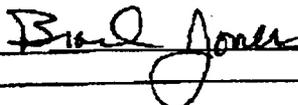
Date: April 16, 2003

Submittal No.: 02140-1

Foster Wheeler Environmental Corporation Stamp

SWMU 10+ Sewage Lagoons Closure, Cannon AFB, NM Certified for approval as indicated below:	
A -	Approved as submitted
B -	Approved except as noted on the drawings and/or attached sheets.
It is hereby certified that the (equipment) (material) shown and marked in this submittal is that proposed to be incorporated into Contract Number DACW45-94-D-0003, Delivery Order No. 35, Work Authorization Directive 1 is in compliance with the contract drawings and specifications, can be installed in the allocated spaces, and is submitted for Government approval.	
Reviewed/Certified By:	 Kathy Omerick, QC Program Manager
Description of items reviewed: SD-06, Test Reports—Materials Handling Plan	

U.S. Army Corps of Engineers Stamp

U.S. Army Engineer District, Albuquerque Corps of Engineers Certified for approval as indicated below:	
A -	Approved as submitted.
<input checked="" type="radio"/> B -	Approved except as noted on the drawings and/or attached sheet(s). Resubmission not required.
C -	Approved except as noted on the drawings and/or attached sheet(s). Resubmission required.
D -	Will be returned by separate correspondence.
E -	Disapproved; see comments on attached sheet.
F -	Receipt acknowledged.
G -	Other: Specify.
Note: Items approved as to general layout only. Dimensions and quantities checked. Approval does not relieve contractor of responsibilities for errors that may exist, as contractor shall be responsible for dimensions and design of adequate corrections. Details and satisfactory construction of work.	
Signature: 	Date: 4-23-03

Reviewer's Signature: _____

**MATERIAL HANDLING PLAN FOR EROSION/VEGETATION LAYER
CLOSURE OF SEWAGE LAGOONS, SWMU 101
CANNON AIR FORCE BASE
CLOVIS, NEW MEXICO
(Revision 0)**

**FOSTER WHEELER ENVIRONMENTAL CORPORATION
SUBCONTRACT NO. 045962**

Submitted to:

**Foster Wheeler Environmental Corporation
6605 Uptown Boulevard N.E.
Suite 220
Albuquerque, New Mexico 87110**

Submitted by:



**Arrowhead Contracting, Inc.
12920 Metcalf Avenue, Suite 150
Overland Park, Kansas 66213**

MARCH 5, 2003

Introduction:

This plan describes the equipment and procedures proposed by Arrowhead Contracting, Inc. for the material and handling of the placement and compaction of the erosion/vegetation layer. Arrowhead Contracting, Inc. reserves the right to adjust the listed equipment and described procedures in this plan if site conditions change or a more reasonable field tested method is approved by Foster Wheeler Environmental.

Material Delivery:

All soil for the erosion/vegetation layer will be provided from an off-site source that has been previously approved by Foster Wheeler Environmental. Approval of the soil source will be provided based on a Borrow Source Assessment as described in Part 3 of spec section 02140 of the Final Work Plan.

The soil material will be delivered to the jobsite in end-dump trucks. The trucks will begin dumping the soil on the north side of the south lagoon area and continue to dump working in a southerly direction as placement progresses. At no time will the end-dumps be driving over placed soil.

Placement and Compaction:

As soil is dumped from the delivery trucks, a CAT D6R LGP dozer will be used to place the soil in 6 inch lifts. After placement of the soil is completed, the lift will be traffic compacted with the dozer as per paragraph 3.2.1 of spec section 02140 of the Final Work Plan. The ground pressure from the dozer will be 4.94 psi.

Caterpillar Performance Handbook

Edition 30

CATERPILLAR®

SUBMITTAL REVIEW VERIFICATION SHEET

Date: Sept 18, 2003

Submittal No.: 02140-2

Foster Wheeler Environmental Corporation Stamp

SWMU 101 Sewage Lagoons Closure, Cannon AFB, NM

Certified for approval as indicated below:

- A - Approved as submitted
- B - Approved except as noted on the drawings and/or attached sheets.

It is hereby certified that the (equipment) (material) shown and marked in this submittal is that proposed to be incorporated into Contract Number DACW45-94-D-0003, Delivery Order No. 35, Work Authorization Directive 1 is in compliance with the contract drawings and specifications, can be installed in the allocated spaces, and is submitted for Government approval.

Reviewed/Certified By:

James Morning - CQM

Description of items reviewed: SD-06 Test Reports-Borrow Source Assessment Erosion/Vegetation layer

U.S. Army Corps of Engineers Stamp

U.S. Army Engineer District, Albuquerque Corps of Engineers

Certified for approval as indicated below:

- A - Approved as submitted.
- B - Approved except as noted on the drawings and/or attached sheet(s). Resubmission not required.
- C - Approved except as noted on the drawings and/or attached sheet(s). Resubmission required.
- D - Will be returned by separate correspondence.
- E - Disapproved; see comments on attached sheet.
- F - Receipt acknowledged.
- G - Other: Specify.

Note: Items approved as to general layout only. Dimensions and quantities checked. Approval does not relieve contractor of responsibilities for errors that may exist, as contractor shall be responsible for dimensions and design of adequate corrections. Details and satisfactory construction of work.

Signature: *Brad Jones*

Date: *9-22-03*

Reviewer's Signature: *Brad Jones*

Memo

To: James Morning
Foster Wheeler Environmental Corporation

From: Aaron Mathena

CC: Greg Wallace

Date: 9/9/03

Re: Sewage Lagoons Remediation Project, Cannon AFB
Subcontract No. 045962
Submittal Borrow Source Assessment – Top Soil

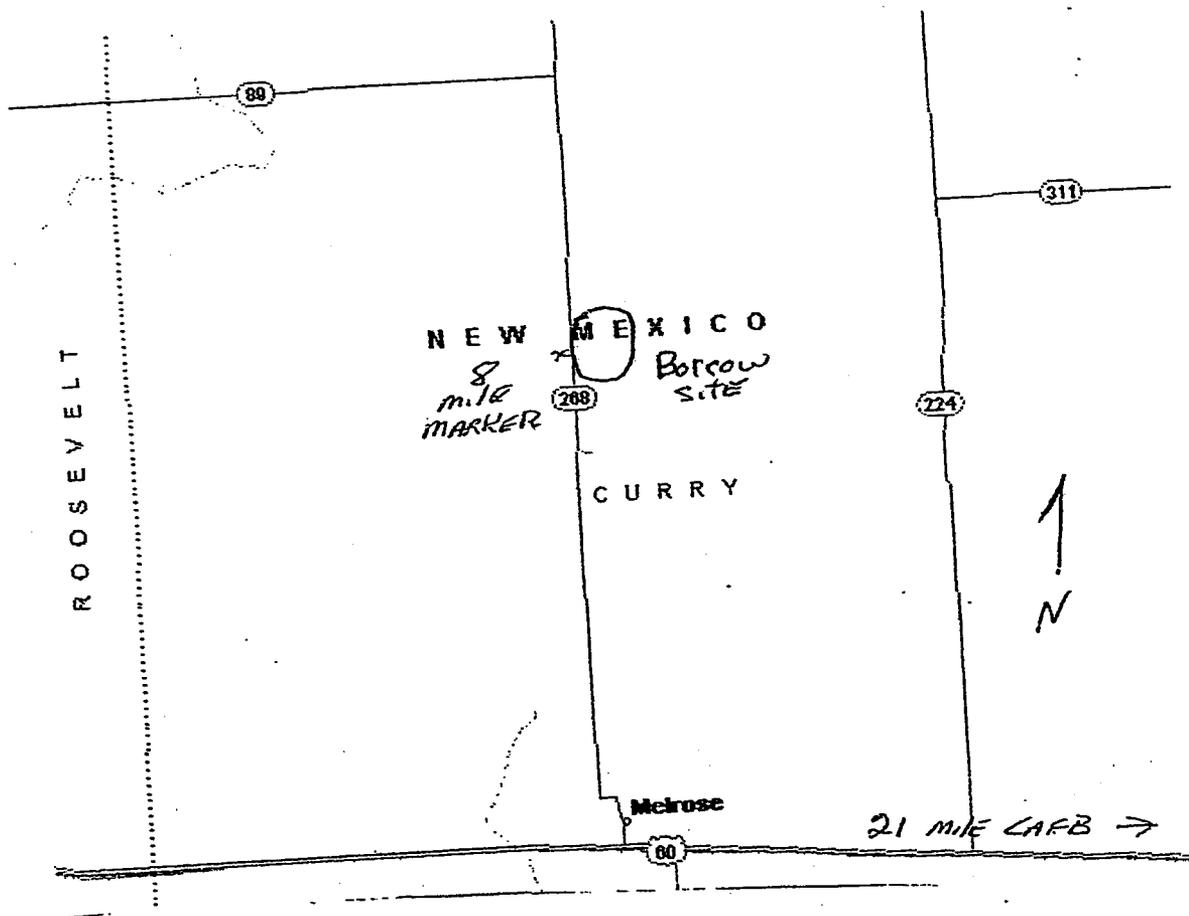
Attached you will find the complete submittal for the Assessment of Borrow material to be used for the construction of the Erosion/Vegetation (Top Soil) layer. The borrow area is located 8 miles north of the Village of Melrose, NM, which is approximately 20 miles due west of Cannon AFB (see attached map). This is the same borrow area that was used to provide material for the Soil Barrier Layer. The borrow area is approximately 25 acres in size and it is estimated that 20,000 yards of topsoil is available for use on this project.

Included in this submittal are the following:

- ASTM's; Soil Classification, Max particle size, pH, Organic Content (%), Atterberg limits, Particle Size Analysis, Moisture Content.
- Logs of subsurface exploration.
- Laboratory test results.

The boring logs and the analytical data being submitted for this borrow source assessment are the same as the information that was submitted for the initial borrow source assessment of the material that was used for the soil barrier layer. The sample submitted for chemical analysis from this area was a composite of varying depth intervals and included top soil as part of the composite sample.

SWMU 101 Sewage Lagoons Proposed Borrow Source Location 8 Miles due North of Melrose on State Road 268



Dyess-Peterson Testing Laboratory, Inc.

PROJECT: Closure of SWMU 101 Sewage Lagoon Cannon AF
 CLIENT: Lydick Engineers
 DRILLED DATE: 3/13/03
 DRILLING METHOD: Mobile B-61 3 1/4 inch ID Auger

LOCATION: Clovis, New Mexico
 LOGGED BY: L. Peterson
 DRILLED BY: A. Patterson
 ELEVATION: N/A

Depth	Sample	Soil Log	Description	SPT Blows/Ft	Moisture Percent	Dry Density	LL	PL	PI	Shear Strength TSF	Passing 200 Sieve
0			Clayey Sand: Light Brown with Rock (SC) 6 / 4 / 7.5YR		6.1		26	13	13		38.2
5			Clayey Sand: Pink with Rock (SC) 7 / 3 / 7.5YR		6.4		26	15	11		43.0
10			Clayey Sand: Pink with Rock (SC) 8 / 3 / 7.5YR		7.5		30	17	13		32.1
15					6.8		30	15	15		20.2
20			Silty Sand: Pink with Rock (SM) 7 / 3 / 7.5YR		7.3		21	--	NP		15.7
25			Silty Sand: White with Rock (SM) 8 / 1 / 7.5YR		5.2		23	--	NP		12.2
30			Poorly Graded Sand with Silt: Pink with Rock (SP-SM) 7 / 4 / 7.5YR		3.6		22	--	NP		7.9
35					3.4		21	--	NP		7.3
40					2.9		23	--	NP		7.1

1 - Equivalent
Ion Chromatography ANALYSIS DATA SHEET

Lab Name: Analytical Management Laboratories
Client ID: Arrowhead
Matrix: S
Sample g/ml: 1.0057
% Solids: not dec. 79.8199996948242
Instrument ID LD120
Injection Volume: 1 (mL)

Sample ID: BA1-001
Project ID Cannon AFB
Project Num 19
Lab Sample ID: 1901
Date Collected: 4/1/03 Time: 8:15
Date Received: 4/2/03 10:00:00 AM
Analytical Method: EPA 300.0

<i>Date Analyzed</i>	<i>Analytical Batch</i>	<i>Prep Batch</i>	<i>COMPOUND</i>	<i>RESULT</i>	<i>Units</i>	<i>Q</i>	<i>LLR</i>	<i>MQL</i>	<i>DF</i>
4/7/03	1006	60	Nitrate	3.35	mg/kg		0.563	2.82	1

1 - Equivalent
PESTICIDES ANALYSIS DATA SHEET

Lab Name: Analytical Management Laboratories
 Client ID: Arrowhead
 Matrix: S
 Sample g/ml: 30.3
 % Solids: not dec. 79.8
 Instrument ID P58902
 Extract Volume: 5 (mL)

Sample ID: BA1-001
 Project ID Cannon AFB
 Project Num 19
 Lab Sample ID: 1901
 Analytical Batch 1001 Prep Batch 130
 Date Collected: 4/1/03 Time: 8:15
 Date Received: 4/2/03 10:00:00 AM

Analytical Method: EPA 8081
 Prep Method: EPA 3550

Date Analyzed: 4/9/03 Time: 6:11
 Date Prepared: 4/7/03 Time: 13:46

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF	Date Analyzed
72-54-8	4,4'-DDD		µg/kg	U	0.418	2.09	1	4/9/03
72-55-9	4,4'-DDE	0.585	µg/kg	J	0.418	2.09	1	4/9/03
50-29-3	4,4'-DDT		µg/kg	U	0.418	2.09	1	4/9/03
309-00-2	Aldrin		µg/kg	U	0.418	2.09	1	4/9/03
319-84-6	alpha-BHC		µg/kg	U	0.418	2.09	1	4/9/03
5103-71-9	alpha-Chlordane		µg/kg	U	0.418	2.09	1	4/9/03
319-85-7	beta-BHC		µg/kg	U	0.418	2.09	1	4/9/03
12789-03-6	Chlordane (Technical)		µg/kg	U	8.36	41.7	1	4/9/03
319-86-8	delta-BHC		µg/kg	U	0.418	2.09	1	4/9/03
60-57-1	Dieldrin		µg/kg	U	0.418	2.09	1	4/9/03
959-98-8	Endosulfan I		µg/kg	U	0.418	2.09	1	4/9/03
33213-65-9	Endosulfan II		µg/kg	U	0.418	2.09	1	4/9/03
1031-07-8	Endosulfan sulfate		µg/kg	U	0.418	2.09	1	4/9/03
72-20-8	Endrin		µg/kg	U	0.418	2.09	1	4/9/03
7421-93-4	Endrin aldehyde		µg/kg	U	0.418	2.09	1	4/9/03
53494-70-5	Endrin ketone		µg/kg	U	0.418	2.09	1	4/9/03
58-89-9	gamma-BHC (Lindane)		µg/kg	U	0.418	2.09	1	4/9/03
5103-74-2	gamma-Chlordane		µg/kg	U	0.418	2.09	1	4/9/03
76-44-8	Heptachlor		µg/kg	U	0.418	2.09	1	4/9/03
1024-57-3	Heptachlor epoxide		µg/kg	U	0.418	2.09	1	4/9/03
72-43-5	Methoxychlor		µg/kg	U	0.418	2.09	1	4/9/03
8001-35-2	Toxaphene		µg/kg	U	8.36	41.7	1	4/9/03

1 - Equivalent
PESTICIDES ANALYSIS DATA SHEET

Lab Name: Analytical Managment Laboratories
 Client ID: Arrowhead
 Matrix: S
 Sample g/ml: 30.3
 % Solids: not dec. 79.8
 Instrument ID P58902
 Extract Volume: 5 (mL)
 Analytical Method: EPA 8082
 Prep Method: EPA 3550

Sample ID: BA1-001
 Project ID Cannon AFB
 Project Num 19
 Lab Sample ID: 1901
 Analytical Batch 1002 Prep Batch 129
 Date Collected: 4/1/03 Time: 8:15
 Date Received: 4/2/03 10:00:00 AM
 Date Analyzed: 4/9/03 Time: 6:11
 Date Prepared: 4/7/03 Time: 13:42

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF	Date Analyzed
12674-11-2	Aroclor-1016		$\mu\text{g}/\text{kg}$	U	8.27	41.3	1	4/9/03
11104-28-2	Aroclor-1221		$\mu\text{g}/\text{kg}$	U	8.27	41.3	1	4/9/03
11141-16-5	Aroclor-1232		$\mu\text{g}/\text{kg}$	U	8.27	41.3	1	4/9/03
53469-21-9	Aroclor-1242		$\mu\text{g}/\text{kg}$	U	8.27	41.3	1	4/9/03
12672-29-6	Aroclor-1248		$\mu\text{g}/\text{kg}$	U	8.27	41.3	1	4/9/03
11097-69-1	Aroclor-1254		$\mu\text{g}/\text{kg}$	U	8.27	41.3	1	4/9/03
11096-82-5	Aroclor-1260		$\mu\text{g}/\text{kg}$	U	8.27	41.3	1	4/9/03

1 - Equivalent
INORGANICS ANALYSIS DATA SHEET

Lab Name: <u>Analytical Management Laboratories</u>	Sample ID: <u>BA1-001</u>
Client ID: <u>Arrowhead</u>	Project ID: <u>Cannon AFB</u>
Matrix: <u>S</u>	Project Num: <u>19</u>
Sample g/ml: <u>1.24</u>	Lab Sample ID: <u>1901</u>
% Solids: not dec. <u>79.8</u>	Analytical Batch: <u>1007</u> Prep Batch: <u>41</u>
Instrument ID: <u>MICPTJ</u>	Date Collected: <u>4/1/03</u> Time: <u>8:15</u>
	Date Received: <u>4/2/03 10:00:00 AM</u>
Analytical Method: <u>EPA 6010B</u>	Date Analyzed: <u>4/8/03</u> Time: <u>13:14</u>
Prep Method: <u>EPA 3050B</u>	Date Prepared: <u>4/7/03</u> Time: <u>10:15</u>

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF
7440-39-3	Barium	102	mg/kg		0.253	0.505	50.5
7440-43-9	Cadmium		mg/kg	U	0.253	1.01	50.5
7440-47-3	Chromium	7.87	mg/kg		0.505	1.01	50.5
7439-92-1	Lead	12.1	mg/kg		2.53	10.1	50.5
7440-22-4	Silver		mg/kg	U	0.505	1.52	50.5

1 - Equivalent
INORGANICS ANALYSIS DATA SHEET

Lab Name: <u>Analytical Management Laboratories</u>	Sample ID: <u>BA1-001</u>
Client ID: <u>Arrowhead</u>	Project ID: <u>Cannon AFB</u>
Matrix: <u>S</u>	Project Num: <u>19</u>
Sample g/ml: <u>1.27</u>	Lab Sample ID: <u>1901</u>
% Solids: not dec. <u>79.8</u>	Analytical Batch: <u>1010</u> Prep Batch: <u>42</u>
Instrument ID: _____	Date Collected: <u>4/1/03</u> Time: <u>8:15</u>
	Date Received: <u>4/2/03 10:00:00 AM</u>
Analytical Method: <u>EPA 6020A</u>	Date Analyzed: <u>4/10/03</u> Time: <u>1:34</u>
Prep Method: <u>EPA 3050B</u>	Date Prepared: <u>4/8/03</u> Time: <u>10:48</u>

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF
7440-38-2	Arsenic	3.5	mg/kg		0.493	0.986	0.49
7439-97-6	Mercury		mg/kg	U	0.123	0.247	0.49
7782-49-2	Selenium		mg/kg	U	0.493	0.986	0.49

ROBERT L LYDICK
ROBERT CHAD LYDICK
Professional Engineer and
Land Surveyor

Lydick
ENGINEERS AND SURVEYORS, INC.
205 E. SECOND STREET - P.O. BOX 728
CLOVIS, NEW MEXICO 88102-0728
505 762-3771 - FAX 505 762-9093

Registered
New Mexico
Texas - Oklahoma
Colorado



Arron Mathenie
Arrowhead Construction
12920 Metcalf Suite 150
Overland Park, Kansas 66213

Date: 9-8-03

RE: Testing of Vegetative Layer on Lagoon Closure SWMU 101 DACW45-94-D0003
Cannon Air Force Base, New Mexico

Dear Arron:

Currently Lydick Laboratories is not validated by the US Army Corps of Engineers to perform the test you requested on the material for the Vegetative Layer, (ASTM D 2974-00 Ash and Organic Matter and the ASTM D 4972-01 pH of soil)

The test results you have recieved to date on these ASTM Designations were perform by Dyess-Peterson Testing Laboratories, this laboratory is also currently not validated by the Corps Of Engineers. The test data was reviewed by Mr Chad Lydick a regestered Professional Engineer in the State of New Mexico, and it is his belief that the test meet all ASTM requirments. Please let me know how you would like me to proceed concerning this matter.

Very Truly yours

Lance E. Langan





FOSTER WHEELER ENVIRONMENTAL CORPORATION

TERC CONTRACT NO.: DACW45-94-D-0003

DELIVERY ORDER: 35

PROJECT TITLE AND LOCATION: Work Plan for the Closure of SWMU 101 - Sewage Lagoons, Cannon AFB

REQUEST FOR INFORMATION

(RFI)

RFI No. 4 Issue Date 9/10/03 Closure Date _____ Sheet 1 of 1

Work Area: EROSION/VEGETATION Layer

Applicable Plans, Drawings, Specifications: 02140 31 Borrow Source Assessment Report

Information Requested: Section does not specify that this TESTING be done by a USACE CERT Lab. AS SECTION 02377 DOES. THERE IS NOT A Submittal item in Approved WP Subcontractors Lab is NOT CERTIFIED TO PERFORM ASTM D 2974-00 AND 4972 (ASH + ORGANIC MATTER - pH soil) - ? IS THE ACCEPTABLE?

Project Quality Control Manager Signature: [Signature] Date: 9/10/03

USACE QA Response: concur with PM
The test report are acceptable as submitted

USACE QA Signature: [Signature] Date: 9-10-03

- Distribution:
- AFB Project Manager
 - DOM
 - Task Manager/Engineer
 - QCM
 - CQC Systems Manager
 - Site Superintendent
 - USACE QA
 - Subcontractor: _____

ATTACHMENTS Provided for Review pg 1 of 6

ROBERT L. LYDICK
ROBERT CHAD LYDICK
Professional Engineer and
Land Surveyor

Lydick
ENGINEERS AND SURVEYORS, INC.
205 E. SECOND STREET - P.O. BOX 728
CLOVIS, NEW MEXICO 88102-0728
505 762-3771 - FAX 505 762-9093

Registered
New Mexico
Texas · Oklahoma
Colorado

TO: ARROWHEAD CONSTRUCTION
12920 METCALF, SUITE 150
OVERLAND PARK, KS 66213

DATE: 9-2-03

RECEIVED FROM: BOSTWICK PIT MELROSE, NM

TYPE OF MATERIAL: PROPOSED MATERIAL FOR EROSION VEGETATIVE LAYER

PROJECT: LAGOON CLOSURE SWMU 101 AT CANNON A.F.B. CLOVIS, NM

ASH AND ORGANIC MATTER OF PEAT AND ORGANIC SOILS
AS PER ASTM DESIGNATION D 2974-00

ASH CONTENT = 95.0%

ORGANIC MATTER = 5.0%

pH OF SOIL AS PER ASTM DESIGNATION D 4972-01 METHOD B

pH = 6.6

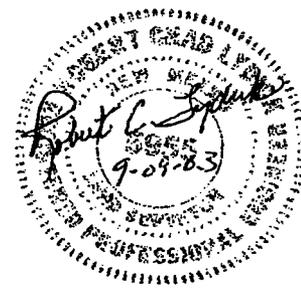
LABORATORY DETERMINATION OF WATER(MOISTURE) CONTENT
OF SOIL AND ROCK BY MASS AS PER ASTM DESIGNATION D 2216-98

% MOISTURE = 10.8%

REMARKS: SAMPLE DELIVERED TO LABORATORY BY CONTRACTOR SAMPLED BELOW EXISTING
VEGETATION LAYER

PROJECT NO: DACW 94-45-0003

LAB NO: AH-4-03-2



LYDICK LABORATORIES

P.O. BOX 728
CLOVIS, NM 88101

MD 4318-01

To: ARROWHEAD CONSTRUCTION
12920 METCALF AVE. SUITE 150
OVERLAND PARK, KS. 66213

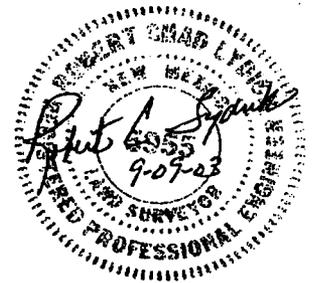
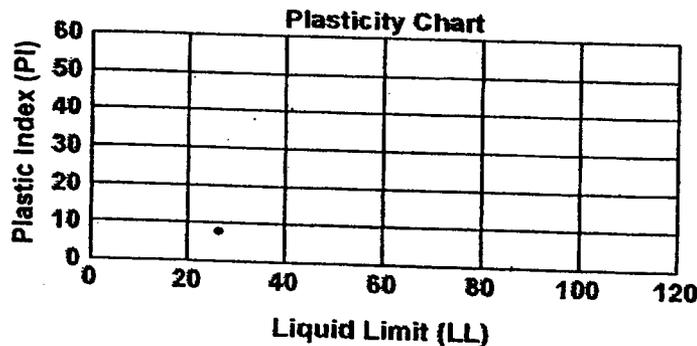
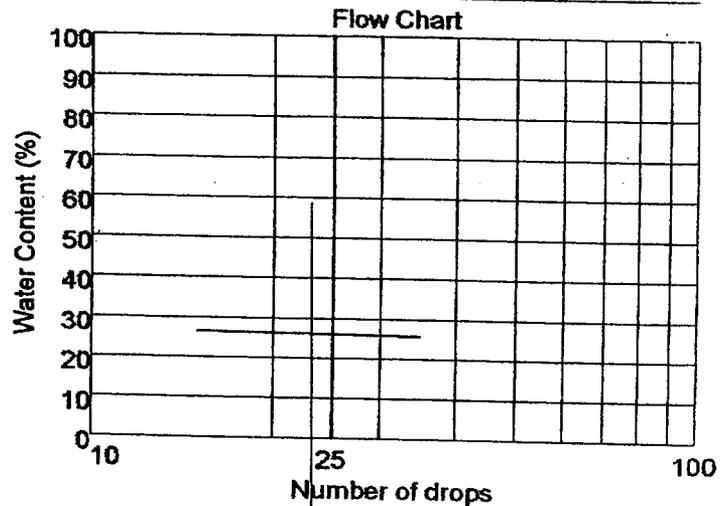
Project: LAGOON CLOSURE SWMU 101 @ CANNON
A.F.B., NM

Atterberg Report

Project Number: DACAW45-94-D-0003
Report Number: 5
Report Date: 9/9/2003
Copies To: FWTT, COE, ARROWHEAD
Authorized By: CONTRACTOR
Performed By: LANCE LANGAN
Bore #: 1
Sample #: 1
Bore Date: 9/2/2003
Sample Depth: BELOW EXISTING VEGETATION
Preparation (Wet/Dry): DRY TO WET
Page: 1 of 1

Plastic Limit	Tare #	6	8	
	Tare Weight	22.32	22.12	
	Tare + Wet Soil	29.91	34.11	
	Tare + Dry Soil	28.73	32.26	
	Weight of Water	1.18	1.85	
	Weight of Dry Soil	6.41	10.14	
	Water Content	18.4	18.2	

Liquid Limit	Tare #	9	2	8
	Tare Weight	22.19	22.13	22.25
	Tare + Wet Soil	39.14	37.77	41.72
	Tare + Dry Soil	35.59	34.52	37.72
	Number of Blows	15	23	31
	Weight of Water	3.55	3.25	4.00
	Weight of Dry Soil	13.40	12.39	15.47
Water Content	26.5	26.2	25.9	



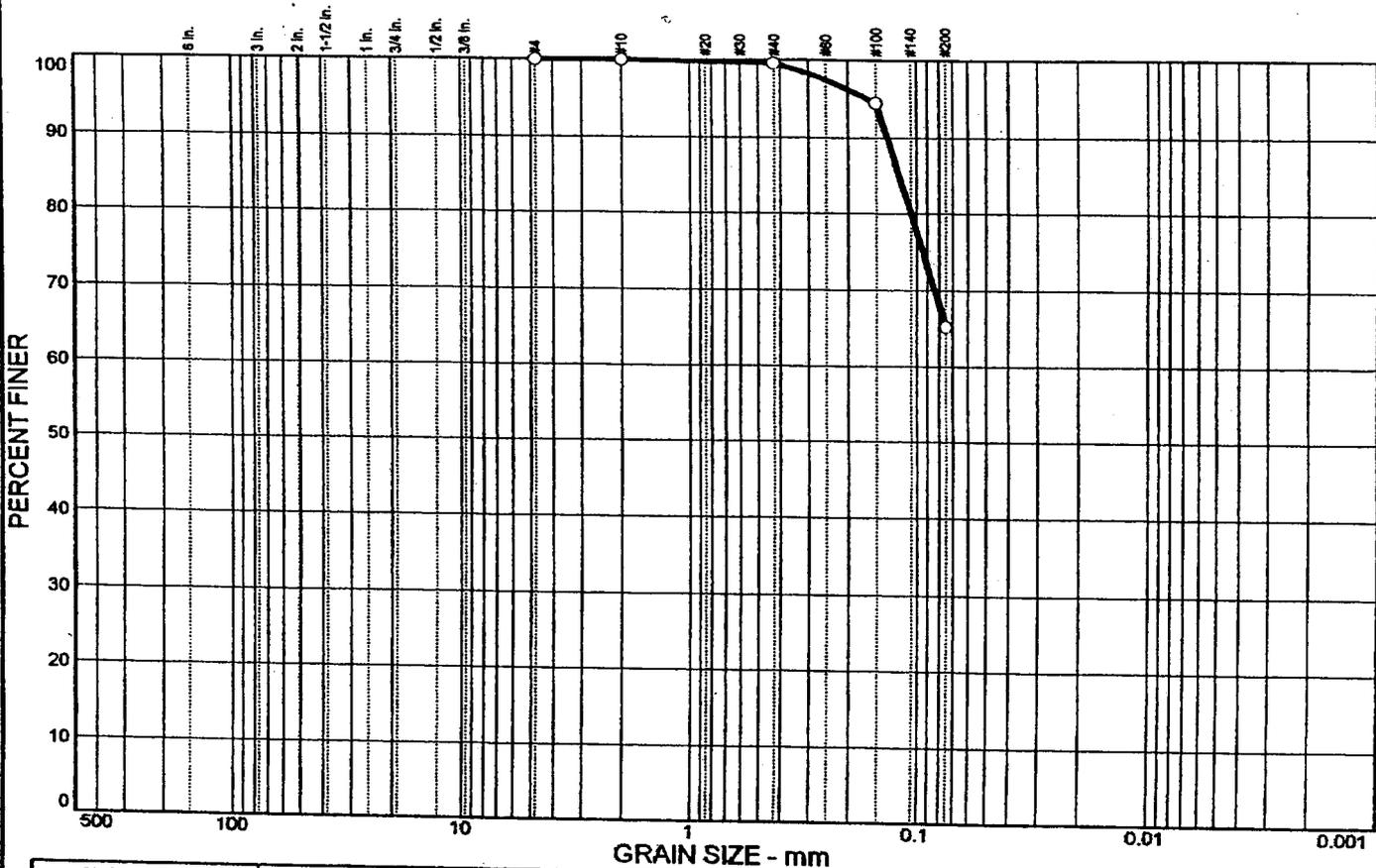
Liquid Limit	26	Natural Water Content	
Plastic Limit	18	Classification of Sample	
Plasticity Index	8	Other tests being performed on this sample:	Grain Size
Method A			

CLASSIFIED AS "CL" AS PER ASTM D-2487
VEGETATIVE LAYER BOSTWICK PIT MELROSE NM

Per: Robert Lydick

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on written request.

ASTM D 422-98 Particle Size Analysis Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	34.8	65.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	100.0		
#40	99.6		
#100	94.5		
#200	65.2		

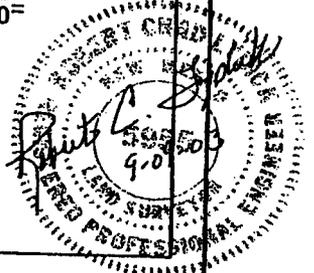
Soil Description

Atterberg Limits
 PL= 18 LL= 26 PI= 8

Coefficients
 D₈₅= 0.120 D₆₀= D₅₀=
 D₃₀= D₁₅= D₁₀=
 C_u= C_c=

Classification
 USCS= "CL" AASHTO=

F.M.=0.05 **Remarks**



* (no specification provided)

Sample No.: Source of Sample:
 Location: VEGETATION LAYER 8-25-03 REDDISH MATERIAL

Date: 9-9-2003
 Elev./Depth:

LYDICK
ENGINEERS & SURVEYORS, INC.

Client: ARROWHEAD CONSTRUCTION
 Project: SWMU 101 LAGOON CLOSURE

Project No: DACW 94-45-0003

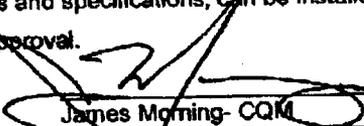
Figure

SUBMITTAL REVIEW VERIFICATION SHEET

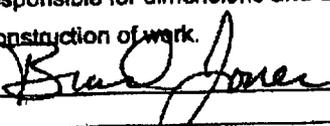
Date: Oct 29, 2003

Submittal No.: 02140-3

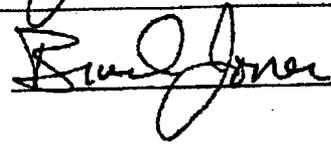
Foster Wheeler Environmental Corporation Stamp

SWMU 101 Sewage Lagoons Closure, Cannon AFB, NM	
Certified for approval as indicated below:	
A -	Approved as submitted
B -	Approved except as noted on the drawings and/or attached sheets.
It is hereby certified that the (equipment) (material) shown and marked in this submittal is that proposed to be incorporated into Contract Number DACW45-94-D-0003, Delivery Order No. 35, Work Authorization Directive 1 is in compliance with the contract drawings and specifications, can be installed in the allocated spaces, and is submitted for Government approval.	
Reviewed/Certified By:	 James Morning- CQM
Description of Items reviewed: SD-06 Test Reports-Material Testing Erosion/Vegetation layer	

U.S. Army Corps of Engineers Stamp

U.S. Army Engineer District, Albuquerque Corps of Engineers	
Certified for approval as indicated below:	
A -	Approved as submitted.
B -	Approved except as noted on the drawings and/or attached sheet(s). Resubmission not required.
C -	Approved except as noted on the drawings and/or attached sheet(s). Resubmission required.
D -	Will be returned by separate correspondence.
E -	Disapproved; see comments on attached sheet.
F -	Receipt acknowledged.
G -	Other: Specify.
Note: Items approved as to general layout only. Dimensions and quantities checked. Approval does not relieve contractor of responsibilities for errors that may exist, as contractor shall be responsible for dimensions and design of adequate corrections. Details and satisfactory construction of work.	
Signature: 	Date: 10-31-03

Reviewer's Signature:



Memo

To: James Morning
Foster Wheeler Environmental Corporation

From: Aaron Mathena

CC: Greg Wallace

Date: 10/28/03

Re: Sewage Lagoons Remediation Project, Cannon AFB
Subcontract No. 045962
Test Reports ASTM 4972-Erosion Vegetation Layer

This memo is in response to your memo dated October 22, 2003, referring specifically to the test reports for ASTM 4972.

The test reports that are referenced in your memo are for in-place tests for topsoil. Specifications required a borrow source assessment which included an ASTM 4972 prior to any material being placed. Also specifications call for in-place tests to occur for every 2,000 yards of topsoil material placed. The original results for material collected at the borrow source showed a PH of 6.6, within the required specification range of 5 – 7. The test results in question are for the first, second and third, 2,000 yards of in-place topsoil, and all have tested out of specification range. In an effort to explain these differences we have contacted our testing facility for a response as well as our subcontractor for seeding. The laboratory is confident in there results, and do not see them as alarmingly uncommon. We see the fact that the topsoil is being placed directly on-top of a concrete material in only a six inch lift as a possible explanation for the spike in reading. I do not know if this was ever considered when the spec was created but the fact that this is an in-place test puts the material in direct contact with the concrete material before the samples are taken. Ourselves as well as our laboratory and seeding contractor see this as a likelihood for effecting the test results. Finally, in talking with our seeding contractor, Brian Guthals, Guthals Nursery, about the effect of the higher PH reading will have on the ability to establish growth with the specified native seed, he related to me that it will not have an effect at all.

If we need to provide further documentation or request a field change order to comply with contract specification please let me know. I can be reached by phone at 913/461-4182.

ROBERT L. LYDICK
ROBERT CHAD LYDICK
Professional Engineer and
Land Surveyor

Lydick
ENGINEERS AND SURVEYORS, INC.
205 E. SECOND STREET - P.O. BOX 728
CLOVIS, NEW MEXICO 88102-0728
505 762-3771 - FAX 505 762-9093

Registered
New Mexico
Texas - Oklahoma
Colorado

TO: ARROWHEAD CONSTRUCTION
12920 METCALF, SUITE 150
OVERLAND PARK, KS 66213

DATE: 10-8-03

RECEIVED FROM: BOSTWICK PIT MELROSE, NM

TYPE OF MATERIAL: EROSION VEGETATIVE LAYER SAMPLE #1 0-2000 yd

PROJECT: LAGOON CLOSURE SWMU 101 AT CANNON A.F.B. CLOVIS, NM

ASH AND ORGANIC MATTER OF PEAT AND ORGANIC SOILS
AS PER ASTM DESIGNATION D 2974-00

ORGANIC MATTER = 5.8%

pH OF SOIL AS PER ASTM DESIGNATION D 4972-01 METHOD B

pH = 8.6

LABORATORY DETERMINATION OF WATER(MOISTURE) CONTENT
OF SOIL AND ROCK BY MASS AS PER ASTM DESIGNATION D 2216-98

% MOISTURE = 7.3%

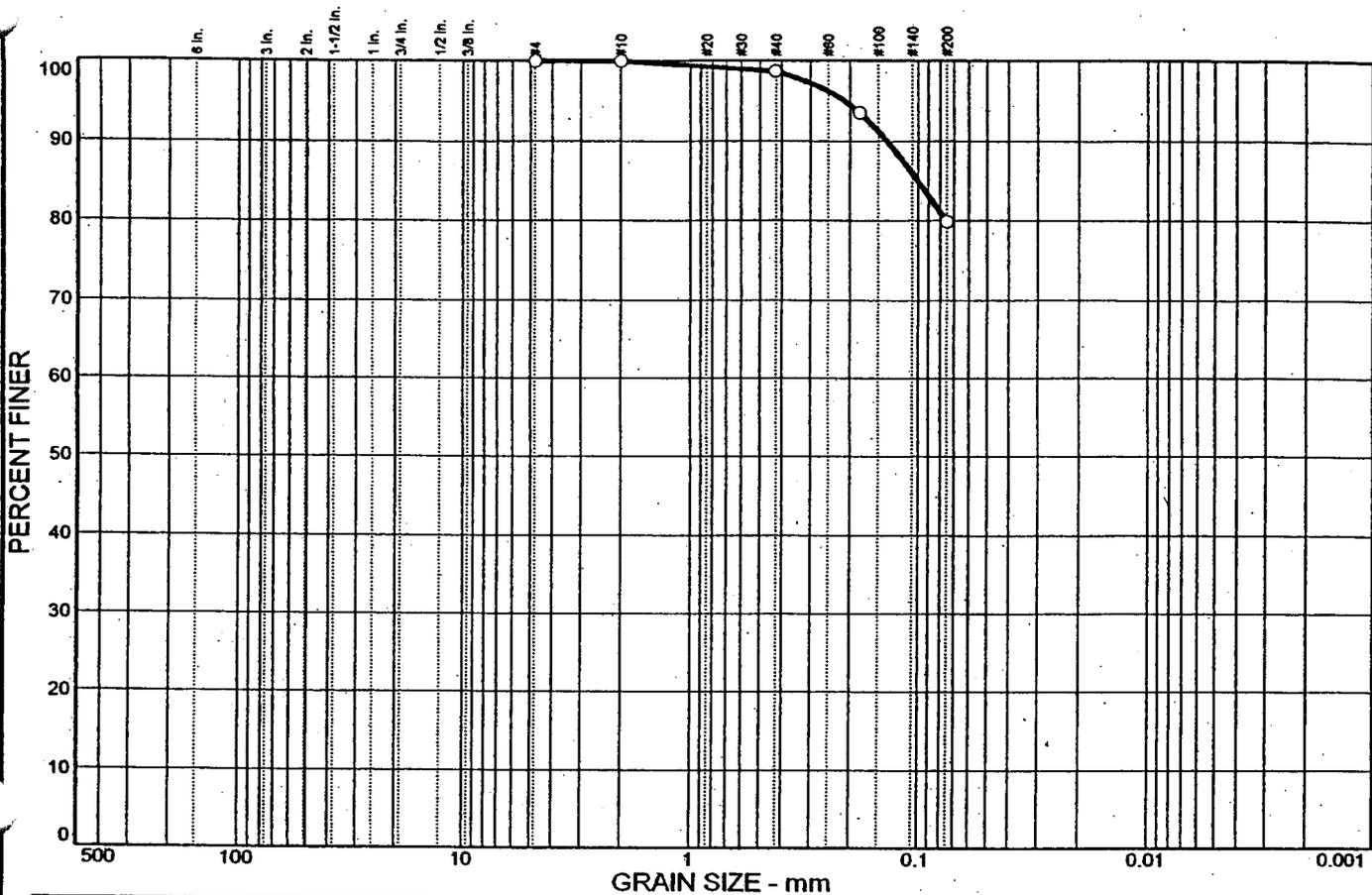
REMARKS: SAMPLE BY LABORATORY

PROJECT NO: DACW 94-45-0003

LAB NO: AH-4-03

LANCE E. LANGAN
LABORATORY SUPERVISOR

ASTM D 422-98 Particle Size Analysis Report



% COBBLES	% GRAVEL	% SAND	% SILT
0.0	0.0	20.2	79.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	100.0		
#40	98.7		
#80	93.5		
#200	79.8		

Soil Description

Atterberg Limits

PL= LL= PI=

Coefficients

D₈₅= 0.100 D₆₀= D₅₀=

D₃₀= D₁₅= D₁₀=

C_u= C_c=

Classification

USCS= AASHTO=

Remarks

SAMPLED 9-23-2003 ON SITE

* (no specification provided)

Sample No.: Source of Sample: Date:

Location: VEGETATION LAYER IN PLACE 9-23-03 SAMPLE1 0-2000 YDS Elev./Depth:

LYDICK ENGINEERS & SURVEYORS, INC.	Client: ARROWHEAD CONSTRUCTION Project: SWMU 101 LAGOON CLOSURE Project No: DACW 94-45-0003	Figure
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GRAIN SIZE DISTRIBUTION TEST DATA

Client: ARROWHEAD CONSTRUCTION
Project: SWMU 101 LAGOON CLOSURE
Project Number: DACW 94-45-0003

Sample Data

Source:
Sample No.:
Level or Depth: Sample Length(in./cm.):
Location: VEGETATION LAYER IN PLACE 9-23-03 SAMPLE1 0-2000 YDS
Description:
Date: PL: LL: PI:
SCS Classification: AASHTO Classification:
Testing Remarks: SAMPLED 9-23-2003 ON SITE

Mechanical Analysis Data

sieve	Size, mm	Percent finer
4	4.750	100.0
10	2.000	100.0
40	0.425	98.7
80	0.180	93.5
200	0.075	79.8

Fractional Components

Gravel/Sand based on #4
Sand/Fines based on #200
COBBLES = % GRAVEL = % SAND = 20.2
FINES = 79.8
PI = 0.10

ROBERT L. LYDICK
ROBERT CHAD LYDICK
Professional Engineer and
Land Surveyor

Lydick
ENGINEERS AND SURVEYORS, INC.
205 E. SECOND STREET - P.O. BOX 728
CLOVIS, NEW MEXICO 88102-0728
505 762-3771 - FAX 505 762-9093

Registered
New Mexico
Texas - Oklahoma
Colorado

TO: ARROWHEAD CONSTRUCTION
12920 METCALF, SUITE 150
OVERLAND PARK, KS 66213

DATE: 10-8-03

RECEIVED FROM: BOSTWICK PIT MELROSE, NM

TYPE OF MATERIAL: EROSION VEGETATIVE LAYER SAMPLE #2 2000 - 4000 yd

PROJECT: LAGOON CLOSURE SWMU 101 AT CANNON A.F.B. CLOVIS, NM

ASH AND ORGANIC MATTER OF PEAT AND ORGANIC SOILS
AS PER ASTM DESIGNATION D 2974-00

ORGANIC MATTER = 5.0%

pH OF SOIL AS PER ASTM DESIGNATION D.4972-01 METHOD B

pH = 8.8

LABORATORY DETERMINATION OF WATER(MOISTURE) CONTENT
OF SOIL AND ROCK BY MASS AS PER ASTM DESIGNATION D 2216-98

% MOISTURE = 5.2%

REMARKS: SAMPLE BY LABORATORY

PROJECT NO: DACW 9445-0003

LAB NO: AH-4-03

LANCE E. LANGAN
LABORATORY SUPERVISOR

ROBERT L. LYDICK
ROBERT CHAD LYDICK
Professional Engineer and
Land Surveyor

Lydick
ENGINEERS AND SURVEYORS, INC.
205 E. SECOND STREET - P.O. BOX 728
CLOVIS, NEW MEXICO 88102-0728
505 762-3771 - FAX 505 762-9093

Registered
New Mexico
Texas - Oklahoma
Colorado

TO: ARROWHEAD CONSTRUCTION
12920 METCALF, SUITE 150
OVERLAND PARK, KS 66213

DATE: 10-8-03

RECEIVED FROM: BOSTWICK PIT MELROSE, NM

TYPE OF MATERIAL: EROSION VEGETATIVE LAYER SAMPLE #3 4000 - 6000 yd

PROJECT: LAGOON CLOSURE SWMU 101 AT CANNON A.F.B. CLOVIS, NM

ASH AND ORGANIC MATTER OF PEAT AND ORGANIC SOILS
AS PER ASTM DESIGNATION D 2974-00

ORGANIC MATTER = 7.6%

pH OF SOIL AS PER ASTM DESIGNATION D 4972-01 METHOD B

pH = 8.7

LABORATORY DETERMINATION OF WATER(MOISTURE) CONTENT
OF SOIL AND ROCK BY MASS AS PER ASTM DESIGNATION D 2216-98

% MOISTURE = 7.3%

REMARKS: SAMPLE BY LABORATORY

PROJECT NO: DACW 94-45-0003

LAB NO: AH-4-03

LANCE E. LANGAN
LABORATORY SUPERVISOR

GRAIN SIZE DISTRIBUTION TEST DATA

Client: ARROWHEAD CONSTRUCTION
Project: SWMU 101 LAGOON CLOSURE
Project Number: DACW 94-45-0003

Sample Data

Source:
Sample No.:
Elev. or Depth: **Sample Length(in./cm.):**
Location: VEGETATION LAYER INPLACE 9-25-03 SAMPLE3 4000-6000 YDS
Description:
Date: **PL:** **LL:** **PI:**
USCS Classification: **AASHTO Classification:**
Testing Remarks: SAMPLED 9-25-03 ON SITE

Mechanical Analysis Data

Sieve	Size, mm	Percent finer
# 4	4.750	100.0
# 10	2.000	100.0
# 40	0.425	98.7
# 80	0.180	94.9
# 200	0.075	79.1

Fractional Components

Gravel/Sand based on #4
Sand/Fines based on #200
% COBBLES = **% GRAVEL =** **% SAND = 20.9**
% FINES = 79.1

D85= 0.10

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE <small>(Read instructions on the reverse side prior to initiating this form)</small>					DATE 12/19/2003		TRANSMITTAL NO. 02140-4			
SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS <small>(This section will be initiated by the contractor)</small>										
TO: Cannon AFB Resident Office US Army Corps of Engineers 201 N. Perimeter Rd. Cannon AFB, NM 88103			FROM: Foster Wheeler Environmental C 6605 Uplawn Blvd, NE Suite 220 Albuquerque, NM 87110			CONTRACT NO. DACW45-94-D-0003 0035		CHECK ONE: <input checked="" type="checkbox"/> THIS IS A NEW TRANSMITTAL <input type="checkbox"/> THIS IS A RESUBMITTAL OF TRANSMITTAL		
SPECIFICATION SEC. NO. <small>(Cover only one section with each transmittal)</small> 02140			PROJECT TITLE AND LOCATION SWMU 101 - Sewage Lagoons Cannon AFB					CHECK ONE: THIS TRANSMITTAL IS FOR <input checked="" type="checkbox"/> FIO <input type="checkbox"/> GOVT. APPROVAL		
ITEM NO. <small>a</small>	DESCRIPTION OF ITEM SUBMITTED <small>(Type size, model number, etc.)</small> <small>b</small>	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. <small>(See instruction no. B)</small> <small>c</small>	NO. OF COPIES <small>d</small>	CONTRACT REFERENCE DOCUMENT		FOR CONTRACTOR USE CODE <small>e</small>	VARIATION <small>(See instruction No. 6)</small> <small>h</small>	FOR CE USE CODE <small>i</small>		
				SPEC. PARA. NO. <small>f</small>	DRAWING SHEET NO. <small>g</small>					
2	Topo	SHOP DRAWINGS	3	1.3.1		A	N	A		
REMARKS Final TOPO Top Soil					I certify that the above submitted items have been reviewed in detail and are correct and in the strict conformance with the contract drawings and specifications except as otherwise stated. <i>Walter Middel</i> <i>Walter Middel</i> NAME AND SIGNATURE OF CONTRACTOR					
SECTION II - APPROVAL ACTION										
ENCLOSURES RETURNED <small>(List by item No.)</small>			NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY <i>Walter Middel</i>				DATE 1-7-04			

SUBMITTAL REVIEW VERIFICATION SHEET

Date: January 2, 2004

Submittal No.: 02140-4

Foster Wheeler Environmental Corporation Stamp

SWMU 101 Sewage Lagoons Closure, Cannon AFB, NM	
Certified for approval as indicated below:	
A -	Approved as submitted
B -	Approved except as noted on the drawings and/or attached sheets.
It is hereby certified that the (equipment) (material) shown and marked in this submittal is that proposed to be incorporated into Contract Number DACW45-94-D-0003, Delivery Order No. 35, Work Authorization Directive 1 is in compliance with the contract drawings and specifications, can be installed in the allocated spaces, and is submitted for Government approval.	
Reviewed/Certified By:	<u>James Morning</u> James Morning- CQM
Description of items reviewed: SD-02 Topographic Survey Erosion Vegetative Layer	

U.S. Army Corps of Engineers Stamp

U.S. Army Engineer District, Albuquerque Corps of Engineers	
Certified for approval as indicated below:	
A -	Approved as submitted.
B -	Approved except as noted on the drawings and/or attached sheet(s). Resubmission not required.
C -	Approved except as noted on the drawings and/or attached sheet(s). Resubmission required.
D -	Will be returned by separate correspondence.
E -	Disapproved; see comments on attached sheet.
F -	Receipt acknowledged.
G -	Other: Specify.
Note: Items approved as to general layout only. Dimensions and quantities checked. Approval does not relieve contractor of responsibilities for errors that may exist, as contractor shall be responsible for dimensions and design of adequate corrections. Details and satisfactory construction of work.	
Signature: <u>Brad Jones</u>	Date: <u>1-7-04</u>

Reviewer's Signature: Brad Jones

SUBMITTAL REVIEW VERIFICATION SHEET

Date: January 2, 2004

Submittal No.: 02140-5

Foster Wheeler Environmental Corporation Stamp

SWMU 101 Sewage Lagoons Closure, Cannon AFB, NM	
Certified for approval as indicated below:	
A -	Approved as submitted
B -	Approved except as noted on the drawings and/or attached sheets.
It is hereby certified that the (equipment) (material) shown and marked in this submittal is that proposed to be incorporated into Contract Number DACW45-94-D-0003, Delivery Order No. 35, Work Authorization Directive 1 is in compliance with the contract drawings and specifications, can be installed in the allocated spaces, and is submitted for Government approval.	
Reviewed/Certified By:	<i>Walter Morning</i> James Morning- CQM
Description of Items reviewed: SD-06 Test Reports-Material Testing Erosion/Vegetation layer 2 nd 6500	

U.S. Army Corps of Engineers Stamp

U.S. Army Engineer District, Albuquerque Corps of Engineers	
Certified for approval as indicated below:	
A -	Approved as submitted.
B -	Approved except as noted on the drawings and/or attached sheet(s). Resubmission not required.
C -	Approved except as noted on the drawings and/or attached sheet(s). Resubmission required.
D -	Will be returned by separate correspondence.
E -	Disapproved; see comments on attached sheet.
F -	Receipt acknowledged.
G -	Other: Specify.
Note: Items approved as to general layout only. Dimensions and quantities checked. Approval does not relieve contractor of responsibilities for errors that may exist, as contractor shall be responsible for dimensions and design of adequate corrections. Details and satisfactory construction of work.	
Signature: <i>Bruce Jones</i>	Date: <u>1-7-04</u>

Reviewer's Signature:

Bruce Jones

Memo

To: Walt Migdal
Tetra Tech FW, Inc.
From: Aaron Mathena
CC: Greg Wallace
Date: 12/29/03
Re: Sewage Lagoons Remediation Project, Cannon AFB

Subcontract No. 45962 Test Reports ASTM 2974-Erosion Vegetation Layer

Please consider this memo as a request for specification variance regarding the test results, on report dated December 17, 2003 from Maxim Technologies, Inc., for ASTM 2974 (Organic Content) for the final three samples taken for the Erosion Vegetation Layer.

Specifications required a borrow source assessment which included an ASTM 2974 prior to any material being placed. Also specifications call for in-place tests to occur for every 2,000 yards of topsoil material placed. The original results for material collected at the borrow source as well as the subsequent three frequency tests showed an organic content percentage within the required specification range of 5 – 20 percent. The test results in question are for the fourth, fifth and sixth, 2,000 yards of in-place topsoil, and all have tested out of specification range at 1.9 to 2.3 percent. As the material was being hauled on-site and placed, we did not observe any noticeable changes in the properties of the soil. In an effort to explain the differences between tests we have contacted our testing facility for a response. The laboratory double checked the test method and results for accuracy and are confident in their results.

The basis for our request for specification variance is the information received from the seeding contractor scheduled to perform the seeding. According to Ron Schreibeis of Rocky Mountain Reclamation the organic content of the topsoil is within the range of what he would expect to see in the area. Furthermore, while it is true the more organic content in the topsoil is better for seed establishment, it is not typically available and therefore not necessary for the establishment of the native seed to be used for re-vegetation next spring. Finally, as evidence that the top soil used to construct the Erosion Vegetation Layer will support the growth of native seed, the borrow area where the topsoil was excavated from some thirty miles west and north of the jobsite had an abundance of native grass growth prior to being cleared for use.

If we need to provide further documentation to comply with contract specification please let me know. I can be reached by phone at 913/461-4182.

MAXIM
Technologies Inc.

December 16, 2003

Aaron Mathena
Arrowhead Contractor
12920 Metcalf *150
Overland Park, KS 66213

RE: Geotechnical Lab Testing
PO #4310 Lab Tests Cannon AFB
Maxim #4390105

Dear Mr. Mathena

On Behalf of Maxim Technologies, Inc., we are pleased to present this laboratory testing report. The laboratory results have been completed for PO #4310 Lab Tests Cannon AFB, Overland Park, Kansas. Submitted are the Summary of results, Hydrometer, and PH results.

The following report is organized as depicted in the table below:

- Lab Summary Sheet
- Grain Size Analysis
- PH Data Sheet

We thank you for the opportunity to be of service. We can be reached at (913) 321-8100 if you have any questions or require additional information.

Sincerely,



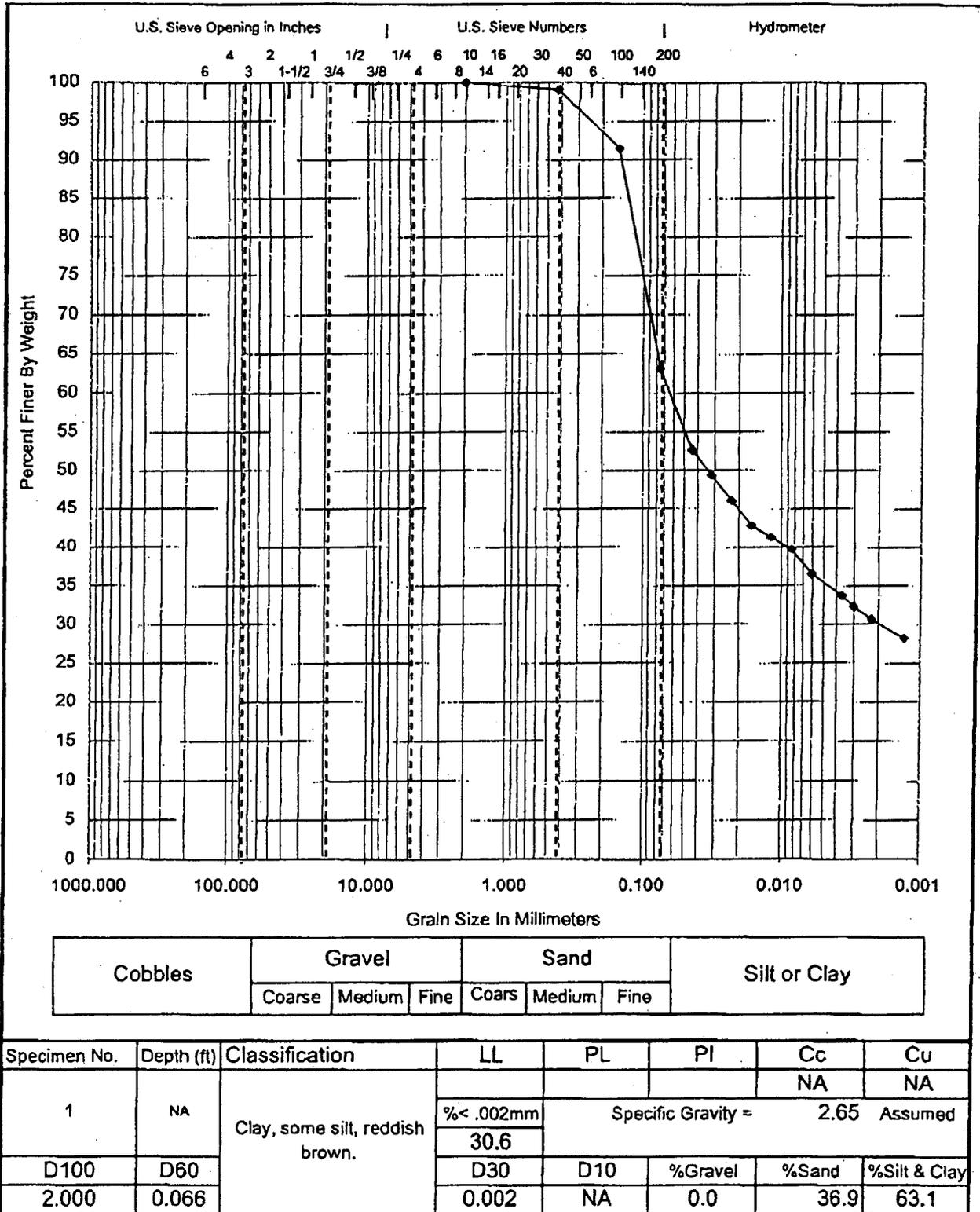
Eric Walston
Geotechnical Laboratory Supervisor

Maxim Technologies Inc.
Tests Result Summary Sheet
PO #4310 Lab Tests Cannon AFB
Arrowhead Contractor
4390105

Boring Number	Sample Depth (ft.)	Sample Type	Moisture (%)	Total Organic Content (Method C) (%)	Percent Finer than #200 Sieve	PH
1	NA	Grab	10.2	2.1	63.1	8.13
2	NA	Grab	14.5	1.9	74.5	8.14
3	NA	Grab	15.1	2.3	71.9	8.17

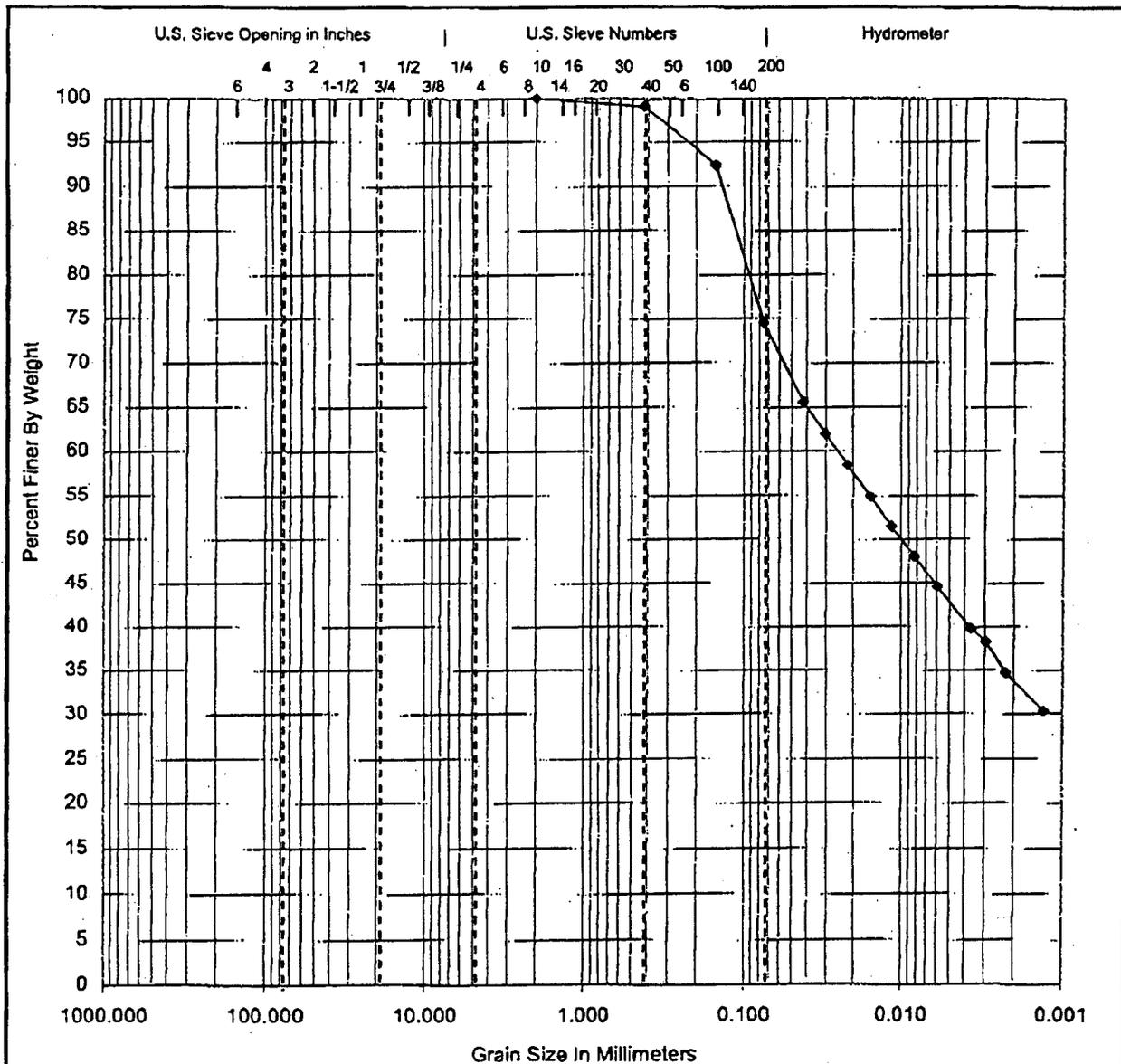
Maxim Technologies Inc.

Project: PO #4310 Lab Tests Cannon AFB
Project Number: 4390105
Location: Crovis, New Mexico
Client: Arrowhead Contractor



Maxim Technologies Inc.

<u>Project:</u>	PO #4310 Lab Tests Cannon AFB
<u>Project Number:</u>	4390105
<u>Location:</u>	Crovis, New Mexico
<u>Client:</u>	Arrowhead Contractor

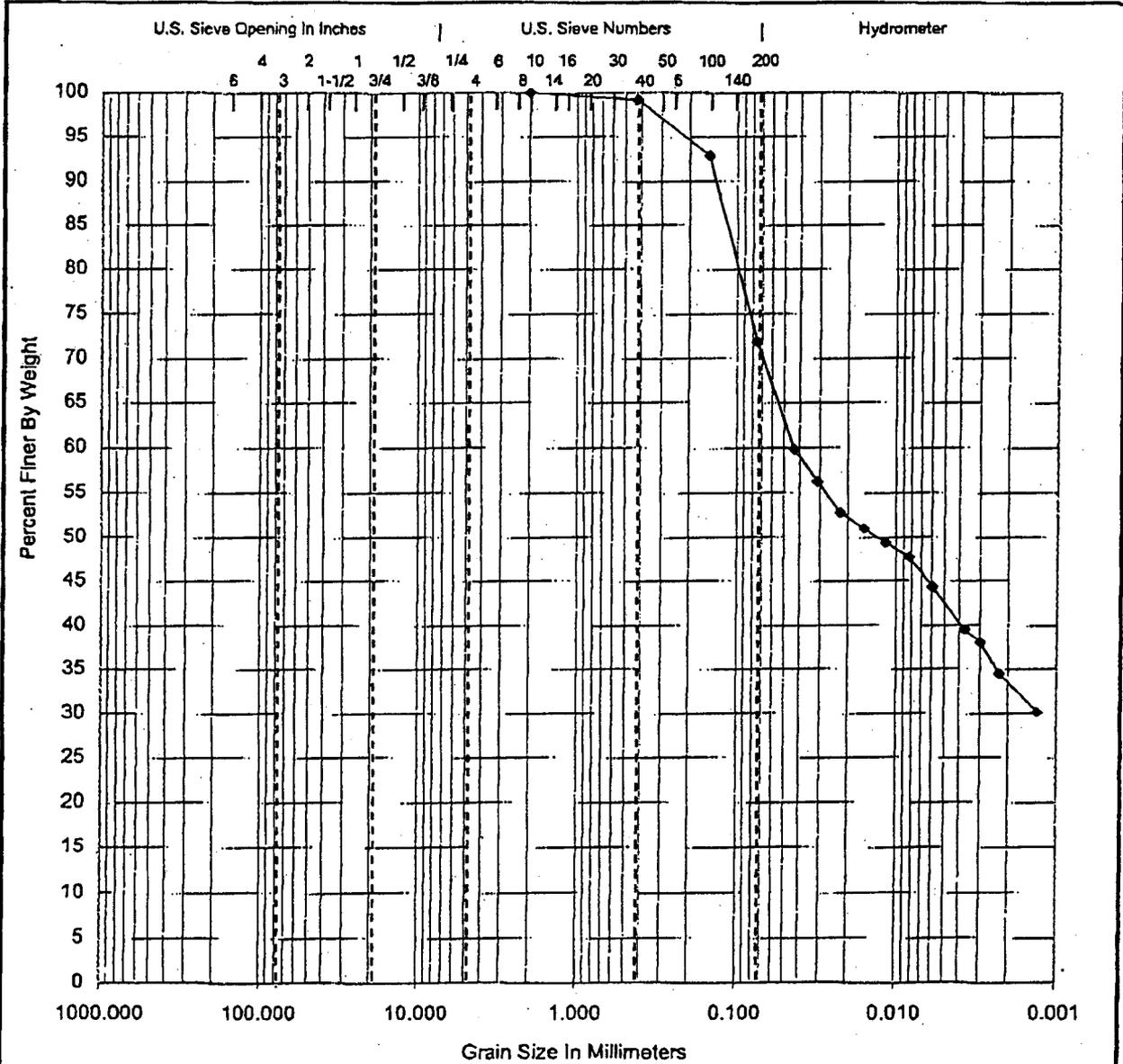


Cobbles	Gravel			Sand			Silt or Clay
	Coarse	Medium	Fine	Coars	Medium	Fine	

Specimen No.	Depth (ft)	Classification	LL	PL	PI	Cc	Cu
2	NA	Clay, some silt, reddish brown.	NA			NA	NA
			%< .002mm		Specific Gravity =		2.65
34.7							
D100	D60		D30	D10	%Gravel	%Sand	%Silt & Clay
2.000	0.025		NA	NA	0.0	25.5	74.5

Maxim Technologies Inc.

Project: PO #4310 Lab Tests Cannon AFB
Project Number: 4390105
Location: Crovis, New Mexico
Client: Arrowhead Contractor



Cobbles	Gravel			Sand			Silt or Clay
	Coarse	Medium	Fine	Coars	Medium	Fine	

Specimen No.	Depth (ft)	Classification	LL	PL	PI	Cc	Cu	
3	NA	Clay, some silt, reddish brown.				NA	NA	
			%<.002mm	Specific Gravity =			2.65	Assumed
			34.5					
D100	D60		D30	D10	%Gravel	%Sand	%Silt & Clay	
2.000	0.044		NA	NA	0.0	28.1	71.9	

SUBMITTAL REVIEW VERIFICATION SHEET

Date: Nov 20, 2003

Submittal No.: 02210-1

Foster Wheeler Environmental Corporation Stamp

SWMU 101 Sewage Lagoons Closure, Cannon AFB, NM
 Certified for approval as indicated below.

A - Approved as submitted

B - Approved except as noted on the drawings and/or attached sheets.

It is hereby certified that the (equipment) (material) shown and marked in this submittal is that proposed to be incorporated into Contract Number DACW45-94-D-0003, Delivery Order No. 35. Work Authorization Directive 1 is in compliance with the contract drawings and specifications, can be installed in the allocated spaces, and is submitted for Government approval.

Reviewed/Certified By: James Morning-CQM

Description of items reviewed: TOPO Survey Post Over Excavation Backfill North lagoon

U.S. Army Corps of Engineers Stamp

U.S. Army Engineer District, Albuquerque Corps of Engineers
 Certified for approval as indicated below.

A - Approved as submitted.

B - Approved except as noted on the drawings and/or attached sheet(s). Resubmission not required.

C - Approved except as noted on the drawings and/or attached sheet(s). Resubmission required.

D - Will be returned by separate correspondence.

E - Disapproved; see comments on attached sheet.

F - Receipt acknowledged.

G - Other: Specify.

Note: Items approved as to general layout only. Dimensions and quantities checked. Approval does not relieve contractor of responsibilities for errors that may exist, as contractor shall be responsible for dimensions and design of adequate corrections. Details and satisfactory construction of work.

Signature: Brad Jones Date: 12-17-03

Reviewer's Signature:

Brad Jones

SUBMITTAL REVIEW VERIFICATION SHEET

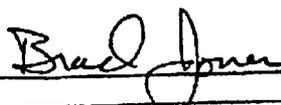
Date: 3/19/03

Submittal No.: 02210 - 2

Foster Wheeler Environmental Corporation Stamp

SWMU 101 Sewage Lagoons Closure, Cannon AFB, NM Certified for approval as indicated below:	
<input checked="" type="radio"/> A-	Approved as submitted
<input type="radio"/> B-	Approved except as noted on the drawings and/or attached sheets.
It is hereby certified that the (equipment) (material) shown and marked in this submittal is that proposed to be incorporated into Contract Number DACW45-04-D-0003, Delivery Order No. 35, Work Authorization Directive 1 is in compliance with the contract drawings and specifications, can be installed in the allocated spaces, and is submitted for Government approval.	
Reviewed/Certified By:	
Description of Items reviewed: 02210-2 Disposal FAC. 3.1 SDDG	

U.S. Army Corps of Engineers Stamp

U.S. Army Engineer District, Albuquerque Corps of Engineers Certified for approval as indicated below:	
<input checked="" type="radio"/> A-	Approved as submitted.
<input type="radio"/> B-	Approved except as noted on the drawings and/or attached sheet(s). Resubmission not required.
<input type="radio"/> C-	Approved except as noted on the drawings and/or attached sheet(s). Resubmission required.
<input type="radio"/> D-	Will be returned by separate correspondence.
<input type="radio"/> E-	Disapproved; see comments on attached sheet.
<input type="radio"/> F-	Receipt acknowledged.
<input type="radio"/> G-	Other: Specify.
Note: Items approved as to general layout only. Dimensions and quantities checked. Approval does not relieve contractor of responsibilities for errors that may exist, as contractor shall be responsible for dimensions and design of adequate corrections. Details and satisfactory construction of work.	
Signature: 	Date: 3-24-03

Reviewer's Signature: _____

March 18, 2003

Mr. James Morning
Foster Wheeler Environmental Corporation
6605 Uptown Boulevard N.E.
Suite 220
Albuquerque, New Mexico 87110

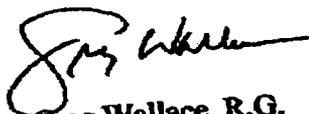
Disposal Facility
Closure of Sewage Lagoons, SWMU 101
Cannon Air Force Base
Clovis, New Mexico

Dear Mr. Morning:

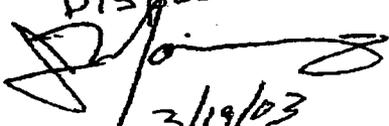
This submittal is intended to inform Foster Wheeler Environmental Corporation that Arrowhead Contracting, Inc. proposes to use the Clovis Landfill as the disposal facility for all solid waste that will be generated during the subject project. The address and telephone number for the Clovis Landfill is 2801 E. Brady, Clovis, New Mexico 88101 and (505) 769-7852, respectively.

If you should have any questions regarding this submittal, please call me at (913) 814-9994.

Sincerely,



Greg Wallace, R.G.
Project Manager

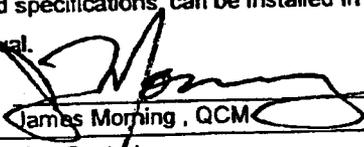
OK per Section
02210.. 3.1
DISPOSAL FAC

3/19/03

SUBMITTAL REVIEW VERIFICATION SHEET

Date: April 25, 2003

Submittal No.: 02210

Foster Wheeler Environmental Corporation Stamp

SWMU 101 Sewage Lagoons Closure, Cannon AFB, NM	
Certified for approval as indicated below:	
<input checked="" type="radio"/> A - <i>JAM</i> <input type="radio"/> B -	Approved as submitted Approved except as noted on the drawings and/or attached sheets.
It is hereby certified that the (equipment) (material) shown and marked in this submittal is that proposed to be incorporated into Contract Number DACW45-94-D-0003, Delivery Order No. 35, Work Authorization Directive 1 is in compliance with the contract drawings and specifications, can be installed in the allocated spaces, and is submitted for Government approval.	
Reviewed/Certified By:	 James Morning, QCM <i>4/25/03</i>
Description of items reviewed: SD-07 Certificates-Field Testing Control	

U.S. Army Corps of Engineers Stamp

U.S. Army Engineer District, Albuquerque Corps of Engineers	
Certified for approval as indicated below:	
<input checked="" type="radio"/> A <input type="radio"/> B - <input type="radio"/> C - <input type="radio"/> D - <input type="radio"/> E - <input type="radio"/> F - <input type="radio"/> G -	Approved as submitted. Approved except as noted on the drawings and/or attached sheet(s). Resubmission not required. Approved except as noted on the drawings and/or attached sheet(s). Resubmission required. Will be returned by separate correspondence. Disapproved; see comments on attached sheet. Receipt acknowledged. Other: Specify.
Note: Items approved as to general layout only. Dimensions and quantities checked. Approval does not relieve contractor of responsibilities for errors that may exist, as contractor shall be responsible for dimensions and design of adequate corrections. Details and satisfactory construction of work.	
Signature: 	Date: <u>4-30-03</u>

Reviewer's Signature: _____



DEPARTMENT OF THE ARMY
ENGINEER RESEARCH AND DEVELOPMENT CENTER, CORPS OF ENGINEERS
GEOTECHNICAL AND STRUCTURES LABORATORY
WATERWAYS EXPERIMENT STATION, 3909 HALLS FERRY ROAD
VICKSBURG, MISSISSIPPI 39180-6189

COPY FOR YOUR
INFORMATION

REPLY TO
ATTENTION OF:

CEERD-GS-E (1110-1-8100c)

24 Mar 03

Memorandum For Commander, USAE District, Albuquerque, ATTN: CESPAC-EC-G/Mr. Gene Gutierrez,
4101 Jefferson Plaza NE, Albuquerque, NM 87109

SUBJECT: Validation of Lydick Engineers & Surveyors, Inc., Clovis, NM

1. Reference Military Interdepartmental Purchase Request No. W81G6930376840, dated 06 Feb 03, requesting the inspection of the materials testing laboratory of Lydick Engineers & Surveyors, Inc., Clovis, NM. This laboratory was inspected on 11 Feb 03. The results of that inspection were reported to the Commander, USAE District, Albuquerque on 25 Feb 03. The laboratory reported their deficiency corrections to the Materials Testing Center on 17 Mar 03.

2. The Quality System of the laboratory is satisfactory and we are granting a validation of the lab to perform material tests for the U.S. Army Corps of Engineers. The material test methods that the laboratory is validated to perform are:

a. **Aggregate Tests:** ASTM C40, C117, C127, C128, C136, C29, C88, C131, C142, C535, C566, C702, C1252, D75, D4791, and D5821.

b. **Bituminous Tests:** ASTM D1559, D2041, D2172, D2726, D3203, D3666, and D5444.

c. **Concrete Tests:** ASTM C31, C39, C138, C143, C172, C173, C231, C1064, C42, C78, C192, C293, C470, C511, C617, C805, and C1077.

d. **Soil Tests:** ASTM D421, D422, D427, D558, D559, D698, D854, D1140, D1556, D1557, D2216, D2217, D2487, D2488, D2922, D2937, D3017, D3740, D4318, and D5084.

3. We will add Lydick Engineers & Surveyors, Inc., Las Cruces, NM to the list of commercial laboratories qualified to conduct material tests for the U.S. Army Corps of Engineers, see the Materials Testing Center homepage at <http://www.wes.army.mil/SL/MTC/mtc.htm>. All Corps offices will be notified of this decision and will have the opportunity to use their services. The laboratory will remain on our list of laboratories qualified to conduct material tests until 11 Feb 06, three (3) years from the date of the inspection.


DANIEL A. LEAVELL
Director, Materials Testing Center

CF:

Mr. Chad Lydick/Lydick Engineers & Surveyors, Inc., Las Cruces, NM

SUBMITTAL REVIEW VERIFICATION SHEET

Date: May 5, 2003

Submittal No.: 02210-4

Foster Wheeler Environmental Corporation Stamp

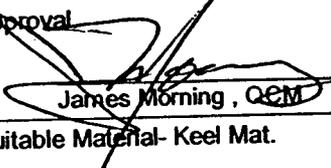
SWMU 101 Sewage Lagoons Closure, Cannon AFB, NM

Certified for approval as indicated below:

- A - ~~Approved as submitted~~
 B - Approved except as noted on the drawings and/or attached sheets.

It is hereby certified that the (equipment) (material) shown and marked in this submittal is that proposed to be incorporated into Contract Number DACW45-94-D-0003, Delivery Order No. 35, Work Authorization Directive 1 is in compliance with the contract drawings and specifications, can be installed in the allocated spaces, and is submitted for Government approval.

Reviewed/Certified By:


James Morning, QEM 5-5-03

Description of items reviewed: SD-06-Test Report- Suitable Material- Keel Mat.

U.S. Army Corps of Engineers Stamp

U.S. Army Engineer District, Albuquerque Corps of Engineers

Certified for approval as indicated below:

- A - Approved as submitted.
 B - Approved except as noted on the drawings and/or attached sheet(s). Resubmission not required.
 C - Approved except as noted on the drawings and/or attached sheet(s). Resubmission required.
 D - Will be returned by separate correspondence.
 E - Disapproved; see comments on attached sheet.
 F - Receipt acknowledged.
 G - Other: Specify.

Note: Items approved as to general layout only. Dimensions and quantities checked. Approval does not relieve contractor of responsibilities for errors that may exist, as contractor shall be responsible for dimensions and design of adequate corrections. Details and satisfactory construction of work.

Signature: 

Date: 5-6-03

Reviewer's Signature: _____

ROBERT L. LYDICK
ROBERT CHAD LYDICK
Professional Engineer and
Land Surveyor

Lydick
ENGINEERS AND SURVEYORS, INC.
205 E. SECOND STREET - P.O. BOX 728
CLOVIS, NEW MEXICO 88102-0728
505 762-3771 - FAX 505 762-9093

Registered
New Mexico
Texas · Oklahoma
Colorado

MAY 5, 2003

ARROWHEAD CONSTRUCTION
12920 METCALF SUITE 150
OVERLAND PARK, KS. 66213

DEAR ARRON

ENCLOSED IS THE TESTING INFORMATION YOU REQUESTED ON THE KEEL SECTION MATERIAL TO BE USED ON THE SWMU 101 LAGOON CLOSURE PROJECT AT CANNON A.F.B. AS RANDOM FILL.

THE MATERIAL MEETS ALL REQUIREMENT SET FORTH IN SPEC. SECTION 2210 PARAGRAPH 1.3.3 "RANDOM FILL". LISTED BELOW IS AN OVERVIEW OF THE TEST PERFORMED.

ASTM D 422-01 PARTICLE-SIZE ANALYSIS OF SOILS

ASTM D 698-01 LABORATORY COMPACTION CHARACTERISTICS OF SOIL USING STANDARD EFFORTS (PROCTOR)

ASTM D 2487-01 CLASSIFICATION OF SOILS FOR ENGINEERING PURPOSES (USCS)

ASTM D 2488-01 DESCRIPTION AND IDENTIFICATION OF SOILS

ASTM D 4318-01 LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOIL

IF I CAN BE OF FURTHER ASSISTANCE IN THIS MATTER PLEASE FEEL FREE TO CONTACT ME

VERY TRULY YOURS



LANCE E. LANGAN
LABORATORY SUPERVISOR

Lydick Engineers & Surveyors, Inc.

P. O. Box 728
205 E. 2nd Street
Clovis, NM 88101
505-762-3771

Sieve

Report Date:

Project:

Report Number:

Analysis

4-May-01

DACA-4700-R-0011

2

To: US Army Corps of
Engineers

Copies To:

C.O.E.

Proj: Runway 22/04 Keel Section CAFB

Sample Type:

COMPOSITE

Sampled By:

Lance E. Langan

Source:

STA. 87+00 22 END

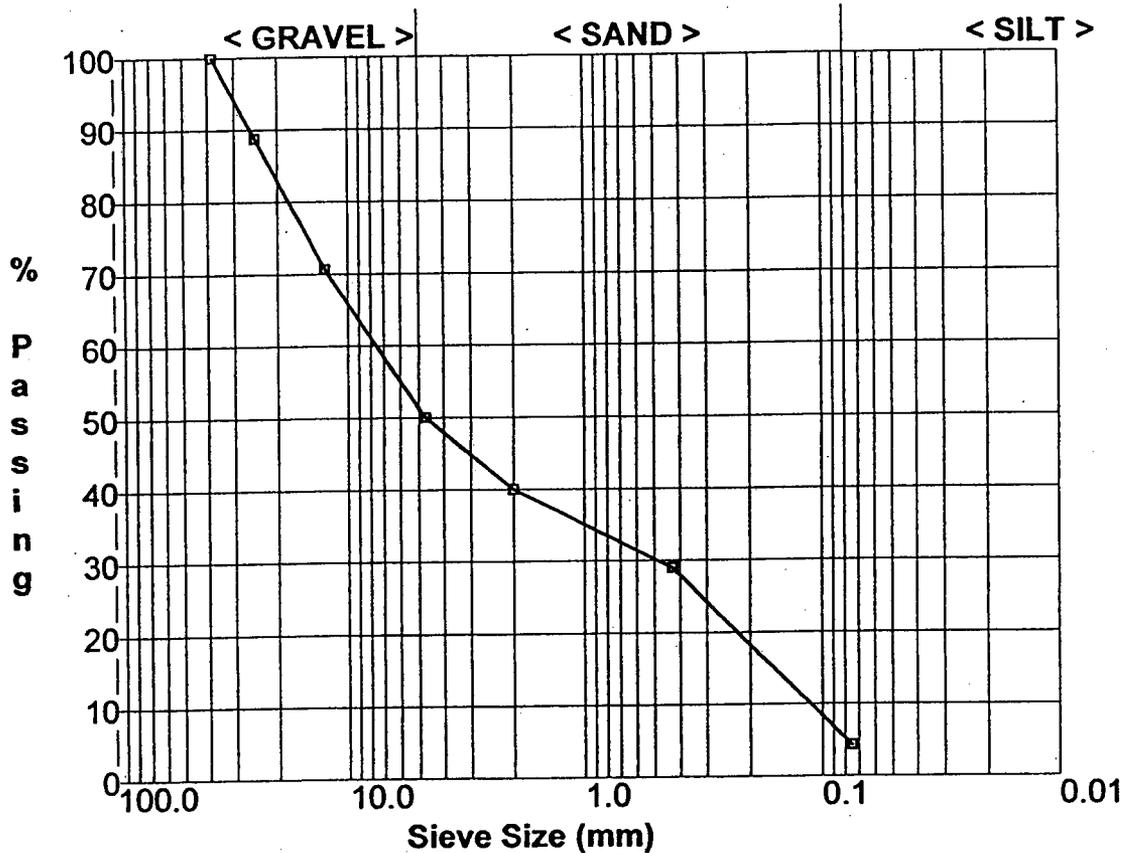
Tested By:

Lance E. Langan

Sample Date: 4-Apr-01

Date Tested: 1-May-01

Date Received: 4-Apr-01



Sieve
Size
(mm)

Percent
Passing

37.500

100.0

25.000

88.5

12.500

70.6

4.750

50.0

2.000

40.0

0.425

28.9

0.075

4.4

Sample Description: IN-PLACE

Comment: LIMITS COULD NOT BE DETERMED AS PER ASTM D-4318

Per:

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on written request.

Lydick Engineers & Surveyors, Inc.

P. O. Box 728
205 E. 2nd Street
Clovis, NM 88101
505-762-3771

Sieve

Report Date:

Project:

Report Number:

Analysis

4-May-01

DACA-4700-R-0011

3

To: US Army Corps of
Engineers

Copies To:

C.O.E.

Proj: Runway 22/04 Keel Section CAFB

Sample Type:

COMPOSITE

Sampled By:

Lance E. Langan

Source:

STA. 85+00 22 END

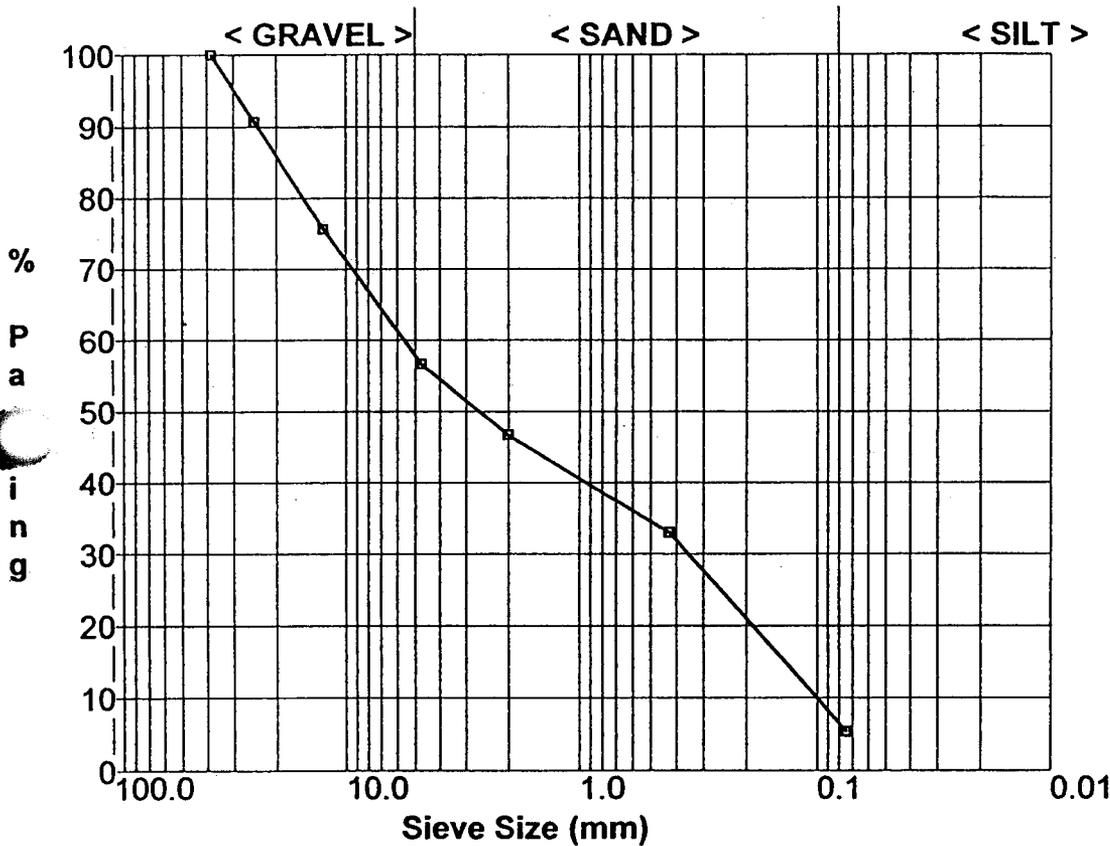
Tested By:

Lance E. Langan

Sample Date: 4-Apr-01

Date Tested: 1-May-01

Date Received: 4-Apr-01



Sieve Size (mm)	Percent Passing
37.500	100.0
25.000	90.6
12.500	75.8
4.750	56.7
2.000	46.5
0.425	32.9
0.075	5.3

Sample Description: In-Place

Comment: LIMITS COULD NOT BE DETERMED AS PER ASTM D-4318

Per.

Lance E. Langan

Lydick Engineers & Surveyors, Inc.

P. O. Box 728
205 E. 2nd Street
Clovis, NM 88101
505-762-3771

Sieve

Report Date:

Project:

Report Number:

Analysis

4-May-01

DACA-4700-R-0011

4

To: US Army Corps of
Engineers

Copies To:

C.O.E.

Proj: Runway 22/04 Keel Section CAFB

Sample Type:

COMPOSITE

Sampled By:

Lance E. Langan

Source:

STA. 80+50 22 END

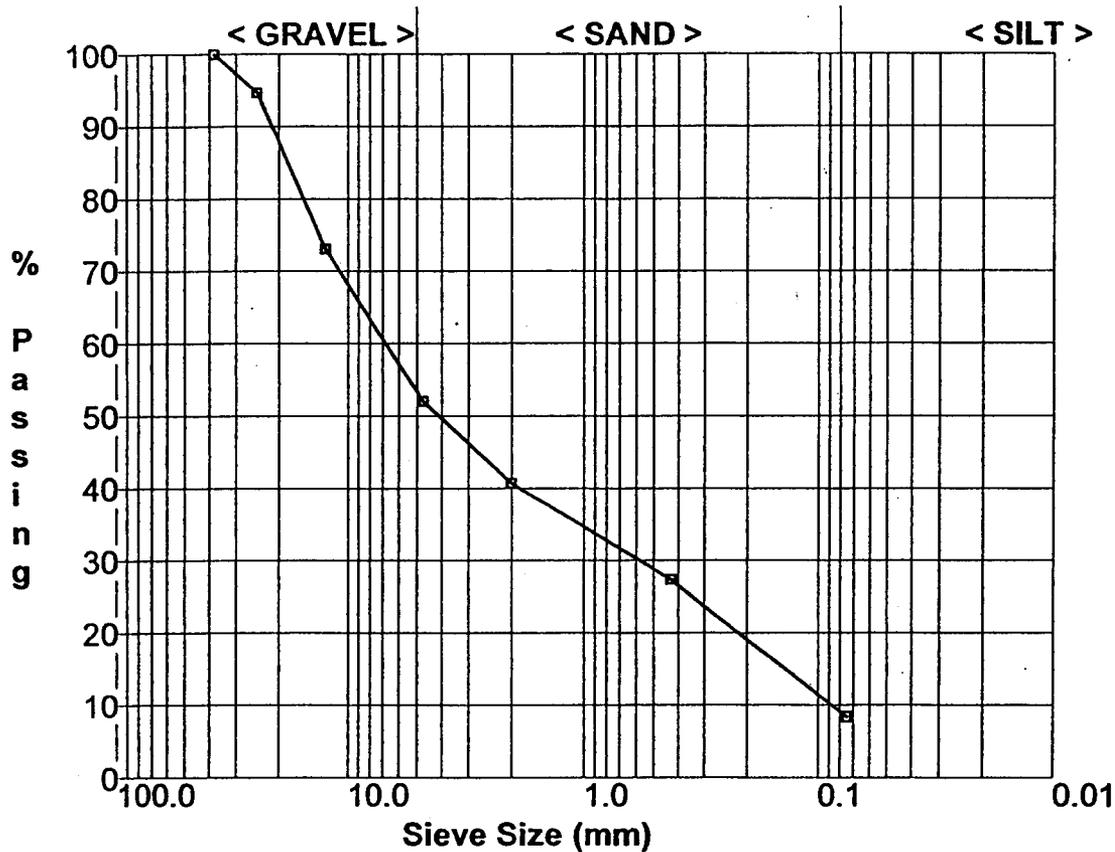
Tested By:

Lance E. Langan

Sample Date: 4-Apr-01

Date Tested: 1-May-01

Date Received: 4-Apr-01



Sieve Size (mm)	Percent Passing
37.500	100.0
25.000	94.7
12.500	72.8
4.750	52.0
2.000	40.5
0.425	27.4
0.075	8.3

Sample Description: In-Place

Comment: LIMITS COULD NOT BE DETERMED AS PER ASTM D-4318

Per:

Lydick Engineers & Surveyors, Inc.

P. O. Box 728
205 E. 2nd Street
Clovis, NM 88101
505-762-3771

Sieve

Report Date:

Project:

Report Number:

Analysis

4-May-01

DACA-4700-R-0011

5

To: US Army Corps of
Engineers

Copies To:

C.O.E.

Proj: Runway 22/04 Keel Section CAFB

Sample Type:

COMPOSITE

Sampled By:

Lance E. Langan

Source:

STOCKPILE

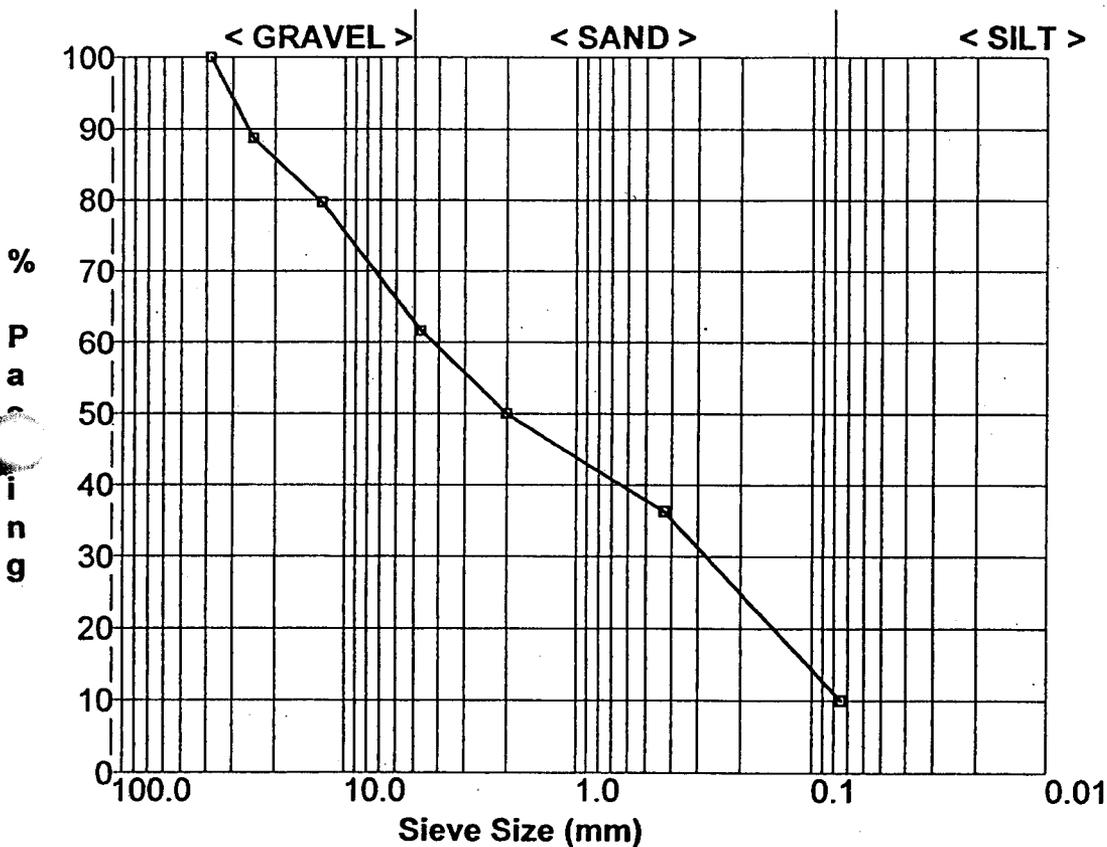
Tested By:

Lance E. Langan

Sample Date: 4-Apr-01

Date Tested: 1-May-01

Date Received: 4-Apr-01



Sample Description: NORTH END

Comment: LIMITS COULD NOT BE DETERMED AS PER ASTM D-4318

Per: *Lance E. Langan*

Lydick Engineers & Surveyors, Inc.

P. O. Box 728
205 E. 2nd Street
Clovis, NM 88101
505-762-3771

Sieve

Report Date:
Project:
Report Number:

Analysis

4-May-01
DACA-4700-R-0011
6

To: US Army Corps of
Engineers

Copies To:

C.O.E.

Proj: Runway 22/04 Keel Section CAFB

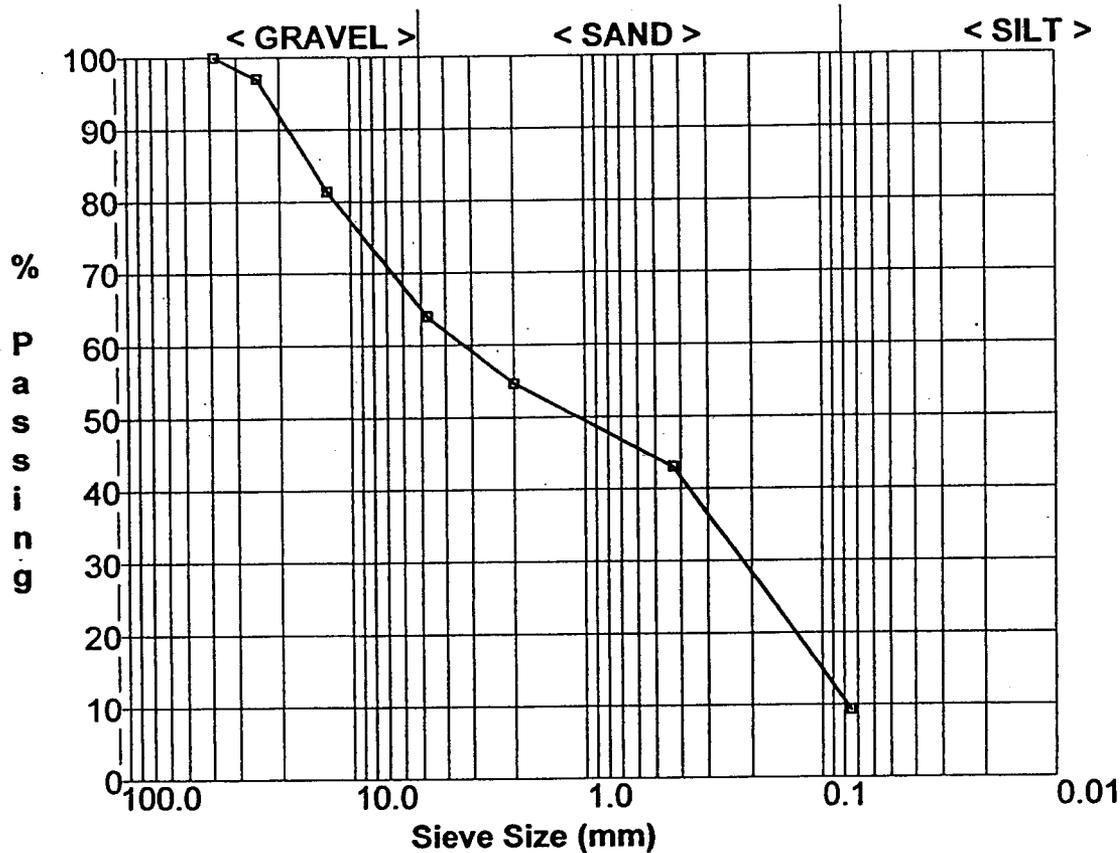
Sample Type:
Sampled By:
Source:
Tested By:

COMPOSITE
Lance E. Langan
STOCKPILE
Lance E. Langan

Sample Date: 4-Apr-01

Date Tested: 1-May-01

Date Received: 4-Apr-01



Sieve Size (mm)	Percent Passing
37.500	100.0
25.000	97.0
12.500	81.4
4.750	64.0
2.000	54.6
0.425	43.0
0.075	9.4

Sample Description: MIDDLE

Comment: LIMITS COULD NOT BE DETERMED AS PER ASTM D-4318

Per:

Lydick Engineers & Surveyors, Inc.

P. O. Box 728
205 E. 2nd Street
Clovis, NM 88101
505-762-3771

To: US Army Corps of
Engineers

Proj: Runway 22/04 Keel Section CAFB

Sieve

Report Date:
Project:
Report Number:

Analysis

4-May-01
DACA-4700-R-0011
7

Copies To:

C.O.E.

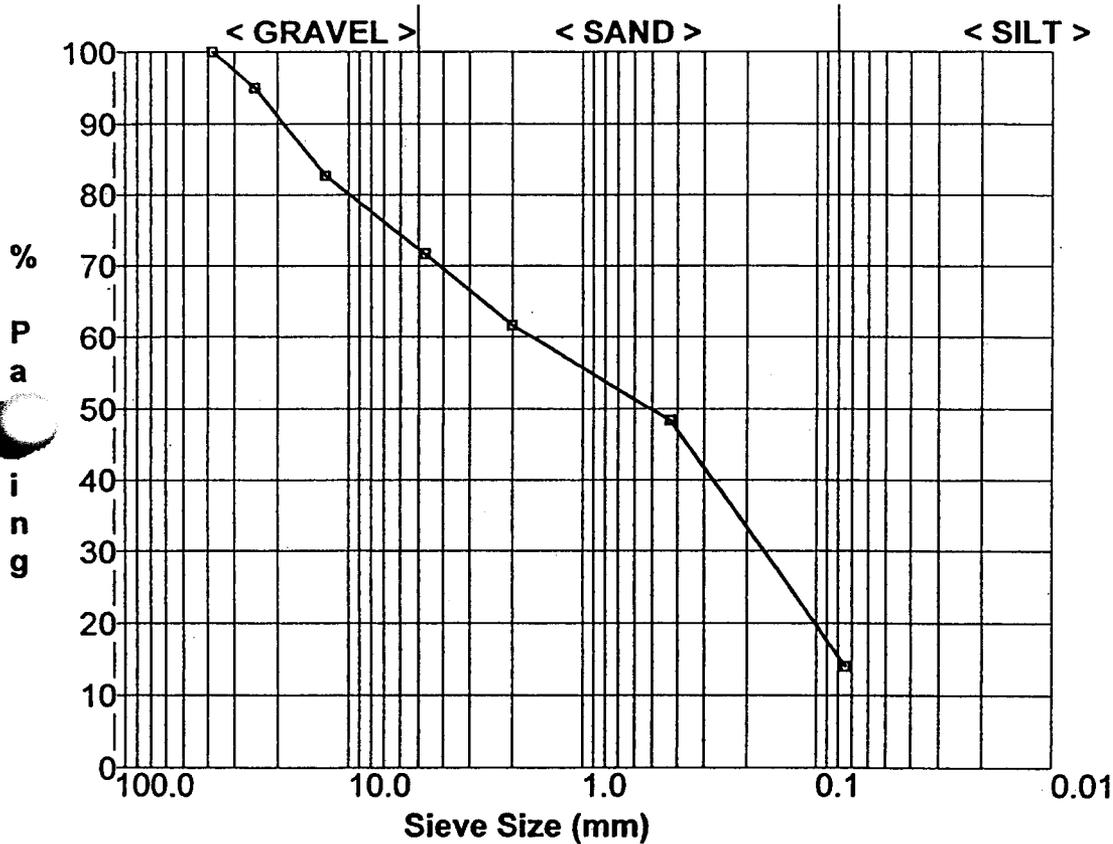
Sample Type:
Sampled By:
Source:
Tested By:

COMPOSITE
Lance E. Langan
STOCKPILE
Lance E. Langan

Sample Date: 4-Apr-01

Date Tested: 1-May-01

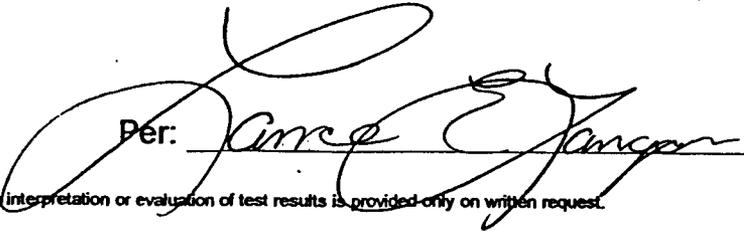
Date Received: 4-Apr-01



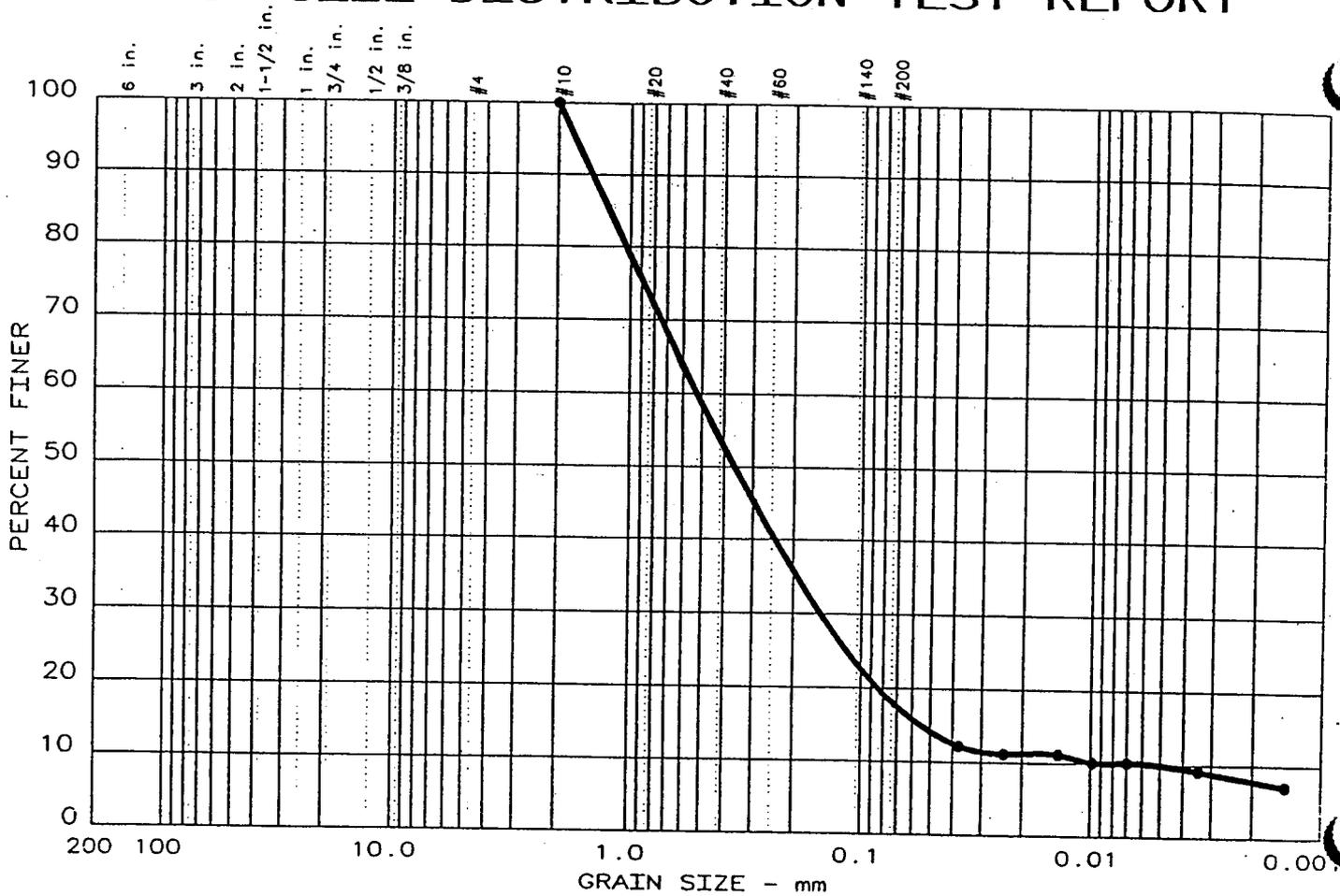
Sieve Size (mm)	Percent Passing
37.500	100.0
25.000	95.0
12.500	82.5
4.750	71.8
2.000	61.7
0.425	48.4
0.075	14.0

Sample Description: SOUTH END

Comment: LIMITS COULD NOT BE DETERMED AS PER ASTM D-4318

Per: 

GRAIN SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
• 1	0.0	0.0	81.5	8.5	10.0

LL	PI	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
• 24	NP	1.22	0.521	0.359	0.150	0.0550	0.0049	8.77	106.4

MATERIAL DESCRIPTION	USCS	AASHTO
• Brown Silty Sand with Coliche Nodules & Gravel	SM	

Project No.: 2041
 Project: Lydick Engineers & Surveyors, Inc.
 • Location: Cannon Air Force Base Sewer Lagoon
 Date: 7-13-01

Remarks:
 Sample Labeled #1 of
 Milled Cement Treated
 Base from Keel Section

Elapsed time, min	Temp, deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
1440.0	20.0	2.0	7.0	0.0137	2.0	16.0	0.0014	7.1

Fractional Components

Gravel/Sand based on #4 sieve

Sand/Fines based on #200 sieve

+ 3 in. = 0.0 % GRAVEL = 0.0 % SAND = 81.5

SILT = 8.5 % CLAY = 10.0

Cu = 1.22 D60 = 0.521 D50 = 0.359

Cc = 0.1496 D15 = 0.05495 D10 = 0.00490

Cu = 8.7700 Cu = 106.4143

GRAIN SIZE DISTRIBUTION TEST DATA

Test No.: 2

Date: 7-13-01
 Project No.: 2041
 Project: Lydick Engineers & Surveyors, Inc.

Sample Data

Location of Sample: Cannon Air Force Base Sewer Lagoon
 Sample Description: Light Brown Silty Sand w/Caliche Nodules/Gravel
 USCS Class: SM Liquid limit: 24
 AASHTO Class: Plasticity index: NP

Notes

Remarks: Sample Labeled #3 of Milled Cement Treated
 Base from Keel Section
 Fig. No.: 2A

Mechanical Analysis Data

Sieve	Size, mm	Percent finer
10	2.000	100.0

Hydrometer Analysis Data

Separation sieve is number 10
 Percent -# 10 based on complete sample= 100.0
 Weight of hydrometer sample: 100
 Pycnometric moisture correction:
 Moist weight & tare = 600.30
 Dry weight & tare = 592.90
 Tare = 133.20
 Hygroscopic moisture= 1.6 %
 Calculated biased weight= 98.42
 Automatic temperature correction
 Composite correction at 20 deg C = 5

Meniscus correction only= 0
 Specific gravity of solids= 2.63
 Specific gravity correction factor= 1.005
 Hydrometer type: 152H Effective depth L= 16.294964 - 0.164 x Rm

Elapsed time, min	Temp, deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
2.0	20.0	19.0	24.0	0.0137	19.0	13.2	0.0352	24.5
5.0	20.0	17.0	22.0	0.0137	17.0	13.5	0.0226	22.4
15.0	20.0	14.0	19.0	0.0137	14.0	14.0	0.0133	19.4
30.0	20.0	13.0	18.0	0.0137	13.0	14.2	0.0094	18.3
60.0	20.0	12.0	17.0	0.0137	12.0	14.3	0.0067	17.3
250.0	20.0	10.0	15.0	0.0137	10.0	14.7	0.0033	15.3

Elapsed time, min	Temp, deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
1440.0	20.0	6.0	11.0	0.0137	6.0	15.3	0.0014	11.2

 Fractional Components

Gravel/Sand based on #4 sieve

Sand/Fines based on #200 sieve

% + 3 in. = 0.0 % GRAVEL = 0.0 % SAND = 68.8

% SILT = 14.6 % CLAY = 16.6

D85= 1.10 D60= 0.385 D50= 0.237

D30= 0.0668 D15= 0.00295

GRAIN SIZE DISTRIBUTION TEST DATA

Test No.: 3

Date: 7-13-01

Project No.: 2041

Project: Lydick Engineers & Surveyors, Inc.

Sample Data

Location of Sample: Cannon Air Force Base Sewer Lagoon
 Sample Description: Brown Silty Sand with Caliche Nodules & Gravel
 USCS Class: SM Liquid limit: 22
 AASHTO Class: Plasticity index: NP

Notes

Remarks: Sample Labeled #2 of Milled Cement Treated
 Base from Keel Section

Fig. No.: 3A

Mechanical Analysis Data

Sieve #	Size, mm	Percent finer
# 10	2.000	100.0

Hydrometer Analysis Data

Separation sieve is number 10
 Percent -# 10 based on complete sample= 100.0
 Weight of hydrometer sample: 100
 Hygroscopic moisture correction:
 Moist weight & tare = 491.30
 Dry weight & tare = 483.60
 Tare = 130.30
 Hygroscopic moisture= 2.2 %
 Calculated biased weight= 97.87
 Automatic temperature correction
 Composite correction at 20 deg C = 5

Meniscus correction only= 0
 Specific gravity of solids= 2.63
 Specific gravity correction factor= 1.005
 Hydrometer type: 152H Effective depth L= 16.294964 - 0.164 x Rm

Elapsed time, min	Temp, deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
2.0	20.0	16.0	21.0	0.0137	16.0	13.7	0.0359	21.5
5.0	20.0	15.0	20.0	0.0137	15.0	13.8	0.0228	20.5
15.0	20.0	13.0	18.0	0.0137	13.0	14.2	0.0133	18.4
30.0	20.0	11.0	16.0	0.0137	11.0	14.5	0.0095	16.4
60.0	20.0	10.0	15.0	0.0137	10.0	14.7	0.0068	15.4
250.0	20.0	8.0	13.0	0.0137	8.0	15.0	0.0034	13.3

Elapsed time, min	Temp, Actual deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
1440.0	20.0	4.0	9.0	0.0137	4.0	15.6	0.0014	9.2

Fractional Components

Gravel/Sand based on #4 sieve

Sand/Fines based on #200 sieve

% + 3 in. = 0.0 % GRAVEL = 0.0 % SAND = 72.8

% SILT = 12.6 % CLAY = 14.6

D85= 1.15 D60= 0.437 D50= 0.282

D30= 0.0923 D15= 0.00582 D10= 0.00166

Cc = 11.7490 Cu = 263.0268

MAR 20 2003

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE

DATE

03/19/2003

TRANSMITTAL NO.

02220-1

(Read instructions on the reverse side prior to initiating this form)

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS (This section will be initiated by the contractor)

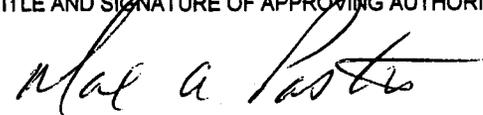
TO: Cannon AFB Resident Office US Army Corps of Engineers 201 N. Perimeter Rd. Cannon AFB, NM 88103	FROM: Foster Wheeler Environmental C 6605 Uptown Blvd, NE Suite 220 Albuquerque, NM 87110	CONTRACT NO. DACW45-94-D-0003 0035	CHECK ONE: <input checked="" type="checkbox"/> THIS IS A NEW TRANSMITTAL <input type="checkbox"/> THIS IS A RESUBMITTAL OF TRANSMITTAL _____
--	---	---------------------------------------	--

SPECIFICATION SEC. NO. (Cover only one section with each transmittal) 02220	PROJECT TITLE AND LOCATION SWMU 101 - Sewage Lagoons Cannon AFB	CHECK ONE: THIS TRANSMITTAL IS FOR <input type="checkbox"/> FIO <input checked="" type="checkbox"/> GOV'T. APPROVAL
--	--	---

ITEM NO. a.	DESCRIPTION OF ITEM SUBMITTED (Type size, model number/etc.) b.	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. (See instruction no. 8) c.	NO. OF COPIES d.	CONTRACT REFERENCE DOCUMENT		FOR CONTRACTOR USE CODE g.	VARIATION (See Instruction No. 6) h.	FOR CE USE CODE i.
				SPEC. PARA. NO. e.	DRAWING SHEET NO. f.			
1	Work Plan-Demo	TEST REPORTS	5	1.3		A		A

REMARKS	I certify that the above submitted items have been reviewed in detail and are correct and in the strict conformance with the contract drawings and specifications except as otherwise stated.  NAME AND SIGNATURE OF CONTRACTOR
---------	--

SECTION II - APPROVAL ACTION

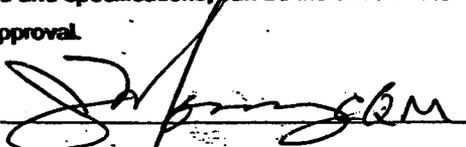
ENCLOSURES RETURNED (List by item No.)	NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY 	DATE 3-20-03
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SUBMITTAL REVIEW VERIFICATION SHEET

Date: 3/19/03

Submittal No.: 02220 -1

Foster Wheeler Environmental Corporation Stamp

SWMU 101 Sewage Lagoons Closure, Cannon AFB, NM Certified for approval as indicated below:	
<input checked="" type="radio"/> A -	Approved as submitted
<input type="radio"/> B -	Approved except as noted on the drawings and/or attached sheets.
It is hereby certified that the (equipment) (material) shown and marked in this submittal is that proposed to be incorporated into Contract Number DACW45-94-D-0003, Delivery Order No. 35, Work Authorization Directive 1 is in compliance with the contract drawings and specifications, can be installed in the allocated spaces, and is submitted for Government approval.	
Reviewed/Certified By:	
Description of items reviewed: Demo. Work - PLAN 02220-1.3 SP 06	

MAR 20 2003

U.S. Army Corps of Engineers Stamp

U.S. Army Engineer District, Albuquerque Corps of Engineers Certified for approval as indicated below:	
<input checked="" type="radio"/> A -	Approved as submitted.
<input type="radio"/> B -	Approved except as noted on the drawings and/or attached sheet(s). Resubmission not required.
<input type="radio"/> C -	Approved except as noted on the drawings and/or attached sheet(s). Resubmission required.
<input type="radio"/> D -	Will be returned by separate correspondence.
<input type="radio"/> E -	Disapproved; see comments on attached sheet.
<input type="radio"/> F -	Receipt acknowledged.
<input type="radio"/> G -	Other: Specify.
Note: Items approved as to general layout only. Dimensions and quantities checked. Approval does not relieve contractor of responsibilities for errors that may exist, as contractor shall be responsible for dimensions and design of adequate corrections. Details and satisfactory construction of work.	
Signature: _____	Date: _____

Reviewer's Signature:



MAR 20 2003

**DEMOLITION PLAN
CLOSURE OF SEWAGE LAGOONS, SWMU 101
CANNON AIR FORCE BASE
CLOVIS, NEW MEXICO
(Revision 0)**

**FOSTER WHEELER ENVIRONMENTAL CORPORATION
SUBCONTRACT NO. 045962**

Submitted to:

**Foster Wheeler Environmental Corporation
6605 Uptown Corporation
Suite 220
Albuquerque, New Mexico 87110**

Submitted by:



**Arrowhead Contracting, Inc.
12920 Metcalf, Suite 150
Overland Park, Kansas 66213
(913) 814-9994**

March 18, 2003

Revision 0

Introduction:

This plan describes the equipment and procedures proposed by Arrowhead Contracting, Inc. for the demolition of discharge and outflow piping within the north and south lagoons and the concrete materials within the south lagoon. Arrowhead Contracting, Inc. reserves the right to modify the listed equipment and described procedures in this plan if site conditions change or a more reasonable field tested method is approved by Foster Wheeler Environmental.

Protection of Property:

Existing trees will not be disturbed or damaged without prior approval of Foster Wheeler Environmental and Base Civil Engineering Office. Portions of fencing on the west side of the south lagoon may be removed to facilitate hauling of the keel material into the south lagoon. Arrowhead will submit a diagram of which sections of fencing will be removed to Foster Wheeler Environmental and the Base Civil Engineering Office for approval prior to this work. The removed sections of fencing will be stored in the equipment staging area to protect against damage from the ongoing work. Arrowhead will restore the sections of fencing in their original locations to the satisfaction of Foster Wheeler Environmental at the completion of the project.

Empty purge tanks adjacent to monitoring wells will be moved adjacent to the perimeter fencing at the onset of construction to protect them from potential damage from site activities. Purge tanks containing fluids will be left in place and surrounded with metal fence post and yellow caution flagging to protect them from potential damage from equipment working in the vicinity of the tanks. Yellow caution flagging will also be placed on the bollards surrounding the wells to highlight the locations to construction equipment working in the vicinity of the wells.

Demolition of Piping:

Piping as designated in the Section 02220 of the Specifications will be removed and disposed of in the center portion of the south lagoon prior to placing any random fill over this material. The piping will be cut with a cutting torch or broken at joints at the ground surface or points coinciding with the limits of earthwork. A permit will be obtained from the base prior to any cutting activities. If applicable, the pipe may be broken with the use of an excavator track-hoe instead of cutting it with a torch.

The pipe will then be transfer to the center of the south lagoon and broken into smaller pieces with the use of the track-hoe. Placement of the piping in the center portion of the south lagoon will ensure that a minimum of 24 inches of random fill is place over the pipe. Sections of piping remaining in the ground will be filled with cement grout having a minimum 28-day compressive strength of 250 psi. The grout will be placed directly into the pipe using a cement truck. A sample of the cement will be obtained and tested to verify the compressive strength.

Concrete Demolition:

The concrete dike at the inside perimeter of the south lagoon will be removed from the face of the berm and used as random fill. The concrete will then be transfer to the center of the south lagoon and broken into smaller pieces no larger than 36 inches with the use of the tack-hoe. Placement of the concrete in the center portion of the south lagoon will ensure that a minimum of 24 inches of random fill is place over this material.

The concrete slab in the south lagoon and the concrete gate structure will be demolished and disposed of in a similar fashion as the concrete dike material; however, Arrowhead may elect to use a breaker attachment or wrecking ball to facilitate the breakage of the concrete into the specified dimension. Water valves and meters associated with the gate structure will also be placed in with the random fill.

Access Road Demolition:

The five access roads into the lagoons will be excavated and placed in with the random fill.

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SPECIFICATIONS, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE

(Read instructions on the reverse side prior to initiating this form)

APR 28 2003

DATE

04/25/2003

TRANSMITTAL NO.

02377

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS (This section will be initiated by the contractor)

TO: Cannon AFB Resident Office
US Army Corps of Engineers
201 N. Perimeter Rd.
Cannon AFB, NM 88103

FROM: Foster Wheeler Environmental C
6605 Uptown Blvd, NE Suite 220
Albuquerque, NM 87110

CONTRACT NO.

DACW45-94-D-0003 0035

CHECK ONE:

THIS IS A NEW TRANSMITTAL
 THIS IS A RESUBMITTAL OF TRANSMITTAL _____

SPECIFICATION SEC. NO. (Cover only one section with each transmittal)
02377

PROJECT TITLE AND LOCATION

SWMU 101 - Sewage Lagoons Cannon AFB

CHECK ONE: THIS TRANSMITTAL IS FOR FIO GOVT. APPROVAL

ITEM NO. a.	DESCRIPTION OF ITEM SUBMITTED (Type size, model number/etc.) b.	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. (See instruction no. 8) c.	NO. OF COPIES d.	CONTRACT REFERENCE DOCUMENT		FOR CONTRACTOR USE CODE g.	VARIATION (See Instruction No. 6) h.	FOR CE USE CODE i.
				SPEC. PARA. NO. e.	DRAWING SHEET NO. f.			
5	Commerical Testing Lab	CERTIFICATES	5	3.1.6		A		F

REMARKS

I certify that the above submitted items have been reviewed in detail and are correct and in the strict conformance with the contract drawings and specifications except as otherwise stated.



KATHY OMERNIK, QC PROGRAM MANAGER
NAME AND SIGNATURE OF CONTRACTOR

SECTION II - APPROVAL ACTION

ENCLOSURES RETURNED (List by item No.)

NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY



DATE

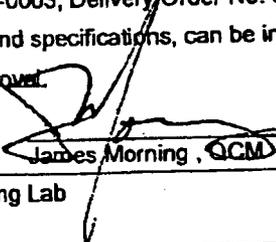
4-30-03

SUBMITTAL REVIEW VERIFICATION SHEET

Date: April 25, 2003

Submittal No.: 02377-1

Foster Wheeler Environmental Corporation Stamp

SWMU 101 Sewage Lagoons Closure, Cannon AFB, NM	
Certified for approval as indicated below:	
<input checked="" type="radio"/> A -	Approved as submitted
<input type="radio"/> B -	Approved except as noted on the drawings and/or attached sheets.
It is hereby certified that the (equipment) (material) shown and marked in this submittal is that proposed to be incorporated into Contract Number DACW45-94-D-0003, Delivery Order No. 35, Work Authorization Directive 1 is in compliance with the contract drawings and specifications, can be installed in the allocated spaces, and is submitted for Government approval.	
Reviewed/Certified By:	 4/25/03 James Morning, QCM
Description of items reviewed: SD-07 Commercial Testing Lab	

U.S. Army Corps of Engineers Stamp

U.S. Army Engineer District, Albuquerque Corps of Engineers	
Certified for approval as indicated below:	
<input type="radio"/> A -	Approved as submitted.
<input type="radio"/> B -	Approved except as noted on the drawings and/or attached sheet(s). Resubmission not required.
<input type="radio"/> C -	Approved except as noted on the drawings and/or attached sheet(s). Resubmission required.
<input type="radio"/> D -	Will be returned by separate correspondence.
<input type="radio"/> E -	Disapproved; see comments on attached sheet.
<input checked="" type="radio"/> F -	Receipt acknowledged.
<input type="radio"/> G -	Other: Specify.
Note: Items approved as to general layout only. Dimensions and quantities checked. Approval does not relieve contractor of responsibilities for errors that may exist, as contractor shall be responsible for dimensions and design of adequate corrections. Details and satisfactory construction of work.	
Signature: 	Date: 4-28-03

Reviewer's Signature: _____

**LYDICK ENGINEERS & SURVEYORS, INC.
CONSTRUCTION MATERIALS TESTING LABORATORY**

STATEMENT OF QUALIFICATIONS

SUMMARY OF QUALIFICATIONS

1. Small Business - 100% family ownership - established in 1961 within the City of Clovis, N.M.
2. Comply with requirements of ASTM E 329 and D 3740.
3. Full time New Mexico and Texas Registered Professional Engineer on staff (Current New Mexico P.E. Registration Number 5955, Texas P.E. Registration Number 48580)
4. All testing equipment calibrated at least annually by an independent calibration laboratory in accordance with ASTM E 4-98.
5. All tests performed in accordance with standards of American society for Testing Materials (ASTM) or other applicable standards.
6. Sufficient personnel to meet project scheduling requirement and avoid delays.

DETAILED QUALIFICATIONS:

OWNERSHIP

Lydick Engineers and Surveyors, Inc. is operated as a sub-chapter S corporation with Robert Chad Lydick, principal. Robert L. Lydick, the father of Chad Lydick, founded the business in 1961, within the City of Clovis. The materials testing Lab was established within the organization in the mid 1970's which allowed the firm to offer a more complete full service operation to our diverse client base.

A new state-of-the-art facility was constructed at 205 Gidding Street in 1997. This new facility has greatly enhanced our capabilities by providing added space for our new equipment as well as increased wet room capacity.

Currently our laboratory staff is composed of three certified lab techs under the supervision of a licensed professional engineer. Additional technicians have been employed in the past as needed; however our present staff has 29 years combined service with our company in this field.

FACILITIES:

A state-of-the-art laboratory located at 204 Gidding Street in Clovis, New Mexico. The facility is a 2600 square foot building consisting of laboratory, office and warehouse space. The facility was opened in October 1997.

Mobile laboratories - We currently do not have fully equipped mobile laboratories to perform soil testing, concrete testing and inspections on site. We do have the capability of sending laboratories, which are fully equipped with state-of-the-art testing equipment when needed.

PERSONNEL: (Resumes included)

Robert C. Lydick – President – Majority Shareholder – Twenty-eight years experience in materials testing.

Lance Langan – Laboratory Supervisor – Eleven years experience in materials testing.

Robert Mick – Laboratory Safety Office – Twenty-seven years experience in materials testing.

Supervisory personnel to coordinate and staff work, observe fieldwork for quality assurance purposes.

Administrative staff to prepare and distribute reports.

QUALITY ASSURANCE:

Supervisor monitors both field and lab work to ensure quality and uniformity in individual test procedures.

Registered Professional Engineer oversees all testing procedures in addition to reviewing, signing, and stamping all reports.

Engineer immediately contacts owner or contractor personnel to discuss any failures.

Seaman, Humboldt and Troxler nuclear gauges are maintained in accordance with regulations of the New Mexico Environmental Department and the United States Nuclear Regulatory Commission.

TRAINING:

Technical personnel training includes:

American Concrete Institute – Laboratory Technician I

American Concrete Institute – Field Technician I

Seaman Nuclear Measuring Devices Certification

NICET Level I

NICET Level II

OSHA 40 Hour Hazwoper Course

NMSHTD Contractor Quality Control (PMBP and Soils)

Corps of Engineers Construction Quality Management for Construction

Corps of Engineers Airfield Paving

INSURANCE:

Commercial General Liability -
 Each Occurrence - \$1,000,000
 Fire Damage - \$ 50,000
 Medical Expense - \$ 5,000
 Personal & Adv Injury - \$1,000,000
 General Aggregate - \$2,000,000
 Products Comp Op Ag \$1,000,000

Automobile Liability -
 Combined Single Limit \$1,000,000

Workers Compensation - Statutory Limits
 Each Accident - \$ 100,000
 Disease Each Employee \$ 500,000
 Disease Policy Limit \$ 100,000

Professional Liability -
 Limit \$1,000,000

PROJECTS: Lydick Engineers Testing Laboratory, Inc. has provided materials testing and engineering services to numerous architects, engineers, contractors and owners. A partial list is enclosed. (Exhibit VII)

TESTING AND INSPECTION SERVICES INCLUDE:

Permeability Tests - Flexible Wall Permeameter performed in accordance with ASTM D5084.

Compacted soils, structural fill, backfill, and aggregate base course for roads and pavements. The optimum moisture-density relationship is performed in accordance with ASTM D 698. In place density and moisture tests are performed utilizing Seaman and Humboldt Nuclear Measuring Gauges. The New Mexico State Highway Department certifies our technicians for contractor quality control. These certifications are required to work on highway projects under the New Mexico State Highway and Transportation Department.

Asphalt Paving and Base Course - We have a complete asphalt laboratory for mix designs and to test samples of hot mix. We also have a mobile hot mix laboratory for use at a hot mix batch plant. Other equipment includes three Nuclear Measuring Gauges for density testing.

Concrete – American Concrete Institute certified technicians. Services include mix designs, slump, air and compressive strength tests. Tests include concrete cylinders, prisms and beams. Tests performed in accordance with ACI procedures and ASTM C 31, ASTM C 39 and ASTM C 143. Equipment calibrated annually.

Mortar – Technicians trained in performing these tests on mortar cubes per ASTM C 270. Company has equipment required to perform compression testing on mortar sample.

Environmental Phase I – Site Assessments

Site assessments are required on most commercial real estate transactions. The lender wants a full understanding of the environmental condition of the property prior to making a lending decision. Site assessments are performed in accordance with ASTM E-1527-00 standards. The site assessments identify documented and/or potential environmental impacts due to past or present operation or conditions, and to identify potential chemical contamination from on-site and off-site sources. Superfund experience.

Numerous other tests as shown in the enclosed price list.

Our technicians are trained and experienced in the performance of all the tests indicated in the proposal. We have a sufficient number of technicians to perform the tests when required without delays. Our support staff quickly prepares the reports from the test data and on the average, the written report is mailed to you within four days of completion of the test. Our engineer immediately communicates failures to you via telephone.

MATERIALS TESTING SERVICES

Lydick Engineers and Surveyors, Inc. has operated its Materials Testing Laboratory since 1975 in the City of Clovis. We have found that being able to offer clients a complete engineering service, from design, construction staking to the materials testing, on their projects has been both a benefit to them as well as us. The prompt determination of data, whether it be construction layout or quality of materials, is of benefit to the Design Engineer in the successful completion of a project.

Our materials testing laboratory is fully equipped for the testing of soils, base course, concrete and asphalt pavements. The U.S. Corps of Engineers has approved the lab equipment and staff for service on their projects. We have provided our services on numerous NMSHTD projects as well as many municipal projects within Eastern New Mexico and West Texas.

Mr. Bob Mick is our senior laboratory technician and radiation safety officer for our laboratory staff. He is currently rated a Certified Associate Engineering Technician through the National Institute for Certification in Engineering Technologies. Bob has been directly involved in the materials testing field since 1974 and is qualified in all areas of materials testing. He is also certified in the operation of both nuclear density gauges operated in our lab. Bob was the project supervisor for the recently completed Franklin Addition, Elbe Street Reconstruction and Canadian and Danube Street Improvements Projects for the City of Portales, New Mexico. Bob is also certified to perform services in hazardous waste restricted areas under OSHA 1910.120 regulations.

Mr. Lance Langan also is certified as Level No. 1 Technician with the American Concrete Institute. He is also certified on the operations of our nuclear density gauges and has 16 years experience with our firm. Lance has been in responsible charge of all materials testing services that our firm has been involved with at C.A.F.B. during their recent 200 million-dollar expansion program, which was begun in 1993. In addition, Lance Langan was the chief materials testing technician on the recently completed Ingram Lake Dam and Channel, Sycamore Street and Fairmont Park/Prince Street Drainage Improvements Projects and the Seventh Street Reconstruction Project within the City of Clovis.

In addition, our firm was involved in the Runway 22/04 Re-keel Project and the Reconstruction of Runway 13/31 Project recently completed at Cannon Air Force

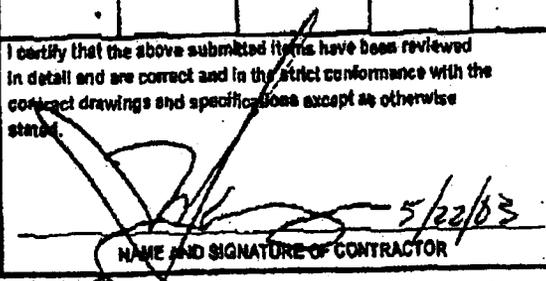
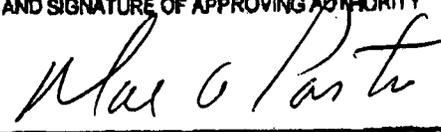
Chad Lydick is the Chief Engineer for our laboratory staff. Chad studied materials testing at N.M.S.U., has attended numerous N.M.S.U. concrete schools annually and is also certified in the usage of nuclear density gauges.

Our knowledge of area material sources as well as preferred concrete and asphalt pavement designs has been a benefit to our clients that are unfamiliar with our area. This has insured a minimum of repetitive testing of materials utilized by the contractor during construction.

Revised: 12-05-02

05/29/2003 13:07 402+221+7848 → 85057842663 NO. 620 003

May 29 03 08:30a CRFB NM Field Office 505-439-0979 P.2

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE <small>(Read instructions on the reverse side prior to initiating this form)</small>					DATE 05/22/2003	TRANSMITTAL NO. 02377		
SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS <small>(This section will be initiated by the contractor)</small>								
TO: Cannon AFB Resident Office US Army Corps of Engineers 201 N. Perimeter Rd. Cannon AFB, NM 88103		FROM: Foster Wheeler Environmental C 6806 Uptown Blvd, NE Suite 220 Albuquerque, NM 87110		CONTRACT NO. DACW45-94-D-0003 0035 MAY 29 2003		CHECK ONE: <input type="checkbox"/> THIS IS A NEW TRANSMITTAL <input checked="" type="checkbox"/> THIS IS A RESUBMITTAL OF TRANSMITTAL 02377		
SPECIFICATION SEC. NO. (Cover only one section with each transmittal) 02377		PROJECT TITLE AND LOCATION SWMU 101 - Sewage Lagoons Cannon AFB				CHECK ONE: THIS TRANSMITTAL IS FOR <input type="checkbox"/> FID <input checked="" type="checkbox"/> GOVT. APPROVAL		
ITEM NO.	DESCRIPTION OF ITEM SUBMITTED (Type size, model number/etc.)	MFG OR CONTR. CAT, CURVE DRAWING OR BROCHURE NO. (See instruction no. 8)	NO. OF COPIES	CONTRACT REFERENCE DOCUMENT		FOR CONTRACTOR USE CODE	VARIATION (See instruction No. 8)	FOR CE USE CODE
				SPEC. PARA. NO.	DRAWING SHEET NO.			
6	Borrow Source Assessment Berm Material	TEST REPORTS	5	3.1		A		B
REMARKS Resubmittal SEE ATTACHED COMMENTS					I certify that the above submitted items have been reviewed in detail and are correct and in strict conformance with the contract drawings and specifications except as otherwise stated.  5/22/03 NAME AND SIGNATURE OF CONTRACTOR			
SECTION II - APPROVAL ACTION								
ENCLOSURES RETURNED (List by item No.)		NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY 			DATE 5-29-03			

**SEWAGE LAGOONS CLOSURE PROJECT
CANNON AFB, NEW MEXICO**

**Borrow Source Assessment Test Submittal
Transmittal No. 02377-3**

The re-submittal is approved, however, the following comments are noted and shall be addressed in all future submittals.

1. Provide USCS classification on all future test reports (Proctor curves, grain-size curves, permeability test reports, Atterberg limits, etc.). USCS classification shall be consistent on all reports.
2. Provide a brief material description to include color, texture, and other distinguishing characteristics of each material for inclusion on all future test reports (Proctor curves, grain-size curves, permeability test reports, Atterberg limits, etc.). Material description shall be consistent on all reports.
3. Proctor curves 1 & 2: USCS classification reported as "SM/SC". Correct USCS classification is "SM-SC". Please be sure USCS classification is correct and consistently noted on all future test reports.

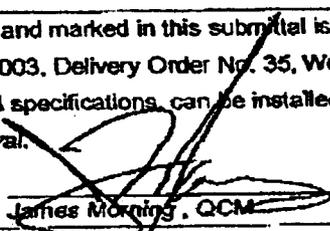
Brad Jones
USACE - Omaha
5-29-03

SUBMITTAL REVIEW VERIFICATION SHEET

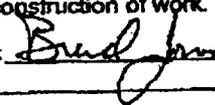
Date: May 22, 2003

Submittal No.: 02377

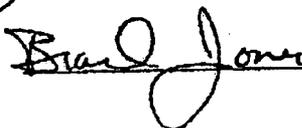
Foster Wheeler Environmental Corporation Stamp

SWMU 101 Sewage Lagoons Closure, Cannon AFB, NM	
Certified for approval as indicated below:	
<input checked="" type="radio"/> A -	Approved as submitted
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Reviewed/Certified By:	 5/22/03 James Morning, QCM
Description of items reviewed: SD-06 Test Report 02377- Re-Submittal Berm Material Assessment	

U.S. Army Corps of Engineers Stamp

U.S. Army Engineer District, Albuquerque Corps of Engineers	
Certified for approval as indicated below:	
<input type="radio"/> A -	Approved as submitted.
<input checked="" type="radio"/> B -	Approved except as noted on the drawings and/or attached sheet(s). Resubmission not required.
<input type="radio"/> C -	Approved except as noted on the drawings and/or attached sheet(s). Resubmission required.
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<input type="radio"/> F -	Receipt acknowledged.
<input type="radio"/> G -	Other: Specify.
Note: Items approved as to general layout only. Dimensions and quantities checked. Approval does not relieve contractor of responsibilities for errors that may exist, as contractor shall be responsible for dimensions and design of adequate corrections. Details and satisfactory construction of work.	
Signature: 	Date: 5-29-03

Reviewer's Signature:



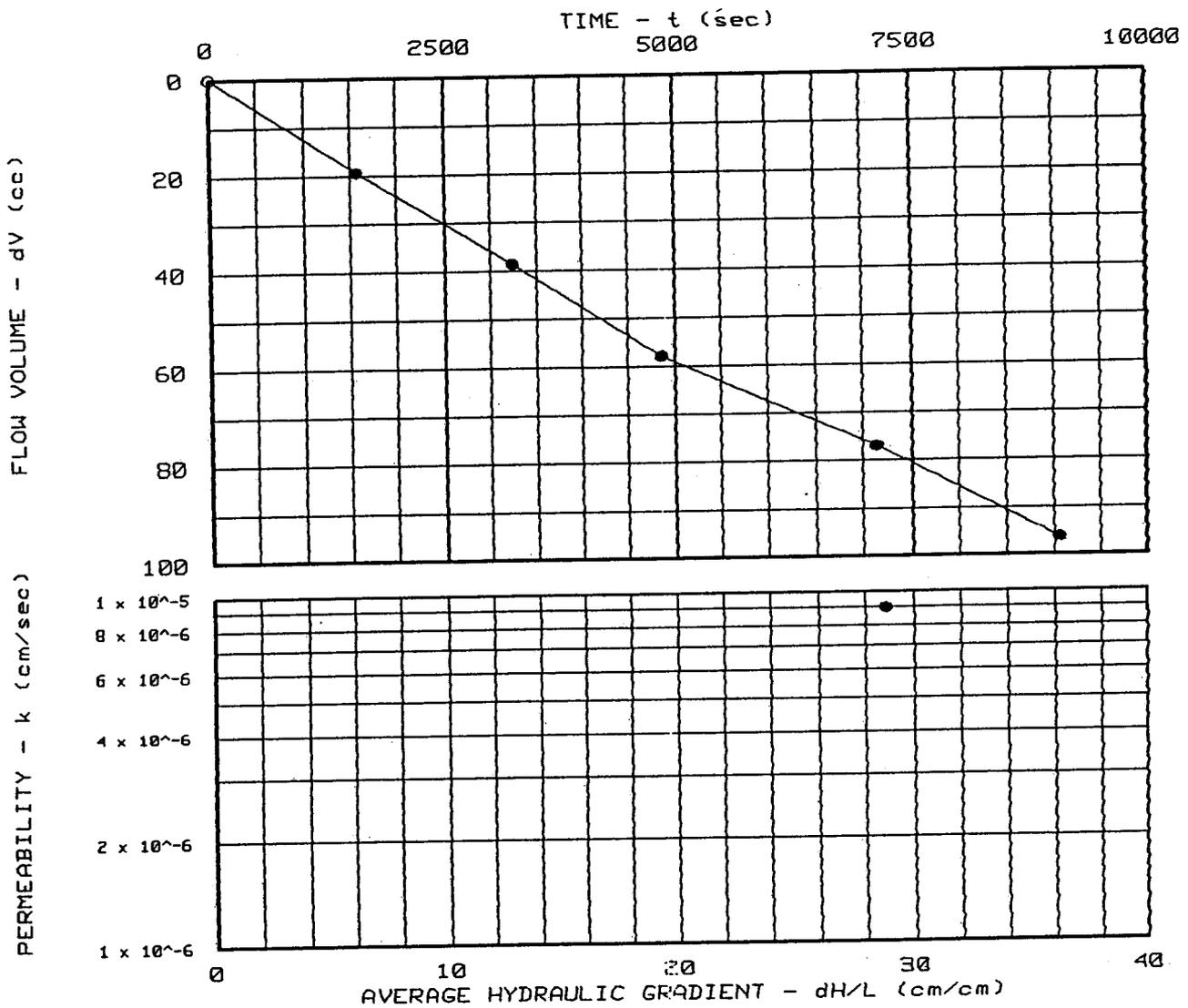
PERMEABILITY TEST REPORT

TEST DATA:

Specimen Height (cm): 11.43
 Specimen Diameter (cm): 7.04
 Dry Unit Weight (pcf): 117.0
 Moisture Before Test (%): 12.6
 Moisture After Test (%): 16.8
 Run Number: 1 • 2 ▲
 Cell Pressure (psi): 50.0
 Test Pressure (psi): 50.0
 Back Pressure (psi): 45.3
 Diff. Head (psi): 4.7
 Flow Rate (cc/sec): 1.01×10^{-2}
 Perm. (cm/sec): 9.01×10^{-6}

SAMPLE DATA:

Sample Identification: EXISTING BERM
 Visual Description: REDDISH CLAYEY SAND
 Remarks: ~~ASTM D 5084-00~~ KSAT
 [POINT#1 24hr. SATURATION]
 Maximum Dry Density (pcf): 117.1
 Optimum Moisture Content (%): 12.8
 ASTM (D698)
 Percent Compaction: 99.9%
 Permeameter type: FLEXWALL
 Sample type: REMOLDED



Project: SWMU 101 LAGOON CLOSURE @ C.A.F.B.
 Location: WASTE WATER PLANT @ CANNON A.F.B.
 Date: 5-9-03

Project No.: DACAW-45-3
 File No.: KSAT-1
 Lab No.: LYDICK 3-03
 Tested by: L.E.L.
 Checked by:
 Test: CH - Constant head

PERMEABILITY TEST REPORT
LYDICK ENGINEERS & SURVEYORS, INC.

CONSTANT HEAD PERMEABILITY TEST RESULTS

PROJECT NAME: SWMU 101 LAGOON CLOSURE @ C.A.F.B. FILE NO.: KSAT-1
PROJECT LOCATION: WASTE WATER PLANT @ CANNON A.F.B. PROJECT NO.: DACAW-45-3
SAMPLE IDENTIFICATION: EXISTING BERM LAB NO.: LYDICK 3-03

DESCRIPTION: REDDISH CLAYEY SAND SAMPLE TYPE: REMOLDED

MAX. DRY DENS.: 117.1 OPT. WATER CONTENT: 12.8 DATE: 5-9-03

SPECIMEN DATA

INITIAL PARAMETERS:

HEIGHT: 11.43 cm
DIAMETER: 7.04 cm
WET WEIGHT: 938.5 g
MOISTURE CONTENT: 12.6 %
DRY DENSITY: 117.0 pcf
PERCENT COMPACTION: 99.9

FINAL PARAMETERS:

HEIGHT: 11.44 cm
DIAMETER: 7.04 cm
WET WEIGHT: 973.8 g
MOISTURE CONTENT: 16.8 %
DRY DENSITY: 116.8 pcf

TEST PARAMETERS

CELL NO.: 2

PANEL NO.: 2

POSITIONS: 2

	RUN NO. 1	RUN NO. 2
CELL PRESSURE:	50.0 psi	
TEST PRESSURE:	50.0 psi	
BACK PRESSURE:	45.3 psi /	
/ 0.0 psi		
DIFFERENTIAL HEAD:	4.7 psi	

PERMEABILITY DATA

	RUN NO. 1	RUN NO. 2
AVERAGE FLOW RATE:	1.01E-02 cc/sec	
B) COEFFICIENT OF CORRELATION:	0.99588	
AVERAGE GRADIENT:	28.8	
TEMPERATURE:	20.0 deg C	
PERMEABILITY, K, at 20 deg C:	9.01E-06 cm/sec	

=====

PERMEABILITY TEST DATA

=====

PROJECT DATA

Project Name: SWMU 101 LAGOON CLOSURE @ C.A.F.B.
 File No.: KSAT-1
 Project Location: WASTE WATER PLANT @ CANNON A.F.B.
 Project No.: DACAW-45-3
 Sample Identification: EXISTING BERM

Lab No.: LYDICK 3-03
 Description: REDDISH CLAYEY SAND

Sample Type: REMOLDED
 Max. Dry Dens.: 117.1
 Method (D1557/D698): D698
 Opt. Water Content: 12.8
 Date: 5-9-03
 Remarks: ASTM D 5084-00 KSAT
 POINT#1 24hr. SATURATION

Permeameter Type: FLEXWALL
 Tested by: L.E.L.
 Checked by:
 Test type: CH - Constant head

PERMEABILITY TEST SPECIMEN DATA

	Before test:			After test:		
Diameter:	1	2		1	2	
Top:	2.772 in		in	2.774 in		in
Middle:	2.769 in		in	2.770 in		in
Bottom:	2.774 in		in	2.775 in		in
Average:	2.77 in	7.04 cm		2.77 in	7.04 cm	
Length:	1	2	3	1	2	3
	4.500 in		in	4.505 in		in
Average:	4.50 in	11.43 cm		4.51 in	11.44 cm	
Moisture, Density and Sample Parameters:						
Specific Gravity:	2.73					
Wet Wt. & Tare:	1072.50			1107.80		
Dry Wt. & Tare:	967.55			967.55		
Tare Wt.:	134.00			134.00		
Moisture Content:	12.6 %			16.8 %		
Dry Unit Weight:	117.0 pcf			116.8 pcf		
Porosity:	0.3134			0.3148		
Saturation:	75.3 %			100.0 %		

CONSTANT HEAD PERMEABILITY TEST CONDITIONS DATA

Cell No.: 2

Panel No.: 2

Positions: 2

Run Number:

1

2

Cell Pressure: 50.0 psi
 Saturation Pressure: 45.0 psi
 Inflow Corr. Factor: 1.00
 Outflow Corr. Factor: 1.00
 Test Temperature: 20.0 °C

0.0 psi
 0.0 psi
 1.00
 1.00
 0.0 °C

PERMEABILITY TEST READINGS DATA

CASE D X S R	DATE	TIME (24 hr)	ELAPSED TIME-sec	GAUGE PRESSURE-psi		BURET READING-cc		OUTFLOW/ INFLOW RATIO
				IN	OUT	IN	OUT	
S X	5/ 9/ 3	6:48:00	0	50.0	45.0	0.40	20.70	0.00
	5/ 9/ 3	7:14:00	1,560	50.0	45.0	19.80	1.30	1.00
R R	5/ 9/ 3	7:42:00	3,240	50.0	45.0	19.80	1.30	0.99
						0.60	20.40	
R R	5/ 9/ 3	8:09:00	4,860	50.0	45.0	19.90	1.20	1.00
						0.90	20.20	
R R	5/ 9/ 3	8:47:00	7,140	50.0	45.0	20.10	1.00	1.00
						1.20	19.90	
R R	5/ 9/ 3	9:19:00	9,060	50.0	45.0	20.40	0.70	0.99
						1.30	19.70	
						20.50	0.60	

Test Pressure = 50.0 psi Differential Head = 4.7 psi, 329.7 cm H₂O
 Gradient = 2.885E 01 Flow rate = 1.012E-02 cc/sec R squared = 0.99588
 Permeability, K_{20.0°} = 9.014E-06 cm/sec, K_{20°} = 9.014E-06 cm/sec

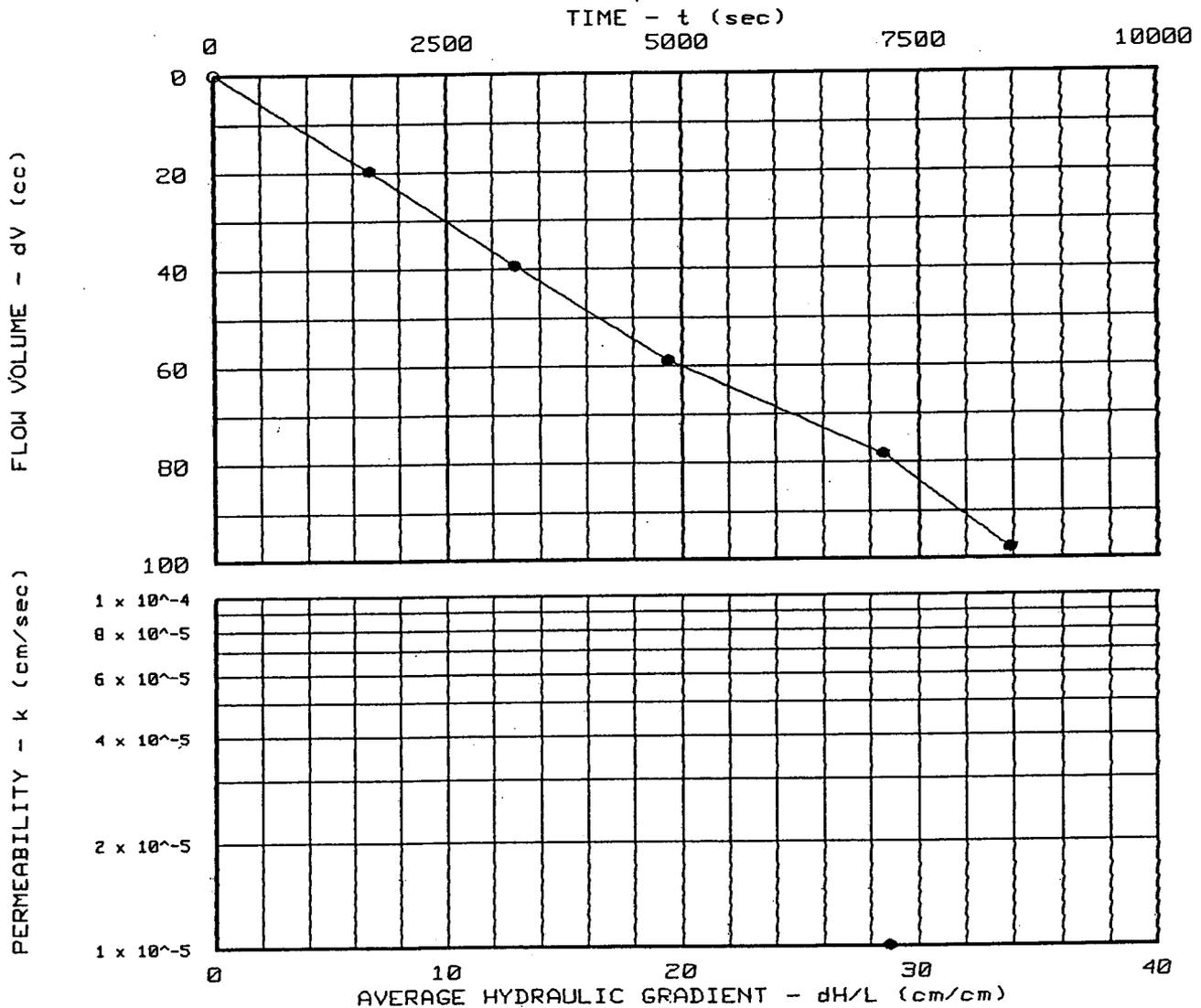
PERMEABILITY TEST REPORT

TEST DATA:

Specimen Height (cm): 11.43
 Specimen Diameter (cm): 6.97
 Dry Unit Weight (pcf): 113.6
 Moisture Before Test (%): 14.7
 Moisture After Test (%): 18.8
 Run Number: 1 • 2 ▲
 Cell Pressure (psi): 50.0
 Test Pressure (psi): 50.0
 Back Pressure (psi): 45.3
 Diff. Head (psi): 4.7
 Flow Rate (cc/sec): 1.11×10^{-2}
 Perm. (cm/sec): 1.01×10^{-5}

SAMPLE DATA:

Sample Identification: EXISTING BERM
 Visual Description: REDDISH CLAYEY SAND
 Remarks: ASTM D 5084-00 KSAT
 [POINT#2 24hr. SATURATION]
 Maximum Dry Density (pcf): 117.1
 Optimum Moisture Content (%): 12.8
 ASTM(698)
 Percent Compaction: 97.0%
 Permeameter type: FLEXWALL
 Sample type: REMOLD



Project: SWMU 101 LAGOON CLOSURE @ C.A.F.B.
 Location: WASTE WATER PLANT @ CANNON A.F.B.
 Date: 5-9-03

Project No.: AH-303
 File No.: KSAT-2
 Lab No.: LYDICK 3-03

PERMEABILITY TEST REPORT

LYDICK ENGINEERS & SURVEYORS, INC.

Tested by:
 Checked by:
 Test: CH - Constant head

=====

PERMEABILITY TEST DATA

=====

PROJECT DATA

Project Name: SWMU 101 LAGOON CLOSURE @ C.A.F.B.
 File No.: KSAT-2
 Project Location: WASTE WATER PLANT @ CANNON A.F.B.
 Project No.: AH-303
 Sample Identification: EXISTING BERM

Lab No.: LYDICK 3-03
 Description: REDDISH CLAYEY SAND

Sample Type: REMOLD
 Max. Dry Dens.: 117.1
 Method (D1557/D698): 698
 Opt. Water Content: 12.8
 Date: 5-9-03
 Remarks: ASTM D 5084-00 KSAT
 POINT#2 24hr.SATURATION

Permeameter Type: FLEXWALL
 Tested by:
 Checked by:
 Test type: CH - Constant head

PERMEABILITY TEST SPECIMEN DATA

	Before test:			After test:		
Diameter:	1	2		1	2	
Top:	2.750 in	in		2.770 in	in	
Middle:	2.740 in	in		2.750 in	in	
Bottom:	2.750 in	in		2.750 in	in	
Average:	2.75 in	6.97 cm		2.76 in	7.00 cm	
Length:	1	2	3	1	2	3
	4.500 in	in	in	4.506 in	in	in
Average:	4.50 in	11.43 cm		4.51 in	11.45 cm	
Moisture, Density and Sample Parameters:						
Specific Gravity:	2.73					
Wet Wt. & Tare:	1036.80			1069.00		
Dry Wt. & Tare:	919.70			919.70		
Tare Wt.:	125.60			125.60		
Moisture Content:	14.7 %			18.8 %		
Dry Unit Weight:	113.6 pcf			112.6 pcf		
Porosity:	0.3335			0.3392		
Saturation:	80.5 %			100.0 %		

CONSTANT HEAD PERMEABILITY TEST CONDITIONS DATA

Cell No.:	3	Panel No.:	3	Positions:	3
Run Number:		1		2	
Cell Pressure:		50.0 psi		0.0 psi	
Saturation Pressure:		45.0 psi		0.0 psi	
Inflow Corr. Factor:		1.00		1.00	
Outflow Corr. Factor:		1.00		1.00	
Test Temperature:		20.0 °C		0.0 °C	

PERMEABILITY TEST READINGS DATA

CASE D X S R	DATE	TIME (24 hr)	ELAPSED TIME-sec	GAUGE PRESSURE-psi		BURET READING-cc		OUTFLOW/ INFLOW RATIO
				IN	OUT	IN	OUT	
S X	5/ 9/ 3	11:00:00	0	50.0	45.0	1.10	21.40	0.00
	5/ 9/ 3	11:28:00	1,680	50.0	45.0	20.80	1.70	1.00
R						20.80	1.70	
R						1.30	21.20	
	5/ 9/ 3	11:54:00	3,240	50.0	45.0	21.00	1.60	0.99
R						21.00	1.60	
R						1.60	21.10	
	5/ 9/ 3	12:21:00	4,860	50.0	45.0	21.10	1.70	0.99
R						21.10	1.70	
R						1.90	20.90	
	5/ 9/ 3	12:59:00	7,140	50.0	45.0	21.40	1.40	1.00
R						21.40	1.40	
R						2.20	20.60	
	5/ 9/ 3	13:21:00	8,460	50.0	45.0	21.60	1.40	0.99

Test Pressure = 50.0 psi Differential Head = 4.7 psi, 329.2 cm H₂O
 Gradient = 2.880E 01 Flow rate = 1.109E-02 cc/sec R squared = 0.99427
 Permeability, K_{20.0°} = 1.008E-05 cm/sec, K_{20°} = 1.008E-05 cm/sec

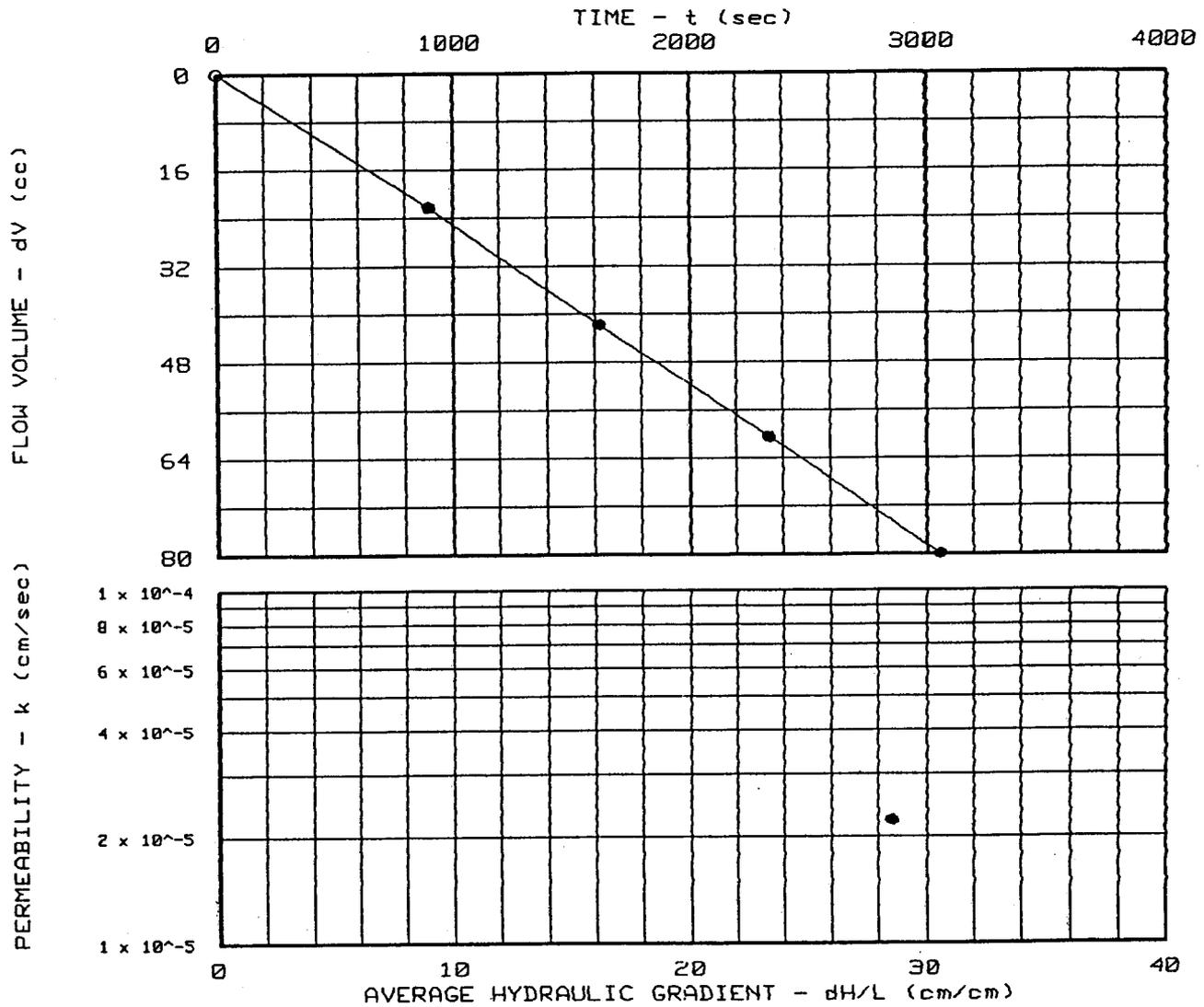
PERMEABILITY TEST REPORT

TEST DATA:

Specimen Height (cm): 11.43
 Specimen Diameter (cm): 7.30
 Dry Unit Weight (pcf): 109.1
 Moisture Before Test (%): 16.7
 Moisture After Test (%): 20.6
 Run Number: 1 • 2 ▲
 Cell Pressure (psi): 50.0
 Test Pressure (psi): 49.7
 Back Pressure (psi): 45.1
 Diff. Head (psi): 4.6
 Flow Rate (cc/sec): 2.66×10^{-2}
 Perm. (cm/sec): 2.22×10^{-5}

SAMPLE DATA:

Sample Identification: EXISTING BERM
 Visual Description: REDDISH BROWN CLAYEY SAND
 Remarks: ASTM D 5084-00 KSAT TEST #3 [24hr. SATURATION]
 Maximum Dry Density (pcf): 117.1
 Optimum Moisture Content (%): 12.8
 ASTM (D698)
 Percent Compaction: 93.2%
 Permeameter type: FLEXWALL
 Sample type: REMOLDED



Project: SWMU 101 LAGOON LOSURE @ C.A.F.B.
 Location: CANNON A.F.B. WASTE WATER PLANT
 Date: 5-9-03

Project No.: DACAW-45-3
 File No.: AH-3-03
 Lab No.: LYDICK 3-03
 Tested by: L.E.L.
 Checked by: L.E.L.
 Test: CH - Constant head

PERMEABILITY TEST REPORT
 LYDICK ENGINEERS & SURVEYORS, INC.

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PERMEABILITY TEST DATA

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PROJECT DATA

Project Name: SWMU 101 LAGOON LOSURE @ C.A.F.B.
 File No.: AH-3-03
 Project Location: CANNON A.F.B. WASTE WATER PLANT
 Project No.: DACAW-45-3
 Sample Identification: EXISTING BERM

Lab No.: LYDICK 3-03
 Description: REDDISH BROWN CLAYEY SAND
 Sample Type: REMOLDED
 Max. Dry Dens.: 117.1
 Method (D1557/D698): D698
 Opt. Water Content: 12.8
 Date: 5-9-03
 Remarks: ASTM D 5084-00 KSAT TEST

Permeameter Type: FLEXWALL
 Tested by: L.E.L.
 Checked by: L.E.L.
 Test type: CH - Constant head

PERMEABILITY TEST SPECIMEN DATA

	Before test:			After test:		
Diameter:	1	2		1	2	
Top:	2.872 in		in	2.872 in		in
Middle:	2.876 in		in	2.876 in		in
Bottom:	2.870 in		in	2.871 in		in
Average:	2.87 in	7.30 cm		2.87 in	7.30 cm	
Length:	1	2	3	1	2	3
	4.500 in		in	4.500 in		in
Average:	4.50 in	11.43 cm		4.50 in	11.43 cm	
Moisture, Density and Sample Parameters:						
Specific Gravity:	2.73					
Wet Wt. & Tare:	1107.20			1139.30		
Dry Wt. & Tare:	967.23			967.23		
Tare Wt.:	131.30			131.30		
Moisture Content:	16.7 %			20.6 %		
Dry Unit Weight:	109.1 pcf	93.2 % of max		109.1 pcf		
Porosity:	0.3597			0.3598		
Saturation:	81.4 %			100.0 %		

CONSTANT HEAD PERMEABILITY TEST CONDITIONS DATA

PROJECT NAME
 PROJECT LOC
 SAMPLE IDENT

Cell No.: 1

Panel No.: 1

Positions: 1

Run Number: 1

1

2

DESCRIPTION:
 SAND
 MAX. DRY DEI

Cell Pressure: 50.0 psi 0.0 psi
 Saturation Pressure: 45.0 psi 0.0 psi
 Inflow Corr. Factor: 1.00 1.00
 Outflow Corr. Factor: 1.00 1.00
 Test Temperature: 20.0 °C 0.0 °C

PERMEABILITY TEST READINGS DATA

INITIAL PAI

HEIGHT: 11.

DIAMETER:

WET WEIGHT:

MOISTURE C

DRY DENSITY

PERCENT COI

CASE D X S R	DATE	TIME (24 hr)	ELAPSED TIME-sec	GAUGE PRESSURE-psi		BURET READING-cc	
				IN	OUT	IN	OUT
S X	5/ 9/ 3	13:32:00	0	49.7	44.7	1.70	23.70
	5/ 9/ 3	13:47:00	900	49.7	44.7	24.00	1.50
R						24.00	1.50
R						3.30	22.30
	5/ 9/ 3	13:59:00	1,620	49.7	44.7	22.50	2.30
R						22.50	2.30
R						4.50	21.10
	5/ 9/ 3	14:11:00	2,340	49.7	44.7	22.80	2.20
R						22.80	2.20
R						5.60	19.90
	5/ 9/ 3	14:23:00	3,060	49.7	44.7	24.70	0.30

CELL NO.

Test Pressure = 49.7 psi Differential Head = 4.6 psi, 326.6 c
 Gradient = 2.858E 01 Flow rate = 2.656E-02 cc/sec R squared =
 Permeability, K20.0° = 2.222E-05 cm/sec, K20° = 2.222E-05 cm/sec

CELL PRESSI

TEST PRESSI

BACK PRESSI

/ 0.

DIFFERENTI

AVERAGE FLO

B COEFFICIENT

AVERAGE GR

TEMPERATURE

PERMEABILITY

Lydick Engineers & Surveyors, Inc.

P. O. Box 728
205 E. 2nd Street
Clovis, NM 88101
505-762-3771

Proctor

Report Date: 26-Mar-03
Project: DACAW45-94-D-0003
Report Number:
Sample Type: COMPOSITE
Source: EXISTING BERMS
Tested By: B HIERONYMUS

Report

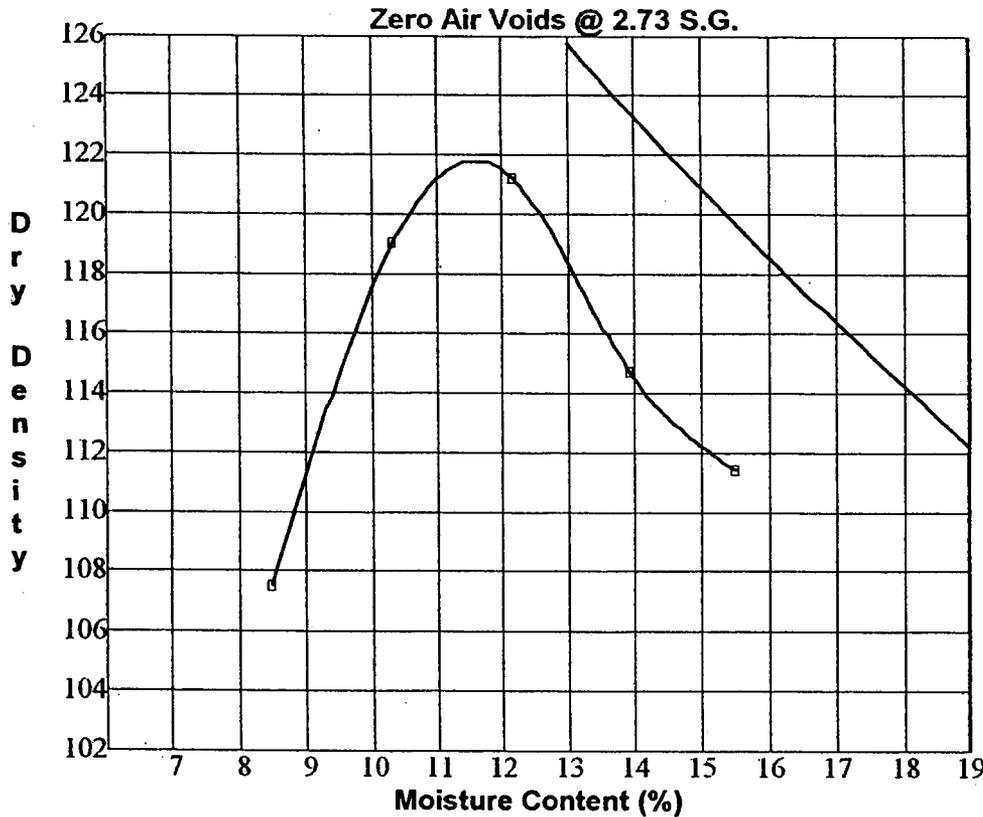
To: ARROWHEAD CONSTRUCTION

Proj: CLOSURE OF SWMU101 SEWAGE LAGOONS

Sample Date: 26-Mar-03

Date Tested: 25-Mar-03

Date Received: 26-Mar-03



Max. Dry Density: 121.8
Optimum Moisture (%): 11.6

Moisture Content	Dry Density	Wet Density
8.5	107.6	116.7
10.3	119.0	131.3
12.2	121.2	135.9
13.9	114.7	130.7
15.5	111.4	128.7

Method: ASTM D-1557-01
Rammer Type: MANUAL
Preparation: DRY TO WET
% Retained 5mm screen: 0.0
% Retained 10mm screen: 0.0
% Retained 20mm screen: 0.0

Comments: ~~USCS CLASSIFIED AS SM/SC REPORT 1 OF 2~~

Per: *Samuel Langston*

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on written request.

Lydick Engineers & Surveyors, Inc.

P. O. Box 728
205 E. 2nd Street
Clovis, NM 88101
762-3771

To: ARROWHEAD CONST.
12920 METCALF AVE. SUITE 150
OVERLAND PARK KS 66213

Proctor

Report Date: 28-Mar-03
Project: DACAW45-94-D-0003
Report Number: 2
Sample Type: COMPOSITE
Source: EXISTING BERMS
Tested By: R. MICK

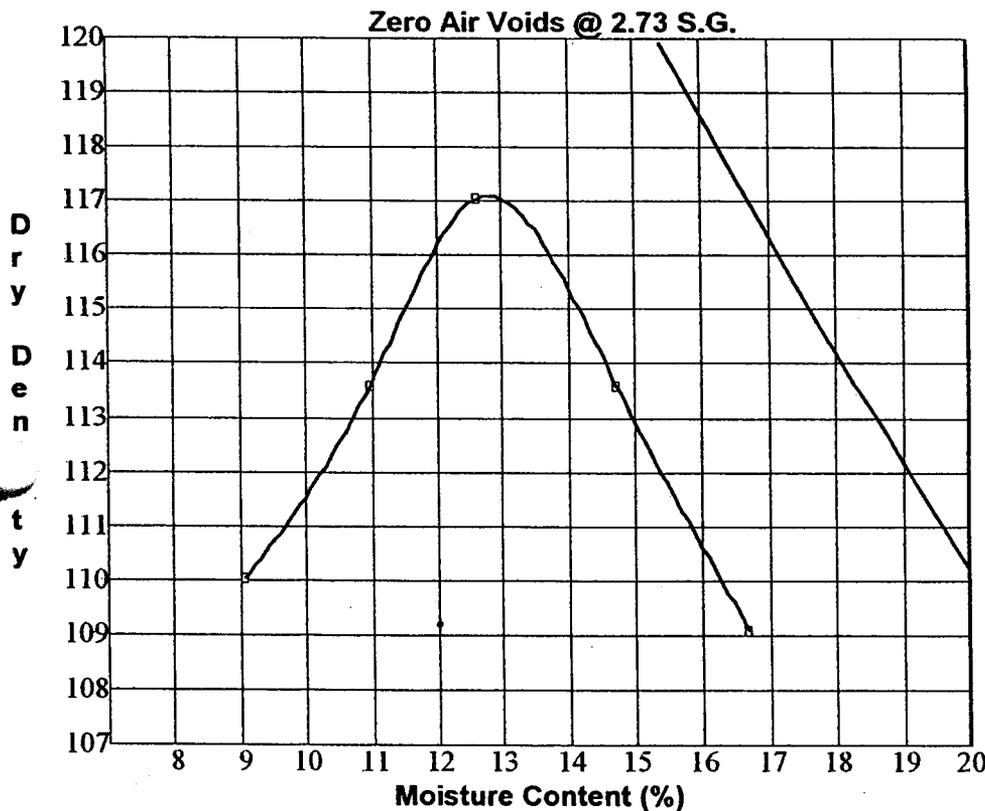
Report

Proj: CLOSURE OF SWMU101 SEWAGE LAGOON @ CANNON AFB

Sample Date: 26-Mar-03

Date Tested: 27-Mar-03

Date Received: 26-Mar-03



Max. Dry Density: 117.1
Optimum Moisture (%): 12.8

Moisture Content	Dry Density	Wet Density
9.1	110.0	120.0
11.0	113.6	126.1
12.6	117.0	131.8
14.7	113.6	130.3
16.7	109.1	127.3

Method: ASTM D-698
Rammer Type: MANUAL
Preparation: DRY TO WET
% Retained 5mm screen: 0.0
% Retained 10mm screen: 0.0
% Retained 20mm screen: 0.0

Sample Description: EXISTING SANDY BROWN

Comment: [USCS CLASSIFIED AS SM/SC REPORT 2 OF 2]

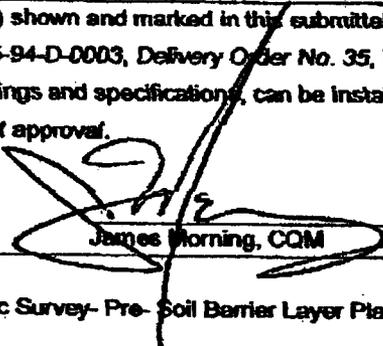
Per: *Lance Longan*

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on written request.

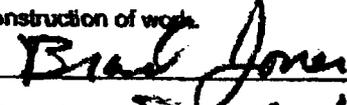
Date: May 30, 2003

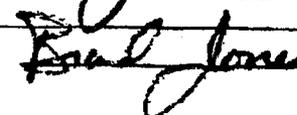
Submittal No.: 02377-4

Foster Wheeler Environmental Corporation Stamp

SWMU 101 Sewage Lagoons Closure, Cannon AFB, NM	
Certified for approval as indicated below:	
A -	Approved as submitted
B -	Approved except as noted on the drawings and/or attached sheets.
It is hereby certified that the (equipment) (material) shown and marked in this submittal is that proposed to be incorporated into Contract Number DACW45-94-D-0003, Delivery Order No. 35, Work Authorization Directive 1 is in compliance with the contract drawings and specifications, can be installed in the allocated spaces, and is submitted for Government approval.	
Reviewed/Certified By:	 James Morning, CQM
Description of items reviewed: SD-02- Topographic Survey- Pre- Soil Barrier Layer Placement	

U.S. Army Corps of Engineers Stamp

U.S. Army Engineer District, Albuquerque Corps of Engineers	
Certified for approval as indicated below.	
A -	Approved as submitted.
B -	Approved except as noted on the drawings and/or attached sheet(s). Resubmission not required.
C -	Approved except as noted on the drawings and/or attached sheet(s). Resubmission required.
D -	Will be returned by separate correspondence.
E -	Disapproved; see comments on attached sheet.
F -	Receipt acknowledged. G - Other: Specify.
Note: Items approved as to general layout only. Dimensions and quantities checked. Approval does not relieve contractor of responsibilities for errors that may exist, as contractor shall be responsible for dimensions and design of adequate corrections. Details and satisfactory construction of work.	
Signature: 	Date: 5-30-03

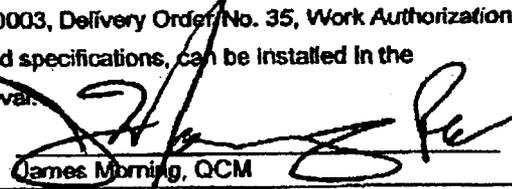
Reviewer's Signature: 

SUBMITTAL REVIEW VERIFICATION SHEET

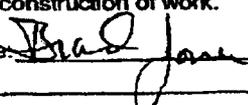
Date: June 5, 2003

Submittal No.: 02377-5

Foster Wheeler Environmental Corporation Stamp

SWMU 101 Sewage Lagoons Closure, Cannon AFB, NM Certified for approval as indicated below:	
A -	Approved as submitted
B -	Approved except as noted on the drawings and/or attached sheets.
It is hereby certified that the (equipment) (material) shown and marked in this submittal is that proposed to be incorporated into Contract Number DACW45-94-D-0003, Delivery Order No. 35, Work Authorization Directive 1 is in compliance with the contract drawings and specifications, can be installed in the allocated spaces, and is submitted for Government approval.	
Reviewed/Certified By:	 James Morning, QCM
Description of items reviewed: Off Site Borrow Source Assessment - Test Reports	

U.S. Army Corps of Engineers Stamp

U.S. Army Engineer District, Albuquerque Corps of Engineers Certified for approval as indicated below:	
<input checked="" type="radio"/> A -	Approved as submitted.
<input type="radio"/> B -	Approved except as noted on the drawings and/or attached sheet(s). Resubmission not required.
<input type="radio"/> C -	Approved except as noted on the drawings and/or attached sheet(s). Resubmission required.
<input type="radio"/> D -	Will be returned by separate correspondence.
<input type="radio"/> E -	Disapproved; see comments on attached sheet.
<input type="radio"/> F -	Receipt acknowledged.
<input type="radio"/> G -	Other: Specify.
Note: Items approved as to general layout only. Dimensions and quantities checked. Approval does not relieve contractor of responsibilities for errors that may exist, as contractor shall be responsible for dimensions and design of adequate corrections. Details and satisfactory construction of work.	
Signature: 	Date: 6-12-03

Reviewer's Signature: 

ROBERT L. LYDICK
ROBERT CHAD LYDICK
Professional Engineer and
Land Surveyor

Lydick
ENGINEERS AND SURVEYORS, INC.
205 E. SECOND STREET - P.O. BOX 728
CLOVIS, NEW MEXICO 88102-0728
505 762-3771 - FAX 505 762-9093

Registered
New Mexico
Texas - Oklahoma
Colorado

May 29, 2003

Arrowhead Construction
12920 Metcalf Suite 150
Overland Park, Ks. 66213

Dear Arron

As per our conversation in the meeting with the Corps of Engineers on May 21, 2003 it was agreed that a notation on the perm report showing that saturation of the test specimen was ran for twenty-four (24) hours prior to the start of permeation would take care of the B coefficient comments. The reports were amended to state that fact which in turn answered the Corps concerns of the B coefficient and the recording log that was requested.

If I can be of further assistance in this matter please feel free to contact me.

Very Truly Yours,


Lance E. Langan
Laboratory Supervisor

ROBERT L LYDICK
ROBERT CHAD LYDICK
Professional Engineer and
Land Surveyor

Lydick
ENGINEERS AND SURVEYORS, INC.
205 E. SECOND STREET - P.O. BOX 728
CLOVIS, NEW MEXICO 88102-0728
505 762-3771 - FAX 505 762-9093

Registered
New Mexico
Texas - Oklahoma
Colorado

INFO
only

April 18, 2003

Foster Wheeler Environmental Corporation
6605 Uptown Blvd, Suite 220
Albuquerque, NM 87110

RE: Closure of SWMU 100 - Sewage Lagoons; Cannon Air Force Base, New Mexico

Deal Walt;

Please find enclosed herein a report on a proposed borrow source for this subject project. This borrow source is located in the SW ¼ Section 25, T4N R32E, in Curry County and is located approximately 8 miles north of the town of Melrose, New Mexico. A site map is included as a part of this report for review.

Lydick Engineers sub-contracted with Dyess Peterson Laboratories of Amarillo, Texas to perform four soil borings on the site and perform various tests on the samples obtained from various depths across the site. Our laboratory staff worked closely with the Dyess Laboratory staff concerning the testing of these materials and will verify the results obtained for this report.

In addition, Mr. Lance Langan of Lydick Engineers, performed tests on samples obtained from the existing berms on the sewage lagoon site at CAFB. These results are also included herein for review.

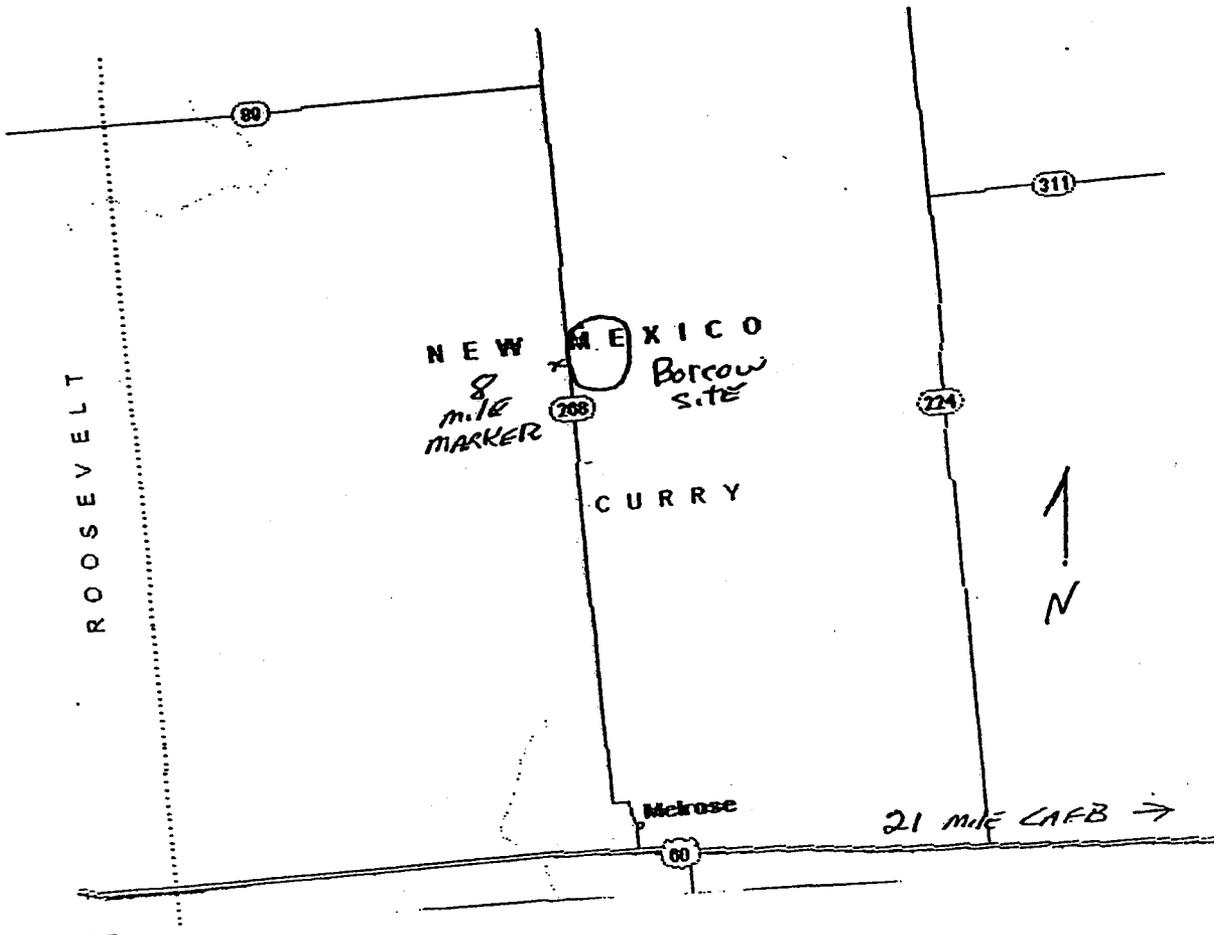
It is my understanding that a blend of these various materials is being considered for usage as the soil barrier portion of this project.

Please notify if I can be of further assistance in this matter.

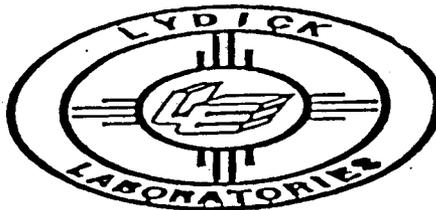
Very truly yours,

Robert Chad Lydick
P. E. & L. S.

SWMU 101 Sewage Lagoons Proposed Borrow Source Location 8 Miles due North of Melrose on State Road 268



ROBERT L. LYDICK
ROBERT CHAD LYDICK
PROFESSIONAL ENGINEER AND
LAND SURVEYOR



LYDICK ENGINEERS & SURVEYORS
BOX 728
CLOVIS, NEW MEXICO 88101
TEL 505-762-3771
FAX 505-762-9093

DESCRIPTION AND IDENTIFICATION OF SOIL
VISUAL - MANUAL PROCEDURE

ASTM D-2488

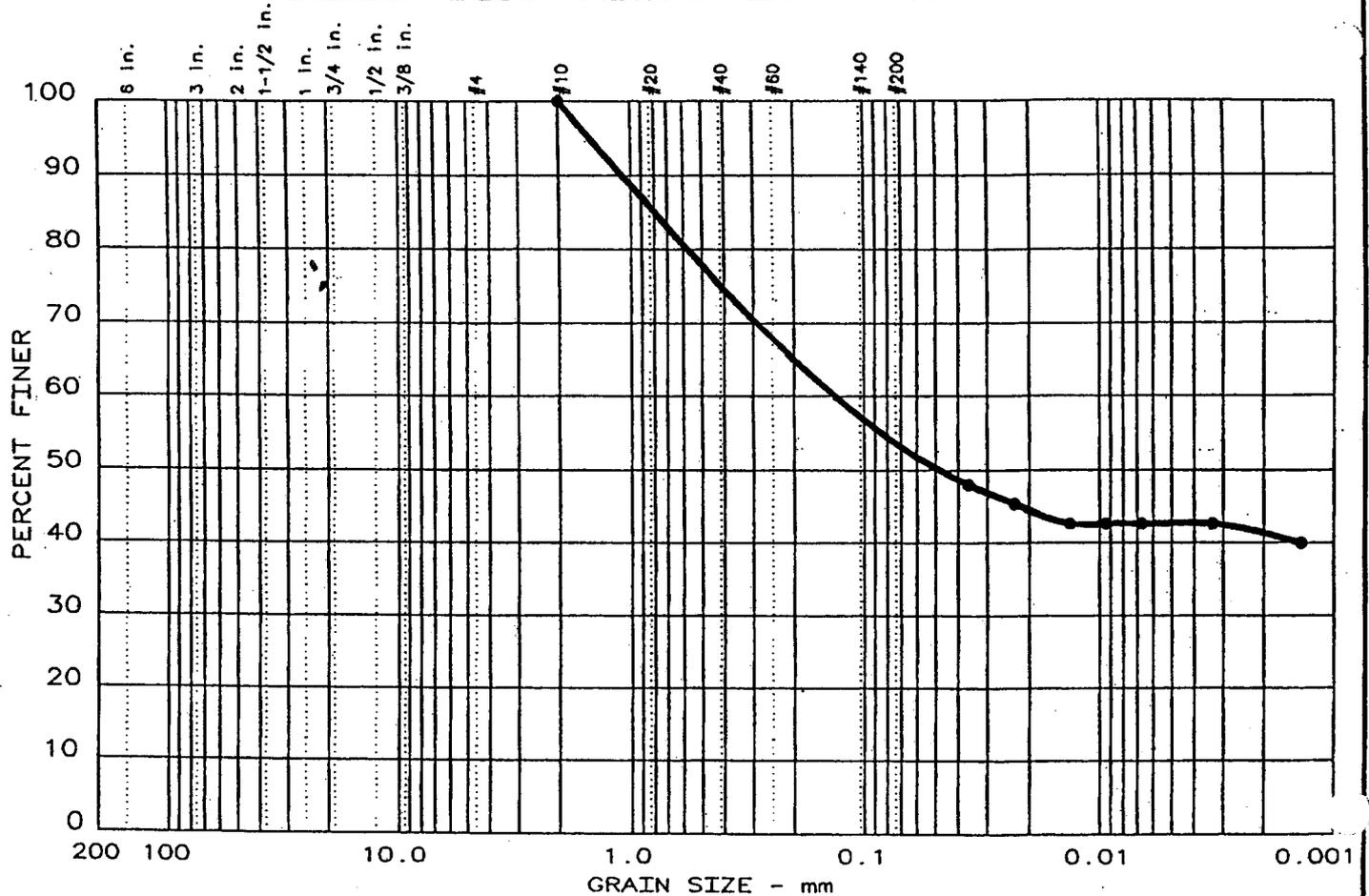
DATE RECEIVED IN LABORATORY: 5-21-03 DATE OF TEST 5-21-03

PROJECT: SWMU 101 Lagoon Closure LOCATION: Bostwick Pit

- 1) GROUP NAME: Lean Clay
- 2) GROUP SYMBOL: "CL"
- 3) PERCENT OF COBBLE, BOULDERS OR BOTH (BY VOLUME) 0
- 4) PERCENT OF GRAVEL, SAND OR FINES OR THREE (BY DRY WEIGHT) 98%
- 5) PARTICLE - SIZE RANGE:
 GRAVEL - FINE COURSE
 SAND - FINE, MEDIUM OR COARSE
- 6) PARTICLE ANGULARITY: ANGULAR, SUBANGULAR, OR ROUNDED
- 7) PARTICLE SIZE: FLAT ELONGATED BOTH N/A
- 8) MAXIMUM PARTICLE SIZE OR DIMENSION: N/A
- 9) HARDNESS OF COARSE SAND AND LARGER PARTICLE: N/A
- 10) PLASTICITY OF FINES: NON- PLASTIC LOW MEDIUM HIGH
- 11) DRY STRENGTH: NONE LOW HIGH VERY HIGH
- 12) DILATANCY: NONE SLOW RAPID
- 13) THOUGHNESS: LOW MEDIUM HIGH
- 14) COLOR: Brown
- 15) ODOR: 0
- 16) MOISTURE: DRY MOIST WET
- 17) REACTION WITH HCl: NONE WEAK STRONG
- 18) CONSISTENCY: (fine-grained soils only) VERY SOFT SOFT HARD VERY HARD
- 19) STRUCTURE: STRATIFIED LAMINATED FISSURED SLICKENSIDED LENSED HOMOGENEOUS
- 20) CEMENTATION: WEAK MODERATE STRONG
- 21) LOCAL NAME: Clay
- 22) GEOLOGIC INTERPRETATION Brown Well Graded Clay
- 23) REMARK: _____

SAMPLED BY: Contractor TESTED BY: [Signature]
CHECKED BY: _____

GRAIN SIZE DISTRIBUTION TEST REPORT



GRAIN SIZE DISTRIBUTION TEST DATA

Test No.: 5

Date: 4-11-2003
 Project No.: 1055
 Project: Lydick Engineers

Sample Data

Location of Sample: Cannon AFB SWMU 101 Sewage Lagoon
 Sample Description: Brown Sandy Lean Clay
 USCS Class: CL Liquid limit: 27
 AASHTO Class: Plasticity index: 12

Notes

Remarks: Sample Labeled 0-2' Depth of Bostwick Pit
 (Melrose) to be used for Liner

Fig. No.:

Mechanical Analysis Data

Sieve #	Size, mm	Percent finer
# 10	2.000	100.0

Hydrometer Analysis Data

Separation sieve is number 10
 Percent -# 10 based on complete sample= 100.0
 Weight of hydrometer sample: 40
 Hygroscopic moisture correction:
 Moist weight & tare = 763.90
 Dry weight & tare = 723.00
 Tare = 127.60
 Hygroscopic moisture= 6.9 %
 Calculated biased weight= 37.43
 Automatic temperature correction
 Composite correction at 20 deg C = 5

Meniscus correction only= 0
 Specific gravity of solids= 2.65
 Specific gravity correction factor= 1.000
 Hydrometer type: 152H Effective depth L= 16.294964 - 0.164 x Rm

Elapsed time, min	Temp, deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
2.0	20.0	13.0	18.0	0.0136	13.0	14.2	0.0363	48.0
5.0	20.0	12.0	17.0	0.0136	12.0	14.3	0.0231	45.3
15.0	20.0	11.0	16.0	0.0136	11.0	14.5	0.0134	42.6
15.0	20.0	11.0	16.0	0.0136	11.0	14.5	0.0134	42.6
30.0	20.0	11.0	16.0	0.0136	11.0	14.5	0.0095	42.6
60.0	20.0	11.0	16.0	0.0136	11.0	14.5	0.0067	42.6

Elapsed time, min	Temp, deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
40.0	20.0	11.0	16.0	0.0136	11.0	14.5	0.0034	42.6
40.0	20.0	10.0	15.0	0.0136	10.0	14.7	0.0014	40.0

 Fractional Components

Gravel/Sand based on #4 sieve

Sand/Fines based on #200 sieve

% + 3 in. = 0.0 % GRAVEL = 0.0 % SAND = 46.2

% SILT = 11.1 % CLAY = 42.7

D85= 0.79 D60= 0.132 D50= 0.048

Lydick Engineers & Surveyors, Inc.

P. O. Box 728
205 E. 2nd Street
Clovis, NM 88101
505-762-3771

Atterberg Report

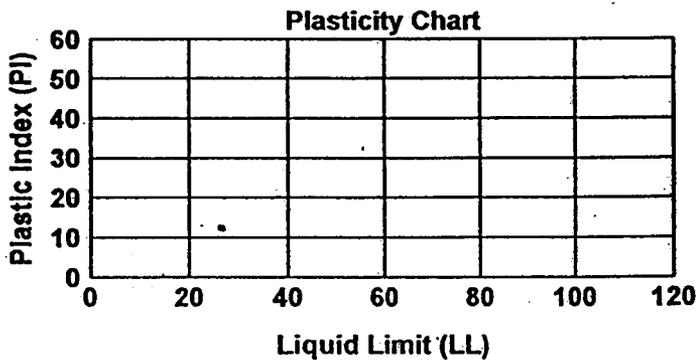
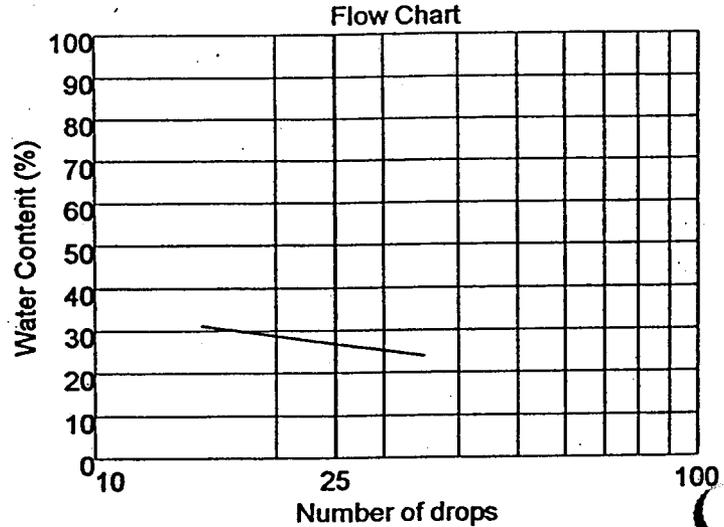
Project Number: DACW45-94-D-0003
Report Number: 2
Report Date: 5/21/2003
Authorized By: CONTRACTOR
Performed By: LANCE E. LANGAN
Bore #: 1
Sample #: 1
Bore Date: 5/21/2003
Sample Depth: 0' TO 2'
Preparation (Wet/Dry): WET TO DRY
Page: 1 of 1

To: ARROWHEAD CONST.
12920 METCALF AVE.SUITE150
OVERLAND PARK,KS.66213

Project: CLOSURE OF SWMU101 SEWAGE LAGOON @
CANNON A.F.B.

Plastic Limit	Tare #	11	12		
	Tare Weight	21.96	22.04		
	Tare + Wet Soil	29.31	31.20		
	Tare + Dry Soil	28.35	30.00		
	Weight of Water	0.96	1.20		
	Weight of Dry Soil	6.39	7.96		
	Water Content	15.0	15.1		

Liquid Limit	Tare #	8	9	10	
	Tare Weight	22.10	22.29	22.18	
	Tare + Wet Soil	37.44	37.02	35.56	
	Tare + Dry Soil	33.90	33.92	32.92	
	Number of Blows	18	27	33	
	Weight of Water	3.54	3.10	2.64	
	Weight of Dry Soil	11.80	11.63	10.74	
Water Content	30.0	26.7	24.6		



Liquid Limit	27	Natural Water Content
Plastic Limit	15	Classification of Sample
Plasticity Index	12	
Method A		

BORROW PIT ASSESSMENT
ASTM D 1586
BROWN LEAN CLAY* CL* AS PER USCS

Per: *Lance E. Langan*

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on written request.

ROBERT L. LYDICK
ROBERT CHAD LYDICK
Professional Engineer and
Land Surveyor

Lydick
ENGINEERS AND SURVEYORS, INC.
205 E. SECOND STREET - P.O. BOX 728
CLOVIS, NEW MEXICO 88102-0728
505 762-3771 - FAX 505 762-9093

Registered
New Mexico
Texas - Oklahoma
Colorado

**LABORATORY DETERMINATION OF WATER(MOISTURE) CONTENT OF SOIL
AND ROCK BY MASS AS PER ASTM D 2216-98
BOSTWICK PIT MELROSE, NM. 0' TO 2'**

$$W = [(M_{cws} - M_{cs}) / (M_{cs} - M_c)] \times 100 = M_s / M_w \times 100$$

W = WATER CONTENT %

M_{cws} = MASS OF CONTAINER AND WET SPECIMEN, g

M_{cs} = MASS OF CONTAINER AND OVEN DRYED SPECIMEN, g

M_c = MASS OF CONTAINER, g

M_w = MASS OF WATER ($M_w = M_{cws} - M_{cds}$), g, and

M_s = MASS OF SOLID PARTICLES ($M_s = M_{cds} - M_c$), g

W = ~~10.6%~~

$M_{cws} = 23.11$

$M_{cs} = 23.00$

$M_c = 21.96$

$M_w = 0.11$

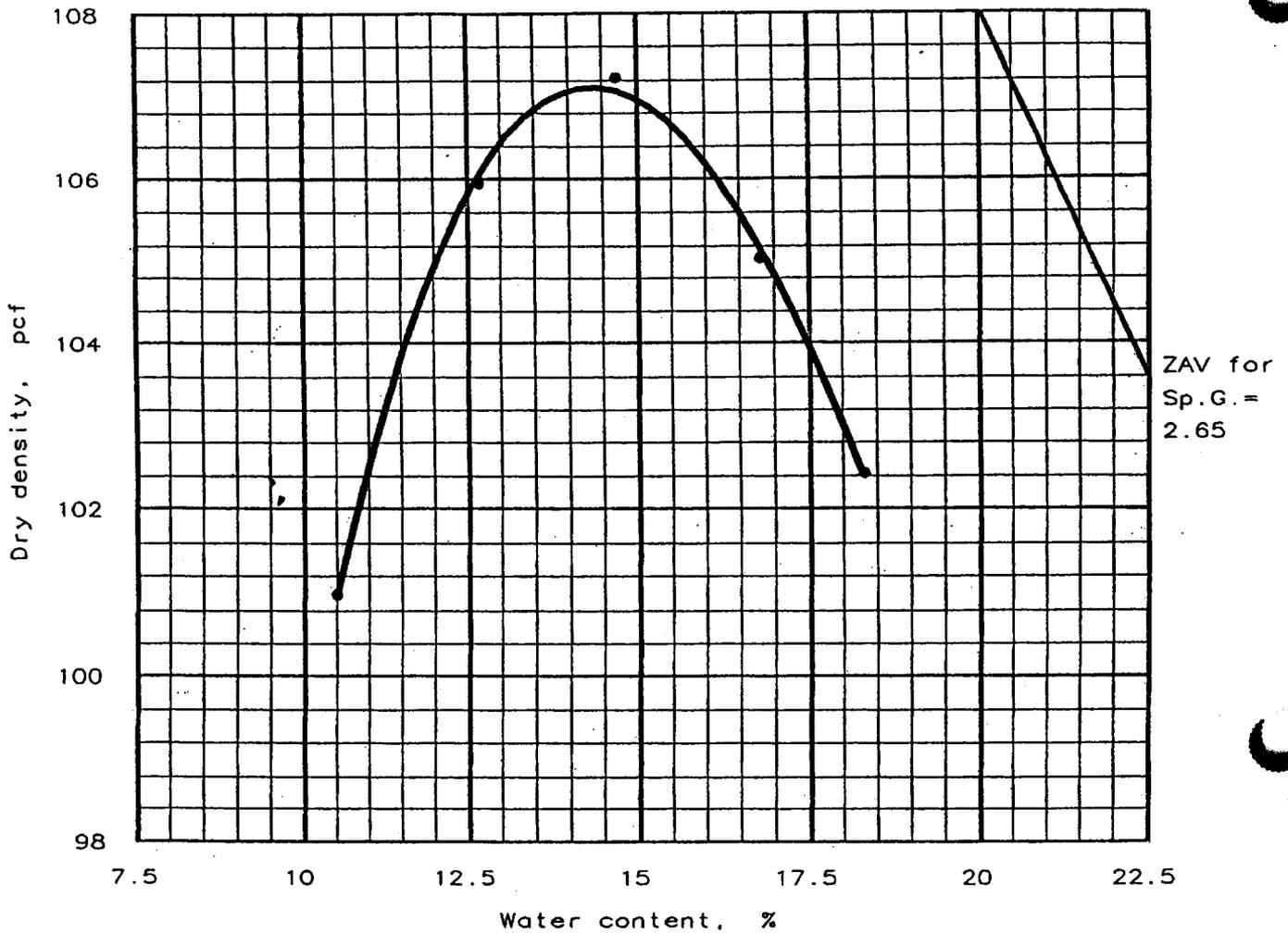
$M_s = 1.04$

NOTE CONDITION OF SAMPLE AS DELIVERED TO LAB
BROWN LEAN CLAY CLASSIFIED AS "CL" AS PER ASTM D 2487-98 (USCS)

TESTED BY

Lance E. Tarjan

MOISTURE-DENSITY RELATIONSHIP TEST



Test specification: ASTM D 698-91 Procedure A, Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No. 4	% < No. 200
	USCS	AASHTO						
	CL			2.65	27	12		53.6 %

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 107.1 pcf Optimum moisture = 14.3 %	Brown Sandy Lean Clay
Project No.: 1055 Project: Lydick Engineers Location: Closure of SWMU 101 Sewage Lagoon at Cannon Air Force Base - Clovis, N.M. Date: 4-11-2003	Remarks: Sample Labeled 0-2' Depth of Bostwick Pit (Melrose) to be used for Liner
MOISTURE-DENSITY RELATIONSHIP TEST DYESS-PETERSON TESTING LABORATORY, INC.	
Fig. No. 7057-F	

Lydick Engineers & Surveyors, Inc.

P. O. Box 728
205 E. 2nd Street
Tulsa, NM 88101
505-762-3771

To: ARROWHEADCONST.
12920 METCALF AVE. SUITE 150
OVERLAND PARK, KS. 66213

Proctor

Report Date:
Project:
Report Number:
Sample Type:
Sampled By:
Source:
Tested By:

Report

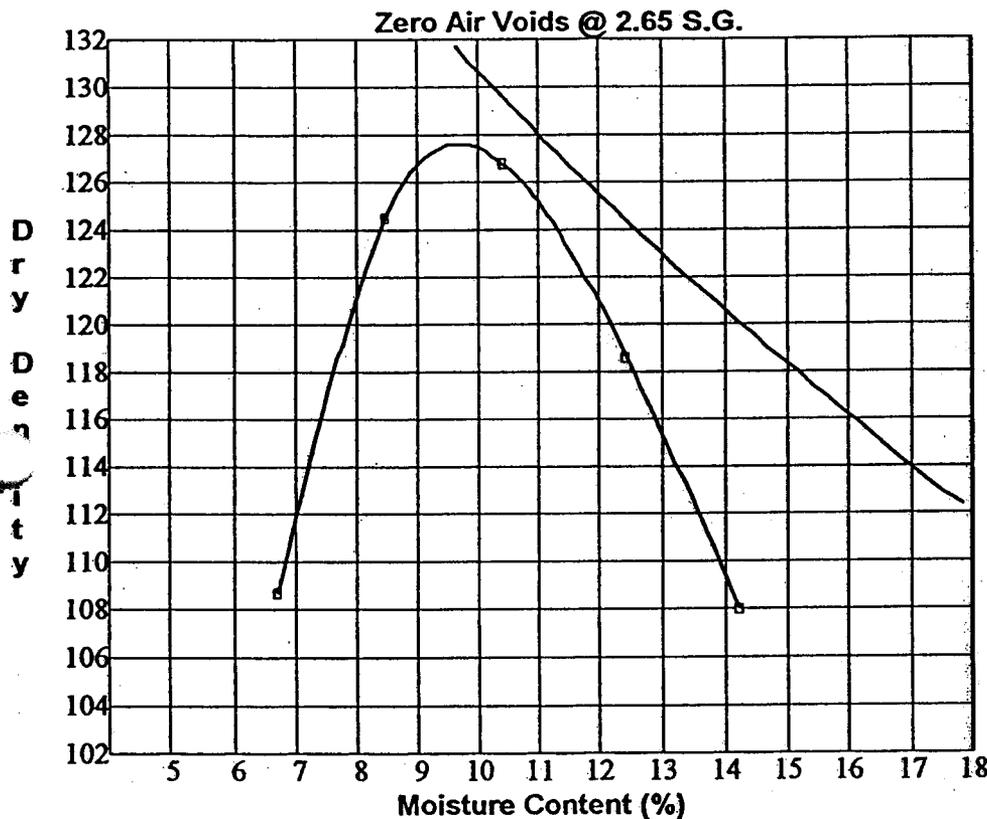
24-May-03
ARROWHEAD 5-03
1
COMPOSITE
CONTRACTOR
BOSTWICK PIT
ROBERT MICK

Proj: CLOSURE OF SWMU 101 SEWAGE LAGOON @ CANNON A.F.B.

Sample Date: 21-May-03

Date Tested: 21-May-03

Date Received: 21-May-03



Max. Dry Density: 127.6
Optimum Moisture (%): 9.7

Moisture Content	Dry Density	Wet Density
6.7	108.7	116.0
8.5	124.5	135.0
10.4	126.8	140.0
12.4	118.6	133.3
14.2	108.0	123.3

Method: ASTM D 1557-01
Rammer Type: MECH.
Preparation: DRY TO WET
% Retained 5mm screen: 0.0
% Retained 10mm screen: 0.0
% Retained 20mm screen: 0.0

Sample Description: BROWN LEAN CLAY CLASSIFIED AS "CL" AS PER USCS

Comment: 0' TO 2' PROCTOR 2 OF 1

Per Lance E. Y...

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on written request.

MOISTURE-DENSITY TEST DATA

DATA FILE: 763

PROJECT DATA

Date: 4-11-2003
 Project no.: 1055
 Project: Lydick Engineers
 Location 1: Closure of SWMU 101 Sewage Lagoon at
 2: Cannon Air Force Base - Clovis, N.M.
 Remarks 1: Sample Labeled 0-2' Depth
 2: of Bostwick Pit (Melrose)
 3: to be used for Liner
 Material 1: Brown Sandy Lean Clay
 description 2:
 Elevation or depth:
 Fig no: 7057-F

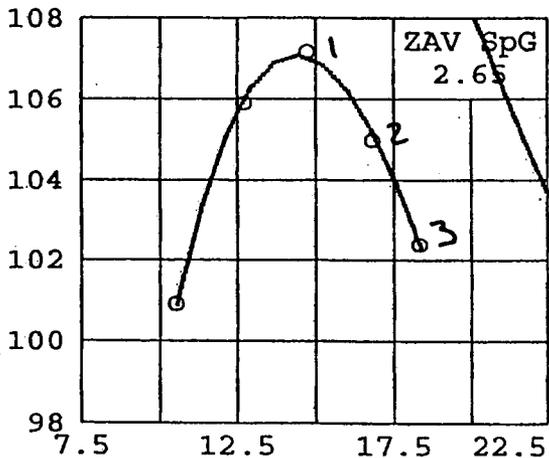
SPECIMEN DATA

USCS classification: CL AASHTO classification:
 Natural moisture: Specific gravity: 2.65
 Percent retained on No. 4 sieve:
 Percent passing No. 200 sieve: 53.6
 Liquid limit: 27 Plastic limit: 15 Plasticity index: 12

ASTM D-4318

TEST DATA AND RESULTS

Type of test: Standard, ASTM D 698-91 Procedure A



POINT NO.	1	2	3	4	5
WM + WS	8.22	8.48	8.60	8.59	8.54
WM	4.50	4.50	4.50	4.50	4.50
WW+T #1	1256.70	1099.50	1132.90	1036.40	1045.00
WD+T #1	1201.30	1051.60	1074.10	984.30	987.60
TARE #1	674.10	674.10	674.10	674.10	674.10
MOIST #1	10.5	12.7	14.7	16.8	18.3
MOISTURE	10.5	12.7	14.7	16.8	18.3
DRY DEN	101.0	106.0	107.2	105.1	102.4

Max dry den= 107.1 pcf, Opt moisture= 14.3 %

Oversize Correction Not Applied

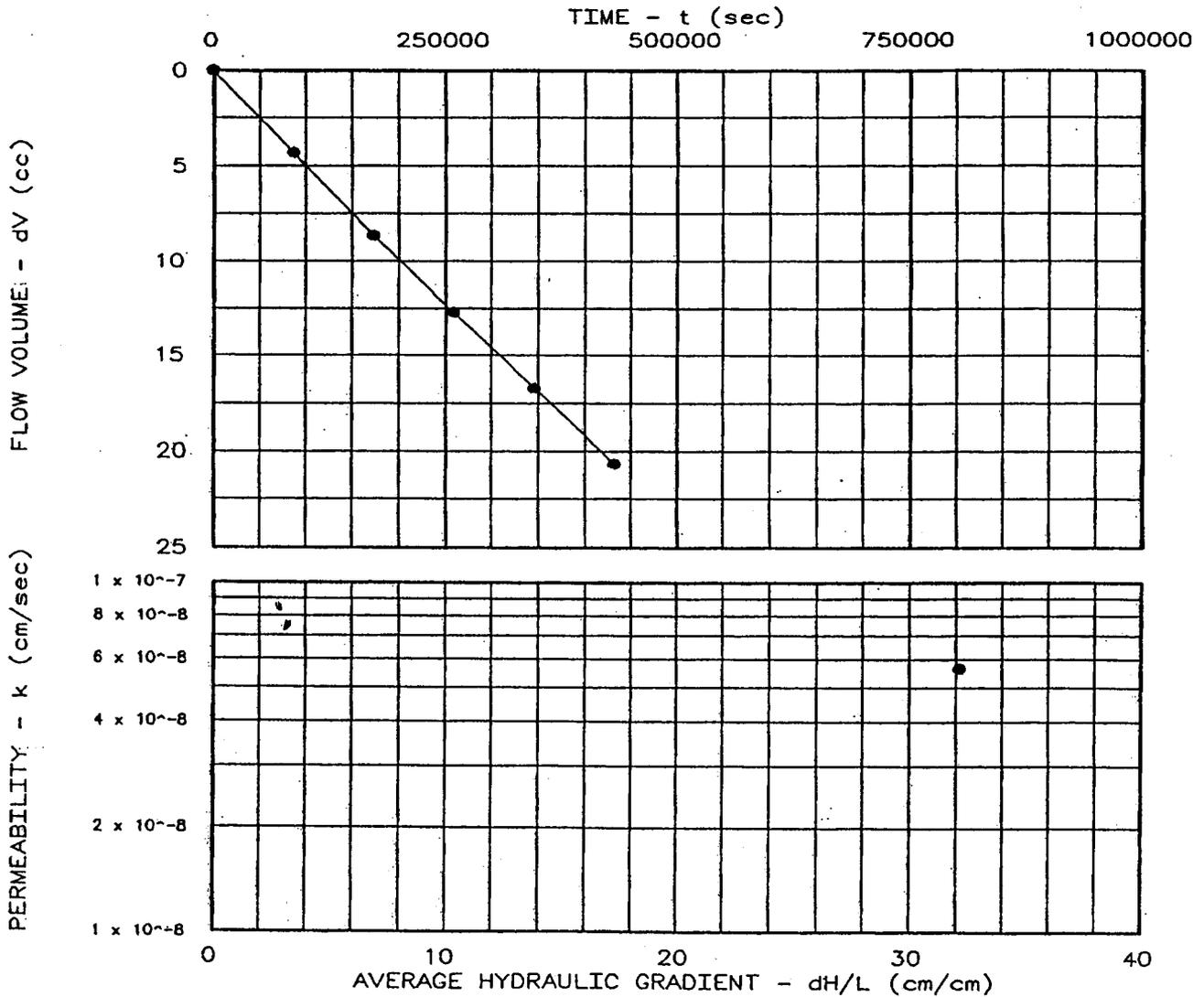
PERMEABILITY TEST REPORT

TEST DATA:

Specimen Height (cm): 11.43
 Specimen Diameter (cm): 5.78
 Dry Unit Weight (pcf): 101.9
 Moisture Before Test (%): 14.7
 Moisture After Test (%): 23.8
 Run Number: 1 ● 2 ▲
 Cell Pressure (psi): 50.0
 Test Pressure (psi): 50.4
 Back Pressure (psi): 45.2
 Diff. Head (psi): 5.2
 Flow Rate (cc/sec): 4.78×10^{-5}
 Perm. (cm/sec): 5.66×10^{-8}

SAMPLE DATA:

Sample Identification: Sample Labeled 0-2'
 Depth of Bostwick Pit
 Visual Description: Brown Sandy Lean Clay (CL)
 Remarks: Melrose, New Mexico
 Maximum Dry Density (pcf): 107.1
 Optimum Moisture Content (%): 14.3
 ASTM(D698)
 Percent Compaction: 95.2%
 Permeameter type: Flexible Wall
 Sample type: Remolded



Project: Lydick Engineers
 Location: Cannon AFB SWMU Sewage Lagoon
 Date: 4-12-2003

Project No.: DP-1055
 File No.: PT-1
 Lab No.: DP-6333-A
 Tested by:
 Checked by:
 Test: CH - Constant head

ASTM D-5084-01

PERMEABILITY TEST REPORT

DYESS-PETERSON TESTING LABORATORY, INC.

=====

CONSTANT HEAD PERMEABILITY TEST RESULTS

PROJECT NAME: Lydick Engineers
PROJECT LOCATION: Cannon AFB SWMU Sewage Lagoon
SAMPLE IDENTIFICATION: Sample Labeled 0-2'
Depth of Bostwick Pit
DESCRIPTION: Brown Sandy Lean Clay
(CL)
MAX. DRY DENS.: 107.1 OPT. WATER CONTENT: 14.3

FILE NO.: PT-1
PROJECT NO.: DP-1055
LAB NO.: DP-6333-A
SAMPLE TYPE: Remolded
DATE: 4-12-2003

SPECIMEN DATA

INITIAL PARAMETERS:

HEIGHT: 11.43 cm
DIAMETER: 5.78 cm
WET WEIGHT: 562.6 g
MOISTURE CONTENT: 14.7 %
DRY DENSITY: 101.9 pcf
PERCENT COMPACTION: 95.2

FINAL PARAMETERS:

HEIGHT: 11.46 cm
DIAMETER: 5.79 cm
WET WEIGHT: 607.3 g
MOISTURE CONTENT: 23.8 %
DRY DENSITY: 101.6 pcf

TEST PARAMETERS

CELL NO.: 2

PANEL NO.: 2

POSITIONS: 1

CELL PRESSURE: 50.0 psi
TEST PRESSURE: 50.4 psi
BACK PRESSURE: 45.2 psi /
/ 0.0 psi
DIFFERENTIAL HEAD: 5.2 psi

RUN NO. 1

RUN NO. 2

PERMEABILITY DATA

AVERAGE FLOW RATE: 4.78E-05 cc/sec
COEFFICIENT OF CORRELATION: 0.99963
AVERAGE GRADIENT: 32.1
TEMPERATURE: 20.0 deg C
PERMEABILITY, K, at 20 deg C: 5.66E-08 cm/sec

RUN NO. 2

=====

PERMEABILITY TEST DATA

=====

PROJECT DATA

Project Name: Lydick Engineers
 File No.: PT-1
 Project Location: Cannon AFB SWMU Sewage Lagoon
 Project No.: DP-1055
 Sample Identification: Sample Labeled 0-2'
 Depth of Bostwick Pit
 Lab No.: DP-6333-A
 Description: Brown Sandy Lean Clay
 (CL)
 Sample Type: Remolded
 Max. Dry Dens.: 107.1
 Method (D1557/D698): D698
 Opt. Water Content: 14.3
 Date: 4-12-2003
 Remarks: Melrose, New Mexico

Permeameter Type: Flexible Wall
 Tested by:
 Checked by:
 Test type: CH - Constant head

PERMEABILITY TEST SPECIMEN DATA

	Before test:			After test:		
Diameter:	1	2		1	2	
Top:	2.276 in	in		2.278 in	in	
Middle:	2.277 in	in		2.277 in	in	
Bottom:	2.280 in	in		2.283 in	in	
Average:	2.28 in	5.78 cm		2.28 in	5.79 cm	
Length:	1	2	3	1	2	3
Average:	4.500 in	in	in	4.510 in	in	in
Average:	4.50 in	11.43 cm		4.51 in	11.46 cm	

Moisture, Density and Sample Parameters:

Specific Gravity:	2.65	
Wet Wt. & Tare:	692.40	737.10
Dry Wt. & Tare:	620.30	620.30
Tare Wt.:	129.80	129.80
Moisture Content:	14.7 %	23.8 %
Dry Unit Weight:	101.9 pcf	95.2 % of max
Porosity:	0.3839	101.6 pcf
Saturation:	62.5 %	0.3859
		100.4 %

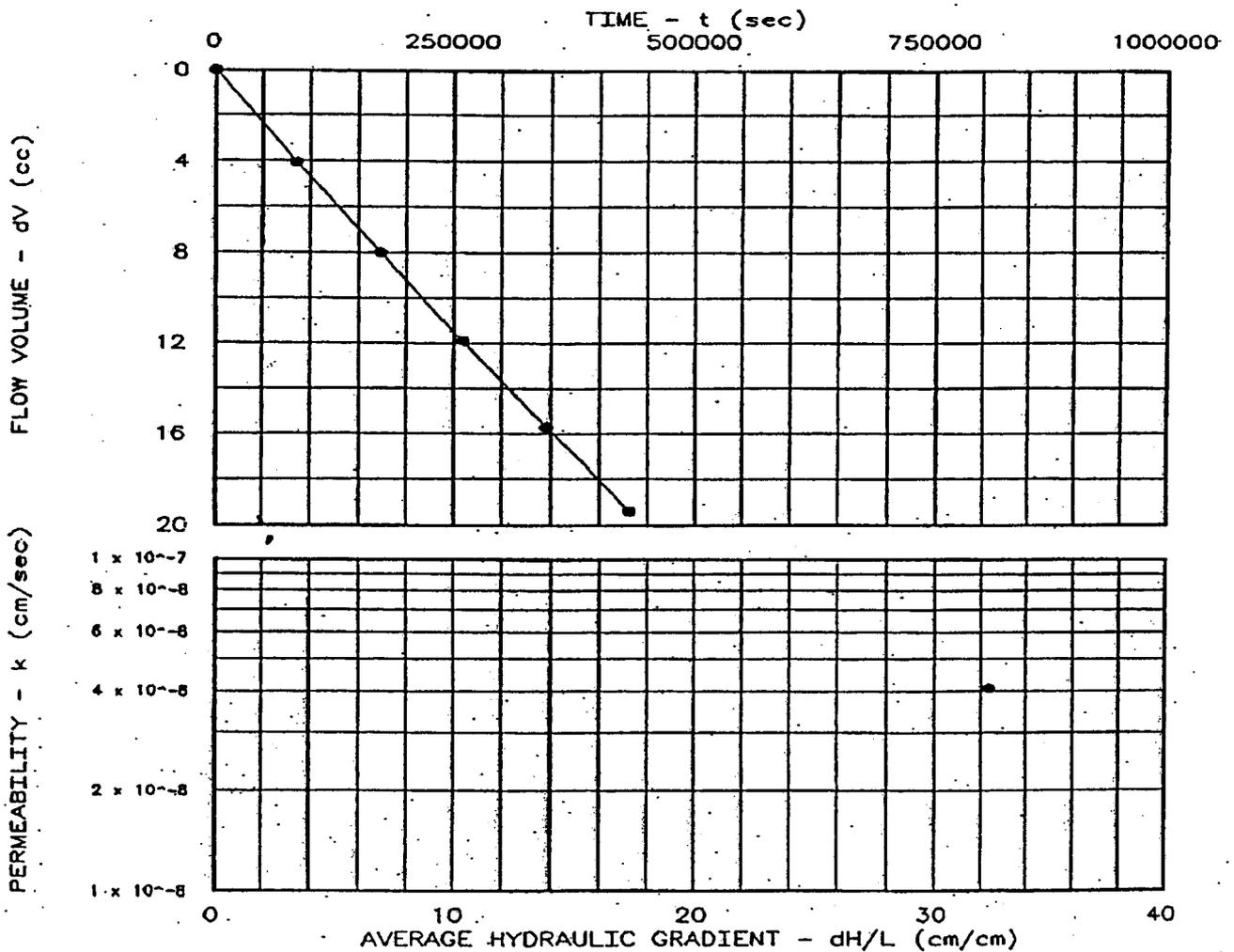
PERMEABILITY TEST REPORT

TEST DATA:

Specimen Height (cm): 11.43
 Specimen Diameter (cm): 6.58
 Dry Unit Weight (pcf): 107.3
 Moisture Before Test (%): 14.9
 Moisture After Test (%): 19.6
 Run Number: 1 ● 2 ▲
 Cell Pressure (psi): 50.0
 Test Pressure (psi): 50.3
 Back Pressure (psi): 45.0
 Diff. Head (psi): 5.3
 Flow Rate (cc/sec): 4.49×10^{-5}
 Perm. (cm/sec): 4.08×10^{-8}

SAMPLE DATA:

Sample Identification: Sample Labeled as
 0-2' Depth of Bostwick Pit for Liner
 Visual Description: Brown Sandy Lean Clay
 (CL)
 Remarks: Clovis **FILE**
 Maximum Dry Density (pcf): 107.1
 Optimum Moisture Content (%): 14.3
 ASTM (D698)
 Percent Compaction: 100.2%
 Permeameter type: Flexible Wall
 Sample type: Remolded



Project: Lydick Engineers
 Location: Cannon AFB SWMU 101 Sewage Lagoon
 Date: 5-24-2003

Project No.: DP-2827
 File No.: PT-3
 Lab No.: DP-6355-C
 Tested by:
 Checked by:
 Test: CH - Constant head

PERMEABILITY TEST REPORT

DYESS-PETERSON TESTING LABORATORY, INC.

CONSTANT HEAD PERMEABILITY TEST RESULTS

PROJECT NAME: Lydick Engineers FILE NO.: PT-3
 PROJECT LOCATION: Cannon AFB SWMU 101 Sewage Lagoon PROJECT NO.: DP-2827
 SAMPLE IDENTIFICATION: Sample Labeled as LAB NO.: DP-6355-C
 0-2' Depth of Bostwick Pit for Liner
 DESCRIPTION: Brown Sandy Lean Clay SAMPLE TYPE: Remolded
 (CL)
 MAX. DRY DENS.: 107.1 OPT. WATER CONTENT: 14.3 DATE: 5-24-2003

SPECIMEN DATA

INITIAL PARAMETERS:	FINAL PARAMETERS:
HEIGHT: 11.43 cm	HEIGHT: 11.46 cm
DIAMETER: 6.58 cm	DIAMETER: 6.53 cm
WET WEIGHT: 768.9 g	WET WEIGHT: 800.4 g
MOISTURE CONTENT: 14.9 %	MOISTURE CONTENT: 19.6 %
DRY DENSITY: 107.3 pcf	DRY DENSITY: 108.9 pcf
PERCENT COMPACTION: 100.2	

TEST PARAMETERS

CELL NO.: 2	PANEL NO.: 2	POSITIONS: 1
	RUN NO. 1	RUN NO. 2
CELL PRESSURE:	50.0 psi	
TEST PRESSURE:	50.3 psi	
BACK PRESSURE:	45.0 psi /	
/ 0.0 psi		
DIFFERENTIAL HEAD:	5.3 psi	

PERMEABILITY DATA

	RUN NO. 1	RUN NO. 2
AVERAGE FLOW RATE:	4.49E-05 cc/sec	
COEFFICIENT OF CORRELATION:	0.99976	
AVERAGE GRADIENT:	32.4	
TEMPERATURE:	20.0 deg C	
PERMEABILITY, K, at 20 deg C:	4.08E-08 cm/sec	

 CONSTANT HEAD PERMEABILITY TEST CONDITIONS DATA

Cell No.: 2	Panel No.: 2	Positions: 1
Run Number:	1	2
Cell Pressure:	50.0 psi	0.0 psi
Saturation Pressure:	45.0 psi	0.0 psi
Inflow Corr. Factor:	1.00	1.00
Outflow Corr. Factor:	1.00	1.00
Test Temperature:	20.0 °C	0.0 °C

 PERMEABILITY TEST READINGS DATA

CASE D X S R	DATE	TIME (24 hr)	ELAPSED TIME-sec	GAUGE PRESSURE-psi		BURET READING-cc		OUTFLOW/ INFLOW RATIO
				IN	OUT	IN	OUT	
S	5/19/ 3	5:57:00	0	50.3	45.1	1.30	24.70	0.00
	5/20/ 3	5:55:00	86,280	50.3	45.1	5.40	20.70	0.98
	5/21/ 3	5:52:00	172,500	50.3	45.1	9.40	16.80	0.98
	5/22/ 3	6:03:00	259,560	50.3	45.1	13.40	13.00	0.95
	5/23/ 3	6:00:00	345,780	50.3	45.1	17.30	9.30	0.95
	5/24/ 3	5:55:00	431,880	50.3	45.1	21.10	5.70	0.95

Test Pressure = 50.3 psi Differential Head = 5.3 psi, 369.8 cm H2O
 Gradient = 3.235E 01 Flow rate = 4.491E-05 cc/sec R squared = 0.99976
 Permeability, K20.0° = 4.077E-08 cm/sec, K20° = 4.077E-08 cm/sec

PERMEABILITY TEST REPORT

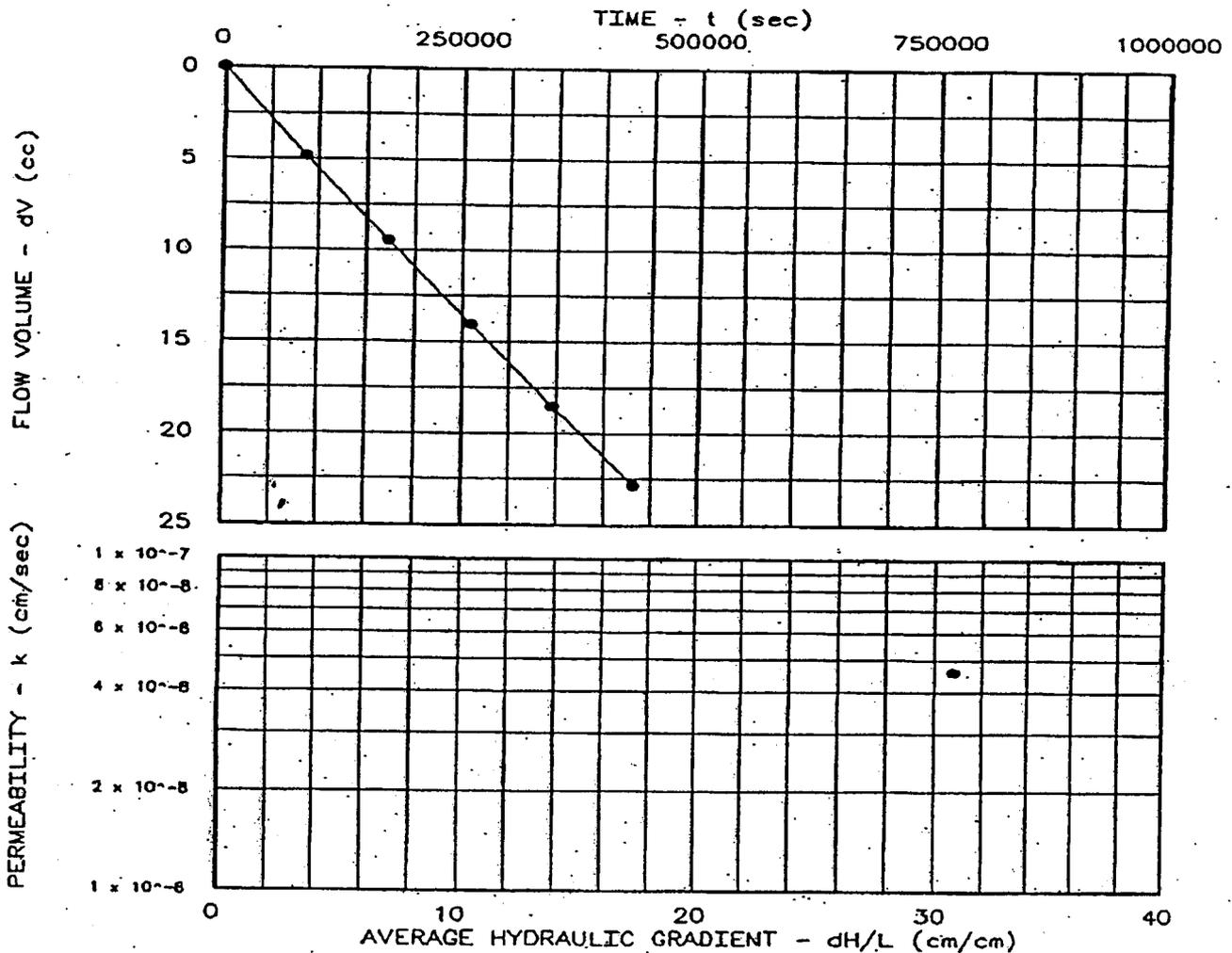
TEST DATA:

Specimen Height (cm): 11.43
 Specimen Diameter (cm): 6.90
 Dry Unit Weight (pcf): 105.1
 Moisture Before Test (%): 16.4
 Moisture After Test (%): 22.1
 Run Number: 1 • 2 *
 Cell Pressure (psi): 50.0
 Test Pressure (psi): 49.9
 Back Pressure (psi): 44.9
 Diff. Head (psi): 5.0
 Flow Rate (cc/sec): 5.29×10^{-5}
 Perm. (cm/sec): 4.59×10^{-8}

SAMPLE DATA:

Sample Identification: Sample Label: **COPY**
 0-2' Depth of Bostwick Pipe Liner
 Visual Description: Brown, Sandy Lean Clay (CL)
 Remarks: Clovis, New Mexico
 Maximum Dry Density (pcf): 107.1
 Optimum Moisture Content (%): 14.3
 ASTM(D698)
 Percent Compaction: 98.1%
 Permeameter type: Flexible Wall
 Sample type: Remolded

Point-2



Project: Lydick Engineers
 Location: Cannon AFB SWMU 101 Sewage Lagoon
 Date: 5-24-2003

Project No.: DP-1055
 File No.: PT-2
 Lab No.: DP-6355-B
 Tested by:
 Checked by:
 Test: CH - Constant head

PERMEABILITY TEST REPORT

DYESS-PETERSON TESTING LABORATORY, INC.

CONSTANT HEAD PERMEABILITY TEST RESULTS

PROJECT NAME: Lydick Engineers

FILE NO.: PT-2

PROJECT LOCATION: Cannon AFB SWMU 101 Sewage Lagoon

PROJECT NO.: DP-1055

SAMPLE IDENTIFICATION: Sample Labeled as

LAB NO.: DP-6355-B

0-2' Depth of Bostwick Pit for Liner

DESCRIPTION: Brown Sandy Lean Clay

SAMPLE TYPE: Remolded

(CL)

MAX. DRY DENS.: 107.1

OPT. WATER CONTENT: 14.3

DATE: 5-24-2003

SPECIMEN DATA

INITIAL PARAMETERS:

FINAL PARAMETERS:

HEIGHT: 11.43 cm

HEIGHT: 11.46 cm

DIAMETER: 6.90 cm

DIAMETER: 6.91 cm

WET WEIGHT: 838.5 g

WET WEIGHT: 879.3 g

MOISTURE CONTENT: 16.4 %

MOISTURE CONTENT: 22.1 %

DRY DENSITY: 105.1 pcf

DRY DENSITY: 104.7 pcf

PERCENT COMPACTION: 98.1

TEST PARAMETERS

CELL NO.: 1

PANEL NO.: 2

POSITIONS: 1

CELL PRESSURE:

RUN NO. 1

RUN NO. 2

TEST PRESSURE:

50.0 psi

BACK PRESSURE:

49.9 psi

/ 0.0 psi

44.9 psi /

DIFFERENTIAL HEAD:

5.0 psi

PERMEABILITY DATA

AVERAGE FLOW RATE:

RUN NO. 1

RUN NO. 2

5.29E-05 cc/sec

COEFFICIENT OF CORRELATION:

0.99971

AVERAGE GRADIENT:

30.8

TEMPERATURE:

20.0 deg C

PERMEABILITY, K, at 20 deg C:

4.59E-08 cm/sec

PERMEABILITY TEST DATA

PROJECT DATA

Project Name: Lydick Engineers
 File No.: PT-2
 Project Location: Cannon AFB SWMU 101 Sewage Lagoon
 Project No.: DP-1055
 Sample Identification: Sample Labeled as
 0-2' Depth of Bostwick Pit for Liner
 Lab No.: DP-6355-B
 Description: Brown Sandy Lean Clay
 (CL)
 Sample Type: Remolded
 Max. Dry Dens.: 107.1
 Method (D1557/D698): D698
 Opt. Water Content: 14.3
 Date: 5-24-2003
 Remarks: Clovis, New Mexico

Permeameter Type: Flexible Wall
 Tested by:
 Checked by:
 Test type: CH - Constant head

PERMEABILITY TEST SPECIMEN DATA

	Before test:			After test:		
Diameter:	1	2		1	2	
Top:	2.717 in	in		2.718 in	in	
Middle:	2.718 in	in		2.719 in	in	
Bottom:	2.719 in	in		2.722 in	in	
Average:	2.72 in	6.90 cm		2.72 in	6.91 cm	
Length:	1	2	3	1	2	3
	4.500 in	in	in	4.512 in	in	in
Average:	4.50 in	11.43 cm		4.51 in	11.46 cm	

Moisture, Density and Sample Parameters:

Specific Gravity:	2.65	
Wet Wt. & Tare:	968.20	1009.00
Dry Wt. & Tare:	850.10	850.10
Tare Wt.:	129.70	129.70
Moisture Content:	16.4 %	22.1 %
Dry Unit Weight:	105.1 pcf	98.1 % of max
Porosity:	0.3646	0.3670
Saturation:	75.7 %	100.8 %

 CONSTANT HEAD PERMEABILITY TEST CONDITIONS DATA

Cell No.: 1 Panel No.: 2 Positions: 1

Run Number: 1 2

Cell Pressure: 50.0 psi 0.0 psi

Saturation Pressure: 45.0 psi 0.0 psi

Inflow Corr. Factor: 1.00 1.00

Outflow Corr. Factor: 1.00 1.00

Test Temperature: 20.0 °C 0.0 °C

 PERMEABILITY TEST READINGS DATA

CASE D X S R	DATE	TIME (24 hr)	ELAPSED TIME-sec	GAUGE PRESSURE-psi		BURET READING-cc		OUTFLOW/ INFLOW RATIO
				IN	OUT	IN	OUT	
S	5/19/ 3	5:57:00	0	49.9	44.9	0.20	23.40	0.00
	5/20/ 3	5:55:00	86,280	49.9	44.9	5.00	18.60	1.00
	5/21/ 3	5:52:00	172,500	49.9	44.9	9.70	14.00	0.98
	5/22/ 3	6:03:00	259,560	49.9	44.9	14.40	9.50	0.96
	5/23/ 3	6:00:00	345,780	49.9	44.9	19.00	5.20	0.93
	5/24/ 3	5:55:00	431,880	49.9	44.9	23.50	1.00	0.93

Test Pressure = 49.9 psi Differential Head = 5.0 psi, 351.5 cm H2O
 Gradient = 3.075E 01 Flow rate = 5.288E-05 cc/sec R squared = 0.99971
 Permeability, K20.0° = 4.593E-08 cm/sec, K20° = 4.593E-08 cm/sec

=====

CONSTANT HEAD PERMEABILITY TEST RESULTS

PROJECT NAME: Lydick Engineers
 PROJECT LOCATION: Cannon AFB SWMU 101 Sewage Lagoon
 SAMPLE IDENTIFICATION: Sample Labeled as
 0-2' Depth of Bostwick Pit for Liner
 DESCRIPTION: Brown Sandy Lean Clay
 (CL)
 MAX. DRY DENS.: 107.1 OPT. WATER CONTENT: 14.3
 FILE NO.: PT-1
 PROJECT NO.: DP-1055
 LAB NO.: DP-6355-A
 SAMPLE TYPE: Remolded
 DATE: 5-24-2003

SPECIMEN DATA

INITIAL PARAMETERS:

FINAL PARAMETERS:

HEIGHT: 11.43 cm
 DIAMETER: 6.71 cm
 WET WEIGHT: 785.5 g
 MOISTURE CONTENT: 18.1 %
 DRY DENSITY: 102.7 pcf
 PERCENT COMPACTION: 95.9

HEIGHT: 11.45 cm
 DIAMETER: 6.71 cm
 WET WEIGHT: 820.1 g
 MOISTURE CONTENT: 23.2 %
 DRY DENSITY: 102.5 pcf

TEST PARAMETERS

CELL NO.: 1

PANEL NO.: 1

POSITIONS: 1

CELL PRESSURE:

RUN NO. 1

RUN NO. 2

TEST PRESSURE:

50.0 psi

BACK PRESSURE:

50.1 psi

/ 0.0 psi

45.0 psi /

DIFFERENTIAL HEAD:

5.1 psi

PERMEABILITY DATA

AVERAGE FLOW RATE:

RUN NO. 1

RUN NO. 2

COEFFICIENT OF CORRELATION:

5.79E-05 cc/sec

AVERAGE GRADIENT:

0.99982

TEMPERATURE:

31.1

20.0 deg C

PERMEABILITY, K, at 20 deg C:

5.26E-08 cm/sec

=====

PERMEABILITY TEST DATA

=====

PROJECT DATA

Project Name: Lydick Engineers
 File No.: PT-1
 Project Location: Cannon AFB SWMU 101 Sewage Lagoon
 Project No.: DP-1055
 Sample Identification: Sample Labeled as
 0-2' Depth of Bostwick Pit for Liner
 Lab No.: DP-6355-A
 Description: Brown Sandy Lean Clay
 (CL)
 Sample Type: Remolded
 Max. Dry Dens.: 107.1
 Method (D1557/D698): D698
 Opt. Water Content: 14.3
 Date: 5-24-2003
 Remarks: Clovis, New Mexico

Permeameter Type: Flexible Wall
 Tested by:
 Checked by:
 Test type: CH - Constant head

PERMEABILITY TEST SPECIMEN DATA

	Before test:			After test:		
Diameter:	1	2		1	2	
Top:	2.642 in	in		2.643 in	in	
Middle:	2.641 in	in		2.641 in	in	
Bottom:	2.644 in	in		2.646 in	in	
Average:	2.64 in	6.71 cm		2.64 in	6.71 cm	
Length:	1	2	3	1	2	3
	4.500 in	in	in	4.508 in	in	in
Average:	4.50 in	11.43 cm		4.51 in	11.45 cm	
Moisture, Density and Sample Parameters:						
Specific Gravity:	2.65					
Wet Wt. & Tare:	918.60			953.20		
Dry Wt. & Tare:	798.00			798.60		
Tare Wt.:	133.10			133.10		
Moisture Content:	18.1 %			23.2 %		
Dry Unit Weight:	102.7 pcf			95.9 % of max		
Porosity:	0.3794			102.5 pcf		
Saturation:	78.6 %			0.3803		
				100.3 %		

 CONSTANT HEAD PERMEABILITY TEST CONDITIONS DATA

Cell No.: 1 Panel No.: 1 Positions: 1

Run Number: 1 2

Cell Pressure: 50.0 psi 0.0 psi

Saturation Pressure: 45.0 psi 0.0 psi

Inflow Corr. Factor: 1.00 1.00

Outflow Corr. Factor: 1.00 1.00

Test Temperature: 20.0 °C 0.0 °C

 PERMEABILITY TEST READINGS DATA

CASE D X S R	DATE	TIME (24 hr)	ELAPSED TIME-sec	GAUGE PRESSURE-psi		BURET READING-cc		OUTFLOW/ INFLOW RATIO
				IN	OUT	IN	OUT	
S	5/19/ 3	5:57:00	0	50.1	45.1	0.90	23.40	0.00
	5/20/ 3	5:55:00	86,280	50.1	45.1	6.10	18.20	1.00
	5/21/ 3	5:52:00	172,500	50.1	45.1	11.20	13.20	0.98
	5/22/ 3	6:03:00	259,560	50.1	45.1	16.30	8.20	0.98
	5/23/ 3	6:00:00	345,780	50.1	45.1	21.30	3.40	0.96
R						21.30	3.40	
R	5/24/ 3	5:55:00	431,880	50.1	45.1	1.20	23.00	
						6.10	18.30	0.96

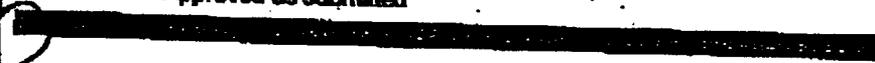
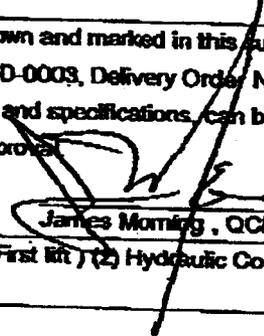
Test Pressure = 50.1 psi Differential Head = 5.1 psi, 355.9 cm H2O
 Gradient = 3.113E 01 Flow rate = 5.787E-05 cc/sec R squared = 0.99982
 Permeability, K20.0° = 5.255E-08 cm/sec, K20° = 5.255E-08 cm/sec

SUBMITTAL REVIEW VERIFICATION SHEET

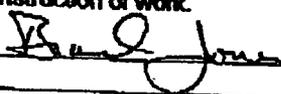
Date: July 24, 2003

Submittal No.: 02377-6.1

Foster Wheeler Environmental Corporation Stamp

SWMU 101 Sewage Lagoons Closure, Cannon AFB, NM	
Certified for approval as indicated below:	
A -	Approved as submitted
	
It is hereby certified that the (equipment) (material) shown and marked in this submittal is that proposed to be incorporated into Contract Number DACW45-94-D-0003, Delivery Order No. 35, Work Authorization Directive 1 is in compliance with the contract drawings and specifications, can be installed in the allocated spaces, and is submitted for Government approval.	
Reviewed/Certified By:  James Morning, OCM	
Description of items reviewed: SD-06 Test Reports- (First lift) (2) Hydraulic Conductivity Test 3.4.3 Retest data for #4&5 RESUBMITTAL	

U.S. Army Corps of Engineers Stamp

U.S. Army Engineer District, Albuquerque Corps of Engineers	
Certified for approval as indicated below:	
A -	Approved as submitted.
B -	Approved except as noted on the drawings and/or attached sheet(s). Resubmission not required.
C -	Approved except as noted on the drawings and/or attached sheet(s). Resubmission required.
D -	Will be returned by separate correspondence.
E -	Disapproved; see comments on attached sheet.
F -	Receipt acknowledged.
G -	Other: Specify.
Note:	Items approved as to general layout only. Dimensions and quantities checked. Approval does not relieve contractor of responsibilities for errors that may exist, as contractor shall be responsible for dimensions and design of adequate corrections. Details and satisfactory construction of work.
Signature:	
Date:	7-25-03

Reviewer's Signature: 

SWMU 101
Sewage Lagoons Closure Project
CAFB NM
Re-Submittal of 02377-Item 4
Hydraulic Conductivity Test
First Lift
Re test 4 and 5

Contents

Test

- | | |
|---|----------------|
| 1. ASTM 5084 test 4 dated 7-14-03 | 4 pages |
| 3..4.3 (5 per lift) test 5 dated 7-15-03 | 4 pages |
| 2. Lydick Letter Soil Classification | 1 page |

Test 1-3 to be submitted at later date

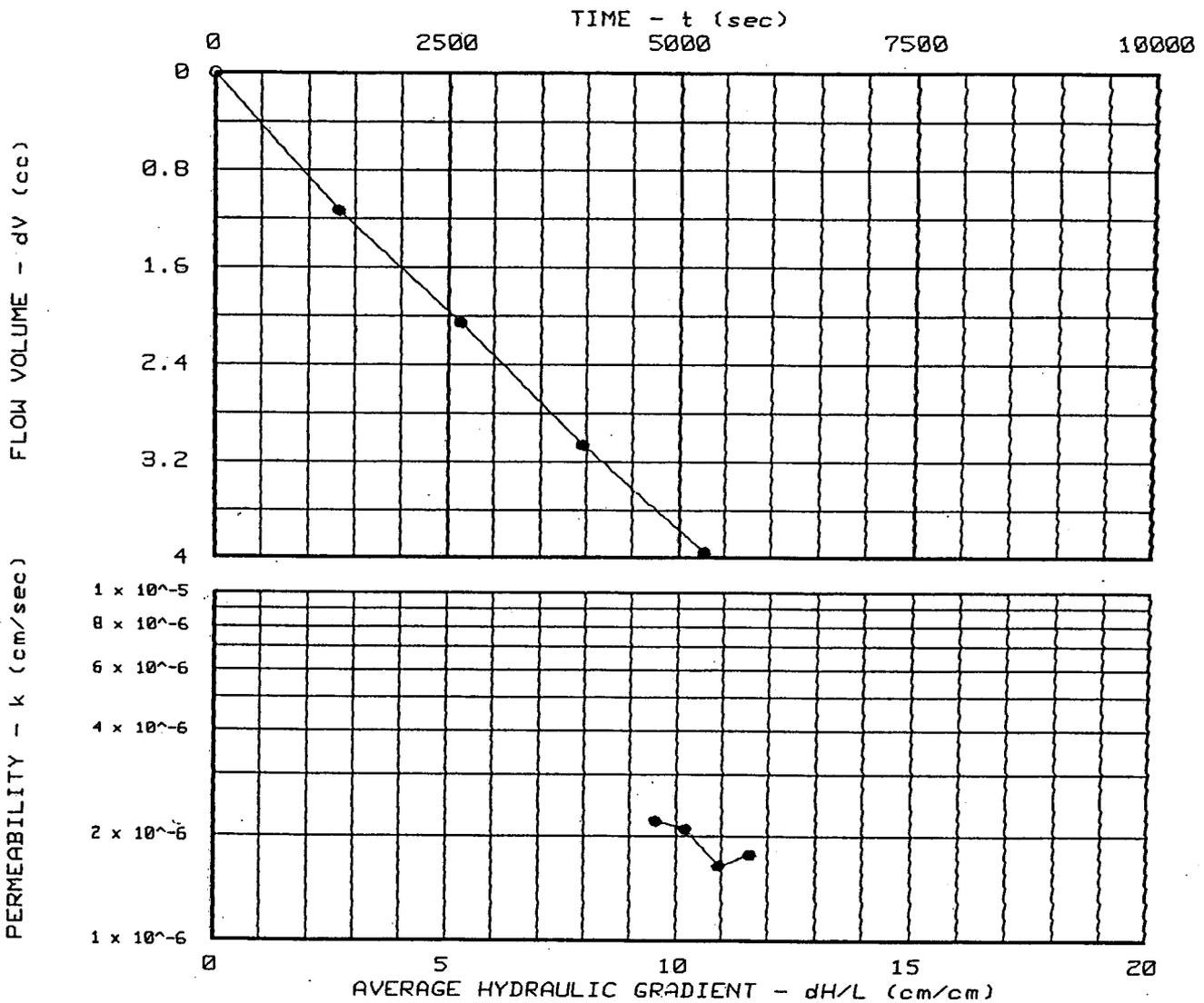
PERMEABILITY TEST REPORT

TEST DATA:

Specimen Height (cm): 6.85
 Specimen Diameter (cm): 7.31
 Dry Unit Weight (pcf): 86.3
 Moisture Before Test (%): 15.8
 Moisture After Test (%): 35.9
 Run Number: 1 ● 2 ▲
 Cell Pressure (psi): 70.1
 Sat. Pressure (psi): 67.5
 Diff. Head (psi): 0.1
 Perm. (cm/sec): 1.86×10^{-6}

SAMPLE DATA:

Sample Identification: BARROW FILL BOSTWICK
 PIT MELROSE, NM. RETEST IN PLACE -4
 Visual Description: BROWN SANDY LEAN CLAY
 CLASSIFIED AS CL AS PER USCS
 Remarks: ASTM D 5084-01 B=95.8
 INCREASED 5 PSI FOR "B"
 Maximum Dry Density (pcf): 107.1
 Optimum Moisture Content (%): 14.3
 ASTM(D 698)
 Percent Compaction: 80.6%
 Permeameter type: FLEXWALL
 Sample type: IN PLACE-4



Project: LAGOON CLOSURE SWMU 101 C.A.F.B., NM
 Location: WASTE WATER PLANT @ CANNON
 Date: 7-14-03

Project No.: LE-10
 File No.: AH-03
 Lab No.: LE-3
 Tested by: LEL
 Checked by:
 Test: FH - Falling head C

PERMEABILITY TEST REPORT
 LYDICK ENGINEERS & SURVEYORS, INC.

=====

PERMEABILITY TEST DATA

=====

PROJECT DATA

Project Name: LAGOON CLOSURE SWMU 101 C.A.F.B., NM
 File No.: AH-03
 Project Location: WASTE WATER PLANT @ CANNON
 Project No.: LE-10
 Sample Identification: BARROW FILL BOSTWICK
 PIT MELROSE, NM. RETESTIN PLACE -4
 Lab No.: LE-3
 Description: BROWN SANDY LEAN CLAY
 CLASSIFIED AS CL AS PER USCS
 Sample Type: IN PLACE-4
 Max. Dry Dens.: 107.1
 Method (D1557/D698): D 698
 Opt. Water Content: 14.3
 Date: 7-14-03
 Remarks: ASTM D 5084-01 B=95.8
 INCREASED 5 PSI FOR "B"
 Permeameter Type: FLEXWALL
 Fested by: LEL
 Checked by:
 Test type: FH - Falling head C

PERMEABILITY TEST SPECIMEN DATA

	Before test:			After test:		
Diameter:	1	2		1	2	
Top:	2.876 in		in	2.890 in		in
Middle:	2.879 in		in	2.864 in		in
Bottom:	2.876 in		in	2.841 in		in
Average:	2.88 in	7.31 cm		2.86 in	7.28 cm	
Length:	1	2	3	1	2	3
	2.696 in		in	2.730 in		in
Average:	2.70 in	6.85 cm		2.73 in	6.93 cm	
Moisture, Density and Sample Parameters:						
Specific Gravity:	2.73					
Wet Wt. & Tare:	888.21			981.10		
Dry Wt. & Tare:	825.31			835.12		
Tare Wt.:	428.21			428.32		
Moisture Content:	15.8 %			35.9 %		
Dry Unit Weight:	86.3 pcf	80.6 % of max		88.1 pcf		
Porosity:	0.4937			0.4832		
Saturation:	44.3 %			104.8 %		

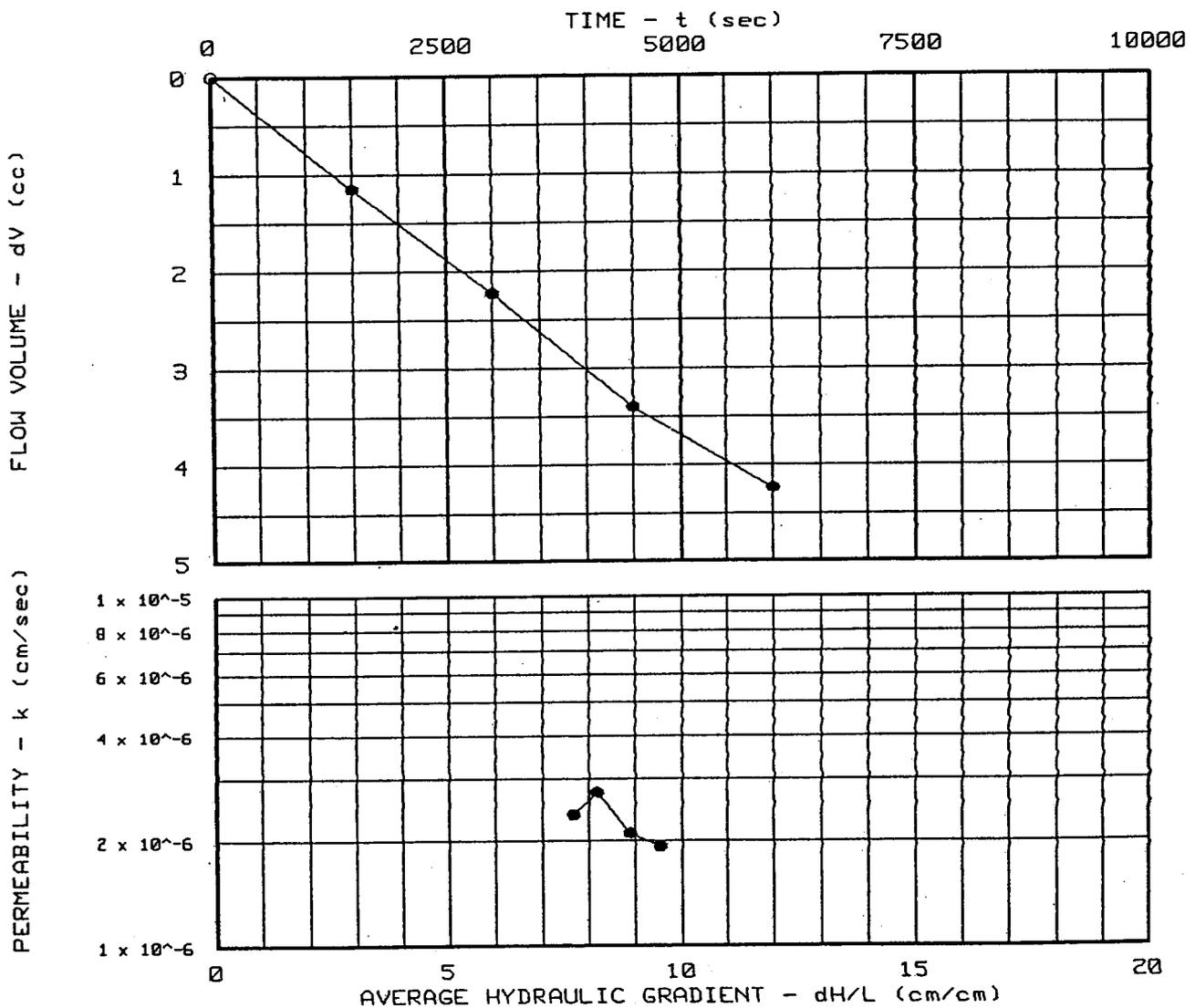
PERMEABILITY TEST REPORT

TEST DATA:

Specimen Height (cm): 8.33
 Specimen Diameter (cm): 7.29
 Dry Unit Weight (pcf): 95.1
 Moisture Before Test (%): 14.2
 Moisture After Test (%): 28.8
 Run Number: 1 ● 2 ▲
 Cell Pressure (psi): 75.1
 Sat. Pressure (psi): 72.3
 Diff. Head (psi): 0.1
 Perm. (cm/sec): 2.21×10^{-6}

SAMPLE DATA:

Sample Identification: BARROW FILL BOSTWICK
 PIT MELROSE, NM RETEST IN PLACE-5
 Visual Description: BROWN SANDY LEAN CLAY
 CLASSIFIED AS CL AS PER USCS
 Remarks: ASTM D 5084-01 B=97.5
 INCREASED 5 PSI FOR "B"
 Maximum Dry Density (pcf): 107.1
 Optimum Moisture Content (%): 14.3
 ASTM(D 698)
 Percent Compaction: 88.8%
 Permeameter type: FLEXWALL
 Sample type: IN-PLACE-5



Project: LAGOON CLOSURE SWMU 101 C.A.F.B., NM
 Location: WASTE WATER PLANT @ CANNON
 Date: 7-15-03

Project No.: LE-10
 File No.: AH-03
 Lab No.: LE-3
 Tested by: BH
 Checked by: LEL
 Test: FH - Falling head C

PERMEABILITY TEST REPORT
LYDICK ENGINEERS & SURVEYORS, INC.

ROBERT L. LYDICK
ROBERT CHAD LYDICK
Professional Engineer and
Land Surveyor

Lydick
ENGINEERS AND SURVEYORS, INC.
205 E. SECOND STREET - P.O. BOX 728
CLOVIS, NEW MEXICO 88102-0728
505 762-3771 - FAX 505 762-9093

Registered
New Mexico
Texas - Oklahoma
Colorado

JULY 23, 2003

MR. BRAD JONES
US ARMY CORPS OF ENGINEERS
GEOTECHNICAL ENGINEERING & SCIENCES BRANCH

RE: CLASSIFICATION AND LABELING OF MATERIAL FOR USE ON THE LAGOON CLOSURE @
C.A.F.B NEW MEXICO

DEAR MR. JONES

THE LAGOON CLOSURE PROJECT ON GOING AT CANNON A.F.B. HAS TWO (2) BARROW SOURCES
THAT ARE BEING USED.

SOURCE 1 IS THE EXISTING BERM MATERIAL IT WAS CLASSIFIED AS A REDDISH SANDY CLAYEY
SAND "SM-SC" AND WAS USED ONLY ON THE FIRST LIFT.

SOURCE 2 IS THE BOSTWICK PIT MATERIAL FROM MELROSE, NM IT WAS CLASSIFIED AS A
BROWN LEAN CLAY "CL".

TO AVOID ANY MORE CONFUSION WITH THE MATERIALS BEING USED ALL THE REPORT NOW
INDICATE EITHER "SM-SC" OR "CL".

IF I CAN BE OF FURTHER ASSISTANCE IN THIS MATTER PLEASE FEEL FREE CONTACT ME.

VERY TRULY YOURS


LANCE E. LANGAN
LABORATORY SUPERVISOR

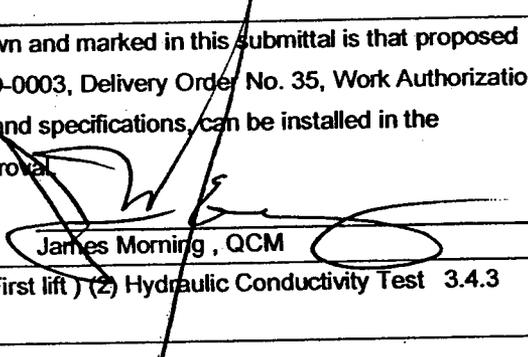
TO CORP
7/24

SUBMITTAL REVIEW VERIFICATION SHEET

Date: July 24, 2003

Submittal No.: 02377-6.1

Foster Wheeler Environmental Corporation Stamp

SWMU 101 Sewage Lagoons Closure, Cannon AFB, NM	
Certified for approval as indicated below:	
A -	Approved as submitted [Redacted]
It is hereby certified that the (equipment) (material) shown and marked in this submittal is that proposed to be incorporated into Contract Number DACW45-94-D-0003, Delivery Order No. 35, Work Authorization Directive 1 is in compliance with the contract drawings and specifications, can be installed in the allocated spaces, and is submitted for Government approval.	
Reviewed/Certified By:	 James Morning, QCM
Description of items reviewed: SD-06 Test Reports- (First lift) (2) Hydraulic Conductivity Test 3.4.3 Retest data for #4&5 RESUBMITTAL	

U.S. Army Corps of Engineers Stamp

U.S. Army Engineer District, Albuquerque Corps of Engineers	
Certified for approval as indicated below:	
A -	Approved as submitted.
B -	Approved except as noted on the drawings and/or attached sheet(s). Resubmission not required.
C -	Approved except as noted on the drawings and/or attached sheet(s). Resubmission required.
D -	Will be returned by separate correspondence.
E -	Disapproved; see comments on attached sheet.
F -	Receipt acknowledged.
G -	Other: Specify.
Note: Items approved as to general layout only. Dimensions and quantities checked. Approval does not relieve contractor of responsibilities for errors that may exist, as contractor shall be responsible for dimensions and design of adequate corrections. Details and satisfactory construction of work.	
Signature: _____	Date: _____

Reviewer's Signature: _____

Jones, Brad N NWO

From: Jones, Brad N NWO
Sent: Monday, July 07, 2003 4:38 PM
To: Pastor, Max A SPA
Cc: Fox, Fawn E SPA
Subject: Sewage Lagoons Closure Project Transmittal No. 02377-7

(HYDRAULIC CONDUCTIVITY TESTING OF IN-PLACE BARRIER LAYER
- 1ST LIFT

Max:

I will send fax of transmittal sheet tomorrow. My comments are as follows.

1. Sample No. 1 - USCS classification for Sample No. 1 is incorrect. The visual description is "REDDISH SANDY CLAYEY SAND, SM-SC".
2. Each test report should reference a unique sample number for comparison with other test reports and to assist in the submittal/review process, as was done for Transmittal No. 02377-3.
3. Sample No. 2 - Outflow/Inflow ratios for last 4 readings are as follows: 1.03, 1.03, 1.07, 1.50. ASTM D 5084 requires the test not be terminated until 4 consecutive readings have an outflow to inflow ratio between 0.75 to 1.25, and the hydraulic conductivity remains steady during these readings. Why did outflow/inflow ratio increase drastically for last reading?
4. Sample No. 5 - Outflow/Inflow ratios for last 4 reading are as follows: 1.00, 0.67, 1.00, 0.83. ASTM D 5084 requires outflow/inflow ratio for 4 consecutive readings be 0.75-1.25 and hydraulic conductivity remain stable during these readings prior to terminating test.
5. Sample No. 3 (Existing Berm Material) - USCS classification for Sample No. 3 is incorrect. The visual description is "REDDISH SANDY CLAYEY SAND, SM-SC".
6. Sample No. 1, 2 & 3 (Existing Berm Material) - Are all based on the same Proctor curve submitted as Transmittal No. 02377-3. If all samples are representative of the same material and Proctor curve, the visual description should match on all test reports (hydraulic conductivity, Proctor, Grain-size analysis), and that is not the case.
7. Sample No. 4 & 5 (Bostwick Pit) - Reported hydraulic conductivity ranges from 4.75 to 5.06 x 10⁻⁹ cm/sec. These values would be very difficult to defend for a high-plasticity, nearly pure clay soil. In this case, the samples contain 46% sand with a Liquid Limit of only 27% (Transmittal No. 02377-5). Reported hydraulic conductivity values from these tests are in error and must be re-run.
8. General comment all tests - Back pressure consistently reported as about 45 psi for all hydraulic conductivity tests. The initial (before test) degree of saturation varies from 63% to 82% for all samples, with most values near 63%. Figure 15 (provided separately via fax) shows a required back pressure of about 75 psi for to attain a final degree of saturation of 95% for soil with an initial saturation of 63%. However, all test results show a final degree of saturation of 100%. I question if samples are 100% saturated at the beginning of the test as reported. (Figure 15 reference "ASCE Research Conference on Shear Strength of Cohesive Soils, Univ. of Colorado, June 1960").
9. Please submit digital camera pictures of set-up and testing for next group of samples to be tested for hydraulic conductivity.

Brad Jones, P.E.

U.S. Army Corps of Engineers, Omaha District
Geotechnical Engineering & Sciences Branch
402.221.4488 - telephone
402.221.7848 - facsimile
brad.n.jones@usace.army.mil

CAROLAN FAX (505) 784-2663

SUBMITTAL REVIEW VERIFICATION SHEET

Date: Sept 19, 2003

Submittal No.: 02377-8.1

Foster Wheeler Environmental Corporation Stamp

SWMU 101 Sewage Lagoons Closure, Cannon AFB, NM

Certified for approval as indicated below:

- A - Approved as submitted
- B - Approved except as noted on the drawings and/or attached sheets.

It is hereby certified that the (equipment) (material) shown and marked in this submittal is that proposed to be incorporated into Contract Number DACW45-94-D-0003, Delivery Order No. 35, Work Authorization Directive 1 is in compliance with the contract drawings and specifications, can be installed in the allocated spaces, and is submitted for Government approval.

Reviewed/Certified By:

James Morning
James Morning, QCM

Description of items reviewed: SD-06 Test Reports Borrow Source Assessment 2nd 6500 CY Off site
Re submittal

U.S. Army Corps of Engineers Stamp

U.S. Army Engineer District, Albuquerque Corps of Engineers

Certified for approval as indicated below:

- A - Approved as submitted.
- B - Approved except as noted on the drawings and/or attached sheet(s). Resubmission not required.
- C - Approved except as noted on the drawings and/or attached sheet(s). Resubmission required.
- D - Will be returned by separate correspondence.
- E - Disapproved; see comments on attached sheet.
- F - Receipt acknowledged.
- G - Other: Specify.

Note: Items approved as to general layout only. Dimensions and quantities checked. Approval does not relieve contractor of responsibilities for errors that may exist, as contractor shall be responsible for dimensions and design of adequate corrections. Details and satisfactory construction of work.

Signature: *Brad Jones*

Date: 9-24-03

Reviewer's Signature: *Brad Jones*

PM 9/25/03

Lydick Engineers & Surveyors, Inc.

P. O. Box 728
205 E. 2nd Street
Clovis, NM 88101
505-326-3771

Proctor

Report

Report Date: 13-Aug-03
Project: DACAW45-94-D-0003
Report Number: 4

To: ARROWHEAD CONST.
12920 METCALF AVE. SUITE 150
OVERLAND PARK KS 66213

Copies To: FW/TT
COE
ARROWHEAD

Proj: CLOSURE OF SWMU101 SEWAGE LAGOON @ CANNON AFB

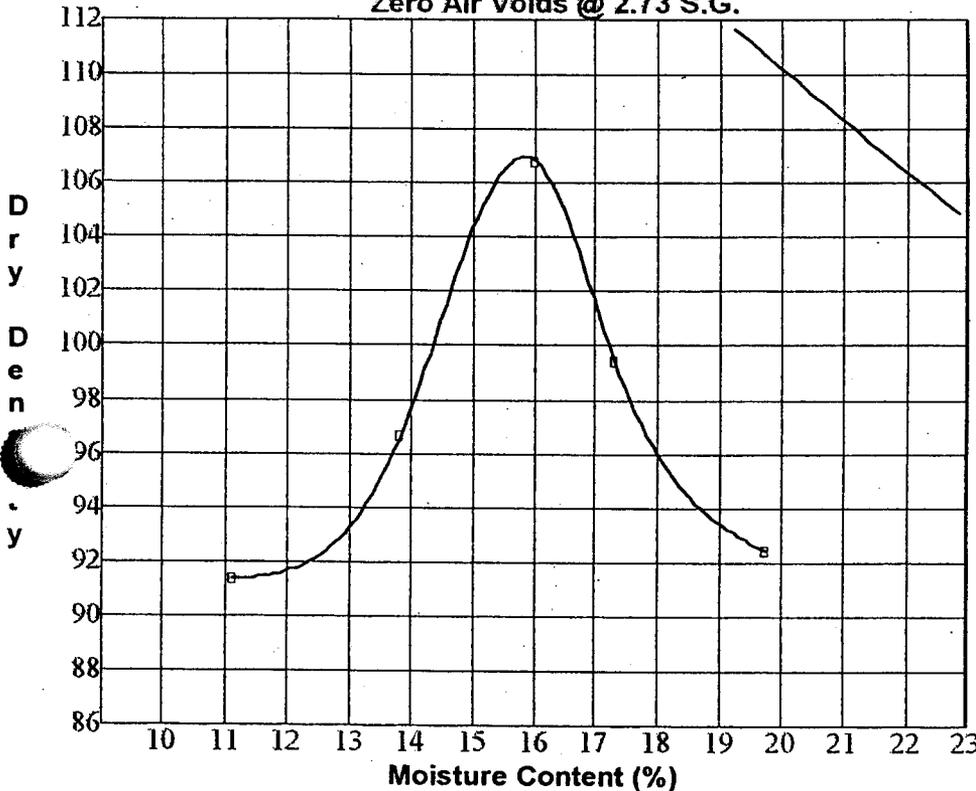
Sample Type: COMPOSITE
Source: BOSTWICK PIT
Tested By: B. HIERONYMUS

Sample Date: 11-Jun-03

Date Tested: 12-Aug-03

Date Received: 11-Jun-03

Zero Air Voids @ 2.73 S.G.



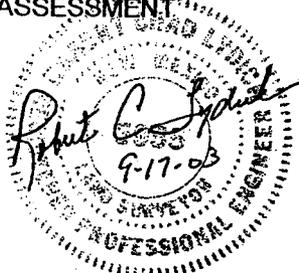
Max. Dry Density: 107.0
Optimum Moisture (%): 15.9

Moisture Content	Dry Density	Wet Density
11.1	91.4	101.5
13.8	96.6	110.0
16.0	106.8	123.9
17.3	99.4	116.7
19.7	92.4	110.6

Method: ASTM D-698
Rammer Type: MANUAL
Preparation: DRY TO WET
% Retained 5mm screen: 0.0
% Retained 10mm screen: 0.0
% Retained 20mm screen: 0.0

Sample Description: BROWN SANDY LEAN CLAY "CL" AS PER USCS FROM BOSTWICK PIT MELROSE, NM

Comment: BORROW PIT ASSESSMENT



Per: Lance E. Long

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on written request.

Lydick Engineers & Surveyors, Inc.

P. O. Box 728
 205 E. 2nd Street
 Clovis, NM 88101
 505-762-3771

Proctor

Report

Report Date: 14-Aug-03
 Project: DACAW45-94-D-0003
 Report Number: 4

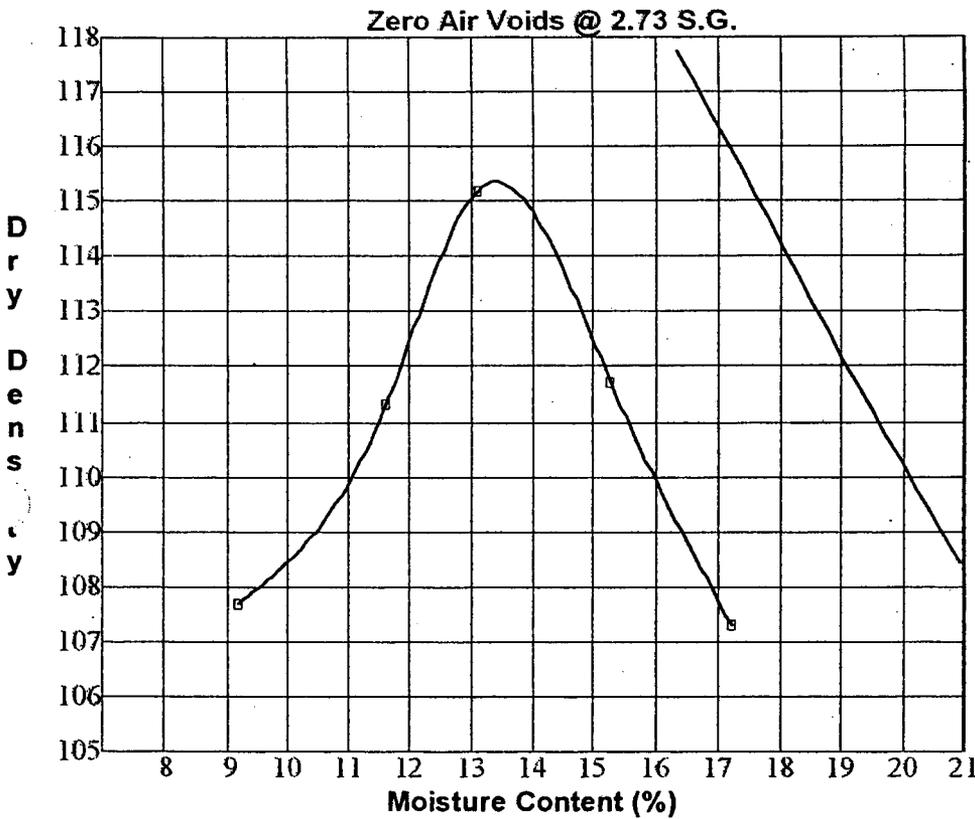
To: ARROWHEAD CONST.
 12920 METCALF AVE. SUITE 150
 OVERLAND PARK KS 66213

Copies To: FW/TT
 COE
 ARROWHEAD

Proj: CLOSURE OF SWMU101 SEWAGE LAGOON @ CANNON AFB

Sample Type: COMPOSITE
 Source: BOSTWICK PIT
 Tested By: R. MICK

Sample Date: 11-Aug-03 Date Tested: 12-Aug-03 Date Received: 11-Aug-03



Max. Dry Density: 115.3
 Optimum Moisture (%): 13.4

Moisture Content	Dry Density	Wet Density
9.2	107.7	117.6
11.6	111.3	124.2
13.1	115.2	130.3
15.3	111.7	128.8
17.2	107.3	125.8

Method: ASTM D-1557
 Rammer Type: MANUAL
 Preparation: DRY TO WET
 % Retained 5mm screen: 0.0
 % Retained 10mm screen: 0.0
 % Retained 20mm screen: 0.0

Sample Description: BROWN SANDY LEAN CLAY "CL" AS PER USCS FROM BOSTWICK PIT MELROSE ,NM

Comment: BORROW PIT ASSESSMENT



Per: *[Signature]*

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on written request.

Lydick Engineers & Surveyors, Inc.

P. O. Box 728
205 E. 2nd Street
Clovis, NM 88101
505-325-3771

To: ARROWHEAD CONST.
12920 METCALF AVE. SUITE 150
OVERLAND PARK KS 66213

Proj: CLOSURE OF SWMU101 SEWAGE LAGOON @ CANNON AFB

Proctor

Report Date: 13-Aug-03
Project: DACAW45-94-D-0003
Report Number: 4

Report

Copies To: FW/TT
COE
ARROWHEAD

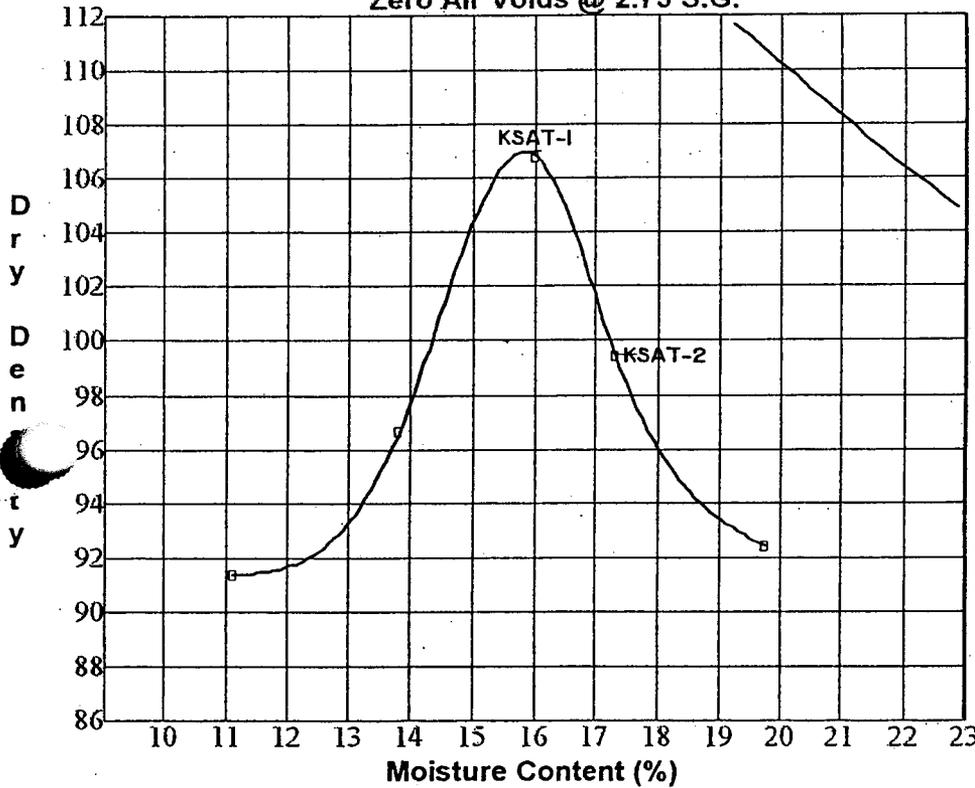
Sample Type: COMPOSITE
Source: BOSTWICK PIT
Tested By: B. HIERONYMUS

Sample Date: 11-Jun-03

Date Tested: 12-Aug-03

Date Received: 11-Jun-03

Zero Air Voids @ 2.73 S.G.



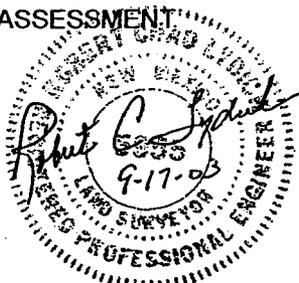
Max. Dry Density: 107.0
Optimum Moisture (%): 15.9

Moisture Content	Dry Density	Wet Density
11.1	91.4	101.5
13.8	96.6	110.0
16.0	106.8	123.9
17.3	99.4	116.7
19.7	92.4	110.6

Method: ASTM D-698
Rammer Type: MANUAL
Preparation: DRY TO WET
% Retained 5mm screen: 0.0
% Retained 10mm screen: 0.0
% Retained 20mm screen: 0.0

Sample Description: BROWN SANDY LEAN CLAY "CL" AS PER USCS FROM BOSTWICK PIT MELROSE, NM

Comment: BORROW PIT ASSESSMENT



Per: *Lance E. Lydick*

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on written request.

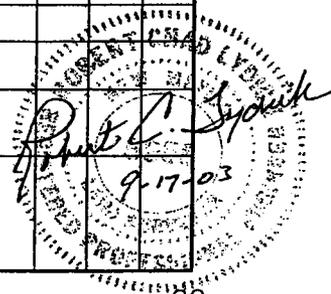
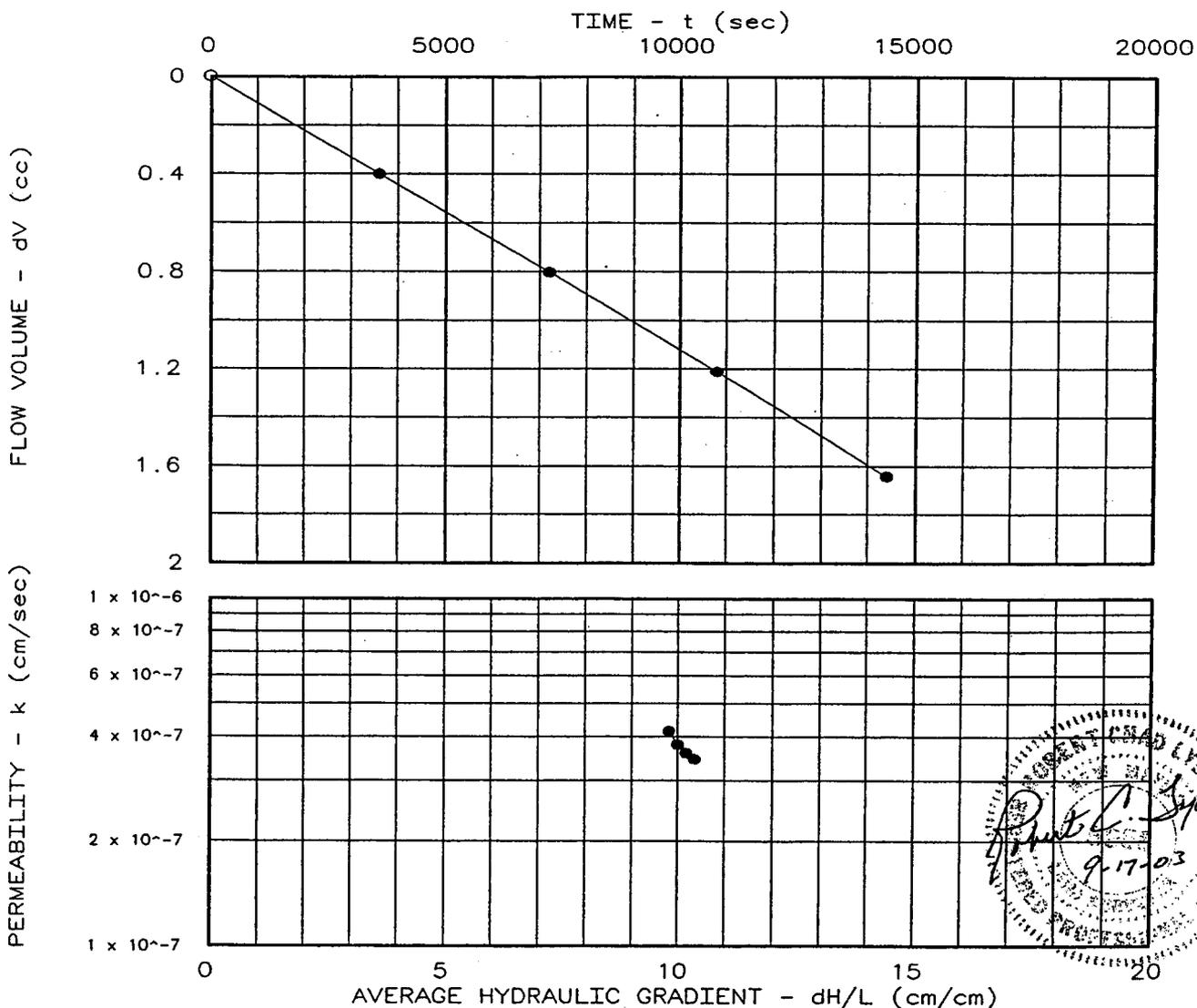
PERMEABILITY TEST REPORT

TEST DATA:

Specimen Height (cm): 11.43
 Specimen Diameter (cm): 6.29
 Dry Unit Weight (pcf): 106.9
 Moisture Before Test (%): 16.0
 Moisture After Test (%): 21.8
 Run Number: 1 ● 2 ▲
 Cell Pressure (psi): 97.0
 Sat. Pressure (psi): 94.5
 Perm. (cm/sec): 3.62×10^{-7}

SAMPLE DATA:

Sample Identification: BORROW FILL MATERIAL
 BOSTWICK PIT MELROSE, NM "ASSESSMENT"
 Visual Description: BROWN SANDY LEAN CLAY
 CLASSIFIED AS "CL" AS PER USCS
 Remarks: ASTM D 5084-01 B=97.3
 5 PSI FOR B Ca₂ REAGENT
 Maximum Dry Density (pcf): 107.0
 Optimum Moisture Content (%): 15.9
 ASTM(D-698)
 Percent Compaction: 100.0%
 Permeometer type: FLEXWALL
 Sample type: REMOLDED



Project: LAGOON CLOSURE SWMU 101 @ CANNON AFB
 Location: WASTE WATER TREATMENT PLANT @ CAFB
 Date: 9-9-03

Project No.: DACW45-03
 File No.: AH-4-3-7
 Lab No.: LE-28B-KSAT-1
 Tested by: L.E.L.
 Checked by: R.C.L.
 Test: FH - Falling head C

PERMEABILITY TEST REPORT
LYDICK ENGINEERS & SURVEYORS, INC.

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FALLING HEAD PERMEABILITY TEST RESULTS

PROJECT NAME: LAGOON CLOSURE SWMU 101 @ CANNON AFB FILE NO.: AH-4-3-7
PROJECT LOCATION: WASTE WATER TREATMENT PLANT @ CAFB PROJECT NO.: DACW45-03
SAMPLE IDENTIFICATION: BORROW FILL MATERIAL LAB NO.: LE-28B-KSAT-1
BOSTWICK PIT MELROSE, NM "ASSESSMENT"
DESCRIPTION: BROWN SANDY LEAN CLAY SAMPLE TYPE: REMOLDED
CLASSIFIED AS "CL" AS PER USCS
AX. DRY DENS.: 107.0 OPT. WATER CONTENT: 15.9 DATE: 9-9-03

SPECIMEN DATA

INITIAL PARAMETERS:

HEIGHT: 11.43 cm
DIAMETER: 6.29 cm
WET WEIGHT: 705.5 g
MOISTURE CONTENT: 16.0 %
DRY DENSITY: 106.9 pcf
PERCENT COMPACTION: 100.0

FINAL PARAMETERS:

HEIGHT: 11.44 cm
DIAMETER: 6.29 cm
WET WEIGHT: 741.5 g
MOISTURE CONTENT: 21.8 %
DRY DENSITY: 106.8 pcf

TEST PARAMETERS

CELL NO.: 2

PANEL NO.: 2

POSITIONS: 2

RUN NO. 1

RUN NO. 2

CELL PRESSURE:

97.0 psi

SATURATION PRESSURE:

94.5 psi

PERMEABILITY DATA

RUN NO. 1

RUN NO. 2

TOTAL FLOW VOLUME:

1.64E 00 cc

LENGTH OF TEST:

14,400 sec

AVERAGE GRADIENT:

9.8

TEMPERATURE:

21.4 deg C

PERMEABILITY, K, at 20 deg C:

3.62E-07 cm/sec

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PERMEABILITY TEST DATA

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PROJECT DATA

oject Name: LAGOON CLOSURE SWMU 101 @ CANNON AFB
 le No.: AH-4-3-7
 oject Location: WASTE WATER TREATMENT PLANT @ CAFB
 oject No.: DACW45-03
 mple Identification: BORROW FILL MATERIAL
 BOSTWICK PIT MELROSE, NM "ASSESSMENT"
 b No.: LE-28B-KSAT-1
 cription: BROWN SANDY LEAN CLAY
 CLASSIFIED AS "CL" AS PER USCS
 mple Type: REMOLDED
 x. Dry Dens.: 107.0
 thod (D1557/D698): D-698
 t. Water Content: 15.9
 te: 9-9-03
 marks: ASTM D 5084-01 B=97.3
 5 PSI FOR B Cal₂ REAGENT
 rmeameter Type: FLEXWALL
 sted by: L.E.L.
 ecked by: R.C.L.
 st type: FH - Falling head C

PERMEABILITY TEST SPECIMEN DATA

	Before test:			After test:		
diameter:	1	2		1	2	
Top:	2.477 in	in		2.477 in	in	
Middle:	2.476 in	in		2.477 in	in	
Bottom:	2.477 in	in		2.478 in	in	
Average:	2.48 in	6.29 cm		2.48 in	6.29 cm	
length:	1	2	3	1	2	3
	4.501 in	in	in	4.506 in	in	in
Average:	4.50 in	11.43 cm		4.51 in	11.44 cm	

Moisture, Density and Sample Parameters:

Specific Gravity:	2.73	
Wet Wt. & Tare:	831.12	867.05
Dry Wt. & Tare:	734.02	734.12
Tare Wt.:	125.58	125.58
Moisture Content:	16.0 %	21.8 %
Dry Unit Weight:	106.9 pcf	100.0 % of max
Porosity:	0.3727	106.8 pcf
Saturation:	73.3 %	0.3736
		100.0 %

FALLING HEAD PERMEABILITY TEST CONDITIONS DATA

Cell No.: 2

Panel No.: 2

Positions: 2

Run Number:

1

2

Cell Pressure:	97.0 psi	0.0 psi
Inflow Saturation Pressure:	94.5 psi	0.0 psi
Inflow Buret Area:	0.2000 cm ²	0.2000 cm ²
Outflow Buret Area:	0.2000 cm ²	0.2000 cm ²
Test Temperature:	21.4 °C	0.0 °C
Outflow Saturation Pressure:	93.5 psi	0.0 psi

PERMEABILITY TEST READINGS DATA

CASE	DATE	TIME	ELAPSED	INFLOW	OUTFLOW	OUTFLOW/	PERM.
D X		(24 hr)	TIME	LEVEL	LEVEL	INFLOW	K
S			sec	cm	cm	RATIO	cm/sec
S X	9/ 9/ 3	14:00:00	0	50.00	0.0	0.00	0.00E 00
	9/ 9/ 3	15:00:00	3,600	48.00	2.0	1.00	3.46E-07
	9/ 9/ 3	16:00:00	3,600	45.99	4.0	1.00	3.59E-07
	9/ 9/ 3	17:00:00	3,600	43.94	6.1	1.00	3.80E-07
	9/ 9/ 3	18:00:00	3,600	41.79	8.2	1.00	4.14E-07

Gradient = 9.805E 00 Total vol = 1.64E 00 cc Test duration = 14,400 sec
 Permeability, K_{21.4°} = 3.749E-07 cm/sec, K_{20°} = 3.625E-07 cm/sec
 Permeability values are incremental

$$c = (a \cdot L) / (2 + A + t)$$

$$1.02266E-05$$

$K_{sat1} = C \cdot \ln[(H_0/H_1)]$	5.37186E-07
$K_{sat2} = C \cdot \ln[(H_1/H_2)]$	5.64137E-07
$K_{sat3} = C \cdot \ln[(H_2/H_3)]$	6.24201E-07
$K_{sat4} = C \cdot \ln[(H_3/H_4)]$	6.57281E-07

$$K_{mean} = (K_{sat1} + K_{sat2} + K_{sat3} + K_{sat4}) / 4$$

$$K_{mean} = 5.95701E-07$$

Percent Deviation - less than 25% deviation from mean value

$$K_1 = \left| \frac{K_{sat1} - K_{mean}}{K_{sat1}} \right|$$

$$K_2 = \left| \frac{K_{sat2} - K_{mean}}{K_{sat2}} \right|$$

$$K_3 = \left| \frac{K_{sat3} - K_{mean}}{K_{sat3}} \right|$$

$$K_4 = \left| \frac{K_{sat4} - K_{mean}}{K_{sat4}} \right|$$

$K_1 =$	10.893%
$K_2 =$	5.595%
$K_3 =$	4.566%
$K_4 =$	9.369%

Temperature Correction

$$K_{20} = [(2.2902 - 0.9842T) / T^{0.1702}] \cdot K_{mean}$$

$$K_{20} = 5.76036E-07$$

Ratio of Inflow/Outflow Rates - Should be between 0.75 and 1.25

$$rate_0 = \frac{(h_{in0} - h_{in1}) \cdot (a/t)}{(h_{out1} - h_{out0}) \cdot (a/t)}$$

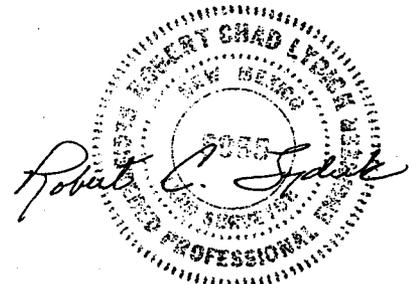
$$rate_1 = \frac{(h_{in1} - h_{in2}) \cdot (a/t)}{(h_{out2} - h_{out1}) \cdot (a/t)}$$

$$rate_2 = \frac{(h_{in2} - h_{in3}) \cdot (a/t)}{(h_{out3} - h_{out2}) \cdot (a/t)}$$

$$rate_3 = \frac{(h_{in3} - h_{in4}) \cdot (a/t)}{(h_{out4} - h_{out3}) \cdot (a/t)}$$

rate ₀ =	1.000
rate ₁ =	1.023
rate ₂ =	0.988
rate ₃ =	0.997

TESTED BY:



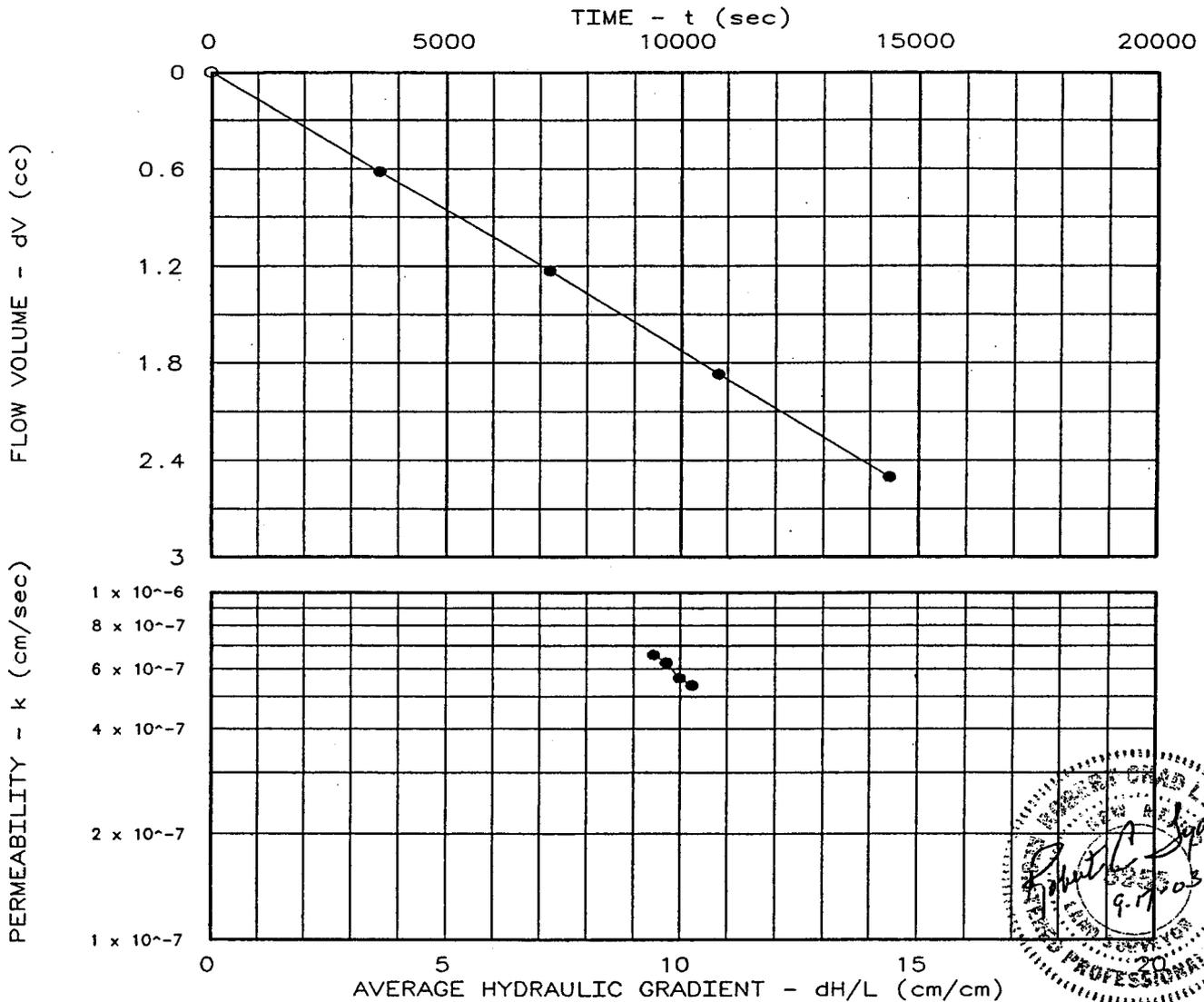
PERMEABILITY TEST REPORT

TEST DATA:

Specimen Height (cm): 11.44
 Specimen Diameter (cm): 6.29
 Dry Unit Weight (pcf): 99.4
 Moisture Before Test (%): 17.3
 Moisture After Test (%): 26.2
 Run Number: 1 • 2 ▲
 Cell Pressure (psi): 99.0
 Sat. Pressure (psi): 97.0
 Perm. (cm/sec): 5.77×10^{-7}

SAMPLE DATA:

Sample Identification: BORROW FILL MATERIAL
 BOSTWICK PIT MELROSE, NM "ASSESSMENT"
 Visual Description: BROWN SANDY LEAN CLAY
 CLASSIFIED AS "CL" AS PER USCS
 Remarks: ASTM D 5084-01 B=97.9
 5 PSI FOR B Cal₂ REAGENT
 Maximum Dry Density (pcf): 107.0
 Optimum Moisture Content (%): 15.9
 ASTM(D-698)
 Percent Compaction: 93.0%
 Permeameter type: FLEXWALL
 Sample type: REMOLDED



Project: LAGOON CLOSURE SWMU 101 @ CANNON AFB
 Location: WASTE WATER TREATMENT PLANT CAFB
 Date: 9-9-03

Project No.: DACW45-03
 File No.: AH-4-03-6
 Lab No.: LE-28B KSAT-2
 Tested by: L.E.L.
 Checked by: R.C.L.
 Test: FH - Falling head C

PERMEABILITY TEST REPORT
LYDICK ENGINEERS & SURVEYORS, INC.

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FALLING HEAD PERMEABILITY TEST RESULTS

PROJECT NAME: LAGOON CLOSURE SWMU 101 @ CANNON AFB FILE NO.: AH-4-03-6
PROJECT LOCATION: WASTE WATER TREATMENT PLANT CAFB PROJECT NO.: DACW45-03
SAMPLE IDENTIFICATION: BORROW FILL MATERIAL LAB NO.: LE-28B KSAT-2
BOSTWICK PIT MELROSE, NM "ASSESSMENT"
DESCRIPTION: BROWN SANDY LEAN CLAY SAMPLE TYPE: REMOLDED
CLASSIFIED AS "CL" AS PER USCS
MAX. DRY DENS.: 107.0 OPT. WATER CONTENT: 15.9 DATE: 9-9-03

SPECIMEN DATA

INITIAL PARAMETERS:	FINAL PARAMETERS:
HEIGHT: 11.44 cm	HEIGHT: 11.45 cm
DIAMETER: 6.29 cm	DIAMETER: 6.29 cm
WET WEIGHT: 663.3 g	WET WEIGHT: 714.8 g
MOISTURE CONTENT: 17.3 %	MOISTURE CONTENT: 26.2 %
DRY DENSITY: 99.4 pcf	DRY DENSITY: 99.4 pcf
PERCENT COMPACTION: 93.0	

TEST PARAMETERS

CELL NO.: 1	PANEL NO.: 1	POSITIONS: 1
	RUN NO. 1	RUN NO. 2
CELL PRESSURE:	99.0 psi	
SATURATION PRESSURE:	97.0 psi	

PERMEABILITY DATA

	RUN NO. 1	RUN NO. 2
TOTAL FLOW VOLUME:	2.50E 00 cc	
LENGTH OF TEST:	14,400 sec	
AVERAGE GRADIENT:	9.4	
TEMPERATURE:	21.4 deg C	
PERMEABILITY, K, at 20 deg C:	5.77E-07 cm/sec	

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PERMEABILITY TEST DATA

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PROJECT DATA

oject Name: LAGOON CLOSURE SWMU 101 @ CANNON AFB
 le No.: AH-4-03-6
 oject Location: WASTE WATER TREATMENT PLANT CAFB
 oject No.: DACW45-03
 mple Identification: BORROW FILL MATERIAL
 BOSTWICK PIT MELROSE, NM "ASSESSMENT"
 b No.: LE-28B KSAT-2
 scription: BROWN SANDY LEAN CLAY
 CLASSIFIED AS "CL" AS PER USCS
 mple Type: REMOLDED
 x. Dry Dens.: 107.0
 thod (D1557/D698): D-698
 t. Water Content: 15.9
 te: 9-9-03
 marks: ASTM D 5084-01 B=97.9
 5 PSI FOR B Cal₂ REAGENT
 rmeameter Type: FLEXWALL
 sted by: L.E.L.
 ecked by: R.C.L.
 st type: FH - Falling head C

PERMEABILITY TEST SPECIMEN DATA

	Before test:			After test:		
Diameter:	1	2		1	2	
Top:	2.475 in	in		2.477 in	in	
Middle:	2.474 in	in		2.476 in	in	
Bottom:	2.476 in	in		2.477 in	in	
Average:	2.47 in	6.29 cm		2.48 in	6.29 cm	
Length:	1	2	3	1	2	3
	4.503 in	in	in	4.508 in	in	in
Average:	4.50 in	11.44 cm		4.51 in	11.45 cm	

Moisture, Density and Sample Parameters:

Specific Gravity:	2.73	
Wet Wt. & Tare:	789.01	840.49
Dry Wt. & Tare:	691.10	692.12
Tare Wt.:	125.70	125.70
Moisture Content:	17.3 %	26.2 %
Dry Unit Weight:	99.4 pcf	93.0 % of max
Porosity:	0.4165	0.4169
Saturation:	66.2 %	100.0 %

FALLING HEAD PERMEABILITY TEST CONDITIONS DATA

Cell No.: 1

Panel No.: 1

Positions: 1

Run Number:

1

2

Cell Pressure:	99.0 psi	0.0 psi
Inflow Saturation Pressure:	97.0 psi	0.0 psi
Inflow Buret Area:	0.2000 cm ²	0.2000 cm ²
Outflow Buret Area:	0.2000 cm ²	0.2000 cm ²
Test Temperature:	21.4 °C	0.0 °C
Outflow Saturation Pressure:	96.0 psi	0.0 psi

PERMEABILITY TEST READINGS DATA

CASE	DATE	TIME	ELAPSED	INFLOW	OUTFLOW	OUTFLOW/	PERM.
D X		(24 hr)	TIME	LEVEL	LEVEL	INFLOW	K
S			sec	cm	cm	RATIO	cm/sec
S X	9/ 9/ 3	8:00:00	0	50.00	0.0	0.00	0.00E 00
	9/ 9/ 3	9:00:00	3,600	46.92	3.1	1.00	5.38E-07
	9/ 9/ 3	10:00:00	3,600	43.82	6.1	0.96	5.65E-07
	9/ 9/ 3	11:00:00	3,600	40.64	9.3	1.01	6.25E-07
	9/ 9/ 3	12:00:00	3,600	37.48	12.5	1.00	6.58E-07

Gradient = 9.425E 00 Total vol = 2.50E 00 cc Test duration = 14,400 sec
 Permeability, K_{21.4°} = 5.968E-07 cm/sec, K_{20°} = 5.770E-07 cm/sec
 Permeability values are incremental

$$c = (a \cdot L) / (2 + A + t)$$

1.02177E-05

$K_{sat1} = c \cdot \ln[(H_0/H_1)]$	3.45291E-07
$K_{sat2} = c \cdot \ln[(H_1/H_2)]$	3.59188E-07
$K_{sat3} = c \cdot \ln[(H_2/H_3)]$	3.79824E-07
$K_{sat4} = c \cdot \ln[(H_3/H_4)]$	4.14129E-07

$$K_{mean} = (K_{sat1} + K_{sat2} + K_{sat3} + K_{sat4}) / 4$$

$$K_{mean} = 3.74608E-07$$

Percent Deviation - less than 25% deviation from mean value

$$d_1 = |(K_{sat1} - K_{mean}) / K_{sat1}|$$

$$d_2 = |(K_{sat2} - K_{mean}) / K_{sat2}|$$

$$d_3 = |(K_{sat3} - K_{mean}) / K_{sat3}|$$

$$d_4 = |(K_{sat4} - K_{mean}) / K_{sat4}|$$

$K_1 =$	8.490%
$K_2 =$	4.293%
$K_3 =$	1.373%
$K_4 =$	9.543%

Temperature Correction

$$K_{20} = [(2.2902 \cdot 0.9842T) / T^{0.1702}] \cdot K_{mean}$$

$$K_{20} = 3.62241E-07$$

Ratio of Inflow/Outflow Rates - Should be between 0.75 and 1.25

$$rate_0 = [(h_{in0} - h_{in1}) \cdot (a/t)] / [(h_{out1} - h_{out0}) \cdot (a/t)]$$

$$rate_1 = [(h_{in1} - h_{in2}) \cdot (a/t)] / [(h_{out2} - h_{out1}) \cdot (a/t)]$$

$$rate_2 = [(h_{in2} - h_{in3}) \cdot (a/t)] / [(h_{out3} - h_{out2}) \cdot (a/t)]$$

$$rate_3 = [(h_{in3} - h_{in4}) \cdot (a/t)] / [(h_{out4} - h_{out3}) \cdot (a/t)]$$

rate ₀ =	1.000
rate ₁ =	1.000
rate ₂ =	1.000
rate ₃ =	1.000

TESTED BY:



ROBERT L. LYDICK
PROFESSIONAL ENGINEER AND
LAND SURVEYOR



ROBERT CHAD LYDICK
PROFESSIONAL ENGINEER AND
LAND SURVEYOR
ASTM D 2216-01

CLOVIS, NEW MEXICO 88101

PROJECT: LAGOON CLOSURE SWMU-101 DATE: 6-11-03

CONTRACTOR: ARROWHEAD TESTED BY: L. LANGAN

SAMPLE NO. 1
WT. WET/CAN 933.4
WT. DRY/CAN 870.4
WT. CAN E) 422.1
WT. WATER 63.9
WT. DRY 448.3
W.C. % 14.190

SAMPLE NO. _____
WT. WET/CAN _____
WT. DRY/CAN _____
WT. CAN _____
WT. WATER _____
WT. DRY _____
W.C. % _____

SAMPLE NO. _____
WT. WET/CAN _____
WT. DRY/CAN _____
WT. CAN _____
WT. WATER _____
WT. DRY _____
W.C. % _____

SAMPLE NO. _____
WT. WET/CAN _____
WT. DRY/CAN _____
WT. CAN _____
~~WT. WATER~~ _____
WT. DRY _____
W.C. % _____

SAMPLE NO. _____
WT. WET/CAN _____
WT. DRY/CAN _____
WT. CAN _____
WT. WATER _____
WT. DRY _____
W.C. % _____

SAMPLE NO. _____
WT. WET/CAN _____
WT. DRY/CAN _____
WT. CAN _____
WT. WATER _____
WT. DRY _____
W.C. % _____

SAMPLE NO. _____
WT. WET/CAN _____
WT. DRY/CAN _____
WT. CAN _____
WT. WATER _____
WT. DRY _____
W.C. % _____

SAMPLE NO. _____
WT. WET/CAN _____
WT. DRY/CAN _____
WT. CAN _____
WT. WATER _____
WT. DRY _____
W.C. % _____

Bostwick Pit Melrose, NM Brown Sandy Lean "CL"

ROBERT L. LYDICK
PROFESSIONAL ENGINEER AND
LAND SURVEYOR



ROBERT CHAD LYDICK
PROFESSIONAL ENGINEER AND
LAND SURVEYOR
ASTM D 2216-01

CLOVIS, NEW MEXICO 88101

PROJECT: LAGOON CLOSURE SWMU 101 DATE: 6-13-03

CONTRACTOR: ARROWHEAD TESTED BY: L. LANGAN

SAMPLE NO. 1
WT. WET/CAN 941.6
WT. DRY/CAN 869.6
WT. CAN 430.6
WT. WATER 72.0
WT. DRY 439.0
W.C. % 16.4%

SAMPLE NO. _____
WT. WET/CAN _____
WT. DRY/CAN _____
WT. CAN _____
WT. WATER _____
WT. DRY _____
W.C. % _____

SAMPLE NO. _____
WT. WET/CAN _____
WT. DRY/CAN _____
WT. CAN _____
WT. WATER _____
WT. DRY _____
W.C. % _____

SAMPLE NO. _____
WT. WET/CAN _____
WT. DRY/CAN _____
WT. CAN _____
WT. WATER _____
WT. DRY _____
W.C. % _____

SAMPLE NO. _____
WT. WET/CAN _____
WT. DRY/CAN _____
WT. CAN _____
WT. WATER _____
WT. DRY _____
W.C. % _____

SAMPLE NO. _____
WT. WET/CAN _____
WT. DRY/CAN _____
WT. CAN _____
WT. WATER _____
WT. DRY _____
W.C. % _____

SAMPLE NO. _____
WT. WET/CAN _____
WT. DRY/CAN _____
WT. CAN _____
WT. WATER _____
WT. DRY _____
W.C. % _____

SAMPLE NO. _____
WT. WET/CAN _____
WT. DRY/CAN _____
WT. CAN _____
WT. WATER _____
WT. DRY _____
W.C. % _____

Bostwick Pit Melrose, NM. Brown Sandy Lean "CL"

ROBERT L. LYDICK
PROFESSIONAL ENGINEER AND
LAND SURVEYOR



ROBERT CHAD LYDICK
PROFESSIONAL ENGINEER AND
LAND SURVEYOR
ASTM D 2216-01

CLOVIS, NEW MEXICO 88101

PROJECT: LAGOON CLOSURE SWMU 101 DATE: 6-16-03

CONTRACTOR: ARROWHEAD TESTED BY: L. LANGAN

SAMPLE NO. 1
WT. WET/CAN 922.5
WT. DRY/CAN 845.5
WT. CAN 421.7
WT. WATER 77.0
WT. DRY 423.8
W.C. % 18.2

SAMPLE NO. _____
WT. WET/CAN _____
WT. DRY/CAN _____
WT. CAN _____
WT. WATER _____
WT. DRY _____
W.C. % _____

SAMPLE NO. _____
WT. WET/CAN _____
WT. DRY/CAN _____
WT. CAN _____
WT. WATER _____
WT. DRY _____
W.C. % _____

SAMPLE NO. _____
WT. WET/CAN _____
WT. DRY/CAN _____
WT. CAN _____
WT. WATER _____
WT. DRY _____
W.C. % _____

SAMPLE NO. _____
WT. WET/CAN _____
WT. DRY/CAN _____
WT. CAN _____
WT. WATER _____
WT. DRY _____
W.C. % _____

SAMPLE NO. _____
WT. WET/CAN _____
WT. DRY/CAN _____
WT. CAN _____
WT. WATER _____
WT. DRY _____
W.C. % _____

SAMPLE NO. _____
WT. WET/CAN _____
WT. DRY/CAN _____
WT. CAN _____
WT. WATER _____
WT. DRY _____
W.C. % _____

SAMPLE NO. _____
WT. WET/CAN _____
WT. DRY/CAN _____
WT. CAN _____
WT. WATER _____
WT. DRY _____
W.C. % _____

Bostwick Pit Melrose, NM Brown Sandy Lean "CL"

08/05/2003 08:49 402+221+7848 → 85057842663 NO. 788 D01

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE <small>(Read Instructions on the reverse side prior to Initiating this form)</small>	DATE 07/30/2003	TRANSMITTAL NO. 02377-9
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SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS (This section will be initiated by the contractor)

TO: Cannon AFB Resident Office US Army Corps of Engineers 201 N. Perimeter Rd. Cannon AFB, NM 88103	FROM: Foster Wheeler Environmental C 6605 Uptown Blvd, NE Suite 220 Albuquerque, NM 87110	CONTRACT NO. DACW45-94-D-0003 0035
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SPECIFICATION SEC. NO. (Cover only one section with each transmittal) 02377	PROJECT TITLE AND LOCATION SWMU 101 - Sewage Lagoons Cannon AFB	CHECK ONE: THIS TRANSMITTAL IS FOR <input type="checkbox"/> FIC <input checked="" type="checkbox"/> GOVT. APPROVAL
--	--	---

ITEM NO.	DESCRIPTION OF ITEM SUBMITTED <small>(Type size, model number/etc.)</small>	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. <small>(See instruction no. 8)</small>	NO. OF COPIES	CONTRACT REFERENCE DOCUMENT		FOR CONTRACTOR USE CODE	VARIATION <small>(See instruction No. 6)</small>	FOR CE USE CODE
				SPEC. PARA. NO.	DRAWING SHEET NO.			
8	Assessment Tests - Gr Size, P,LL,Proc	TEST REPORTS	3	3.1		A		B

REMARKS
Berm Material- First Lift
ASTM D-422's
ASTM D 698's

MANY GRAIN-SIZE CURVES SHOW HIGHER % PASSING 0.075 mm SIEVE THAN #200 SIEVE, WHICH IS NOT POSSIBLE. THIS MAY BE DUE TO SLIGHT INCONSISTENCY BETWEEN HYDROMETER & SIEVES

I certify that the above submitted items have been reviewed in detail and are correct and in the strict conformance with the contract drawings and specifications except as otherwise stated.

James Morning
NAME AND SIGNATURE OF CONTRACTOR

SECTION II - APPROVAL ACTION

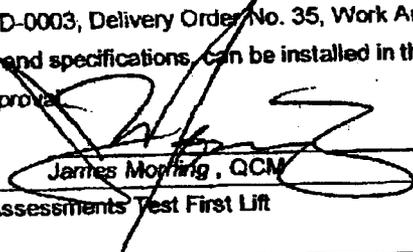
ENCLOSURES RETURNED (List by item No.)	NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY <i>M. J. O. Perito</i>	DATE 8-5-03
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SUBMITTAL REVIEW VERIFICATION SHEET

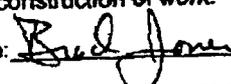
Date: July 30, 2003

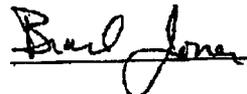
Submittal No.: 02377-9

Foster Wheeler Environmental Corporation Stamp

SWMU 101 Sewage Lagoons Closure, Cannon AFB, NM	
Certified for approval as indicated below:	
A -	Approved as submitted
B -	Approved except as noted on the drawings and/or attached sheets.
It is hereby certified that the (equipment) (material) shown and marked in this submittal is that proposed to be incorporated into Contract Number DACW45-94-D-0003, Delivery Order No. 35, Work Authorization Directive 1 is in compliance with the contract drawings and specifications, can be installed in the allocated spaces, and is submitted for Government approval.	
Reviewed/Certified By:	 James Morning, QCM
Description of items reviewed: SD-06 Test Reports-Assessments Test First Lift Item 8	

U.S. Army Corps of Engineers Stamp

U.S. Army Engineer District, Albuquerque Corps of Engineers	
Certified for approval as indicated below:	
A -	Approved as submitted.
<input checked="" type="radio"/> B -	Approved except as noted on the drawings and/or attached sheet(s). Resubmission not required.
C -	Approved except as noted on the drawings and/or attached sheet(s). Resubmission required.
D -	Will be returned by separate correspondence.
E -	Disapproved; see comments on attached sheet.
F -	Receipt acknowledged.
G -	Other: Specify.
Note:	Items approved as to general layout only. Dimensions and quantities checked. Approval does not relieve contractor of responsibilities for errors that may exist, as contractor shall be responsible for dimensions and design of adequate corrections. Details and satisfactory construction of work.
Signature: 	Date: 8-5-03

Reviewer's Signature: 

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE		DATE 08/07/2003	TRANSMITTAL NO. 02377-9
PROJECT TITLE SWMU 101 - Sewage Lagoons	CONTRACT NO. DACW45-94-D-0003 0035		PAGE 1 of 1
LOCATION Cannon AFB			

Item	Description	Value	Code
8	Assessment Tests - Gr Size, PI,LL,P	No	B

SECTION III - GOVERNMENT REVIEW REMARKS

Code B Remarks:
 Many grain size curves show higher % passing 0.035mm sieve than #200 sieve, which may be due to slight inconsistency between hydrometer [results] and sieve. [Please investigate for future tests].

**SWMU 101
Sewage Lagoons Closure Project
CAFB NM**

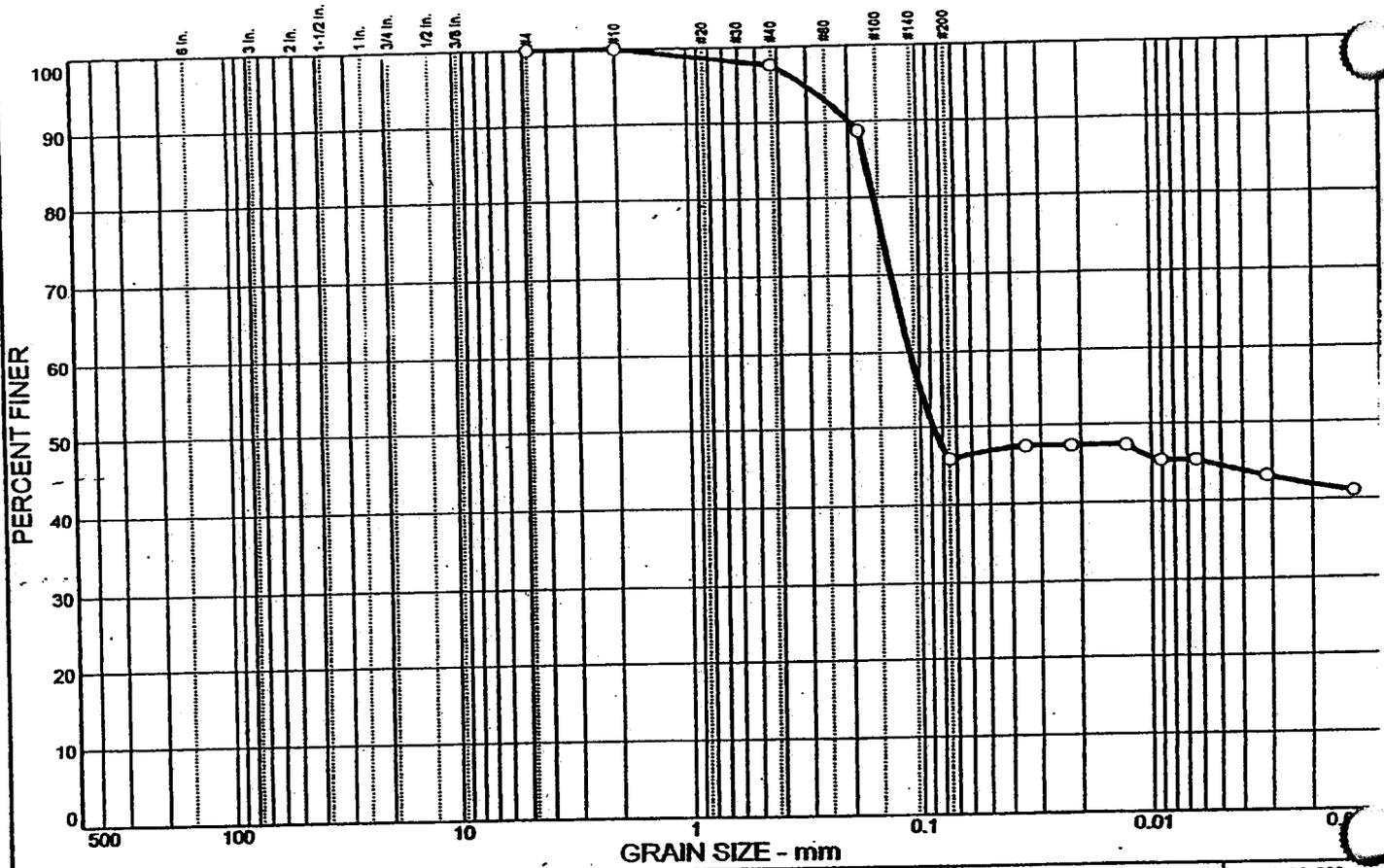
**Submittal of 02377-Item 8
Assessment Test
Soil Barrier Placement
Berm Material First Lift**

Contents

Test

- | | | |
|---------------------------------|-----------------------------------|---------------|
| 1. ASTM D-422 | 8 test from 5/31 thru 6-14 | |
| 3 pages each report | | |
| 3.4 1/1500 CY required | | |
| 2. ASTM D 698-01 | dated 5-29-03 | 1 page |
| 3.4.2 1/5000 CY required | 6-3-03 | 1 page |
| | 6-7-03 | 1 page |
| 3. Lydick Letter | Soil Classification | 1 page |

ASTM D 422-98 Particle Size Analysis Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	54.2	1.3	44.5

SIEVE SIZE	PERCENT FINER	SPEC. PERCENT	PASS? (X=NO)
#4	100.0		
#10	100.0		
#40	97.7		
#80	88.7		
#200	45.8		

Soil Description

Atterberg Limits
 PL = 17 LL = 23 PI = 6

Coefficients
 D₈₅ = 0.170 D₆₀ = 0.111 D₅₀ = 0.0876
 D₃₀ = D₁₅ = D₁₀ =
 C_u = C_c =

Classification
 USCS = SM-SC AASHTO =

Remarks

SAMPLE TAKEN FROM IN-PLACE MATERIAL

(no specification provided)

Sample No.: 1
 Location: EXISTING BERM

Source of Sample:

Date: 5-31-03
 Elev./Depth: 1st LIFT

LYDICK ENGINEERS & SURVEYORS, INC.	Client: ARROWHEAD CONSTRUCTION Project: SWMU 101 LAGOON CLOSURE Project No: DACW 94-45-0003
Figure	

Fractional Components

Gravel/Sand based on #4

Sand/Fines based on #200

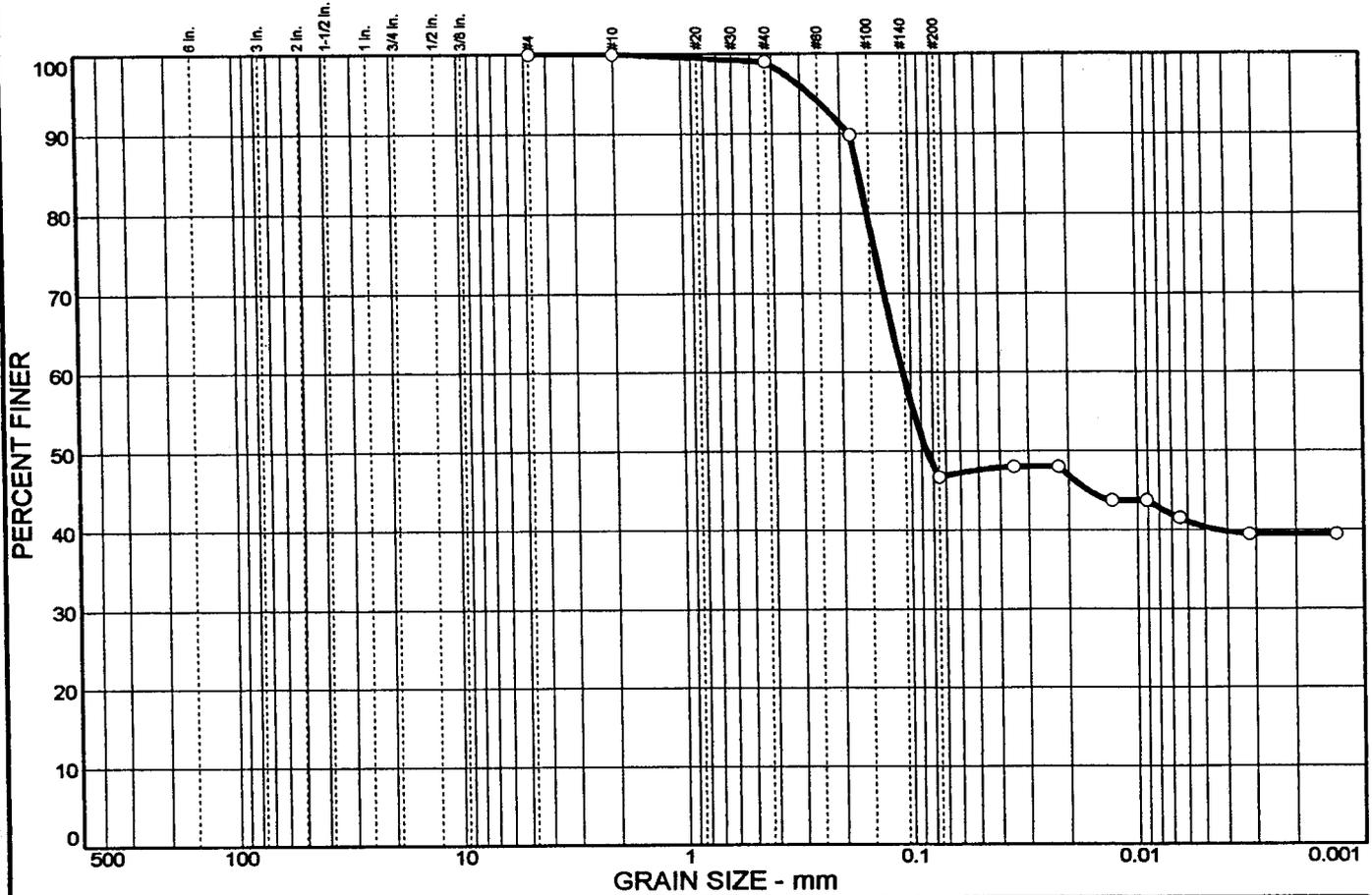
% COBBLES = % GRAVEL =

% SAND = 54.2

% SILT = 1.3 % CLAY = 44.5

D85= 0.17 D60= 0.11 D50= 0.09

PARTICLE SIZE ANALYSIS AS PER ASTM D 422-98



Fractional Components

1/Sand based on #4

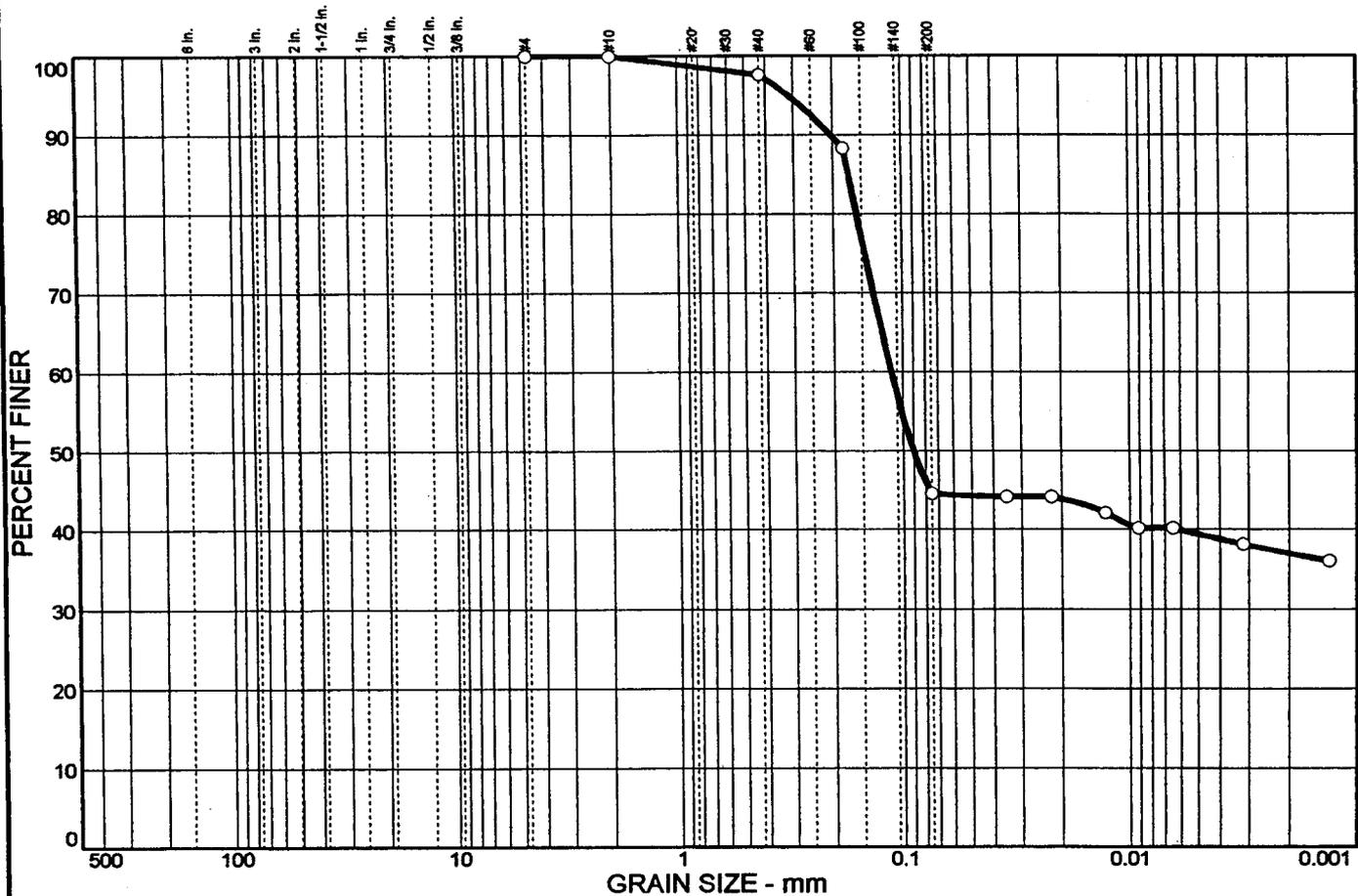
d/Fines based on #200

% COBBLES = % GRAVEL = % SAND = 49.8

% SILT = 9.9 % CLAY = 40.3

D85= 0.16 D60= 0.10 D50= 0.07

PARTICLE SIZE ANALYSIS AS PER ASTM D 422-98



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	55.5	5.1	39.4

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	100.0		
#40	97.6		
#80	88.3		
#200	44.5		

Soil Description

REDDISH CLAYEY SAND

Atterberg Limits

PL= 19 LL= 23 PI= 4

Coefficients

D₈₅= 0.171 D₆₀= 0.112 D₅₀= 0.0899
D₃₀= D₁₅= D₁₀=
C_u= C_c=

Classification

USCS= SM-SC AASHTO=

Remarks

SAMPLED FROM IN PLACE MATERIAL

* (no specification provided)

Sample No.: 3 Source of Sample: Date: 6-4-03
Location: BERM 6-4-03 Elev./Depth: 0' TO 5'

LYDICK ENGINEERS & SURVEYORS, INC.	Client: ARROW HEAD CONST Project: SWMU101 LAGOON CLOSURE @ CANNON A.F.B. CLOVIS, NM Project No: DACW45-94-D-003
Figure	

GRAIN SIZE DISTRIBUTION TEST DATA

Client: ARROW HEAD CONST
 Project: SWMU101 LAGOON CLOSURE @ CANNON A.F.B. CLOVIS, NM
 Project Number: DACW45-94-D--003

Sample Data

Source:
 Sample No.: 3
 Elev. or Depth: 0' TO 5' Sample Length(in./cm.):
 Location: BERM 6-4-03
 Description: REDDISH CLAYEY SAND
 Date: 6-4-03 PL: 19 LL: 23 PI: 4
 USCS Classification: SM-SC AASHTO Classification:
 Testing Remarks: SAMPLED FROM IN PLACE MATERIAL

Mechanical Analysis Data

Sieve	Size, mm	Percent finer
# 4	4.750	100.0
# 10	2.000	100.0
# 40	0.425	97.6
# 80	0.180	88.3
# 200	0.075	44.5

Hydrometer Analysis Data

Retention sieve is #10
 Percent -#10 based upon complete sample= 100.0
 Weight of hydrometer sample: 50.00
 Hygroscopic moisture correction:
 Moist weight & tare = 36.33
 Dry weight & tare = 36.11
 Tare = 21.24
 Hygroscopic moisture= 1.5 %
 Calculated biased weight= 49.27
 Automatic temperature correction
 Composite correction at 20 deg C = 5.0

 Meniscus correction only= 0
 Specific gravity of solids= 2.70
 Specific gravity correction factor= 0.989
 Hydrometer type: 152H
 Effective depth L= 16.294964 - 0.164 x Rm

Elapsed time, min	Temp, deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
2.00	20.0	17.0	22.0	0.0134	17.0	13.5	0.0349	44.1
5.00	20.0	17.0	22.0	0.0134	17.0	13.5	0.0221	44.1
15.00	20.0	16.0	21.0	0.0134	16.0	13.7	0.0128	42.1
30.00	20.0	15.0	20.0	0.0134	15.0	13.8	0.0091	40.1
60.00	20.0	15.0	20.0	0.0134	15.0	13.8	0.0065	40.1
150.00	20.0	14.0	19.0	0.0134	14.0	14.0	0.0032	38.1
140.00	20.0	13.0	18.0	0.0134	13.0	14.2	0.0013	36.0

Fractional Components

Gravel/Sand based on #4

nd/Fines based on #200

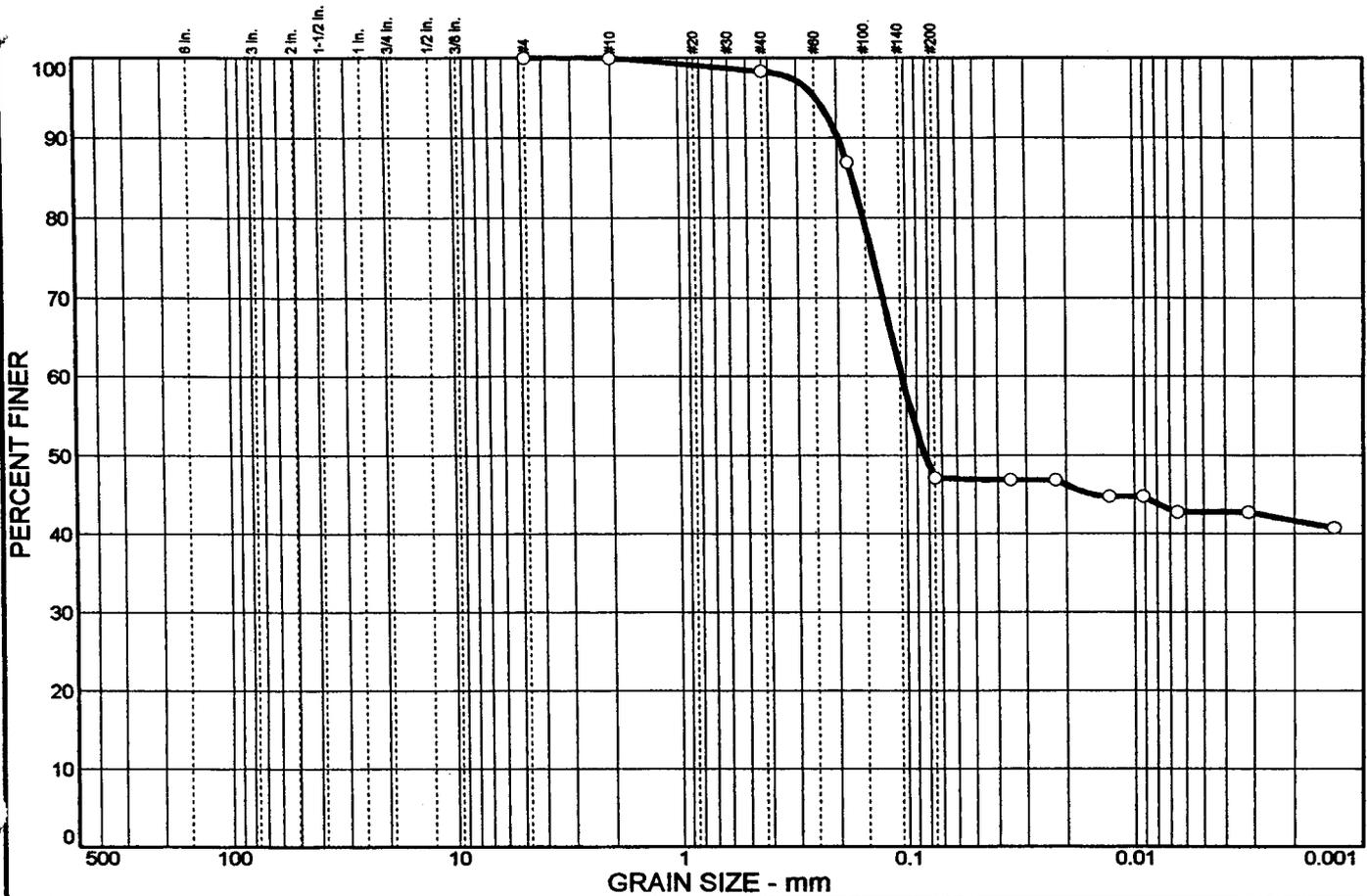
% COBBLES = % GRAVEL =

% SAND = 55.5

% SILT = 5.1 % CLAY = 39.4

D85= 0.17 D60= 0.11 D50= 0.09

PARTICLE SIZE ANALYSIS AS PER ASTM D 422-98



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	52.9	4.4	42.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	100.0		
#40	98.3		
#80	86.9		
#200	47.1		

Soil Description

REDDISH CLAYEY SAND

Atterberg Limits

PL= 17 LL= 24 PI= 7

Coefficients

D₈₅= 0.172 D₆₀= 0.104 D₅₀= 0.0826
D₃₀= D₁₅= D₁₀=
C_u= C_c=

Classification

USCS= SM-SC AASHTO=

Remarks

SAMPLED FROM IN-PLACE MATERIAL

* (no specification provided)

Sample No.: 4 **Source of Sample:**
Location: IN-PLACE BERM MATERIAL 1 6-7-03

Date: 6-7-03
Elev./Depth: FIRST LIFT

LYDICK ENGINEERS & SURVEYORS, INC.	Client: ARROW HEAD CONST Project: SWMU101 LAGOON CLOSURE @ CANNON A.F.B. CLOVIS, NM Project No: DACW45-94-D-003
---	--

Figure

4-1

GRAIN SIZE DISTRIBUTION TEST DATA

Client: ARROW HEAD CONST
 Project: SWMU101 LAGOON CLOSURE @ CANNON A.F.B. CLOVIS, NM
 Project Number: DACW45-94-D--003

Sample Data

Source:
 Sample No.: 4
 Elev. or Depth: FIRST LIFT Sample Length(in./cm.):
 Location: IN-PLACE BERM MATERIAL 1 6-7-03
 Description: REDDISH CLAYEY SAND
 Date: 6-7-03 PL: 17 LL: 24 PI: 7
 USCS Classification: SM-SC AASHTO Classification:
 Testing Remarks: SAMPLED FROM IN-PLACE MATERIAL

Mechanical Analysis Data

Sieve	Size, mm	Percent finer
# 4	4.750	100.0
# 10	2.000	100.0
# 40	0.425	98.3
# 80	0.180	86.9
# 200	0.075	47.1

Hydrometer Analysis Data

Separation sieve is #10
 Percent -#10 based upon complete sample= 100.0
 Weight of hydrometer sample: 50.0
 Hygroscopic moisture correction:
 Moist weight & tare = 35.37
 Dry weight & tare = 35.14
 Tare = 21.13
 Hygroscopic moisture= 1.6 %
 Calculated biased weight= 49.19
 Automatic temperature correction
 Composite correction at 20 deg C = 5.0

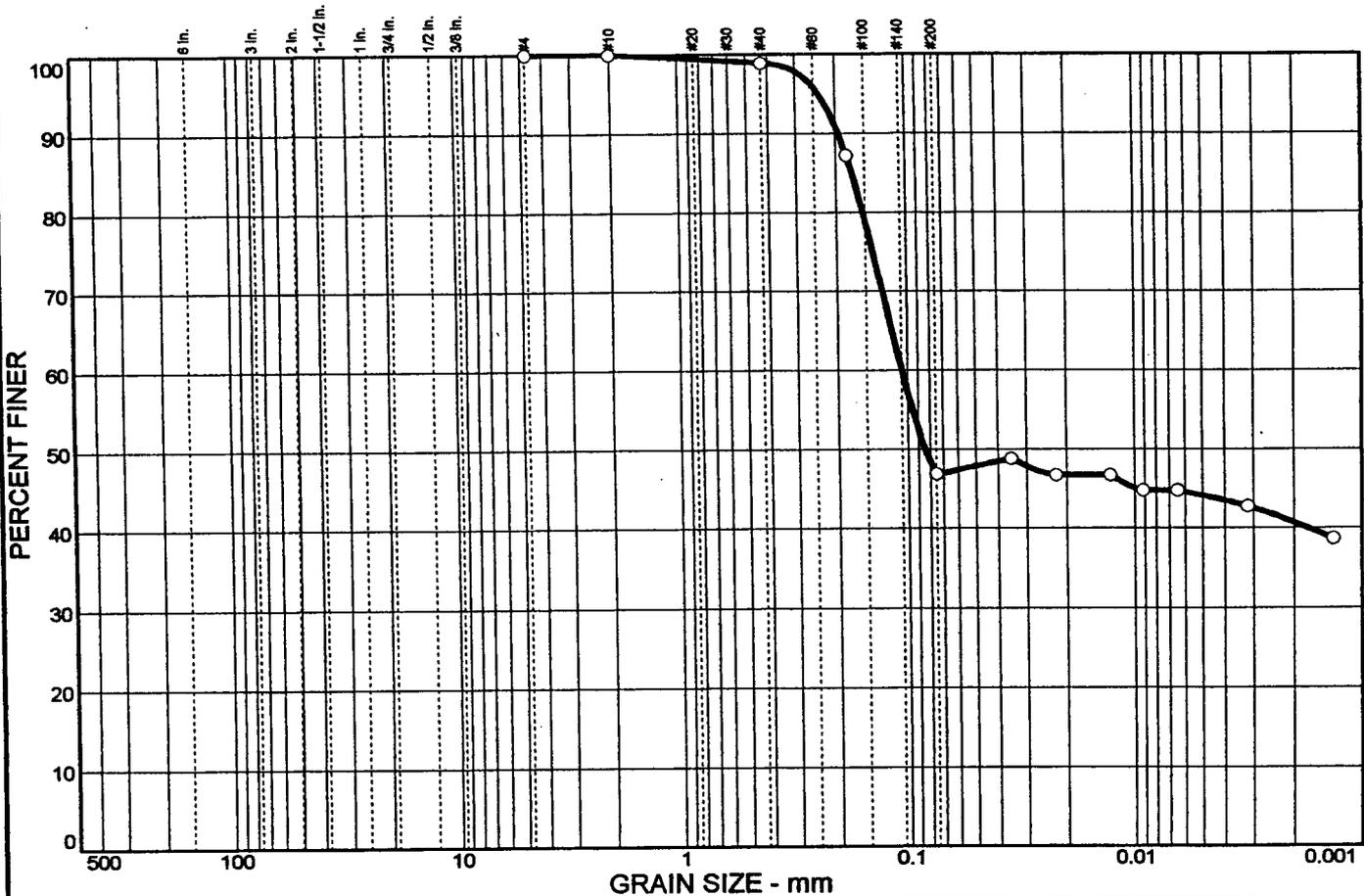
Meniscus correction only= 0
 Specific gravity of solids= 2.65
 Specific gravity correction factor= 1.000
 Hydrometer type: 152H
 Effective depth L= 16.294964 - 0.164 x Rm

Elapsed time, min	Temp, deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
2.00	20.2	18.0	23.0	0.0136	18.0	13.3	0.0352	46.8
5.00	20.2	18.0	23.0	0.0136	18.0	13.3	0.0222	46.8
15.00	20.2	17.0	22.0	0.0136	17.0	13.5	0.0129	44.7
30.00	20.2	17.0	22.0	0.0136	17.0	13.5	0.0091	44.7
60.00	20.2	16.0	21.0	0.0136	16.0	13.7	0.0065	42.7
250.00	20.2	16.0	21.0	0.0136	16.0	13.7	0.0032	42.7
1440.00	20.2	15.0	20.0	0.0136	15.0	13.8	0.0013	40.7

Fractional Components

1/Sand based on #4
Fines based on #200
% COBBLES = % GRAVEL = % SAND = 52.9
% SILT = 4.4 % CLAY = 42.7
D85= 0.17 D60= 0.10 D50= 0.08

PARTICLE SIZE ANALYSIS AS PER ASTM D 422-98



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	53.2	2.7	44.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	100.0		
#40	98.9		
#80	87.2		
#200	46.8		

Soil Description

REDDISH CLAYEY SAND

Atterberg Limits

PL= 17 LL= 24 PI= 7

Coefficients

D₈₅= 0.171 D₆₀= 0.105 D₅₀= 0.0840
D₃₀= D₁₅= D₁₀=
C_u= C_c=

Classification

USCS= SM-SC AASHTO=

Remarks

SAMPLED FROM IN-PLACE MATERIAL

* (no specification provided)

Sample No.: 5 Source of Sample: IN-PLACE BERM MATERIAL 2 6-7-03

Date: 6-7-03
Elev./Depth: FIRST LIFT

LYDICK ENGINEERS & SURVEYORS, INC.	Client: ARROW HEAD CONST Project: SWMU101 LAGOON CLOSURE @ CANNON A.F.B. CLOVIS, NM Project No: DACW45-94-D-003
Figure	

GRAIN SIZE DISTRIBUTION TEST DATA

Client: ARROW HEAD CONST
 Project: SWMU101 LAGOON CLOSURE @ CANNON A.F.B. CLOVIS, NM
 Project Number: DACW45-94-D--003

Sample Data

Source:
 Sample No.: 5
 Elev. or Depth: FIRST LIFT Sample Length(in./cm.):
 Location: IN-PLACE BERM MATERIAL 2 6-7-03
 Description: REDDISH CLAYEY SAND
 Date: 6-7-03 PL: 17 LL: 24 PI: 7
 USCS Classification: SM-SC AASHTO Classification:
 Testing Remarks: SAMPLED FROM IN-PLACE MATERIAL

Mechanical Analysis Data

Sieve	Size, mm	Percent finer
# 4	4.750	100.0
# 10	2.000	100.0
# 40	0.425	98.9
# 80	0.180	87.2
# 200	0.075	46.8

Hydrometer Analysis Data

Retention sieve is #10
 Percent -#10 based upon complete sample= 100.0
 Weight of hydrometer sample: 50.0
 Hygroscopic moisture correction:
 Moist weight & tare = 35.25
 Dry weight & tare = 35.05
 Tare = 22.23
 Hygroscopic moisture= 1.6 %
 Calculated biased weight= 49.23
 Automatic temperature correction
 Composite correction at 20 deg C = 5.0

 Meniscus correction only= 0
 Specific gravity of solids= 2.65
 Specific gravity correction factor= 1.000
 Hydrometer type: 152H
 Effective depth L= 16.294964 - 0.164 x Rm

Elapsed time, min	Temp, deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
2.00	20.2	19.0	24.0	0.0136	19.0	13.2	0.0349	48.8
5.00	20.2	18.0	23.0	0.0136	18.0	13.3	0.0222	46.7
15.00	20.2	18.0	23.0	0.0136	18.0	13.3	0.0128	46.7
30.00	20.2	17.0	22.0	0.0136	17.0	13.5	0.0091	44.7
60.00	20.2	17.0	22.0	0.0136	17.0	13.5	0.0065	44.7
250.00	20.2	16.0	21.0	0.0136	16.0	13.7	0.0032	42.7
140.00	20.2	14.0	19.0	0.0136	14.0	14.0	0.0013	38.6

Fractional Components

Gravel/Sand based on #4

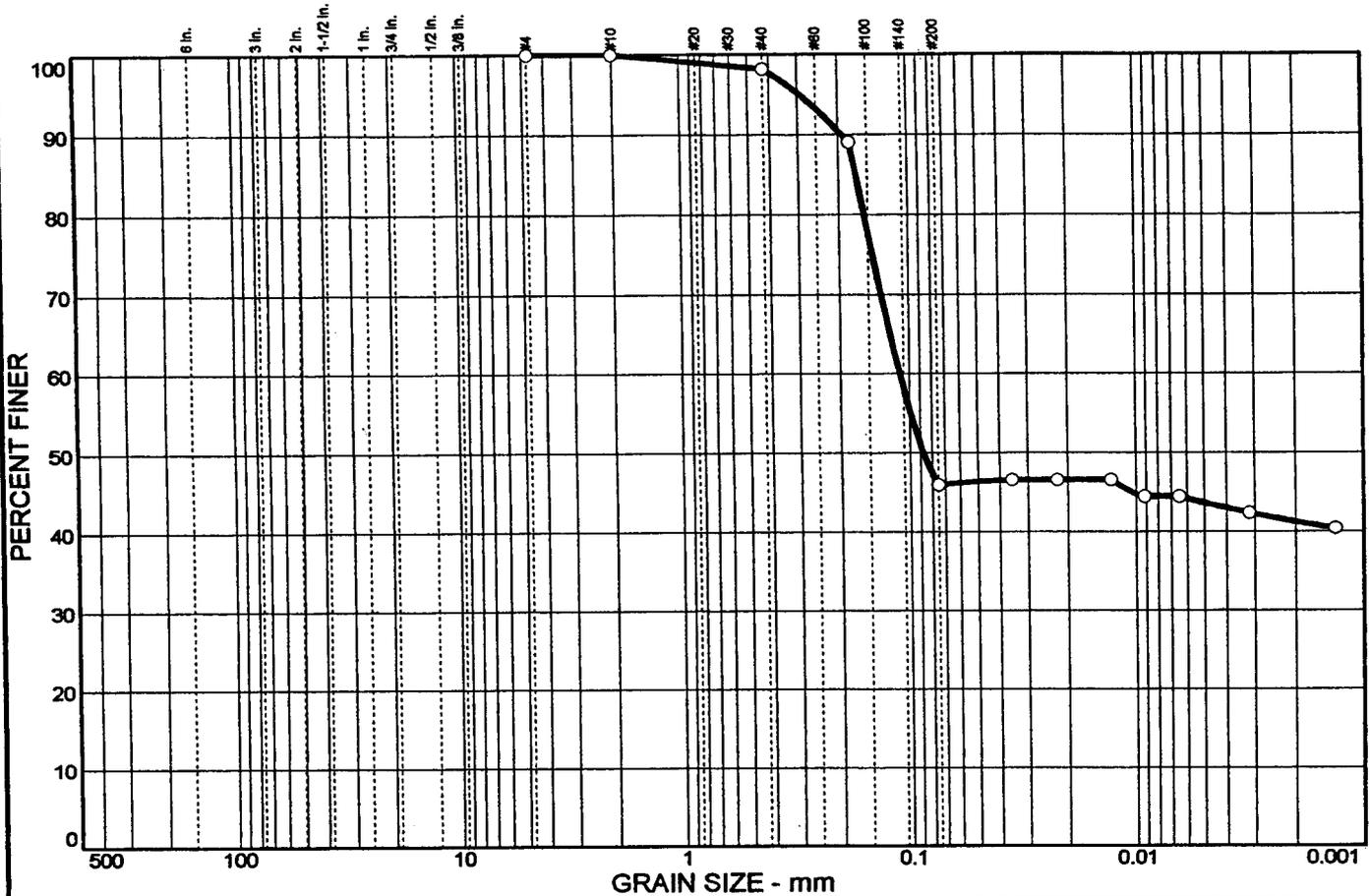
nd/Fines based on #200

% COBBLES = % GRAVEL =
% SILT = 2.7 % CLAY = 44.1

% SAND = 53.2

D85= 0.17 D60= 0.11 D50= 0.08

PARTICLE SIZE ANALYSIS AS PER ASTM D 422-98



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	54.1	2.3	43.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	100.0		
#40	98.2		
#80	89.0		
#200	45.9		

Soil Description

REDDISH CLAYEY SAND

Atterberg Limits

PL= 21 LL= 26 PI= 5

Coefficients

D₈₅= 0.169 D₆₀= 0.110 D₅₀= 0.0870
D₃₀= D₁₅= D₁₀=
C_u= C_c=

Classification

USCS= SM-SC AASHTO=

Remarks

SAMPLED FROM IN-PLACE MATERIAL

* (no specification provided)

Sample No.: 6 **Source of Sample:**
Location: IN PLACE BERM MATERIAL 1 6-14-03

Date: 6-14-03
Elev./Depth: FIRST LIFT

LYDICK ENGINEERS & SURVEYORS, INC.	Client: ARROW HEAD CONST Project: SWMU101 LAGOON CLOSURE @ CANNON A.F.B. CLOVIS, NM Project No: DACW45-94-D-003
Figure	

GRAIN SIZE DISTRIBUTION TEST DATA

Client: ARROW HEAD CONST
 Project: SWMU101 LAGOON CLOSURE @ CANNON A.F.B. CLOVIS, NM
 Project Number: DACW45-94-D--003

Sample Data

Source:
 Sample No.: 6
 Elev. or Depth: FIRST LIFT Sample Length(in./cm.):
 Location: IN PLACE BERM MATERIAL 1 6-14-03
 Description: REDDISH CLAYEY SAND
 Date: 6-14-03 PL: 21 LL: 26 PI: 5
 JCS Classification: SM-SC AASHTO Classification:
 Testing Remarks: SAMPLED FROM IN-PLACE MATERIAL

Mechanical Analysis Data

Sieve	Size, mm	Percent finer
# 4	4.750	100.0
# 10	2.000	100.0
# 40	0.425	98.2
# 80	0.180	89.0
# 200	0.075	45.9

Hydrometer Analysis Data

Separation sieve is #10
 Percent -#10 based upon complete sample= 100.0
 Weight of hydrometer sample: 50.0
 Hygroscopic moisture correction:
 Moist weight & tare = 36.29
 Dry weight & tare = 36.15
 Tare = 23.45
 Hygroscopic moisture= 1.1 %
 Calculated biased weight= 49.45
 Automatic temperature correction
 Composite correction at 20 deg C = 5.0

Meniscus correction only= 0
 Specific gravity of solids= 2.65
 Specific gravity correction factor= 1.000
 Hydrometer type: 152H
 Effective depth L= 16.294964 - 0.164 x Rm

Elapsed time, min	Temp, deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
2.00	20.1	18.0	23.0	0.0136	18.0	13.3	0.0352	46.5
5.00	20.1	18.0	23.0	0.0136	18.0	13.3	0.0223	46.5
15.00	20.1	18.0	23.0	0.0136	18.0	13.3	0.0129	46.5
30.00	20.1	17.0	22.0	0.0136	17.0	13.5	0.0091	44.4
60.00	20.1	17.0	22.0	0.0136	17.0	13.5	0.0065	44.4
250.00	20.1	16.0	21.0	0.0136	16.0	13.7	0.0032	42.4
1440.00	20.1	15.0	20.0	0.0136	15.0	13.8	0.0013	40.4

Fractional Components

1/Sand based on #4

2/Fines based on #200

% COBBLES = % GRAVEL =

% SAND = 54.1

% SILT = 2.3 % CLAY = 43.6

D85= 0.17 D60= 0.11 D50= 0.09

GRAIN SIZE DISTRIBUTION TEST DATA

Client: ARROW HEAD CONST
 Project: SWMU101 LAGOON CLOSURE @ CANNON A.F.B. CLOVIS, NM
 Project Number: DACW45-94-D--003

Sample Data

Source:
 Sample No.: 7
 Elev. or Depth: FIRST LIFT Sample Length(in./cm.):
 Location: IN-PLACE BERM MATERIAL 2 6-14-03
 Description: REDDISH CLAYEY SAND
 Date: 6-14-03 PL: 18 LL: 25 PI: 7
 USCS Classification: SM-SC AASHTO Classification:
 Testing Remarks: SAMPLED FROM IN-PLACE MATERIAL

Mechanical Analysis Data

Sieve	Size, mm	Percent finer
# 4	4.750	100.0
# 10	2.000	100.0
# 40	0.425	96.5
# 80	0.180	84.3
# 200	0.075	43.2

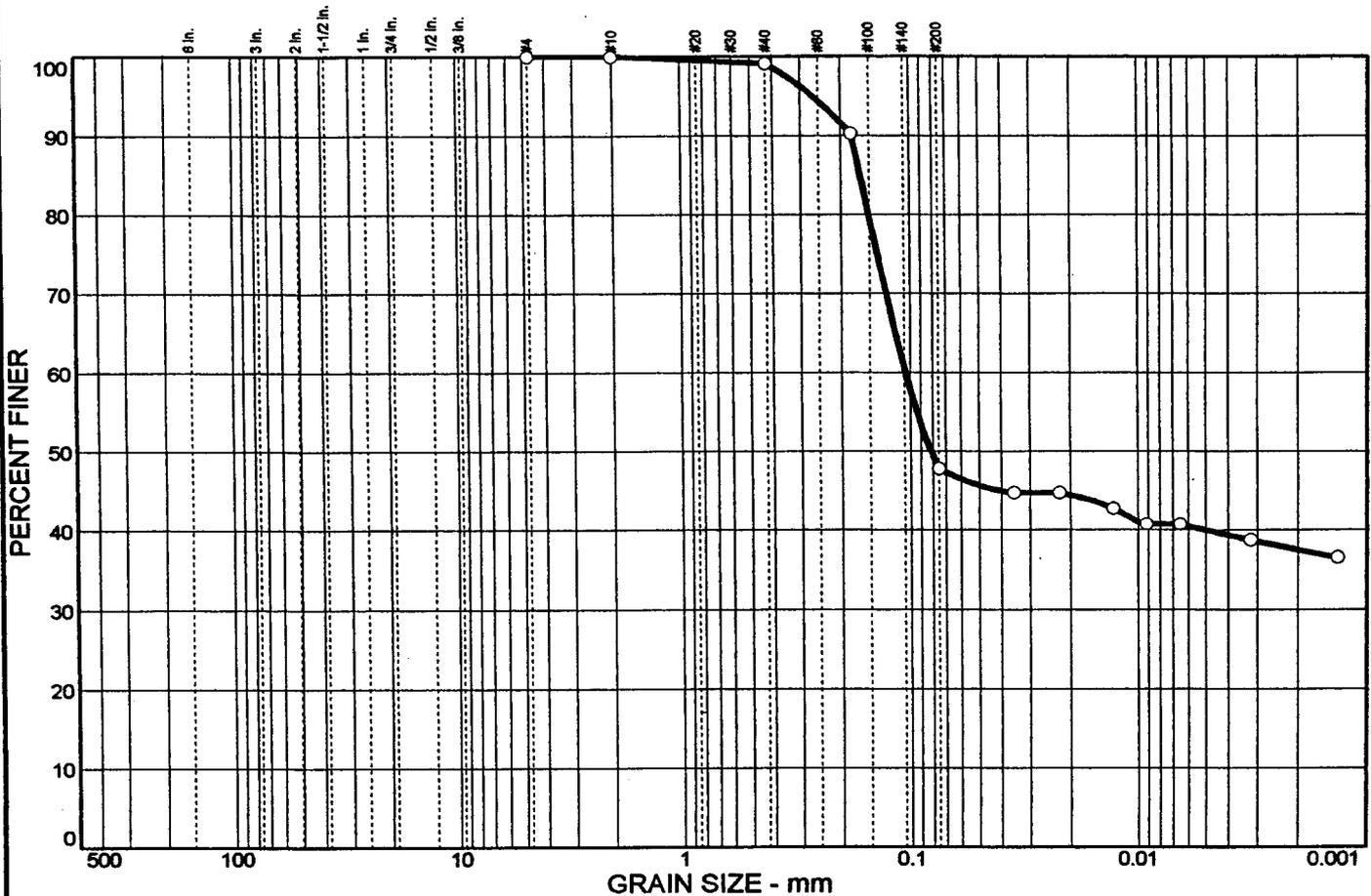
Hydrometer Analysis Data

Separation sieve is #10
 Percent -#10 based upon complete sample= 100.0
 Weight of hydrometer sample: 50.0
 Hygroscopic moisture correction:
 Moist weight & tare = 32.47
 Dry weight & tare = 32.27
 Tare = 21.45
 Hygroscopic moisture= 1.8 %
 Calculated biased weight= 49.09
 Automatic temperature correction
 Composite correction at 20 deg C = 5.0

 Meniscus correction only= 0
 Specific gravity of solids= 2.65
 Specific gravity correction factor= 1.000
 Hydrometer type: 152H
 Effective depth L= 16.294964 - 0.164 x Rm

Elapsed time, min	Temp, deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
2.00	20.0	17.0	22.0	0.0136	17.0	13.5	0.0355	44.7
5.00	20.0	17.0	22.0	0.0136	17.0	13.5	0.0224	44.7
15.00	20.0	16.0	21.0	0.0136	16.0	13.7	0.0130	42.7
30.00	20.0	15.0	20.0	0.0136	15.0	13.8	0.0093	40.7
60.00	20.0	14.0	19.0	0.0136	14.0	14.0	0.0066	38.6
250.00	20.0	13.0	18.0	0.0136	13.0	14.2	0.0032	36.6
1440.00	20.0	12.0	17.0	0.0136	12.0	14.3	0.0014	34.5

PARTICLE SIZE ANALYSIS AS PER ASTM D 422-98



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	52.2	7.9	39.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	100.0		
#40	99.1		
#80	90.3		
#200	47.8		

Soil Description

REDDISH CLAYEY SAND

Atterberg Limits

PL= 17 LL= 22 PI= 5

Coefficients

D₈₅= 0.165 D₆₀= 0.105 D₅₀= 0.0812
D₃₀= D₁₅= D₁₀=
C_u= C_c=

Classification

USCS= SM-SC AASHTO=

Remarks

SAMPLED FROM IN-PLACE MATERIAL

* (no specification provided)

Sample No.: 8 Source of Sample: Date: 6-14-03
Location: IN-PLACE BERM MATERIAL 3 6-14-03 Elev./Depth: FIRST LIFT

LYDICK ENGINEERS & SURVEYORS, INC.	Client: ARROW HEAD CONST Project: SWMU101 LAGOON CLOSURE @ CANNON A.F.B. CLOVIS, NM Project No: DACW45-94-D-003
Figure	

GRAIN SIZE DISTRIBUTION TEST DATA

Point: ARROW HEAD CONST
 Project: SWMU101 LAGOON CLOSURE @ CANNON A.F.B. CLOVIS, NM
 Project Number: DACW45-94-D--003

Sample Data

Source:
 Sample No.: 8
 Elev. or Depth: FIRST LIFT Sample Length(in./cm.):
 Location: IN-PLACE BERM MATERIAL 3 6-14-03
 Description: REDDISH CLAYEY SAND
 Date: 6-14-03 PL: 17 LL: 22 PI: 5
 USCS Classification: SM-SC AASHTO Classification:
 Testing Remarks: SAMPLED FROM IN-PLACE MATERIAL

Mechanical Analysis Data

Sieve	Size, mm	Percent finer
# 4	4.750	100.0
# 10	2.000	100.0
# 40	0.425	99.1
# 80	0.180	90.3
# 200	0.075	47.8

Hydrometer Analysis Data

Retention sieve is #10
 Percent -#10 based upon complete sample= 100.0
 Weight of hydrometer sample: 50.0
 Hygroscopic moisture correction:
 Moist weight & tare = 35.41
 Dry weight & tare = 35.27
 Tare = 22.25
 Hygroscopic moisture= 1.1 %
 Calculated biased weight= 49.47
 Automatic temperature correction
 Composite correction at 20 deg C = 5.0

 Meniscus correction only= 0
 Specific gravity of solids= 2.65
 Specific gravity correction factor= 1.000
 Hydrometer type: 152H
 Effective depth L= 16.294964 - 0.164 x Rm

Elapsed time, min	Temp, deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
2.00	20.8	17.0	22.1	0.0135	17.0	13.5	0.0351	44.7
5.00	20.8	17.0	22.1	0.0135	17.0	13.5	0.0222	44.7
15.00	20.8	16.0	21.1	0.0135	16.0	13.7	0.0129	42.7
30.00	20.8	15.0	20.1	0.0135	15.0	13.8	0.0092	40.7
60.00	20.8	15.0	20.1	0.0135	15.0	13.8	0.0065	40.7
250.00	20.8	14.0	19.1	0.0135	14.0	14.0	0.0032	38.7
440.00	20.5	13.0	18.1	0.0136	13.0	14.2	0.0013	36.5

Fractional Components

Gravel/Sand based on #4

and/Fines based on #200

% COBBLES = % GRAVEL =

% SAND = 52.2

% SILT = 7.9 % CLAY = 39.9

D85= 0.16 D60= 0.10 D50= 0.08

Lydick Engineers & Surveyors, Inc.

P. O. Box 728
205 E. 2nd Street
Clovis, NM 88101
5-762-3771

Proctor

Report

Report Date: 29-May-03
Project: DACW45-94-D-0003
Report Number: 1

To: ARROWHEAD CONST.
12920 METCALF AVE. SUITE 150
OVERLAND PARK, KS. 66213

Copies To: ARROW HEAD
FOSTER WHEELER
CORPS OF ENGINEERS

Proj: CLOSURE OF SWMU 101 SEWAGE LAGOON @ CANNONA.F.B.

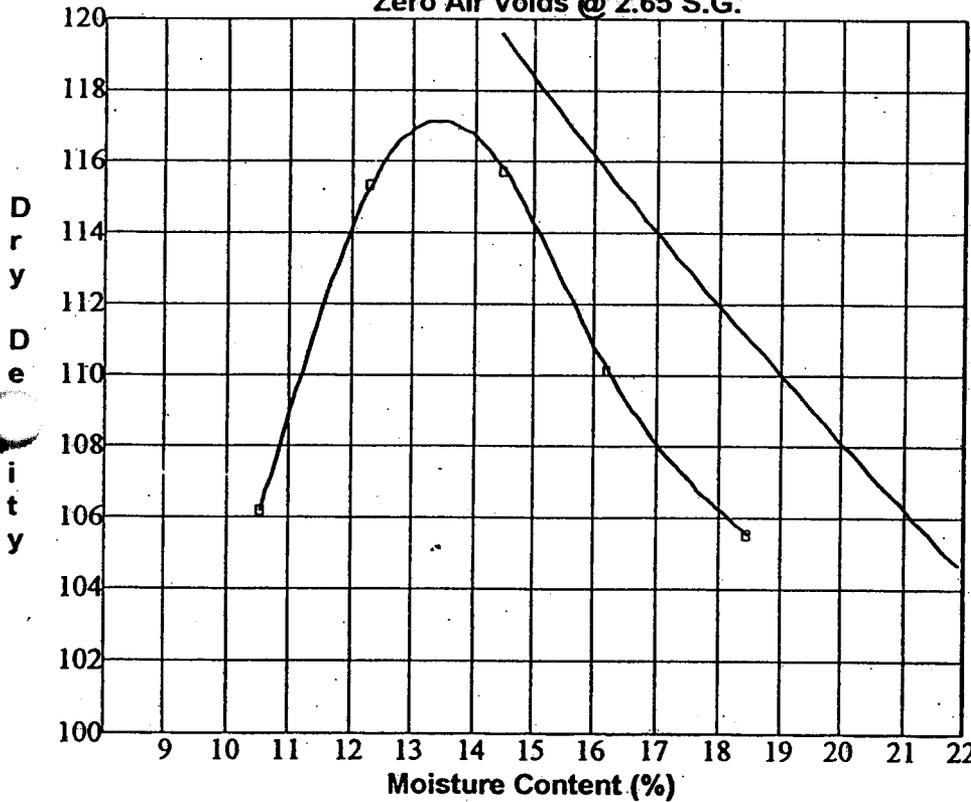
Sample Type: IN-PLACE
Sampled By: LANCE E. LANGAN
Source: EXISTING BERM
Tested By: LANCE LANGAN

Sample Date: 29-May-03

Date Tested: 29-May-03

Date Received: 29-May-03

Zero Air Voids @ 2.65 S.G.



Max. Dry Density: 117.1
Optimum Moisture (%): 13.4

Moisture Content	Dry Density	Wet Density
10.6	106.2	117.5
12.3	115.3	129.5
14.5	115.8	132.5
16.2	110.2	128.0
18.4	105.5	125.0

Method: ASTM D 698-01
Rammer Type: MANUAL
Preparation: DRY TO WET
% Retained 5mm screen: 0.0
% Retained 10mm screen: 0.0
% Retained 20mm screen: 0.0

Sample Description: EXISTING BERM REDDISH CLAYEY SAND CLASSIFIED AS SM-SC AS PER USCS

Per

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on written request.

Lydick Engineers & Surveyors, Inc.

P. O. Box 728
205 E. 2nd Street
Clovis, NM 88101
505-762-3771

Proctor

Report

Report Date: 9-Jun-03
Project: DACW45-94-D-0003
Report Number: 3

To: ARROWHEAD CONST.
12920 METCALF AVE. SUITE 150
OVERLAND PARK, KS. 66213

Copies To: ARROW HEAD
FOSTER WHEELER
CORPS OF ENGINEERS

Proj: CLOSURE OF SWMU 101 SEWAGE LAGOON @ CANNONA.F.B.

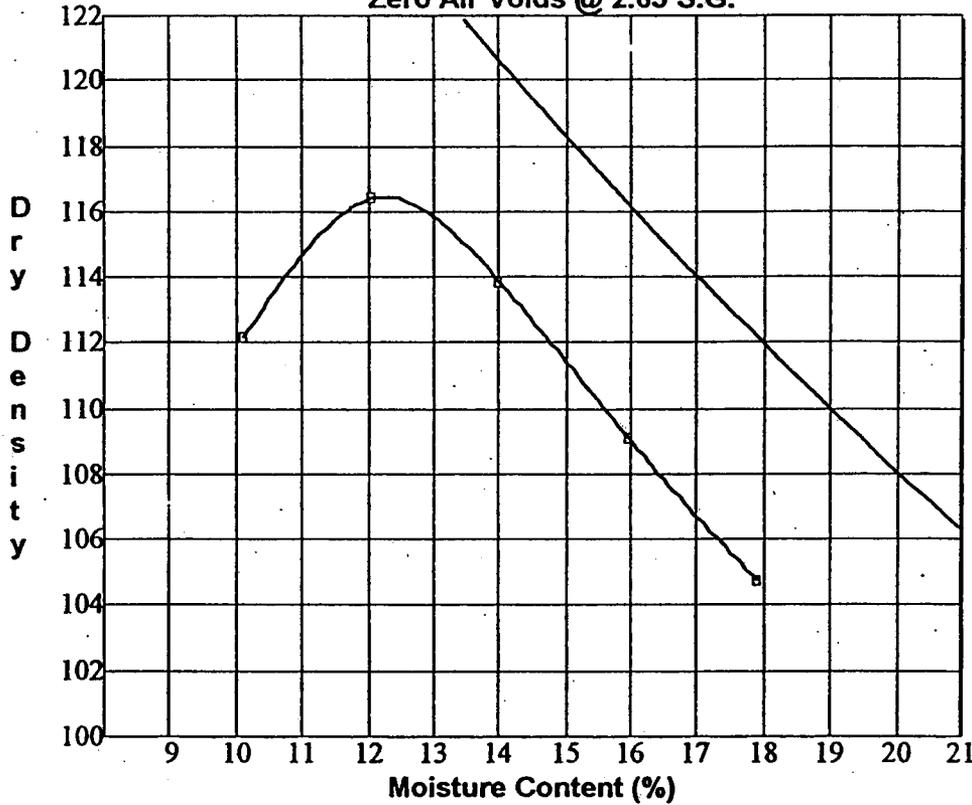
Sample Type: IN-PLACE
Sampled By: LANCE E. LANGAN
Source: EXISTING BERM
Tested By: LANCE LANGAN

Sample Date: 7-Jun-03

Date Tested: 9-Jun-03

Date Received: 7-Jun-03

Zero Air Voids @ 2.65 S.G.



Max. Dry Density: 116.4
Optimum Moisture (%): 12.2

Moisture Content	Dry Density	Wet Density
10.1	112.2	123.5
12.1	116.4	130.4
14.0	113.9	129.8
16.0	109.1	126.5
17.9	104.7	123.5

Method: ASTM D 698-01
Rammer Type: MANUAL
Preparation: DRY TO WET
% Retained 5mm screen: 0.0
% Retained 10mm screen: 0.0
% Retained 20mm screen: 0.0

Sample Description: EXISTING BERM REDDISH CLAYEY SAND CLASSIFIED AS SM-SC AS PER USCS

Per: *Lance E. Langan*

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on written request.

ROBERT L. LYDICK
ROBERT CHAD LYDICK
Professional Engineer and
Land Surveyor

Lydick
ENGINEERS AND SURVEYORS, INC.
205 E. SECOND STREET - P.O. BOX 728
CLOVIS, NEW MEXICO 88102-0728
505 762-3771 - FAX 505 762-9093

Registered
New Mexico
Texas - Oklahoma
Colorado

JULY 23, 2003

MR. BRAD JONES
US ARMY CORPS OF ENGINEERS
GEOTECHNICAL ENGINEERING & SCIENCES BRANCH

RE: CLASSIFICATION AND LABELING OF MATERIAL FOR USE ON THE LAGOON CLOSURE @
C.A.F.B NEW MEXICO

DEAR MR. JONES

THE LAGOON CLOSURE PROJECT ON GOING AT CANNON A.F.B. HAS TWO (2) BARROW SOURCES
THAT ARE BEING USED.

SOURCE 1 IS THE EXISTING BERM MATERIAL IT WAS CLASSIFIED AS A REDDISH SANDY CLAYEY
SAND "SM-SC" AND WAS USED ONLY ON THE FIRST LIFT.

SOURCE 2 IS THE BOSTWICK PIT MATERIAL FROM MELROSE, NM IT WAS CLASSIFIED AS A
BROWN LEAN CLAY "CL".

TO AVOID ANY MORE CONFUSION WITH THE MATERIALS BEING USED ALL THE REPORT NOW
INDICATE EITHER "SM-SC" OR "CL".

IF I CAN BE OF FURTHER ASSISTANCE IN THIS MATTER PLEASE FEEL FREE CONTACT ME.

VERY TRULY YOURS


LANCE E. LANGAN
LABORATORY SUPERVISOR

Onaka

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE <small>(Read instructions on the reverse side prior to initiating this form)</small>		DATE 07/30/2003	TRANSMITTAL NO. 02377-10
--	--	--------------------	-----------------------------

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS (This section will be initiated by the contractor)

TO: Cannon AFB Resident Office US Army Corps of Engineers 201 N. Perimeter Rd. Cannon AFB, NM 88103	FROM: Foster Wheeler Environmental C 6805 Uptown Blvd, NE Suite 220 Albuquerque, NM 87110	CONTRACT NO. DACW48-84-D-0003 0035	CHECK ONE: <input checked="" type="checkbox"/> THIS IS A NEW TRANSMITTAL <input type="checkbox"/> THIS IS A RESUBMITTAL OF TRANSMITTAL _____
--	---	---------------------------------------	--

SPECIFICATION SEC. NO. (Cover only one section with each transmittal) 02377	PROJECT TITLE AND LOCATION SWMU 101 - Sewage Lagoons Cannon AFB	CHECK ONE: THIS TRANSMITTAL IS FOR <input type="checkbox"/> FIO <input checked="" type="checkbox"/> GOVT. APPROVAL
--	--	--

ITEM NO.	DESCRIPTION OF ITEM SUBMITTED <small>(Type size, model number/etc.)</small>	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. <small>(See instruction no. 8)</small>	NO. OF COPIES	CONTRACT REFERENCE DOCUMENT		FOR CONTRACTOR USE CODE	VARIATION <small>(See instruction No. 6)</small>	FOR CE USE CODE
				SPEC. PARA. NO.	DRAWING SHEET NO.			
3	Moisture Content, Dens Soil Barrier-1st	TEST REPORTS	3	3.4.2		B		BE
<p>FOR FUTURE SUBMITTALS, PLEASE INCLUDE VERIFICATION (NEW) PROCTORS WITH FIELD DENSITY REPORTS</p> <p>Bad form, 8-6-03</p>								
<p>Proctors are from the original borrow assessment Reports, not ^{OK} Field Verification Reports</p>								

Rick MacArthur
8-7-03

REMARKS
ASTM D-3017, ASTM D-2922, (Nuclear rapid in place test) ASTM D-2216, ASTM D-1556 (Sand cone)
First Lift Soil Barrier layer
Field Sample Location Map included "not to scale"
Contractors code "B"
**Test 60 ASTM's 3017 result was 12.2 (.6% below the required Moisture 12.8)
Sand cone test 3 - 2216, was performed as a retest and the results passed the requirement-

IN-FIELD DENSITY TESTS DO NOT CORRESPOND WITH ANY OF THE PROCTOR CURVES PROVIDED

I certify that the above submitted items have been reviewed in detail and are correct and in the strict conformance with the contract drawings and specifications except as otherwise stated.

James Manning
NAME AND SIGNATURE OF CONTRACTOR

SECTION II - APPROVAL ACTION

ENCLOSURES RETURNED (List by item No.)	NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY <i>Walter P. ...</i>	DATE 8-7-03
--	--	----------------

4907421717948 → 800578426653
 NO. 797
 P02

SUBMITTAL REVIEW VERIFICATION SHEET

Date: July 30, 2003

Submittal No.: 02377-10

Foster Wheeler Environmental Corporation Stamp

SWMU 101 Sewage Lagoons Closure, Cannon AFB, NM
Certified for approval as indicated below:

- A - Approved as submitted
- B - Approved except as noted on the drawings and/or attached sheets.

It is hereby certified that the (equipment) (material) shown and marked in this submittal is that proposed to be incorporated into Contract Number DACW45-94-D-0003, Delivery Order No. 35, Work Authorization Directive 1 is in compliance with the contract drawings and specifications, can be installed in the allocated spaces, and is submitted for Government approval.

Reviewed/Certified By:

[Signature]
James Morning, QC

Description of items reviewed: SD-06 Test Reports-Moisture & Densities Test First Lift
Item 3

U.S. Army Corps of Engineers Stamp

U.S. Army Engineer District, Albuquerque Corps of Engineers
Certified for approval as indicated below:

- A - Approved as submitted.
- B - Approved except as noted on the drawings and/or attached sheet(s). Resubmission not required.
- C - Approved except as noted on the drawings and/or attached sheet(s). Resubmission required.
- D - Will be returned by separate correspondence.
- E - Disapproved; see comments on attached sheet.
- F - Receipt acknowledged.
- G - Other. Specify.

Note: Items approved as to general layout only. Dimensions and quantities checked. Approval does not relieve contractor of responsibilities for errors that may exist, as contractor shall be responsible for dimensions and design of adequate corrections. Details and satisfactory construction of work.

Signature: *[Signature]*

Date: 8-5-03

Reviewer's Signature: *[Signature]*

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE		DATE 08/07/2003	TRANSMITTAL NO. " 02377-10
PROJECT TITLE	SWMU 101 - Sewage Lagoons	CONTRACT NO. DACW45-94-D-0003 0035	PAGE 1 of 1
LOCATION	Cannon AFB		

Item	Descriptor	Variation	Q. Code
3	Moisture Content, Dens Soil Barrier	No	B

SECTION II - GOVERNMENT REVIEW REMARKS

Code B Remarks:
For future submittals, please include verification (new) proctors with field density reports.

**SWMU 101
Sewage Lagoons Closure Project
CAFB NM**

**Submittal of 02377 Item 3
Rapid Moisture Content ASTM D-3017
Rapid Density Test ASTM-D 2922
Standard Density/Moisture ASTM D 1556 D 2216
First lift**

Contents

Test

- 1. Field Density Report's Test 1 thru 69 13 pages
(3.4.2) Surface area approx. 615,000 Sq. Ft,
requiring no less than 62 sample locations.**
- 2. Sand Cone Test 1-3 3 pages
1/20 ASTM's 3017/2922's**
- 3. Field Map Sample Location 1 page**
- 4. Sample Result Spread Sheet 3 pages**

**Sand Cone Hole #3 (ASTM-D 1556) result is a
retest for ASTM-D 3017 test 60**

Failed areas requiring rework were reprocessed with a combination of scarifying, disking, re-application of moisture, compacted with combination's of pad foot compactor (815 Cat) and wheel rolling with 40 ton articulated dump truck loaded with soil, re graded and wheeled rolled again. Areas were reworked to the limits of the surrounding passed test area.

Lydick Engineers & Surveyors, Inc.

P. O. Box 728
205 E. 2nd Street
Clovis, NM 88101
505-762-3771

To: ARROWHEAD CONST.
12920 METCALF AVE. SUITE 150
OVERLAND PARK, KS 66213

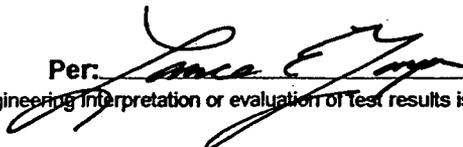
Project: CLOSURE OF SWMU101 SEWAGE LAGOON @
CANNON AFB

Field Densities

Project Number: DACAW45-94-D-0003
Report Number: 1
Report Date: 5-31-03
Copies To: COE AND ARROWHEAD
Technician: BRANDON HIERONYMOUS
Depth: 6 IN
Maximum Dry Density: 117.1
Optimum Moisture: 12.8
Test Date: 5-31-03
% Compaction Required: 90%
Moisture Requirement: 12.8 OR ABOVE
Page: 1 of 1

ID No.	Sample Location	Wet Density (lb./ft. ³)	Moist. Content (%)	Dry Density (lb./ft. ³)	Percent of Max. (%)
1	ON MAP	120.1	13.1	106.2	90.7
2	ON MAP	119.8	13.3	105.7	90.3
3	ON MAP	122.0	13.0	108.0	92.2
4	ON MAP	128.5	15.1	111.6	95.3
5	ON MAP	121.4	13.0	107.4	91.7
6	ON MAP	124.9	14.7	108.9	93.0
7	ON MAP	120.8	13.6	106.3	90.8
8	ON MAP	121.9	14.1	106.8	91.2
9	ON MAP	125.7	12.9	111.3	95.0
10	ON MAP	125.5	19.1	105.4	90.0

EXISTING BERM REDDISH CLAYEY SAND SM-SC TROXLER 3411-B DS=2749 MS=718

Per: 

Reporting of these test results constitutes a testing service only. Engineering Interpretation or evaluation of Test results is provided only on written request.

Lydick Engineers & Surveyors, Inc.

P. O. Box 728
205 E. 2nd Street
Clovis, NM 88101
505-3771

Field Densities

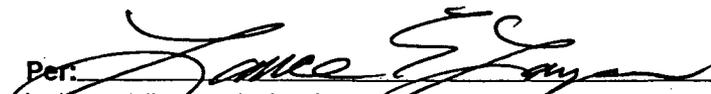
Project Number: DACAW45-94-D-0003
Report Number: 2
Report Date: 6/3/2003
Copies To: COE AND ARROWHEAD
Technician: BRANDON HIERONYMOUS
Depth: 6 IN
Maximum Dry Density: 117.1
Optimum Moisture: 12.8
Test Date: 6-2-03
% Compaction Required: 90%
Moisture Requirement: 12.8 OR ABOVE
Page: 1 of 1

To: ARROWHEAD CONST.
12920 METCALF AVE. SUITE 150
OVERLAND PARK, KS 66213

Project: CLOSURE OF SWMU101 SEWAGE LAGOON @
CANNON AFB

ID No.	Sample Location	Wet Density (lb./ft. ³)	Moist. Content (%)	Dry Density (lb./ft. ³)	Percent of Max. (%)
11	ON MAP	127.7	12.9	113.1	96.6
12	ON MAP	129.5	15.4	112.2	95.8
13	ON MAP	124.2	14.0	108.9	93.0
14	ON MAP	126.3	16.1	108.8	92.9
15	ON MAP	116.0	9.1	106.3	90.8
16	ON MAP	123.1	15.0	107.0	91.4
17	ON MAP	117.2	10.0	106.5	90.9

EXISTING BERM REDDISH CLAYEY SAND SM-SC TROXLER 3411-B DS=2701 MS=720

Per: 

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on written request.

Lydick Engineers & Surveyors, Inc.

P. O. Box 728
205 E. 2nd Street
Clovis, NM 88101
505-762-3111

Field Densities

To: ARROWHEAD CONST.
12920 METCALF AVE. SUITE
150
OVERLAND PARK, KS 66213

Project Number: DACAW45-94-D-0003
Report Number: 3
Report Date: 6/4/2003
Copies To: COE AND ARROWHEAD
Technician: BRANDON HIERONYMOUS
Depth: 6 IN
Maximum Dry Density: 117.1
Optimum Moisture: 12.8
Test Date: 6-3-03
% Compaction Required: 90%
Moisture Requirement: 12.8 OR ABOVE
Page: 1 of 1

Project: CLOSURE OF SWMU101 SEWAGE LAGOON @
CANNON AFB

ID No.	Sample Location	Wet Density (lb./ft. ³)	Moist. Content (%)	Dry Density (lb./ft. ³)	Percent of Max. (%)
18	RETEST 15 ON MAP	126.1	12.9	111.7	95.4
19	RETEST 16 ON MAP	124.6	15.3	108.1	92.3
20	RETEST 17 ON MAP	120.8	11.5	108.3	92.5
21	TEST-18 ON MAP	118.3	8.1	109.4	93.4

EXISTING BERM REDDISH CLAYEY SANDSM-SC TROXLER 3411-B MS=709 DS=2719

Per: 

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on written request.

Lydick Engineers & Surveyors, Inc.

P. O. Box 728
205 E. 2nd Street
Clavis, NM 88101
62-3771

To: ARROWHEAD CONST.
12920 METCALF AVE. SUITE
150
OVERLAND PARK, KS 66213

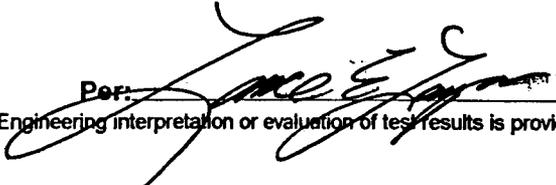
Project: CLOSURE OF SWMU101 SEWAGE LAGOON @
CANNON AFB

Field Densities

Project Number: DACAW45-94-D-0003
Report Number: 4
Report Date: 6-4-03
Copies To: COE AND ARROWHEAD
Technician: BRANDON HIERONYMOUS
Depth: 6 IN
Maximum Dry Density: 117.1
Optimum Moisture: 12.8
Test Date: 6-4-03
% Compaction Required: 90%
Moisture Requirement: 12.8 OR ABOVE
Page: 1 of 1

ID No.	Sample Location	Wet Density (lb./ft. ³)	Moist. Content (%)	Dry Density (lb./ft. ³)	Percent of Max. (%)
22	RETEST 17 ON MAP	128.4	13.7	112.9	96.4
23	RETEST 18 ON MAP	122.6	15.8	105.9	90.4
24	TEST 19 ON MAP	117.4	18.4	99.2	84.7
25	TEST 20 ON MAP	117.0	10.6	105.8	90.4
26	RETEST 19 ON MAP	126.7	14.1	111.0	94.8
27	RETEST 20 ON MAP (SAND CO	129.8	14.3	113.6	97.0

EXISTING BERM REDDISH CLAYEY SAND SM-SC TROXLER 3411-B MS=706 DS=2715

Per: 

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on written request.

Lydick Engineers & Surveyors, Inc.

Field Densities

P. O. Box 728
205 E. 2nd Street
Clare, NM 88101
505-762-3771

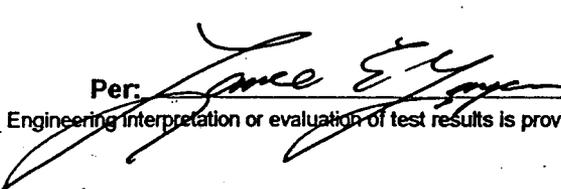
To: ARROWHEAD CONST.
12920 METCALF AVE. SUITE
150
OVERLAND PARK, KS 66213

Project Number: DACAW45-94-D-0003
Report Number: 5
Report Date: 6/24/2003
Copies To: COE AND ARROWHEAD
Technician: BRANDON HIERONYMOUS
Depth: 6 IN
Maximum Dry Density: 117.1
Optimum Moisture: 12.8
Test Date: 6/7/2003
% Compaction Required: 90%
Moisture Requirement: 12.8 OR ABOVE
Page: 1 of 1

Project: CLOSURE OF SWMU101 SEWAGE LAGOON @
CANNON AFB

ID No.	Sample Location	Wet Density (lb./ft. ³)	Moist. Content (%)	Dry Density (lb./ft. ³)	Percent of Max. (%)
28	TEST 21 ON MAP	127.7	16.6	109.5	93.5
29	TEST 22 ON MAP	126.4	13.9	111.0	94.8
30	TEST 23 ON MAP	124.1	17.0	106.1	90.6
31	TEST 24 ON MAP	122.8	13.7	108.0	92.2
32	TEST 25 ON MAP	127.1	12.8	112.7	96.2
33	TEST 26 ON MAP	128.3	13.8	112.7	96.2
34	TEST 27 ON MAP	123.0	12.9	108.9	93.0
35	TEST 28 ON MAP	124.4	17.4	106.0	90.5
36	TEST 29 ON MAP	124.2	16.0	107.1	91.5
37	TEST 30 ON MAP	122.6	12.8	108.7	92.8
38	TEST 31 ON MAP	118.7	9.1	108.8	92.9
9	TEST 32 ON MAP	114.1	11.1	102.7	87.7

EXISTING BERM REDDISH CLAYEY SAND SM-SC TROXLER 3411-B MS=686 DS=2669

Per: 

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on written request.

Lydick Engineers & Surveyors, Inc.

P. O. Box 728
205 E. 2nd Street
Clovis, NM 88101
505-237-3771

To: ARROWHEAD CONST.
12920 METCALF AVE. SUITE 150
OVERLAND PARK, KS 66213

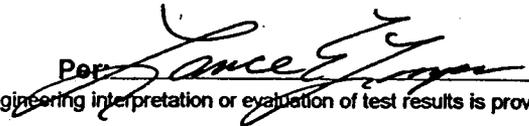
Project: CLOSURE OF SWMU101 SEWAGE LAGOON @
CANNON AFB

Field Densities

Project Number: DACAW45-94-D-0003
Report Number: 6
Report Date: 6/24/2003
Copies To: COE AND ARROWHEAD
Technician: BRANDON HIERONYMOUS
Depth: 6 IN
Maximum Dry Density: 117.1
Optimum Moisture: 12.8
Test Date: 6/9/2003
% Compaction Required: 90%
Moisture Requirement: 12.8 OR ABOVE
Page: 1 of 1

ID No.	Sample Location	Wet Density (lb./ft. ³)	Moist. Content (%)	Dry Density (lb./ft. ³)	Percent of Max. (%)
40	RETEST 31 ON MAP	125.6	14.0	110.2	94.1
41	RETEST 32 ON MAP	128.5	16.3	110.5	94.4

ALL DENSITIES TAKEN WITH A TROXLER 3411-B MS=735 DS=2633
EXISTING BERM REDDISH CLAYEY SAND SM-SC

Per 

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on written request.

Lydick Engineers & Surveyors, Inc.

Field Densities

P. O. Box 728
205 E. 2nd Street
Clovis, NM 88101
505-762-3771

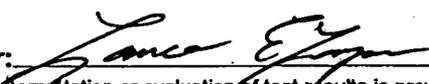
Project Number: DACAW45-94-D-0003
Report Number: 7
Report Date: 6/24/2003
Copies To: COE AND ARROWHEAD
Technician: BRANDON HIERONYMOUS
Depth: 6 IN
Maximum Dry Density: 107.1
Optimum Moisture: 14.3
Test Date: 6/11/2003
% Compaction Required: 90%
Moisture Requirement: 12.8 OR ABOVE
Page: 1 of 1

To: ARROWHEAD CONST.
12920 METCALF AVE. SUITE 150
OVERLAND PARK, KS 66213

Project: CLOSURE OF SWMU101 SEWAGE LAGOON @
CANNON AFB

ID No.	Sample Location	Wet Density (lb./ft. ³)	Moist. Content (%)	Dry Density (lb./ft. ³)	Percent of Max. (%)
42	TEST 33 ON MAP	98.0	19.3	82.1	76.7
43	TEST 34 ON MAP	110.4	28.9	85.6	79.9

ALL DENSITIES TAKEN WITH A TROXLER 3411-B MS=730 DS=2629
BARROW FILL BOSTWICK PIT BROWN SANDY LEAN CLAY

Per: 

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on written request.

Lydick Engineers & Surveyors, Inc.

Field Densities

P. O. Box 728
205 E. 2nd Street
Clovis, NM 88101
3771

To: ARROWHEAD CONST.
12920 METCALF AVE. SUITE 150
OVERLAND PARK, KS 66213

Project: CLOSURE OF SWMU101 SEWAGE LAGOON @
CANNON AFB

Project Number: DACAW45-94-D-0003
Report Number: 8
Report Date: 6/24/2003
Copies To: COE AND ARROWHEAD
Technician: BRANDON HIERONYMOUS
Depth: 6 IN
Maximum Dry Density: 107.1
Optimum Moisture: 14.3
Test Date: 6/12/2003
% Compaction Required: 90%
Moisture Requirement: 14.3 OR ABOVE
Page: 1 of 1

ID No.	Sample Location	Wet Density (lb./ft. ³)	Moist. Content (%)	Dry Density (lb./ft. ³)	Percent of Max. (%)
44	RETEST33 ON MAP	116.2	19.1	97.6	91.1
45	RETEST 34 ON MAP	115.1	17.0	98.4	91.9
46	TEST 35 ON MAP	112.8	25.2	90.1	84.1
47	TEST 36 ON MAP	104.9	20.4	87.1	81.3
48	TEST 37 ON MAP	108.5	16.1	93.5	87.3

ALL DENSITIES TAKEN WITH A TROXLER 3411-B AS PER MS=721 DS=2732
BARROW FILL (BOSTWICK PIT) BROWN SANDY LEAN CLAY "CL"

Per: 

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on written request.

Lydick Engineers & Surveyors, Inc.

P. O. Box 728
205 E. 2nd Street
Clovis, NM 88101
505-762-3771

To: ARROWHEAD CONST.
12920 METCALF AVE. SUITE 150
OVERLAND PARK, KS 66213

Project: CLOSURE OF SWMU101 SEWAGE LAGOON @
CANNON AFB

Field Densities

Project Number: DACAW45-94-D-0003
Report Number: 9
Report Date: 6/24/2003
Copies To: COE AND ARROWHEAD
Technician: BRANDON HIERONYMOUS
Depth: 6 IN
Maximum Dry Density: 117.1
Optimum Moisture: 12.8
Test Date: 6/13/2003
% Compaction Required: 90%
Moisture Requirement: 12.8 OR ABOVE
Page: 1 of 1

ID No.	Sample Location	Wet Density (lb./ft. ³)	Moist. Content (%)	Dry Density (lb./ft. ³)	Percent of Max. (%)
49	TEST 42 ON MAP	120.0	9.3	109.8	93.8
50	TEST 43 ON MAP	129.5	12.5	115.1	98.3
51	TEST 44 ON MAP	129.3	12.4	115.0	98.2
52	TEST 45 ON MAP	126.2	12.7	112.0	95.6

ALL DENSITIES TAKEN WITH A TROXLER 3411-B MS=731 DS=2712
EXISTING BERM REDDISH CLAYEY SAND "SM-SC"

Per: 

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on written request.

Lydick Engineers & Surveyors, Inc.

P. O. Box 728
205 E. 2nd Street
Clovis, NM 88101
52-3771

To: ARROWHEAD CONST.
12920 METCALF AVE. SUITE 150
OVERLAND PARK, KS 66213

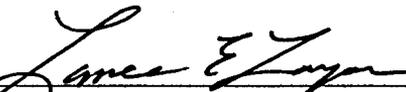
Project: CLOSURE OF SWMU101 SEWAGE LAGOON @
CANNON AFB

Field Densities

Project Number: DACAW45-94-D-0003
Report Number: 10
Report Date: 6/24/2003
Copies To: COE AND ARROWHEAD
Technician: BRANDON HIERONYMOUS
Depth: 6 IN
Maximum Dry Density: 107.1
Optimum Moisture: 14.3
Test Date: 6/14/2003
% Compaction Required: 90%
Moisture Requirement: 14.3 OR ABOVE
Page: 1 of 1

ID No.	Sample Location	Wet Density (lb./ft. ³)	Moist. Content (%)	Dry Density (lb./ft. ³)	Percent of Max. (%)
53	RETEST 35 ON MAP	106.7	22.5	87.1	81.3
54	RETEST 37 ON MAP	107.0	16.0	92.2	86.1
55	RETEST 36 ON MAP	118.6	17.7	100.8	94.1

ALL DENSITIES TAKEN WITH A TROXLER 3411-B MS=727
DS=2658
BARROW FILL (BOSTWICK PIT) BROWN SANDY LEAN CLAY

Per: 

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on written request.

Lydick Engineers & Surveyors, Inc.

P. O. Box 728
 205 E. 2nd Street
 Clovis, NM 88101
 505-762-3771

Field Densities

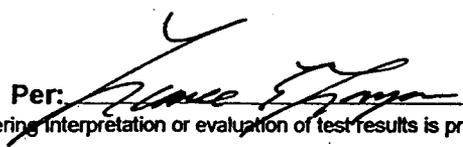
Project Number: DACAW45-94-D-0003
 Report Number: 11
 Report Date: 6/24/2003
 Copies To: COE AND ARROWHEAD
 Technician: BRANDON HIERONYMOUS
 Depth: 6 IN
 Maximum Dry Density: 117.1
 Optimum Moisture: 12.8
 Test Date: 6/14/2003
 % Compaction Required: 90%
 Moisture Requirement: 12.8 OR ABOVE
 Page: 1 of 1

To: ARROWHEAD CONST.
 12920 METCALF AVE. SUITE 150
 OVERLAND PARK, KS 66213

Project: CLOSURE OF SWMU101 SEWAGE LAGOON @
 CANNON AFB

ID No.	Sample Location	Wet Density (lb./ft. ³)	Moist. Content (%)	Dry Density (lb./ft. ³)	Percent of Max. (%)
56	RETEST 43 ON MAP	127.0	15.4	110.1	94.0
57	RETEST 44 ON MAP	125.8	16.3	108.2	92.4
58	RETEST 45 ON MAP	129.4	13.8	113.7	97.1
59	TEST 46 ON MAP	124.7	14.2	109.2	93.3
60	TEST 47 ON MAP	123.3	16.2	106.1	90.6
61	TEST 48 ON MAP	122.3	15.9	105.5	90.1
62	TEST 49 ON MAP	126.0	14.8	109.8	93.8
63	RETEST 42 ON MAP (ROAD)	124.2	14.8	108.2	92.4
64	TEST 50 ON MAP	124.7	15.7	107.8	92.1
65	TEST 51 ON MAP	125.2	14.8	109.1	93.2
66	TEST 52 ON MAP	123.9	16.3	106.5	90.9
67	TEST 53 ON MAP	123.0	13.4	108.5	92.7
68	TEST 54 ON MAP	121.9	13.9	107.0	91.4
69	TEST 55 ON MAP	127.5	13.9	111.9	95.6
70	TEST 56 ON MAP	127.6	13.3	112.6	96.2
71	TEST 57 ON MAP	121.0	12.8	107.3	91.6
72	TEST 58 ON MAP	121.4	15.2	105.4	90.0
73	TEST 59 ON MAP	125.6	12.8	111.3	95.0
74	TEST 60 ON MAP (SAND CONE)	126.7	12.2	112.9	96.4
75	TEST 61 ON MAP	128.5	13.4	113.3	96.8

ALL DENSITIES TAKEN WITH A TROXLER 3411-B MS=696 DS=2721
 EXISTING BERM REDDISH CLAYEY SAND "SM-SC"

Per: 

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on written request.

Lydick Engineers & Surveyors, Inc.

P. O. Box 728
205 E. 2nd Street
Clavis, NM 88101
62-3771

Field Densities

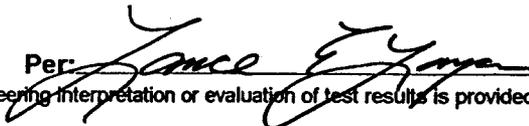
Project Number: DACAW45-94-D-0003
Report Number: 12
Report Date: 6/24/2003
Copies To: COE AND ARROWHEAD
Technician: BRANDON HIERONYMOUS
Depth: 6 IN
Maximum Dry Density: 107.1
Optimum Moisture: 14.3
Test Date: 6/17/2003
% Compaction Required: 90%
Moisture Requirement: 14.3 OR ABOVE
Page: 1 of 1

To: ARROWHEAD CONST.
12920 METCALF AVE. SUITE 150
OVERLAND PARK, KS 66213

Project: CLOSURE OF SWMU101 SEWAGE LAGOON @
CANNON AFB

ID No.	Sample Location	Wet Density (lb./ft. ³)	Moist. Content (%)	Dry Density (lb./ft. ³)	Percent of Max. (%)
76	RETEST 37 ON MAP	115.9	15.6	100.3	93.7
77	TEST 38 ON MAP	117.8	19.3	98.7	92.2
78	TEST 39 ON MAP	120.6	20.2	100.3	93.7
79	TEST 40 ON MAP (SAND CONE)	121.1	20.0	100.9	94.2
80	TEST 41 ON MAP	121.0	17.7	102.8	96.0
81	RETEST 35 ON MAP	113.4	15.3	98.4	91.9

ALL DENSITIES TAKEN WITH A TROXLER 3411-B MS=721 DS=2731
BARROW FILL(BOSTWICK PIT) BROWN SANDY LEAN CLAY "CL"

Per: 

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Lydick Engineers & Surveyors, Inc.

Field Densities

P. O. Box 728
205 E. 2nd Street
Clovis, NM 88101
505-762-3771

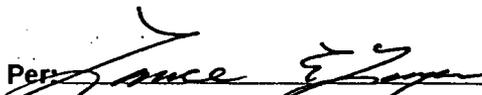
To: ARROWHEAD CONST.
12920 METCALF AVE, SUITE 150
OVERLAND PARK, KS 66213

Project: CLOSURE OF SWMU101 SEWAGE LAGOON @
CANNON AFB

Project Number: DACAW45-94-D-0003
Report Number: 13
Report Date: 6/24/2003
Copies To: COE AND ARROWHEAD
Technician: BRANDON HIERONYMOUS
Depth: 6 IN
Maximum Dry Density: 107.1
Optimum Moisture: 14.3
Test Date: 6/24/2003
% Compaction Required: 90%
Moisture Requirement: 14.3 OR ABOVE
Page: 1 of 1

ID No.	Sample Location	Wet Density (lb./ft. ³)	Moist. Content (%)	Dry Density (lb./ft. ³)	Percent of Max. (%)
82	TEST 62 ON MAP	117.5	17.8	99.7	93.1
83	TEST 63 ON MAP	127.0	19.2	106.5	99.4
84	TEST 64 ON MAP	127.6	19.8	106.5	99.4
85	TEST 65 ON MAP	127.6	19.6	106.7	99.6
86	TEST 66 ON MAP	118.0	17.4	100.5	93.8
87	TEST 67 ON MAP	114.5	17.2	97.7	91.2
88	TEST 68 ON MAP	117.9	18.6	99.4	92.8
89	TEST 69 ON MAP	116.7	20.2	97.1	90.7

ALL DENSITIES TAKEN WITH A TROXLER 3411-B MS=698 DS=2697
BARROW FILL(BOSTWICK PIT) BROWN SANDY LEAN CLAY "CL"

Per: 

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on written request.

ADDRESS
 PROJECT SWMU 101 Closure
 LOCATION
 Soil Barrier Layer



P.O. BOX 728
 CLOVIS, NEW MEXICO 88101
 TEL. 505-762-3771
 FAX 505-762-9093

DATE 6-4-03
 HOLE NO. 1

SAND CONE - DENSITY DETERMINATION - ASTM D-1556 - D-2216

REPORT NO. 28 - #20 STATION Q-2

TYPE OF MATERIAL Existing Berm "SM-SC"

DEPTH 6" 1st Lift CONTROL DENSITY 117.1 / 12.8

SAND CALIBRATION				GROUND SURFACE CALIBRATION			
1	WT. OF CAN FILLED	g.	lbs.	6	WT. OF CAN + SAND BEFORE	g.	16.4 lbs.
2	WT. OF CAN EMPTY	g.	lbs.	7	WT. OF CAN + SAND AFTER	g.	12.4 lbs.
3	WT. OF SAND	g.	lbs.	8	WT. OF SAND	g.	4.0 lbs.
4	VOL. OF CAN (PREDETERMINED)	cu.ft.					
5	CALIBRATED DENSITY (3 ÷ 4)	94.0	lbs./cu.ft.				

HOLE VOLUME DETERMINATION

9	WT. OF CAN + SAND BEFORE	g.	16.00 lbs.	12	WT. OF SAND (8)	g.	4.0 lbs.
10	WT. OF CAN + SAND AFTER	g.	6.80 lbs.	13	WT. OF SAND IN HOLE (11 - 12)	g.	5.2 lbs.
	WT. OF SAND	g.	9.20 lbs.	14	VOLUME OF HOLE (13 ÷ 5)	0.05531 cu.ft.	

MOISTURE DETERMINATION

15	WET WT. OF PAN + SAMPLE	g.	9.73 lbs.	19	DRY WT. OF SAMPLE (16 - 18)	g.	6.20 lbs.
16	DRY WT. OF PAN + SAMPLE	g.	8.83 lbs.	20	WATER CONTENT (17 ÷ 19) x 100	14.5 %	
17	WT. OF WATER (15 - 16)	g.	.90 lbs.				
18	WT. OF PAN - NO	#6	g. 2.63 lbs.	Nuclear 14.370			

DENSITY DETERMINATION AND ROCK CORRECTION (SAND METHOD)

21	TOTAL WET WT. OF PAN + SAMPLE	g.	7.78	lbs.	
22	WT. OF PAN - NO	g.	#1-A	.68	lbs.
23	TOTAL WET WT. OF SAMPLE (21 - 22)	g.	7.10	lbs.	
24	WT. OF ROCK	g.		lbs.	
25	VOL. OF ROCK				cu.ft.
26	WT. OF SOIL (WET)(23 - 24)	g.		lbs.	
27	VOL OF SOIL (14 - 25)				cu.ft.

"Nuclear" 129.8 DENSITY OF TOTAL SAMPLE 113.6

28 WET DENSITY (23 ÷ 14) 128.4 lbs/cu.ft. 29 DRY DENSITY 28 ÷ (100 + 20) 112.1 lbs/cu.ft.

30 PERCENT COMPACTION ÷ ACTUAL DENSITY ÷ CONTROL (DENSITY) 95.7 (97.0)

NOTE: TO CONVERT GRAMS TO POUNDS DIVIDE BY 453.6

TESTED BY: Brandon Heronimus COMPUTED BY: Robert Mick CHECKED BY: Lance Longan

REVISED FEB. 01

71	14-Jun-03	57	sm	area l	117.1	12.8	91.6	12.8	na	na	na	na	na	no
72	14-Jun-03	58	sm	area l	117.1	12.8	90	15.2	na	na	na	na	na	no
73	14-Jun-03	59	sm	area l	117.1	12.8	95	12.8	na	na	na	na	na	no
74	14-Jun-03	60	sm	area l	117.1	12.8	96.4	12.2	na	na	na	na	na	no
75	14-Jun-03	Sand cone 3	sm	area 1	117.1	12.8	95	13.5	na	na	na	na	na	yes
76	Sand Cone 3	is retest 60												
77	14-Jun-03	61	sm	area g	117.1	12.8	96.8	13.4	na	na	na	na	na	no
78	17-Jun-03	retest 37	cl	area F	107.1	14.3	93.7	15.6	na	na	na	na	na	no
79	17-Jun-03	38	cl	area F	107.1	14.3	92.2	19.3	na	na	na	na	na	no
80	17-Jun-03	39	cl	area F	107.1	14.3	93.7	20.2	na	na	na	na	na	no
81	17-Jun-03	40	cl	area F	107.1	14.3	94.2	20	na	na	na	na	na	no
82	17-Jun-03	Sand cone 2	cl	area F	107.1	14.3	95.1	19.2	na	na	na	na	na	yes
83	17-Jun-03	41	cl	area F	107.1	14.3	96	17.7	na	na	na	na	na	no
84	17-Jun-03	retest 35	cl	area F	107.1	14.3	91.9	15.3	na	na	na	na	na	no
85	24-Jun-03	62	cl	area H	107.1	14.3	93.1	17.8	na	na	na	na	na	no
86	24-Jun-03	63	cl	area H	107.1	14.3	99.4	19.2	na	na	na	na	na	no
87	24-Jun-03	64	cl	area H	107.1	14.3	99.4	19.8	na	na	na	na	na	no
88	24-Jun-03	65	cl	area H	107.1	14.3	99.6	19.6	na	na	na	na	na	no
89	24-Jun-03	66	cl	area H	107.1	14.3	93.8	17.4	na	na	na	na	na	no
90	24-Jun-03	67	cl	area H	107.1	14.3	91.2	17.2	na	na	na	na	na	no
91	24-Jun-03	68	cl	area H	107.1	14.3	92.8	18.6	na	na	na	na	na	no
92	24-Jun-03	69	cl	area H	107.1	14.3	90.7	20.2	na	na	na	na	na	no
93														
94														
95														
96														
97														
98														
99														
100														
101														
102														
103														
104														
105														
106														
107														

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE		DATE 08/07/2003	TRANSMITTAL NO. 02377-11
PROJECT TITLE SWMU 101 - Sewage Lagoons	CONTRACT NO. DACW45-94-D-0003 0035		PAGE 1 of 1
LOCATION Cannon AFB			

Item	Description	Variation	QA Code
13	TOPO-POST SBL PLACEMENT SOUTH	No	B

SECTION III - GOVERNMENT REVIEW REMARKS

Code B Remarks:

The west edge of survey area is not shown or not surveyed in sufficient detail to show contours along the west edge. This area should be shown in next submittal.

SUBMITTAL REVIEW VERIFICATION SHEET

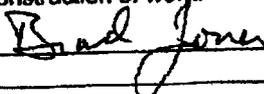
Date: August 5, 2003

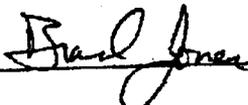
Submittal No.: 02377-13

Foster Wheeler Environmental Corporation Stamp

SWMU 101 Sewage Lagoons Closure, Cannon AFB, NM	
Certified for approval as indicated below:	
A -	Approved as submitted
B -	Approved except as noted on the drawings and/or attached sheets.
It is hereby certified that the (equipment) (material) shown and marked in this submittal is that proposed to be incorporated into Contract Number DACW45-94-D-0003, Delivery Order No. 35, Work Authorization Directive 1 is in compliance with the contract drawings and specifications, can be installed in the allocated spaces, and is submitted for Government approval.	
Reviewed/Certified By:	
Description of items reviewed: TOPO Post Soil Barrier Placement (South Half) - Test Reports SD06	

U.S. Army Corps of Engineers Stamp

U.S. Army Engineer District, Albuquerque Corps of Engineers	
Certified for approval as indicated below:	
A -	Approved as submitted.
<input checked="" type="radio"/> B -	Approved except as noted on the drawings and/or attached sheet(s). Resubmission not required.
C -	Approved except as noted on the drawings and/or attached sheet(s). Resubmission required.
D -	Will be returned by separate correspondence.
E -	Disapproved; see comments on attached sheet.
F -	Receipt acknowledged.
G -	Other: Specify.
Note: Items approved as to general layout only. Dimensions and quantities checked. Approval does not relieve contractor of responsibilities for errors that may exist, as contractor shall be responsible for dimensions and design of adequate corrections. Details and satisfactory construction of work.	
Signature: 	Date: <u>8-6-03</u>

Reviewer's Signature: 

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE		DATE 08/07/2003	TRANSMITTAL NO. 02377-11
PROJECT TITLE SWMU 101 - Sewage Lagoons	CONTRACT NO. DACW45-94-D-0003 0035		PAGE 1 of 1
LOCATION Cannon AFB			

Item	Description	Quantity	Code
13	TOPO-POST SBL PLACEMENT SOUTH	No	B

SECTION III - GOVERNMENT REVIEW REMARKS

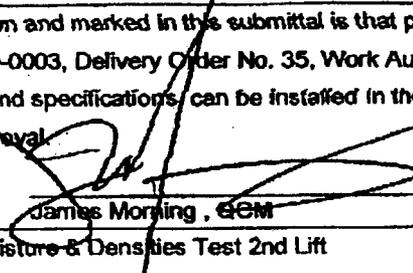
Code B Remarks:
The west edge of survey area is not shown or not surveyed in sufficient detail to show contours along the west edge. This area should be shown in next submittal.

SUBMITTAL REVIEW VERIFICATION SHEET

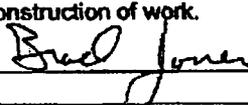
Date: Aug 7, 2003

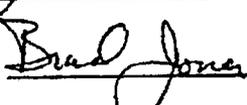
Submittal No.: 02377-12

Foster Wheeler Environmental Corporation Stamp

SWMU 101 Sewage Lagoons Closure, Cannon AFB, NM Certified for approval as indicated below:	
A -	Approved as submitted
B -	Approved except as noted on the drawings and/or attached sheets.
It is hereby certified that the (equipment) (material) shown and marked in this submittal is that proposed to be incorporated into Contract Number DACW45-94-D-0003, Delivery Order No. 35, Work Authorization Directive 1 is in compliance with the contract drawings and specifications, can be installed in the allocated spaces, and is submitted for Government approval.	
Reviewed/Certified By:	 James Morning, EGM
Description of items reviewed: SD-06 Test Reports-Moisture & Densities Test 2nd Lift Partial 1-40 of 68.	

U.S. Army Corps of Engineers Stamp

U.S. Army Engineer District, Albuquerque Corps of Engineers Certified for approval as indicated below:	
<input checked="" type="radio"/> A -	Approved as submitted.
<input type="radio"/> B -	Approved except as noted on the drawings and/or attached sheet(s). Resubmission not required.
<input type="radio"/> C -	Approved except as noted on the drawings and/or attached sheet(s). Resubmission required.
<input type="radio"/> D -	Will be returned by separate correspondence.
<input type="radio"/> E -	Disapproved; see comments on attached sheet.
<input type="radio"/> F -	Receipt acknowledged.
<input type="radio"/> G -	Other: Specify.
Note: Items approved as to general layout only. Dimensions and quantities checked. Approval does not relieve contractor of responsibilities for errors that may exist, as contractor shall be responsible for dimensions and design of adequate corrections. Details and satisfactory construction of work.	
Signature: 	Date: 8-12-03

Reviewer's Signature: 

Lydick Engineers & Surveyors, Inc.

P. O. Box 728
205 E. 2nd Street
Clovis, NM 88101
505-762-3771

To: ARROWHEAD CONST.
12920 METCALF AVE. SUITE 150
OVERLAND PARK, KS 66213

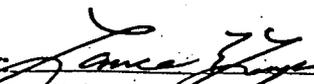
Project: CLOSURE OF SWMU101 SEWAGE LAGOON @
CANNON AFB

Field Densities

Project Number: DACAW45-94-D-0002
Report Number: 14
Report Date: 6/24/2003
Copies To: COE AND ARROWHEAD
Technician: BRANDON HIERONYMOUS
Depth: 6 IN
Maximum Dry Density: 107.1
Optimum Moisture: 14.3
Test Date: 6/24/2003
% Compaction Required: 90%
Moisture Requirement: 14.3 OR ABOVE
Page: 1 of 1

ID No.	Sample Location	Wet Density (lb./ft. ³)	Moist. Content (%)	Dry Density (lb./ft. ³)	Percent of Max. (%)
1	ON MAP	121.3	16.2	104.4	97.5
2	ON MAP	119.6	15.9	103.2	96.4
3	ON MAP	118.4	16.5	101.6	94.9
4	ON MAP	117.2	15.7	101.3	94.6
5	ON MAP	119.3	17.4	101.6	94.9
6	ON MAP	122.5	18.3	103.6	96.7
7	ON MAP	119.8	18.2	101.4	94.7
8	ON MAP	125.8	19.2	105.5	98.5
9	ON MAP	121.8	19.2	102.2	95.4
10	ON MAP	120.5	15.3	104.5	97.6
11	ON MAP	118.0	20.5	97.9	91.4
12	ON MAP	124.6	18.5	105.1	98.1

ALL DENSITIES TAKEN WITH A TROXLER 3411-B MS=723 DS=2709
BARROW FILL(BOSTWICK PIT) BROWN SANDY LEAN CLAY "CL" 2nd LIFT

Per: 

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on written request.

CLIENT Arrowhead Const
 ADDRESS
 PROJECT SWMU 101 Closure
 LOCATION
Cannon AFB Clovis, NM.



LYDICK ENGINEERS & SURVEYORS
 P.O. BOX 728
 CLOVIS, NEW MEXICO 88101
 TEL. 505-762-3771
 FAX 505-762-9093

DATE 6-30-03
 HOLE NO. 4

SAND CONE - DENSITY DETERMINATION - ASTM D-1556

REPORT NO. 20 STATION

TYPE OF MATERIAL Barrow Fill (Bostwick Pit)

DEPTH 6" 2nd Lift CONTROL DENSITY 107.1 / 14.3

SAND CALIBRATION				GROUND SURFACE CALIBRATION			
1	WT. OF CAN FILLED	g.	lbs.	6	WT. OF CAN + SAND BEFORE	g.	lbs.
2	WT. OF CAN EMPTY	g.	lbs.	7	WT. OF CAN + SAND AFTER	g.	lbs.
3	WT. OF SAND	g.	lbs.	8	WT. OF SAND	g.	lbs.
4	VOL. OF CAN (PREDETERMINED)	cu.ft.					
5	CALIBRATED DENSITY (3 ÷ 4)	<u>94.0</u> lbs./cu.ft.					

HOLE VOLUME DETERMINATION

9	WT. OF CAN + SAND BEFORE	g.	lbs.	12	WT. OF SAND (8)	g.	lbs.
10	WT. OF CAN + SAND AFTER	g.	lbs.	13	WT. OF SAND IN HOLE (11 - 12)	g.	lbs.
	WT. OF SAND	g.	lbs.	14	VOLUME OF HOLE (13 ÷ 5)	<u>0.05531</u> cu.ft.	

MOISTURE DETERMINATION

15	WET WT. OF PAN + SAMPLE	g.	lbs.	19	DRY WT. OF SAMPLE (16 - 18)	g.	lbs.
16	DRY WT. OF PAN + SAMPLE	g.	lbs.	20	WATER CONTENT (17 ÷ 19) × 100	<u>23.4</u> %	
17	WT. OF WATER (15 - 16)	g.	lbs.	<u>Nuke 22.3</u>			
18	WT. OF PAN - NO	g.	lbs.				

DENSITY DETERMINATION AND ROCK CORRECTION (SAND METHOD)

21	TOTAL WET WT. OF PAN + SAMPLE	g.	lbs.	<u>7.50</u> lbs.			
22	WT. OF PAN - NO	g.	lbs.	<u>.60</u> lbs.			
23	TOTAL WET WT. OF SAMPLE (21 - 22)	g.	lbs.	<u>6.90</u> lbs.			
24	WT. OF ROCK	g.	lbs.				
25	VOL. OF ROCK			cu.ft.			
26	WT. OF SOIL (WET)(23 - 24)	g.	lbs.				
27	VOL OF SOIL (14 - 25)			cu.ft.			

Nuke 124.7

DENSITY OF TOTAL SAMPLE

Nuke 102.0

28	WET DENSITY (23 ÷ 14)	<u>124.8</u>	lbs/cu.ft.	29	DRY DENSITY 28 ÷ (100 + 20))	<u>101.1</u>	lbs/cu.ft.
----	-----------------------	--------------	------------	----	------------------------------	--------------	------------

PERCENT COMPACTION ÷ ACTUAL DENSITY ÷ CONTROL (DENSITY) 94.4 Nuke = 95.2

NOTE: TO CONVERT GRAMS TO POUNDS DIVIDE BY 453.6

TESTED BY: Lance Lopez

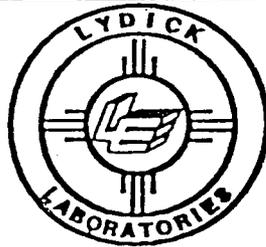
COMPUTED BY: Lance Lopez

CHECKED BY:

CLIENT Arrow Head Const.
ADDRESS

PROJECT SMU 101 Closure
LOCATION

Cannon AFB Clovis, N.M.



LYDICK ENGINEERS & SURVEYORS
P.O. BOX 728
CLOVIS, NEW MEXICO 88101
TEL. 505-762-3771
FAX 505-762-9093

DATE 7-1-03

HOLE NO. 5

SAND CONE - DENSITY DETERMINATION - ASTM D-1556

REPORT NO. 40 STATION _____

TYPE OF MATERIAL Borrow Fill (Bostwick Pit)

DEPTH 6" 2nd Lift CONTROL DENSITY 107.1 / 119.3

SAND CALIBRATION

GROUND SURFACE CALIBRATION

1	WT. OF CAN FILLED	g.	lbs.	6	WT. OF CAN + SAND BEFORE	g.	lbs.
2	WT. OF CAN EMPTY	g.	lbs.	7	WT. OF CAN + SAND AFTER	g.	lbs.
3	WT. OF SAND	g.	lbs.	8	WT. OF SAND	g.	lbs.
4	VOL. OF CAN (PREDETERMINED)	cu.ft.					
5	CALIBRATED DENSITY (3 ÷ 4)	<u>94.0</u> lbs./cu.ft.					

HOLE VOLUME DETERMINATION

9	WT. OF CAN + SAND BEFORE	g.	lbs.	12	WT. OF SAND (8)	g.	lbs.
10	WT. OF CAN + SAND AFTER	g.	lbs.	13	WT. OF SAND IN HOLE (11 - 12)	g.	lbs.
11	WT. OF SAND	g.	lbs.	14	VOLUME OF HOLE (13 ÷ 5)	<u>0.05744</u> cu.ft.	

MOISTURE DETERMINATION

15	WET WT. OF PAN + SAMPLE	g.	lbs.	19	DRY WT. OF SAMPLE (16 - 18)	g.	lbs.
16	DRY WT. OF PAN + SAMPLE	g.	lbs.	20	WATER CONTENT (17 ÷ 19) x 100	<u>20.0</u> %	
17	WT. OF WATER (15 - 16)	g.	lbs.	Nuke <u>19.4</u>			
18	WT. OF PAN - NO	g.	lbs.				

DENSITY DETERMINATION AND ROCK CORRECTION (SAND METHOD)

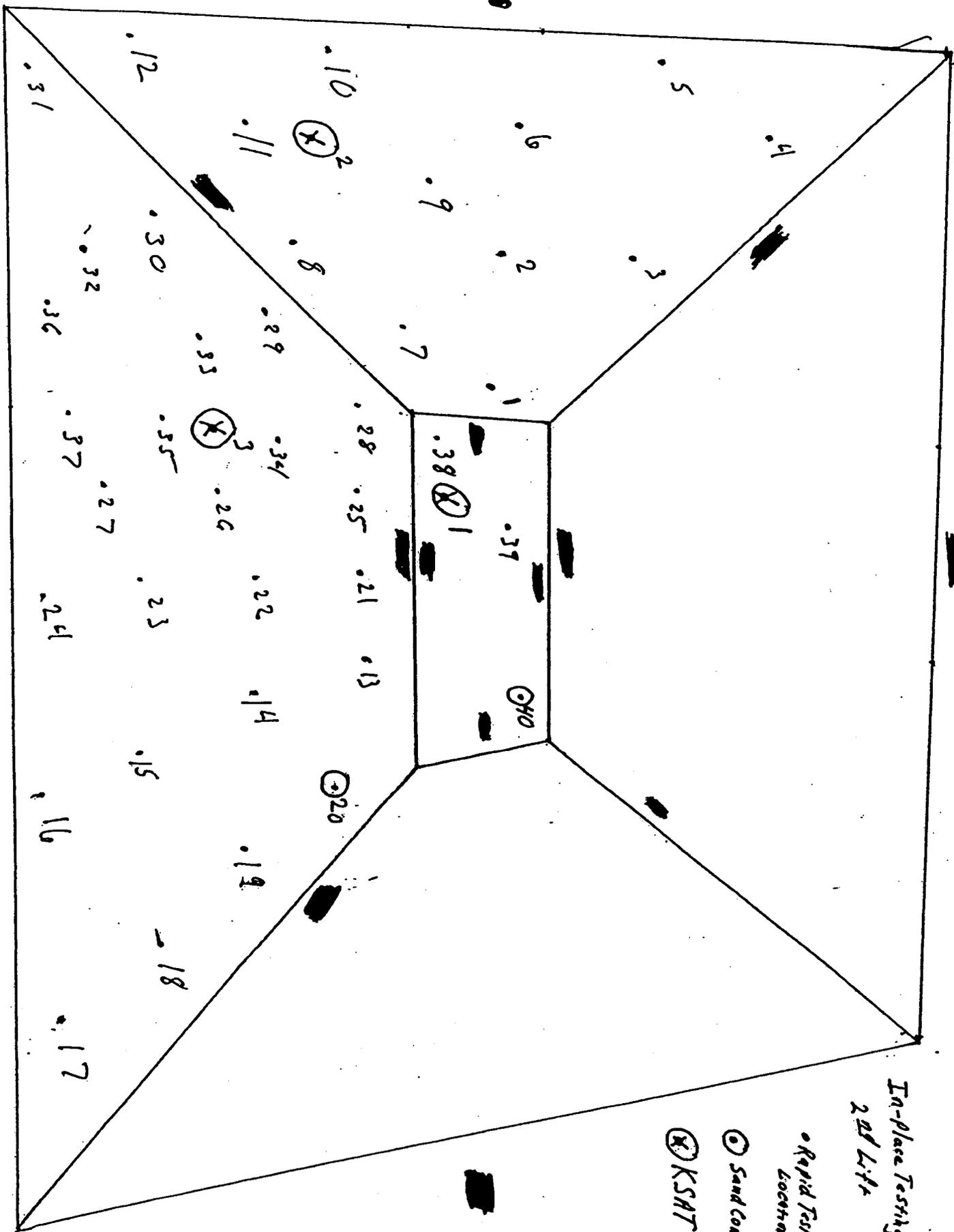
21	TOTAL WET WT. OF PAN + SAMPLE	g.	lbs.	<u>7.32</u> lbs.	
22	WT. OF PAN - NO	g.	lbs.	<u>.60</u> lbs.	
23	TOTAL WET WT. OF SAMPLE (21 - 22)	g.	lbs.	<u>6.72</u> lbs.	
24	WT. OF ROCK	g.	lbs.		
25	VOL. OF ROCK			cu.ft.	
26	WT. OF SOIL (WET)(23 - 24)	g.	lbs.		
27	VOL OF SOIL (14 - 25)			cu.ft.	

DENSITY OF TOTAL SAMPLE

Nuke <u>116.4</u>		Nuke = <u>97.5</u>			
28	NET DENSITY (23 ÷ 14)	<u>117.0</u> lbs/cu.ft.	29	DRY DENSITY 28 ÷ (100 + 20))	<u>97.5</u> lbs/cu.ft.
30	PERCENT COMPACTION ÷ ACTUAL DENSITY ÷ CONTROL (DENSITY)		<u>91.0</u>	Nuke = <u>91.0</u>	

NOTE: TO CONVERT GRAMS TO POUNDS DIVIDE BY 453.6

TESTED BY: Lance Langan COMPUTED BY: [Signature] CHECKED BY:



In-place Testing
2nd Lift

○ Rapid Test
Locations

○ Sand Cores

⊗ KSAT

N
↑

SUBMITTAL REVIEW VERIFICATION SHEET

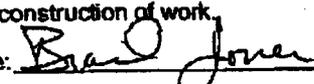
Date: Aug 7, 2003

Submittal No.: 02377-13

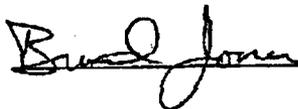
Foster Wheeler Environmental Corporation Stamp

SWMU 101 Sewage Lagoons Closure, Cannon AFB, NM	
Certified for approval as indicated below:	
A -	Approved as submitted
B -	Approved except as noted on the drawings and/or attached sheets.
It is hereby certified that the (equipment) (material) shown and marked in this submittal is that proposed to be incorporated into Contract Number DACW45-94-D-0003, Delivery Order No. 35, Work Authorization Directive 1 is in compliance with the contract drawings and specifications, can be installed in the allocated spaces, and is submitted for Government approval.	
Reviewed/Certified By:	 James Morning, QCM
Description of items reviewed: SD-08 Test Reports-2 nd set Assessments Test First and 2 nd Lift	

U.S. Army Corps of Engineers Stamp

U.S. Army Engineer District, Albuquerque Corps of Engineers	
Certified for approval as indicated below:	
<input checked="" type="radio"/> A -	Approved as submitted.
<input type="radio"/> B -	Approved except as noted on the drawings and/or attached sheet(s). Resubmission not required.
<input type="radio"/> C -	Approved except as noted on the drawings and/or attached sheet(s). Resubmission required.
<input type="radio"/> D -	Will be returned by separate correspondence.
<input type="radio"/> E -	Disapproved; see comments on attached sheet.
<input type="radio"/> F -	Receipt acknowledged.
<input type="radio"/> G -	Other. Specify.
Note: Items approved as to general layout only. Dimensions and quantities checked. Approval does not relieve contractor of responsibilities for errors that may exist, as contractor shall be responsible for dimensions and design of adequate corrections. Details and satisfactory construction of work.	
Signature: 	Date: 8-12-03

Reviewer's Signature:



GRAIN SIZE DISTRIBUTION TEST DATA

ent: ARROW HEAD CONSTRUCTION
Project: SWMU 101 LAGOON CLOSURE @ WASTE WATER TREATMENT PLANT CANNON A.F.B.
Project Number: DACW45-94-0003

Sample Data

Source:
Sample No.: 9
Elev. or Depth: FIRST LIFT **Sample Length(in./cm.):**
Location: BARROW FILL FROM BOSTICK PIT MELROSE, NM 1 6-17-03
Description: BROWN SANDY LEAN CLAY
Date: 6-17-03 **PL:** 29 **LL:** 43 **PI:** 14
USCS Classification: CL **AASHTO Classification:**
Testing Remarks: SAMPLED FROM IN PLACE MATERIAL

Mechanical Analysis Data

Sieve	Size, mm	Percent finer
# 4	4.750	100.0
# 10	2.000	100.0
# 40	0.425	95.4
# 80	0.180	83.2
# 200	0.075	52.1

Hydrometer Analysis Data

Separation sieve is #10
 Percent -#10 based upon complete sample= 100.0
 Weight of hydrometer sample: 50.0
 Hygroscopic moisture correction:
 Moist weight & tare = 38.50
 Dry weight & tare = 37.27
 Tare = 21.36
 Hygroscopic moisture= 7.7 %
 Calculated biased weight= 46.41
 Automatic temperature correction
 Composite correction at 20 deg C = 5.0

Meniscus correction only= 0
 Specific gravity of solids= 2.70
 Specific gravity correction factor= 0.989
 Hydrometer type: 152H
 Effective depth L= 16.294964 - 0.164 x Rm

Elapsed time, min	Temp, deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
2.00	20.5	14.0	19.1	0.0134	14.0	14.0	0.0353	40.6
5.00	20.5	14.0	19.1	0.0134	14.0	14.0	0.0224	40.6
15.00	20.5	13.0	18.1	0.0134	13.0	14.2	0.0130	38.5
30.00	20.5	13.0	18.1	0.0134	13.0	14.2	0.0092	38.5
60.00	20.5	13.0	18.1	0.0134	13.0	14.2	0.0065	38.5
250.00	20.5	12.0	17.1	0.0134	12.0	14.3	0.0032	36.4
1440.00	20.5	12.0	17.1	0.0134	12.0	14.3	0.0013	36.4

Fractional Components

Gravel/Sand based on #4

Sand/Fines based on #200

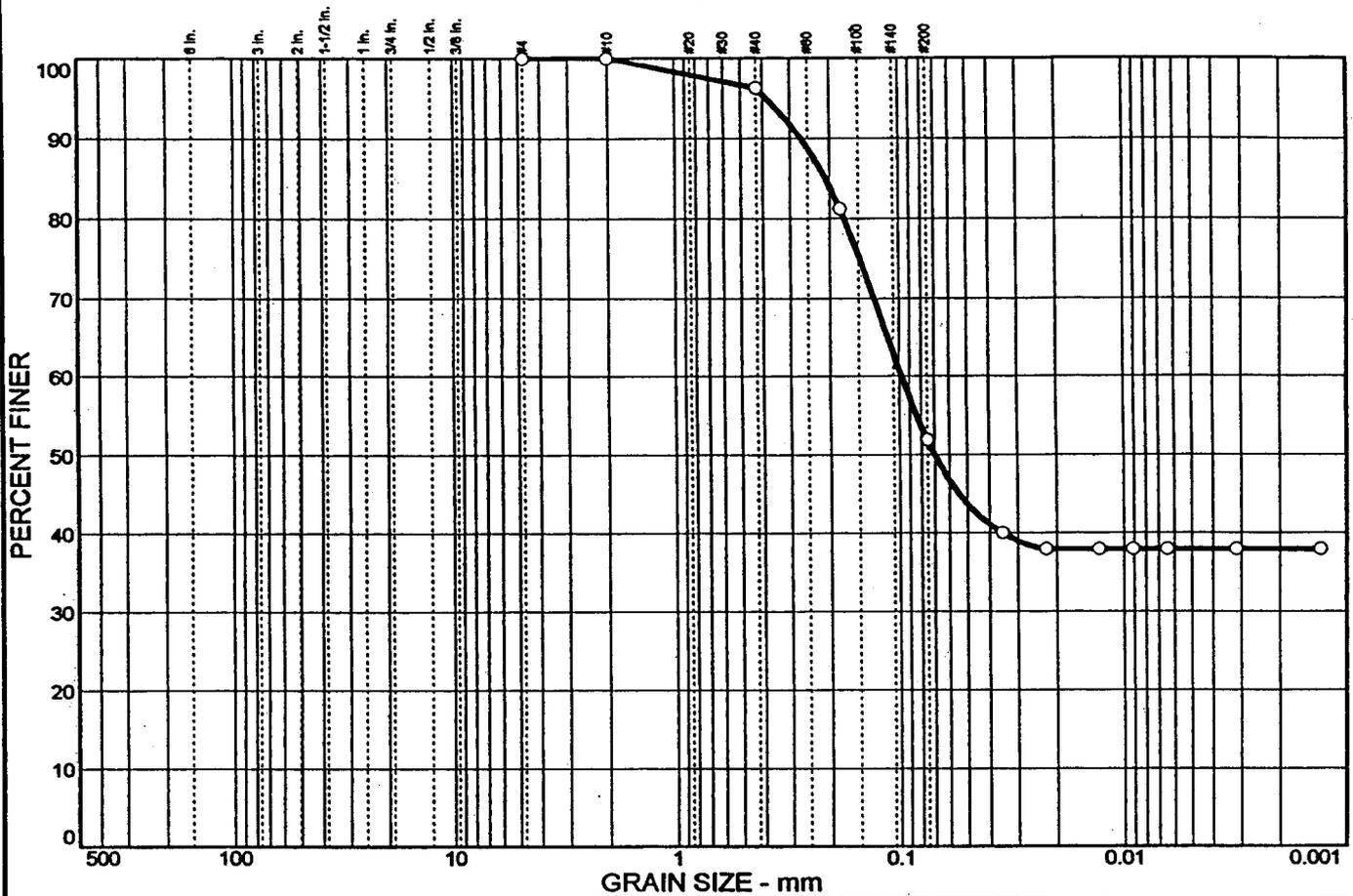
% COBBLES = % GRAVEL =

% SAND = 47.9

% SILT = 14.5 % CLAY = 37.6

D85= 0.19 D60= 0.09 D50= 0.07

PARTICLE SIZE ANALYSIS AS PER ASTM D 422-98



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	48.1	14.0	37.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	100.0		
#40	96.3		
#80	81.2		
#200	51.9		

* (no specification provided)

Soil Description

BROWN SANDY LEAN CLAY

Atterberg Limits

PL= 27 LL= 39 PI= 12

Coefficients

D₈₅= 0.209 D₆₀= 0.0970 D₅₀= 0.0697
D₃₀= D₁₅= D₁₀=
C_u= C_c=

Classification

USCS= CL AASHTO=

Remarks

SAMPLED FROM IN-PLACE MATERIAL

Sample No.: 10 Source of Sample: Date: 6-17-03
Location: BARROW FILL FROM BOSTWICK PIT MELROSE, NM 2 6-17-03 Elev./Depth: FIRST LIFT

LYDICK ENGINEERS & SURVEYORS, INC.	Client: ARROW HEAD CONSTRUCTION Project: SWMU 101 LAGOON CLOSURE @ WASTE WATER TREATMENT PLANT CANNON A.F.B. Project No: DACW45-94-0003 Figure
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GRAIN SIZE DISTRIBUTION TEST DATA

Client: ARROW HEAD CONSTRUCTION
 Project: SWMU 101 LAGOON CLOSURE @ WASTE WATER TREATMENT PLANT CANNON A.F.B.
 Project Number: DACW45-94-0003

Sample Data

Source:
 Sample No.: 10
 Elev. or Depth: FIRST LIFT
 Location: BARROW FILL FROM BOSTWICK PIT MELROSE, NM 2 6-17-03
 Description: BROWN SANDY LEAN CLAY
 Date: 6-17-03 PL: 27 LL: 39 PI: 12
 USCS Classification: CL AASHTO Classification:
 Testing Remarks: SAMPLED FROM IN-PLACE MATERIAL

Mechanical Analysis Data

Sieve	Size, mm	Percent finer
# 4	4.750	100.0
# 10	2.000	100.0
# 40	0.425	96.3
# 80	0.180	81.2
# 200	0.075	51.9

Hydrometer Analysis Data

Separation sieve is #10
 Percent -#10 based upon complete sample= 100.0
 Weight of hydrometer sample: 50.0
 Hygroscopic moisture correction:
 Moist weight & tare = 37.83
 Dry weight & tare = 37.01
 Tare = 25.00
 Hygroscopic moisture= 6.8 %
 Calculated biased weight= 46.80
 Automatic temperature correction
 Composite correction at 20 deg C = 5.0

Meniscus correction only= 0
 Specific gravity of solids= 2.73
 Specific gravity correction factor= 0.983
 Hydrometer type: 152H
 Effective depth L= 16.294964 - 0.164 x Rm

Elapsed time, min	Temp, deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
2.00	20.5	14.0	19.1	0.0132	14.0	14.0	0.0350	40.0
5.00	20.5	13.0	18.1	0.0132	13.0	14.2	0.0223	37.9
15.00	20.5	13.0	18.1	0.0132	13.0	14.2	0.0129	37.9
30.00	20.5	13.0	18.1	0.0132	13.0	14.2	0.0091	37.9
60.00	20.5	13.0	18.1	0.0132	13.0	14.2	0.0064	37.9
250.00	20.5	13.0	18.1	0.0132	13.0	14.2	0.0032	37.9
1440.00	20.5	13.0	18.1	0.0132	13.0	14.2	0.0013	37.9

Fractional Components

Gravel/Sand based on #4

Sand/Fines based on #200

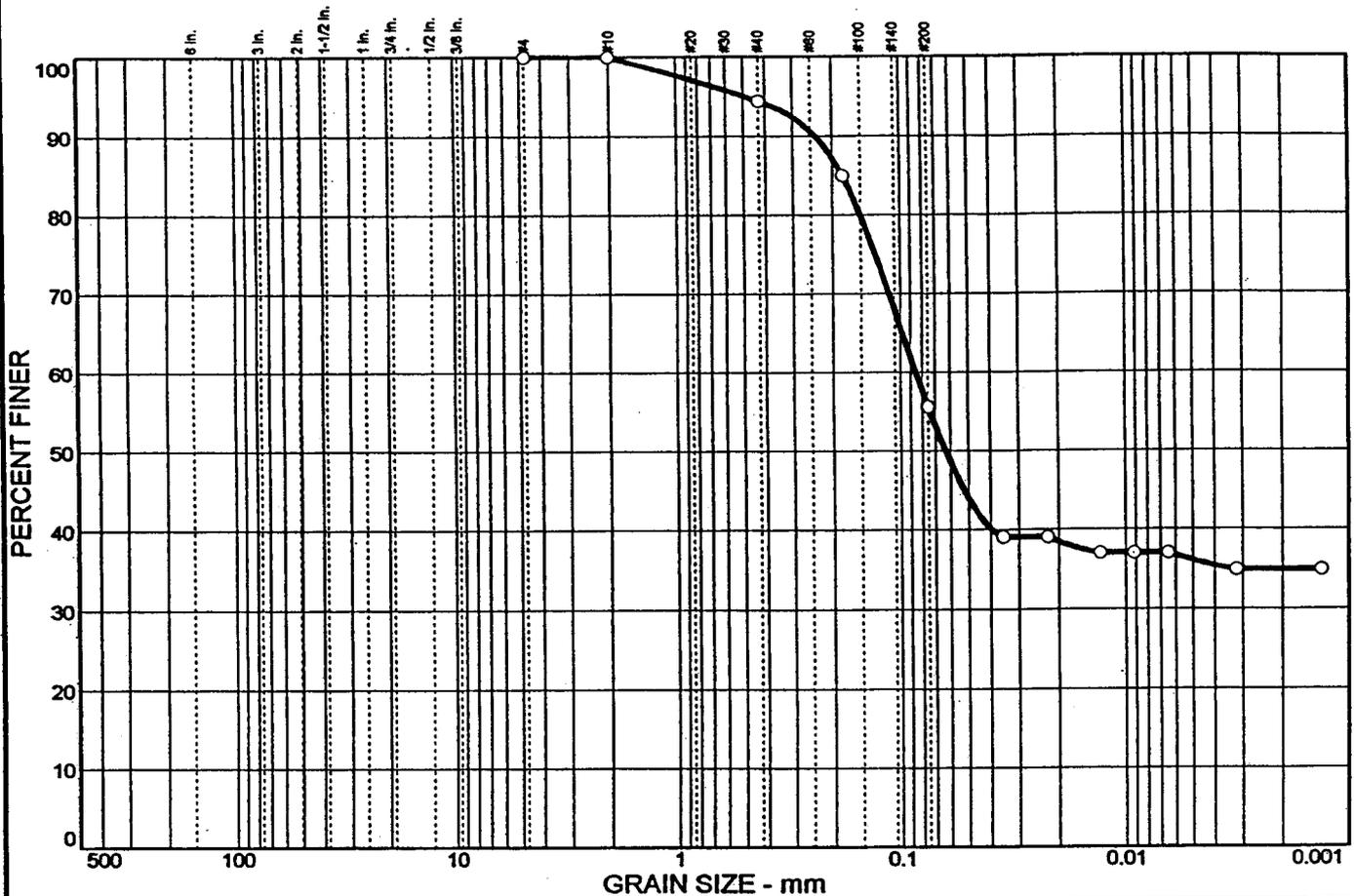
% COBBLES = % GRAVEL =

% SAND = 48.1

% SILT = 14.0 % CLAY = 37.9

D85= 0.21 D60= 0.10 D50= 0.07

PARTICLE SIZE ANALYSIS AS PER ASTM D 422-98



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	44.4	19.5	36.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	100.0		
#40	94.3		
#80	84.9		
#200	55.6		

Soil Description

BROWN SANDY LEAN CLAY

Atterberg Limits

PL= 24 LL= 39 PI= 15

Coefficients

D₈₅= 0.181 D₆₀= 0.0851 D₅₀= 0.0629
 D₃₀= D₁₅= D₁₀=
 C_u= C_c=

Classification

USCS= CL AASHTO=

Remarks

SAMPLED FROM IN-PLACE MATERIAL

* (no specification provided)

Sample No.: 11 Source of Sample: Date: 6-24-03
 Location: BARROW FILL FROM BOSTWICK PIT MELROSE, NM 1 6-24-03 Elev./Depth: FIRST LIFT

LYDICK ENGINEERS & SURVEYORS, INC.	Client: ARROW HEAD CONSTRUCTION Project: SWMU 101 LAGOON CLOSURE @ WASTE WATER TREATMENT PLANT CANNON A.F.B. Project No: DACW45-94-0003
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GRAIN SIZE DISTRIBUTION TEST DATA

ent: ARROW HEAD CONSTRUCTION
Project: SWMU 101 LAGOON CLOSURE @ WASTE WATER TREATMENT PLANT CANNON A.F.B.
Project Number: DACW45-94-0003

Sample Data

Source:
Sample No.: 11
Elev. or Depth: FIRST LIFT Sample Length(in./cm.):
Location: BARROW FILL FROM BOSTWICK PIT MELROSE, NM 1 6-24-03
Description: BROWN SANDY LEAN CLAY
Date: 6-24-03 PL: 24 LL: 39 PI: 15
USCS Classification: CL AASHTO Classification:
Testing Remarks: SAMPLED FROM IN-PLACE MATERIAL

Mechanical Analysis Data

Table with 3 columns: Sieve, Size, mm, Percent finer. Rows include sieves #4, #10, #40, #80, #200.

Hydrometer Analysis Data

Separation sieve is #10
Percent -#10 based upon complete sample= 100.0
Weight of hydrometer sample: 50.0
Hygroscopic moisture correction:
Moist weight & tare = 38.48
Dry weight & tare = 37.89
Tare = 25.25
Hygroscopic moisture= 4.7 %
Calculated biased weight= 47.77
Automatic temperature correction
Composite correction at 20 deg C = 5.0
Meniscus correction only= 0
Specific gravity of solids= 2.73
Specific gravity correction factor= 0.983
Hydrometer type: 152H
Effective depth L= 16.294964 - 0.164 x Rm

Table with 9 columns: Elapsed time, min; Temp, deg C; Actual reading; Corrected reading; K; Rm; Eff. depth; Diameter mm; Percent finer. Rows show data for 2.00, 5.00, 15.00, 30.00, 60.00, 250.00, and 1440.00 minutes.

Fractional Components

Gravel/Sand based on #4

Sand/Fines based on #200

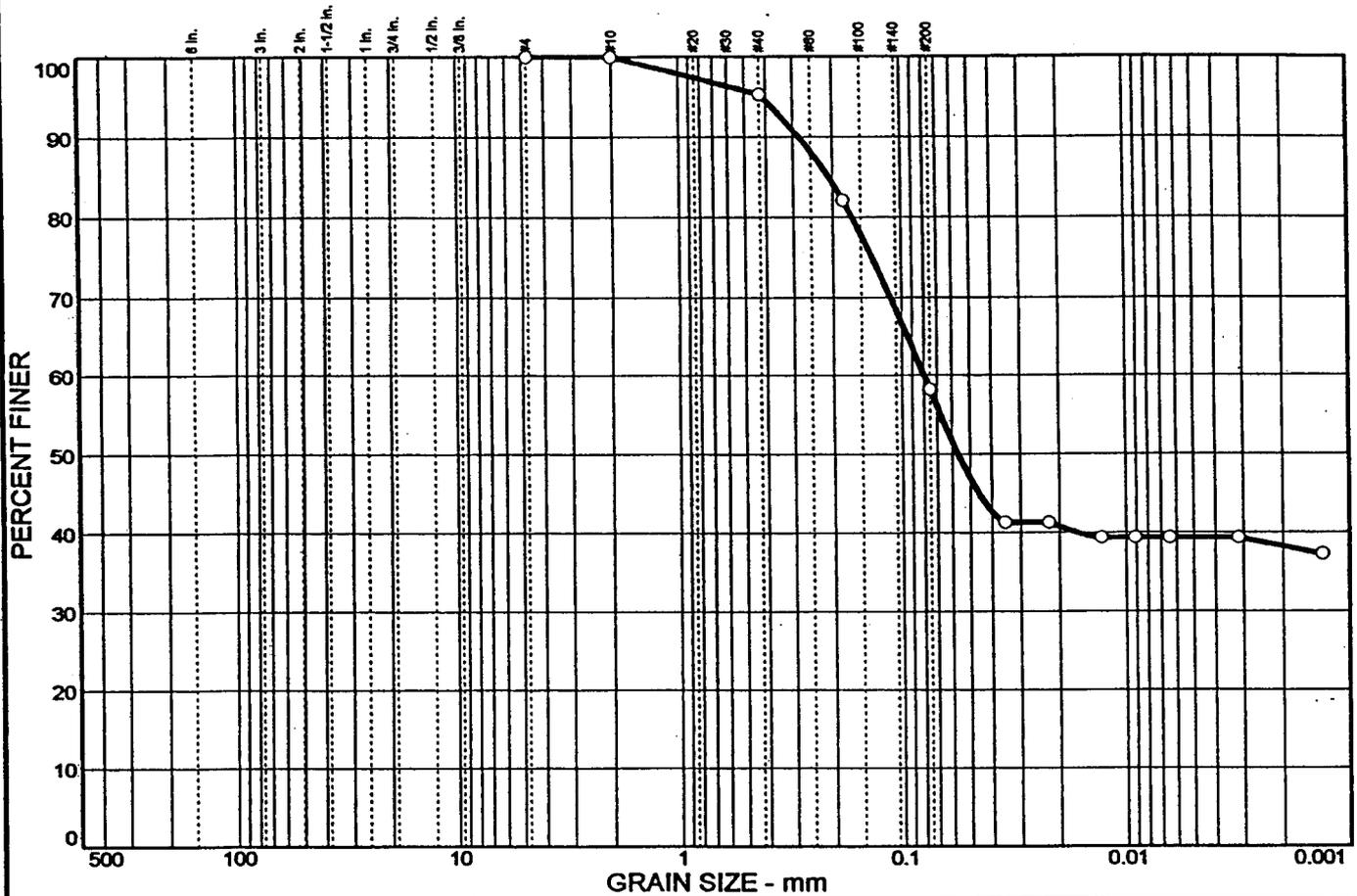
% COBBLES = % GRAVEL =

% SAND = 44.4

% SILT = 19.5 % CLAY = 36.1

D85= 0.18 D60= 0.09 D50= 0.06

PARTICLE SIZE ANALYSIS AS PER ASTM D 422-98



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	41.8	18.9	39.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	100.0		
#40	95.3		
#80	82.1		
#200	58.2		

Soil Description

BROWN SANDY LEAN CLAY

Atterberg Limits

PL= 24 LL= 39 PI= 15

Coefficients

D₈₅= 0.208 D₆₀= 0.0796 D₅₀= 0.0565
D₃₀= D₁₅= D₁₀=
C_u= C_c=

Classification

USCS= CL AASHTO=

Remarks

SAMPLED FROM IN-PLACE MATERIAL

* (no specification provided)

Sample No.: 12 Source of Sample: Date: 6-24-03
Location: BARROW FILL FROM BOSTWICK PIT MELROSE, NM 2 6-24-03 Elev./Depth: FIRST LIFT

LYDICK ENGINEERS & SURVEYORS, INC.	Client: ARROW HEAD CONSTRUCTION Project: SWMU 101 LAGOON CLOSURE @ WASTE WATER TREATMENT PLANT CANNON A.F.B. Project No.: DACW45-94-0003
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GRAIN SIZE DISTRIBUTION TEST DATA

Client: ARROW HEAD CONSTRUCTION
 Project: SWMU 101 LAGOON CLOSURE @ WASTE WATER TREATMENT PLANT CANNON A.F.B.
 Project Number: DACW45-94-0003

Sample Data

Source:
 Sample No.: 12
 Elev. or Depth: FIRST LIFT Sample Length(in./cm.):
 Location: BARROW FILL FROM BOSTWICK PIT MELROSE, NM 2 6-24-03
 Description: BROWN SANDY LEAN CLAY
 Date: 6-24-03 PL: 24 LL: 39 PI: 15
 USCS Classification: CL AASHTO Classification:
 Testing Remarks: SAMPLED FROM IN-PLACE MATERIAL

Mechanical Analysis Data

Sieve	Size, mm	Percent finer
# 4	4.750	100.0
# 10	2.000	100.0
# 40	0.425	95.3
# 80	0.180	82.1
# 200	0.075	58.2

Hydrometer Analysis Data

Preparation sieve is #10
 Percent -#10 based upon complete sample= 100.0
 Weight of hydrometer sample: 50.0
 Hygroscopic moisture correction:
 Moist weight & tare = 37.27
 Dry weight & tare = 36.41
 Tare = 20.30
 Hygroscopic moisture= 5.3 %
 Calculated biased weight= 47.47
 Automatic temperature correction
 Composite correction at 20 deg C = 5.0

 Meniscus correction only= 0
 Specific gravity of solids= 2.73
 Specific gravity correction factor= 0.983
 Hydrometer type: 152H
 Effective depth L= 16.294964 - 0.164 x Rm

Elapsed time, min	Temp, deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
2.00	20.0	15.0	20.0	0.0133	15.0	13.8	0.0350	41.3
5.00	20.0	15.0	20.0	0.0133	15.0	13.8	0.0222	41.3
15.00	20.0	14.0	19.0	0.0133	14.0	14.0	0.0129	39.3
30.00	20.0	14.0	19.0	0.0133	14.0	14.0	0.0091	39.3
60.00	20.0	14.0	19.0	0.0133	14.0	14.0	0.0064	39.3
250.00	20.0	14.0	19.0	0.0133	14.0	14.0	0.0032	39.3
1440.00	20.0	13.0	18.0	0.0133	13.0	14.2	0.0013	37.2

Fractional Components

Gravel/Sand based on #4

Sand/Fines based on #200

% COBBLES =

% GRAVEL =

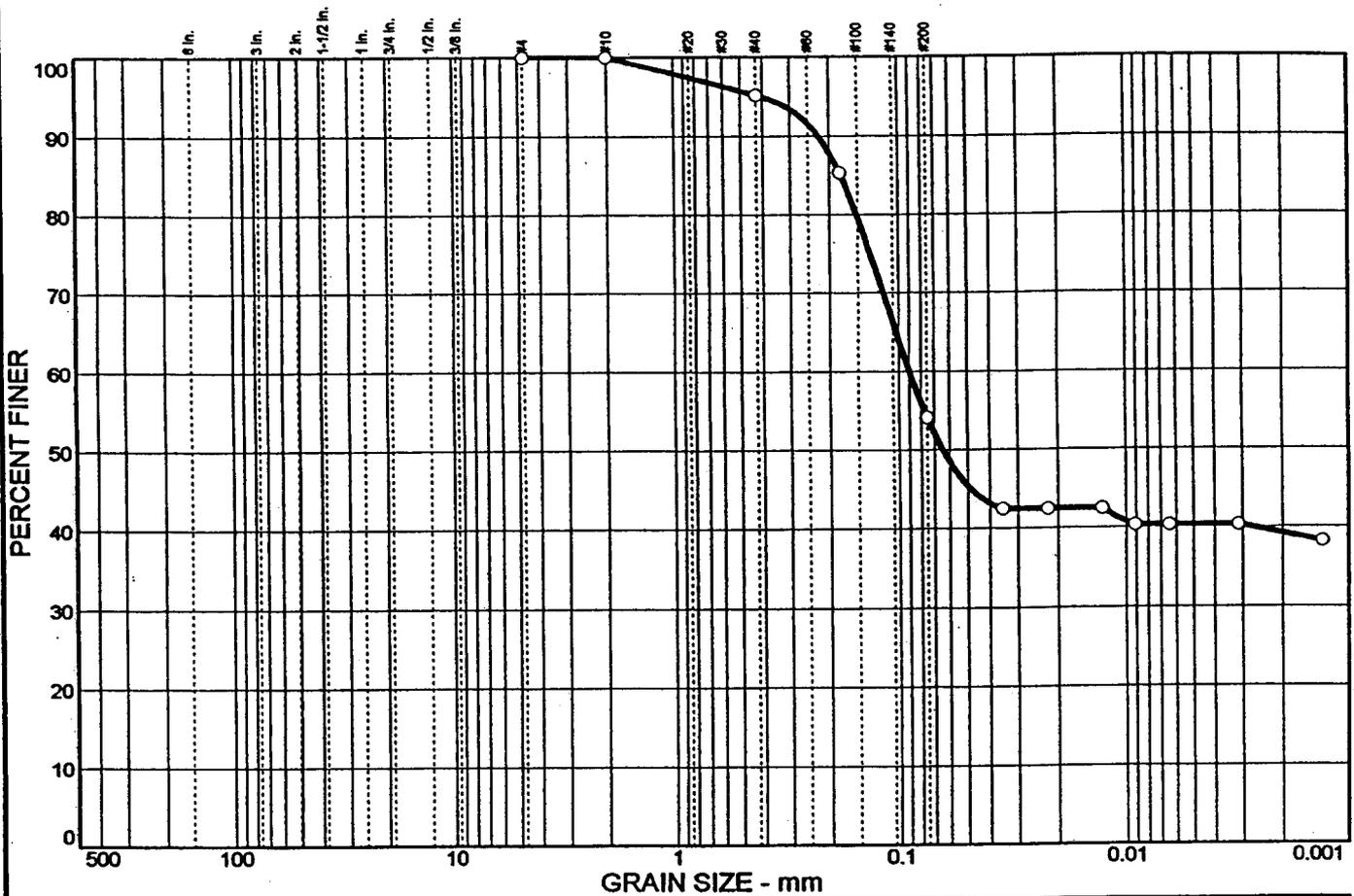
% SILT = 18.9

% CLAY = 39.3

% SAND = 41.8

D85= 0.21 D60= 0.08 D50= 0.06

PARTICLE SIZE ANALYSIS AS PER ASTM D 422-98



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	45.9	13.8	40.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	100.0		
#40	95.1		
#80	85.3		
#200	54.1		

Soil Description
BROWN SANDY LEAN CLAY

Atterberg Limits
 PL= 22 LL= 35 PI= 13

Coefficients
 D₈₅= 0.178 D₆₀= 0.0895 D₅₀= 0.0643
 D₃₀= D₁₅= D₁₀=
 C_u= C_c=

Classification
 USCS= CL AASHTO=

Remarks
 SAMPLED FROM IN-PLACE MATERIAL

* (no specification provided)

Sample No.: 13 Source of Sample: Date: 6-25-03
 Location: BARROW FILL FROM BOSTWICK PIT MELROSE, NM 6-25-03 Elev./Depth: SECOND

LYDICK ENGINEERS & SURVEYORS, INC.	Client: ARROW HEAD CONSTRUCTION Project: SWMU 101 LAGOON CLOSURE @ WASTE WATER TREATMENT PLANT CANNON A.F.B. Project No: DACW45-94-0003	Figure
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GRAIN SIZE DISTRIBUTION TEST DATA

Client: ARROW HEAD CONSTRUCTION
 Project: SWMU 101 LAGOON CLOSURE @ WASTE WATER TREATMENT PLANT CANNON A.F.B.
 Project Number: DACW45-94-0003

Sample Data

Source:
 Sample No.: 13
 Elev. or Depth: SECOND LIFT Sample Length(in./cm.):
 Location: BARROW FILL FROM BOSTWICK PIT MELROSE, NM 6-25-03
 Description: BROWN SANDY LEAN CLAY
 Date: 6-25-03 PL: 22 LL: 35 PI: 13
 USCS Classification: CL AASHTO Classification:
 Testing Remarks: SAMPLED FROM IN-PLACE MATERIAL

Mechanical Analysis Data

Sieve	Size, mm	Percent finer
# 4	4.750	100.0
# 10	2.000	100.0
# 40	0.425	95.1
# 80	0.180	85.3
# 200	0.075	54.1

Hydrometer Analysis Data

Separation sieve is #10
 Percent -#10 based upon complete sample= 100.0
 Weight of hydrometer sample: 50
 Hygroscopic moisture correction:
 Moist weight & tare = 38.25
 Dry weight & tare = 37.03
 Tare = 21.22
 Hygroscopic moisture= 7.7 %
 Calculated biased weight= 46.42
 Automatic temperature correction
 Composite correction at 20 deg C = 5.0

Meniscus correction only= 0
 Specific gravity of solids= 2.73
 Specific gravity correction factor= 0.983
 Hydrometer type: 152H
 Effective depth L= 16.294964 - 0.164 x Rm

Elapsed time, min	Temp, deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
2.00	20.3	15.0	20.0	0.0133	15.0	13.8	0.0349	42.4
5.00	20.3	15.0	20.0	0.0133	15.0	13.8	0.0221	42.4
15.00	20.3	15.0	20.0	0.0133	15.0	13.8	0.0128	42.4
30.00	20.3	14.0	19.0	0.0133	14.0	14.0	0.0091	40.3
60.00	20.3	14.0	19.0	0.0133	14.0	14.0	0.0064	40.3
250.00	20.3	14.0	19.0	0.0133	14.0	14.0	0.0031	40.3
1440.00	20.3	13.0	18.0	0.0133	13.0	14.2	0.0013	38.2

Fractional Components

Gravel/Sand based on #4

Sand/Fines based on #200

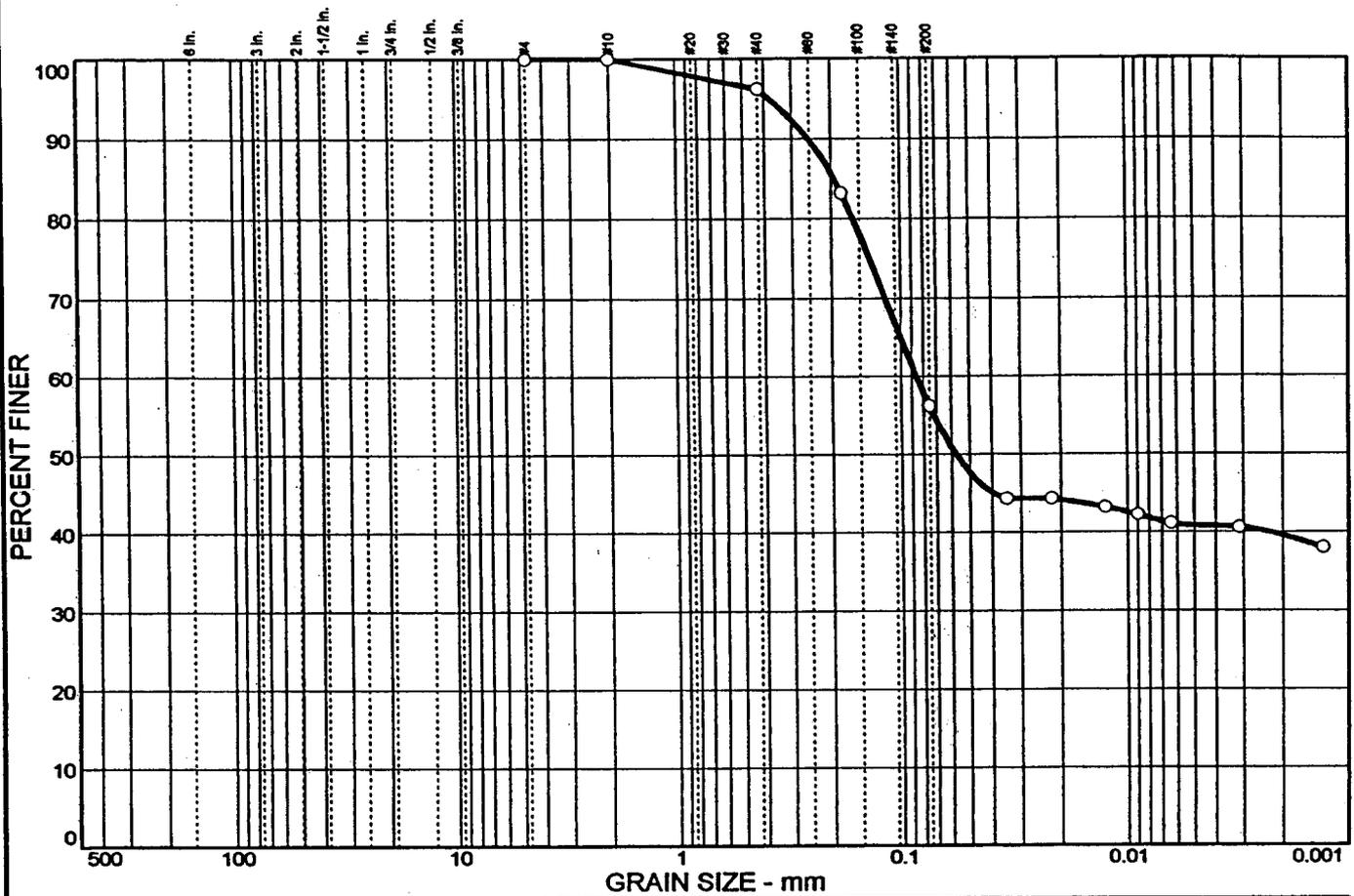
% COBBLES = % GRAVEL =

% SAND = 45.9

% SILT = 13.8 % CLAY = 40.3

D85= 0.18 D60= 0.09 D50= 0.06

PARTICLE SIZE ANALYSIS AS PER ASTM D 422-98



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	43.8	15.4	40.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	100.0		
#40	96.2		
#80	83.2		
#200	56.2		

Soil Description

BROWN SANDY LEAN CLAY

Atterberg Limits

PL= 23 LL= 38 PI= 15

Coefficients

D₈₅= 0.194 D₆₀= 0.0856 D₅₀= 0.0573
D₃₀= D₁₅= D₁₀=
C_u= C_c=

Classification

USCS= "CL" AASHTO=

Remarks

SAMPLED FROM IN-PLACE MATERIAL

* (no specification provided)

Sample No.: 14 Source of Sample: Date: 6-30-03
Location: BARROW FILL FROM BOSTWICK PIT MELROSE, NM 1 630-03 Elev./Depth: SECOND

LYDICK ENGINEERS & SURVEYORS, INC.	Client: ARROW HEAD CONSTRUCTION Project: SWMU 101 LAGOON CLOSURE @ WASTE WATER TREATMENT PLANT CANNON A.F.B. Project No: DACW45-94-0003 Figure
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GRAIN SIZE DISTRIBUTION TEST DATA

Client: ARROW HEAD CONSTRUCTION
 Project: SWMU 101 LAGOON CLOSURE @ WASTE WATER TREATMENT PLANT CANNON A.F.B.
 Project Number: DACW45-94-0003

Sample Data

Source:
 Sample No.: 14
 Elev. or Depth: SECOND LIFT Sample Length(in./cm.):
 Location: BARROW FILL FROM BOSTWICK PIT MELROSE, NM 1 630-03
 Description: BROWN SANDY LEAN CLAY
 Date: 6-30-03 PL: 23 LL: 38 PI: 15
 USCS Classification: "CL" AASHTO Classification:
 Testing Remarks: SAMPLED FROM IN-PLACE MATERIAL

Mechanical Analysis Data

Sieve	Size, mm	Percent finer
# 4	4.750	100.0
# 10	2.000	100.0
# 40	0.425	96.2
# 80	0.180	83.2
# 200	0.075	56.2

Hydrometer Analysis Data

Preparation sieve is #10
 Percent -#10 based upon complete sample= 100.0
 Weight of hydrometer sample: 50.0
 Hygroscopic moisture correction:
 Moist weight & tare = 39.23
 Dry weight & tare = 38.15
 Tare = 22.30
 Hygroscopic moisture= 6.8 %
 Calculated biased weight= 46.81
 Automatic temperature correction
 Composite correction at 20 deg C = 5.0

 Meniscus correction only= 0
 Specific gravity of solids= 2.73
 Specific gravity correction factor= 0.983
 Hydrometer type: 152H
 Effective depth L= 16.294964 - 0.164 x Rm

Elapsed time, min	Temp, deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
2.00	20.6	16.0	21.1	0.0132	16.0	13.7	0.0346	44.3
5.00	20.6	16.0	21.1	0.0132	16.0	13.7	0.0219	44.3
15.00	20.6	15.5	20.6	0.0132	15.5	13.8	0.0127	43.2
30.00	20.6	15.0	20.1	0.0132	15.0	13.8	0.0090	42.2
60.00	20.6	14.5	19.6	0.0132	14.5	13.9	0.0064	41.1
250.00	20.6	14.2	19.3	0.0132	14.2	14.0	0.0031	40.6
1440.00	20.6	13.0	18.1	0.0132	13.0	14.2	0.0013	38.0

Fractional Components

Gravel/Sand based on #4

Sand/Fines based on #200

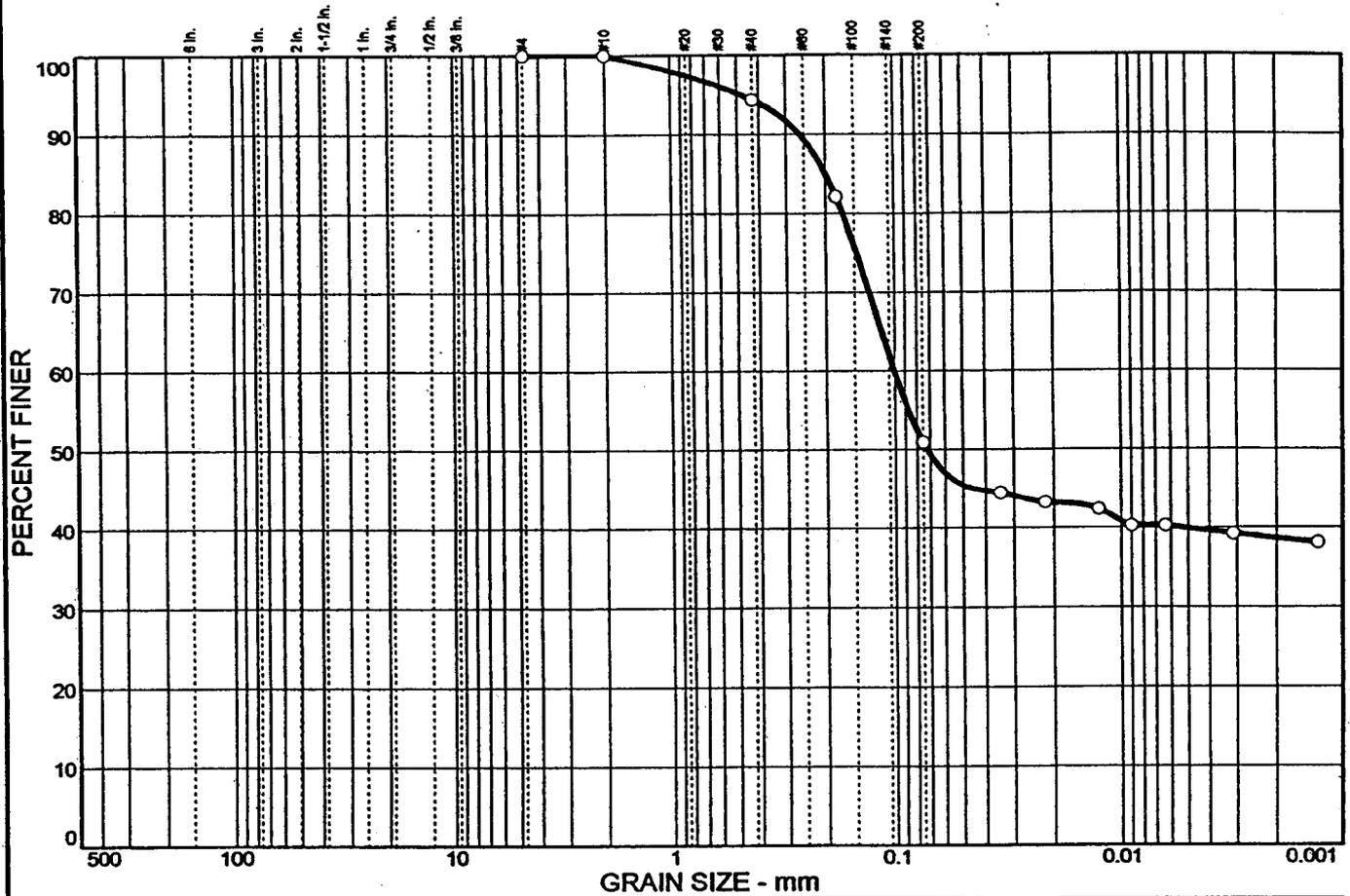
% COBBLES = % GRAVEL =

% SAND = 43.8

% SILT = 15.4 % CLAY = 40.8

D85= 0.19 D60= 0.09 D50= 0.06

PARTICLE SIZE ANALYSIS AS PER ASTM D 422-98



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	49.1	11.0	39.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	100.0		
#40	94.3		
#80	82.1		
#200	50.9		

Soil Description

SAMPLED FROM IN-PLACE MATERIAL

Atterberg Limits

PL= 24 LL= 37 PI= 13

Coefficients

D₈₅= 0.200 D₆₀= 0.0999 D₅₀= 0.0721
D₃₀= D₁₅= D₁₀=
C_u= C_c=

Classification

USCS= "CL" AASHTO=

Remarks

SAMPLED FROM INPLACE MATERIAL

* (no specification provided)

Sample No.: 15 Source of Sample: BARROW FILL FROM BOSTWICK PIT MELROSE, NM 2 6-30-03

Date: 6-30-03
Elev./Depth: SECOND

LYDICK ENGINEERS & SURVEYORS, INC.	Client: ARROW HEAD CONSTRUCTION Project: SWMU 101 LAGOON CLOSURE @ WASTE WATER TREATMENT PLANT CANNON A.F.B. Project No: DACW45-94-0003 Figure
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GRAIN SIZE DISTRIBUTION TEST DATA

ent: ARROW HEAD CONSTRUCTION
 Project: SWMU 101 LAGOON CLOSURE @ WASTE WATER TREATMENT PLANT CANNON A.F.B.
 Project Number: DACW45-94-0003

Sample Data

Source:
 Sample No.: 15
 Elev. or Depth: SECOND LIFT Sample Length(in./cm.):
 Location: BARROW FILL FROM BOSTWICK PIT MELROSE, NM 2 6-30-03
 Description: SAMPLED FROM IN-PLACE MATERIAL
 Date: 6-30-03 PL: 24 LL: 37 PI: 13
 USCS Classification: "CL" AASHTO Classification:
 Testing Remarks: SAMPLED FROM INPLACE MATERIAL

Mechanical Analysis Data

Sieve	Size, mm	Percent finer
# 4	4.750	100.0
# 10	2.000	100.0
# 40	0.425	94.3
# 80	0.180	82.1
# 200	0.075	50.9

Hydrometer Analysis Data

Preparation sieve is #10
 Percent -#10 based upon complete sample= 100.0
 Weight of hydrometer sample: 50.0
 Hygroscopic moisture correction:
 Moist weight & tare = 39.51
 Dry weight & tare = 38.50
 Tare = 22.34
 Hygroscopic moisture= 6.2 %
 Calculated biased weight= 47.06
 Automatic temperature correction
 Composite correction at 20 deg C = 5.0

 Meniscus correction only= 0
 Specific gravity of solids= 2.73
 Specific gravity correction factor= 0.983
 Hydrometer type: 152H
 Effective depth L= 16.294964 - 0.164 x Rm

Elapsed time, min	Temp, deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
2.00	21.3	16.0	21.2	0.0131	16.0	13.7	0.0343	44.4
5.00	21.3	15.4	20.7	0.0131	15.4	13.8	0.0218	43.2
15.00	21.3	15.0	20.2	0.0131	15.0	13.8	0.0126	42.3
30.00	21.3	14.0	19.2	0.0131	14.0	14.0	0.0090	40.2
60.00	21.3	14.0	19.2	0.0131	14.0	14.0	0.0063	40.2
250.00	21.3	13.5	18.7	0.0131	13.5	14.1	0.0031	39.2
1440.00	21.3	13.0	18.2	0.0131	13.0	14.2	0.0013	38.1

Fractional Components

Gravel/Sand based on #4

Sand/Fines based on #200

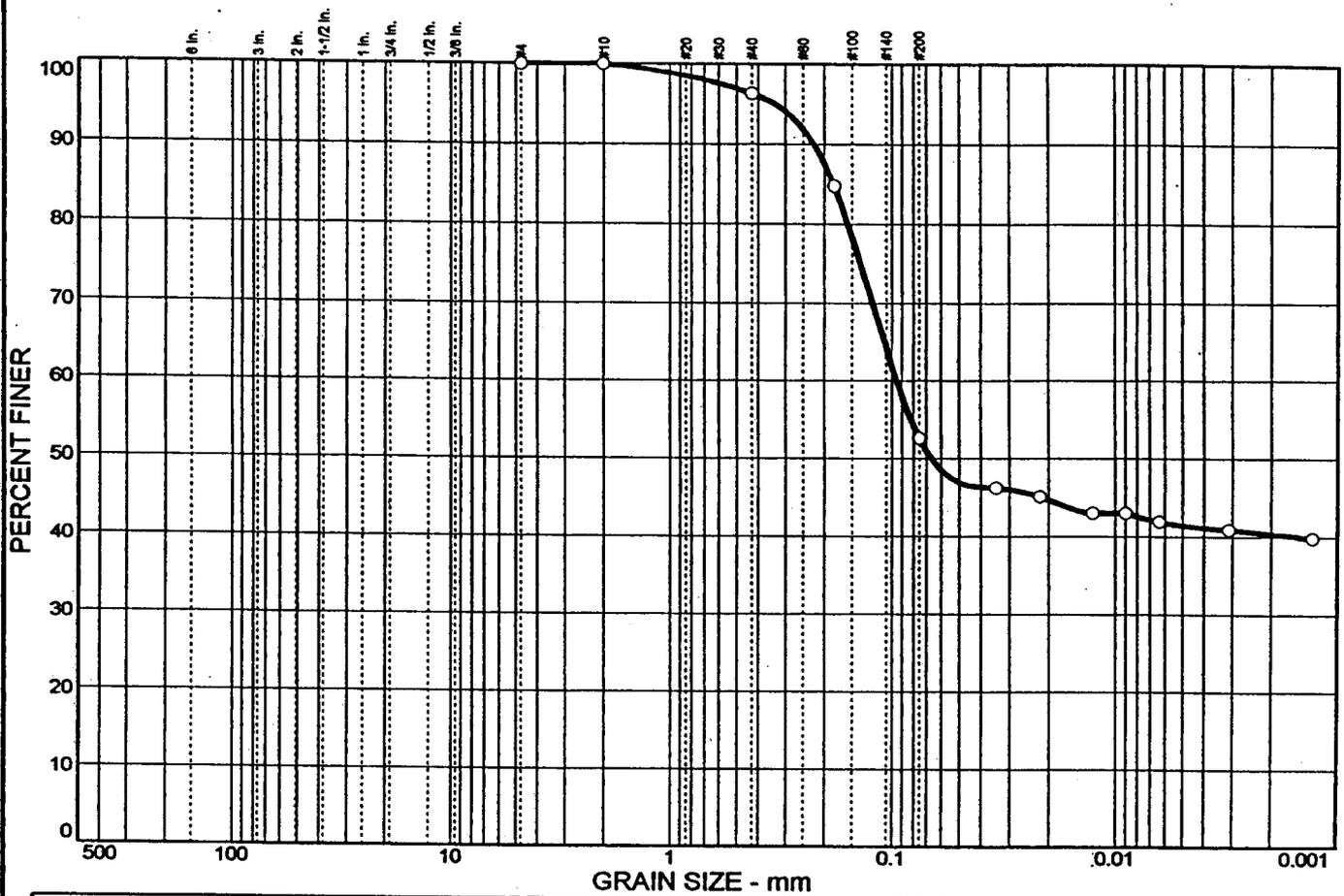
% COBBLES = % GRAVEL =

% SAND = 49.1

% SILT = 11.0 % CLAY = 39.9

D85= 0.20 D60= 0.10 D50= 0.07

PARTICLE SIZE ANALYSIS AS PER ASTM D 422-98



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	47.4	11.2	41.4

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	100.0		
#40	96.3		
#80	84.7		
#200	52.6		

Soil Description

SAMPLED FROM IN-PLACE MATERIAL

Atterberg Limits

PL= 21 LL= 36 PI= 15

Coefficients

D₈₅= 0.182 D₆₀= 0.0947 D₅₀= 0.0663
D₃₀= D₁₅= D₁₀=
C_u= C_c=

Classification

USCS= "CL" AASHTO=

Remarks

SAMPLED FROM IN-PLACE MATERIAL

* (no specification provided)

Sample No.: 16 Source of Sample: Date: 6-30-03
Location: BARROW FILL FROM BOSTWICK PIT MELROSE, NM 3 6-30-03 Elev./Depth: SECOND

LYDICK ENGINEERS & SURVEYORS, INC.	Client: ARROW HEAD CONSTRUCTION Project: SWMU 101 LAGOON CLOSURE @ WASTE WATER TREATMENT PLANT CANNON A.F.B. Project No: DACW45-94-0003
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Figure

GRAIN SIZE DISTRIBUTION TEST DATA

Client: ARROW HEAD CONSTRUCTION
 Project: SWMU 101 LAGOON CLOSURE @ WASTE WATER TREATMENT PLANT CANNON A.F.B.
 Project Number: DACW45-94-0003

Sample Data

Source:
 Sample No.: 16
 Elev. or Depth: SECOND LIFT Sample Length(in./cm.):
 Location: BARROW FILL FROM BOSTWICK PIT MELROSE, NM 3 6-30-03
 Description: SAMPLED FROM IN-PLACE MATERIAL
 Date: 6-30-03 PL: 21 LL: 36 PI: 15
 USCS Classification: "CL" AASHTO Classification:
 Testing Remarks: SAMPLED FROM IN-PLACE MATERIAL

Mechanical Analysis Data

Sieve	Size, mm	Percent finer
# 4	4.750	100.0
# 10	2.000	100.0
# 40	0.425	96.3
# 80	0.180	84.7
# 200	0.075	52.6

Hydrometer Analysis Data

Separation sieve is #10
 Percent -#10 based upon complete sample= 100.0
 Weight of hydrometer sample: 50.0
 Hygroscopic moisture correction:
 Moist weight & tare = 39.63
 Dry weight & tare = 38.21
 Tare = 21.53
 Hygroscopic moisture= 8.5 %
 Calculated biased weight= 46.08
 Automatic temperature correction
 Composite correction at 20 deg C = 5.0

Meniscus correction only= 0
 Specific gravity of solids= 2.73
 Specific gravity correction factor= 0.983
 Hydrometer type: 152H
 Effective depth $L = 16.294964 - 0.164 \times R_m$

Elapsed time, min	Temp, deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
2.00	20.9	16.5	21.7	0.0132	16.5	13.6	0.0344	46.2
5.00	20.9	16.0	21.2	0.0132	16.0	13.7	0.0218	45.1
15.00	20.9	15.0	20.2	0.0132	15.0	13.8	0.0127	43.0
30.00	20.9	15.0	20.2	0.0132	15.0	13.8	0.0089	43.0
60.00	20.9	14.5	19.7	0.0132	14.5	13.9	0.0063	41.9
250.00	20.9	14.0	19.2	0.0132	14.0	14.0	0.0031	40.9
1440.00	20.9	13.5	18.7	0.0132	13.5	14.1	0.0013	39.8

Fractional Components

Gravel/Sand based on #4

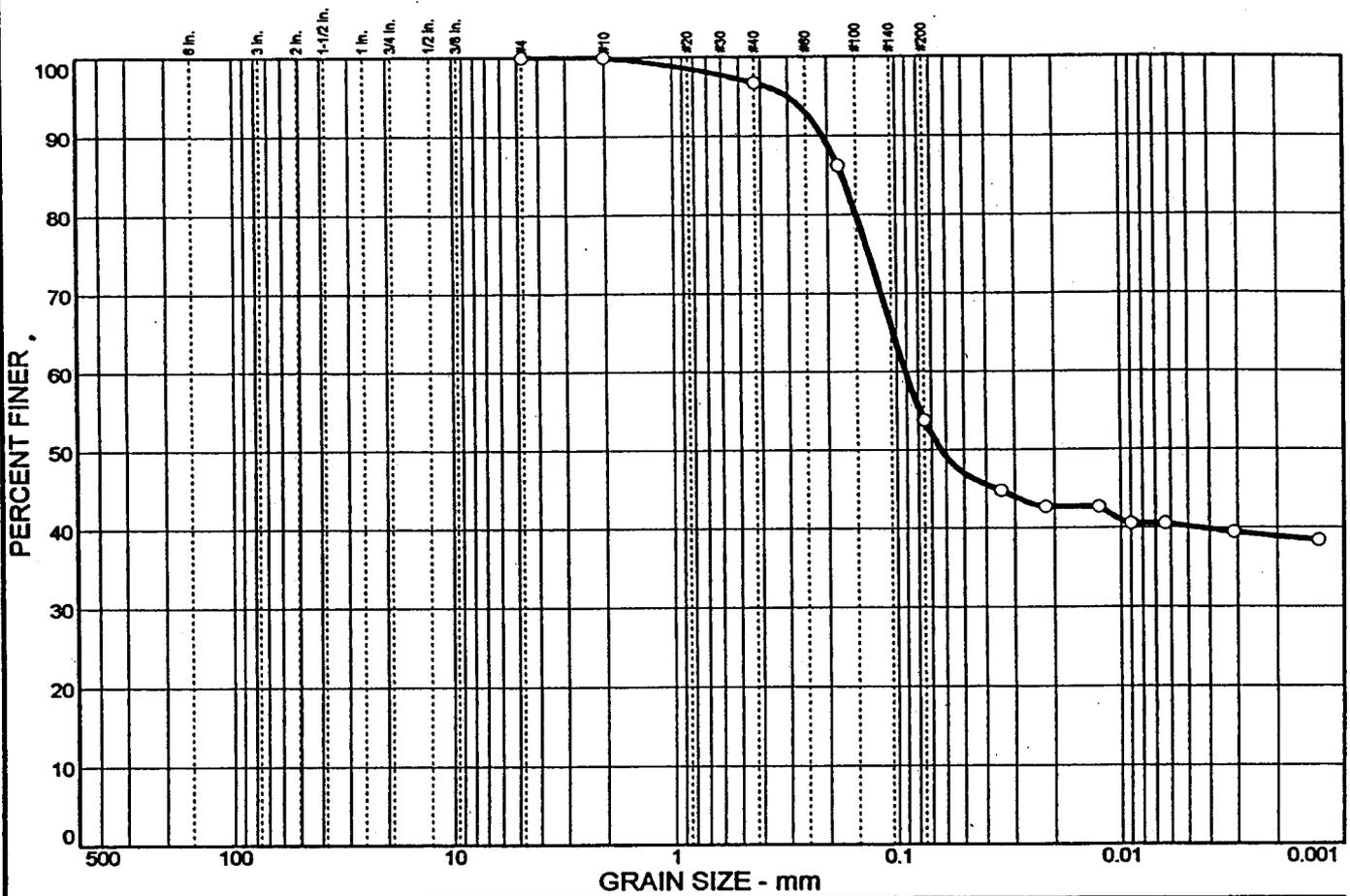
Sand/Fines based on #200

% COBBLES = % GRAVEL = % SAND = 47.4

% SILT = 11.2 % CLAY = 41.4

D85= 0.18 D60= 0.09 D50= 0.07

PARTICLE SIZE ANALYSIS AS PER ASTM D 422-98



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	46.2	13.7	40.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	100.0		
#40	96.7		
#80	86.1		
#200	53.8		

Soil Description

SAMPLED FROM IN-PLACE MATERIAL

Atterberg Limits

PL= 20 LL= 35 PI= 15

Coefficients

D₈₅= 0.173 D₆₀= 0.0909 D₅₀= 0.0631
D₃₀= D₁₅= D₁₀=
C_u= C_c=

Classification

USCS= "CL" AASHTO=

Remarks

SAMPLED FROM IN-PLACE SAMPLE

* (no specification provided)

Sample No.: 17 Source of Sample: Date: 6-30-03
Location: BARROW FILL FROM BOSTWICK PIT MELROSE, NM 4 6-30-03 Elev./Depth: SECOND

LYDICK ENGINEERS & SURVEYORS, INC.	Client: ARROW HEAD CONSTRUCTION Project: SWMU 101 LAGOON CLOSURE @ WASTE WATER TREATMENT PLANT CANNON A.F.B. Project No: DACW45-94-0003 Figure
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GRAIN SIZE DISTRIBUTION TEST DATA

ent: ARROW HEAD CONSTRUCTION
 Project: SWMU 101 LAGOON CLOSURE @ WASTE WATER TREATMENT PLANT CANNON A.F.B.
 Project Number: DACW45-94-0003

Sample Data

Source:
 Sample No.: 17
 Elev. or Depth: SECOND LIFT Sample Length(in./cm.):
 Location: BARROW FILL FROM BOSTWICK PIT MELROSE, NM 4 6-30-03
 Description: SAMPLED FROM IN-PLACE MATERIAL
 Date: 6-30-03 PL: 20 LL: 35 PI: 15
 USCS Classification: "CL" AASHTO Classification:
 Testing Remarks: SAMPLED FROM IN-PLACE SAMPLE

Mechanical Analysis Data

Sieve	Size, mm	Percent finer
# 4	4.750	100.0
# 10	2.000	100.0
# 40	0.425	96.7
# 80	0.180	86.1
# 200	0.075	53.8

Hydrometer Analysis Data

Separation sieve is #10
 Percent -#10 based upon complete sample= 100.0
 Weight of hydrometer sample: 50.0
 Hygroscopic moisture correction:
 Moist weight & tare = 38.69
 Dry weight & tare = 37.59
 Tare = 21.66
 Hygroscopic moisture= 6.9 %
 Calculated biased weight= 46.77
 Automatic temperature correction
 Composite correction at 20 deg C = 5.0

Meniscus correction only= 0
 Specific gravity of solids= 2.73
 Specific gravity correction factor= 0.983
 Hydrometer type: 152H
 Effective depth L= 16.294964 - 0.164 x Rm

Elapsed time, min	Temp, deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
2.00	21.4	16.0	21.3	0.0131	16.0	13.7	0.0342	44.7
5.00	21.4	15.0	20.3	0.0131	15.0	13.8	0.0218	42.6
15.00	21.4	15.0	20.3	0.0131	15.0	13.8	0.0126	42.6
30.00	21.4	14.0	19.3	0.0131	14.0	14.0	0.0089	40.5
60.00	21.4	14.0	19.3	0.0131	14.0	14.0	0.0063	40.5
250.00	21.4	13.5	18.8	0.0131	13.5	14.1	0.0031	39.4
1440.00	21.4	13.0	18.3	0.0131	13.0	14.2	0.0013	38.4

Fractional Components

Gravel/Sand based on #4

Sand/Fines based on #200

% COBBLES = % GRAVEL =

% SAND = 46.2

% SILT = 13.7 % CLAY = 40.1

D85= 0.17 D60= 0.09 D50= 0.06

GRAIN SIZE DISTRIBUTION TEST DATA

Client: ARROW HEAD CONSTRUCTION
 Project: SWMU 101 LAGOON CLOSURE @ WASTE WATER TREATMENT PLANT CANNON A.F.B.
 Project Number: DACW45-94-0003

Sample Data

Source:
 Sample No.: 18
 Elev. or Depth: SECOND LIFT Sample Length(in./cm.):
 Location: BARROW FILL FROM BOSTWICK PIT MELROSE, NM 7-1-03
 Description: SAMPLED FROM IN-PLACE MATERIAL
 Date: 7-1-03 PL: 21 LL: 37 PI: 16
 USCS Classification: "CL" AASHTO Classification:
 Testing Remarks: SAMPLED FROM IN PLACE MATERIAL

Mechanical Analysis Data

Sieve	Size, mm	Percent finer
# 4	4.750	100.0
# 10	2.000	100.0
# 40	0.425	96.3
# 80	0.180	84.2
# 200	0.075	55.3

Hydrometer Analysis Data

Separation sieve is #10
 Percent -#10 based upon complete sample= 100.0
 Weight of hydrometer sample: 50.0
 Hygroscopic moisture correction:
 Moist weight & tare = 38.95
 Dry weight & tare = 37.23
 Tare = 20.15
 Hygroscopic moisture= 10.1 %
 Calculated biased weight= 45.43
 Automatic temperature correction
 Composite correction at 20 deg C = 5.0
 Meniscus correction only= 0
 Specific gravity of solids= 2.73
 Specific gravity correction factor= 0.983
 Hydrometer type: 152H
 Effective depth L= 16.294964 - 0.164 x Rm

Elapsed time, min	Temp, deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
2.00	20.4	16.0	21.0	0.0133	16.0	13.7	0.0347	45.5
5.00	20.4	16.0	21.0	0.0133	16.0	13.7	0.0219	45.5
15.00	20.4	14.0	19.0	0.0133	14.0	14.0	0.0128	41.2
30.00	20.4	14.0	19.0	0.0133	14.0	14.0	0.0091	41.2
60.00	20.4	13.5	18.5	0.0133	13.5	14.1	0.0064	40.1
250.00	20.4	13.0	18.0	0.0133	13.0	14.2	0.0032	39.0
1440.00	20.4	13.0	18.0	0.0133	13.0	14.2	0.0013	39.0

Fractional Components

Gravel/Sand based on #4

Sand/Fines based on #200

% COBBLES = % GRAVEL =

% SAND = 44.7

% SILT = 15.8 % CLAY = 39.5

D85= 0.19 D60= 0.09 D50= 0.06

SUBMITTAL REVIEW VERIFICATION SHEET

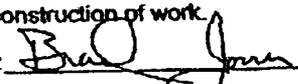
Date: Aug 7, 2003

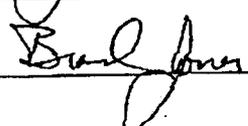
Submittal No.: 02377-14

Foster Wheeler Environmental Corporation Stamp

SWMU 101 Sewage Lagoons Closure, Cannon AFB, NM	
Certified for approval as indicated below:	
<input checked="" type="radio"/> A -	Approved as submitted
<input type="radio"/> B -	Approved except as noted on the drawings and/or attached sheets.
It is hereby certified that the (equipment) (material) shown and marked in this submittal is that proposed to be incorporated into Contract Number DACW45-94-D-0003, Delivery Order No. 35, Work Authorization Directive 1 is in compliance with the contract drawings and specifications, can be installed in the allocated spaces, and is submitted for Government approval.	
Reviewed/Certified By:	 James Morning, QCM
Description of items reviewed: SD-06 Test Reports- (2 nd lift) (3) Hydraulic Conductivity Test 3.4.3 Test 6,7,8 (3 of 5 needed)	

U.S. Army Corps of Engineers Stamp

U.S. Army Engineer District, Albuquerque Corps of Engineers	
Certified for approval as indicated below:	
<input type="radio"/> A -	Approved as submitted.
<input checked="" type="radio"/> B -	Approved except as noted on the drawings and/or attached sheet(s). Resubmission not required.
<input type="radio"/> C -	Approved except as noted on the drawings and/or attached sheet(s). Resubmission required.
<input type="radio"/> D -	Will be returned by separate correspondence.
<input type="radio"/> E -	Disapproved; see comments on attached sheet.
<input type="radio"/> F -	Receipt acknowledged.
<input type="radio"/> G -	Other: Specify.
Note: Items approved as to general layout only. Dimensions and quantities checked. Approval does not relieve contractor of responsibilities for errors that may exist, as contractor shall be responsible for dimensions and design of adequate corrections. Details and satisfactory construction of work.	
Signature: 	Date: 8-12-03

Reviewer's Signature: 

PERMEABILITY TEST REPORT

TEST DATA:

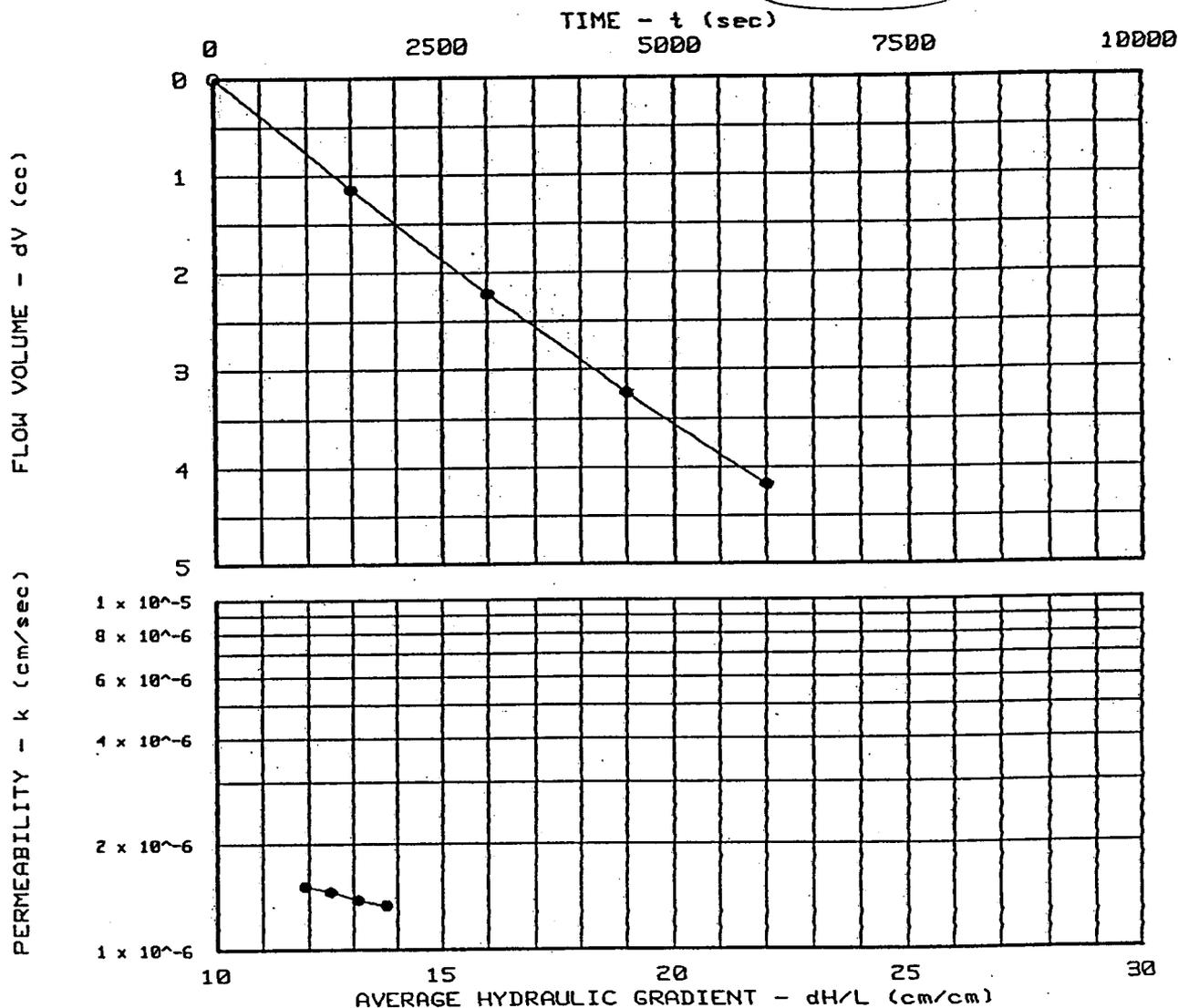
Specimen Height (cm): 8.34
 Specimen Diameter (cm): 7.29
 Dry Unit Weight (pcf): 101.5
 Moisture Before Test (%): 17.1
 Moisture After Test (%): 24.9
 Run Number: 1 ● 2 ▲
 Cell Pressure (psi): 75.5

 Sat. Pressure (psi): 72.3
 Diff. Head (psi): 0.1

 Perm. (cm/sec): 1.37×10^{-6}

SAMPLE DATA:

Sample Identification: BARROW MATERIAL FROM BOSTWICK PIT MELROSE, NM
 Visual Description: BROWN SANDY LEAN CLAY CLASSIFIED AS CL AS PER USCS 2ND LIFT
 Remarks: ASTM D 5084-01B=96.1 5 PSI FOR B Cal₂ REAGENT
 Maximum Dry Density (pcf): 107.1
 Optimum Moisture Content (%): 14.3 ASTM(D698)
 Percent Compaction: 94.8%
 Permeameter type: FLEXWALL
 Sample type: IN PLACE-6



Project: LAGOON CLOSURE SWMU 101 C.A.F.B. NM
 Location: WASTE WATER TREATMENT PLANT CAFB
 Date: 8-4-03

Project No.: DACAW-4503
 File No.: AH-4-03
 Lab No.: LE-24
 Tested by: BH
 Checked by: LEL
 Test: FH - Falling head C

PERMEABILITY TEST REPORT
 LYDICK ENGINEERS & SURVEYORS, INC.

FALLING HEAD PERMEABILITY TEST RESULTS

PROJECT NAME: LAGOON CLOSURE SWMU 101 C.A.F.B. NM FILE NO.: AH-4-03
PROJECT LOCATION: WASTE WATER TREATMENT PLANT CAFB PROJECT NO.: DACAW-4503
SAMPLE IDENTIFICATION: BARROW MATERIAL LAB NO.: LE-24
FROM BOSTWICK PIT MELROSE, NM
DESCRIPTION: BROWN SANDY LEAN CLAY SAMPLE TYPE: IN PLACE-6
CLASSIFIED AS CL AS PER USCS 2ND LIFT
MAX. DRY DENS.: 107.1 OPT. WATER CONTENT: 14.3 DATE: 8-4-03

SPECIMEN DATA

INITIAL PARAMETERS:

HEIGHT: 8.34 cm
DIAMETER: 7.29 cm
WET WEIGHT: 664.0 g
MOISTURE CONTENT: 17.1 %
DRY DENSITY: 101.5 pcf
PERCENT COMPACTION: 94.8

FINAL PARAMETERS:

HEIGHT: 8.33 cm
DIAMETER: 7.30 cm
WET WEIGHT: 708.3 g
MOISTURE CONTENT: 24.9 %
DRY DENSITY: 101.5 pcf

TEST PARAMETERS

CELL NO.: 1

PANEL NO.: 1

POSITIONS: 1

CELL PRESSURE:

RUN NO. 1

RUN NO. 2

SATURATION PRESSURE:

75.5 psi

72.3 psi

DIFFERENTIAL HEAD:

0.1 psi

PERMEABILITY DATA

TOTAL FLOW VOLUME:

RUN NO. 1

RUN NO. 2

LENGTH OF TEST:

4.18E 00 cc

6,000 sec

AVERAGE GRADIENT:

11.9

TEMPERATURE:

21.4 deg C

PERMEABILITY, K, at 20 deg C: 1.37E-06 cm/sec

PERMEABILITY TEST DATA

PROJECT DATA

Project Name: LAGOON CLOSURE SWMU 101 C.A.F.B. NM
 File No.: AH-4-03
 Project Location: WASTE WATER TREATMENT PLANT CAFB
 Project No.: DACAW-4503
 Sample Identification: BARROW MATERIAL
 FROM BOSTWICK PIT MELROSE, NM
 Lab No.: LE-24
 Description: BROWN SANDY LEAN CLAY
 CLASSIFIED AS CL AS PER USCS 2ND LIFT
 Sample Type: IN PLACE-6
 Max. Dry Dens.: 107.1
 Method (D1557/D698): D698
 Opt. Water Content: 14.3
 Date: 8-4-03
 Remarks: ASTM D 5084-01B=96.1 5
 PSI FOR B Cal₂ REAGENT
 Permeameter Type: FLEXWALL
 Tested by: BH
 Checked by: LEL
 Test type: FH - Falling head C

PERMEABILITY TEST SPECIMEN DATA

	Before test:			After test:		
Diameter:	1	2		1	2	
Top:	2.869 in		in	2.871 in		in
Middle:	2.871 in		in	2.872 in		in
Bottom:	2.875 in		in	2.878 in		in
Average:	2.87 in	7.29	cm	2.87 in	7.30	cm
Length:	1	2	3	1	2	3
	3.284 in		in	3.280 in		in
Average:	3.28 in	8.34	cm	3.28 in	8.33	cm
Moisture, Density and Sample Parameters:						
Specific Gravity:	2.73					
Wet Wt. & Tare:	999.32			1008.32		
Dry Wt. & Tare:	902.21			866.90		
Tare Wt.:	335.31			300.00		
Moisture Content:	17.1 %			24.9 %		
Dry Unit Weight:	101.5 pcf			101.5 pcf		
Porosity:	0.4042			0.4042		
Saturation:	68.9 %			100.4 %		
			94.8 % of max			

FALLING HEAD PERMEABILITY TEST CONDITIONS DATA

Cell No.: 1	Panel No.: 1	Positions: 1
Run Number:	1	2
Cell Pressure:	75.5 psi	0.0 psi
Inflow Saturation Pressure:	72.3 psi	0.0 psi
Inflow Buret Area:	0.2000 cm ²	0.2000 cm ²
Outflow Buret Area:	0.2010 cm ²	0.2000 cm ²
Test Temperature:	21.4 °C	0.0 °C
Outflow Saturation Pressure:	71.3 psi	0.0 psi

PERMEABILITY TEST READINGS DATA

CASE D X S	DATE	TIME (24 hr)	ELAPSED TIME sec	INFLOW LEVEL cm	OUTFLOW LEVEL cm	OUTFLOW/ INFLOW RATIO	PERM. K cm/sec	PERM./ RUNNING 4 AVE.
S X	8/ 1/ 3	9:00:00	0	50.00	0.0	0.00	0.00E 00	0.00
	8/ 1/ 3	9:25:00	1,500	44.25	5.7	1.00	1.33E-06	0.00
	8/ 1/ 3	9:50:00	1,500	38.81	11.0	0.97	1.38E-06	0.00
	8/ 1/ 3	10:15:00	1,500	33.65	16.0	0.97	1.46E-06	0.00
	8/ 1/ 3	10:40:00	1,500	28.87	20.6	0.97	1.51E-06	1.06

Average differential head = 0.1 psi, 10.3 cm H₂O
 Gradient = 1.192E 01 Total vol = 4.18E 00 cc Test duration = 6,000 sec
 Permeability, K_{21.4°} = 1.420E-06 cm/sec, K_{20°} = 1.373E-06 cm/sec
 Permeability values are incremental

Bad Jones!

Cancel

wrong

same as every test

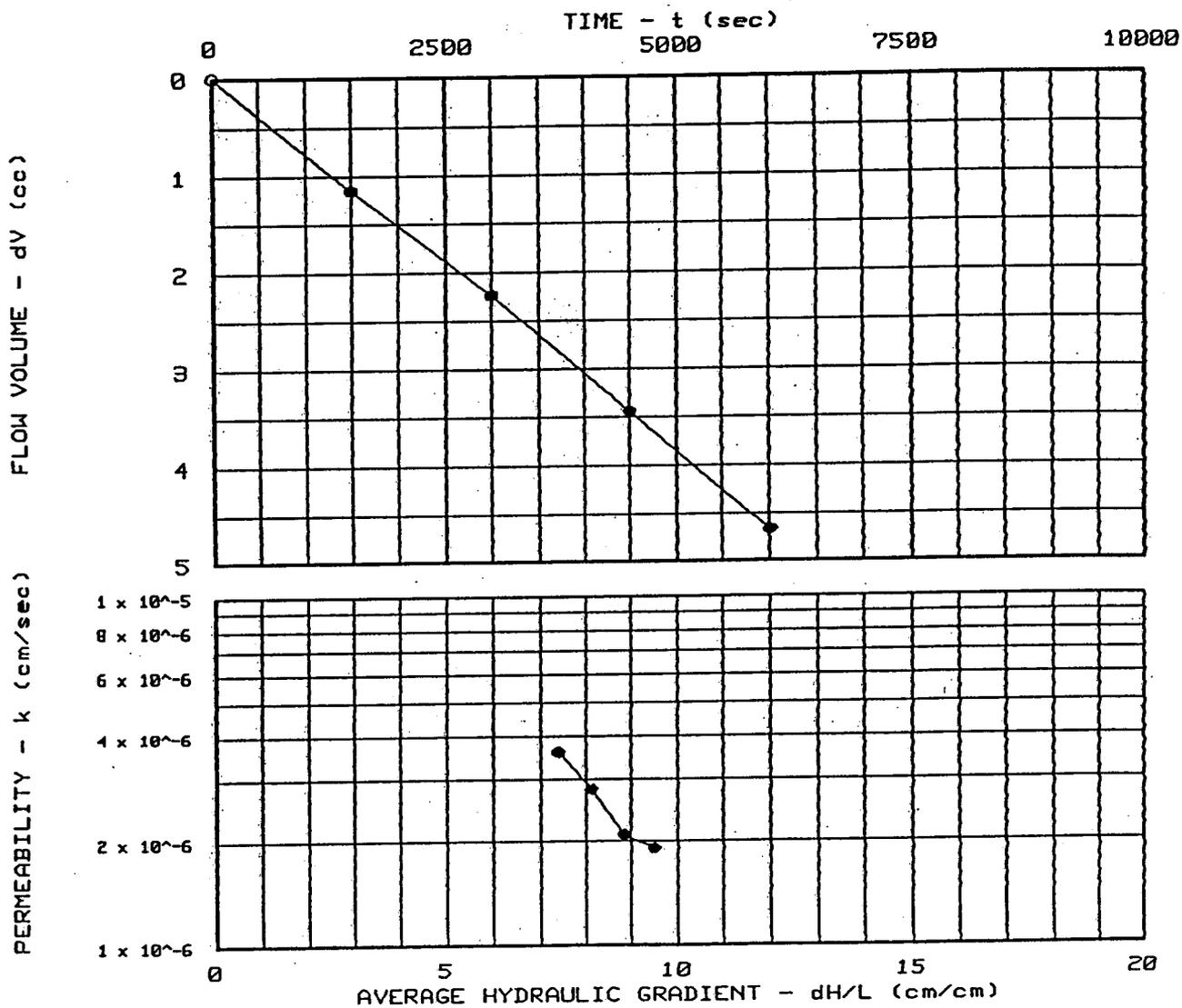
PERMEABILITY TEST REPORT

TEST DATA:

Specimen Height (cm): 8.37
 Specimen Diameter (cm): 7.35
 Dry Unit Weight (pcf): 98.1
 Moisture Before Test (%): 19.9
 Moisture After Test (%): 28.2
 Run Number: 1 • 2 ▲
 Cell Pressure (psi): 80.5
 Sat. Pressure (psi): 75.5
 Diff. Head (psi): 0.2
 Perm. (cm/sec): 2.55×10^{-6}

SAMPLE DATA:

Sample Identification: BARROW FILL MATERIAL
 BOSTWICK PIT MELROSE, NM 2ND LIFT
 Visual Description: BROWN SANDY LEAN CLAY
 CLASSIFIED AS "CL" AS PER USCS
 Remarks: ASTM D 5084-01 B=97.3.5
 PSI FOR "B" CaI₂ REAGENT
 Maximum Dry Density (pcf): 107.1
 Optimum Moisture Content (%): 14.3
 ASTM(D698)
 Percent Compaction: 91.6%
 Permeameter type: FLEXWALL
 Sample type: IN-PLACE-7



Project: LAGOON CLOSURE SWMU 101 C.A.F.B., NM
 Location: WASTE WATER TREATMENT PLANT CAFB
 Date: 8-4-03

Project No.: DACAW-4503
 File No.: AH-4-03
 Lab No.: LE-25
 Tested by: BH
 Checked by: LEL
 Test: FH - Falling head C

PERMEABILITY TEST REPORT
 LYDICK ENGINEERS & SURVEYORS, INC.

FALLING HEAD PERMEABILITY TEST RESULTS

PROJECT NAME: LAGOON CLOSURE SWMU 101 C.A.F.B., NM FILE NO.: AH-4-03
PROJECT LOCATION: WASTE WATER TREATMENT PLANT CAFB PROJECT NO.: DACAW-4503
SAMPLE IDENTIFICATION: BARROW FILL MATERIAL LAB NO.: LE-25
BOSTWICK PIT MELROSE, NM 2ND LIFT
DESCRIPTION: BROWN SANDY LEAN CLAY SAMPLE TYPE: IN-PLACE-7
CLASSIFIED AS "CL" AS PER USCS
MAX. DRY DENS.: 107.1 OPT. WATER CONTENT: 14.3 DATE: 8-4-03

SPECIMEN DATA

INITIAL PARAMETERS:

HEIGHT: 8.37 cm
DIAMETER: 7.35 cm
WET WEIGHT: 669.0 g
MOISTURE CONTENT: 19.9 %
DRY DENSITY: 98.1 pcf
PERCENT COMPACTION: 91.6

FINAL PARAMETERS:

HEIGHT: 8.38 cm
DIAMETER: 7.38 cm
WET WEIGHT: 712.9 g
MOISTURE CONTENT: 28.2 %
DRY DENSITY: 96.7 pcf

TEST PARAMETERS

CELL NO.: 3

PANEL NO.: 3

POSITIONS:

CELL PRESSURE:
SATURATION PRESSURE:
DIFFERENTIAL HEAD:

RUN NO. 1
80.5 psi
75.5 psi
0.2 psi

RUN NO. 2

PERMEABILITY DATA

TOTAL FLOW VOLUME:
LENGTH OF TEST:
AVERAGE GRADIENT:

RUN NO. 1
4.66E 00 cc
6,000 sec
7.4

RUN NO. 2

TEMPERATURE:

20.9 deg C

PERMEABILITY, K, at 20 deg C: 2.55E-06 cm/sec

PERMEABILITY TEST DATA

PROJECT DATA

Project Name: LAGOON CLOSURE SWMU 101 C.A.F.B., NM
 File No.: AH-4-03
 Project Location: WASTE WATER TREATMENT PLANT CAFB
 Project No.: DACAW-4503
 Sample Identification: BARROW FILL MATERIAL
 BOSTWICK PIT MELROSE, NM 2ND LIFT.
 Lab No.: LE-25
 Description: BROWN SANDY LEAN CLAY
 CLASSIFIED AS "CL" AS PER USCS
 Sample Type: IN-PLACE-7
 Max. Dry Dens.: 107.1
 Method (D1557/D698): D698
 Opt. Water Content: 14.3
 Date: 8-4-03
 Remarks: ASTM D 5084-01 B=97.3 5
 PSI FOR "B" Cal₂ REAGENT
 Permeameter Type: FLEXWALL
 Tested by: BH
 Checked by: LEL
 Test type: FH - Falling head C

PERMEABILITY TEST SPECIMEN DATA

	Before test:			After test:		
Diameter:	1	2		1	2	
Top:	2.890 in		in	2.905 in		in
Middle:	2.890 in	2.891 in		2.908 in		in
Bottom:	2.908 in		in	2.908 in		in
Average:	2.89 in	7.35 cm		2.91 in	7.38 cm	
Length:	1	2	3	1	2	3
	3.295 in		in	3.298 in		in
Average:	3.30 in	8.37 cm		3.30 in	8.38 cm	

Moisture, Density and Sample Parameters:

Specific Gravity:	2.73		
Wet Wt. & Tare:	1001.20	1027.86	
Dry Wt. & Tare:	890.21	870.98	
Tare Wt.:	332.21	315.00	
Moisture Content:	19.9 %	28.2 %	
Dry Unit Weight:	98.1 pcf	91.6 % of max	96.7 pcf
Porosity:	0.4243		0.4323
Saturation:	73.7 %		101.1 %

FALLING HEAD PERMEABILITY TEST CONDITIONS DATA

Cell No.: 3

Panel No.: 3

Positions:

Run Number:

1

2

Cell Pressure:	80.5 psi	0.0 psi
Inflow Saturation Pressure:	75.5 psi	0.0 psi
Inflow Buret Area:	0.2000 cm ²	0.2000 cm ²
Outflow Buret Area:	0.2000 cm ²	0.2000 cm ²
Test Temperature:	20.9 °C	0.0 °C
Outflow Saturation Pressure:	75.0 psi	0.0 psi

PERMEABILITY TEST READINGS DATA

CASE D X S	DATE	TIME (24 hr)	ELAPSED TIME sec	INFLOW LEVEL cm	OUTFLOW LEVEL cm	OUTFLOW/ INFLOW RATIO	PERM. K cm/sec	PERM./ RUNNING 4 AVE.
S X	8/ 1/ 3	1:00:00	0	50.00	0.0	0.00	0.00E 00	0.00
	8/ 1/ 3	1:25:00	1,500	44.25	5.8	1.00	1.91E-06	0.00
	8/ 1/ 3	1:50:00	1,500	38.71	11.1	0.95	2.09E-06	0.00
	8/ 1/ 3	2:15:00	1,500	32.50	17.0	0.95	2.82E-06	0.00
	8/ 1/ 3	2:40:00	1,500	26.25	22.9	0.95	3.61E-06	1.38

Average differential head = 0.2 psi, 11.4 cm H₂O
 Gradient = 7.389E 00 Total vol = 4.66E 00 cc Test duration = 6,000 sec
 Permeability, K_{20.9°} = 2.607E-06 cm/sec, K_{20°} = 2.551E-06 cm/sec
 Permeability values are incremental

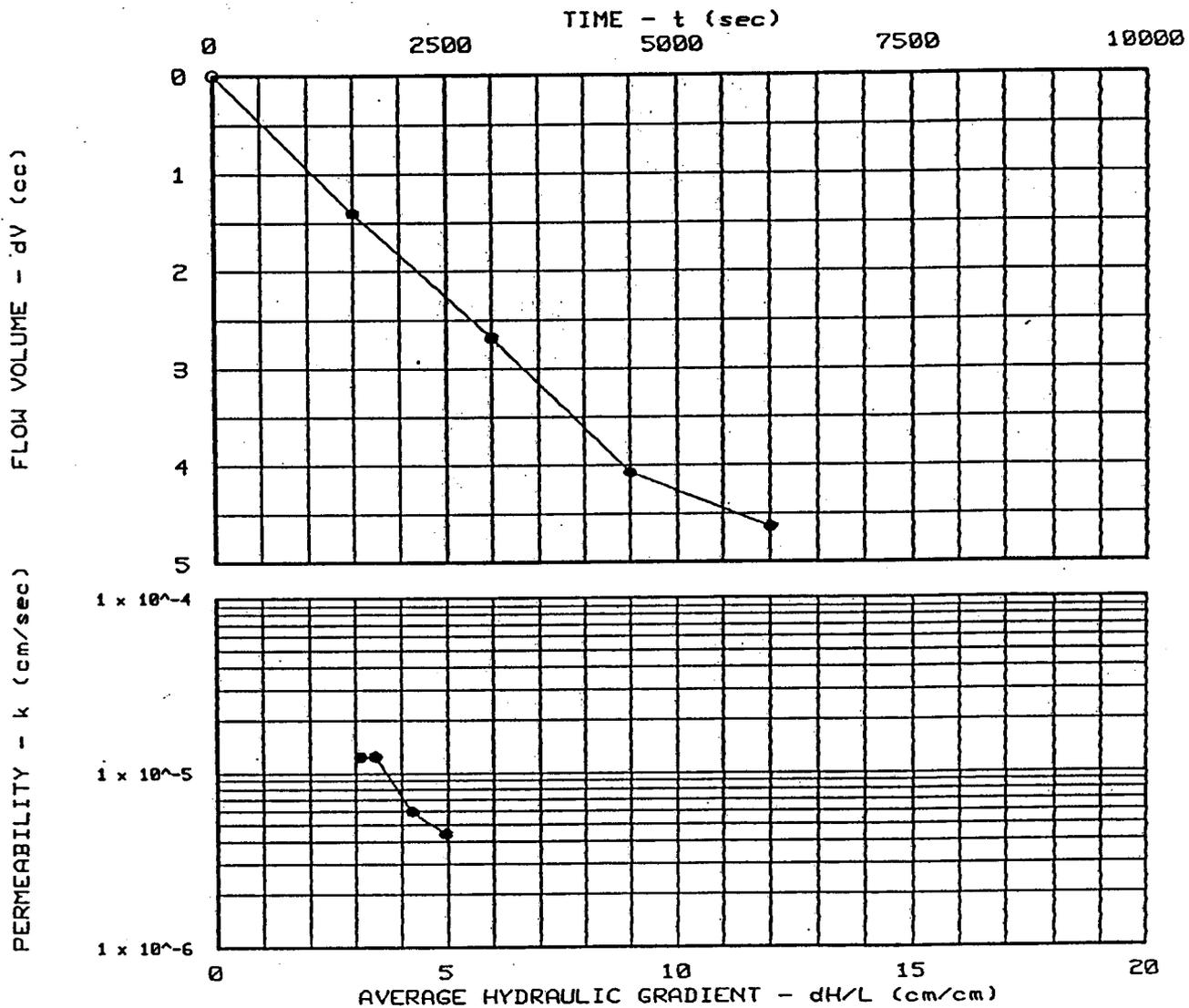
PERMEABILITY TEST REPORT

TEST DATA:

Specimen Height (cm): 8.67
 Specimen Diameter (cm): 7.40
 Dry Unit Weight (pcf): 97.3
 Moisture Before Test (%): 23.3
 Moisture After Test (%): 29.5
 Run Number: 1 ● 2 ▲
 Cell Pressure (psi): 85.0
 Sat. Pressure (psi): 80.5
 Diff. Head (psi): 0.2
 Perm. (cm/sec): 8.77×10^{-6}

SAMPLE DATA:

Sample Identification: BARROW FILL MATERIAL
 BOSTWICK PIT MELROSE, NM 2ND LIFT
 Visual Description: BROWN SANDY LEAN CLAY
 CLASSIFIED AS "CL" AS PER USCS
 Remarks: ASTM D 5084-01 B-95.9 5
 PSI FOR B CaI₂ REAGENT
 Maximum Dry Density (pcf): 107.1
 Optimum Moisture Content (%): 14.3
 ASTM(D698)
 Percent Compaction: 90.8%
 Permeameter type: FLEXWALL
 Sample type: IN-PLACE-B



Project: LAGOON CLOSURE SWMU 101 C.A.F.B., NM
 Location: WASTE WATER TREATMENT PLANT CAFB
 Date: 8-4-03

Project No.: DACA-4503
 File No.: AH-4-03
 Lab No.: LE-26
 Tested by: LEL
 Checked by:
 Test: FH - Falling head C

PERMEABILITY TEST REPORT
 LYDICK ENGINEERS & SURVEYORS, INC.

FALLING HEAD PERMEABILITY TEST RESULTS

PROJECT NAME: LAGOON CLOSURE SWMU 101 C.A.F.B., NM FILE NO.: AH-4-03
PROJECT LOCATION: WASTE WATER TREATMENT PLANT CAFB PROJECT NO.: DACA-4503
SAMPLE IDENTIFICATION: BARROW FILL MATERIAL LAB NO.: LE-26
BOSTWICK PIT MELROSE, NM 2ND LIFT
DESCRIPTION: BROWN SANDY LEAN CLAY SAMPLE TYPE: IN-PLACE-8
CLASSIFIED AS "CL" AS PER USCS
MAX. DRY DENS.: 107.1 OPT. WATER CONTENT: 14.3 DATE: 8-4-03

SPECIMEN DATA

INITIAL PARAMETERS:

HEIGHT: 8.67 cm
DIAMETER: 7.40 cm
WET WEIGHT: 715.1 g
MOISTURE CONTENT: 23.3 %
DRY DENSITY: 97.3 pcf
PERCENT COMPACTION: 90.8

FINAL PARAMETERS:

HEIGHT: 8.68 cm
DIAMETER: 7.40 cm
WET WEIGHT: 732.0 g
MOISTURE CONTENT: 29.5 %
DRY DENSITY: 94.4 pcf

TEST PARAMETERS

CELL NO.: 1

PANEL NO.: 1

POSITIONS: 1

CELL PRESSURE:
SATURATION PRESSURE:
DIFFERENTIAL HEAD:

RUN NO. 1
85.0 psi
80.5 psi
0.2 psi

RUN NO. 2

PERMEABILITY DATA

TOTAL FLOW VOLUME: RUN NO. 1 RUN NO. 2
4.63E 00 cc
LENGTH OF TEST: 6,000 sec
AVERAGE GRADIENT: 3.1
TEMPERATURE: 20.0 deg C
PERMEABILITY, K, at 20 deg C: 8.77E-06 cm/sec

PERMEABILITY TEST DATA

PROJECT DATA

Project Name: LAGOON CLOSURE SWMU 101 C.A.F.B., NM
 File No.: AH-4-03
 Project Location: WASTE WATER TREATMENT PLANT CAFB
 Project No.: DACA-4503
 Sample Identification: BARROW FILL MATERIAL
 BOSTWICK PIT MELROSE, NM 2ND LIFT
 Lab No.: LE-26
 Description: BROWN SANDY LEAN CLAY
 CLASSIFIED AS "CL" AS PER USCS
 Sample Type: IN-PLACE-8
 Max. Dry Dens.: 107.1
 Method (D1557/D698): D698
 Opt. Water Content: 14.3
 Date: 8-4-03
 Remarks: ASTM D 5084-01 B=95.9 5
 PSI FOR B Cal₂ REAGENT
 Permeameter Type: FLEXWALL
 Tested by: LEL
 Checked by:
 Test type: FH - Falling head C

PERMEABILITY TEST SPECIMEN DATA

	Before test:			After test:		
Diameter:	1	2		1	2	
Top:	2.913 in	in		2.916 in	in	
Middle:	2.910 in	in		2.913 in	in	
Bottom:	2.913 in	in		2.916 in	in	
Average:	2.91 in	7.40 cm		2.91 in	7.40 cm	
Length:	1	2	3	1	2	3
	3.412 in	in	in	3.418 in	in	in
Average:	3.41 in	8.67 cm		3.42 in	8.68 cm	

Moisture, Density and Sample Parameters:

Specific Gravity:	2.73	
Wet Wt. & Tare:	1055.69	1072.00
Dry Wt. & Tare:	920.65	905.23
Tare Wt.:	340.60	340.00
Moisture Content:	23.3 %	29.5 %
Dry Unit Weight:	97.3 pcf	90.8 % of max
Porosity:	0.4292	0.4459
Saturation:	84.5 %	100.1 %

FALLING HEAD PERMEABILITY TEST CONDITIONS DATA

Cell No.: 1

Panel No.: 1

Positions: 1

Run Number:

1

2

Cell Pressure:	85.0 psi	0.0 psi
Inflow Saturation Pressure:	80.5 psi	0.0 psi
Inflow Buret Area:	0.2000 cm ²	0.2000 cm ²
Outflow Buret Area:	0.2000 cm ²	0.2000 cm ²
Test Temperature:	20.0 °C	0.0 °C
Outflow Saturation Pressure:	79.0 psi	0.0 psi

PERMEABILITY TEST READINGS DATA

CASE D X S	DATE	TIME (24 hr)	ELAPSED TIME sec	INFLOW LEVEL cm	OUTFLOW LEVEL cm	OUTFLOW/ INFLOW RATIO	PERM. K cm/sec	PERM./ RUNNING 4 AVE.
S X	8/ 2/ 3	4:15:00	0	50.00	0.0	0.00	0.00E 00	0.00
	8/ 2/ 3	4:40:00	1,500	43.00	7.0	1.00	4.42E-06	0.00
	8/ 2/ 3	5:05:00	1,500	36.52	13.3	0.98	5.92E-06	0.00
	8/ 2/ 3	5:30:00	1,500	29.46	20.3	0.98	1.24E-05	0.00
	8/ 2/ 3	5:55:00	1,500	26.67	23.0	0.98	1.23E-05	1.41

Average differential head = 0.2 psi, 11.5 cm H₂O
 Gradient = 3.097E 00 Total vol = 4.63E 00 cc Test duration = 6,000 sec
 Permeability, K_{20.0°} = 8.774E-06 cm/sec, K_{20°} = 8.774E-06 cm/sec
 Permeability values are incremental

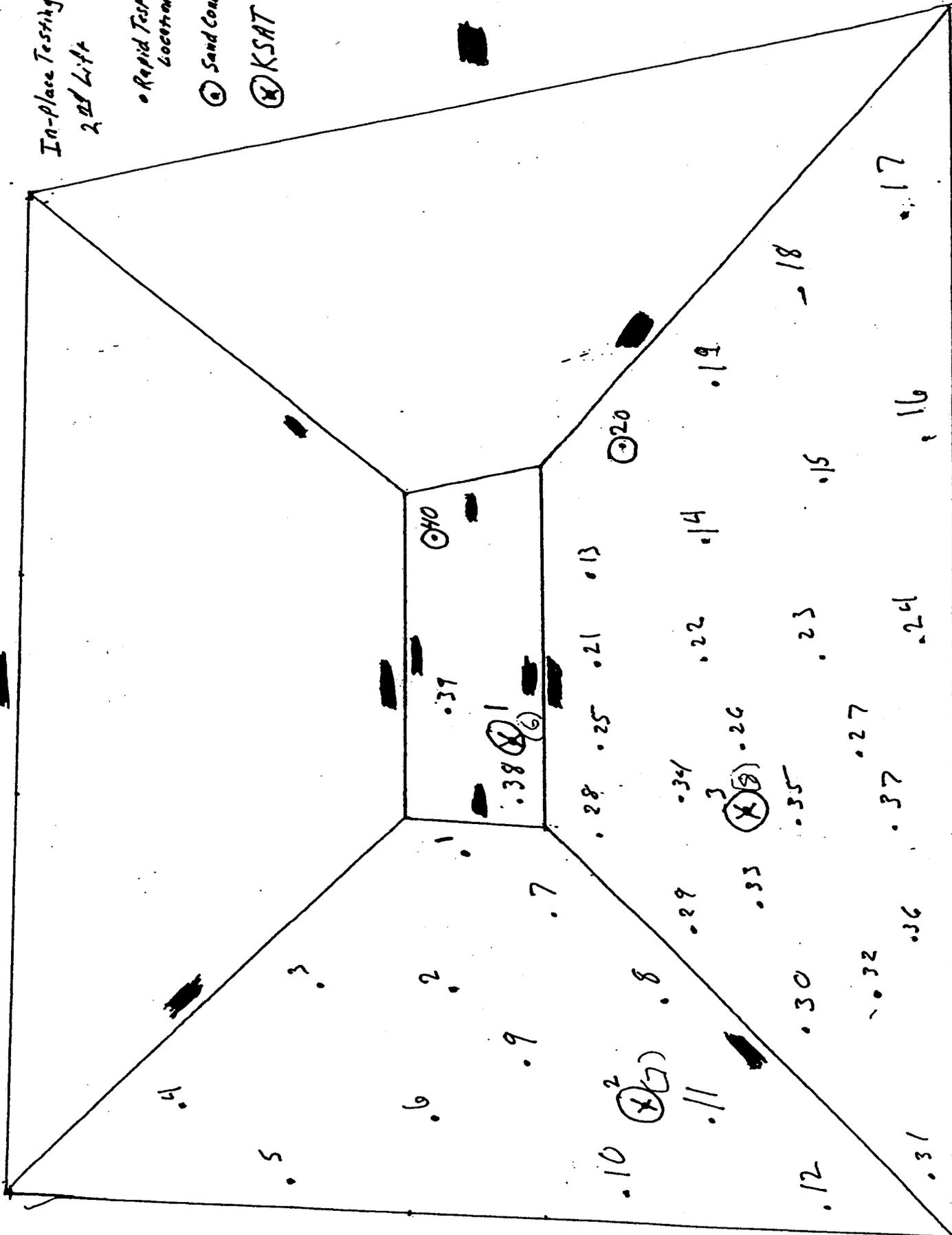
In-place Testing
2 of Lift

• Rapid Test
Locations

⊙ Sand Cones

⊗ KSAT

N ↑

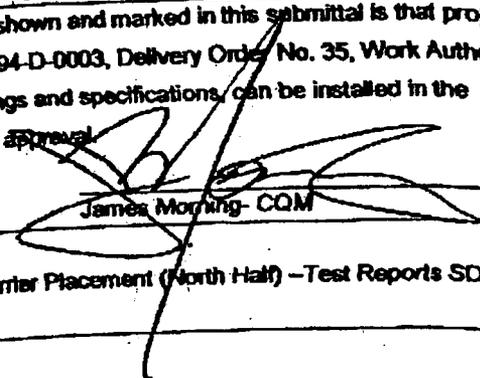


SUBMITTAL REVIEW VERIFICATION SHEET

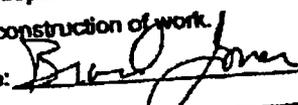
Submission No.: 02377-16

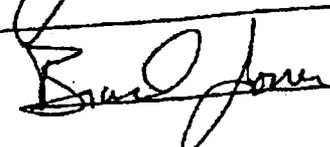
Date: Sept 18, 2003

Foster Wheeler Environmental Corporation Stamp

SWMU 101 Sewage Lagoons Closure, Cannon AFB, NM	
Certified for approval as indicated below:	
<input checked="" type="radio"/> A -	Approved as submitted
<input type="radio"/> B -	Approved except as noted on the drawings and/or attached sheets.
It is hereby certified that the (equipment) (material) shown and marked in this submittal is that proposed to be incorporated into Contract Number DACW45-94-D-0003, Delivery Order No. 35, Work Authorization Directive 1 is in compliance with the contract drawings and specifications, can be installed in the allocated spaces, and is submitted for Government approval.	
Reviewed/Certified By:	 James Morning- CQM
Description of items reviewed: TOPO Post Soil Barrier Placement (North Half) - Test Reports SD06	

U.S. Army Corps of Engineers Stamp

U.S. Army Engineer District, Albuquerque Corps of Engineers	
Certified for approval as indicated below:	
<input checked="" type="radio"/> A -	Approved as submitted.
<input type="radio"/> B -	Approved except as noted on the drawings and/or attached sheet(s). Resubmission not required.
<input type="radio"/> C -	Approved except as noted on the drawings and/or attached sheet(s). Resubmission required.
<input type="radio"/> D -	Will be returned by separate correspondence.
<input type="radio"/> E -	Disapproved; see comments on attached sheet.
<input type="radio"/> F -	Receipt acknowledged.
<input type="radio"/> G -	Other: Specify.
Note:	Items approved as to general layout only. Dimensions and quantities checked. Approval does not relieve contractor of responsibilities for errors that may exist, as contractor shall be responsible for dimensions and design of adequate corrections. Details and satisfactory construction of work.
Signature: 	Date: <u>9-22-03</u>

Reviewer's Signature: 

TERC CONTRACT NO.: DACW45-94-D-0003
PROJECT TITLE AND LOCATION: Work Plan for the Closure of SWMU 101 - 2

FIELD CHANGE REQUEST

PROJECT Closure of SWMU 101 Sewage Lagoons		PROJ. NO. 5155.0035.0001	FIELD CHANGE NO. 10
TO	Max Pastor	DEPT.	USACE
		LOCATION	Cannon AFB
RE:	DRAWING NO.	TITLE	
	SPEC NO. 02377 3.2.1 and 3.3	TITLE	Soil Barrier Layer
	OTHER		

DESCRIPTION (Items involved, submit sketch if applicable) The soil barrier layer has been installed and the post placement survey shows that the layer thickness exceeds the specification by approx. 1 inch. Section 3.2.1 Survey states an average of 21 inches of cover. 20 inches is the maximum per the specification.

3. RECOMMENDED DISPOSITION MINOR CHANGE MAJOR CHANGE
Request a variance to the 2 inch tolerance section 3.3. This does not affect the design purpose of a barrier layer and is a no cost change.

4. RESIDENT ENGINEER or designee (Signature)	DATE	PROJECT SEPT. CONCURRENCE (Signature)	DATE
Max Pastor		Jones Morning	9/18/03

5. DISPOSITION

NOT APPROVED (Give Reason)

CONSIDERED MINOR CHANGE - Approval per Recommended Disposition - Design Documents will not be normally revised; field to Maintain as-built records

CONSIDERED MAJOR CHANGE - Action will be taken as prescribed on DCN -

LEAD DISCIPLINE ENGINEER OR DESIGNEE (Signature)	DATE	PROJECT ENGR OR DESIGNEE (Signature)	DATE
		Brad Jones	9/22/03

Project Engineer signs and returns to LDE for transmittal to Resident Engineer with copies to:

- Cc:
- R. Macfarlane, USACE-Cannon AFB
- J. Davy, USACE-Omaha
- B. Jones, USACE-Omaha
- C. Bientals/TTFW1, Albuquerque
- W. Migdal/TTFW1, Albuquerque
- J. Morning/TTFW1, Cannon AFB
- K. Omerik/TTFW1, Denver
- SW TERC Project Files (DO 35 Wad 1)

SUBMITTAL REVIEW VERIFICATION SHEET

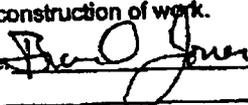
Date: Sept 18, 2003

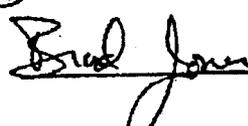
Submittal No.: 02377-17

Foster Wheeler Environmental Corporation Stamp

SWMU 101 Sewage Lagoons Closure, Cannon AFB, NM Certified for approval as indicated below:	
<input checked="" type="radio"/> A	Approved as submitted
<input type="radio"/> B	Approved except as noted on the drawings and/or attached sheets.
It is hereby certified that the (equipment) (material) shown and marked in this submittal is that proposed to be incorporated into Contract Number DACW45-94-D-0003, Delivery Order No. 35, Work Authorization Directive 1 is in compliance with the contract drawings and specifications, can be installed in the allocated spaces, and is submitted for Government approval.	
Reviewed/Certified By:	 James Morning, QCM
Description of items reviewed: SD-06 Test Reports-Moisture & Densities Test 2nd Lift final group 41-68, Proctors and sand cone.	

U.S. Army Corps of Engineers Stamp

U.S. Army Engineer District, Albuquerque Corps of Engineers Certified for approval as indicated below:	
A -	Approved as submitted.
<input checked="" type="radio"/> B -	Approved except as noted on the drawings and/or attached sheet(s). Resubmission not required.
C -	Approved except as noted on the drawings and/or attached sheet(s). Resubmission required.
D -	Will be returned by separate correspondence.
E -	Disapproved; see comments on attached sheet.
F -	Receipt acknowledged,
G -	Other: Specify.
Note: Items approved as to general layout only. Dimensions and quantities checked. Approval does not relieve contractor of responsibilities for errors that may exist, as contractor shall be responsible for dimensions and design of adequate corrections. Details and satisfactory construction of work.	
Signature: 	Date: 9-24-03

Reviewer's Signature: 

PM 9/25/03

Lydick Engineers & Surveyors, Inc.

Field Densities

P. O. Box 728
205 E. 2nd Street
Clovis, NM 88101
505-762-3771

To: ARROWHEAD CONST.
12920 METCALF AVE. SUITE 150
OVERLAND PARK, KS 66213

Project: CLOSURE OF SWMU101 SEWAGE LAGOON @
CANNON AFB

Project Number: DACAW45-94-D-0003
Report Number: 17
Report Date: 8/5/2003
Copies To: COE AND ARROWHEAD
Technician: BRANDON HIERONYMOUS
Depth: 6 IN
Maximum Dry Density: 107.1
Optimum Moisture: 14.3
Test Date: 7/28/2003
% Compaction Required: 90%
Moisture Requirement: 14.3 OR ABOVE
Page: 1 of 1

ID No.	Sample Location	Wet Density (lb./ft. ³)	Moist. Content (%)	Dry Density (lb./ft. ³)	Percent of Max. (%)
41	ON MAP	123.7	17.7	105.1	98.1
42	ON MAP	120.3	14.9	104.7	97.8
43	ON MAP	121.5	14.4	106.2	99.2
44	ON MAP	119.8	15.4	103.8	96.9
45	ON MAP	121.3	16.7	103.9	97.0
46	ON MAP	116.6	19.7	97.4	90.9
47	ON MAP	115.8	16.7	99.2	92.6
48	ON MAP	116.5	15.7	100.7	94.0

ALL DENSITIES TAKEN WITH A TROXLER 3411-B MS=721 DS=2703
BARROW FILL(BOSTWICK PIT) BROWN SANDY LEAN CLAY "CL" 2nd LIFT



Per. *James E. Taylor*

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on written request.

Lydick Engineers & Surveyors, Inc.

P. O. Box 728
205 E. 2nd Street
Clovis, NM 88101
3771

To: ARROWHEAD CONST.
12920 METCALF AVE. SUITE 150.
OVERLAND PARK, KS 66213

Project: CLOSURE OF SWMU101 SEWAGE LAGOON @
CANNON AFB

Field Densities

Project Number: DACAW45-94-D-0003
Report Number: 18
Report Date: 8/5/2003
Copies To: COE AND ARROWHEAD
Technician: BRANDON HIERONYMOUS
Depth: 6 IN
Maximum Dry Density: 107.1
Optimum Moisture: 14.3
Test Date: 7/30/2003
% Compaction Required: 90%
Moisture Requirement: 14.3 OR ABOVE
Page: 1 of 1

ID No.	Sample Location	Wet Density (lb./ft. ³)	Moist. Content (%)	Dry Density (lb./ft. ³)	Percent of Max. (%)
49	ON MAP	114.2	15.8	98.6	92.1
50	ON MAP	113.8	16.8	97.4	90.9
51	ON MAP	114.9	18.8	96.7	90.3
52	ON MAP	116.8	16.7	100.1	93.5

ALL DENSITIES TAKEN WITH A TROXLER 3411-B MS=723 DS=2973
BARROW FILL(BOSTWICK PIT) BROWN SANDY LEAN CLAY "CL" 2nd LIFT



Per: 

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Lydick Engineers & Surveyors, Inc.

P. O. Box 728
205 E. 2nd Street
Clovis, NM 88101
505-762-3771

To: ARROWHEAD CONST.
12920 METCALF AVE. SUITE 150
OVERLAND PARK, KS 66213

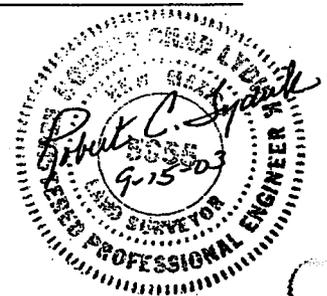
Project: CLOSURE OF SWMU101 SEWAGE LAGOON @
CANNON AFB

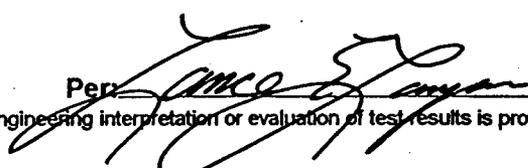
Field Densities

Project Number: DACAW45-94-D-0003
Report Number: 19
Report Date: 8/5/2003
Copies To: COE AND ARROWHEAD
Technician: BRANDON HIERONYMOUS
Depth: 6 IN
Maximum Dry Density: 107.1
Optimum Moisture: 14.3
Test Date: 8/1/2003
% Compaction Required: 90%
Moisture Requirement: 14.3 OR ABOVE
Page: 1 of 1

ID No.	Sample Location	Wet Density (lb./ft. ³)	Moist. Content (%)	Dry Density (lb./ft. ³)	Percent of Max. (%)
53	ON MAP	116.3	16.2	100.1	93.5
54	ON MAP	112.9	15.4	97.8	91.3
55	ON MAP	115.3	17.5	98.1	91.6
56	ON MAP	114.3	16.0	98.5	92.0

ALL DENSITIES TAKEN WITH A TROXLER 3411B MS=733 DS=2979 2nd lift
BARROW FILL(BOSTWICK PIT) BROWN SANDY LEAN CLAY "CL" 2nd LIFT



Per: 

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on written request.

Lydick Engineers & Surveyors, Inc.

P. O. Box 728
205 E. 2nd Street
Clovis, NM 88101
2-3771

Field Densities

Project Number: DACAW45-94-D-0003
Report Number: 20
Report Date: 8/5/2003
Copies To: COE AND ARROWHEAD
Technician: BRANDON HIERONYMOUS
Depth: 6 IN
Maximum Dry Density: 107.1
Optimum Moisture: 14.3
Test Date: 8/4/2003
% Compaction Required: 90%
Moisture Requirement: 14.3 OR ABOVE
Page: 1 of 1

To: ARROWHEAD CONST.
12920 METCALF AVE. SUITE 150
OVERLAND PARK, KS 66213

Project: CLOSURE OF SWMU101 SEWAGE LAGOON @
CANNON AFB

ID No.	Sample Location	Wet Density (lb./ft. ³)	Moist. Content (%)	Dry Density (lb./ft. ³)	Percent of Max. (%)
57	ON MAP	115.3	15.3	100.0	93.4
58	ON MAP	114.4	14.5	99.9	93.3
59	ON MAP	114.9	16.9	98.3	91.8
60	ON MAP(SANDCONE)	115.8	16.7	99.2	92.6

ALL DENSITIES TAKEN WITH A TROXLER 3411B MS=729 DS=2984 2nd lift
BARROW FILL(BOSTWICK PIT) BROWN SANDY LEAN CLAY "CL" 2nd LIFT



Per: *[Signature]*

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on written request.

Lydick Engineers & Surveyors, Inc.

P. O. Box 728
205 E. 2nd Street
Clovis, NM 88101
505-762-3771

To: ARROWHEAD CONST.
12920 METCALF AVE. SUITE 150
OVERLAND PARK, KS 66213

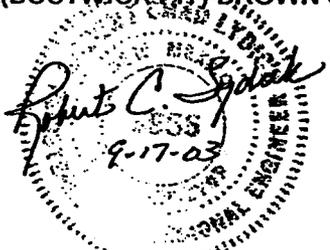
Project: CLOSURE OF SWMU101 SEWAGE LAGOON @
CANNON AFB

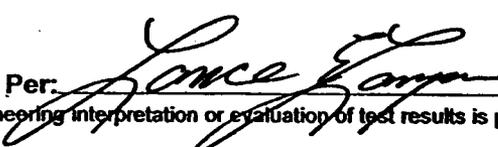
Field Densities

Project Number: DACAW45-94-D-0003
Report Number: 21
Report Date: 8/6/2003
Copies To: COE AND ARROWHEAD
Technician: BRANDON HIERONYMOUS
Depth: 6 IN
Maximum Dry Density: 107.1
Optimum Moisture: 14.3
Test Date: 8/6/2003
% Compaction Required: 90%
Moisture Requirement: 14.3 OR ABOVE
Page: 1 of 1

ID No.	Sample Location	Wet Density (lb./ft. ³)	Moist. Content (%)	Dry Density (lb./ft. ³)	Percent of Max. (%)
51	ON MAP	116.7	16.1	100.5	93.8
52	ON MAP	117.3	14.3	102.6	95.8
53	ON MAP	113.5	16.2	97.7	91.2
54	ON MAP	114.8	16.0	99.0	92.4
55	ON MAP	115.9	15.9	100.0	93.4
56	ON MAP	116.4	14.8	101.4	94.7

ALL DENSITIES TAKEN WITH A TROXLER 3411B MS=742 DS=2999 2nd lift
ARROW FILL (BOSTWICK PIT) BROWN SANDY LEAN CLAY "CL" 2nd LIFT



Per: 

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on written request.

Lydick Engineers & Surveyors, Inc.

P. O. Box 728
205 E. 2nd Street
Clovis, NM 88101
505-371-3771

To: ARROWHEAD CONST.
12920 METCALF AVE. SUITE 150
OVERLAND PARK, KS 66213

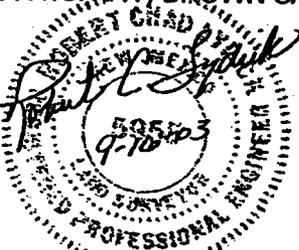
Project: CLOSURE OF SWMU101 SEWAGE LAGOON @
CANNON AFB

Field Densities

Project Number: DACAW45-94-D-0003
Report Number: 22
Report Date: 8/8/2003
Copies To: COE AND ARROWHEAD
Technician: BRANDON HIERONYMOUS
Depth: 6 IN
Maximum Dry Density: 107.1
Optimum Moisture: 14.3
Test Date: 8/7/2003
% Compaction Required: 90%
Moisture Requirement: 14.3 OR ABOVE
Page: 1 of 1

D No.	Sample Location	Wet Density (lb./ft. ³)	Moist. Content (%)	Dry Density (lb./ft. ³)	Percent of Max. (%)
17	ON MAP	113.8	15.1	98.9	92.3
18	ON MAP	114.7	14.6	100.1	93.5

ALL DENSITIES TAKEN WITH A TROXLER 3411B MS=736 DS=2973 2nd lift
ARROW FILL (BOSTWICK PIT) BROWN SANDY LEAN CLAY "CL"



Per: *James E. Taylor*

None of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on written request.

Lydick Engineers & Surveyors, Inc.

P. O. Box 728
 105 E. 2nd Street
 Clovis, NM 88101
 505-762-3771

Proctor

Report Date: 14-Aug-03
 Project: DACAW45-94-D-0003
 Report Number: 8

Report

Copies To: FW/TT
 COE
 ARROWHEAD

To: ARROWHEAD CONST.
 12920 METCALF AVE. SUITE 150
 OVERLAND PARK KS 66213

Sample Type: COMPOSITE
 Source: BOSTWICK PIT
 Tested By: B. HIERONYMUS

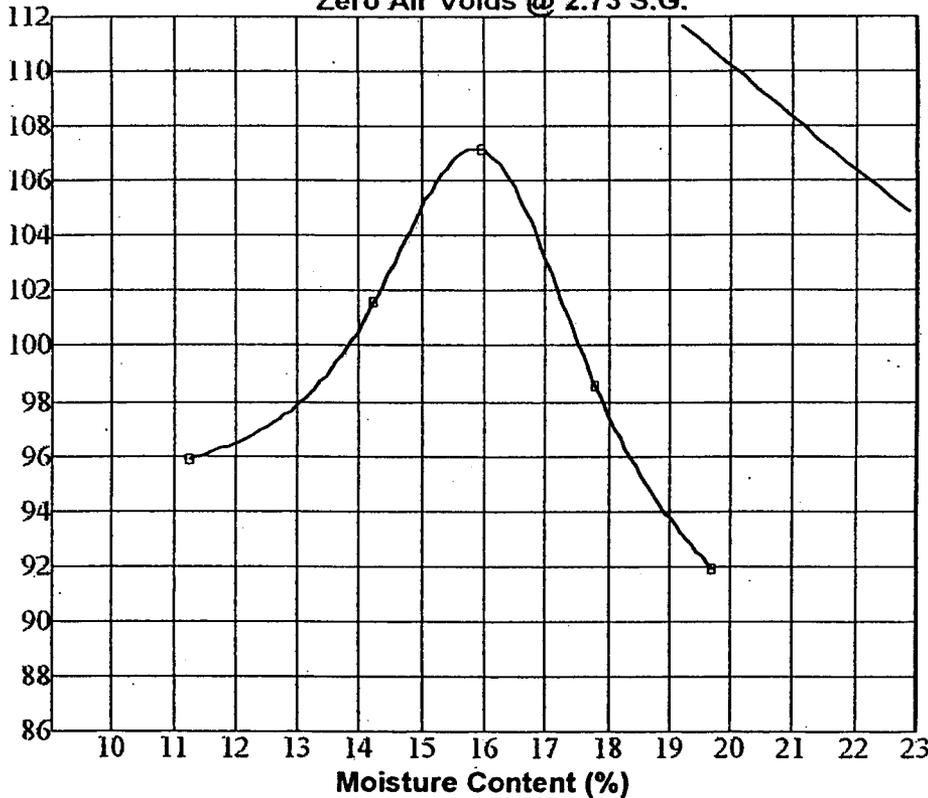
Proj: CLOSURE OF SWMU101 SEWAGE LAGOON @ CANNON AFB

Sample Date: 28-Jul-03

Date Tested: 13-Aug-03

Date Received: 28-Jul-03

Zero Air Voids @ 2.73 S.G.



Max. Dry Density: 107.2
 Optimum Moisture (%): 15.8

Moisture Content	Dry Density	Wet Density
11.3	95.9	106.7
14.2	101.6	116.1
16.0	107.2	124.2
17.8	98.5	116.1
19.7	91.9	110.0

Method: ASTM D-698
 Rammer Type: MANUAL
 Preparation: DRY TO WET
 % Retained 5mm screen: 0.0
 % Retained 10mm screen: 0.0
 % Retained 20mm screen: 0.0

Sample Description: BROWN SANDY LEAN CLAY "CL" AS PER USCS FROM BOSTWICK PIT MELROSE, NM

Comment: IN PLACE TESTING



Per: *Lance Stanger*

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on written request.

Lydick Engineers & Surveyors, Inc.

P. O. Box 728
205 E. 2nd Street
Clovis, NM 88101
505-762-3771

Proctor Report

Report Date: 14-Aug-03
Project: DACAW45-94-D-0003
Report Number: 7

To: ARROWHEAD CONST.
12920 METCALF AVE. SUITE 150
OVERLAND PARK KS 66213

Copies To: FW/TT
COE
ARROWHEAD

Proj: CLOSURE OF SWMU101 SEWAGE LAGOON @ CANNON AFB

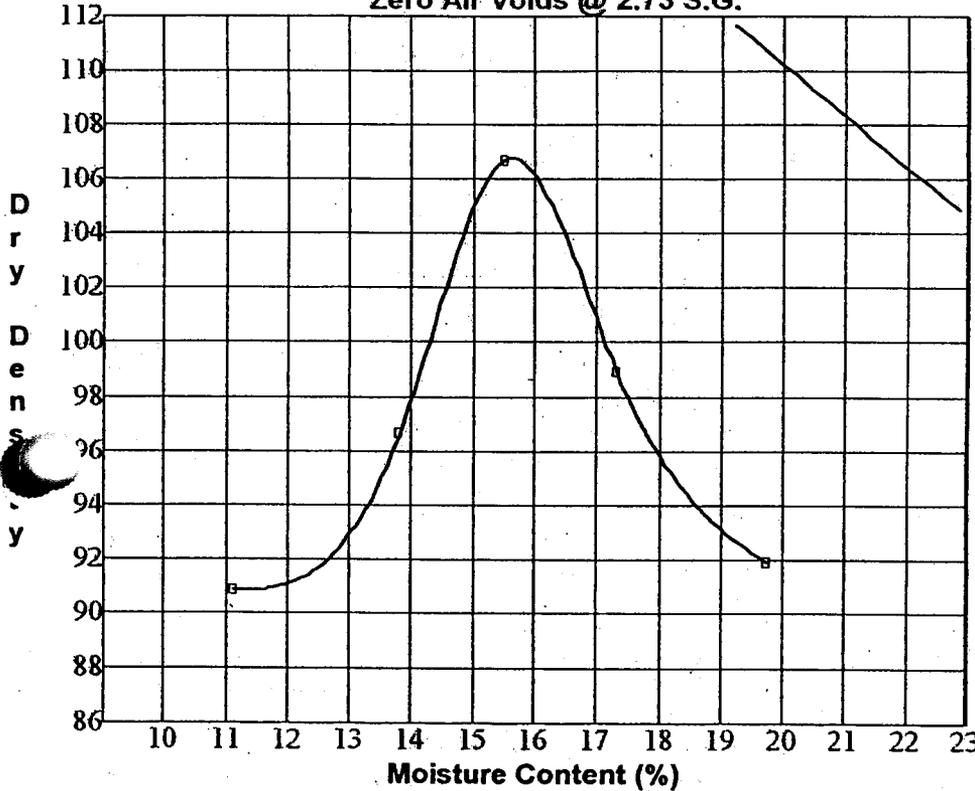
Sample Type: COMPOSITE
Source: BOSTWICK PIT
Tested By: B. HIERONYMUS

Sample Date: 30-Jun-03

Date Tested: 13-Aug-03

Date Received: 30-Jun-03

Zero Air Voids @ 2.73 S.G.



Max. Dry Density: 106.8
Optimum Moisture (%): 15.6

Moisture Content	Dry Density	Wet Density
11.1	90.8	100.9
13.8	96.6	110.0
15.5	106.8	123.3
17.3	98.9	116.1
19.7	91.9	110.0

Method: ASTM D-698
Rammer Type: MANUAL
Preparation: DRY TO WET
% Retained 5mm screen: 0.0
% Retained 10mm screen: 0.0
% Retained 20mm screen: 0.0

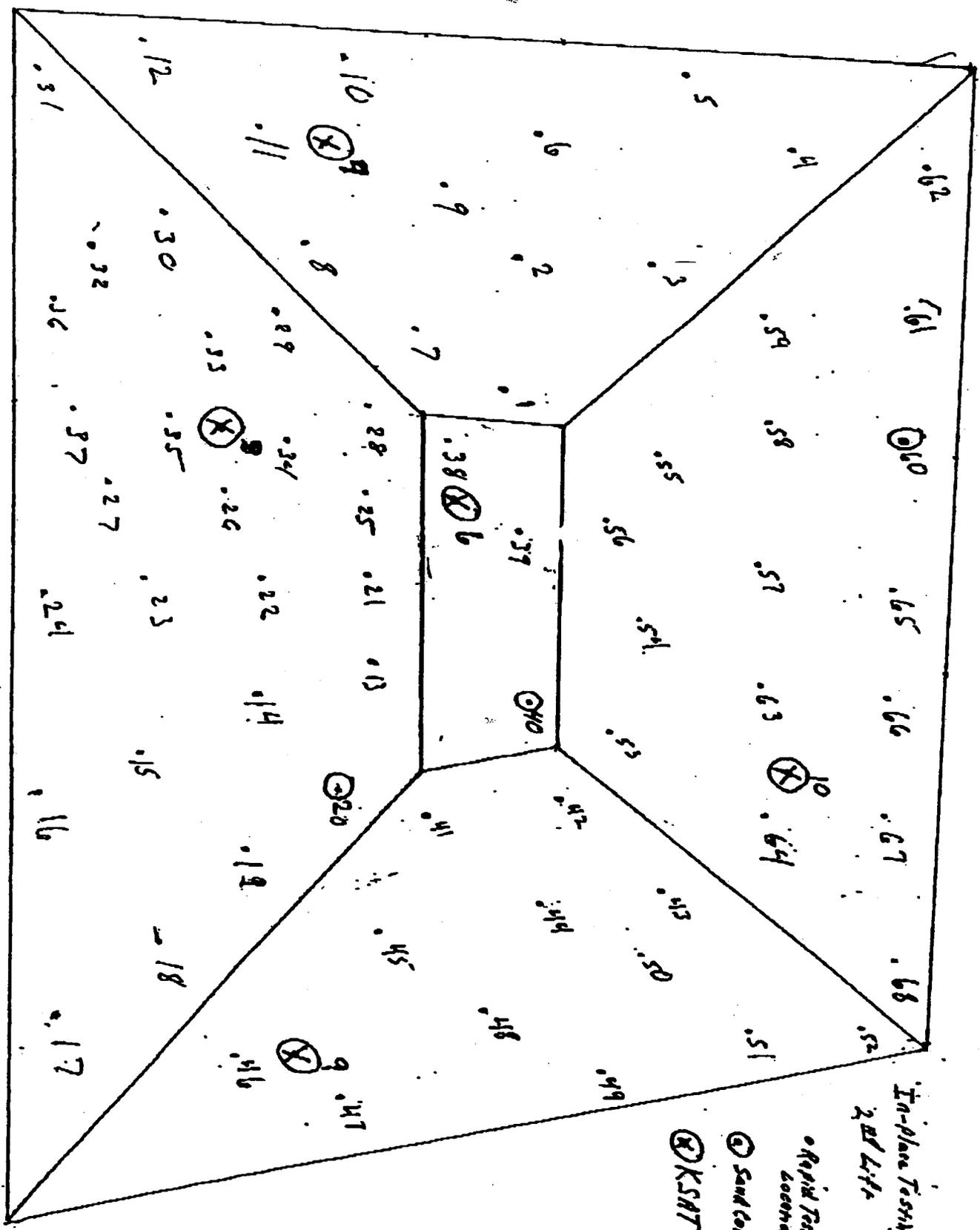
Sample Description: BROWN SANDY LEAN CLAY "CL" AS PER USCS FROM BOSTWICK PIT MELROSE ,NM

Comment: IN PLACE TESTING



Per James E. Gangan

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on written request.



In-place Testing
2nd Lift

Rapid Test
Locations

Sand Cones

KSAT



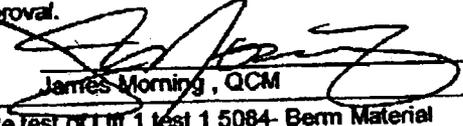
NTS

SUBMITTAL REVIEW VERIFICATION SHEET

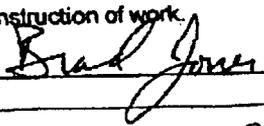
Date: Sept 18, 2003

Submittal No.: 02377-18

Foster Wheeler Environmental Corporation Stamp

SWMU 101 Sewage Lagoons Closure, Cannon AFB, NM Certified for approval as indicated below:	
<input checked="" type="radio"/> A - <input type="radio"/> B -	Approved as submitted Approved except as noted on the drawings and/or attached sheets.
It is hereby certified that the (equipment) (material) shown and marked in this submittal is that proposed to be incorporated into Contract Number DACW45-94-D-0003, Delivery Order No. 35, Work Authorization Directive 1 is in compliance with the contract drawings and specifications, can be installed in the allocated spaces, and is submitted for Government approval.	
Reviewed/Certified By:	 James Morning, QCM
Description of items reviewed: SD-06 Test Reports- Re test of LIT 1 test 1 5084- Berm Material	

U.S. Army Corps of Engineers Stamp

U.S. Army Engineer District, Albuquerque Corps of Engineers Certified for approval as indicated below:	
A -	Approved as submitted.
<input checked="" type="radio"/> B -	Approved except as noted on the drawings and/or attached sheet(s). Resubmission not required.
C -	Approved except as noted on the drawings and/or attached sheet(s). Resubmission required.
D -	Will be returned by separate correspondence.
E -	Disapproved; see comments on attached sheet.
F -	Receipt acknowledged.
G -	Other: Specify.
Note: Items approved as to general layout only. Dimensions and quantities checked. Approval does not relieve contractor of responsibilities for errors that may exist, as contractor shall be responsible for dimensions and design of adequate corrections. Details and satisfactory construction of work.	
Signature: 	Date: <u>9-24-03</u>

Reviewer's Signature: 

RM 9/25/03

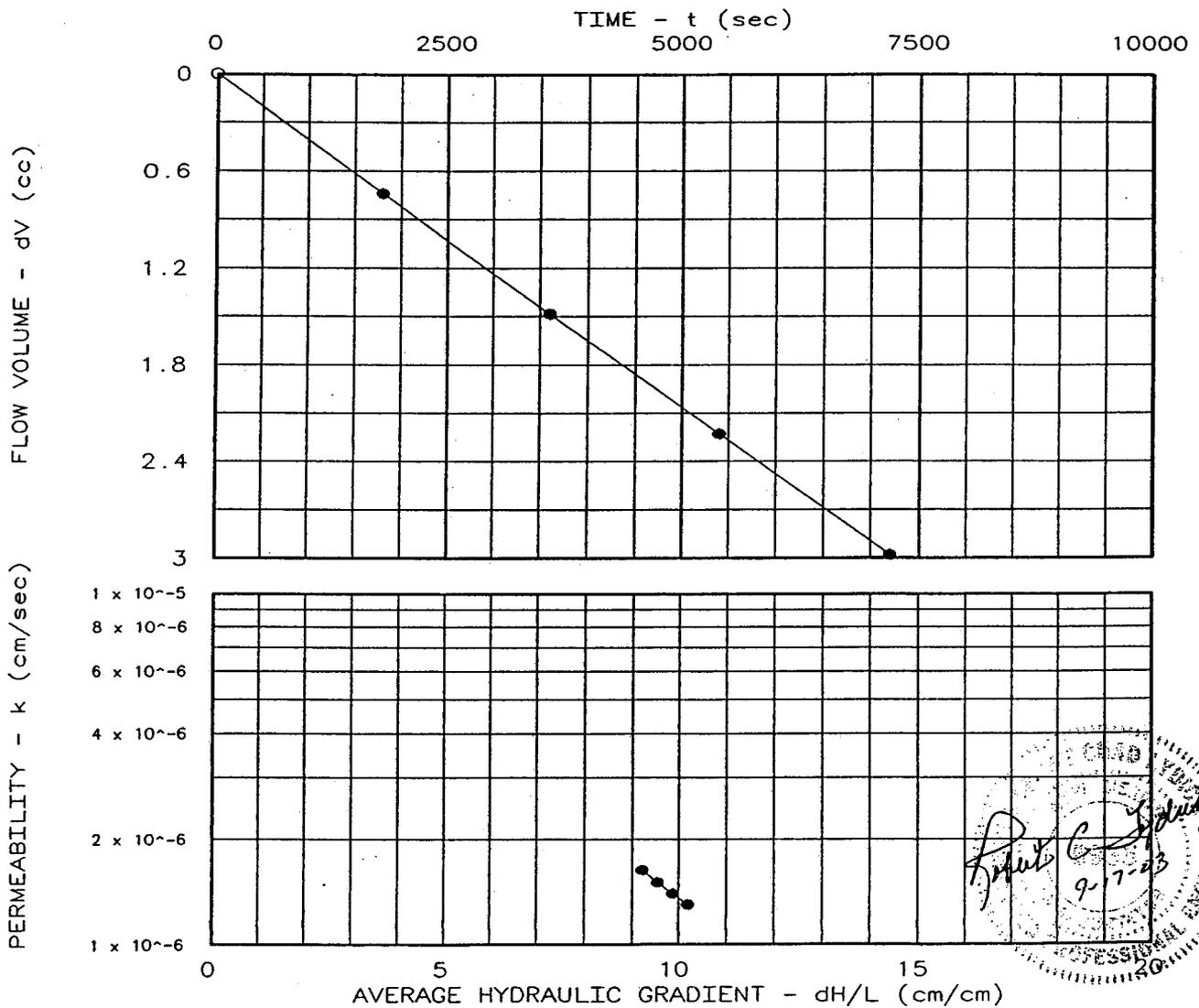
PERMEABILITY TEST REPORT

TEST DATA:

Specimen Height (cm): 11.44
 Specimen Diameter (cm): 6.28
 Dry Unit Weight (pcf): 108.4
 Moisture Before Test (%): 13.3
 Moisture After Test (%): 19.9
 Run Number: 1 ● 2 ▲
 Cell Pressure (psi): 94.5
 Sat. Pressure (psi): 92.5
 Perm. (cm/sec): 1.41×10^{-6}

SAMPLE DATA:

Sample Identification: EXISTING BERM
 MATERIAL: REMOED SAMPLE OF IN-PLACE-1
 Visual Description: REDDISH SANDY CLAYEY SAND CLASSIFIED AS SM-SC AS PER USCS
 Remarks: ASTM D 5084-01 B=98.3
 5 PSI FOR B Ca₂ REAGENT
 Maximum Dry Density (pcf): 117.1
 Optimum Moisture Content (%): 12.8
 ASTM(D-698)
 Percent Compaction: 92.6%
 Permeameter type: FLEXWALL
 Sample type: REMOLDED



Project: LAGOON CLOSURE SWMU 101 @ CANNON AFB
 Location: WASTE WATER TREATMENT PLANT @ CAFB
 Date: 9-12-03

Project No.: DACW45-03
 File No.: AH-4-03-11
 Lab No.: LE-RT-IP-1

PERMEABILITY TEST REPORT
LYDICK ENGINEERS & SURVEYORS, INC.

Tested by: L.E.L.
 Checked by: R.C.L.
 Test: FH - Falling head C

Lydick Laboratories
 205 E. Second Street
 Clovis, NM 88101
 505-762-3771

ASTM D 5084-01

Contractor: ARROWHEAD
 Project: SWMU 101
 Location: CANNON A.F.B.
 Date: 9/12/2003

Sample ID: RETESTOF INPLACE-1

a = burette area (cm²)
 t = time interval (s)
 T = temperature (deg C)
 L = sample length (cm)
 d = sample diameter (cm)

a	t	T	L	d
0.2	1.300	21.4	11.41	6.28

$A = (\pi/4) \cdot (d)^2$
 30.97484693

P_{in} = inflow pressure
 P_{out} = outflow pressure
 cmW = conversion factor from psi to cm of water

cmW
 0.0142091301798

P _{in} (psi)	P _{out} (psi)
92.5	91.5

P _{in} (cm)	P _{out} (cm)
6.51E+03	6.44E+03

	h _{in} Values	h _{out} Values
h ₀	50	0
h ₁	46.3	3.7
h ₂	42.5	7.42
h ₃	38.85	11.15
h ₄	35.1	14.9

$H = P_{in} + (h_{in} - h_{out}) - P_{out}$

gradient = H/L

H ₀	120.3772847 cmW
H ₁	112.9772847 cmW
H ₂	105.5372847 cmW
H ₃	98.0772847 cmW
H ₄	90.5772847 cmW

G ₀	10.52249
G ₁	9.875637
G ₂	9.225287
G ₃	8.573189
G ₄	7.917595

gradient_{avg} = (G₀+G₄)/2
 gradient_{avg} = 9.220042369

Headloss across sample should not drop to less than 75% of initial

minh = 0.75(h₀)
 minh = 90.2830 cmW

$$c = (a \cdot L) / (2 + A + t)$$

2.05184E-05

$K_{sat1} = c \cdot \ln[(H_0/H_1)]$	1.30177E-06
$K_{sat2} = c \cdot \ln[(H_1/H_2)]$	1.39777E-06
$K_{sat3} = c \cdot \ln[(H_2/H_3)]$	1.50418E-06
$K_{sat4} = c \cdot \ln[(H_3/H_4)]$	1.63229E-06

$$K_{mean} = (K_{sat1} + K_{sat2} + K_{sat3} + K_{sat4}) / 4$$

$$K_{mean} = 1.459E-06$$

Percent Deviation - less than 25% deviation from mean value

$$K_1 = |(K_{sat1} - K_{mean}) / K_{sat1}|$$

$$K_2 = |(K_{sat2} - K_{mean}) / K_{sat2}|$$

$$K_3 = |(K_{sat3} - K_{mean}) / K_{sat3}|$$

$$K_4 = |(K_{sat4} - K_{mean}) / K_{sat4}|$$

$K_1 =$	12.078%
$K_2 =$	4.381%
$K_3 =$	3.003%
$K_4 =$	10.616%

Temperature Correction

$$K_{20} = [(2.2902 - 0.9842T) / T0.1702] \cdot K_{mean}$$

$$K_{20} = 1.41084E-06$$

Ratio of Inflow/Outflow Rates - Should be between 0.75 and 1.25

$$rate_0 = [(h_{in0} - h_{in1}) \cdot (a/t)] / [(h_{out1} - h_{out0}) \cdot (a/t)]$$

$$rate_1 = [(h_{in1} - h_{in2}) \cdot (a/t)] / [(h_{out2} - h_{out1}) \cdot (a/t)]$$

$$rate_2 = [(h_{in2} - h_{in3}) \cdot (a/t)] / [(h_{out3} - h_{out2}) \cdot (a/t)]$$

$$rate_3 = [(h_{in3} - h_{in4}) \cdot (a/t)] / [(h_{out4} - h_{out3}) \cdot (a/t)]$$

rate0 =	1.000
rate1 =	1.000
rate2 =	1.000
rate3 =	1.000



TESTED BY: *[Signature]*

=====

FALLING HEAD PERMEABILITY TEST RESULTS

PROJECT NAME: LAGOON CLOSURE SWMU 101 @ CANNON AFB FILE NO.: AH-4-03-11
PROJECT LOCATION: WASTE WATER TREATMENT PLANT @ CAFB PROJECT NO.: DACW45-03
SAMPLE IDENTIFICATION: EXISTING BERM LAB NO.: LE-RT-IP-1
MATERIAL REMOVED SAMPLE OF IN-PLACE-1
DESCRIPTION: REDDISH SANDY CLAYEY SAMPLE TYPE: REMOLDED
SAND CLASSIFIED AS SM-SC AS PER USCS
MAX. DRY DENS.: 117.1 OPT. WATER CONTENT: 12.8 DATE: 9-12-03

SPECIMEN DATA

INITIAL PARAMETERS:

HEIGHT: 11.44 cm
DIAMETER: 6.28 cm
WET WEIGHT: 698.3 g
MOISTURE CONTENT: 13.3 %
DRY DENSITY: 108.4 pcf
PERCENT COMPACTION: 92.6

FINAL PARAMETERS:

HEIGHT: 11.45 cm
DIAMETER: 6.29 cm
WET WEIGHT: 739.3 g
MOISTURE CONTENT: 19.9 %
DRY DENSITY: 108.3 pcf

TEST PARAMETERS

CELL NO.: 1

PANEL NO.: 1

POSITIONS: 1

CELL PRESSURE:

RUN NO. 1

RUN NO. 2

SATURATION PRESSURE:

94.5 psi

92.5 psi

PERMEABILITY DATA

TOTAL FLOW VOLUME:

RUN NO. 1

RUN NO. 2

LENGTH OF TEST:

2.98E 00 cc

7,200 sec

AVERAGE GRADIENT:

9.2

TEMPERATURE:

21.4 deg C

PERMEABILITY, K, at 20 deg C:

1.41E-06 cm/sec



===== LYDICK ENGINEERS & SURVEYORS, INC. =====

=====

PERMEABILITY TEST DATA

=====

PROJECT DATA

Project Name: LAGOON CLOSURE SWMU 101 @ CANNON AFB
 File No.: AH-4-03-11
 Project Location: WASTE WATER TREATMENT PLANT @ CAFB
 Project No.: DACW45-03
 Sample Identification: EXISTING BERM
 MATERIAL REMOLED SAMPLE OF IN-PLACE-1
 Lab No.: LE-RT-IP-1
 Description: REDDISH SANDY CLAYEY
 SAND CLASSIFIED AS SM-SC AS PER USCS
 Sample Type: REMOLDED
 Max. Dry Dens.: 117.1
 Method (D1557/D698): D-698
 Opt. Water Content: 12.8
 Date: 9-12-03
 Remarks: ASTM D 5084-01 B=98.3
 5 PSI FOR B Cal₂ REAGENT
 Permeameter Type: FLEXWALL
 Tested by: L.E.L.
 Checked by: R.C.L.
 Test type: FH - Falling head C

PERMEABILITY TEST SPECIMEN DATA

	Before test:			After test:		
Diameter:	1	2		1	2	
Top:	2.473 in	in		2.474 in	in	
Middle:	2.474 in	in		2.475 in	in	
Bottom:	2.474 in	in		2.475 in	in	
Average:	2.47 in	6.28 cm		2.47 in	6.29 cm	
Length:	1	2	3	1	2	3
Average:	4.505 in	in	in	4.509 in	in	in
Average:	4.51 in	11.44 cm		4.51 in	11.45 cm	

Moisture, Density and Sample Parameters:

Specific Gravity:	2.65		
Wet Wt. & Tare:	828.56		869.57
Dry Wt. & Tare:	746.51		746.69
Tare Wt.:	130.25		130.25
Moisture Content:	13.3 %		19.9 %
Dry Unit Weight:	108.4 pcf	92.6 % of max	108.3 pcf
Porosity:	0.3446		0.3455
Saturation:	67.1 %		100.1 %

FALLING HEAD PERMEABILITY TEST CONDITIONS DATA

Cell No.: 1	Panel No.: 1	Positions: 1
Run Number:	1	2
Cell Pressure:	94.5 psi	0.0 psi
Inflow Saturation Pressure:	92.5 psi	0.0 psi
Inflow Buret Area:	0.2000 cm ²	0.2000 cm ²
Outflow Buret Area:	0.2000 cm ²	0.2000 cm ²
Test Temperature:	21.4 °C	0.0 °C
Outflow Saturation Pressure:	91.5 psi	0.0 psi

PERMEABILITY TEST READINGS DATA

CASE D X S	DATE	TIME (24 hr)	ELAPSED TIME sec	INFLOW LEVEL cm	OUTFLOW LEVEL cm	OUTFLOW/ INFLOW RATIO	PERM. K cm/sec
S X	9/14/ 3	12:00:00	0	50.00	0.0	0.00	0.00E 00
	9/14/ 3	12:30:00	1,800	46.30	3.7	1.00	1.30E-06
	9/14/ 3	13:00:00	1,800	42.58	7.4	1.00	1.40E-06
	9/14/ 3	13:30:00	1,800	38.85	11.2	1.00	1.50E-06
	9/14/ 3	14:00:00	1,800	35.10	14.9	1.00	1.63E-06

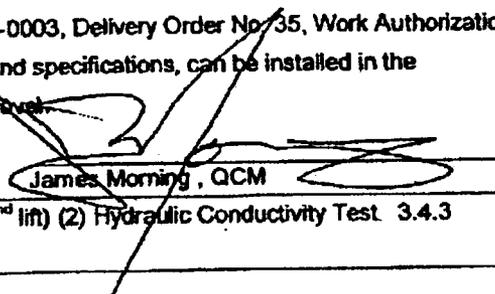
Gradient = 9.212E 00 Total vol = 2.98E 00 cc Test duration = 7,200 sec
 Permeability, K_{21.4°} = 1.459E-06 cm/sec, K_{20°} = 1.410E-06 cm/sec
 Permeability values are incremental

SUBMITTAL REVIEW VERIFICATION SHEET

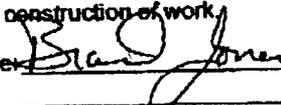
Date: Sept 19, 2003

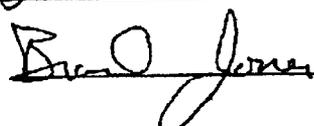
Submittal No.: 02377-19

Foster Wheeler Environmental Corporation Stamp

SWMU 101 Sewage Lagoons Closure, Cannon AFB, NM Certified for approval as indicated below:	
<input checked="" type="radio"/> A	Approved as submitted
<input type="radio"/> B	Approved except as noted on the drawings and/or attached sheets.
It is hereby certified that the (equipment) (material) shown and marked in this submittal is that proposed to be incorporated into Contract Number DACW45-94-D-0003, Delivery Order No. 35, Work Authorization Directive 1 is in compliance with the contract drawings and specifications, can be installed in the allocated spaces, and is submitted for Government approval.	
Reviewed/Certified By:	 James Morning, QCM
Description of items reviewed: SD-06 Test Reports- (2 nd lift) (2) Hydraulic Conductivity Test 3.4.3 Test 9-10 (5 test per lift) Final set.	

U.S. Army Corps of Engineers Stamp

U.S. Army Engineer District, Albuquerque Corps of Engineers Certified for approval as indicated below:	
<input checked="" type="radio"/> A	Approved as submitted.
<input type="radio"/> B	Approved except as noted on the drawings and/or attached sheet(s). Resubmission not required.
<input type="radio"/> C	Approved except as noted on the drawings and/or attached sheet(s). Resubmission required.
<input type="radio"/> D	Will be returned by separate correspondence.
<input type="radio"/> E	Disapproved; see comments on attached sheet.
<input type="radio"/> F	Receipt acknowledged.
<input type="radio"/> G	Other: Specify.
Note: Items approved as to general layout only. Dimensions and quantities checked. Approval does not relieve contractor of responsibilities for errors that may exist, as contractor shall be responsible for dimensions and design of adequate corrections. Details and satisfactory construction of work.	
Signature: 	Date: 9-24-03

Reviewer's Signature: 

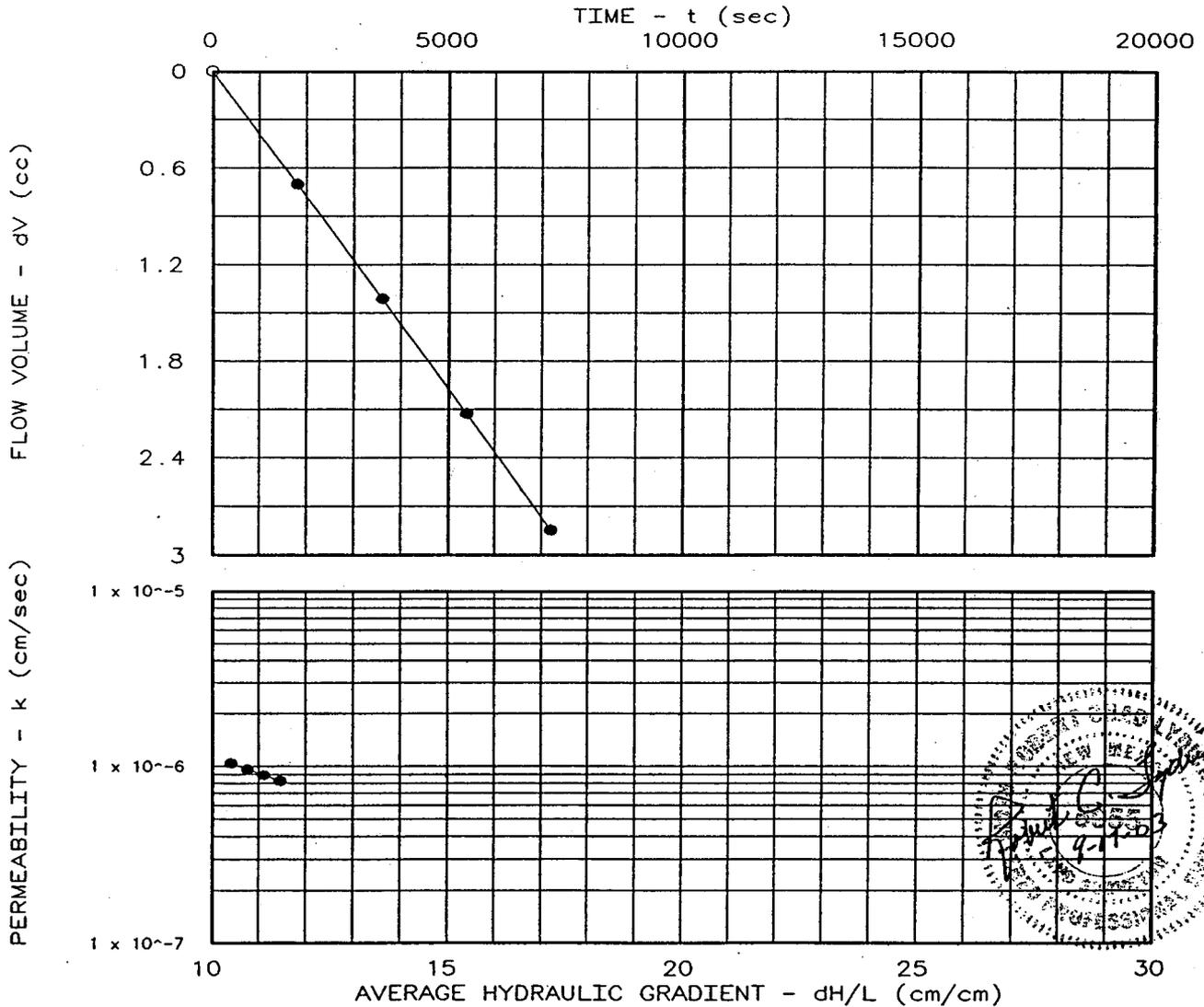
PERMEABILITY TEST REPORT

TEST DATA:

Specimen Height (cm): 10.19
 Specimen Diameter (cm): 7.24
 Dry Unit Weight (pcf): 96.8
 Moisture Before Test (%): 15.3
 Moisture After Test (%): 27.9
 Run Number: 1 • 2 ▲
 Cell Pressure (psi): 93.5
 Sat. Pressure (psi): 91.0
 Perm. (cm/sec): 8.98×10^{-7}

SAMPLE DATA:

Sample Identification: BORROW FILL MATERIAL
 BOSTWICK PIT MELROSE, NM IN-PLACE-9
 Visual Description: BROWN SANDY LEAN CLAY
 CLASSIFIED AS "CL" AS PER USCS
 Remarks: ASTM D 5084-01 B=98.1
 5 PSI FOR B CaI₂ REAGENT
 Maximum Dry Density (pcf): 107.1
 Optimum Moisture Content (%): 14.3
 ASTM(D-698)
 Percent Compaction: 90.3%
 Permeameter type: FLEXWALL
 Sample type: IN-PLACE-9



Project: LAGOON CLOSURE SWMU 101 @ CANNON AFB
 Location: WASTE WATER TREATMENT PLANT CAFB
 Date: 9-12-03

Project No.: DACW45-03
 File No.: AH4-03-8
 Lab No.: LE-IP-9
 Tested by: L.E.L.
 Checked by: R.C.L.
 Test: FH - Falling head C

PERMEABILITY TEST REPORT
LYDICK ENGINEERS & SURVEYORS, INC.

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FALLING HEAD PERMEABILITY TEST RESULTS

PROJECT NAME: LAGOON CLOSURE SWMU 101 @ CANNON AFB FILE NO.: AH4-03-8
PROJECT LOCATION: WASTE WATER TREATMENT PLANT CAFB PROJECT NO.: DACW45-03
SAMPLE IDENTIFICATION: BORROW FILL MATERIAL LAB NO.: LE-IP-9
BOSTWICK PIT MELROSE, NM IN-PLACE-9
DESCRIPTION: BROWN SANDY LEAN CLAY SAMPLE TYPE: IN-PLACE-9
CLASSIFIED AS "CL" AS PER USCS
MAX. DRY DENS.: 107.1 OPT. WATER CONTENT: 14.3 DATE: 9-12-03

SPECIMEN DATA

INITIAL PARAMETERS:

HEIGHT: 10.19 cm
DIAMETER: 7.24 cm
WET WEIGHT: 749.6 g
MOISTURE CONTENT: 15.3 %
DRY DENSITY: 96.8 pcf
PERCENT COMPACTION: 90.3

FINAL PARAMETERS:

HEIGHT: 10.20 cm
DIAMETER: 7.24 cm
WET WEIGHT: 833.2 g
MOISTURE CONTENT: 27.9 %
DRY DENSITY: 96.8 pcf

TEST PARAMETERS

CELL NO.: 3

PANEL NO.: 3

POSITIONS: 3

CELL PRESSURE:

RUN NO. 1
93.5 psi

RUN NO. 2

SATURATION PRESSURE:

91.0 psi

PERMEABILITY DATA

TOTAL FLOW VOLUME:

RUN NO. 1
2.85E 00 cc

RUN NO. 2

LENGTH OF TEST:

7,200 sec

AVERAGE GRADIENT:

10.4

TEMPERATURE:

21.4 deg C

PERMEABILITY, K, at 20 deg C:

8.98E-07 cm/sec

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PERMEABILITY TEST DATA

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PROJECT DATA

roject Name: LAGOON CLOSURE SWMU 101 @ CANNON AFB
 ile No.: AH4-03-8
 roject Location: WASTE WATER TREATMENT PLANT CAFB
 roject No.: DACW45-03
 ample Identification: BORROW FILL MATERIAL
 BOSTWICK PIT MELROSE, NM IN-PLACE-9
 ab No.: LE-IP-9
 escription: BROWN SANDY LEAN CLAY
 CLASSIFIED AS "CL" AS PER USCS
 ample Type: IN-PLACE-9
 ax. Dry Dens.: 107.1
 ethod (D1557/D698): D-698
 pt. Water Content: 14.3
 ate: 9-12-03
 emarks: ASTM D 5084-01 B=98.1
 5 PSI FOR B Cal₂ REAGENT
 ermeameter Type: FLEXWALL
 ested by: L.E.L.
 hecked by: R.C.L.
 est type: FH - Falling head C

PERMEABILITY TEST SPECIMEN DATA

	Before test:			After test:		
Diameter:	1	2		1	2	
Top:	2.850 in	in		2.852 in	in	
Middle:	2.850 in	in		2.851 in	in	
Bottom:	2.851 in	in		2.852 in	in	
Average:	2.85 in	7.24 cm		2.85 in	7.24 cm	
Length:	1	2	3	1	2	3
Average:	4.013 in	in	in	4.016 in	in	in
Average:	4.01 in	10.19 cm		4.02 in	10.20 cm	

Moisture, Density and Sample Parameters:

Specific Gravity:	2.73		
Wet Wt. & Tare:	875.32		958.95
Dry Wt. & Tare:	775.91		777.35
Tare Wt.:	125.74		125.74
Moisture Content:	15.3 %		27.9 %
Dry Unit Weight:	96.8 pcf	90.3 % of max	96.8 pcf
Porosity:	0.4323		0.4321
Saturation:	54.8 %		100.0 %

FALLING HEAD PERMEABILITY TEST CONDITIONS DATA

Cell No.: 3	Panel No.: 3	Positions: 3
Run Number:	1	2
Cell Pressure:	93.5 psi	0.0 psi
Inflow Saturation Pressure:	91.0 psi	0.0 psi
Inflow Buret Area:	0.2000 cm ²	0.2000 cm ²
Outflow Buret Area:	0.2000 cm ²	0.2000 cm ²
Test Temperature:	21.4 °C	0.0 °C
Outflow Saturation Pressure:	90.0 psi	0.0 psi

PERMEABILITY TEST READINGS DATA

CASE	DATE	TIME	ELAPSED	INFLOW	OUTFLOW	OUTFLOW/	PERM.
D X		(24 hr)	TIME	LEVEL	LEVEL	INFLOW	K
S			sec	cm	cm	RATIO	cm/sec
S X	9/12/ 3	8:00:00	0	50.00	0.0	0.00	0.00E 00
	9/12/ 3	8:30:00	1,800	46.50	3.5	1.00	8.25E-07
	9/12/ 3	9:00:00	1,800	42.95	7.1	1.00	8.90E-07
	9/12/ 3	9:30:00	1,800	39.37	10.6	1.00	9.60E-07
	9/12/ 3	10:00:00	1,800	35.76	14.2	1.00	1.04E-06

Gradient = 1.041E 01 Total vol = 2.85E 00 cc Test duration = 7,200 sec
 Permeability, K_{21.4°} = 9.292E-07 cm/sec, K_{20°} = 8.984E-07 cm/sec
 Permeability values are incremental



ydick Laboratories
 105 E. Second Street
 Fort Worth, TX 76102
 Phone: 817-372-3771

ASTM D 5084-01

Contractor: ARROWHEAD
 Project: SWMU 101
 Location: CANNON A.F.B.
 Date: 9/12/2003

Sample ID: IN-PLACE-9

- = burette area (cm²)
- = time interval (s)
- = temperature (deg C)
- = sample length (cm)
- = sample diameter (cm)

a	t	T	L	d
41.16868677	1800	21.4	10.19	7.24

$$A = (\pi/4) \cdot (d)^2$$

41.16868677

- in = inflow pressure
- out = outflow pressure
- nW = conversion factor from psi to cm of water

cmW
 0.0142091301798

Pin (psi)	Pout (psi)
91	90

Pin (cm)	Pout (cm)
6.40E+03	6.33E+03

	hin Values	hout Values
h0	50	0
h1	46.5	3.5
h2	42.95	7.05
h3	39.37	10.63
h4	35.76	14.24

$$H = P_{in} + (h_{in} - h_{out}) - P_{out}$$

H0	120.3772847 cmW
H1	113.3772847 cmW
H2	106.2772847 cmW
H3	99.1172847 cmW
H4	91.8972847 cmW

$$\text{gradient} = H/L$$

G0	11.81328
G1	11.12633
G2	10.42957
G3	9.726917
G4	9.018379

$$\text{gradient}_{avg} = (G_0 + G_4)/2$$

gradient_{avg} = 10.41582774

Headloss across sample should not drop to less than 75% of initial

$$\text{minh} = 0.75(h_0)$$

minh = 90.2830 cmW

95

$$c = (a \cdot L) / (2 + A + t)$$

$$1.3751E-05$$

$K_{sat1} = c \cdot \ln[(H_0/H_1)]$	8.2382E-07
$K_{sat2} = c \cdot \ln[(H_1/H_2)]$	8.89271E-07
$K_{sat3} = c \cdot \ln[(H_2/H_3)]$	9.59102E-07
$K_{sat4} = c \cdot \ln[(H_3/H_4)]$	1.04002E-06

$$K_{mean} = (K_{sat1} + K_{sat2} + K_{sat3} + K_{sat4}) / 4$$

$$K_{mean} = 9.28054E-07$$

Percent Deviation - less than 25% deviation from mean value

$d_1 = (K_{sat1} - K_{mean}) / K_{sat1} $
$d_2 = (K_{sat2} - K_{mean}) / K_{sat2} $
$d_3 = (K_{sat3} - K_{mean}) / K_{sat3} $
$d_4 = (K_{sat4} - K_{mean}) / K_{sat4} $

$K_1 =$	12.652%
$K_2 =$	4.361%
$K_3 =$	3.237%
$K_4 =$	10.766%

Temperature Correction

$$K_{20} = [(2.2902 \cdot 0.9842T) / T^{0.1702}] \cdot K_{mean}$$

$$K_{20} = 8.97416E-07$$

Ratio of Inflow/Outflow Rates - Should be between 0.75 and 1.25

$rate_0 = [(h_{in0} - h_{in1}) \cdot (a/t)] / [(h_{out1} - h_{out0}) \cdot (a/t)]$
$rate_1 = [(h_{in1} - h_{in2}) \cdot (a/t)] / [(h_{out2} - h_{out1}) \cdot (a/t)]$
$rate_2 = [(h_{in2} - h_{in3}) \cdot (a/t)] / [(h_{out3} - h_{out2}) \cdot (a/t)]$
$rate_3 = [(h_{in3} - h_{in4}) \cdot (a/t)] / [(h_{out4} - h_{out3}) \cdot (a/t)]$

$rate_0 =$	1.000
$rate_1 =$	1.000
$rate_2 =$	1.000
$rate_3 =$	1.000



TESTED BY: *[Signature]*

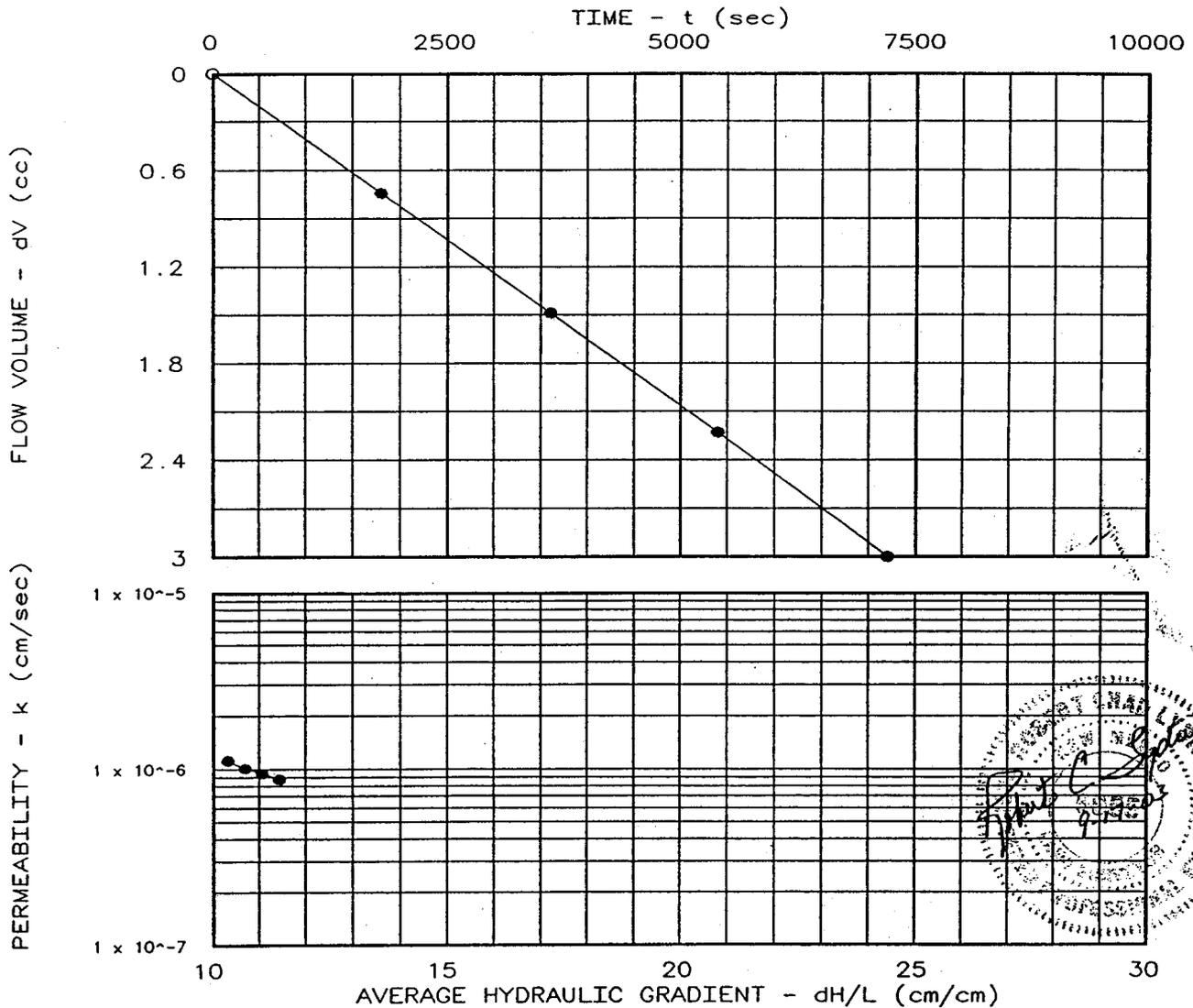
PERMEABILITY TEST REPORT

TEST DATA:

Specimen Height (cm): 10.20
 Specimen Diameter (cm): 7.24
 Dry Unit Weight (pcf): 96.5
 Moisture Before Test (%): 14.4
 Moisture After Test (%): 27.8
 Run Number: 1 ● 2 ▲
 Cell Pressure (psi): 94.5
 Sat. Pressure (psi): 92.0
 Perm. (cm/sec): 9.53×10^{-7}

SAMPLE DATA:

Sample Identification: BORROW FILL MATERIAL
 BOSTWICK PIT MELROSE, NM IN-PLACE-10
 Visual Description: BROWN SANDY LEAN CLAY
 CLASSIFIED AS "CL" AS PER USCS
 Remarks: ASTM D 5084-01 B=97.8
 5PSI FOR B CaI₂ REAGENT
 Maximum Dry Density (pcf): 107.1
 Optimum Moisture Content (%): 14.3
 ASTM(D-698)
 Percent Compaction: 90.1%
 Permeameter type: FLEXWALL
 Sample type: IN-PLACE-10



Project: LAGOON CLOSURE SWMU 101 @ CANNON AFB
 Location: WASTE WATER TREATMENT PLANT CAFB
 Date: 9-12-03

Project No.: DACW-45-03
 File No.: AH-3-04-10
 Lab No.: LE-IP-10
 Tested by: L.E.L.
 Checked by: R.C.L.
 Test: FH - Falling head C

PERMEABILITY TEST REPORT
LYDICK ENGINEERS & SURVEYORS, INC.

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FALLING HEAD PERMEABILITY TEST RESULTS

PROJECT NAME: LAGOON CLOSURE SWMU 101 @ CANNON AFB FILE NO.: AH-3-04-10
PROJECT LOCATION: WASTE WATER TREATMENT PLANT CAFB PROJECT NO.: DACW-45-03
SAMPLE IDENTIFICATION: BORROW FILL MATERIAL LAB NO.: LE-IP-10
BOSTWICK PIT MELROSE, NM IN-PLACE-10
DESCRIPTION: BROWN SANDY LEAN CLAY SAMPLE TYPE: IN-PLACE
CLASSIFIED AS "CL" AS PER USCS
MAX. DRY DENS.: 107.1 OPT. WATER CONTENT: 14.3 DATE: 9-12-03

SPECIMEN DATA

INITIAL PARAMETERS:

HEIGHT: 10.20 cm
DIAMETER: 7.24 cm
WET WEIGHT: 741.4 g
MOISTURE CONTENT: 14.4 %
DRY DENSITY: 96.5 pcf
PERCENT COMPACTION: 90.1

FINAL PARAMETERS:

HEIGHT: 10.21 cm
DIAMETER: 7.24 cm
WET WEIGHT: 832.4 g
MOISTURE CONTENT: 27.8 %
DRY DENSITY: 96.8 pcf

TEST PARAMETERS

CELL NO.: 2

PANEL NO.: 2

POSITIONS: 2

CELL PRESSURE:

RUN NO. 1

RUN NO. 2

94.5 psi

SATURATION PRESSURE:

92.0 psi

PERMEABILITY DATA

TOTAL FLOW VOLUME:

RUN NO. 1

RUN NO. 2

3.00E 00 cc

LENGTH OF TEST:

7,200 sec

AVERAGE GRADIENT:

10.3

TEMPERATURE:

21.4 deg C

PERMEABILITY, K, at 20 deg C:

9.53E-07 cm/sec

===== LYDICK ENGINEERS & SURVEYORS, INC. =====

FALLING HEAD PERMEABILITY TEST CONDITIONS DATA

Cell No.: 2	Panel No.: 2	Positions: 2
Run Number:	1	2
Cell Pressure:	94.5 psi	0.0 psi
Inflow Saturation Pressure:	92.0 psi	0.0 psi
Inflow Buret Area:	0.2000 cm ²	0.2000 cm ²
Outflow Buret Area:	0.2000 cm ²	1.7100 cm ²
Test Temperature:	21.4 °C	0.0 °C
Outflow Saturation Pressure:	91.0 psi	0.0 psi

PERMEABILITY TEST READINGS DATA

CASE	DATE	TIME	ELAPSED	INFLOW	OUTFLOW	OUTFLOW/	PERM.
D X		(24 hr)	TIME	LEVEL	LEVEL	INFLOW	K
S			sec	cm	cm	RATIO	cm/sec
S X	9/12/ 3	13:00:00	0	50.00	0.0	0.00	0.00E 00
	9/12/ 3	13:30:00	1,800	46.30	3.7	1.00	8.75E-07
	9/12/ 3	14:00:00	1,800	42.56	7.4	1.00	9.45E-07
	9/12/ 3	14:30:00	1,800	38.85	11.2	1.00	1.01E-06
	9/12/ 3	15:00:00	1,800	35.01	15.0	1.00	1.12E-06

Gradient = 1.032E 01 Total vol = 3.00E 00 cc Test duration = 7,200 sec
 Permeability, K_{21.4°} = 9.859E-07 cm/sec, K_{20°} = 9.532E-07 cm/sec
 Permeability values are incremental



ASTM D 5084-01

Contractor: ARROWHEAD
 Project: SWMU 101
 Location: CANNON A.F.B.
 Date: 9/12/2003

dydick Laboratories
 05 E. Second Street
 Lovis, NM 88101
 62-3771

Sample ID: IN-PLACE- 10

- A = burette area (cm²)
- t = time interval (s)
- T = temperature (deg C)
- L = sample length (cm)
- d = sample diameter (cm)

a	t	T	L	d
0.2	1800	21.4	10.2	2.4

$A = (\pi/4) \cdot (d)^2$
 41.16868677

- P_{in} = inflow pressure
- P_{out} = outflow pressure
- mW = conversion factor from psi to cm of water

cmW
 0.0142091301798

P _{in} (psi)	P _{out} (psi)
92	91

P _{in} (cm)	P _{out} (cm)
6.47E+03	6.40E+03

	h _{in} Values	h _{out} Values
h ₀	50	0
h ₁	46.2	3.7
h ₂	42.56	7.44
h ₃	38.8	11.1
h ₄	35.07	14.96

$H = P_{in} + (h_{in} - h_{out}) - P_{out}$

gradient = H/L

H ₀	120.3772847 cmW
H ₁	112.9772847 cmW
H ₂	105.4972847 cmW
H ₃	97.9772847 cmW
H ₄	90.3972847 cmW

G ₀	11.80169
G ₁	11.0762
G ₂	10.34287
G ₃	9.605616
G ₄	8.862479

gradient_{avg} = (G₀+G₄)/2
 gradient_{avg} = 10.33208674

Headloss across sample should not drop to less than 75% of initial

minh = 0.75(h₀)
 minh = 90.2830 cmW

$$s = (a \cdot L) / (2 + A + t)$$

1.37645E-05

$K_{sat1} = C \cdot \ln[(H_0/H_1)]$	8.73276E-07
$K_{sat2} = C \cdot \ln[(H_1/H_2)]$	9.4289E-07
$K_{sat3} = C \cdot \ln[(H_2/H_3)]$	1.01788E-06
$K_{sat4} = C \cdot \ln[(H_3/H_4)]$	1.10834E-06

$$K_{mean} = (K_{sat1} + K_{sat2} + K_{sat3} + K_{sat4}) / 4$$

$$K_{mean} = 9.85596E-07$$

Percent Deviation - less than 25% deviation from mean value

$$K_1 = \left| \frac{K_{sat1} - K_{mean}}{K_{sat1}} \right|$$

$$K_2 = \left| \frac{K_{sat2} - K_{mean}}{K_{sat2}} \right|$$

$$K_3 = \left| \frac{K_{sat3} - K_{mean}}{K_{sat3}} \right|$$

$$K_4 = \left| \frac{K_{sat4} - K_{mean}}{K_{sat4}} \right|$$

$K_1 =$	12.862%
$K_2 =$	4.529%
$K_3 =$	3.172%
$K_4 =$	11.074%

Temperature Correction

$$K_{20} = [(2.2902 \cdot 0.9842T) / T_0.1702] \cdot K_{mean}$$

$$K_{20} = 9.53059E-07$$

Ratio of Inflow/Outflow Rates - Should be between 0.75 and 1.25

$$rate_0 = [(h_{in0} - h_{in1}) \cdot (a/t)] / [(h_{out1} - h_{out0}) \cdot (a/t)]$$

$$rate_1 = [(h_{in1} - h_{in2}) \cdot (a/t)] / [(h_{out2} - h_{out1}) \cdot (a/t)]$$

$$rate_2 = [(h_{in2} - h_{in3}) \cdot (a/t)] / [(h_{out3} - h_{out2}) \cdot (a/t)]$$

$$rate_3 = [(h_{in3} - h_{in4}) \cdot (a/t)] / [(h_{out4} - h_{out3}) \cdot (a/t)]$$

rate0 =	1.000
rate1 =	1.000
rate2 =	1.000
rate3 =	1.000



TESTED BY:

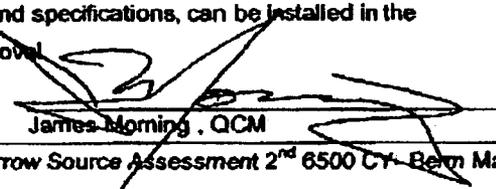
[Handwritten Signature]

SUBMITTAL REVIEW VERIFICATION SHEET

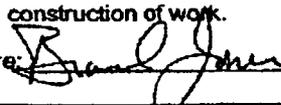
Date: Sept 19, 2003

Submittal No.: 02377-20

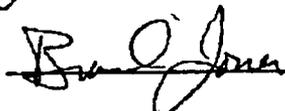
Foster Wheeler Environmental Corporation Stamp

SWMU 101 Sewage Lagoons Closure, Cannon AFB, NM	
Certified for approval as indicated below:	
<input checked="" type="radio"/> A	Approved as submitted
<input type="radio"/> B	Approved except as noted on the drawings and/or attached sheets.
It is hereby certified that the (equipment) (material) shown and marked in this submittal is that proposed to be incorporated into Contract Number DACW45-94-D-0003, Delivery Order No. 35, Work Authorization Directive 1 is in compliance with the contract drawings and specifications, can be installed in the allocated spaces, and is submitted for Government approval.	
Reviewed/Certified By:	 James Morning, QCM
Description of items reviewed: SD-06 Test Reports-Borrow Source Assessment 2 nd 6500 CY Berm Mat	

U.S. Army Corps of Engineers Stamp

U.S. Army Engineer District, Albuquerque Corps of Engineers	
Certified for approval as indicated below:	
<input type="radio"/> A	Approved as submitted.
<input checked="" type="radio"/> B	Approved except as noted on the drawings and/or attached sheet(s). Resubmission not required.
<input type="radio"/> C	Approved except as noted on the drawings and/or attached sheet(s). Resubmission required.
<input type="radio"/> D	Will be returned by separate correspondence.
<input type="radio"/> E	Disapproved; see comments on attached sheet.
<input type="radio"/> F	Receipt acknowledged.
<input type="radio"/> G	Other: Specify.
Note: Items approved as to general layout only. Dimensions and quantities checked. Approval does not relieve contractor of responsibilities for errors that may exist, as contractor shall be responsible for dimensions and design of adequate corrections. Details and satisfactory construction of work.	
Signature: 	Date: 9-29-03

Reviewer's Signature:



Lydick Engineers & Surveyors, Inc.

P. O. Box 728
205 E. 2nd Street
Clovis, NM 88101
505-762-3771

Proctor

Report

Report Date: 3-Jun-03
Project: DACW45-94-D-0003
Report Number: 2

To: ARROWHEAD CONST.
12920 METCALF AVE. SUITE 150
OVERLAND PARK, KS. 66213

Copies To: ARROW HEAD
FOSTER WHEELER
CORPS OF ENGINEERS

Proj: CLOSURE OF SWMU 101 SEWAGE LAGOON @ CANNONA.F.B.

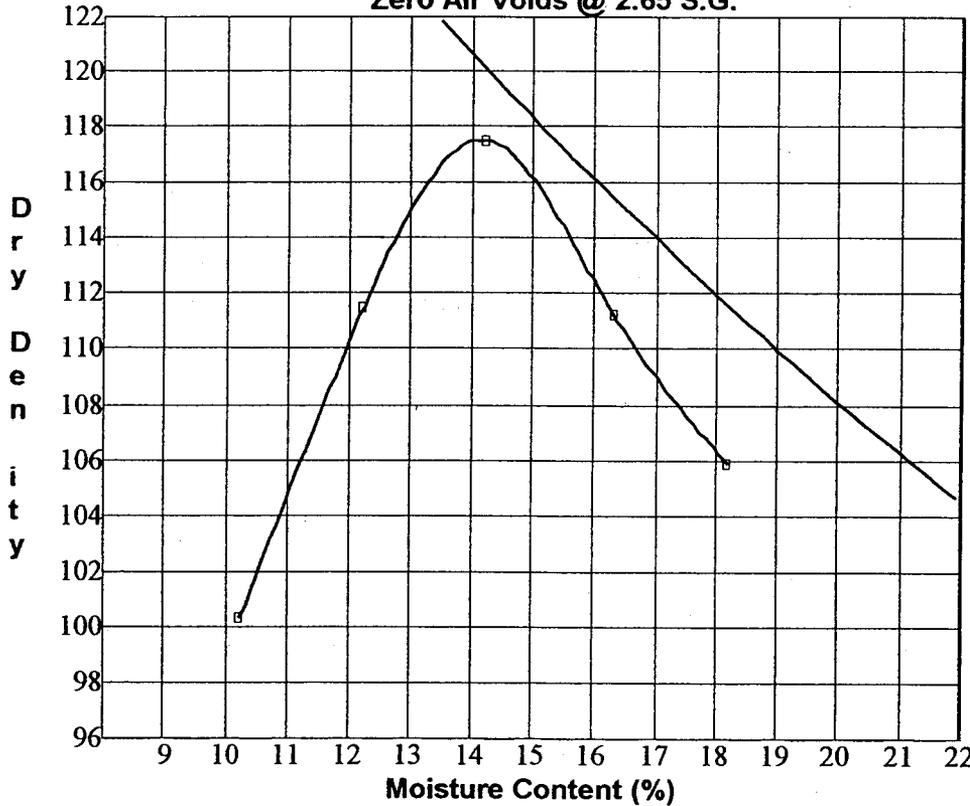
Sample Type: IN-PLACE
Sampled By: LANCE E. LANGAN
Source: EXISTING BERM
Tested By: LANCE LANGAN

Sample Date: 3-Jun-03

Date Tested: 4-Jun-03

Date Received: 3-Jun-03

Zero Air Voids @ 2.65 S.G.



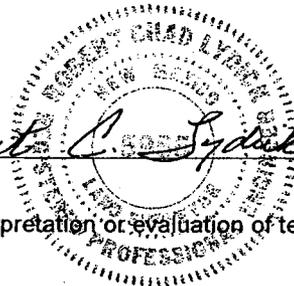
Max. Dry Density: 117.5
Optimum Moisture (%): 14.1

Moisture Content	Dry Density	Wet Density
10.2	100.3	110.6
12.2	111.5	125.2
14.2	117.5	134.2
16.3	111.3	129.4
18.2	105.9	125.2

Method: ASTM D 698-01
Rammer Type: MANUAL
Preparation: DRY TO WET
% Retained 5mm screen: 0.0
% Retained 10mm screen: 0.0
% Retained 20mm screen: 0.0

Sample Description: EXISTING BERM REDDISH CLAYEY SAND CLASSIFIED AS SM-SC AS PER USCS

Per: *[Signature]*



Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on written request.

Lydick Engineers & Surveyors, Inc.

P. O. Box 728
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Clovis, NM 88101
762-3771

To: ARROWHEADCONST.
12920 METCALF AVE. SUITE 150
OVERLAND PARK, KS. 66213

Proctor

Report Date:

Report

22-Sep-03

Project:

DACW45-94-0003

Report Number:

2

Sample Type:

COMPOSITE

Sampled By:

LAB

Source:

EXISTING BERM

Tested By:

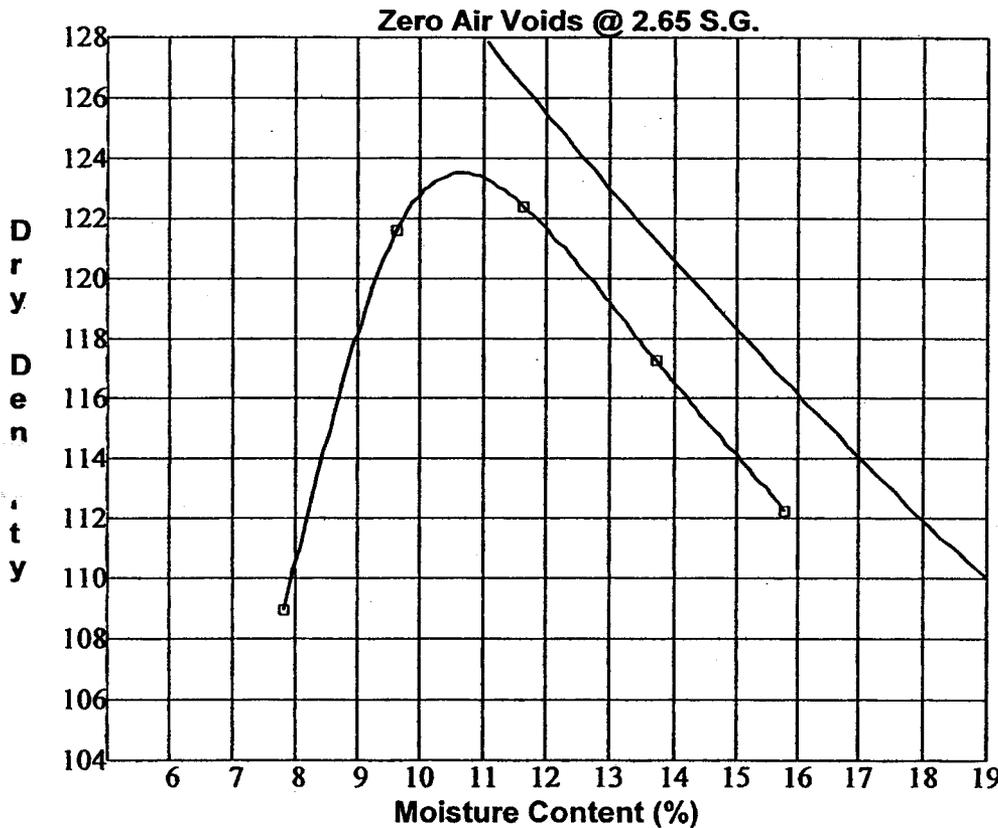
ROBERT MICK

Proj: CLOSURE OF SWMU 101 SEWAGE LAGOON @ CANNON A.F.B.

Sample Date: 11-Sep-03

Date Tested: 20-Sep-03

Date Received: 11-Sep-03



Max. Dry Density: 123.5
Optimum Moisture (%): 10.7

Moisture Content	Dry Density	Wet Density
7.8	108.9	117.5
9.6	121.6	133.3
11.6	122.4	136.7
13.7	117.2	133.3
15.8	112.3	130.0

Method: ASTM D 1557-01
Rammer Type: MECH.
Preparation: DRY TO WET
% Retained 5mm screen: 0.0
% Retained 10mm screen: 0.0
% Retained 20mm screen: 0.0

Sample Description: EXISTING BERM CLASSIFIED AS "SM-SC AS PER USCS

Comment: RETEST OF SAMPLE 3-JUN-03



Per:

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on written request

Lydick Engineers & Surveyors, Inc.

P. O. Box 728
205 E. 2nd Street
Clovis, NM 88101
505-762-3771

Proctor

Report

Report Date: 3-Jun-03
Project: DACW45-94-D-0003
Report Number: 2

To: ARROWHEAD CONST.
12920 METCALF AVE. SUITE 150
OVERLAND PARK, KS. 66213

Copies To: ARROW HEAD
FOSTER WHEELER
CORPS OF ENGINEERS

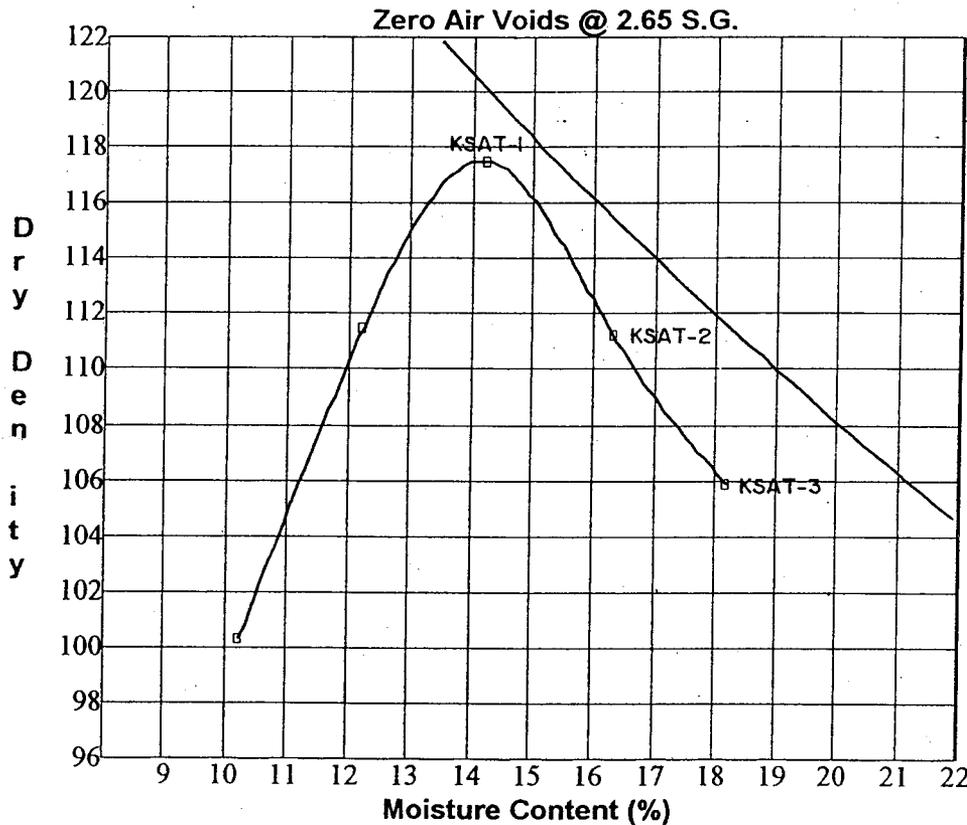
Proj: CLOSURE OF SWMU 101 SEWAGE LAGOON @ CANNONA.F.B.

Sample Type: IN-PLACE
Sampled By: LANCE E. LANGAN
Source: EXISTING BERM
Tested By: LANCE LANGAN

Sample Date: 3-Jun-03

Date Tested: 4-Jun-03

Date Received: 3-Jun-03



Max. Dry Density: 117.5
Optimum Moisture (%): 14.1

Moisture Content	Dry Density	Wet Density
10.2	100.3	110.6
12.2	111.5	125.2
14.2	117.5	134.2
16.3	111.3	129.4
18.2	105.9	125.2

Method: ASTM D 698-01
Rammer Type: MANUAL
Preparation: DRY TO WET
% Retained 5mm screen: 0.0
% Retained 10mm screen: 0.0
% Retained 20mm screen: 0.0

Sample Description: EXISTING BERM REDDISH CLAYEY SAND CLASSIFIED AS SM-SC AS PER USCS

Per: *Robert C. Lydick*

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on written request.

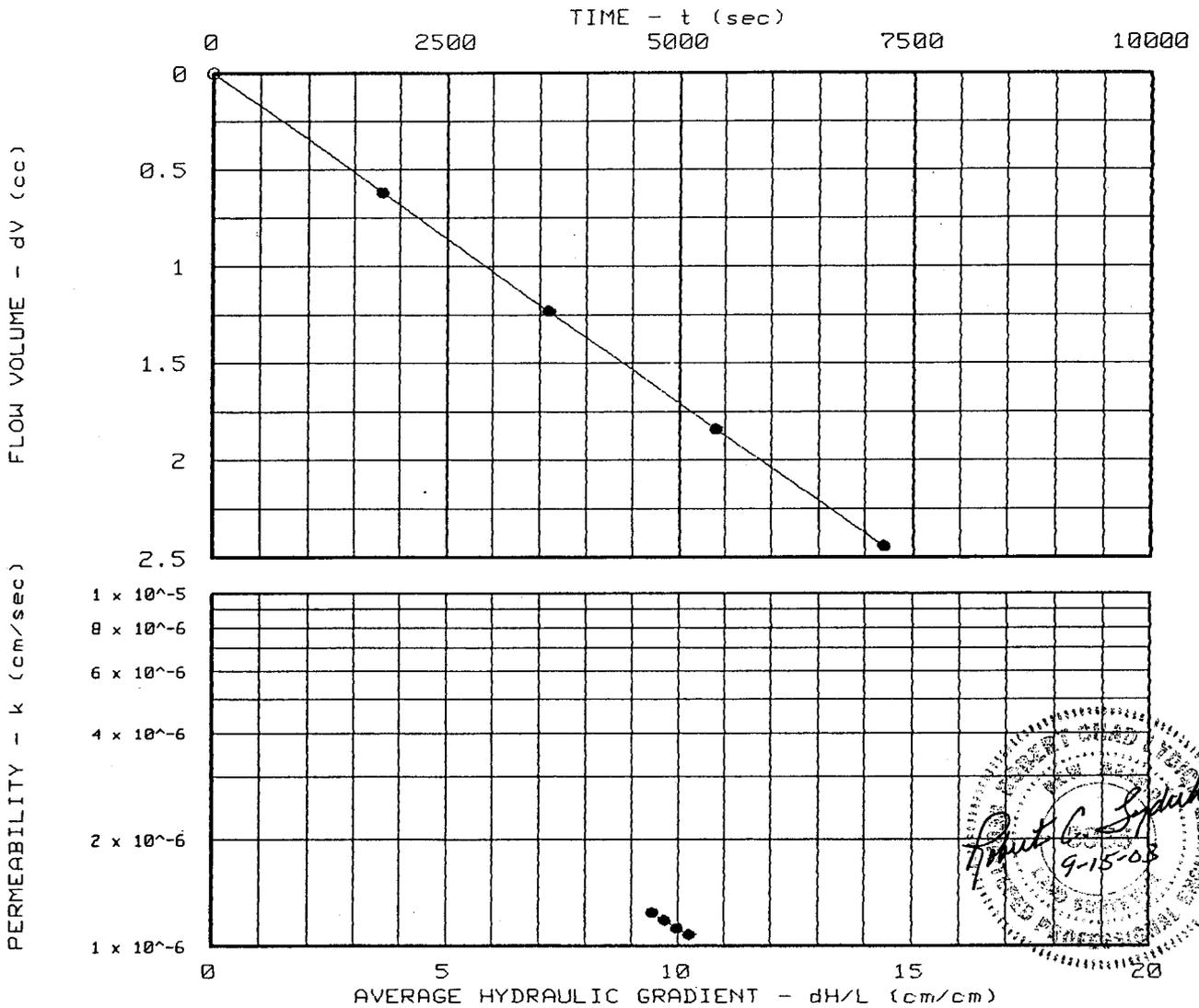
PERMEABILITY TEST REPORT

TEST DATA:

Specimen Height (cm): 11.44
 Specimen Diameter (cm): 6.29
 Dry Unit Weight (pcf): 117.5
 Moisture Before Test (%): 14.1
 Moisture After Test (%): 15.6
 Run Number: 1 • 2 ▲
 Cell Pressure (psi): 92.0
 Sat. Pressure (psi): 90.0
 Perm. (cm/sec): 1.12×10^{-6}

SAMPLE DATA:

Sample Identification: EXISTING BERM MATERIAL " ASSESSMENT"
 Visual Description: REDDISH SANDY CLAYEY SAND CLASSIFIED AS SM-SC AS PER USCS
 Remarks: ASTM D 5084-01 B=98.8 5 PSI FOR B Cal₂ REAGENT
 Maximum Dry Density (pcf): 117.5
 Optimum Moisture Content (%): 14.1 ASTM(D-698)
 Percent Compaction: 100.0%
 Permeameter type: FLEXWALL
 Sample type: REMOLDED



Project: LAGOON CLOSURE SWMU 101 @ CANNON AFB
 Location: WASTE WATER TREATMENT PLANT CAFB
 Date: 9-8-03

Project No.: DACW-45-94
 File No.: AH-4-03-47
 Lab No.: LE-32B KSAT-1
 Tested by: L.E.L.
 Checked by: R.C.L.
 Test: FH - Falling head C

PERMEABILITY TEST REPORT
LYDICK ENGINEERS & SURVEYORS, INC.

=====

FALLING HEAD PERMEABILITY TEST RESULTS

PROJECT NAME: LAGOON CLOSURE SWMU 101 @ CANNON AFB FILE NO.: AH-4-03-47
PROJECT LOCATION: WASTE WATER TREATMENT PLANT CAFB PROJECT NO.: DACW-45-94
SAMPLE IDENTIFICATION: EXISTING BERM LAB NO.: LE-32B KSAT-1
MATERIAL " ASSESSMENT"
DESCRIPTION: REDDISH SANDY CLAYEY SAMPLE TYPE: REMOLDED
SAND CLASSIFIED AS SM-SC AS PER USCS
MAX. DRY DENS.: 117.5 OPT. WATER CONTENT: 14.1 DATE: 9-8-03

SPECIMEN DATA

INITIAL PARAMETERS:

HEIGHT: 11.44 cm
DIAMETER: 6.29 cm
WET WEIGHT: 764.5 g
MOISTURE CONTENT: 14.1 %
DRY DENSITY: 117.5 pcf
PERCENT COMPACTION: 100.0

FINAL PARAMETERS:

HEIGHT: 11.46 cm
DIAMETER: 6.30 cm
WET WEIGHT: 774.6 g
MOISTURE CONTENT: 15.6 %
DRY DENSITY: 117.3 pcf

TEST PARAMETERS

CELL NO.: 1 PANEL NO.: 1 POSITIONS: 1

	RUN NO. 1	RUN NO. 2
CELL PRESSURE:	92.0 psi	
SATURATION PRESSURE:	90.0 psi	

PERMEABILITY DATA

	RUN NO. 1	RUN NO. 2
TOTAL FLOW VOLUME:	2.44E 00 cc	
LENGTH OF TEST:	7,200 sec	
AVERAGE GRADIENT:	9.5	
TEMPERATURE:	21.4 deg C	
PERMEABILITY, K, at 20 deg C:	1.12E-06 cm/sec	

=====

PERMEABILITY TEST DATA

=====

PROJECT DATA

Project Name: LAGOON CLOSURE SWMU 101 @ CANNON AFB
 File No.: AH-4-03-47
 Project Location: WASTE WATER TREATMENT PLANT CAFB
 Project No.: DACW-45-94
 Sample Identification: EXISTING BERM
 MATERIAL " ASSESSMENT"
 Lab No.: LE-32B KSAT-1
 Description: REDDISH SANDY CLAYEY
 SAND CLASSIFIED AS SM-SC AS PER USCS
 Sample Type: REMOLDED
 Max. Dry Dens.: 117.5
 Method (D1557/D698): D-698
 Opt. Water Content: 14.1
 Date: 9-8-03
 Remarks: ASTM D 5084-01 B=98.8 5
 PSI FOR B Cal₂ REAGENT
 Permeameter Type: FLEXWALL
 Tested by: L.E.L.
 Checked by: R.C.L.
 Test type: FH - Falling head C

PERMEABILITY TEST SPECIMEN DATA

	Before test:			After test:		
Diameter:	1	2		1	2	
Top:	2.477 in	in		2.479 in	in	
Middle:	2.478 in	in		2.479 in	in	
Bottom:	2.478 in	in		2.479 in	in	
Average:	2.48 in	6.29 cm		2.48 in	6.30 cm	
Length:	1	2	3	1	2	3
	4.503 in	in	in	4.510 in	in	in
Average:	4.50 in	11.44 cm		4.51 in	11.46 cm	
Moisture, Density and Sample Parameters:						
Specific Gravity:	2.65					
Wet Wt. & Tare:	889.60			899.60		
Dry Wt. & Tare:	795.00			795.00		
Tare Wt.:	125.10			125.00		
Moisture Content:	14.1 %			15.6 %		
Dry Unit Weight:	117.5 pcf	100.0 % of max		117.3 pcf		
Porosity:	0.2895			0.2912		
Saturation:	91.8 %			100.7 %		

Lydick Laboratories
 205 E. Second Street
 Clovis, NM 88101
 505-762-3771

ASTM D 5084-01

Contractor: ARROW HEAD
 Project: SWMU 101
 Location: WASTE WATER
 Date: 9/8/03

Sample ID: 32B

- a = burette area (cm²)
- t = time interval (s)
- T = temperature (deg C)
- L = sample length (cm)
- d = sample diameter (cm)

a	t	T	L	d
0.2	1.800	21.4	11.44	6.29

$A = (\pi/4) \cdot (d)^2$
 31.07357148

- P_{in} = inflow pressure
- P_{out} = outflow pressure
- cmW = conversion factor from psi to cm of water

cmW
 0.0142091301798

P _{in} (psi)	P _{out} (psi)
90	80

P _{in} (cm)	P _{out} (cm)
6.33E+03	6.26E+03

	h _{in} Values	h _{out} Values
h ₀	50	0
h ₁	46.9	3.1
h ₂	43.84	6.16
h ₃	40.8	9.2
h ₄	37.79	12.21

$H = P_{in} + (h_{in} - h_{out}) - P_{out}$

gradient = H/L

H ₀	120.3772847 cmW
H ₁	114.1772847 cmW
H ₂	108.0572847 cmW
H ₃	101.9772847 cmW
H ₄	95.9572847 cmW

G ₀	10.52249
G ₁	9.980532
G ₂	9.445567
G ₃	8.914098
G ₄	8.387875

gradient_{avg} = (G₀+G₄)/2
 gradient_{avg} = 9.455182229

Headloss across sample should not drop to less than 75% of initial
 min h = 0.75(h₀)

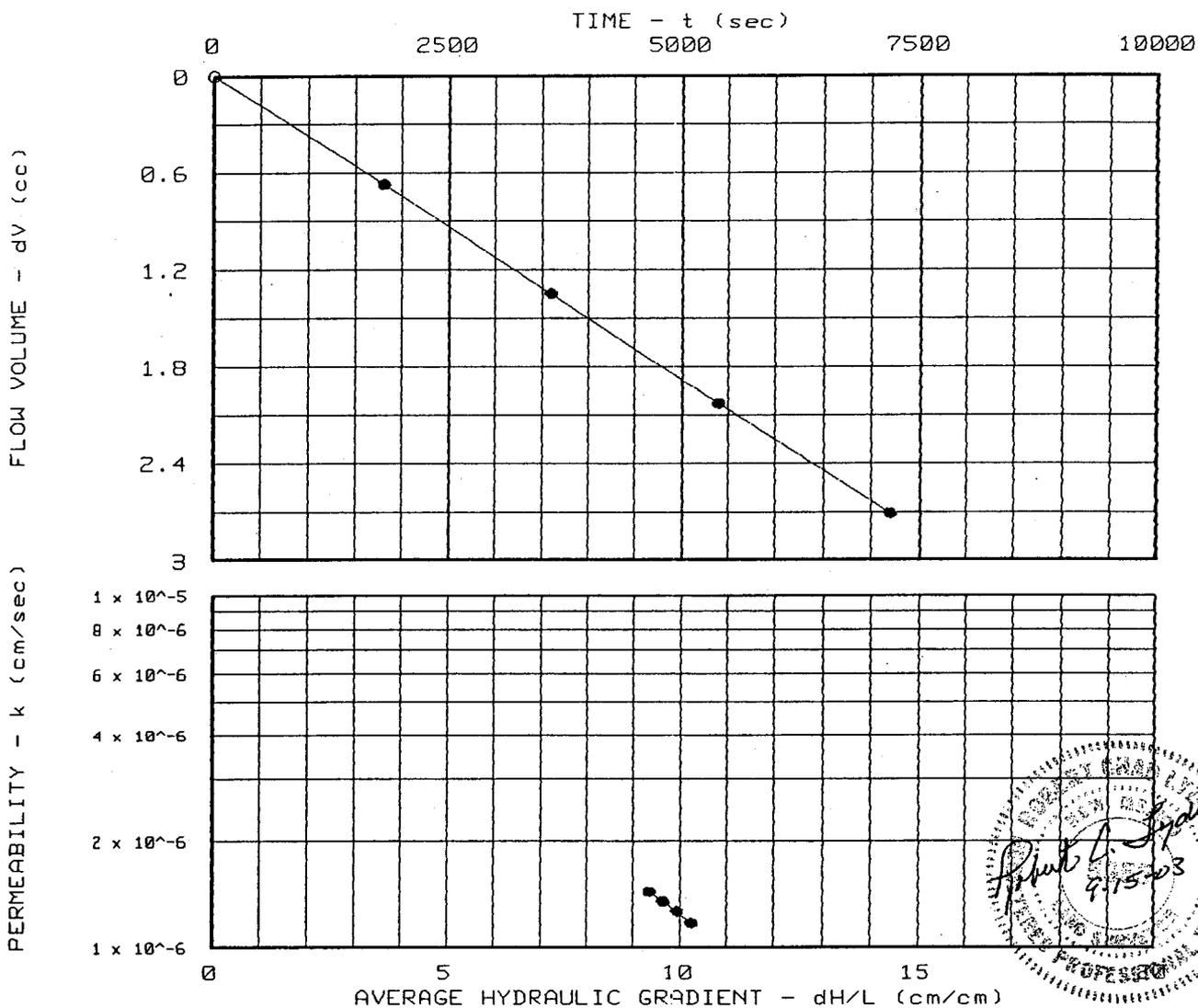
PERMEABILITY TEST REPORT

TEST DATA:

Specimen Height (cm): 11.42
 Specimen Diameter (cm): 6.27
 Dry Unit Weight (pcf): 111.3
 Moisture Before Test (%): 16.3
 Moisture After Test (%): 18.5
 Run Number: 1 • 2 ▲
 Cell Pressure (psi): 95.5
 Sat. Pressure (psi): 93.5
 Perm. (cm/sec): 1.27×10^{-6}

SAMPLE DATA:

Sample Identification: EXISTING BERM MATERIAL "ASSESSMENT"
 Visual Description: REDDISH SANDY CLAYEY SAND CLASSIFIED AS SM-SC AS PER USCS
 Remarks: ASTM D 5084-01 98.2
 5 PSI FOR B Cal₂ REAGENT
 Maximum Dry Density (pcf): 117.5
 Optimum Moisture Content (%): 14.1
 ASTM(D-698)
 Percent Compaction: 94.8%
 Permeameter type: FLEXWALL
 Sample type: REMOLDED



Project: LAGOON CLOSURE SWMU 101 @ CANNON AFB
 Location: WASTE WATER TREATMENT PLANT @ CAFB
 Date: 9-8-03

Project No.: DACW-45-03
 File No.: AH-4-03-48
 Lab No.: LE-33B KSAT-2
 Tested by: L.E.L.
 Checked by: R.C.L.
 Test: FH - Falling head C

PERMEABILITY TEST REPORT
LYDICK ENGINEERS & SURVEYORS, INC.

=====

FALLING HEAD PERMEABILITY TEST RESULTS

PROJECT NAME: LAGOON CLOSURE SWMU 101 @ CANNON AFB FILE NO.: AH-4-03-48
PROJECT LOCATION: WASTE WATER TREATMENT PLANT @ CAFB PROJECT NO.: DACW-45-03
SAMPLE IDENTIFICATION: EXISTING BERM LAB NO.: LE-33B KSAT-2
MATERIAL "ASSESSMENT"
DESCRIPTION: REDDISH SANDY CLAYEY SAMPLE TYPE: REMOLDED
SAN CLASSIFIED AS SM-SC AS PER USCS
MAX. DRY DENS.: 117.5 OPT. WATER CONTENT: 14.1 DATE: 9-8-03

SPECIMEN DATA

INITIAL PARAMETERS:

HEIGHT: 11.42 cm
DIAMETER: 6.27 cm
WET WEIGHT: 732.4 g
MOISTURE CONTENT: 16.3 %
DRY DENSITY: 111.3 pcf
PERCENT COMPACTION: 94.8

FINAL PARAMETERS:

HEIGHT: 11.45 cm
DIAMETER: 6.29 cm
WET WEIGHT: 749.7 g
MOISTURE CONTENT: 18.5 %
DRY DENSITY: 111.1 pcf

TEST PARAMETERS

CELL NO.: 2

PANEL NO.: 2

POSITIONS: 2

CELL PRESSURE:

RUN NO. 1
95.5 psi

RUN NO. 2

SATURATION PRESSURE:

93.5 psi

PERMEABILITY DATA

TOTAL FLOW VOLUME:

RUN NO. 1
2.71E 00 cc

RUN NO. 2

LENGTH OF TEST:

7,200 sec

AVERAGE GRADIENT:

9.3

TEMPERATURE:

21.4 deg C

PERMEABILITY, K, at 20 deg C:

1.27E-06 cm/sec

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PERMEABILITY TEST DATA

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PROJECT DATA

roject Name: LAGOON CLOSURE SWMU 101 @ CANNON AFB
 ile No.: AH-4-03-48
 roject Location: WASTE WATER TREATMENT PLANT @ CAFB
 roject No.: DACW-45-03
 ample Identification: EXISTING BERM
 MATERIAL "ASSESSMENT"
 ab No.: LE-33B KSAT-2
 escription: REDDISH SANDY CLAYEY
 SAN CLASSIFIED AS SM-SC AS PER USCS
 ample Type: REMOLDED
 ax. Dry Dens.: 117.5
 ethod (D1557/D698): D-698
 pt. Water Content: 14.1
 ate: 9-8-03
 emarks: ASTM D 5084-01 98.2
 5 PSI FOR B Cal₂ REAGENT
 ermeameter Type: FLEXWALL
 ested by: L.E.L.
 hecked by: R.C.L.
 est type: FH - Falling head C

PERMEABILITY TEST SPECIMEN DATA

	Before test:			After test:		
Diameter:	1	2		1	2	
Top:	2.470 in		in	2.475 in		in
Middle:	2.470 in		in	2.476 in		in
Bottom:	2.470 in		in	2.476 in		in
Average:	2.47 in	6.27 cm		2.48 in	6.29 cm	
Length:	1	2	3	1	2	3
Average:	4.498 in		in	4.506 in		in
	4.50 in	11.42 cm		4.51 in	11.45 cm	
Moisture, Density and Sample Parameters:						
Specific Gravity:	2.65					
Wet Wt. & Tare:	861.76			883.02		
Dry Wt. & Tare:	759.21			765.95		
Tare Wt.:	129.33			133.33		
Moisture Content:	16.3 %			18.5 %		
Dry Unit Weight:	111.3 pcf		94.8 % of max	111.1 pcf		
Porosity:	0.3270			0.3284		
Saturation:	88.8 %			100.3 %		

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 505-762-3771

ASTM D 5084-01

Contractor: ARROW HEAD
 Project: SWMU 101
 Location: WASTE WATER
 Date: 9/8/03

Sample ID: 33B

- a = burette area (cm²)
- t = time interval (s)
- T = temperature (deg C)
- L = sample length (cm)
- d = sample diameter (cm)

a	t	T	L	d
0.2	1.800	21.4	11.42	6.27

$$A = (\pi/4) \cdot (d)^2$$

30.87627946

- P_{in} = inflow pressure
- P_{out} = outflow pressure
- cmW = conversion factor from psi to cm of water

cmW
 0.0142091301798

P _{in} (psi)	P _{out} (psi)
93.5	92.5

P _{in} (cm)	P _{out} (cm)
6.58E+03	6.51E+03

	h _{in} Values	h _{out} Values
h ₀	50	0
h ₁	46.65	3.85
h ₂	43.25	6.75
h ₃	39.83	10.15
h ₄	36.4	13.5

$$H = P_{in} + (h_{in} - h_{out}) - P_{out}$$

$$\text{gradient} = H/L$$

H ₀	120.3772847 cmW
H ₁	113.6772847 cmW
H ₂	106.8772847 cmW
H ₃	100.0572847 cmW
H ₄	93.2772847 cmW

G ₀	10.54092
G ₁	9.954228
G ₂	9.358781
G ₃	8.761584
G ₄	8.167888

$$\text{gradient}_{avg} = (G_0 + G_4)/2$$

$$\text{gradient}_{avg} = 9.354403214$$

Headloss across sample should not drop to less than 75% of initial
 minh = 0.75(h₀)

minh = 90.2830 cmW

$$c = (a \cdot L) / (2 + A + t)$$

2.0548E-05

$K_{sat1} = c \cdot \ln[(H_0/H_1)]$	1.17672E-06
$K_{sat2} = c \cdot \ln[(H_1/H_2)]$	1.26745E-06
$K_{sat3} = c \cdot \ln[(H_2/H_3)]$	1.3549E-06
$K_{sat4} = c \cdot \ln[(H_3/H_4)]$	1.44177E-06

$$K_{mean} = (K_{sat1} + K_{sat2} + K_{sat3} + K_{sat4}) / 4$$

$K_{mean} =$ 1.31021E-06

Percent Deviation - less than 25% deviation from mean value

$$K_1 = \left| \frac{K_{sat1} - K_{mean}}{K_{sat1}} \right|$$

$$K_2 = \left| \frac{K_{sat2} - K_{mean}}{K_{sat2}} \right|$$

$$K_3 = \left| \frac{K_{sat3} - K_{mean}}{K_{sat3}} \right|$$

$$K_4 = \left| \frac{K_{sat4} - K_{mean}}{K_{sat4}} \right|$$

$K_1 =$	11.344%
$K_2 =$	3.374%
$K_3 =$	3.298%
$K_4 =$	9.125%

Temperature Correction

$$K_{20} = [(2.2902 - 0.9842T) / T^{0.1702}] \cdot K_{mean}$$

$K_{20} =$ 1.26696E-06

Ratio of Inflow/Outflow Rates - Should be between 0.75 and 1.25

$$rate_0 = [(h_{in0} - h_{in1}) \cdot (a/t)] / [(h_{out1} - h_{out0}) \cdot (a/t)]$$

$$rate_1 = [(h_{in1} - h_{in2}) \cdot (a/t)] / [(h_{out2} - h_{out1}) \cdot (a/t)]$$

$$rate_2 = [(h_{in2} - h_{in3}) \cdot (a/t)] / [(h_{out3} - h_{out2}) \cdot (a/t)]$$

$$rate_3 = [(h_{in3} - h_{in4}) \cdot (a/t)] / [(h_{out4} - h_{out3}) \cdot (a/t)]$$

rate0 =	1.000
rate1 =	1.000
rate2 =	1.006
rate3 =	1.024



K-2-6

15

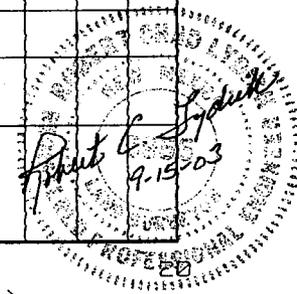
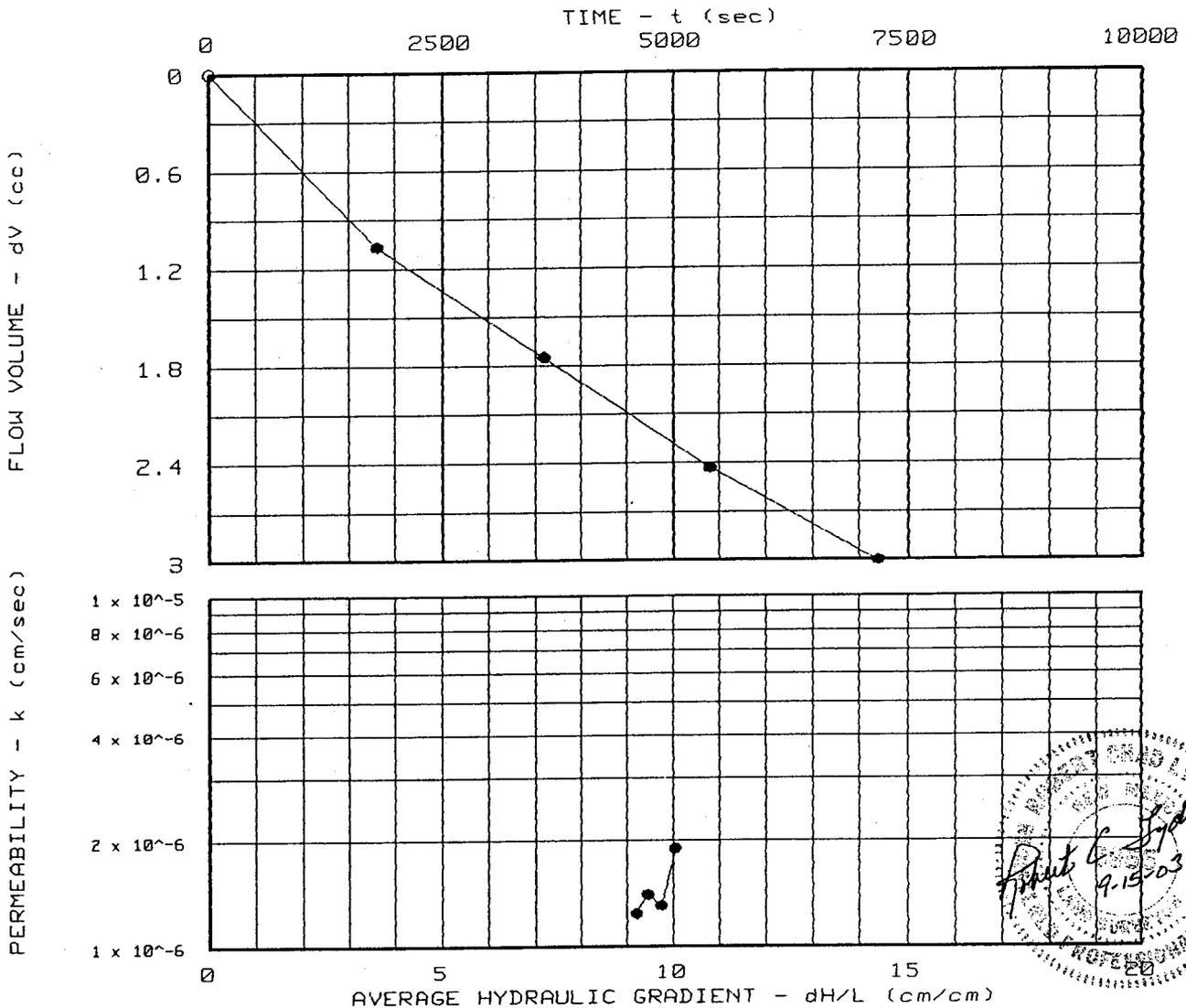
PERMEABILITY TEST REPORT

TEST DATA:

Specimen Height (cm): 11.44
 Specimen Diameter (cm): 6.30
 Dry Unit Weight (pcf): 105.9
 Moisture Before Test (%): 18.2
 Moisture After Test (%): 21.4
 Run Number: 1 • 2 ▲
 Cell Pressure (psi): 99.5
 Sat. Pressure (psi): 97.5
 Perm. (cm/sec): 1.41×10^{-6}

SAMPLE DATA:

Sample Identification: EXISTING BERM
 MATERIAL " ASSESSMENT "
 Visual Description: REDDISH SANDY CLAYEY
 SAND CLASSIFIED AS SM-SC AS PER USCS
 Remarks: ASTM D 5084-01 B=96.9
 5 PSI FOR B Cal₂ REAGENT
 Maximum Dry Density (pcf): 117.5
 Optimum Moisture Content (%): 14.1
 ASTM(D-698)
 Percent Compaction: 90.1%
 Permeameter type: FLEXWALL
 Sample type: REMOLDED



Project: LAGOON CLOSURE SWMU 101 @ CANNON AFB
 Location: WASTE WATER TREATMENT PLANT CAFB
 Date: 9-8-03

Project No.: DACW45-03
 File No.: AH-4-03-49
 Lab No.: LE-34B KSAT-3
 Tested by: L.E.L.
 Checked by: R.C.L.
 Test: FH - Falling head C

PERMEABILITY TEST REPORT
LYDICK ENGINEERS & SURVEYORS, INC.

FALLING HEAD PERMEABILITY TEST CONDITIONS DATA

Cell No.:	3	Panel No.:	3	Positions:	3
Run Number:		1		2	
Cell Pressure:		99.5 psi		0.0 psi	
Inflow Saturation Pressure:		97.5 psi		0.0 psi	
Inflow Buret Area:		0.2000 cm ²		0.2000 cm ²	
Outflow Buret Area:		0.2000 cm ²		0.2000 cm ²	
Test Temperature:		21.4 °C		0.0 °C	
Outflow Saturation Pressure:		96.5 psi		0.0 psi	

PERMEABILITY TEST READINGS DATA

CASE	DATE	TIME	ELAPSED	INFLOW	OUTFLOW	OUTFLOW/	PERM.
D X		(24 hr)	TIME	LEVEL	LEVEL	INFLOW	K
S			sec	cm	cm	RATIO	cm/sec
S X	9/ 8/ 3	15:00:00	0	50.00	0.0	0.00	0.00E 00
	9/ 8/ 3	15:30:00	1,800	44.65	5.4	1.00	1.90E-06
	9/ 8/ 3	16:00:00	1,800	41.25	8.8	1.00	1.31E-06
	9/ 8/ 3	16:30:00	1,800	37.83	12.2	1.00	1.40E-06
	9/ 8/ 3	17:00:00	1,800	35.00	15.0	1.00	1.24E-06

Gradient = 9.205E 00 Total vol = 3.00E 00 cc Test duration = 7,200 sec
 Permeability, K_{21.4°} = 1.463E-06 cm/sec, K_{20°} = 1.414E-06 cm/sec
 Permeability values are incremental



Lydick Laboratories
 205 E. Second Street
 Corrales, NM 88101
 505-762-3771

ASTM D 5084-01

Contractor: ARROW HEAD
 Project: SWMU 101
 Location: WASTE WATER
 Date: 9/8/03

Sample ID: 34B

a = burette area (cm²)
 t = time interval (s)
 T = temperature (deg C)
 L = sample length (cm)
 d = sample diameter (cm)

a	t	T	L	d
0.2	1.800	21.4	11.44	6.3

$$A = (\pi/4) \cdot (d)^2$$

31.17245311

P_{in} = inflow pressure
 P_{out} = outflow pressure
 cmW = conversion factor from psi to cm of water

cmW
 0.0142091301798

P _{in} (psi)	P _{out} (psi)
97.5	96.5

P _{in} (cm)	P _{out} (cm)
6.86E+03	6.79E+03

	h _{in} Values	h _{out} Values
h ₀	50	0
h ₁	44.65	5.35
h ₂	41.25	8.75
h ₃	37.85	12.15
h ₄	35	15.5

$$H = P_{in} + (h_{in} - h_{out}) - P_{out}$$

$$\text{gradient} = H/L$$

H ₀	120.3772847 cmW	G ₀	10.52249
H ₁	109.6772847 cmW	G ₁	9.587175
H ₂	102.8772847 cmW	G ₂	8.99277
H ₃	96.0372847 cmW	G ₃	8.394868
H ₄	90.3772847 cmW	G ₄	7.900112

$$\text{gradient}_{avg} = (G_0 + G_4)/2$$

gradient_{avg} = 9.21130111

Headloss across sample should not drop to less than 75% of initial
 minh = 0.75(h₀)

minh = 90.2830 cmW

$c = (a \cdot L) / (2 + A + t)$
2.03884E-05

$K_{sat1} = c \cdot \ln[(H_0/H_1)]$	1.89792E-06
$K_{sat2} = c \cdot \ln[(H_1/H_2)]$	1.30497E-06
$K_{sat3} = c \cdot \ln[(H_2/H_3)]$	1.40273E-06
$K_{sat4} = c \cdot \ln[(H_3/H_4)]$	1.23846E-06

$K_{mean} = (K_{sat1} + K_{sat2} + K_{sat3} + K_{sat4}) / 4$

$K_{mean} =$ 1.46102E-06

Percent Deviation - less than 25% deviation from mean value

$K_1 = |(K_{sat1} - K_{mean}) / K_{sat1}|$
 $K_2 = |(K_{sat2} - K_{mean}) / K_{sat2}|$
 $K_3 = |(K_{sat3} - K_{mean}) / K_{sat3}|$
 $K_4 = |(K_{sat4} - K_{mean}) / K_{sat4}|$

$K_1 =$	23.020%
$K_2 =$	11.958%
$K_3 =$	4.156%
$K_4 =$	17.971%

Temperature Correction

$K_{20} = [(2.2902 \cdot 0.9842T) / T_0.1702] \cdot K_{mean}$

$K_{20} =$ 1.41279E-06

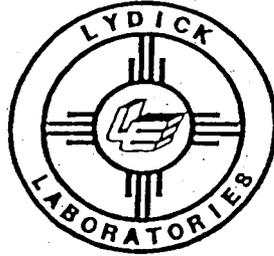
R of Inflow/Outflow Rates - Should be between 0.75 and 1.25

$rate_0 = [(h_{in0} - h_{in1}) \cdot (a/t)] / [(h_{out1} - h_{out0}) \cdot (a/t)]$
 $rate_1 = [(h_{in1} - h_{in2}) \cdot (a/t)] / [(h_{out2} - h_{out1}) \cdot (a/t)]$
 $rate_2 = [(h_{in2} - h_{in3}) \cdot (a/t)] / [(h_{out3} - h_{out2}) \cdot (a/t)]$
 $rate_3 = [(h_{in3} - h_{in4}) \cdot (a/t)] / [(h_{out4} - h_{out3}) \cdot (a/t)]$

rate0 =	1.000
rate1 =	1.000
rate2 =	1.000
rate3 =	1.000



ROBERT L. LYDICK
PROFESSIONAL ENGINEER AND
LAND SURVEYOR



ROBERT CHAD LYDICK
PROFESSIONAL ENGINEER AND
LAND SURVEYOR
ASTM D 2216-01

CLOVIS, NEW MEXICO 88101

PROJECT: Lagoon Closure SWMU 101 DATE: 6-24-03

CONTRACTOR: Arrowhead Const TESTED BY: L. Langan

SAMPLE NO. 6-24 Existing Berm SAMPLE NO. _____

WT. WET/CAN 1000.0
WT. DRY/CAN 879.25
WT. CAN 147.54
WT. WATER 120.75
WT. DRY 731.71
W.C. % 16.570

WT. WET/CAN _____
WT. DRY/CAN _____
WT. CAN _____
WT. WATER _____
WT. DRY _____
W.C. % _____

SAMPLE NO. _____

WT. WET/CAN _____
WT. DRY/CAN _____
WT. CAN _____
WT. WATER _____
WT. DRY _____
W.C. % _____

SAMPLE NO. _____

WT. WET/CAN _____
WT. DRY/CAN _____
WT. CAN _____
WT. WATER _____
WT. DRY _____
W.C. % _____

SAMPLE NO. _____

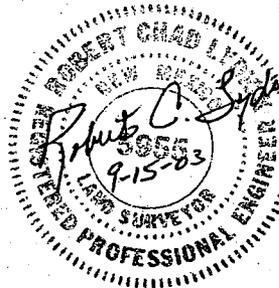
WT. WET/CAN _____
WT. DRY/CAN _____
WT. CAN _____
WT. WATER _____
WT. DRY _____
W.C. % _____

SAMPLE NO. _____

WT. WET/CAN _____
WT. DRY/CAN _____
WT. CAN _____
WT. WATER _____
WT. DRY _____
W.C. % _____

SAMPLE NO. _____

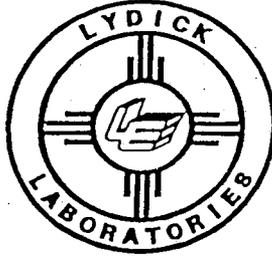
WT. WET/CAN _____
WT. DRY/CAN _____
WT. CAN _____
WT. WATER _____
WT. DRY _____
W.C. % _____



SAMPLE NO. _____

WT. WET/CAN _____
WT. DRY/CAN _____
WT. CAN _____
WT. WATER _____
WT. DRY _____
W.C. % _____

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PROFESSIONAL ENGINEER AND
LAND SURVEYOR
ASTM D 2216-01

CLOVIS, NEW MEXICO 88101

PROJECT: Lagoon Closure Sum 101 DATE: 6-17-03

CONTRACTOR: Arrowhead Const TESTED BY: L. Langan

SAMPLE NO. 6-17 Existing Berm

SAMPLE NO. _____

WT. WET/CAN 1200.0
WT. DRY/CAN 874.46
WT. CAN 140.31
WT. WATER 125.54
WT. DRY 734.15
W.C. % 17.1%

WT. WET/CAN _____
WT. DRY/CAN _____
WT. CAN _____
WT. WATER _____
WT. DRY _____
W.C. % _____

SAMPLE NO. _____

SAMPLE NO. _____

WT. WET/CAN _____
WT. DRY/CAN _____
WT. CAN _____
WT. WATER _____
WT. DRY _____
W.C. % _____

WT. WET/CAN _____
WT. DRY/CAN _____
WT. CAN _____
WT. WATER _____
WT. DRY _____
W.C. % _____

SAMPLE NO. _____

SAMPLE NO. _____

WT. WET/CAN _____
WT. DRY/CAN _____
WT. CAN _____
WT. WATER _____
WT. DRY _____
W.C. % _____

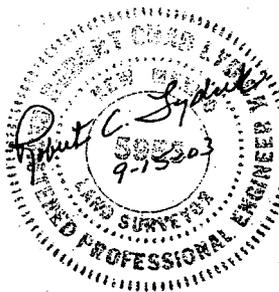
WT. WET/CAN _____
WT. DRY/CAN _____
WT. CAN _____
WT. WATER _____
WT. DRY _____
W.C. % _____

SAMPLE NO. _____

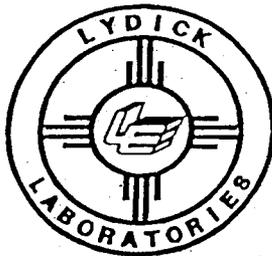
SAMPLE NO. _____

WT. WET/CAN _____
WT. DRY/CAN _____
WT. CAN _____
WT. WATER _____
WT. DRY _____
W.C. % _____

WT. WET/CAN _____
WT. DRY/CAN _____
WT. CAN _____
WT. WATER _____
WT. DRY _____
W.C. % _____



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PROFESSIONAL ENGINEER AND
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ASTM D 2216-01

CLOVIS, NEW MEXICO 88101

PROJECT: Leagal Closure SWMU 101 DATE: 6-14-03

CONTRACTOR: Arrowhead Const TESTED BY: L. Langan

SAMPLE NO. 6-14 Existing Perm SAMPLE NO. _____

WT. WET/CAN 1000.0
WT. DRY/CAN 887.12
WT. CAN 135.10
WT. WATER 112.88
WT. DRY 752.02
W.C. % 15.0

WT. WET/CAN _____
WT. DRY/CAN _____
WT. CAN _____
WT. WATER _____
WT. DRY _____
W.C. % _____

SAMPLE NO. _____

WT. WET/CAN _____
WT. DRY/CAN _____
WT. CAN _____
WT. WATER _____
WT. DRY _____
W.C. % _____

SAMPLE NO. _____

WT. WET/CAN _____
WT. DRY/CAN _____
WT. CAN _____
WT. WATER _____
WT. DRY _____
W.C. % _____

SAMPLE NO. _____

WT. WET/CAN _____
WT. DRY/CAN _____
WT. CAN _____
WT. WATER _____
WT. DRY _____
W.C. % _____

SAMPLE NO. _____

WT. WET/CAN _____
WT. DRY/CAN _____
WT. CAN _____
WT. WATER _____
WT. DRY _____
W.C. % _____

SAMPLE NO. _____

WT. WET/CAN _____
WT. DRY/CAN _____
WT. CAN _____
WT. WATER _____
WT. DRY _____
W.C. % _____



SAMPLE NO. _____

WT. WET/CAN _____
WT. DRY/CAN _____
WT. CAN _____
WT. WATER _____
WT. DRY _____
W.C. % _____

SUBMITTAL REVIEW VERIFICATION SHEET

Date: Sept 19, 2003

Submittal No.: 02377-21

Foster Wheeler Environmental Corporation Stamp

SWMU 101 Sewage Lagoons Closure, Cannon AFB, NM
 Certified for approval as indicated below:

A - Approved as submitted
 B - Approved except as noted on the drawings and/or attached sheets.

It is hereby certified that the (equipment) (material) shown and marked in this submittal is that proposed to be incorporated into Contract Number DACW45-94-D-0003, Delivery Order No. 25, Work Authorization Directive 1 is in compliance with the contract drawings and specifications, can be installed in the allocated spaces, and is submitted for Government approval.

Reviewed/Certified By: James Morning, QCM

Description of items reviewed: SD-06 Test Reports Borrow Source Assessment 3rd 6500 CY- Off site

U.S. Army Corps of Engineers Stamp

U.S. Army Engineer District, Albuquerque Corps of Engineers
 Certified for approval as indicated below:

A - Approved as submitted.
 B - Approved except as noted on the drawings and/or attached sheet(s). Resubmission not required.
 C - Approved except as noted on the drawings and/or attached sheet(s). Resubmission required.
 D - Will be returned by separate correspondence.
 E - Disapproved; see comments on attached sheet.
 F - Receipt acknowledged.
 G - Other: Specify.

Note: Items approved as to general layout only. Dimensions and quantities checked. Approval does not relieve contractor of responsibilities for errors that may exist, as contractor shall be responsible for dimensions and design of adequate corrections. Details and satisfactory construction of work.

Signature: Brad Jones Date: 9-24-03

Reviewer's Signature: Brad Jones

PM
9/25/03

Lydick Engineers & Surveyors, Inc.

P. O. Box 728
205 E. 2nd Street
Clovis, NM 88101
505-762-3771

Proctor

Report

Report Date: 20-Aug-03
Project: DACAW45-94-D-0003
Report Number: 6

To: ARROWHEAD CONST.
12920 METCALF AVE. SUITE 150
OVERLAND PARK KS 66213

Copies To: FW/TT
COE
ARROWHEAD

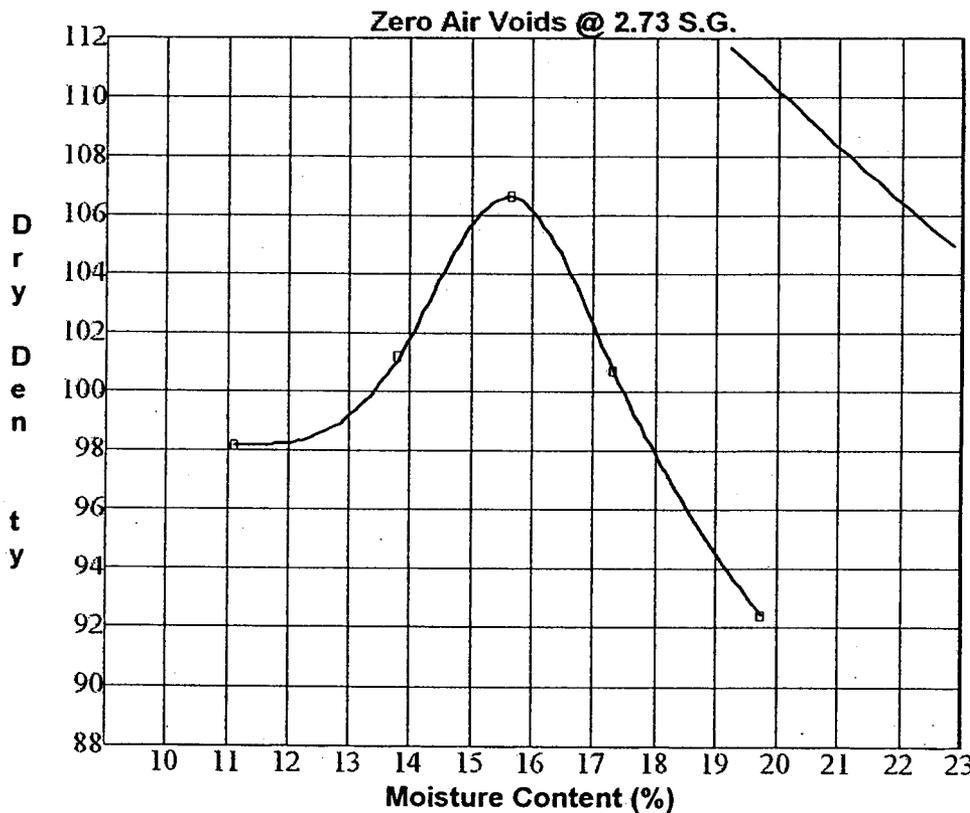
Proj: CLOSURE OF SWMU101 SEWAGE LAGOON @ CANNON AFB

Sample Type: COMPOSITE
Source: BOSTWICK PIT
Tested By: B. HIERONYMUS

Sample Date: 5-Aug-03

Date Tested: 18-Aug-03

Date Received: 5-Aug-03



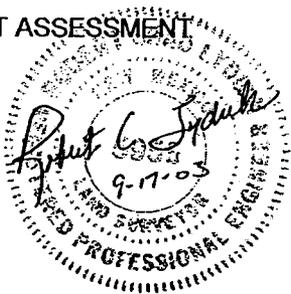
Max. Dry Density: 106.6
Optimum Moisture (%): 15.6

Moisture Content	Dry Density	Wet Density
11.1	98.2	109.1
13.8	101.2	115.2
15.7	106.6	123.3
17.3	100.7	118.2
19.7	92.4	110.6

Method: ASTM D-698
Rammer Type: MANUAL
Preparation: DRY TO WET
% Retained 5mm screen: 0.0
% Retained 10mm screen: 0.0
% Retained 20mm screen: 0.0

Sample Description: BROWN SANDY LEAN CLAY "CL" AS PER USCS FROM BOSTWICK PIT MELROSE, NM

Comment: BORROW PIT ASSESSMENT



Per: *[Signature]*

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on written request.

Lydick Engineers & Surveyors, Inc.

P. O. Box 728
205 E. 2nd Street
Clovis, NM 88101
505-762-3771

Proctor

Report Date:
Project:
Report Number:

Report

20-Aug-03
DACAW45-94-D-0003
6

To: ARROWHEAD CONST.
12920 METCALF AVE. SUITE 150
OVERLAND PARK KS 66213

Copies To: FW/TT
COE
ARROWHEAD

Proj: CLOSURE OF SWMU101 SEWAGE LAGOON @ CANNON AFB

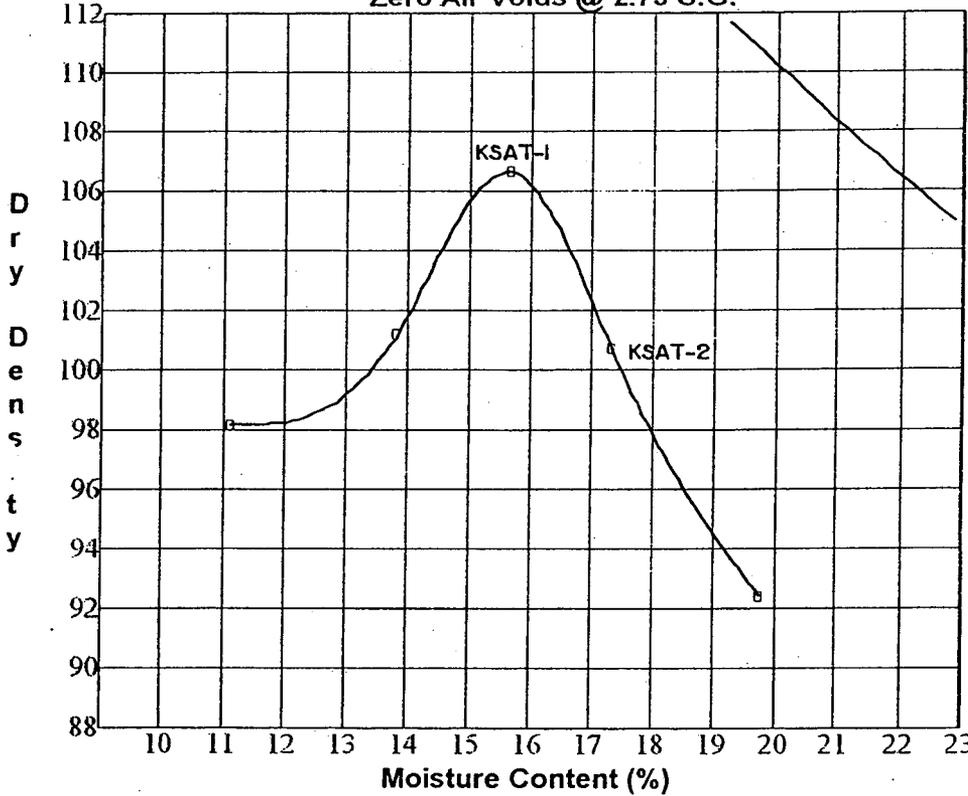
Sample Type: COMPOSITE
Source: BOSTWICK PIT
Tested By: B. HIERONYMUS

Sample Date: 5-Aug-03

Date Tested: 18-Aug-03

Date Received: 5-Aug-03

Zero Air Voids @ 2.73 S.G.



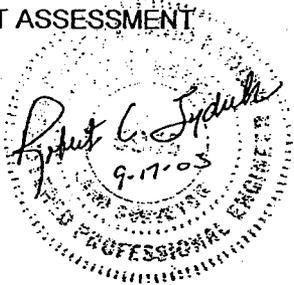
Max. Dry Density: 106.6
Optimum Moisture (%): 15.6

Moisture Content	Dry Density	Wet Density
11.1	98.2	109.1
13.8	101.2	115.2
15.7	106.6	123.3
17.3	100.7	118.2
19.7	92.4	110.6

Method: ASTM D-698
Rammer Type: MANUAL
Preparation: DRY TO WET
% Retained 5mm screen: 0.0
% Retained 10mm screen: 0.0
% Retained 20mm screen: 0.0

Sample Description: BROWN SANDY LEAN CLAY "CL" AS PER USCS FROM BOSTWICK PIT MELROSE ,NM

Comment: BORROW PIT ASSESSMENT



Per: *[Signature]*

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on written request.

Lydick Engineers & Surveyors, Inc.

P. O. Box 728
205 E. 2nd Street
Clovis, NM 88101
505-762-3771

Proctor

Report

Report Date: 20-Aug-03
Project: DACAW45-94-D-0003
Report Number: 5

To: ARROWHEAD CONST.
12920 METCALF AVE. SUITE 150
OVERLAND PARK KS 66213

Copies To: FW/TT
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ARROWHEAD

Proj: CLOSURE OF SWMU101 SEWAGE LAGOON @ CANNON AFB

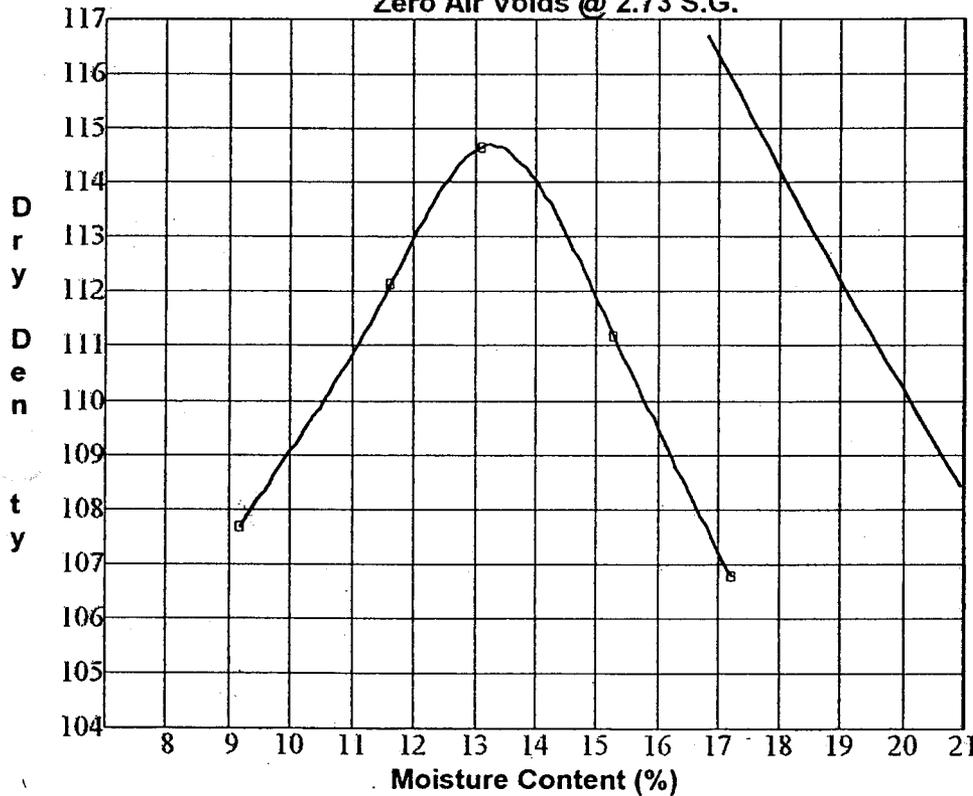
Sample Type: COMPOSITE
Source: BOSTWICK PIT
Tested By: R. MICK

Sample Date: 5-Aug-03

Date Tested: 18-Aug-03

Date Received: 5-Aug-03

Zero Air Voids @ 2.73 S.G.



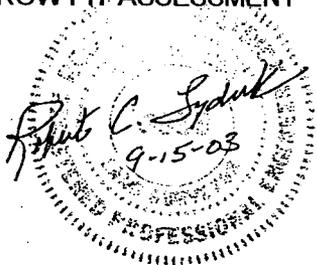
Max. Dry Density: 114.7
Optimum Moisture (%): 13.3

Moisture Content	Dry Density	Wet Density
9.2	107.7	117.6
11.6	112.1	125.2
13.1	114.7	129.7
15.3	111.2	128.2
17.2	106.8	125.2

Method: ASTM D-1557
Rammer Type: MANUAL
Preparation: DRY TO WET
% Retained 5mm screen: 0.0
% Retained 10mm screen: 0.0
% Retained 20mm screen: 0.0

Sample Description: BROWN SANDY LEAN CLAY "CL" AS PER USCS FROM BOSTWICK PIT MELROSE, NM

Comment: BORROW PIT ASSESSMENT



Per: Lance E. Gayer

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on written request.

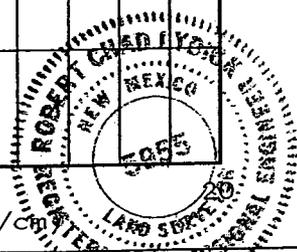
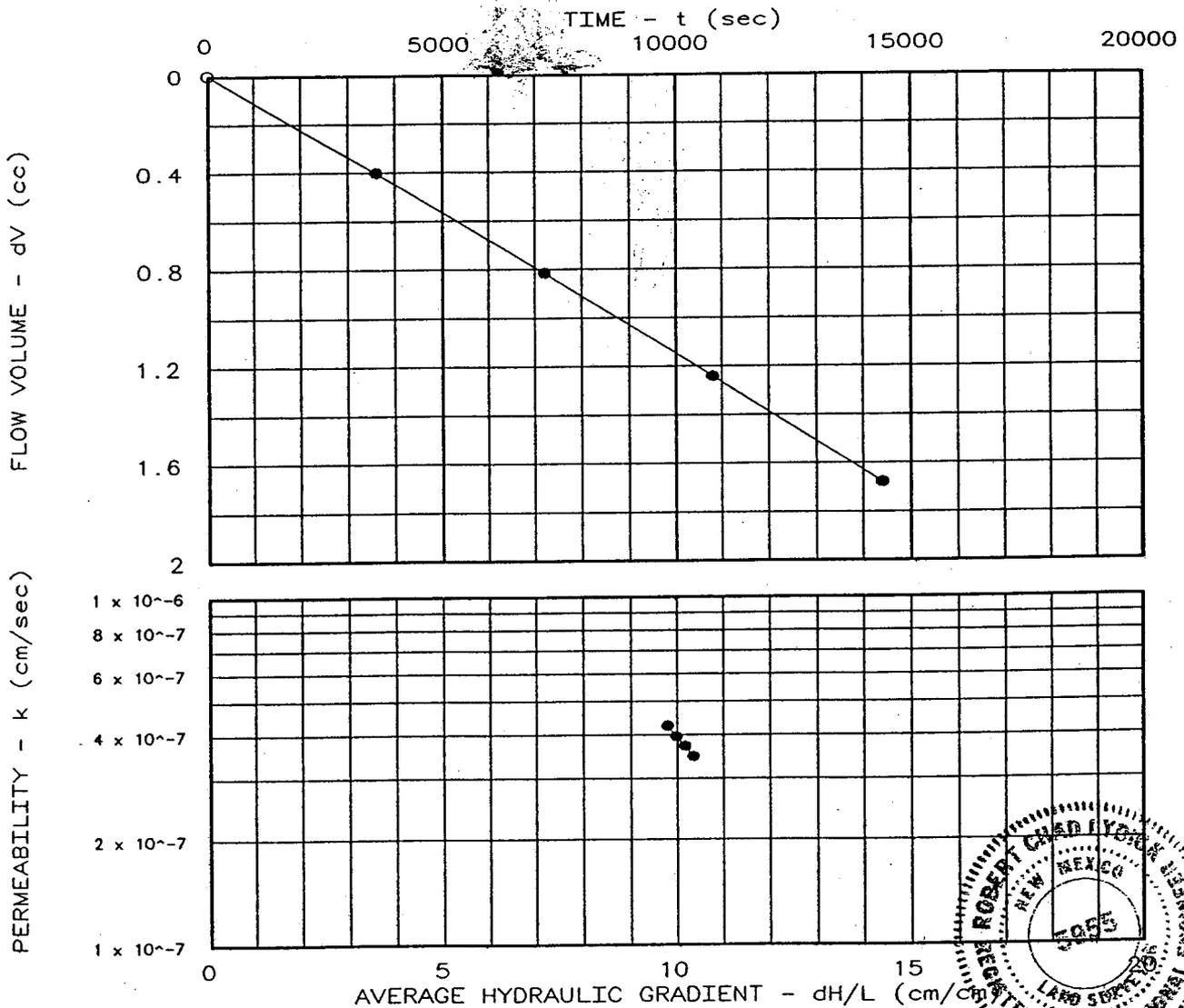
PERMEABILITY TEST REPORT

TEST DATA:

Specimen Height (cm): 11.44
 Specimen Diameter (cm): 6.29
 Dry Unit Weight (pcf): 106.6
 Moisture Before Test (%): 15.3
 Moisture After Test (%): 21.9
 Run Number: 1 • 2 ▲
 Cell Pressure (psi): 98.5
 Sat. Pressure (psi): 96.0
 Perm. (cm/sec): 3.72×10^{-7}

SAMPLE DATA:

Sample Identification: BORROW FILL MATERIAL
 BOSTWICK PIT MELROSE, NM " ASSESSMENT "
 Visual Description: BROWN SANDY LEAN CLAY
 CLASSIFIED AS "CL" AS PER USCS
 Remarks: ASTM D 5084-01 B=98.9
 5 PSI FOR B Ca₂ REAGENT
 Maximum Dry Density (pcf): 106.6
 Optimum Moisture Content (%): 15.6
 ASTM(D-698)
 Percent Compaction: 100.0%
 Permeameter type: FLEX WALL
 Sample type: REMOLDED



Project: LAGOON CLOSURE SWMU 101 @ CANNON AFB
 Location: WASTE WATER TREATMENT PLANT CAFB
 Date: 9-10-03

Project No.: DAGW-45-03
 File No.: AH-4-03-50
 Lab No.: LE-35B KSAT-1
 Tested by: L.E.L.
 Checked by: R.C.L.
 Test: FH - Falling head C

PERMEABILITY TEST REPORT
LYDICK ENGINEERS & SURVEYORS, INC.

=====

PERMEABILITY TEST DATA

=====

PROJECT DATA

Project Name: LAGOON CLOSURE SWMU 101 @ CANNON AFB
 File No.: AH-4-03-50
 Project Location: WASTE WATER TREATMENT PLANT CAFB
 Project No.: DACW-45-03
 Sample Identification: BORROW FILL MATERIAL
 BOSTWICK PIT MELROSE, NM " ASSESSMENT "
 Lab No.: LE-35B KSAT-1
 Description: BROWN SANDY LEAN CLAY
 CLASSIFIED AS "CL" AS PER USCS
 Sample Type: REMOLDED
 Max. Dry Dens.: 106.6
 Method (D1557/D698): D-698
 Opt. Water Content: 15.6
 Date: 9-10-03
 Remarks: ASTM D 5084-01 B=98.9
 5 PSI FOR B Cal₂ REAGENT
 Permeameter Type: FLEX WALL
 Tested by: L.E.L.
 Checked by: R.C.L.
 Test type: FH - Falling head C

PERMEABILITY TEST SPECIMEN DATA

	Before test:			After test:		
Diameter:	1	2		1	2	
Top:	2.475 in	in		2.477 in	in	
Middle:	2.475 in	in		2.477 in	in	
Bottom:	2.476 in	in		2.478 in	in	
Average:	2.48 in	6.29 cm		2.48 in	6.29 cm	
Length:	1	2	3	1	2	3
Average:	4.503 in	in	in	4.510 in	in	in
	4.50 in	11.44 cm		4.51 in	11.46 cm	

Moisture, Density and Sample Parameters:

Specific Gravity:	2.73	
Wet Wt. & Tare:	824.50	866.95
Dry Wt. & Tare:	731.70	733.60
Tare Wt.:	125.10	125.10
Moisture Content:	15.3 %	21.9 %
Dry Unit Weight:	106.6 pcf	100.0 % of max
Porosity:	0.3742	106.6 pcf
Saturation:	69.8 %	0.3743
		100.0 %

FALLING HEAD PERMEABILITY TEST CONDITIONS DATA

Cell No.: 1	Panel No.: 1	Positions: 1
Run Number:	1	2
Cell Pressure:	98.5 psi	0.0 psi
Inflow Saturation Pressure:	96.0 psi	0.0 psi
Inflow Buret Area:	0.2000 cm ²	0.2000 cm ²
Outflow Buret Area:	0.2000 cm ²	0.2000 cm ²
Test Temperature:	21.4 °C	0.0 °C
Outflow Saturation Pressure:	95.0 psi	0.0 psi

PERMEABILITY TEST READINGS DATA

CASE	DATE	TIME	ELAPSED	INFLOW	OUTFLOW	OUTFLOW/	PERM.
D X		(24 hr)	TIME	LEVEL	LEVEL	INFLOW	K
S			sec	cm	cm	RATIO	cm/sec
S X	9/10/ 3	7:00:00	0	50.00	0.0	0.00	0.00E 00
	9/10/ 3	8:00:00	3,600	47.99	2.0	1.00	3.47E-07
	9/10/ 3	9:00:00	3,600	45.94	4.1	1.02	3.72E-07
	9/10/ 3	10:00:00	3,600	43.79	6.2	0.98	3.95E-07
	9/10/ 3	11:00:00	3,600	41.61	8.4	1.01	4.24E-07

Gradient = 9.785E 00 Total vol = 1.68E 00 cc Test duration = 14,400 sec
 Permeability, K_{21.4°} = 3.846E-07 cm/sec, K_{20°} = 3.718E-07 cm/sec
 Permeability values are incremental

$$c = (a \cdot L) / (2 + A + t)$$

1.02266E-05

$K_{sat1} = C \cdot \ln[(H_0/H_1)]$	3.47351E-07
$K_{sat2} = C \cdot \ln[(H_1/H_2)]$	3.6685E-07
$K_{sat3} = C \cdot \ln[(H_2/H_3)]$	3.99429E-07
$K_{sat4} = C \cdot \ln[(H_3/H_4)]$	4.21588E-07

$$K_{mean} = (K_{sat1} + K_{sat2} + K_{sat3} + K_{sat4}) / 4$$

$$K_{mean} = 3.83805E-07$$

Percent Deviation - less than 25% deviation from mean value

$$K_1 = |(K_{sat1} - K_{mean}) / K_{sat1}|$$

$$K_2 = |(K_{sat2} - K_{mean}) / K_{sat2}|$$

$$K_3 = |(K_{sat3} - K_{mean}) / K_{sat3}|$$

$$K_4 = |(K_{sat4} - K_{mean}) / K_{sat4}|$$

$K_1 =$	10.495%
$K_2 =$	4.622%
$K_3 =$	3.912%
$K_4 =$	8.962%

Temperature Correction

$$K_{20} = [(2.2902 - 0.9842T) / T0.1702] \cdot K_{mean}$$

$$K_{20} = 3.71134E-07$$

Ratio of Inflow/Outflow Rates - Should be between 0.75 and 1.25

$$rate_0 = (h_{in0} - h_{in1}) \cdot (at) / [(h_{out1} - h_{out0}) \cdot (at)]$$

$$rate_1 = (h_{in1} - h_{in2}) \cdot (at) / [(h_{out2} - h_{out1}) \cdot (at)]$$

$$rate_2 = (h_{in2} - h_{in3}) \cdot (at) / [(h_{out3} - h_{out2}) \cdot (at)]$$

$$rate_3 = (h_{in3} - h_{in4}) \cdot (at) / [(h_{out4} - h_{out3}) \cdot (at)]$$

rate0 =	1.000
rate1 =	1.000
rate2 =	1.000
rate3 =	1.000

TESTED BY:



Lydick Laboratories
 205 E. Second Street
 (), NM 88101
 505-762-3771

ASTM D 5084-01

Contractor: ARROW HEAD
 Project: SWMU 101
 Location: WASTE WATER
 Date: 9/10/2003

Sample ID: 35B

a = burette area (cm²)
 t = time interval (s)
 T = temperature (deg C)
 L = sample length (cm)
 d = sample diameter (cm)

a	t	T	L	d
0.2	3.600	21.4	11.44	6.29

$$A = (\pi/4) \cdot (d)^2$$

31.07357148

P_{in} = inflow pressure
 P_{out} = outflow pressure
 cmW = conversion factor from psi to cm of water

cmW
 0.0142091301798

P _{in} (psi)	P _{out} (psi)
96	95

P _{in} (cm)	P _{out} (cm)
6.76E+03	6.69E+03

	h _{in} Values	h _{out} Values
h ₀	50	0
h ₁	47.99	2.01
h ₂	45.94	4.06
h ₃	43.79	6.21
h ₄	41.61	8.39

$$H = P_{in} + (h_{in} - h_{out}) - P_{out}$$

$$\text{gradient} = H/L$$

H ₀	120.3772847 cmW
H ₁	116.3572847 cmW
H ₂	112.2572847 cmW
H ₃	107.9572847 cmW
H ₄	103.5972847 cmW

G ₀	10.52249
G ₁	10.17109
G ₂	9.8127
G ₃	9.436826
G ₄	9.055707

$$\text{gradient}_{avg} = (G_0 + G_4)/2$$

gradient_{avg} = 9.789098313

Headloss across sample should not drop to less than 75% of initial

$$\text{min}h = 0.75(h_0)$$

minh = 90.2830 cmW

K1-5

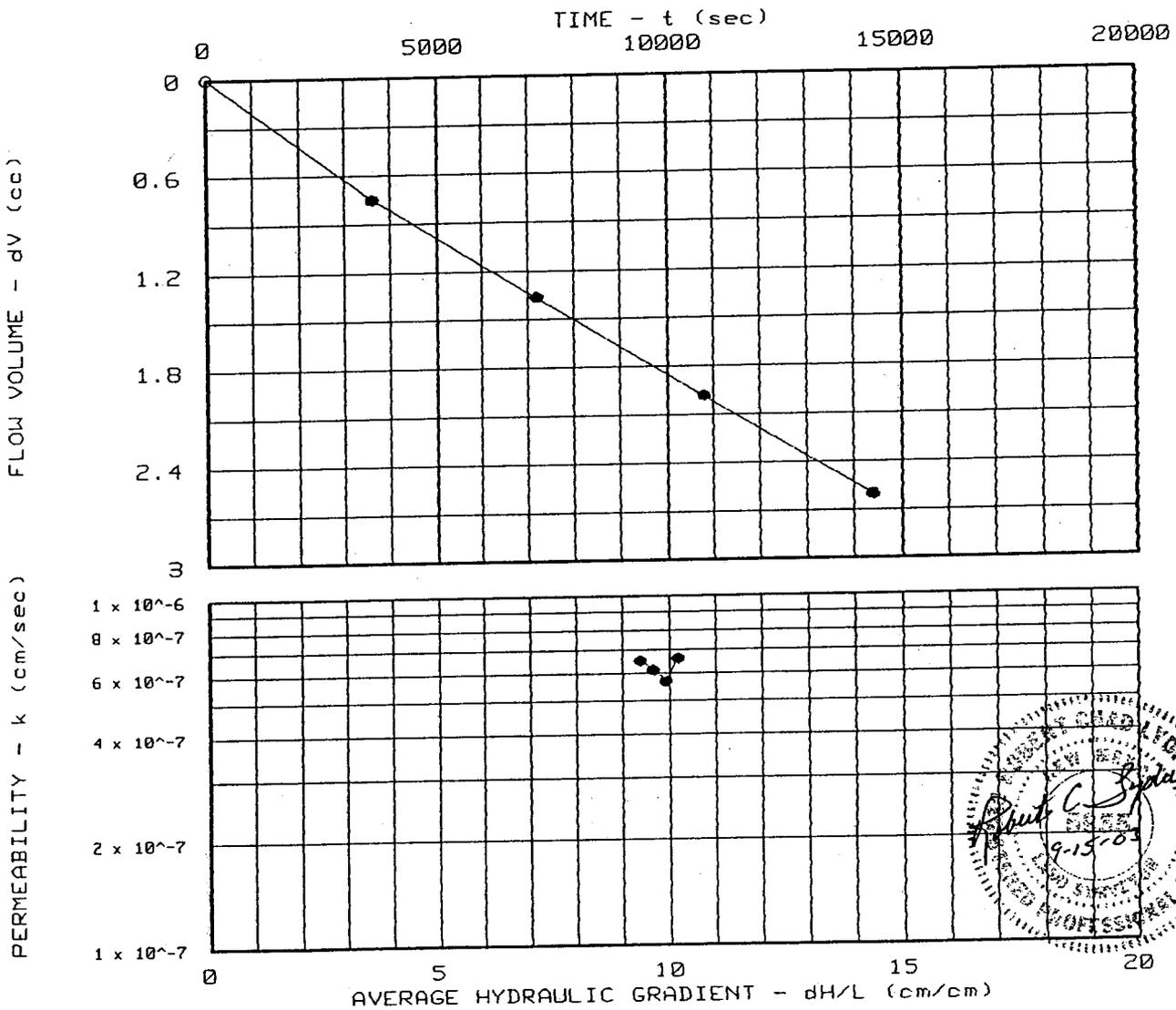
PERMEABILITY TEST REPORT

TEST DATA:

Specimen Height (cm): 11.44
 Specimen Diameter (cm): 6.29
 Dry Unit Weight (pcf): 100.8
 Moisture Before Test (%): 17.3
 Moisture After Test (%): 25.3
 Run Number: 1 • 2 ▲
 Cell Pressure (psi): 96.5
 Sat. Pressure (psi): 94.0
 Perm. (cm/sec): 6.03×10^{-7}

SAMPLE DATA:

Sample Identification: BORROW FILL MATERIAL
 BOSTWICK PIT MELROSE, NM "ASSESSMENT
 Visual Description: BROWN SANDY LEAN CLAY
 CLASSIFIED AS "CL" AS PER USCS
 Remarks: ASTM D 5084-01 B=97.9
 SPSI FOR B CaI₂ REAGENT
 Maximum Dry Density (pcf): 106.6
 Optimum Moisture Content (%): 15.6
 ASTM(D-698)
 Percent Compaction: 94.5%
 Permeameter type: FLEXWALL
 Sample type: REMOLDED



Project: LAGOON CLOSURE SWMU 101 @ CANNON AFB
 Location: WASTE WATER TREATMENT PLANT CAFB
 Date: 9-10-03

Project No.: DACW-45-03
 File No.: AH-4-03-51
 Lab No.: LE-36B KSAT-2
 Tested by: L.E.L.
 Checked by: R.C.L.
 Test: FH - Falling head C

PERMEABILITY TEST REPORT
 LYDICK ENGINEERS & SURVEYORS, INC.

=====

PERMEABILITY TEST DATA

=====

PROJECT DATA

Project Name: LAGOON CLOSURE SWMU 101 @ CANNON AFB
 File No.: AH-4-03-51
 Project Location: WASTE WATER TREATMENT PLANT CAFB
 Project No.: DACW-45-03
 Sample Identification: BORROW FILL MATERIAL
 BOSTWICK PIT MELROSE, NM "ASSESSMENT"
 Lab No.: LE-36B KSAT-2
 Description: BROWN SANDY LEAN CLAY
 CLASSIFIED AS "CL" AS PER USCS
 Sample Type: REMOLDED
 Max. Dry Dens.: 106.6
 Method (D1557/D698): D-698
 Opt. Water Content: 15.6
 Date: 9-10-03
 Remarks: ASTM D 5084-01 B=97.9
 5PSI FOR B Cal₂ REAGENT
 Permeameter Type: FLEXWALL
 Tested by: L.E.L.
 Checked by: R.C.L.
 Test type: FH - Falling head C

PERMEABILITY TEST SPECIMEN DATA

	Before test:			After test:		
Diameter:	1	2		1	2	
Top:	2.476 in		in	2.478 in		in
Middle:	2.475 in		in	2.477 in		in
Bottom:	2.476 in		in	2.479 in		in
Average:	2.48 in	6.29 cm		2.48 in	6.29 cm	
Length:	1	2	3	1	2	3
	4.503 in		in	4.509 in		in
Average:	4.50 in	11.44 cm		4.51 in	11.45 cm	
Moisture, Density and Sample Parameters:						
Specific Gravity:	2.73					
Wet Wt. & Tare:	802.75			851.16		
Dry Wt. & Tare:	703.45			705.65		
Tare Wt.:	130.25			130.25		
Moisture Content:	17.3 %			25.3 %		
Dry Unit Weight:	100.8 pcf	94.5 % of max		100.8 pcf		
Porosity:	0.4088			0.4084		
Saturation:	68.4 %			100.0 %		

FALLING HEAD PERMEABILITY TEST CONDITIONS DATA

Cell No.: 3

Panel No.: 3

Positions: 3

Run Number:

1

2

Cell Pressure:	96.5 psi	0.0 psi
Inflow Saturation Pressure:	94.0 psi	0.0 psi
Inflow Buret Area:	0.2000 cm ²	0.2000 cm ²
Outflow Buret Area:	0.2000 cm ²	0.2000 cm ²
Test Temperature:	21.4 °C	0.0 °C
Outflow Saturation Pressure:	93.0 psi	0.0 psi

PERMEABILITY TEST READINGS DATA

CASE D X S	DATE	TIME (24 hr)	ELAPSED TIME sec	INFLOW LEVEL cm	OUTFLOW LEVEL cm	OUTFLOW/ INFLOW RATIO	PERM. K cm/sec
S X	9/10/ 3	13:00:00	0	50.00	0.0	0.00	0.00E 00
	9/10/ 3	14:00:00	3,600	46.23	3.8	1.00	6.62E-07
	9/10/ 3	15:00:00	3,600	43.18	6.8	1.00	5.69E-07
	9/10/ 3	16:00:00	3,600	40.08	9.9	1.00	6.13E-07
	9/10/ 3	17:00:00	3,600	36.95	13.0	0.98	6.52E-07

Gradient = 9.380E 00 Total vol = 2.60E 00 cc Test duration = 14,400 sec
 Permeability, K_{21.4°} = 6.239E-07 cm/sec, K_{20°} = 6.032E-07 cm/sec
 Permeability values are incremental



Lydick Laboratories
 205 E. Second Street
 , NM 88101
 505-762-3771

ASTM D 5084-01

Contractor: ARROW HEAD
 Project: SWMU 101
 Location: WASTE WATER
 Date: 9/10/2003

Sample ID: 36B

a = burette area (cm²)
 t = time interval (s)
 T = temperature (deg C)
 L = sample length (cm)
 d = sample diameter (cm)

a	t	T	L	d
0.2	3.600	21.4	11.45	6.29

$$A = (\pi/4) \cdot (d)^2$$

$$= 31.07357148$$

P_{in} = inflow pressure
 P_{out} = outflow pressure
 cmW = conversion factor from psi to cm of water

cmW
 0.0142091301798

P _{in} (psi)	P _{out} (psi)
94	93

P _{in} (cm)	P _{out} (cm)
6.62E+03	6.55E+03

	h _{in} Values
h ₀	50
h ₁	46.23
h ₂	43.18
h ₃	40.08
h ₄	36.95

	h _{out} Values
	0
	3.77
	6.82
	9.92
	12.99

$$H = P_{in} + (h_{in} - h_{out}) - P_{out}$$

H ₀	120.3772847 cmW
H ₁	112.8372847 cmW
H ₂	106.7372847 cmW
H ₃	100.5372847 cmW
H ₄	94.3372847 cmW

$$\text{gradient} = H/L$$

G ₀	10.5133
G ₁	9.854785
G ₂	9.322034
G ₃	8.780549
G ₄	8.239064

$$\text{gradient}_{avg} = (G_0 + G_4)/2$$

$$\text{gradient}_{avg} = 9.37618207$$

Headloss across sample should not drop to less than 75% of initial

$$\text{min}h = 0.75(h_0)$$

$$\text{min}h = 90.2830 \text{ cmW}$$

K-2-5

$$c = (a \cdot L) / (2 + A + t)$$

1.02356E-05

$K_{sat1} = c \cdot \ln[(H_0/H_1)]$	6.62078E-07
$K_{sat2} = c \cdot \ln[(H_1/H_2)]$	5.68855E-07
$K_{sat3} = c \cdot \ln[(H_2/H_3)]$	6.12515E-07
$K_{sat4} = c \cdot \ln[(H_3/H_4)]$	6.51516E-07

$$K_{mean} = (K_{sat1} + K_{sat2} + K_{sat3} + K_{sat4}) / 4$$

$$K_{mean} = 6.23741E-07$$

Percent Deviation - less than 25% deviation from mean value

$$K_1 = |(K_{sat1} - K_{mean}) / K_{sat1}|$$

$$K_2 = |(K_{sat2} - K_{mean}) / K_{sat2}|$$

$$K_3 = |(K_{sat3} - K_{mean}) / K_{sat3}|$$

$$K_4 = |(K_{sat4} - K_{mean}) / K_{sat4}|$$

$K_1 =$	5.790%
$K_2 =$	9.649%
$K_3 =$	1.833%
$K_4 =$	4.263%

Temperature Correction

$$K_{20} = [(2.2902 - 0.9842T) / T]^{0.1702} \cdot K_{mean}$$

$$K_{20} = 6.0315E-07$$

Ratio of Inflow/Outflow Rates - Should be between 0.75 and 1.25

$$rate_0 = [(h_{in0} - h_{in1}) \cdot (a/t)] / [(h_{out1} - h_{out0}) \cdot (a/t)]$$

$$rate_1 = [(h_{in1} - h_{in2}) \cdot (a/t)] / [(h_{out2} - h_{out1}) \cdot (a/t)]$$

$$rate_2 = [(h_{in2} - h_{in3}) \cdot (a/t)] / [(h_{out3} - h_{out2}) \cdot (a/t)]$$

$$rate_3 = [(h_{in3} - h_{in4}) \cdot (a/t)] / [(h_{out4} - h_{out3}) \cdot (a/t)]$$

rate ₀ =	1.000
rate ₁ =	1.000
rate ₂ =	1.000
rate ₃ =	1.020

TESTED BY:



K-2-6

ROBERT L. LYDICK
PROFESSIONAL ENGINEER AND
LAND SURVEYOR



ROBERT CHAD LYDICK
PROFESSIONAL ENGINEER AND
LAND SURVEYOR
ASTM D 2216-01

CLOVIS, NEW MEXICO 88101

PROJECT: Lagoon Closure SWMU 101 DATE: 6-18-03

CONTRACTOR: Arrashead TESTED BY: L. Langdon

SAMPLE NO. 6-18 Boatwick Pit SAMPLE NO. _____

WT. WET/CAN 1000.0
WT. DRY/CAN 854.32
WT. CAN 128.60
WT. WATER 145.68
WT. DRY 725.72
W.C. % 20.1

WT. WET/CAN _____
WT. DRY/CAN _____
WT. CAN _____
WT. WATER _____
WT. DRY _____
W.C. % _____

SAMPLE NO. _____

WT. WET/CAN _____
WT. DRY/CAN _____
WT. CAN _____
WT. WATER _____
WT. DRY _____
W.C. % _____

SAMPLE NO. _____

WT. WET/CAN _____
WT. DRY/CAN _____
WT. CAN _____
WT. WATER _____
WT. DRY _____
W.C. % _____

SAMPLE NO. _____

WT. WET/CAN _____
WT. DRY/CAN _____
WT. CAN _____
WT. WATER _____
WT. DRY _____
W.C. % _____

SAMPLE NO. _____

WT. WET/CAN _____
WT. DRY/CAN _____
WT. CAN _____
WT. WATER _____
WT. DRY _____
W.C. % _____

SAMPLE NO. _____

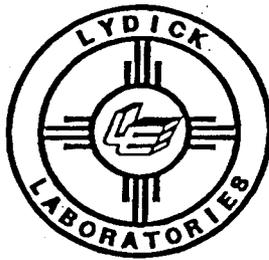
WT. WET/CAN _____
WT. DRY/CAN _____
WT. CAN _____
WT. WATER _____
WT. DRY _____
W.C. % _____

SAMPLE NO. _____

WT. WET/CAN _____
WT. DRY/CAN _____
WT. CAN _____
WT. WATER _____
WT. DRY _____
W.C. % _____



ROBERT L. LYDICK
PROFESSIONAL ENGINEER AND
LAND SURVEYOR



ROBERT CHAD LYDICK
PROFESSIONAL ENGINEER AND
LAND SURVEYOR
ASTM D 2216-01

CLOVIS, NEW MEXICO 88101

PROJECT: Lagoon Closure SWMU 101 DATE: 6-24-03

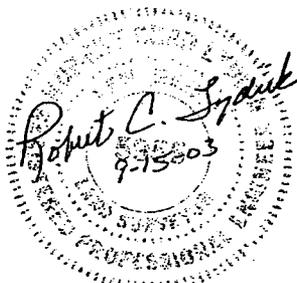
CONTRACTOR: Arrowhead Const TESTED BY: L. Langan

SAMPLE NO. <u>6-24 Bestwick Pit</u>	SAMPLE NO. _____
WT. WET/CAN <u>1000.0</u>	WT. WET/CAN _____
WT. DRY/CAN <u>864.56</u>	WT. DRY/CAN _____
WT. CAN <u>125.6</u>	WT. CAN _____
WT. WATER <u>135.44</u>	WT. WATER _____
WT. DRY <u>738.96</u>	WT. DRY _____
W.C. % <u>18.3</u>	W.C. % _____

SAMPLE NO. _____	SAMPLE NO. _____
WT. WET/CAN _____	WT. WET/CAN _____
WT. DRY/CAN _____	WT. DRY/CAN _____
WT. CAN _____	WT. CAN _____
WT. WATER _____	WT. WATER _____
WT. DRY _____	WT. DRY _____
W.C. % _____	W.C. % _____

SAMPLE NO. _____	SAMPLE NO. _____
WT. WET/CAN _____	WT. WET/CAN _____
WT. DRY/CAN _____	WT. DRY/CAN _____
WT. CAN _____	WT. CAN _____
WT. WATER _____	WT. WATER _____
WT. DRY _____	WT. DRY _____
W.C. % _____	W.C. % _____

SAMPLE NO. _____	SAMPLE NO. _____
WT. WET/CAN _____	WT. WET/CAN _____
WT. DRY/CAN _____	WT. DRY/CAN _____
WT. CAN _____	WT. CAN _____
WT. WATER _____	WT. WATER _____
WT. DRY _____	WT. DRY _____
W.C. % _____	W.C. % _____



ROBERT L. LYDICK
PROFESSIONAL ENGINEER AND
LAND SURVEYOR



ROBERT CHAD LYDICK
PROFESSIONAL ENGINEER AND
LAND SURVEYOR
ASTM D 2216-01

CLOVIS, NEW MEXICO 88101

PROJECT: Lagoon Closure SWMu 101 DATE: 7-10-03

CONTRACTOR: Arrowhead Const TESTED BY: L. Langan

SAMPLE NO. 7-10 Bostwick Pit

SAMPLE NO. _____

WT. WET/CAN 1000.0
WT. DRY/CAN 859.12
WT. CAN 135.6
WT. WATER 140.88
WT. DRY 723.52
W.C. % 19.5

WT. WET/CAN _____
WT. DRY/CAN _____
WT. CAN _____
WT. WATER _____
WT. DRY _____
W.C. % _____

SAMPLE NO. _____

SAMPLE NO. _____

WT. WET/CAN _____
WT. DRY/CAN _____
WT. CAN _____
WT. WATER _____
WT. DRY _____
W.C. % _____

WT. WET/CAN _____
WT. DRY/CAN _____
WT. CAN _____
WT. WATER _____
WT. DRY _____
W.C. % _____

SAMPLE NO. _____

SAMPLE NO. _____

WT. WET/CAN _____
WT. DRY/CAN _____
WT. CAN _____
WT. WATER _____
WT. DRY _____
W.C. % _____

WT. WET/CAN _____
WT. DRY/CAN _____
WT. CAN _____
WT. WATER _____
WT. DRY _____
W.C. % _____

SAMPLE NO. _____

SAMPLE NO. _____

WT. WET/CAN _____
WT. DRY/CAN _____
WT. CAN _____
WT. WATER _____
WT. DRY _____
W.C. % _____



WT. WET/CAN _____
WT. DRY/CAN _____
WT. CAN _____
WT. WATER _____
WT. DRY _____
W.C. % _____

OMAHA

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE <small>(Read instructions on the reverse side prior to initiating this form)</small>	DATE 09/19/2003	TRANSMITTAL NO. 02377-22
---	--------------------	-----------------------------

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS (This section will be initiated by the contractor)

TO: Cannon AFB Resident Office US Army Corps of Engineers 201 N. Perimeter Rd. Cannon AFB, NM 88103	FROM: Foster Wheeler Environmental C 6605 Uptown Blvd, NE Suite 220 Albuquerque, NM 87110	CONTRACT NO. DACW45-94-D-0003 0035
--	---	---------------------------------------

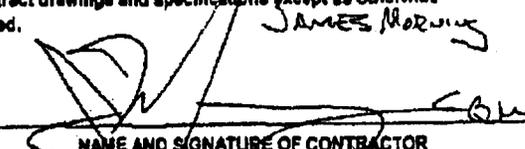
CHECK ONE:
 THIS IS A NEW TRANSMITTAL
 THIS IS A RESUBMITTAL OF TRANSMITTAL

SPECIFICATION SEC. NO. (Cover only one section with each transmittal) 02377	PROJECT TITLE AND LOCATION SWMU 101 - Sewage Lagoons Cannon AFB	CHECK ONE: THIS TRANSMITTAL IS FOR <input type="checkbox"/> FID <input checked="" type="checkbox"/> GOVT. APPROVAL
--	--	---

ITEM NO.	DESCRIPTION OF ITEM SUBMITTED <small>(Type size, model number/etc.)</small>	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. <small>(See instruction no. 8)</small>	NO. OF COPIES	CONTRACT REFERENCE DOCUMENT		FOR CONTRACTOR USE CODE	VARIATION <small>(See instruction No. 6)</small>	FOR CE USE CODE
				SPEC. PARA. NO.	DRAWING SHEET NO.			
a.	b.	c.	d.	e.	f.	g.	h.	i.
20	Final Assessment test Gr,PI,LL	TEST REPORTS	3	3.4.1		B		B

(SEE COMMENTS BELOW)

REMARKS
 Final set of 422's.
 698's submitted with In Place Density Test.
USACE Omaha Comments
 1. Sample No. 24 - Atterberg Limits Incorrectly reported on Grain-Size Curve
 2. Since all sampling was done "in place" within the borrow area, Lydick should note the sample depth on each grain-size curve.

I certify that the above submitted items have been reviewed in detail and are correct and in the strict conformance with the contract drawings and specifications except as otherwise stated.

 NAME AND SIGNATURE OF CONTRACTOR

SECTION II - APPROVAL ACTION

ENCLOSURES RETURNED (List by item No.)	NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY <i>Maia Pastor</i>	DATE 9-25-03
--	--	-----------------

09/24/2003 16:01 402+221+7848 → 85057842663 NO. 908 P02

SUBMITTAL REVIEW VERIFICATION SHEET

Date: Sept 19, 2003

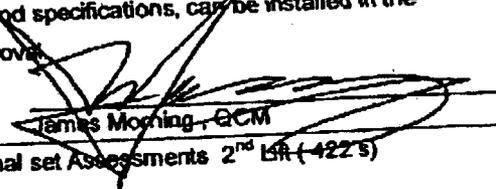
Submittal No.: 02377-22

Foster Wheeler Environmental Corporation Stamp

SWMU 101 Sewage Lagoons Closure, Cannon AFB, NM
 Certified for approval as indicated below:

A - Approved as submitted
 B - Approved except as noted on the drawings and/or attached sheets.

It is hereby certified that the (equipment) (material) shown and marked in this submittal is that proposed to be incorporated into Contract Number DACW45-94-D-0003, Delivery Order No. 35, Work Authorization Directive 1 is in compliance with the contract drawings and specifications, can be installed in the allocated spaces, and is submitted for Government approval.

Reviewed/Certified By:  James Moching, GCM

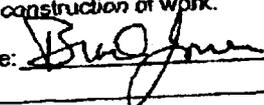
Description of items reviewed: SD-06 Test Reports-Final set Assessments 2nd LR (4225)

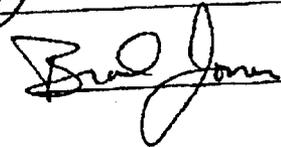
U.S. Army Corps of Engineers Stamp

U.S. Army Engineer District, Albuquerque Corps of Engineers
 Certified for approval as indicated below:

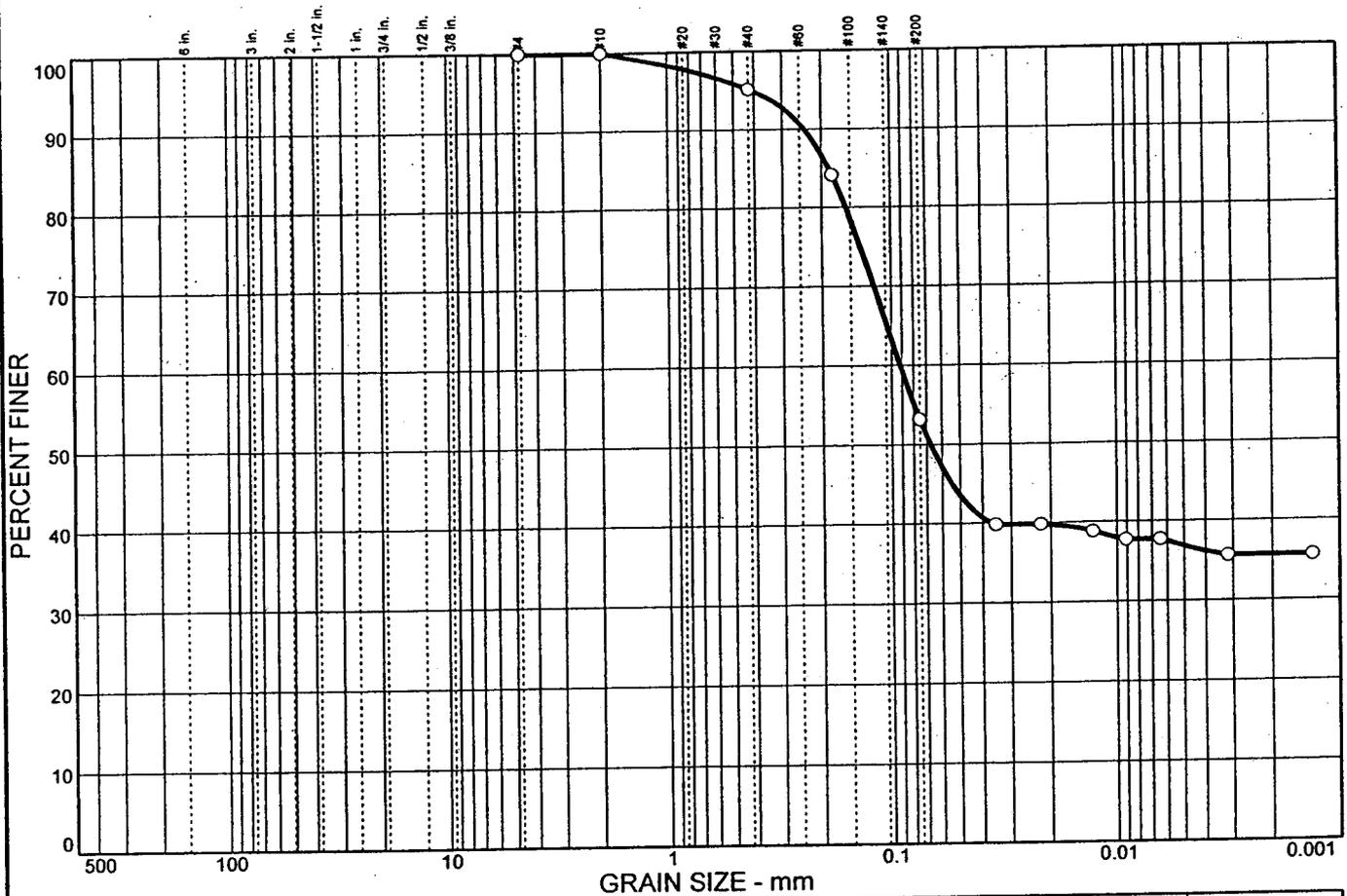
A - Approved as submitted.
 B - Approved except as noted on the drawings and/or attached sheet(s). Resubmission not required.
 C - Approved except as noted on the drawings and/or attached sheet(s). Resubmission required.
 D - Will be returned by separate correspondence.
 E - Disapproved; see comments on attached sheet.
 F - Receipt acknowledged.
 G - Other. Specify.

Note: Items approved as to general layout only. Dimensions and quantities checked. Approval does not relieve contractor of responsibilities for errors that may exist, as contractor shall be responsible for dimensions and design of adequate corrections. Details and satisfactory construction of work.

Signature:  _____ Date: 9-22-03

Reviewer's Signature:  _____

PARTICLE SIZE ANALYSIS AS PER ASTM D 422-98



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	46.8	16.4	36.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	100.0		
#40	95.1		
#80	84.1		
#200	53.2		

* (no specification provided)

Soil Description

SAMPLED FROM IN-PLACE MATERIAL

Atterberg Limits

PL= 15 LL= 27 PI= 12

Coefficients

D₈₅= 0.186 D₆₀= 0.0914 D₅₀= 0.0672
D₃₀= D₁₅= D₁₀=
C_u= C_c=

Classification

USCS= "CL" AASHTO=

Remarks

SAMPLED FROM IN-PLACE MATERIAL

Sample No.: 19 Source of Sample: Date: 8-1-03
Location: BORROW FILL FROM BOSTWICK PIT MELROSE, NM 1 7-28-03 Elev./Depth: SECOND

Fractional Components

Gravel/Sand based on #4

Sand/Fines based on #200

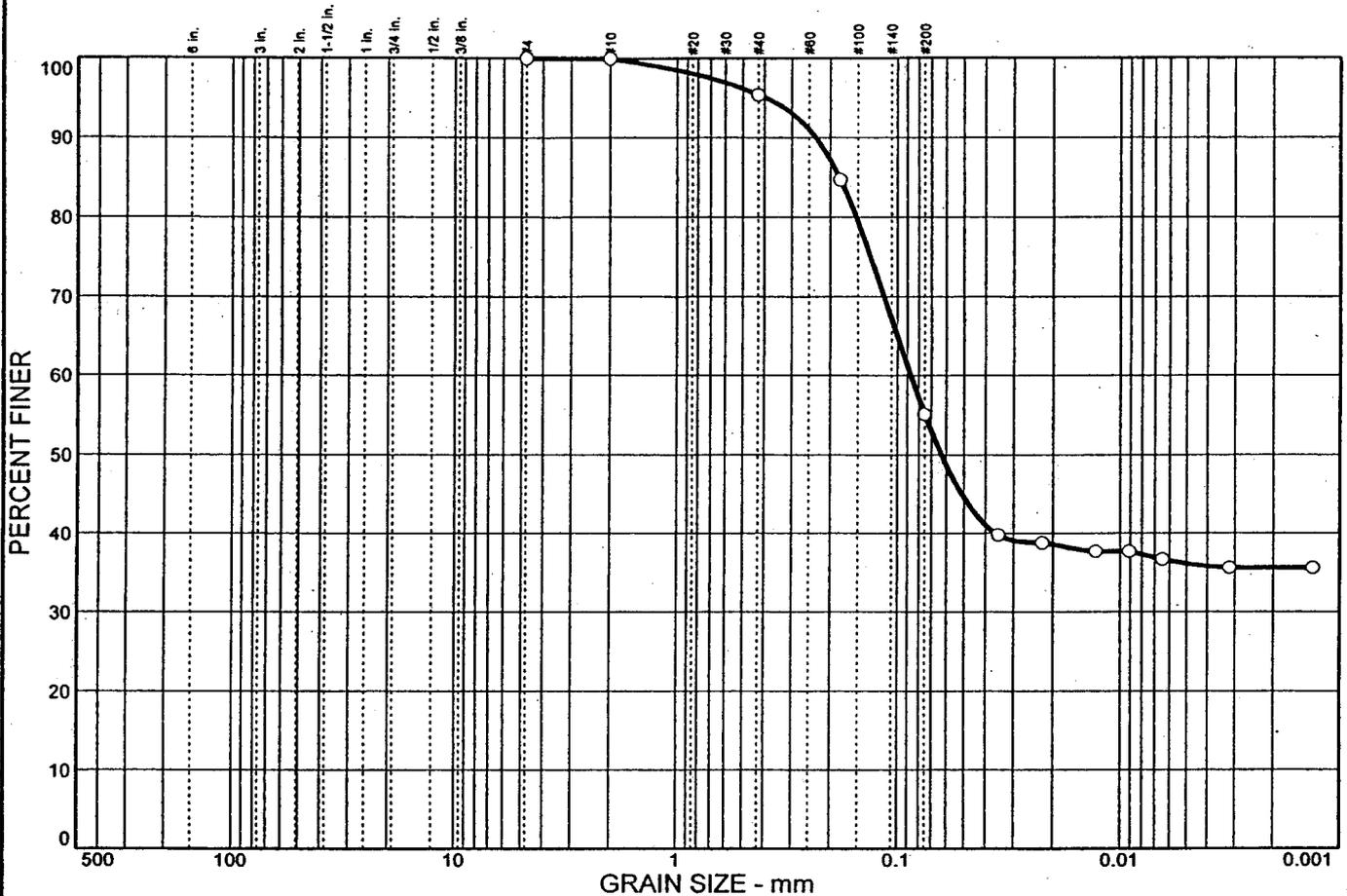
% COBBLES = % GRAVEL =

% SAND = 46.8

% SILT = 16.4 % CLAY = 36.8

D85= 0.19 D60= 0.09 D50= 0.07

PARTICLE SIZE ANALYSIS AS PER ASTM D 422-98



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	44.9	19.0	36.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	100.0		
#40	95.4		
#80	84.7		
#200	55.1		

* (no specification provided)

Soil Description

SAMPLED FROM IN-PLACE MATERIAL

Atterberg Limits

PL= 15 LL= 27 PI= 12

Coefficients

D₈₅= 0.182 D₆₀= 0.0867 D₅₀= 0.0631
D₃₀= D₁₅= D₁₀=
C_u= C_c=

Classification

USCS= "CL" AASHTO=

Remarks

SAMPLED FROM IN-PLACE

Sample No.: 20 Source of Sample: Date: 8-1-03
Location: BARROW FILL MATERIAL FROM BOSTWICK PIT MELROSE, NM 2 7-28-03 Elev./Depth: SECOND

GRAIN SIZE DISTRIBUTION TEST DATA

Client: ARROW HEAD CONSTRUCTION
Project: SWMU 101 LAGOON CLOSURE @ WASTE WATER TREATMENT PLANT CANNON A.F.B.
Project Number: DACW45-94-0003

Sample Data

Source:
Sample No.: 20
Elev. or Depth: SECOND LIFT **Sample Length(in./cm.):**
Location: BARROW FILL MATERIAL FROM BOSTWICK PIT MELROSE, NM 2 7-28-03
Description: SAMPLED FROM IN-PLACE MATERIAL
Date: 8-1-03 **PL:** 15 **LL:** 27 **PI:** 12
USCS Classification: "CL" **AASHTO Classification:**
Testing Remarks: SAMPLED FROM IN-PLACE

Mechanical Analysis Data

Sieve	Size, mm	Percent finer
# 4	4.750	100.0
# 10	2.000	100.0
# 40	0.425	95.4
# 80	0.180	84.7
# 200	0.075	55.1

Hydrometer Analysis Data

Separation sieve is #10
 Percent -#10 based upon complete sample= 100.0
 Weight of hydrometer sample: 50.00
 Hygroscopic moisture correction:
 Moist weight & tare = 38.41
 Dry weight & tare = 37.41
 Tare = 21.35
 Hygroscopic moisture= 6.2 %
 Calculated biased weight= 47.07
 Automatic temperature correction
 Composite correction at 20 deg C = 5.0

 Meniscus correction only=
 Specific gravity of solids= 2.73
 Specific gravity correction factor= 0.983
 Hydrometer type: 152H
 Effective depth L= 16.294964 - 0.164 x Rm

Elapsed time, min	Temp, deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
2.00	20.5	14.0	19.1	0.0132	14.0	14.0	0.0350	39.8
5.00	20.5	13.5	18.6	0.0132	13.5	14.1	0.0222	38.8
15.00	20.5	13.0	18.1	0.0132	13.0	14.2	0.0129	37.7
30.00	20.5	13.0	18.1	0.0132	13.0	14.2	0.0091	37.7
60.00	20.5	12.5	17.6	0.0132	12.5	14.2	0.0065	36.7
250.00	20.5	12.0	17.1	0.0132	12.0	14.3	0.0032	35.6
1440.00	20.5	12.0	17.1	0.0132	12.0	14.3	0.0013	35.6

Fractional Components

Gravel/Sand based on #4

Sand/Fines based on #200

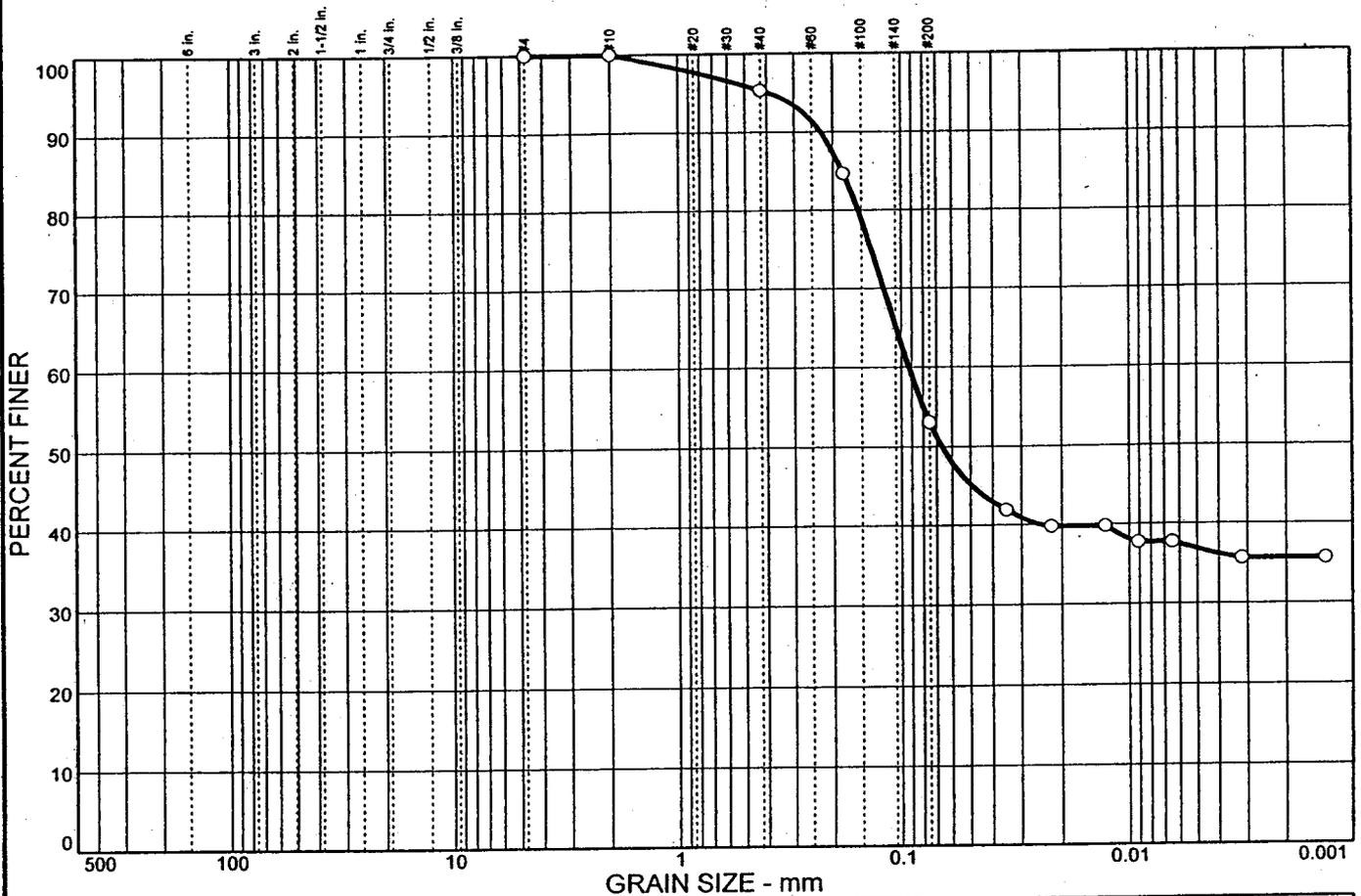
COBBLES = % GRAVEL =

% SAND = 44.9

% SILT = 19.0 % CLAY = 36.1

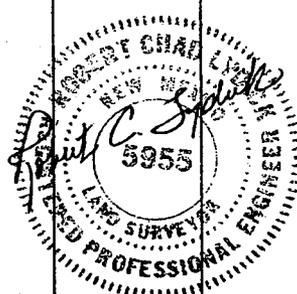
D85= 0.18 D60= 0.09 D50= 0.06

PARTICLE SIZE ANALYSIS AS PER ASTM D 422-98



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	46.9	16.3	36.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	100.0		
#40	95.3		
#80	84.7		
#200	53.1		



Soil Description

SAMPLED FROM IN-PLACE MATERIAL

Atterberg Limits

PL= 15 LL= 27 PI= 12

Coefficients

D₈₅= 0.182 D₆₀= 0.0923 D₅₀= 0.0664
D₃₀= D₁₅= D₁₀=
C_u= C_c=

Classification

USCS= "CL" AASHTO=

Remarks

SAMPLE FROM IN-PLACE MATERIAL

* (no specification provided)

Sample No.: 21 Source of Sample: Date: 8-1-03
Location: BORROW FILL MATERIAL FROM BOSTWICK PIT MELROSE, NM 7-29-03 Elev./Depth: 2ND LIFT

LYDICK ENGINEERS & SURVEYORS, INC.	Client: ARROW HEAD CONSTRUCTION Project: SWMU 101 LAGOON CLOSURE @ WASTE WATER TREATMENT PLANT CANNON A.F.B. Project No: DACW45-94-0003
Figure 21	

GRAIN SIZE DISTRIBUTION TEST DATA

Client: ARROW HEAD CONSTRUCTION
 Project: SWMU 101 LAGOON CLOSURE @ WASTE WATER TREATMENT PLANT CANNON A.F.B.
 Project Number: DACW45-94-0003

Sample Data

Source:
 Sample No.: 21
 Elev. or Depth: 2ND LIFT Sample Length(in./cm.):
 Location: BORROW FILL MATERIAL FROM BOSTWICK PIT MELROSE, NM 7-29-03
 Description: SAMPLED FROM IN-PLACE MATERIAL
 Date: 8-1-03 PL: 15 LL: 27 PI: 12
 USCS Classification: " CL " AASHTO Classification:
 Testing Remarks: SAMPLE FROM IN-PLACE MATERIAL

Mechanical Analysis Data

Sieve	Size, mm	Percent finer
# 4	4.750	100.0
# 10	2.000	100.0
# 40	0.425	95.3
# 80	0.180	84.7
# 200	0.075	53.1

Hydrometer Analysis Data

Separation sieve is #10
 Percent -#10 based upon complete sample= 100.0
 Weight of hydrometer sample: 50.00
 Hygroscopic moisture correction:
 Moist weight & tare = 38.25
 Dry weight & tare = 37.21
 Tare = 20.10
 Hygroscopic moisture= 6.1 %
 Calculated biased weight= 47.13
 Automatic temperature correction
 Composite correction at 20 deg C = 5.0

 Meniscus correction only=
 Specific gravity of solids= 2.73
 Specific gravity correction factor= 0.983
 Hydrometer type: 152H
 Effective depth L= 16.294964 - 0.164 x Rm

Elapsed time, min	Temp, deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
2.00	20.5	15.0	20.1	0.0132	15.0	13.8	0.0348	41.9
5.00	20.5	14.0	19.1	0.0132	14.0	14.0	0.0222	39.8
15.00	20.5	14.0	19.1	0.0132	14.0	14.0	0.0128	39.8
30.00	20.5	13.0	18.1	0.0132	13.0	14.2	0.0091	37.7
60.00	20.5	13.0	18.1	0.0132	13.0	14.2	0.0064	37.7
250.00	20.5	12.0	17.1	0.0132	12.0	14.3	0.0032	35.6
1440.00	20.5	12.0	17.1	0.0132	12.0	14.3	0.0013	35.6

Fractional Components

Gravel/Sand based on #4

Sand/Fines based on #200

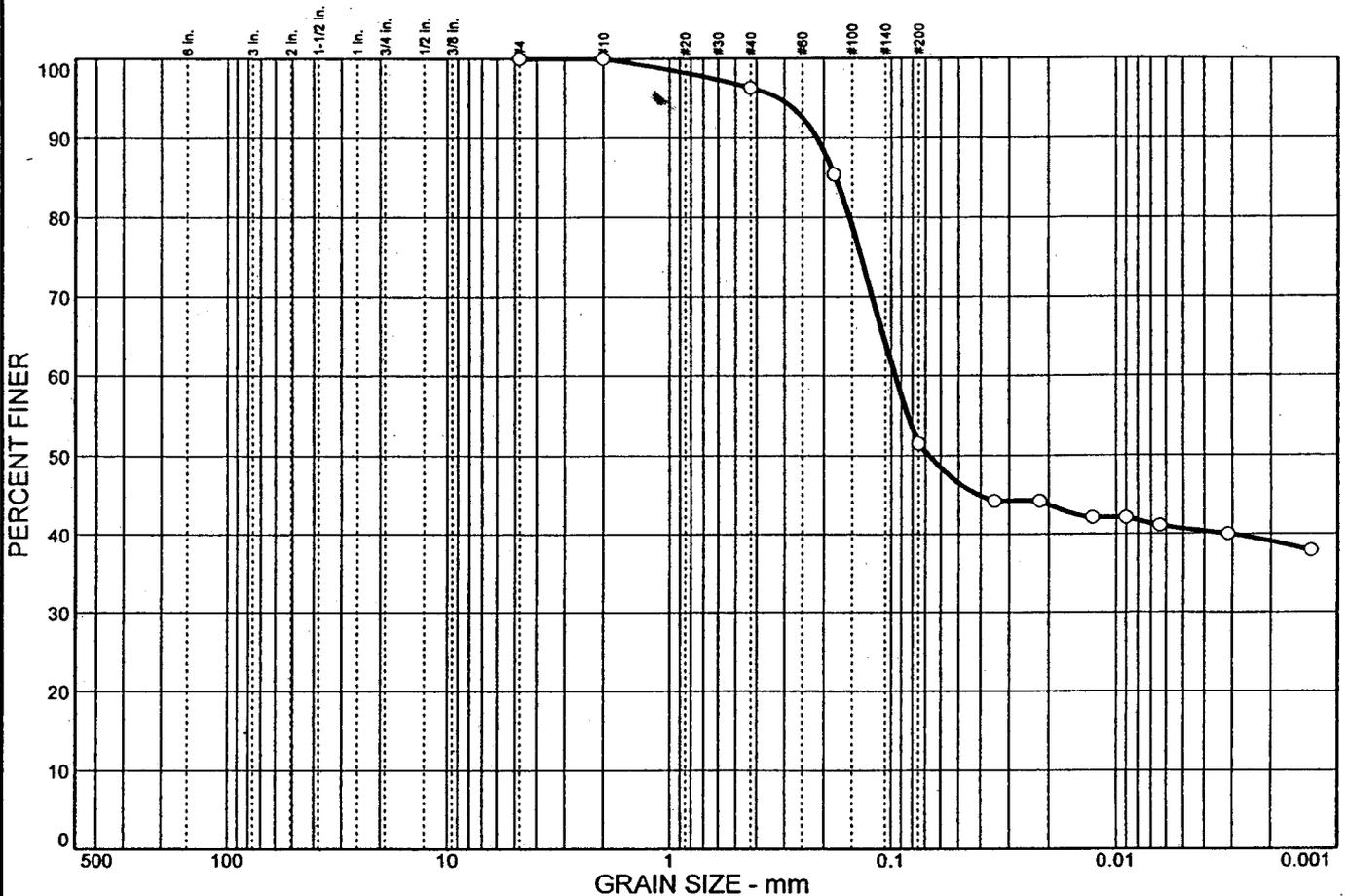
% COBBLES = % GRAVEL =

% SAND = 46.9

% SILT = 16.3 % CLAY = 36.8

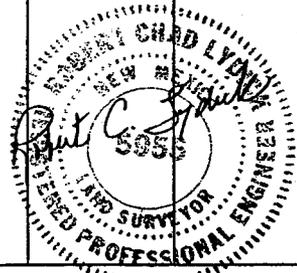
D85= 0.18 D60= 0.09 D50= 0.07

PARTICLE SIZE ANALYSIS AS PER ASTM D 422-98



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	48.5	10.9	40.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	100.0		
#40	96.3		
#80	85.4		
#200	51.5		



* (no specification provided)

Soil Description

SAMPLE FROM IN PLACE MATERIAL

Atterberg Limits

PL= 15 LL= 27 PI= 12

Coefficients

D₈₅= 0.178 D₆₀= 0.0958 D₅₀= 0.0677
D₃₀= D₁₅= D₁₀=
C_u= C_c=

Classification

USCS= " CL " AASHTO=

Remarks

SAMPLED FROM IN-PLACE MATERIAL

Sample No.: 22 Source of Sample: Date: 8-1-03
Location: BORROW FILL MATERIAL FROM BOSTWICK PIT MELROSE, NM 7-30-03 Elev./Depth: 2ND LIFT

LYDICK ENGINEERS & SURVEYORS, INC.	Client: ARROW HEAD CONSTRUCTION Project: SWMU 101 LAGOON CLOSURE @ WASTE WATER TREATMENT PLANT CANNON A.F.B. Project No: DACW45-94-0003
Figure 22	

Fractional Components

Gravel/Sand based on #4

Sand/Fines based on #200

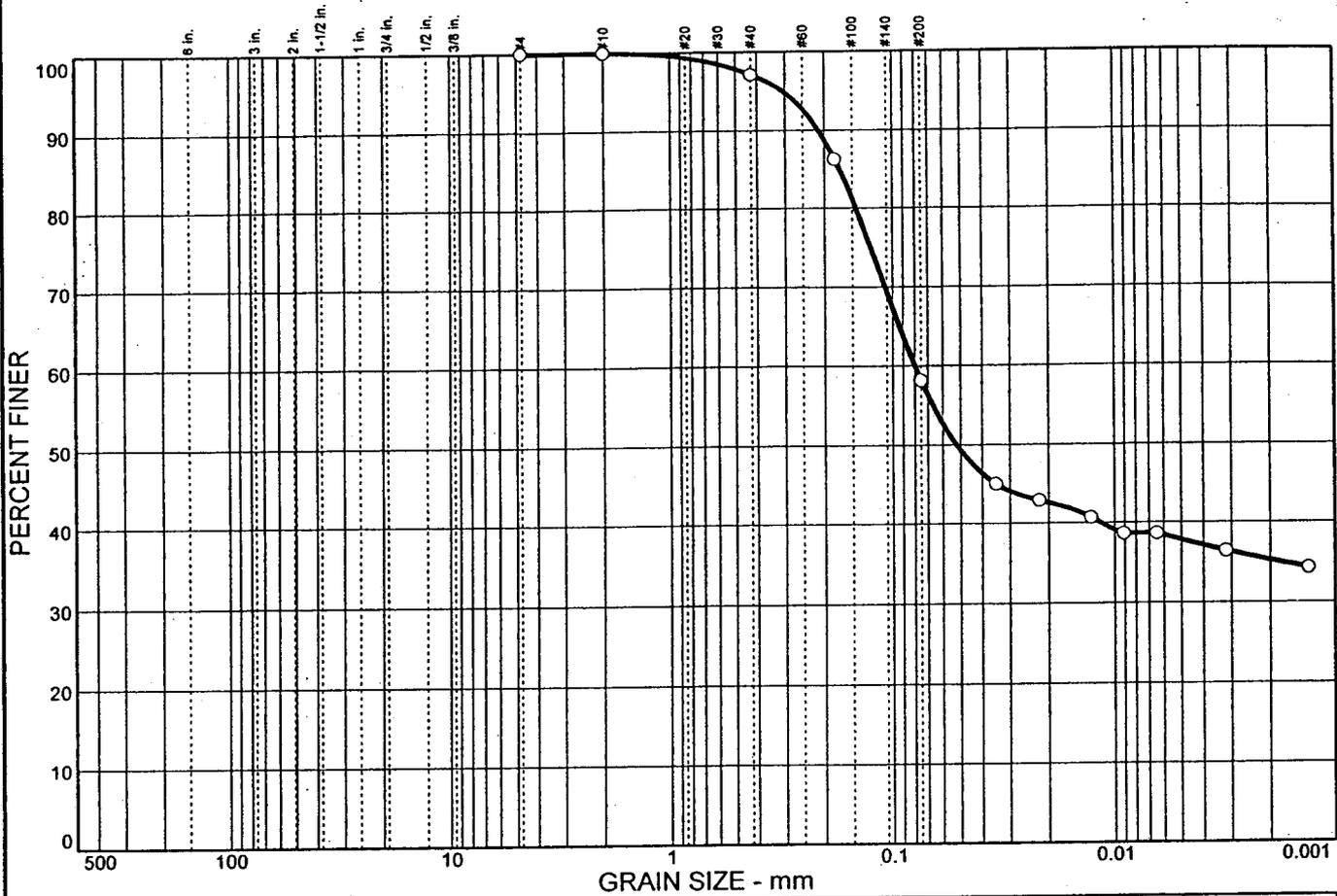
COBBLES = % GRAVEL =

% SAND = 48.5

% SILT = 10.9 % CLAY = 40.6

D85= 0.18 D60= 0.10 D50= 0.07

PARTICLE SIZE ANALYSIS AS PER ASTM D 422-98



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	41.8	20.4	37.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	100.0		
#40	97.1		
#80	86.3		
#200	58.2		

Soil Description

SAMPLED FROM IN PLACE MATERIAL

Atterberg Limits

PL= 16 LL= 31 PI= 15

Coefficients

D₈₅= 0.171 D₆₀= 0.0798 D₅₀= 0.0521
D₃₀= D₁₅= D₁₀=
C_u= C_c=

Classification

USCS= " CL " AASHTO=

Remarks

SAMPLED FROM IN PLACE MATERIAL

* (no specification provided)

Sample No.: 23 Source of Sample: Date: 8-3-03
Location: BORROW FILL MATERIAL FROM BOSTWICK PIT MELROSE, NM 7-31-03 Elev./Depth: 2ND LIFT

LYDICK ENGINEERS & SURVEYORS, INC.	Client: ARROW HEAD CONSTRUCTION Project: SWMU 101 LAGOON CLOSURE @ WASTE WATER TREATMENT PLANT CANNON A.F.B. Project No: DACW45-94-0003 Figure
---	--

Fractional Components

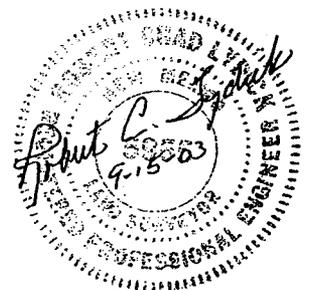
Gravel/Sand based on #4

and/Fines based on #200

COBBLES = % GRAVEL =
SILT = 20.4 % CLAY = 37.8

% SAND = 41.8

$P_{85} = 0.17$ $D_{60} = 0.08$ $D_{50} = 0.05$



GRAIN SIZE DISTRIBUTION TEST DATA

Client: ARROW HEAD CONSTRUCTION
 Project: SWMU 101 LAGOON CLOSURE @ WASTE WATER TREATMENT PLANT CANNON A.F.B.
 Project Number: DACW45-94-0003

Sample Data

Source:
 Sample No.: 24
 Elev. or Depth: 2ND LIFT
 Location: BORROW FILL MATERIAL FROM BOSTWICK PIT MELROSE, NM 8-5-03
 Description: SAMPLED FROM IN PLACE MATERIAL
 Date: 8-7-03 PL: 14 LL: 27 PI: 13
 SCS Classification: " CL " AASHTO Classification:
 Testing Remarks: SAMPLED FROM IN-PLACE MATERIAL

Mechanical Analysis Data

Sieve	Size, mm	Percent finer
4	4.750	100.0
10	2.000	100.0
40	0.425	95.1
80	0.180	84.2
200	0.075	56.2

Hydrometer Analysis Data

Separation sieve is #10
 Percent -#10 based upon complete sample= 100.0
 Weight of hydrometer sample: 50.0
 Pyroscopic moisture correction:
 Moist weight & tare = 38.54
 Dry weight & tare = 37.54
 Tare = 21.45
 Hygroscopic moisture= 6.2 %
 Calculated biased weight= 47.07
 Automatic temperature correction
 Composite correction at 20 deg C = 5.0
 Meniscus correction only=
 Specific gravity of solids= 2.73
 Specific gravity correction factor= 0.983
 Hydrometer type: 152H
 Effective depth L= 16.294964 - 0.164 x Rm

Elapsed time, min	Temp, deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
2.00	20.5	14.0	19.1	0.0132	14.0	14.0	0.0350	39.8
5.00	20.5	14.0	19.1	0.0132	14.0	14.0	0.0222	39.8
15.00	20.5	13.0	18.1	0.0132	13.0	14.2	0.0129	37.7
30.00	20.5	13.0	18.1	0.0132	13.0	14.2	0.0091	37.7
60.00	20.5	12.0	17.1	0.0132	12.0	14.3	0.0065	35.6
250.00	20.5	12.0	17.1	0.0132	12.0	14.3	0.0032	35.6
1440.00	20.5	11.0	16.1	0.0132	11.0	14.5	0.0013	33.6

Fractional Components

Gravel/Sand based on #4

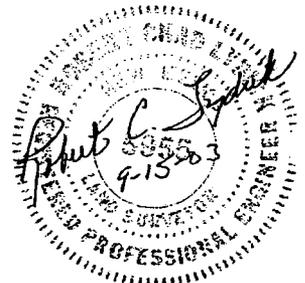
Sand/Fines based on #200

% BBLES = % GRAVEL =

% SAND = 43.8

% SILT = 20.6 % CLAY = 35.6

D85= 0.19 D60= 0.08 D50= 0.06



Lydick Engineers & Surveyors, Inc.

P. O. Box 728
 205 E. 2nd Street
 Clovis, NM 88101
 505-762-3771

Atterberg Report

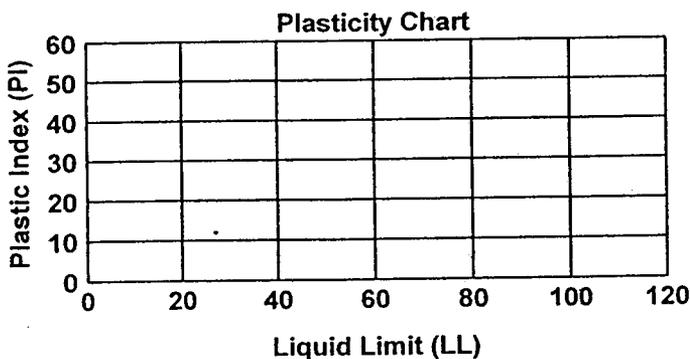
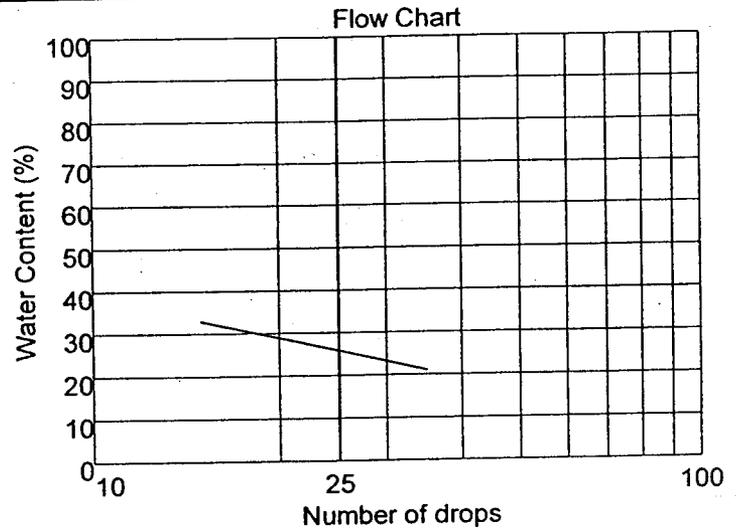
Project Number: DACW45-94-0003
 Report Number: 3
 Report Date: 8/1/2003
 Copies To: AH, FF/TT, COE
 Authorized By: CONTRACTOR
 Performed By: ROBERT MICK
 Bore #: 1
 Sample #: 19-22
 Bore Date: 7/28/2003
 Sample Depth: IN-PLACE
 Preparation (Wet/Dry): WET TO DRY
 Page: 1 of 1

To: ARROWHEAD CONST.
 1920 METCALF AVE. SUITE150
 OVERLAND PARK,KS 66213

Project: LAGOON CLOSURE SWMU 101 WASTE WATER
 TREATMENT PLANT C.A.F.B.

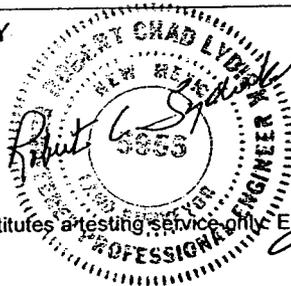
Tare #	1	2		
Tare Weight	22.24	22.26		
Tare + Wet Soil	29.40	29.41		
Tare + Dry Soil	28.45	28.47		
Weight of Water	0.95	0.94		
Weight of Dry Soil	6.21	6.21		
Water Content	15.3	15.1		

Tare #	9	10	7	
Tare Weight	22.30	22.32	22.28	
Tare + Wet Soil	33.42	34.51	34.12	
Tare + Dry Soil	30.56	31.62	32.15	
Number of Blows	10	25	32	
Weight of Water	2.86	2.89	1.97	
Weight of Dry Soil	8.26	9.30	9.87	
Water Content	34.6	31.1	20.0	



Liquid Limit	27	Natural Water Content	
Plastic Limit	15	Classification of Sample	
Plasticity Index	12		
Method A			

BROWN SANDY LEAN CLAY



Per: *Robert Chad Lydick*

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on written request.

Lydick Engineers & Surveyors, Inc.

P. O. Box 728
205 E. 2nd Street
Clovis, NM 88101
505-762-3771

Atterberg Report

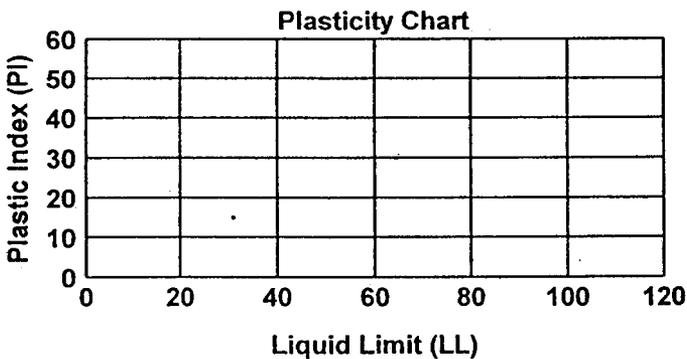
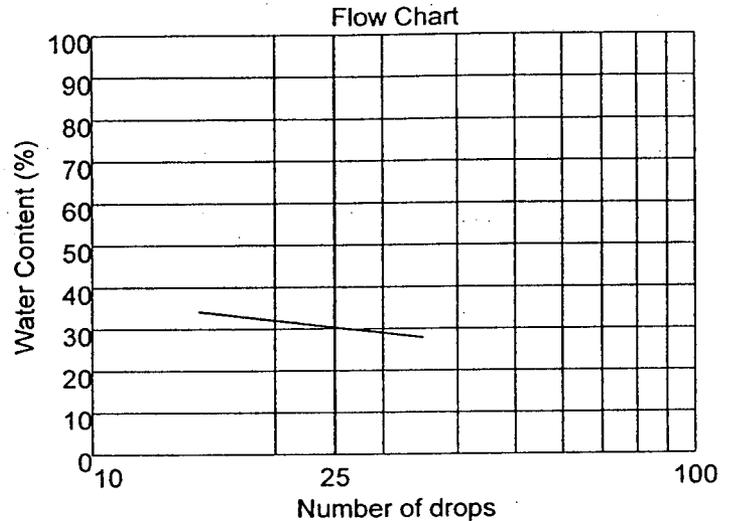
Project Number: DACW45-94-0003
Report Number: 4
Report Date: 8/7/2003
Copies To: AH, FF/TT, COE
Authorized By: CONTRACTOR
Performed By: ROBERT MICK
Bore #: 2
Sample #: 23
Bore Date: 8/3/2003
Sample Depth: IN-PLACE
Preparation (Wet/Dry): WET TO DRY
Page: 1 of 1

To: ARROWHEAD CONST.
1920 METCALF AVE. SUITE150
OVERLAND PARK,KS 66213

Project: LAGOON CLOSURE SWMU 101 WASTE WATER
TREATMENT PLANT C.A.F.B.

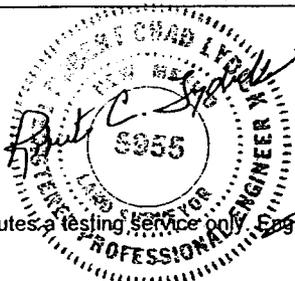
Plastic Limit	Tare #	8	11		
	Tare Weight	22.29	22.30		
	Tare + Wet Soil	30.43	30.51		
	Tare + Dry Soil	29.31	29.43		
	Weight of Water	1.12	1.08		
	Weight of Dry Soil	7.02	7.13		
	Water Content	16.0	15.1		

Liquid Limit	Tare #	14	15	24	
	Tare Weight	22.25	22.19	22.22	
	Tare + Wet Soil	33.43	34.48	34.98	
	Tare + Dry Soil	30.51	31.57	32.05	
	Number of Blows	12	23	30	
	Weight of Water	2.92	2.91	2.93	
	Weight of Dry Soil	8.26	9.38	9.83	
Water Content	35.4	31.0	29.8		



Liquid Limit	31	Natural Water Content
Plastic Limit	16	Classification of Sample
Plasticity Index	15	
Method A		

BROWN SANDY LEAN CLAY



Per: *James E. Lydick*

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on written request.

Lydick Engineers & Surveyors, Inc.

P. O. Box 728
205 E. 2nd Street
Clovis, NM 88101
505-762-3771

Atterberg Report

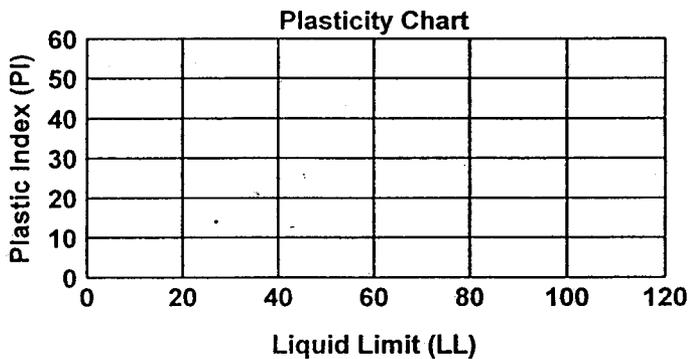
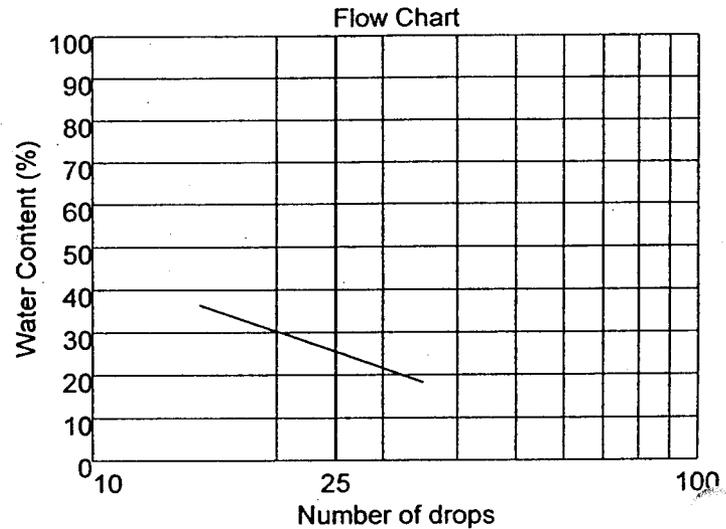
Project Number: DACW45-94-0003
Report Number: 5
Report Date: 8/7/2003
Copies To: AH, FF/TT, COI
Authorized By: CONTRACTOR
Performed By: ROBERT MICK
Bore #: 3
Sample #: 24
Bore Date: 8/5/2003
Sample Depth: IN-PLACE
Preparation (Wet/Dry): WET TO DRY
Page: 1 of 1

To: ARROWHEAD CONST.
1920 METCALF AVE. SUITE150
OVERLAND PARK,KS 66213

Project: LAGOON CLOSURE SWMU 101 WASTE WATER
TREATMENT PLANT C.A.F.B.

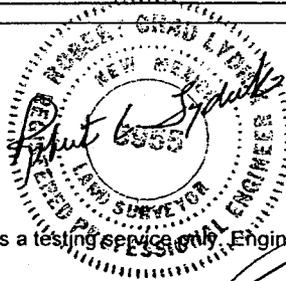
Plastic Limit	Tare #	17	18		
	Tare Weight	22.27	22.29		
	Tare + Wet Soil	32.44	32.45		
	Tare + Dry Soil	31.24	31.35		
	Weight of Water	1.20	1.10		
	Weight of Dry Soil	8.97	9.06		
	Water Content	13.4	12.1		

Liquid Limit	Tare #	21	22	23
	Tare Weight	22.24	22.31	22.33
	Tare + Wet Soil	33.42	34.98	33.76
	Tare + Dry Soil	30.49	32.05	32.06
	Number of Blows	15	24	35
	Weight of Water	2.93	2.93	1.70
	Weight of Dry Soil	8.25	9.74	9.73
Water Content	35.5	30.1	17.5	



Liquid Limit	27	Natural Water Content	
Plastic Limit	13	Classification of Sample	
Plasticity Index	14		
Method A			

BROWN SANDY LEAN CLAY



Per: *Robert Mick*

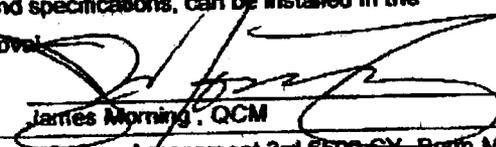
Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on written request.

SUBMITTAL REVIEW VERIFICATION SHEET

Date: Sept 19, 2003

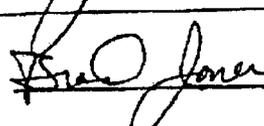
Submittal No.: 02377-23

Foster Wheeler Environmental Corporation Stamp

SWMU 101 Sewage Lagoons Closure, Cannon AFB, NM	
Certified for approval as indicated below:	
<input checked="" type="radio"/> A - <input type="radio"/> B -	Approved as submitted Approved except as noted on the drawings and/or attached sheets.
It is hereby certified that the (equipment) (material) shown and marked in this submittal is that proposed to be incorporated into Contract Number DACW45-94-D-0003, Delivery Order No. 15, Work Authorization Directive 1 is in compliance with the contract drawings and specifications, can be installed in the allocated spaces, and is submitted for Government approval.	
Reviewed/Certified By:	 James Morning, QCM
Description of items reviewed: SD-06 Test Reports-Borrow Source Assessment 3rd 6500-GY-Berm Mat	

U.S. Army Corps of Engineers Stamp

U.S. Army Engineer District, Albuquerque Corps of Engineers	
Certified for approval as indicated below:	
<input type="radio"/> A - <input checked="" type="radio"/> B - <input type="radio"/> C - <input type="radio"/> D - <input type="radio"/> E - <input type="radio"/> F - <input type="radio"/> G -	Approved as submitted. Approved except as noted on the drawings and/or attached sheet(s). Resubmission not required. Approved except as noted on the drawings and/or attached sheet(s). Resubmission required. Will be returned by separate correspondence. Disapproved; see comments on attached sheet. Receipt acknowledged. Other: Specify.
Note: Items approved as to general layout only. Dimensions and quantities checked. Approval does not relieve contractor of responsibilities for errors that may exist, as contractor shall be responsible for dimensions and design of adequate corrections. Details and satisfactory construction of work.	
Signature: 	Date: 9-24-03

Reviewer's Signature: 

Lydick Engineers & Surveyors, Inc.

P. O. Box 728
205 E. 2nd Street
Clovis, NM 88101
505-762-3771

Proctor

Report Date: 13-Sep-03
Project: DACAW45-94-D-0003
Report Number: 10
Sample Type: COMPOSITE
Sampled By: LANCE LANGAN
Source: EXISTING BERMS
Tested By: R. MICK

Report

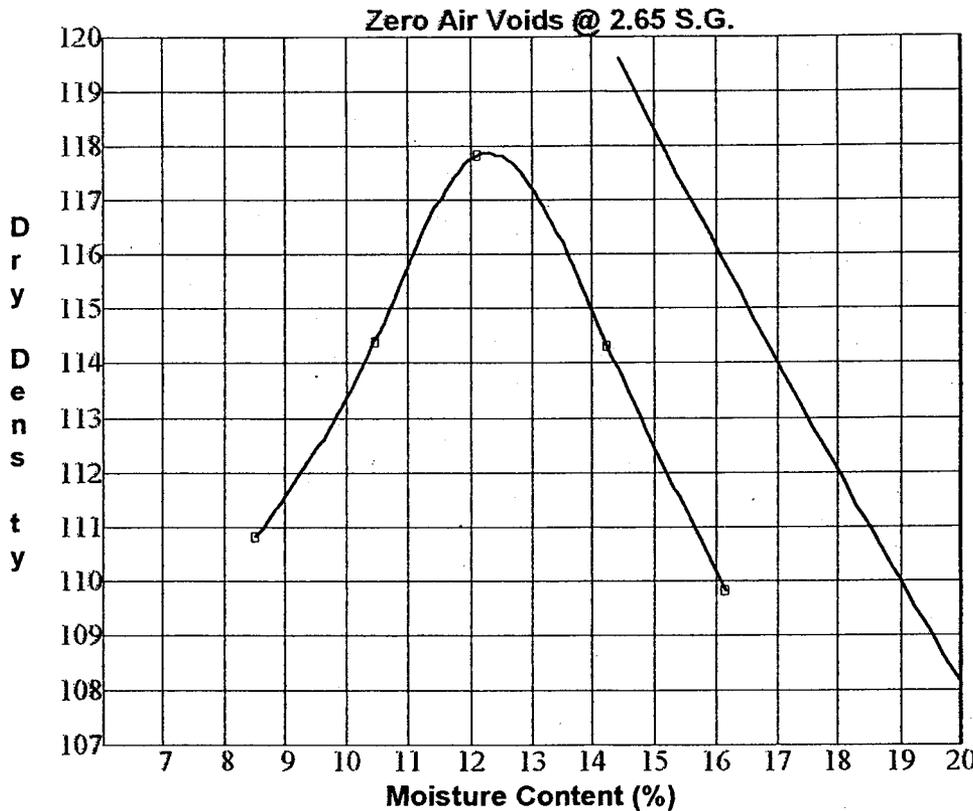
To: ARROWHEAD CONST.
12920 METCALF AVE. SUITE 150
OVERLAND PARK KS 66213

Proj: CLOSURE OF SWMU101 SEWAGE LAGOON @ CANNON AFB

Sample Date: 12-Sep-03

Date Tested: 12-Sep-03

Date Received: 12-Sep-03



Max. Dry Density: 117.9
Optimum Moisture (%): 12.3

Moisture Content	Dry Density	Wet Density
8.5	110.8	120.3
10.5	114.4	126.4
12.1	117.8	132.1
14.2	114.3	130.6
16.2	109.8	127.6

Method: ASTM D-698
Rammer Type: MANUAL
Preparation: DRY TO WET
% Retained 5mm screen: 0.0
% Retained 10mm screen: 0.0
% Retained 20mm screen: 0.0

Sample Description: EXISTING REDDISH SANDY CLAYEY SAND

Comment: CLASSIFIED AS "SM-SC" AS PER USCS



Per: Robert Mick

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on written request.

Lydick Engineers & Surveyors, Inc.

P. O. Box 728
205 E. 2nd Street
Clovis, NM 88101
505-762-3771

Proctor

Report

Report Date: 13-Sep-03
Project: DACAW45-94-D-0003
Report Number: 10
Sample Type: COMPOSITE
Sampled By: LANCE LANGAN
Source: EXISTING BERMS
Tested By: R. MICK

To: ARROWHEAD CONST.
12920 METCALF AVE. SUITE 150
OVERLAND PARK KS 66213

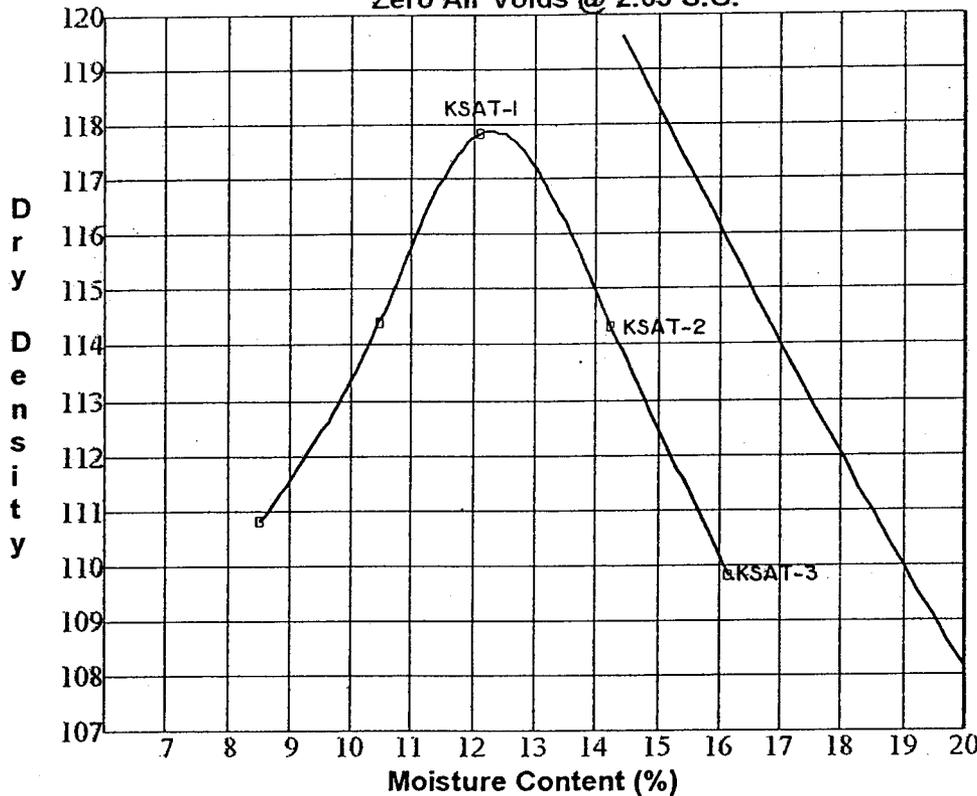
Proj: CLOSURE OF SWMU101 SEWAGE LAGOON @ CANNON AFB

Sample Date: 12-Sep-03

Date Tested: 12-Sep-03

Date Received: 12-Sep-03

Zero Air Voids @ 2.65 S.G.



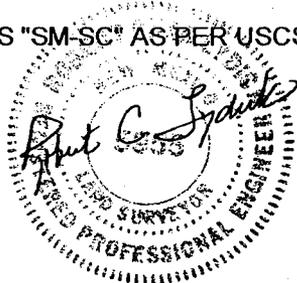
Max. Dry Density: 117.9
Optimum Moisture (%): 12.3

Moisture Content	Dry Density	Wet Density
8.5	110.8	120.3
10.5	114.4	126.4
12.1	117.8	132.1
14.2	114.3	130.6
16.2	109.8	127.6

Method: ASTM D-698
Rammer Type: MANUAL
Preparation: DRY TO WET
% Retained 5mm screen: 0.0
% Retained 10mm screen: 0.0
% Retained 20mm screen: 0.0

Sample Description: EXISTING REDDISH SANDY CLAYEY SAND

Comment: CLASSIFIED AS "SM-SC" AS PER USCS



Per: Robert Mick

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on written request.

Lydick Engineers & Surveyors, Inc.

P. O. Box 728
205 E. 2nd Street
Clovis, NM 88101
505-762-3771

Proctor

Report Date: 13-Sep-03
Project: DACAW45-94-D-0003
Report Number: 9
Sample Type: COMPOSITE
Sampled By: LANCE LANGAN
Source: EXISTING BERMS
Tested By: R.MICK

Report

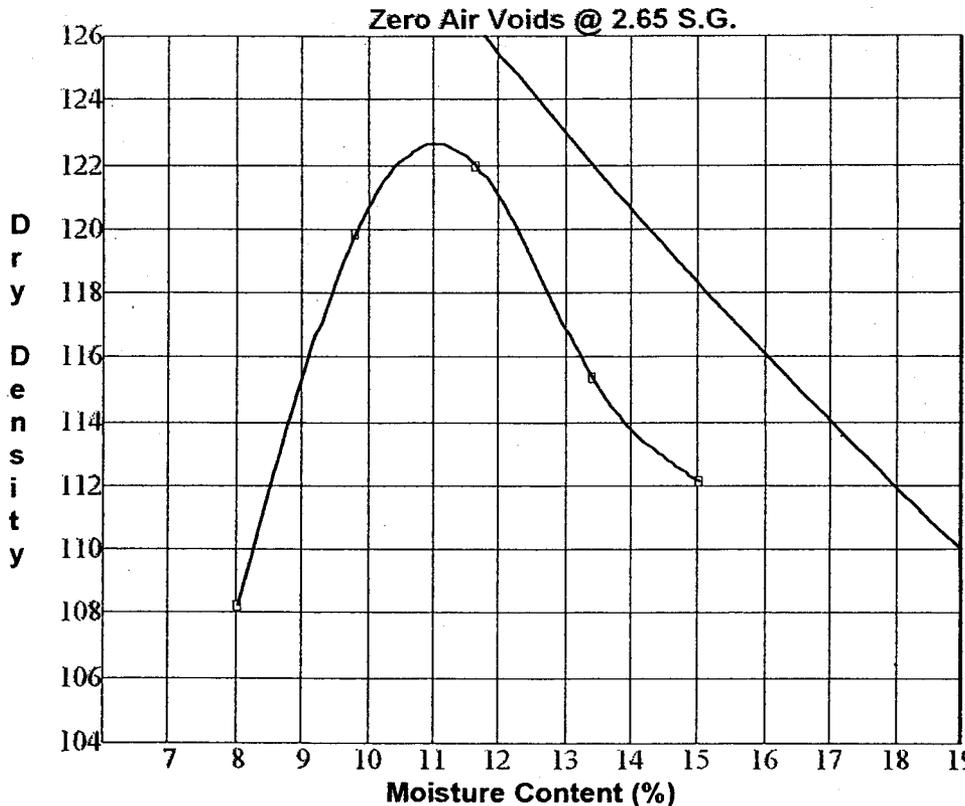
To: ARROWHEAD CONSTRUCTION

Proj: CLOSURE OF SWMU101 SEWAGE LAGOONS

Sample Date: 12-Sep-03

Date Tested: 12-Sep-03

Date Received: 12-Sep-03



Max. Dry Density: 122.6
Optimum Moisture (%): 11.0

Moisture Content	Dry Density	Wet Density
8.0	108.2	116.9
9.8	119.8	131.6
11.6	122.0	136.2
13.4	115.4	130.8
15.0	112.1	129.0

Method: ASTM D-1557-01
Rammer Type: MANUAL
Preparation: DRY TO WET
% Retained 5mm screen: 0.0
% Retained 10mm screen: 0.0
% Retained 20mm screen: 0.0

Sample Description: EXISTING REDDISH SANDY CLAYEY SAND

Comment: CLASSIFIED AS "SM-SC" AS PER USCS



Per: Robert Mick

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on written request.

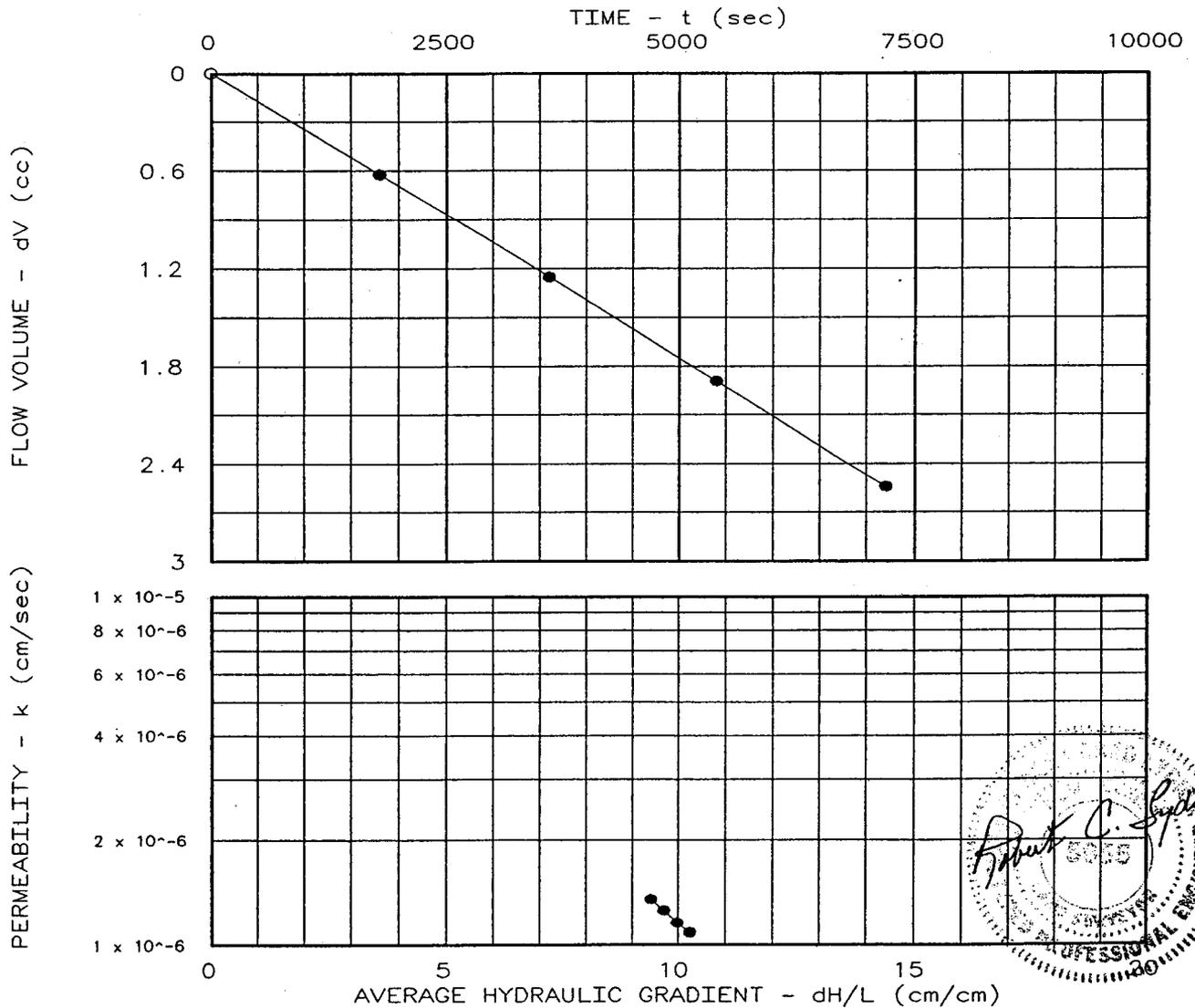
PERMEABILITY TEST REPORT

TEST DATA:

Specimen Height (cm): 11.44
 Specimen Diameter (cm): 6.29
 Dry Unit Weight (pcf): 117.9
 Moisture Before Test (%): 12.3
 Moisture After Test (%): 15.2
 Run Number: 1 ● 2 ▲
 Cell Pressure (psi): 93.5
 Sat. Pressure (psi): 91.0
 Perm. (cm/sec): 1.17×10^{-6}

SAMPLE DATA:

Sample Identification: EXISTING BERM
 MATERIAL "ASSESSMENT"
 Visual Description: REDDISH SANDY CLAYEY
 SAND CLASSIFIED AS "SM-SC" AS PER USCS
 Remarks: ASTM D 5084-01 B=97.5
 5 PSI FOR B Q_{a12} REAGENT
 Maximum Dry Density (pcf): 117.9
 Optimum Moisture Content (%): 12.3
 ASTM(D-698)
 Percent Compaction: 100.0%
 Permeameter type: FLEXWALL
 Sample type: REMOLDED



Project: LAGOON CLOSURE SWMU 101 @ CANNON AFB
 Location: WASTE WATER TREATMENT PLANT CAFB
 Date: 9-13-03

Project No.: DACW-45-03
 File No.: AH-4-03-12
 Lab No.: LE-12 Ksat-1
 Tested by: L.E.L.
 Checked by: R.C.L.
 Test: FH - Falling head C

PERMEABILITY TEST REPORT

LYDICK ENGINEERS & SURVEYORS, INC.

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FALLING HEAD PERMEABILITY TEST RESULTS

PROJECT NAME: LAGOON CLOSURE SWMU 101 @ CANNON AFB FILE NO.: AH-4-03-12
PROJECT LOCATION: WASTE WATER TREATMENT PLANT CAFB PROJECT NO.: DACW-45-03
SAMPLE IDENTIFICATION: EXISTING BERM LAB NO.: LE-12 Ksat-1
MATERIAL "ASSESSMENT"
DESCRIPTION: REDDISH SANDY CLAYEY SAMPLE TYPE: REMOLDED
SAND CLASSIFIED AS "SM-SC" AS PER USCS
MAX. DRY DENS.: 117.9 OPT. WATER CONTENT: 12.3 DATE: 9-13-03

SPECIMEN DATA

INITIAL PARAMETERS:

FINAL PARAMETERS:

HEIGHT: 11.44 cm
DIAMETER: 6.29 cm
WET WEIGHT: 753.2 g
MOISTURE CONTENT: 12.3 %
DRY DENSITY: 117.9 pcf
PERCENT COMPACTION: 100.0

HEIGHT: 11.45 cm
DIAMETER: 6.29 cm
WET WEIGHT: 775.2 g
MOISTURE CONTENT: 15.2 %
DRY DENSITY: 117.9 pcf

TEST PARAMETERS

CELL NO.: 1

PANEL NO.: 1

POSITIONS: 1

CELL PRESSURE:

RUN NO. 1

RUN NO. 2

93.5 psi

SATURATION PRESSURE:

91.0 psi

PERMEABILITY DATA

TOTAL FLOW VOLUME:

RUN NO. 1

RUN NO. 2

2.54E 00 cc

LENGTH OF TEST:

7,200 sec

AVERAGE GRADIENT:

9.4

TEMPERATURE:

21.4 deg C

PERMEABILITY, K, at 20 deg C: 1.17E-06 cm/sec

=====

PERMEABILITY TEST DATA

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PROJECT DATA

Project Name: LAGOON CLOSURE SWMU 101 @ CANNON AFB
 File No.: AH-4-03-12
 Project Location: WASTE WATER TREATMENT PLANT CAFB
 Project No.: DACW-45-03
 Sample Identification: EXISTING BERM
 MATERIAL "ASSESSMENT"
 Lab No.: LE-12 Ksat-1
 Description: REDDISH SANDY CLAYEY
 SAND CLASSIFIED AS "SM-SC" AS PER USCS
 Sample Type: REMOLDED
 Max. Dry Dens.: 117.9
 Method (D1557/D698): D-698
 Opt. Water Content: 12.3
 Date: 9-13-03
 Remarks: ASTM D 5084-01 B=97.5
 5 PSI FOR B Cal₂ REAGENT
 Permeameter Type: FLEXWALL
 Tested by: L.E.L.
 Checked by: R.C.L.
 Test type: FH - Falling head C

PERMEABILITY TEST SPECIMEN DATA

	Before test:			After test:		
Diameter:	1	2		1	2	
Top:	2.477 in	in		2.478 in	in	
Middle:	2.476 in	in		2.478 in	in	
Bottom:	2.475 in	in		2.478 in	in	
Average:	2.48 in	6.29 cm		2.48 in	6.29 cm	
Length:	1	2	3	1	2	3
Average:	4.502 in	in	in	4.507 in	in	in
Average:	4.50 in	11.44 cm		4.51 in	11.45 cm	
 Moisture, Density and Sample Parameters:						
Specific Gravity:	2.65					
Wet Wt. & Tare:	878.59			900.51		
Dry Wt. & Tare:	796.31			798.30		
Tare Wt.:	125.36			125.36		
Moisture Content:	12.3 %			15.2 %		
Dry Unit Weight:	117.9 pcf	100.0 % of max		117.9 pcf		
Porosity:	0.2872			0.2871		
Saturation:	80.6 %			100.0 %		

FALLING HEAD PERMEABILITY TEST CONDITIONS DATA

Cell No.: 1	Panel No.: 1	Positions: 1
Run Number:	1	2
Cell Pressure:	93.5 psi	0.0 psi
Inflow Saturation Pressure:	91.0 psi	0.0 psi
Inflow Buret Area:	0.2000 cm ²	0.2000 cm ²
Outflow Buret Area:	0.2000 cm ²	0.2000 cm ²
Test Temperature:	21.4 °C	0.0 °C
Outflow Saturation Pressure:	90.0 psi	0.0 psi

PERMEABILITY TEST READINGS DATA

CASE D X S	DATE	TIME (24 hr)	ELAPSED TIME sec	INFLOW LEVEL cm	OUTFLOW LEVEL cm	OUTFLOW/ INFLOW RATIO	PERM. K cm/sec
S X	9/13/ 3	9:00:00	0	50.00	0.0	0.00	0.00E 00
	9/13/ 3	9:30:00	1,800	46.89	3.1	1.00	1.09E-06
	9/13/ 3	10:00:00	1,800	43.74	6.2	0.99	1.16E-06
	9/13/ 3	10:30:00	1,800	40.54	9.5	1.01	1.26E-06
	9/13/ 3	11:00:00	1,800	37.29	12.7	1.00	1.36E-06

Gradient = 9.409E 00 Total vol = 2.54E 00 cc Test duration = 7,200 sec
 Permeability, K_{21.4°} = 1.214E-06 cm/sec, K_{20°} = 1.173E-06 cm/sec
 Permeability values are incremental

Lydick Laboratories
 205 E. Second Street
 Clovis, NM 88101
 505-762-3771

ASTM D 5084-01

Contractor: ARROWHEAD
 Project: SWMU 101
 Location: WASTE WATER
 Date: 9/13/2003

Sample ID: Ksat-1

a = burette area (cm²)
 t = time interval (s)
 T = temperature (deg C)
 L = sample length (cm)
 d = sample diameter (cm)

a	t	T	L	d
0.2	1.800	21.4	11.44	6.29

$$A = (\pi/4) \cdot (d)^2$$

31.07357148

P_{in} = inflow pressure
 P_{out} = outflow pressure
 cmW = conversion factor from psi to cm of water

cmW
 0.0142091301798

P _{in} (psi)	P _{out} (psi)
9.1	9.0

P _{in} (cm)	P _{out} (cm)
6.40E+03	6.33E+03

	h _{in} Values	h _{out} Values
h ₀	50	0
h ₁	46.89	3.41
h ₂	43.74	6.24
h ₃	40.54	9.46
h ₄	37.29	12.71

$$H = P_{in} + (h_{in} - h_{out}) - P_{out}$$

H ₀	120.3772847 cmW
H ₁	114.1572847 cmW
H ₂	107.8772847 cmW
H ₃	101.4572847 cmW
H ₄	94.9572847 cmW

$$\text{gradient} = H/L$$

G ₀	10.52249
G ₁	9.978784
G ₂	9.429833
G ₃	8.868644
G ₄	8.300462

$$\text{gradient}_{avg} = (G_0 + G_4)/2$$

gradient_{avg} = 9.411475935

Headloss across sample should not drop to less than 75% of initial

$$\text{min}h = 0.75(h_0)$$

minh = 90.2830 cmW

$$c = (a \cdot L) / (2 + A + t)$$

2.04533E-05

$K_{sat1} = c \cdot \ln[(H_0/H_1)]$	1.08512E-06
$K_{sat2} = c \cdot \ln[(H_1/H_2)]$	1.1573E-06
$K_{sat3} = c \cdot \ln[(H_2/H_3)]$	1.25494E-06
$K_{sat4} = c \cdot \ln[(H_3/H_4)]$	1.35422E-06

$$K_{mean} = (K_{sat1} + K_{sat2} + K_{sat3} + K_{sat4}) / 4$$

$$K_{mean} = 1.2129E-06$$

Percent Deviation - less than 25% deviation from mean value

$$K_1 = |(K_{sat1} - K_{mean}) / K_{sat1}|$$

$$K_1 = 11.775\%$$

$$K_2 = |(K_{sat2} - K_{mean}) / K_{sat2}|$$

$$K_2 = 4.804\%$$

$$K_3 = |(K_{sat3} - K_{mean}) / K_{sat3}|$$

$$K_3 = 3.350\%$$

$$K_4 = |(K_{sat4} - K_{mean}) / K_{sat4}|$$

$$K_4 = 10.436\%$$

Temperature Correction

$$K_{20} = [(2.2902 - 0.9842T) / T^{0.1702}] \cdot K_{mean}$$

$$K_{20} = 1.17286E-06$$

Ratio of Inflow/Outflow Rates - Should be between 0.75 and 1.25

$$rate_0 = [(h_{in0} - h_{in1}) \cdot (a/t)] / [(h_{out1} - h_{out0}) \cdot (a/t)]$$

$$rate_0 = 1.000$$

$$rate_1 = [(h_{in1} - h_{in2}) \cdot (a/t)] / [(h_{out2} - h_{out1}) \cdot (a/t)]$$

$$rate_1 = 1.006$$

$$rate_2 = [(h_{in2} - h_{in3}) \cdot (a/t)] / [(h_{out3} - h_{out2}) \cdot (a/t)]$$

$$rate_2 = 0.994$$

$$rate_3 = [(h_{in3} - h_{in4}) \cdot (a/t)] / [(h_{out4} - h_{out3}) \cdot (a/t)]$$

$$rate_3 = 1.000$$



TESTED BY:

James Gray

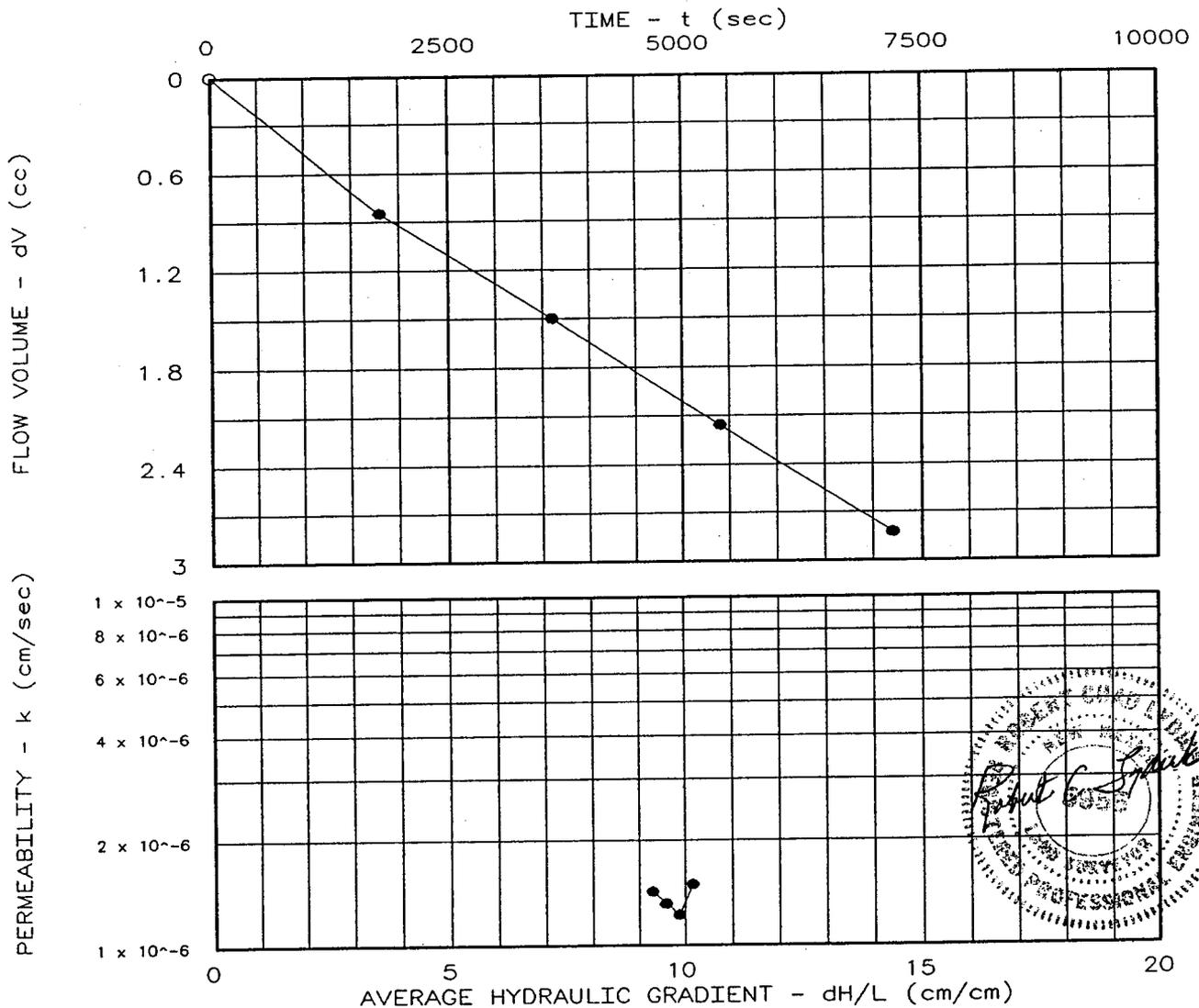
PERMEABILITY TEST REPORT

TEST DATA:

Specimen Height (cm): 11.43
 Specimen Diameter (cm): 6.28
 Dry Unit Weight (pcf): 114.3
 Moisture Before Test (%): 14.2
 Moisture After Test (%): 16.9
 Run Number: 1 ● 2 ▲
 Cell Pressure (psi): 95.5
 Sat. Pressure (psi): 93.0
 Perm. (cm/sec): 1.32×10^{-6}

SAMPLE DATA:

Sample Identification: EXISTING BERM
 MATERIAL " ASSESSMENT"
 Visual Description: REDDISH SAND CLAYEY
 SAND CLASSIFIED AS "SM-SC" AS PER USCS
 Remarks: ASTM D 5084-01 B=98.7
 5 PSI FOR B Cal₂ REAGENT
 Maximum Dry Density (pcf): 117.9
 Optimum Moisture Content (%): 12.3
 ASTM(D-698)
 Percent Compaction: 97.0%
 Permeameter type: FLEXWALL
 Sample type: REMOLDED



Project: LAGOON CLOSURE SWMU 101 @ CANNON AFB
 Location: WASTE WATER TREATMENT PLANT CAFB
 Date: 9-13-03

Project No.: DACW-45-03
 File No.: AH-4-03-13
 Lab No.: LE-13 Ksat-2
 Tested by: L.E.L.
 Checked by: R.C.L.
 Test: FH - Falling head C

PERMEABILITY TEST REPORT
LYDICK ENGINEERS & SURVEYORS, INC.

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FALLING HEAD PERMEABILITY TEST RESULTS

PROJECT NAME: LAGOON CLOSURE SWMU 101 @ CANNON AFB FILE NO.: AH-4-03-13
PROJECT LOCATION: WASTE WATER TREATMENT PLANT CAFB PROJECT NO.: DACW-45-03
SAMPLE IDENTIFICATION: EXISTING BERM LAB NO.: LE-13 Ksat-2
MATERIAL " ASSESSMENT"
DESCRIPTION: REDDISH SAND CLAYEY SAMPLE TYPE: REMOLDED
SAND CLASSIFIED AS "SM-SC" AS PER USCS
MAX. DRY DENS.: 117.9 OPT. WATER CONTENT: 12.3 DATE: 9-13-03

SPECIMEN DATA

INITIAL PARAMETERS:	FINAL PARAMETERS:
HEIGHT: 11.43 cm	HEIGHT: 11.44 cm
DIAMETER: 6.28 cm	DIAMETER: 6.29 cm
WET WEIGHT: 741.4 g	WET WEIGHT: 759.8 g
MOISTURE CONTENT: 14.2 %	MOISTURE CONTENT: 16.9 %
DRY DENSITY: 114.3 pcf	DRY DENSITY: 114.4 pcf
PERCENT COMPACTION: 97.0	

TEST PARAMETERS

CELL NO.: 2	PANEL NO.: 2	POSITIONS: 2
	RUN NO. 1	RUN NO. 2
CELL PRESSURE:	95.5 psi	
SATURATION PRESSURE:	93.0 psi	

PERMEABILITY DATA

	RUN NO. 1	RUN NO. 2
TOTAL FLOW VOLUME:	2.82E 00 cc	
LENGTH OF TEST:	7,200 sec	
AVERAGE GRADIENT:	9.3	
TEMPERATURE:	21.4 deg C	
PERMEABILITY, K, at 20 deg C:	1.32E-06 cm/sec	

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PERMEABILITY TEST DATA

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PROJECT DATA

Project Name: LAGOON CLOSURE SWMU 101 @ CANNON AFB
 File No.: AH-4-03-13
 Project Location: WASTE WATER TREATMENT PLANT CAFB
 Project No.: DACW-45-03
 Sample Identification: EXISTING BERM
 MATERIAL " ASSESSMENT"
 Lab No.: LE-13 Ksat-2
 Description: REDDISH SAND CLAYEY
 SAND CLASSIFIED AS "SM-SC" AS PER USCS
 Sample Type: REMOLDED
 Max. Dry Dens.: 117.9
 Method (D1557/D698): D-698
 Opt. Water Content: 12.3
 Date: 9-13-03
 Remarks: ASTM D 5084-01 B=98.7
 5 PSI FOR B Cal₂ REAGENT
 Permeameter Type: FLEXWALL
 Tested by: L.E.L.
 Checked by: R.C.L.
 Test type: FH - Falling head C

PERMEABILITY TEST SPECIMEN DATA

	Before test:			After test:		
Diameter:	1	2		1	2	
Top:	2.473 in	in		2.475 in	in	
Middle:	2.474 in	in		2.474 in	in	
Bottom:	2.474 in	in		2.475 in	in	
Average:	2.47 in	6.28 cm		2.47 in	6.29 cm	
Length:	1	2	3	1	2	3
Average:	4.500 in	in	in	4.503 in	in	in
Average:	4.50 in	11.43 cm		4.50 in	11.44 cm	

Moisture, Density and Sample Parameters:

Specific Gravity:	2.65	
Wet Wt. & Tare:	867.72	886.14
Dry Wt. & Tare:	775.45	776.52
Tare Wt.:	126.32	126.32
Moisture Content:	14.2 %	16.9 %
Dry Unit Weight:	114.3 pcf	97.0 % of max
Porosity:	0.3088	0.3086
Saturation:	84.3 %	100.1 %

FALLING HEAD PERMEABILITY TEST CONDITIONS DATA

Cell No.: 2	Panel No.: 2	Positions: 2
Run Number:	1	2
Cell Pressure:	95.5 psi	0.0 psi
Inflow Saturation Pressure:	93.0 psi	0.0 psi
Inflow Buret Area:	0.2000 cm ²	0.2000 cm ²
Outflow Buret Area:	0.2000 cm ²	1.7100 cm ²
Test Temperature:	21.4 °C	0.0 °C
Outflow Saturation Pressure:	92.0 psi	0.0 psi

PERMEABILITY TEST READINGS DATA

CASE D X S	DATE	TIME (24 hr)	ELAPSED TIME sec	INFLOW LEVEL cm	OUTFLOW LEVEL cm	OUTFLOW/ INFLOW RATIO	PERM. K cm/sec
S X	9/13/ 3	13:00:00	0	50.00	0.0	0.00	0.00E 00
	9/13/ 3	13:30:00	1,800	45.76	4.2	1.00	1.50E-06
	9/13/ 3	14:00:00	1,800	42.51	7.5	1.00	1.23E-06
	9/13/ 3	14:30:00	1,800	39.22	10.8	1.00	1.32E-06
	9/13/ 3	15:00:00	1,800	35.89	14.1	1.00	1.43E-06

Gradient = 9.291E 00 Total vol = 2.82E 00 cc Test duration = 7,200 sec
 Permeability, K_{21.4°} = 1.369E-06 cm/sec, K_{20°} = 1.323E-06 cm/sec
 Permeability values are incremental

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 205 E. Second Street
 Clovis, NM 88101
 505-762-3771

ASTM D 5084-01

Contractor: ARROWHEAD
 Project: SWMU 101
 Location: WASTE WATER
 Date: 9/13/2003

Sample ID: Ksat-2

a = burette area (cm²)
 t = time interval (s)
 T = temperature (deg C)
 L = sample length (cm)
 d = sample diameter (cm)

a	t	T	L	d
0.2	800	21.4	11.43	6.28

$$A = (\pi/4) \cdot (d)^2$$

30.97484693

P_{in} = inflow pressure
 P_{out} = outflow pressure
 cmW = conversion factor from psi to cm of water

cmW
 0.0142091301798

P _{in} (psi)	P _{out} (psi)
93	92

P _{in} (cm)	P _{out} (cm)
6.55E+03	6.47E+03

	h _{in} Values	h _{out} Values
h ₀	50	0
h ₁	45.76	4.24
h ₂	42.51	7.49
h ₃	39.22	10.78
h ₄	35.89	14.11

$$H = P_{in} + (h_{in} - h_{out}) - P_{out}$$

H ₀	120.3772847 cmW
H ₁	111.8972847 cmW
H ₂	105.3972847 cmW
H ₃	98.8172847 cmW
H ₄	92.1572847 cmW

$$\text{gradient} = H/L$$

G ₀	10.5317
G ₁	9.789789
G ₂	9.22111
G ₃	8.645432
G ₄	8.062755

$$\text{gradient}_{avg} = (G_0 + G_4)/2$$

gradient_{avg} = 9.297225258

Headloss across sample should not drop to less than 75% of initial

$$\text{min}h = 0.75(h_0)$$

minh = 90.2830 cmW

$$c = (a \cdot L) / (2 + A + t)$$

2.05005E-05

$K_{sat1} = c \cdot \ln[(H_0/H_1)]$	1.49755E-06
$K_{sat2} = c \cdot \ln[(H_1/H_2)]$	1.22684E-06
$K_{sat3} = c \cdot \ln[(H_2/H_3)]$	1.32155E-06
$K_{sat4} = c \cdot \ln[(H_3/H_4)]$	1.43044E-06

$$K_{mean} = (K_{sat1} + K_{sat2} + K_{sat3} + K_{sat4}) / 4$$

$$K_{mean} = 1.3691E-06$$

Percent Deviation - less than 25% deviation from mean value

$$K_1 = |(K_{sat1} - K_{mean}) / K_{sat1}|$$

$$K_1 = 8.578\%$$

$$K_2 = |(K_{sat2} - K_{mean}) / K_{sat2}|$$

$$K_2 = 11.595\%$$

$$K_3 = |(K_{sat3} - K_{mean}) / K_{sat3}|$$

$$K_3 = 3.598\%$$

$$K_4 = |(K_{sat4} - K_{mean}) / K_{sat4}|$$

$$K_4 = 4.288\%$$

Temperature Correction

$$K_{20} = [(2.2902 - 0.9842T) / T^{0.1702}] \cdot K_{mean}$$

$$K_{20} = 1.3239E-06$$

Ratio of Inflow/Outflow Rates - Should be between 0.75 and 1.25

$$rate_0 = [(h_{in0} - h_{in1}) \cdot (a/t)] / [(h_{out1} - h_{out0}) \cdot (a/t)]$$

$$rate_0 = 1.000$$

$$rate_1 = [(h_{in1} - h_{in2}) \cdot (a/t)] / [(h_{out2} - h_{out1}) \cdot (a/t)]$$

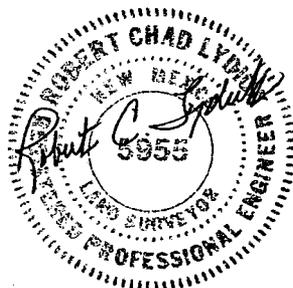
$$rate_1 = 1.000$$

$$rate_2 = [(h_{in2} - h_{in3}) \cdot (a/t)] / [(h_{out3} - h_{out2}) \cdot (a/t)]$$

$$rate_2 = 1.000$$

$$rate_3 = [(h_{in3} - h_{in4}) \cdot (a/t)] / [(h_{out4} - h_{out3}) \cdot (a/t)]$$

$$rate_3 = 1.000$$



TESTED BY

A handwritten signature in black ink, appearing to read "Lance J. [unclear]".

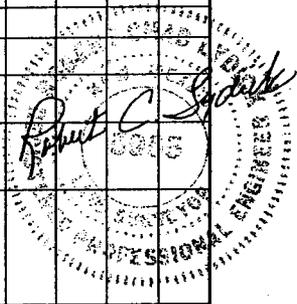
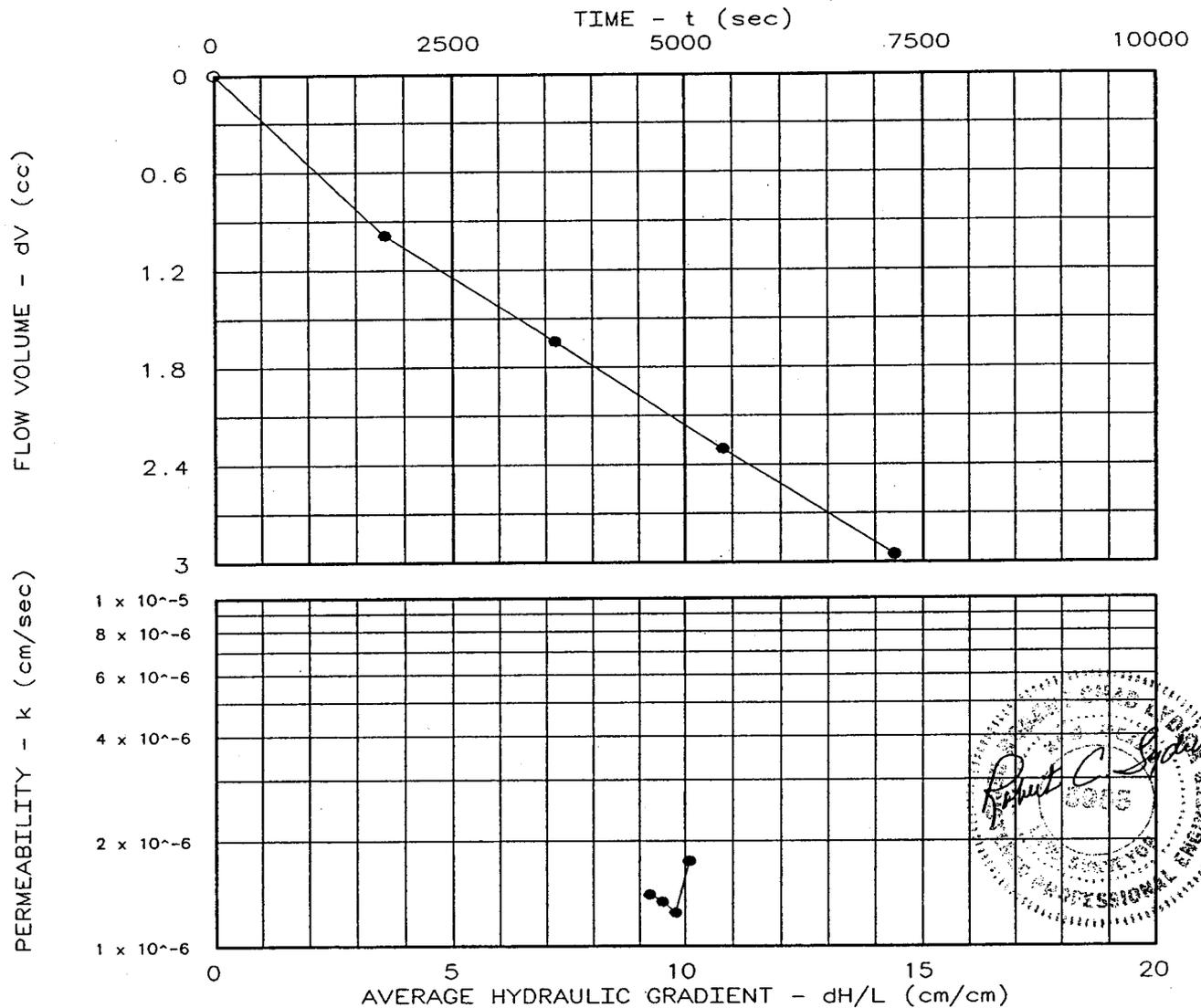
PERMEABILITY TEST REPORT

TEST DATA:

Specimen Height (cm): 11.44
 Specimen Diameter (cm): 6.29
 Dry Unit Weight (pcf): 109.8
 Moisture Before Test (%): 16.2
 Moisture After Test (%): 19.1
 Run Number: 1 ● 2 ▲
 Cell Pressure (psi): 97.5
 Sat. Pressure (psi): 95.0
 Perm. (cm/sec): 1.39×10^{-6}

SAMPLE DATA:

Sample Identification: EXISTING BERM
 MATERIAL "ASSESSMENT"
 Visual Description: REDDISH SANDY CLAYEY SAND CLASSIFIED AS "SM-SC" AS PER USCS
 Remarks: ASTM D 5084-01 B=98.1
 5 PSI FOR B CaI₂ REAGENT
 Maximum Dry Density (pcf): 117.9
 Optimum Moisture Content (%): 12.3
 ASTM(D-698)
 Percent Compaction: 93.1%
 Permeameter type: FLEXWALL
 Sample type: REMOLDED



Project: LAGOON CLOSURE SWMU 101 @ CANNON AFB
 Location: WASTE WATER TREATMENT PLANT CAFB
 Date: 9-13-03

Project No.: DACW-45-03
 File No.: AH-4-03-14
 Lab No.: LE-14 Ksat-3
 Tested by: L.E.L.
 Checked by: R.C.L.
 Test: FH - Falling head C

PERMEABILITY TEST REPORT

LYDICK ENGINEERS & SURVEYORS, INC.

=====

FALLING HEAD PERMEABILITY TEST RESULTS

PROJECT NAME: LAGOON CLOSURE SWMU 101 @ CANNON AFB FILE NO.: AH-4-03-14
PROJECT LOCATION: WASTE WATER TREATMENT PLANT CAFB PROJECT NO.: DACW-45-03
SAMPLE IDENTIFICATION: EXISTING BERM LAB NO.: LE-14 Ksat-3
MATERIAL "ASSESSMENT"
DESCRIPTION: REDDISH SANDY CLAYEY SAMPLE TYPE: REMOLDED
SAND CLASSIFIED AS "SM-SC" AS PER USCS
MAX. DRY DENS.: 117.9 OPT. WATER CONTENT: 12.3 DATE: 9-13-03

SPECIMEN DATA

INITIAL PARAMETERS:

HEIGHT: 11.44 cm
DIAMETER: 6.29 cm
WET WEIGHT: 726.8 g
MOISTURE CONTENT: 16.2 %
DRY DENSITY: 109.8 pcf
PERCENT COMPACTION: 93.1

FINAL PARAMETERS:

HEIGHT: 11.45 cm
DIAMETER: 6.29 cm
WET WEIGHT: 747.1 g
MOISTURE CONTENT: 19.1 %
DRY DENSITY: 109.9 pcf

TEST PARAMETERS

CELL NO.: 1

PANEL NO.: 1

POSITIONS: 1

RUN NO. 1

RUN NO. 2

CELL PRESSURE:

97.5 psi

SATURATION PRESSURE:

95.0 psi

PERMEABILITY DATA

RUN NO. 1

RUN NO. 2

TOTAL FLOW VOLUME:

2.95E 00 cc

LENGTH OF TEST:

7,200 sec

AVERAGE GRADIENT:

9.2

TEMPERATURE:

21.4 deg C

PERMEABILITY, K, at 20 deg C: 1.39E-06 cm/sec

=====

=====

PERMEABILITY TEST DATA

=====

PROJECT DATA

Project Name: LAGOON CLOSURE SWMU 101 @ CANNON AFB
 File No.: AH-4-03-14
 Project Location: WASTE WATER TREATMENT PLANT CAFB
 Project No.: DACW-45-03
 Sample Identification: EXISTING BERM
 MATERIAL "ASSESSMENT"
 Lab No.: LE-14 Ksat-3
 Description: REDDISH SANDY CLAYEY
 SAND CLASSIFIED AS "SM-SC" AS PER USCS
 Sample Type: REMOLDED
 Max. Dry Dens.: 117.9
 Method (D1557/D698): D-698
 Opt. Water Content: 12.3
 Date: 9-13-03
 Remarks: ASTM D 5084-01 B=98.1
 5 PSI FOR B Cal₂ REAGENT
 Permeameter Type: FLEXWALL
 Tested by: L.E.L.
 Checked by: R.C.L.
 Test type: FH - Falling head C

PERMEABILITY TEST SPECIMEN DATA

	Before test:			After test:		
Diameter:	1	2		1	2	
Top:	2.477 in	in		2.478 in	in	
Middle:	2.476 in	in		2.478 in	in	
Bottom:	2.477 in	in		2.478 in	in	
Average:	2.48 in	6.29 cm		2.48 in	6.29 cm	
Length:	1	2	3	1	2	3
Average:	4.505 in	in	in	4.508 in	in	in
Average:	4.51 in	11.44 cm		4.51 in	11.45 cm	

Moisture, Density and Sample Parameters:

Specific Gravity:	2.65		
Wet Wt. & Tare:	852.65	872.96	
Dry Wt. & Tare:	751.18	753.33	
Tare Wt.:	125.88	125.88	
Moisture Content:	16.2 %	19.1 %	
Dry Unit Weight:	109.8 pcf	93.1 % of max	109.9 pcf
Porosity:	0.3364		0.3354
Saturation:	84.8 %		100.1 %

FALLING HEAD PERMEABILITY TEST CONDITIONS DATA

Cell No.: 1	Panel No.: 1	Positions: 1
Run Number:	1	2
Cell Pressure:	97.5 psi	0.0 psi
Inflow Saturation Pressure:	95.0 psi	0.0 psi
Inflow Buret Area:	0.2000 cm ²	0.2000 cm ²
Outflow Buret Area:	0.2000 cm ²	0.2000 cm ²
Test Temperature:	21.4 °C	0.0 °C
Outflow Saturation Pressure:	94.0 psi	0.0 psi

PERMEABILITY TEST READINGS DATA

CASE	DATE	TIME	ELAPSED	INFLOW	OUTFLOW	OUTFLOW/	PERM.
D X		(24 hr)	TIME	LEVEL	LEVEL	INFLOW	K
S			sec	cm	cm	RATIO	cm/sec
S X	9/13/ 3	16:30:00	0	50.00	0.0	0.00	0.00E 00
	9/13/ 3	17:00:00	1,800	45.06	4.9	1.00	1.75E-06
	9/13/ 3	17:30:00	1,800	41.79	8.2	1.00	1.25E-06
	9/13/ 3	18:00:00	1,800	38.49	11.5	1.00	1.34E-06
	9/13/ 3	18:30:00	1,800	35.25	14.8	1.00	1.41E-06

Gradient = 9.225E 00 Total vol = 2.95E 00 cc Test duration = 7,200 sec
 Permeability, K_{21.4°} = 1.439E-06 cm/sec, K_{20°} = 1.391E-06 cm/sec
 Permeability values are incremental

Lydick Laboratories
 205 E. Second Street
 Clovis, NM 88101
 505-762-3771

ASTM D 5084-01

Contractor: ARROWHEAD
 Project: SWMU 101
 Location: WASTE WATER
 Date: 9/13/2003

Sample ID: Ksat-3

a = burette area (cm²)
 t = time interval (s)
 T = temperature (deg C)
 L = sample length (cm)
 d = sample diameter (cm)

a	t	T	L	d
0.2	1.800	21.4	11.42	6.29

$$A = (\pi/4) \cdot (d)^2$$

31.07357148

P_{in} = inflow pressure
 P_{out} = outflow pressure
 cmW = conversion factor from psi to cm of water

cmW
 0.0142091301798

P _{in} (psi)	P _{out} (psi)
95	94

P _{in} (cm)	P _{out} (cm)
6.69E+03	6.62E+03

	h _{in} Values	h _{out} Values
h ₀	50	0
h ₁	45.06	4.94
h ₂	41.79	8.21
h ₃	38.49	11.51
h ₄	35.25	14.75

$$H = P_{in} + (h_{in} - h_{out}) - P_{out}$$

H ₀	120.3772847 cmW
H ₁	110.4972847 cmW
H ₂	103.9572847 cmW
H ₃	97.3572847 cmW
H ₄	90.8772847 cmW

$$\text{gradient} = H/L$$

G ₀	10.52249
G ₁	9.658854
G ₂	9.087175
G ₃	8.510252
G ₄	7.943819

$$\text{gradient}_{avg} = (G_0 + G_4)/2$$

gradient_{avg} = 9.233154257

Headloss across sample should not drop to less than 75% of initial

$$\text{minh} = 0.75(h_0)$$

minh = 90.2830 cmW

$$c = (a \cdot L) / (2 + A + t)$$

2.04533E-05

$K_{sat1} = c \cdot \ln[(H_0/H_1)]$	1.75161E-06
$K_{sat2} = c \cdot \ln[(H_1/H_2)]$	1.24787E-06
$K_{sat3} = c \cdot \ln[(H_2/H_3)]$	1.34158E-06
$K_{sat4} = c \cdot \ln[(H_3/H_4)]$	1.40877E-06

$$K_{mean} = (K_{sat1} + K_{sat2} + K_{sat3} + K_{sat4}) / 4$$

$$K_{mean} = 1.43746E-06$$

Percent Deviation - less than 25% deviation from mean value

$$K_1 = |(K_{sat1} - K_{mean}) / K_{sat1}|$$

$$K_2 = |(K_{sat2} - K_{mean}) / K_{sat2}|$$

$$K_3 = |(K_{sat3} - K_{mean}) / K_{sat3}|$$

$$K_4 = |(K_{sat4} - K_{mean}) / K_{sat4}|$$

$K_1 =$	17.935%
$K_2 =$	15.193%
$K_3 =$	7.147%
$K_4 =$	2.037%

Temperature Correction

$$K_{20} = [(2.2902 \cdot 0.9842T) / T_0.1702] \cdot K_{mean}$$

$$K_{20} = 1.39E-06$$

Ratio of Inflow/Outflow Rates - Should be between 0.75 and 1.25

$$rate_0 = [(h_{in0} - h_{in1}) \cdot (a/t)] / [(h_{out1} - h_{out0}) \cdot (a/t)]$$

$$rate_1 = [(h_{in1} - h_{in2}) \cdot (a/t)] / [(h_{out2} - h_{out1}) \cdot (a/t)]$$

$$rate_2 = [(h_{in2} - h_{in3}) \cdot (a/t)] / [(h_{out3} - h_{out2}) \cdot (a/t)]$$

$$rate_3 = [(h_{in3} - h_{in4}) \cdot (a/t)] / [(h_{out4} - h_{out3}) \cdot (a/t)]$$

rate ₀ =	1.000
rate ₁ =	1.000
rate ₂ =	1.000
rate ₃ =	1.000



TESTED BY: *Lance E. [Signature]*

Lydick Engineers & Surveyors, Inc.

P.O. Box 728
205 E. 2nd Street
Clovis, NM 88101
505-762-3771

Atterberg Report

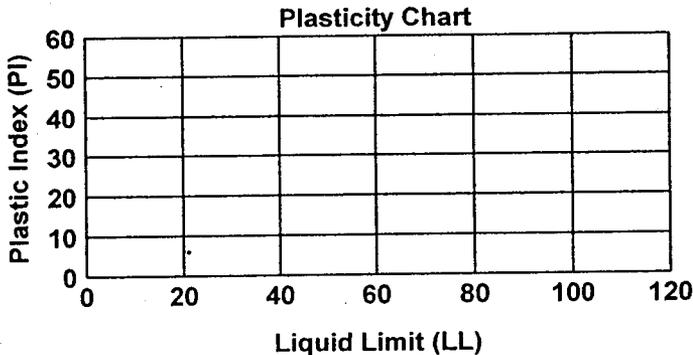
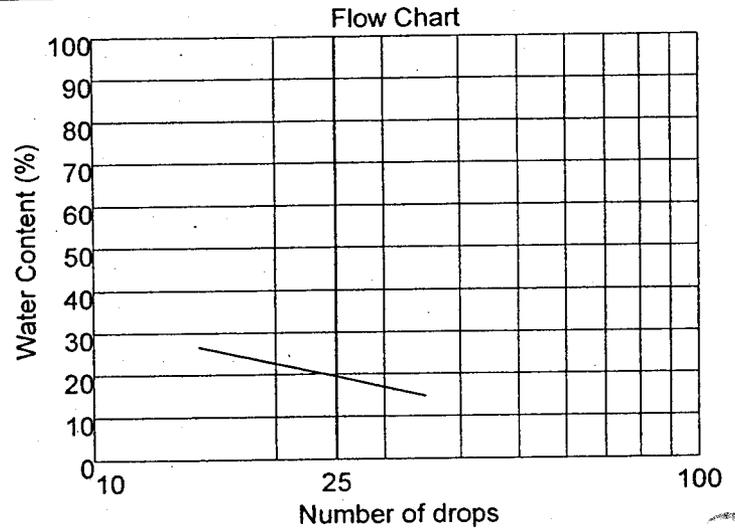
Project Number: DACW45-94-D-0003
Report Number: 7
Report Date: 9/18/2003
Authorized By: CONTRACTOR
Performed By: LANCE E. LANGAN
Bore #: 4
Sample #: 4
Bore Date: 9/12/2003
Sample Depth: EXISTING BERM
Preparation (Wet/Dry): WET TO DRY
Page: 1 of 1

To: ARROWHEAD CONST.
12920 METCALF AVE. SUITE 150
OVERLAND PARK, KS. 66213

Project: CLOSURE OF SWMU101 SEWAGE LAGOON @
CANNON A.F.B.

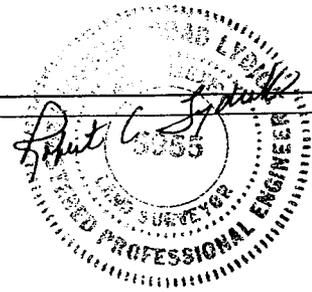
Plastic Limit	Tare #	7	8		
	Tare Weight	22.28	22.29		
	Tare + Wet Soil	30.25	29.65		
	Tare + Dry Soil	29.20	28.66		
	Weight of Water	1.05	0.99		
	Weight of Dry Soil	6.92	6.37		
	Water Content	15.2	15.5		

Liquid Limit	Tare #	9	10	11	
	Tare Weight	22.30	22.32	22.30	
	Tare + Wet Soil	36.99	36.15	34.51	
	Tare + Dry Soil	33.86	33.82	32.84	
	Number of Blows	14	26	33	
	Weight of Water	3.13	2.33	1.67	
	Weight of Dry Soil	11.56	11.50	10.54	
Water Content	27.1	20.3	15.8		



Liquid Limit	21	Natural Water Content
Plastic Limit	15	Classification of Sample
Plasticity Index	6	
Method A		

BORROW PIT ASSESSMENT
ASTM D 4318-01
REDDISH SANDYCLAYEY
SAND CLASSIFIED AS "SM-SC"
AS PER USCS



Per: *Lance E. Langan*

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on written request.

ROBERT L. LYDICK
PROFESSIONAL ENGINEER AND
LAND SURVEYOR



ROBERT CHAD LYDICK
PROFESSIONAL ENGINEER AND
LAND SURVEYOR
ASTM D 2216-01

CLOVIS, NEW MEXICO 88101

PROJECT: Lagoon Closure SWMU 101 DATE: 9-12-03

CONTRACTOR: Arrow head TESTED BY: L. Langan

SAMPLE NO. 1 Berm Assessment #3

WT. WET/CAN 1500 gms
WT. DRY/CAN 1395.63
WT. CAN 425.03
WT. WATER 104.37
WT. DRY 970.6
W.C. % 10.8

SAMPLE NO. _____
WT. WET/CAN _____
WT. DRY/CAN _____
WT. CAN _____
WT. WATER _____
WT. DRY _____
W.C. % _____

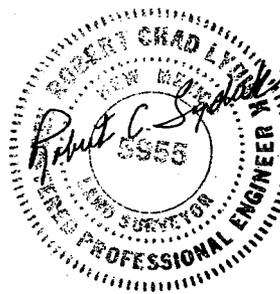
SAMPLE NO. 2
WT. WET/CAN 1500 gms
WT. DRY/CAN 1387.23
WT. CAN 420.71
WT. WATER 112.77
WT. DRY 966.52
W.C. % 11.7

SAMPLE NO. _____
WT. WET/CAN _____
WT. DRY/CAN _____
WT. CAN _____
WT. WATER _____
WT. DRY _____
W.C. % _____

SAMPLE NO. 3
WT. WET/CAN 1500 gms.
WT. DRY/CAN 1401.23
WT. CAN 431.01
WT. WATER 98.77
WT. DRY 970.22
W.C. % 10.2

SAMPLE NO. _____
WT. WET/CAN _____
WT. DRY/CAN _____
WT. CAN _____
WT. WATER _____
WT. DRY _____
W.C. % _____

SAMPLE NO. _____
WT. WET/CAN _____
WT. DRY/CAN _____
WT. CAN _____
WT. WATER _____
WT. DRY _____
W.C. % _____



SAMPLE NO. _____
WT. WET/CAN _____
WT. DRY/CAN _____
WT. CAN _____
WT. WATER _____
WT. DRY _____
W.C. % _____

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE <small>(Read instructions on the reverse side prior to initiating this form)</small>	DATE 01/08/2004	TRANSMITTAL NO. 02921-1
---	--------------------	----------------------------

JAN 09 2004

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS (This section will be initiated by the contractor)

TO: Cannon AFB Resident Office US Army Corps of Engineers 201 N. Perimeter Rd. Cannon AFB, NM 88103	FROM: Foster Wheeler Environmental C 6605 Uptown Blvd, NE Suite 220 Albuquerque, NM 87110	CONTRACT NO. DACW45-94-D-0003 0035	CHECK ONE: <input checked="" type="checkbox"/> THIS IS A NEW TRANSMITTAL <input type="checkbox"/> THIS IS A RESUBMITTAL OF TRANSMITTAL _____
---	--	--	---

SPECIFICATION SEC. NO. (Cover only one section with each transmittal) 02921	PROJECT TITLE AND LOCATION SWMU 101 - Sewage Lagoons Cannon AFB	CHECK ONE: THIS TRANSMITTAL IS FOR <input checked="" type="checkbox"/> FIO <input type="checkbox"/> GOVT. APPROVAL
---	---	---

ITEM NO.	DESCRIPTION OF ITEM SUBMITTED <small>(Type size, model number/etc.)</small>	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. <small>(See instruction no. 8)</small>	NO. OF COPIES	CONTRACT REFERENCE DOCUMENT		FOR CONTRACTOR USE CODE	VARIATION <small>(See instruction No. 6)</small>	FOR CE USE CODE
				SPEC. PARA. NO.	DRAWING SHEET NO.			
a.	b.	c.	d.	e.	f.	g.	h.	i.
3	Mulch	CERTIFICATES	3	2.4		A		✓

REMARKS Weed Free Mulch Certificates for 48 tons- Weight tickets attached Certified by Kansas Department of Agriculture-Certification labels from Bales attached.	I certify that the above submitted items have been reviewed in detail and are correct and in the strict conformance with the contract drawings and specifications except as otherwise stated. <div style="text-align: right;"> JAMES MORAWING NAME AND SIGNATURE OF CONTRACTOR </div>
--	--

SECTION II - APPROVAL ACTION

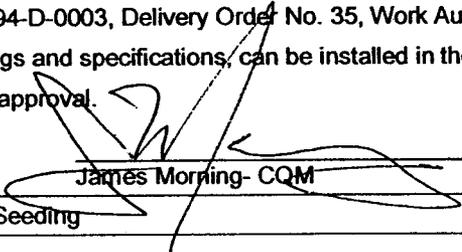
ENCLOSURES RETURNED (List by item No.)	NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY <div style="text-align: center;"> Mar a l a r t o </div>	DATE 2-4-04
---	---	-----------------------

SUBMITTAL REVIEW VERIFICATION SHEET

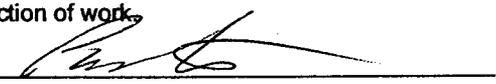
Date: Jan 9 2004

Submittal No.: 02921-1

Foster Wheeler Environmental Corporation Stamp

SWMU 101 Sewage Lagoons Closure, Cannon AFB, NM	
Certified for approval as indicated below:	
A -	Approved as submitted
B -	Approved except as noted on the drawings and/or attached sheets.
It is hereby certified that the (equipment) (material) shown and marked in this submittal is that proposed to be incorporated into Contract Number DACW45-94-D-0003, Delivery Order No. 35, Work Authorization Directive 1 is in compliance with the contract drawings and specifications, can be installed in the allocated spaces, and is submitted for Government approval.	
Reviewed/Certified By:	 James Morning- CQM
Description of items reviewed: Certificates- Mulch- Seeding	

U.S. Army Corps of Engineers Stamp

U.S. Army Engineer District, Albuquerque Corps of Engineers	
Certified for approval as indicated below:	
A -	Approved as submitted.
B -	Approved except as noted on the drawings and/or attached sheet(s). Resubmission not required.
C -	Approved except as noted on the drawings and/or attached sheet(s). Resubmission required.
D -	Will be returned by separate correspondence.
E -	Disapproved; see comments on attached sheet.
<u>F -</u>	Receipt acknowledged.
G -	Other: Specify.
Note:	Items approved as to general layout only. Dimensions and quantities checked. Approval does not relieve contractor of responsibilities for errors that may exist, as contractor shall be responsible for dimensions and design of adequate corrections. Details and satisfactory construction of work.
Signature:	 _____
Date:	5-6-04 _____

Reviewer's Signature: _____



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CERTIFICATION PROGRAM

THIS FORAGE/MULCH PRODUCT IS CERTIFIED TO
THE NORTH AMERICAN STANDARDS

NO. ■ 11679



KANSAS DEPARTMENT OF AGRICULTURE
Plant Protection & Weed Control
 (785) 862-2180

NORTH AMERICAN WEED FREE FORAGE
CERTIFICATION PROGRAM

THIS FORAGE/MULCH PRODUCT IS CERTIFIED TO
THE NORTH AMERICAN STANDARDS

NO. ■ 11684



KANSAS DEPARTMENT OF AGRICULTURE
Plant Protection & Weed Control
 (785) 862-2180

NORTH AMERICAN WEED FREE FORAGE
CERTIFICATION PROGRAM

THIS FORAGE/MULCH PRODUCT IS CERTIFIED TO
THE NORTH AMERICAN STANDARDS

NO. ■ 11678



KANSAS DEPARTMENT OF AGRICULTURE
Plant Protection & Weed Control
 (785) 862-2180

NORTH AMERICAN WEED FREE FORAGE
CERTIFICATION PROGRAM

THIS FORAGE/MULCH PRODUCT IS CERTIFIED TO
THE NORTH AMERICAN STANDARDS

NO. ■ 11683



KANSAS DEPARTMENT OF AGRICULTURE
Plant Protection & Weed Control
 (785) 862-2180

NORTH AMERICAN WEED FREE FORAGE
CERTIFICATION PROGRAM

THIS FORAGE/MULCH PRODUCT IS CERTIFIED TO
THE NORTH AMERICAN STANDARDS

NO. ■ 11677



KANSAS DEPARTMENT OF AGRICULTURE
Plant Protection & Weed Control
 (785) 862-2180

NORTH AMERICAN WEED FREE FORAGE
CERTIFICATION PROGRAM

THIS FORAGE/MULCH PRODUCT IS CERTIFIED TO
THE NORTH AMERICAN STANDARDS

NO. ■ 11682



KANSAS DEPARTMENT OF AGRICULTURE

Plant Protection & Weed Control
(785) 862-2180

NORTH AMERICAN WEED FREE FORAGE
CERTIFICATION PROGRAM

THIS FORAGE/MULCH PRODUCT IS CERTIFIED TO
THE NORTH AMERICAN STANDARDS

NO. ■ 11676



KANSAS DEPARTMENT OF AGRICULTURE
Plant Protection & Weed Control
(785) 862-2180

NORTH AMERICAN WEED FREE FORAGE
CERTIFICATION PROGRAM

THIS FORAGE/MULCH PRODUCT IS CERTIFIED TO
THE NORTH AMERICAN STANDARDS

NO. ■ 11671



KANSAS DEPARTMENT OF AGRICULTURE
Plant Protection & Weed Control
(785) 862-2180

NORTH AMERICAN WEED FREE FORAGE
CERTIFICATION PROGRAM

THIS FORAGE/MULCH PRODUCT IS CERTIFIED TO
THE NORTH AMERICAN STANDARDS

NO. ■ 11675



KANSAS DEPARTMENT OF AGRICULTURE
Plant Protection & Weed Control
(785) 862-2180

NORTH AMERICAN WEED FREE FORAGE
CERTIFICATION PROGRAM

THIS FORAGE/MULCH PRODUCT IS CERTIFIED TO
THE NORTH AMERICAN STANDARDS

NO. ■ 11670



KANSAS DEPARTMENT OF AGRICULTURE
Plant Protection & Weed Control
(785) 862-2180

NORTH AMERICAN WEED FREE FORAGE
CERTIFICATION PROGRAM

THIS FORAGE/MULCH PRODUCT IS CERTIFIED TO
THE NORTH AMERICAN STANDARDS

NO. ■ 11674



KANSAS DEPARTMENT OF AGRICULTURE
Plant Protection & Weed Control
(785) 862-2180

NORTH AMERICAN WEED FREE FORAGE
CERTIFICATION PROGRAM

THIS FORAGE/MULCH PRODUCT IS CERTIFIED TO
THE NORTH AMERICAN STANDARDS

NO. ■ 11669



KANSAS DEPARTMENT OF AGRICULTURE
Plant Protection & Weed Control
(785) 862-2180

NORTH AMERICAN WEED FREE FORAGE
CERTIFICATION PROGRAM

THIS FORAGE/MULCH PRODUCT IS CERTIFIED TO
THE NORTH AMERICAN STANDARDS

NO. ■ 11673



KANSAS DEPARTMENT OF AGRICULTURE
Plant Protection & Weed Control
(785) 862-2180

NORTH AMERICAN WEED FREE FORAGE
CERTIFICATION PROGRAM

THIS FORAGE/MULCH PRODUCT IS CERTIFIED TO
THE NORTH AMERICAN STANDARDS

NO. ■ 11668



KANSAS DEPARTMENT OF AGRICULTURE
Plant Protection & Weed Control
(785) 862-2180

NORTH AMERICAN WEED FREE FORAGE
CERTIFICATION PROGRAM

THIS FORAGE/MULCH PRODUCT IS CERTIFIED TO
THE NORTH AMERICAN STANDARDS

NO. ■ 11672



KANSAS DEPARTMENT OF AGRICULTURE
Plant Protection & Weed Control
(785) 862-2180

NORTH AMERICAN WEED FREE FORAGE
CERTIFICATION PROGRAM

THIS FORAGE/MULCH PRODUCT IS CERTIFIED TO
THE NORTH AMERICAN STANDARDS

NO. ■ 11667



KANSAS DEPARTMENT OF AGRICULTURE
 Plant Protection & Weed Control
 (785) 862-2180

**NORTH AMERICAN WEED FREE FORAGE
 CERTIFICATION PROGRAM**

**THIS FORAGE/MULCH PRODUCT IS CERTIFIED TO
 THE NORTH AMERICAN STANDARDS**

NO. ■ 11666



KANSAS DEPARTMENT OF AGRICULTURE
 Plant Protection & Weed Control
 (785) 862-2180

**NORTH AMERICAN WEED FREE FORAGE
 CERTIFICATION PROGRAM**

**THIS FORAGE/MULCH PRODUCT IS CERTIFIED TO
 THE NORTH AMERICAN STANDARDS**

NO. ■ 11752



KANSAS DEPARTMENT OF AGRICULTURE
 Plant Protection & Weed Control
 (785) 862-2180

**NORTH AMERICAN WEED FREE FORAGE
 CERTIFICATION PROGRAM**

**THIS FORAGE/MULCH PRODUCT IS CERTIFIED TO
 THE NORTH AMERICAN STANDARDS**

NO. ■ 11665



KANSAS DEPARTMENT OF AGRICULTURE
 Plant Protection & Weed Control
 (785) 862-2180

**NORTH AMERICAN WEED FREE FORAGE
 CERTIFICATION PROGRAM**

**THIS FORAGE/MULCH PRODUCT IS CERTIFIED TO
 THE NORTH AMERICAN STANDARDS**

NO. ■ 11751



KANSAS DEPARTMENT OF AGRICULTURE
 Plant Protection & Weed Control
 (785) 862-2180

**NORTH AMERICAN WEED FREE FORAGE
 CERTIFICATION PROGRAM**

**THIS FORAGE/MULCH PRODUCT IS CERTIFIED TO
 THE NORTH AMERICAN STANDARDS**

NO. ■ 11664



KANSAS DEPARTMENT OF AGRICULTURE
 Plant Protection & Weed Control
 (785) 862-2180

**NORTH AMERICAN WEED FREE FORAGE
 CERTIFICATION PROGRAM**

**THIS FORAGE/MULCH PRODUCT IS CERTIFIED TO
 THE NORTH AMERICAN STANDARDS**

NO. ■ 11750



KANSAS DEPARTMENT OF AGRICULTURE
 Plant Protection & Weed Control
 (785) 862-2180

**NORTH AMERICAN WEED FREE FORAGE
 CERTIFICATION PROGRAM**

**THIS FORAGE/MULCH PRODUCT IS CERTIFIED TO
 THE NORTH AMERICAN STANDARDS**

NO. ■ 11663



KANSAS DEPARTMENT OF AGRICULTURE
 Plant Protection & Weed Control
 (785) 862-2180

**NORTH AMERICAN WEED FREE FORAGE
 CERTIFICATION PROGRAM**

**THIS FORAGE/MULCH PRODUCT IS CERTIFIED TO
 THE NORTH AMERICAN STANDARDS**

NO. ■ 11749



KANSAS DEPARTMENT OF AGRICULTURE
 Plant Protection & Weed Control
 (785) 862-2180

**NORTH AMERICAN WEED FREE FORAGE
 CERTIFICATION PROGRAM**

**THIS FORAGE/MULCH PRODUCT IS CERTIFIED TO
 THE NORTH AMERICAN STANDARDS**

NO. ■ 11662



KANSAS DEPARTMENT OF AGRICULTURE
 Plant Protection & Weed Control
 (785) 862-2180

**NORTH AMERICAN WEED FREE FORAGE
 CERTIFICATION PROGRAM**

**THIS FORAGE/MULCH PRODUCT IS CERTIFIED TO
 THE NORTH AMERICAN STANDARDS**

NO. ■ 11748



KANSAS DEPARTMENT OF AGRICULTURE
Plant Protection & Weed Control
(785) 862-2180

NORTH AMERICAN WEED FREE FORAGE
CERTIFICATION PROGRAM

THIS FORAGE/MULCH PRODUCT IS CERTIFIED TO
THE NORTH AMERICAN STANDARDS

NO. ■ 11747



KANSAS DEPARTMENT OF AGRICULTURE
Plant Protection & Weed Control
(785) 862-2180

NORTH AMERICAN WEED FREE FORAGE
CERTIFICATION PROGRAM

THIS FORAGE/MULCH PRODUCT IS CERTIFIED TO
THE NORTH AMERICAN STANDARDS

NO. ■ 11746



KANSAS DEPARTMENT OF AGRICULTURE
Plant Protection & Weed Control
(785) 862-2180

NORTH AMERICAN WEED FREE FORAGE
CERTIFICATION PROGRAM

THIS FORAGE/MULCH PRODUCT IS CERTIFIED TO
THE NORTH AMERICAN STANDARDS

NO. ■ 11745



KANSAS DEPARTMENT OF AGRICULTURE
Plant Protection & Weed Control
(785) 862-2180

NORTH AMERICAN WEED FREE FORAGE
CERTIFICATION PROGRAM

THIS FORAGE/MULCH PRODUCT IS CERTIFIED TO
THE NORTH AMERICAN STANDARDS

NO. ■ 11744



KANSAS DEPARTMENT OF AGRICULTURE
Plant Protection & Weed Control
(785) 862-2180

NORTH AMERICAN WEED FREE FORAGE
CERTIFICATION PROGRAM

THIS FORAGE/MULCH PRODUCT IS CERTIFIED TO
THE NORTH AMERICAN STANDARDS

NO. ■ 11743



KANSAS DEPARTMENT OF AGRICULTURE
Plant Protection & Weed Control
(785) 862-2180

NORTH AMERICAN WEED FREE FORAGE
CERTIFICATION PROGRAM

THIS FORAGE/MULCH PRODUCT IS CERTIFIED TO
THE NORTH AMERICAN STANDARDS

NO. ■ 11742



KANSAS DEPARTMENT OF AGRICULTURE
Plant Protection & Weed Control
(785) 862-2180

NORTH AMERICAN WEED FREE FORAGE
CERTIFICATION PROGRAM

THIS FORAGE/MULCH PRODUCT IS CERTIFIED TO
THE NORTH AMERICAN STANDARDS

NO. ■ 11741



KANSAS DEPARTMENT OF AGRICULTURE
Plant Protection & Weed Control
(785) 862-2180

NORTH AMERICAN WEED FREE FORAGE
CERTIFICATION PROGRAM

THIS FORAGE/MULCH PRODUCT IS CERTIFIED TO
THE NORTH AMERICAN STANDARDS

NO. ■ 11740



KANSAS DEPARTMENT OF AGRICULTURE
Plant Protection & Weed Control
(785) 862-2180

NORTH AMERICAN WEED FREE FORAGE
CERTIFICATION PROGRAM

THIS FORAGE/MULCH PRODUCT IS CERTIFIED TO
THE NORTH AMERICAN STANDARDS

NO. ■ 11739



KANSAS DEPARTMENT OF AGRICULTURE
Plant Protection & Weed Control
(785) 862-2180

NORTH AMERICAN WEED FREE FORAGE
CERTIFICATION PROGRAM

THIS FORAGE/MULCH PRODUCT IS CERTIFIED TO
THE NORTH AMERICAN STANDARDS

NO. ■ 11738



KANSAS DEPARTMENT OF AGRICULTURE
Plant Protection & Weed Control
(785) 862-2180

NORTH AMERICAN WEED FREE FORAGE
CERTIFICATION PROGRAM

THIS FORAGE/MULCH PRODUCT IS CERTIFIED TO
THE NORTH AMERICAN STANDARDS

NO. ■ 11737



KANSAS DEPARTMENT OF AGRICULTURE
Plant Protection & Weed Control
(785) 862-2180

NORTH AMERICAN WEED FREE FORAGE
CERTIFICATION PROGRAM

THIS FORAGE/MULCH PRODUCT IS CERTIFIED TO
THE NORTH AMERICAN STANDARDS

NO. ■ 11736



KANSAS DEPARTMENT OF AGRICULTURE
Plant Protection & Weed Control
(785) 862-2180

NORTH AMERICAN WEED FREE FORAGE
CERTIFICATION PROGRAM

THIS FORAGE/MULCH PRODUCT IS CERTIFIED TO
THE NORTH AMERICAN STANDARDS

NO. ■ 11735



KANSAS DEPARTMENT OF AGRICULTURE
Plant Protection & Weed Control
(785) 862-2180

NORTH AMERICAN WEED FREE FORAGE
CERTIFICATION PROGRAM

THIS FORAGE/MULCH PRODUCT IS CERTIFIED TO
THE NORTH AMERICAN STANDARDS

NO. ■ 11734



KANSAS DEPARTMENT OF AGRICULTURE
Plant Protection & Weed Control
(785) 862-2180

NORTH AMERICAN WEED FREE FORAGE
CERTIFICATION PROGRAM

THIS FORAGE/MULCH PRODUCT IS CERTIFIED TO
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KANSAS DEPARTMENT OF AGRICULTURE
Plant Protection & Weed Control
(785) 862-2180

NORTH AMERICAN WEED FREE FORAGE
CERTIFICATION PROGRAM

THIS FORAGE/MULCH PRODUCT IS CERTIFIED TO
THE NORTH AMERICAN STANDARDS

NO. ■ 11732



KANSAS DEPARTMENT OF AGRICULTURE
Plant Protection & Weed Control
(785) 862-2180

NORTH AMERICAN WEED FREE FORAGE
CERTIFICATION PROGRAM

THIS FORAGE/MULCH PRODUCT IS CERTIFIED TO
THE NORTH AMERICAN STANDARDS

NO. ■ 11731



KANSAS DEPARTMENT OF AGRICULTURE
Plant Protection & Weed Control
(785) 862-2180

NORTH AMERICAN WEED FREE FORAGE
CERTIFICATION PROGRAM

THIS FORAGE/MULCH PRODUCT IS CERTIFIED TO
THE NORTH AMERICAN STANDARDS

NO. ■ 11730



KANSAS DEPARTMENT OF AGRICULTURE
Plant Protection & Weed Control
(785) 862-2180

NORTH AMERICAN WEED FREE FORAGE
CERTIFICATION PROGRAM

THIS FORAGE/MULCH PRODUCT IS CERTIFIED TO
THE NORTH AMERICAN STANDARDS

NO. ■ 11729



KANSAS DEPARTMENT OF AGRICULTURE
Plant Protection & Weed Control
(785) 862-2180

NORTH AMERICAN WEED FREE FORAGE
CERTIFICATION PROGRAM

THIS FORAGE/MULCH PRODUCT IS CERTIFIED TO
THE NORTH AMERICAN STANDARDS

NO. ■ 11728



KANSAS DEPARTMENT OF AGRICULTURE
Plant Protection & Weed Control
(785) 862-2180

NORTH AMERICAN WEED FREE FORAGE
CERTIFICATION PROGRAM

THIS FORAGE/MULCH PRODUCT IS CERTIFIED TO
THE NORTH AMERICAN STANDARDS

NO. ■ 11727



KANSAS DEPARTMENT OF AGRICULTURE
Plant Protection & Weed Control
(785) 862-2180

NORTH AMERICAN WEED FREE FORAGE
CERTIFICATION PROGRAM

THIS FORAGE/MULCH PRODUCT IS CERTIFIED TO
THE NORTH AMERICAN STANDARDS

NO. ■ 11722



KANSAS DEPARTMENT OF AGRICULTURE
Plant Protection & Weed Control
(785) 862-2180

NORTH AMERICAN WEED FREE FORAGE
CERTIFICATION PROGRAM

THIS FORAGE/MULCH PRODUCT IS CERTIFIED TO
THE NORTH AMERICAN STANDARDS

NO. ■ 11726



KANSAS DEPARTMENT OF AGRICULTURE
Plant Protection & Weed Control
(785) 862-2180

NORTH AMERICAN WEED FREE FORAGE
CERTIFICATION PROGRAM

THIS FORAGE/MULCH PRODUCT IS CERTIFIED TO
THE NORTH AMERICAN STANDARDS

NO. ■ 11721



KANSAS DEPARTMENT OF AGRICULTURE
Plant Protection & Weed Control
(785) 862-2180

NORTH AMERICAN WEED FREE FORAGE
CERTIFICATION PROGRAM

THIS FORAGE/MULCH PRODUCT IS CERTIFIED TO
THE NORTH AMERICAN STANDARDS

NO. ■ 11725



KANSAS DEPARTMENT OF AGRICULTURE
Plant Protection & Weed Control
(785) 862-2180

NORTH AMERICAN WEED FREE FORAGE
CERTIFICATION PROGRAM

THIS FORAGE/MULCH PRODUCT IS CERTIFIED TO
THE NORTH AMERICAN STANDARDS

NO. ■ 11720



KANSAS DEPARTMENT OF AGRICULTURE
Plant Protection & Weed Control
(785) 862-2180

NORTH AMERICAN WEED FREE FORAGE
CERTIFICATION PROGRAM

THIS FORAGE/MULCH PRODUCT IS CERTIFIED TO
THE NORTH AMERICAN STANDARDS

NO. ■ 11724



KANSAS DEPARTMENT OF AGRICULTURE
Plant Protection & Weed Control
(785) 862-2180

NORTH AMERICAN WEED FREE FORAGE
CERTIFICATION PROGRAM

THIS FORAGE/MULCH PRODUCT IS CERTIFIED TO
THE NORTH AMERICAN STANDARDS

NO. ■ 11719



KANSAS DEPARTMENT OF AGRICULTURE
Plant Protection & Weed Control
(785) 862-2180

NORTH AMERICAN WEED FREE FORAGE
CERTIFICATION PROGRAM

THIS FORAGE/MULCH PRODUCT IS CERTIFIED TO
THE NORTH AMERICAN STANDARDS

NO. ■ 11723



KANSAS DEPARTMENT OF AGRICULTURE
Plant Protection & Weed Control
(785) 862-2180

NORTH AMERICAN WEED FREE FORAGE
CERTIFICATION PROGRAM

THIS FORAGE/MULCH PRODUCT IS CERTIFIED TO
THE NORTH AMERICAN STANDARDS

NO. ■ 11718



KANSAS DEPARTMENT OF AGRICULTURE
Plant Protection & Weed Control
(785) 862-2180

NORTH AMERICAN WEED FREE FORAGE
CERTIFICATION PROGRAM

THIS FORAGE/MULCH PRODUCT IS CERTIFIED TO
THE NORTH AMERICAN STANDARDS

NO. ■ 11717



KANSAS DEPARTMENT OF AGRICULTURE
Plant Protection & Weed Control
(785) 862-2180

NORTH AMERICAN WEED FREE FORAGE
CERTIFICATION PROGRAM

THIS FORAGE/MULCH PRODUCT IS CERTIFIED TO
THE NORTH AMERICAN STANDARDS

NO. ■ 11712



KANSAS DEPARTMENT OF AGRICULTURE
Plant Protection & Weed Control
(785) 862-2180

NORTH AMERICAN WEED FREE FORAGE
CERTIFICATION PROGRAM

THIS FORAGE/MULCH PRODUCT IS CERTIFIED TO
THE NORTH AMERICAN STANDARDS

NO. ■ 11716



KANSAS DEPARTMENT OF AGRICULTURE
Plant Protection & Weed Control
(785) 862-2180

NORTH AMERICAN WEED FREE FORAGE
CERTIFICATION PROGRAM

THIS FORAGE/MULCH PRODUCT IS CERTIFIED TO
THE NORTH AMERICAN STANDARDS

NO. ■ 11711



KANSAS DEPARTMENT OF AGRICULTURE
Plant Protection & Weed Control
(785) 862-2180

NORTH AMERICAN WEED FREE FORAGE
CERTIFICATION PROGRAM

THIS FORAGE/MULCH PRODUCT IS CERTIFIED TO
THE NORTH AMERICAN STANDARDS

NO. ■ 11715



KANSAS DEPARTMENT OF AGRICULTURE
Plant Protection & Weed Control
(785) 862-2180

NORTH AMERICAN WEED FREE FORAGE
CERTIFICATION PROGRAM

THIS FORAGE/MULCH PRODUCT IS CERTIFIED TO
THE NORTH AMERICAN STANDARDS

NO. ■ 11710



KANSAS DEPARTMENT OF AGRICULTURE
Plant Protection & Weed Control
(785) 862-2180

NORTH AMERICAN WEED FREE FORAGE
CERTIFICATION PROGRAM

THIS FORAGE/MULCH PRODUCT IS CERTIFIED TO
THE NORTH AMERICAN STANDARDS

NO. ■ 11714



KANSAS DEPARTMENT OF AGRICULTURE
Plant Protection & Weed Control
(785) 862-2180

NORTH AMERICAN WEED FREE FORAGE
CERTIFICATION PROGRAM

THIS FORAGE/MULCH PRODUCT IS CERTIFIED TO
THE NORTH AMERICAN STANDARDS

NO. ■ 11709



KANSAS DEPARTMENT OF AGRICULTURE
Plant Protection & Weed Control
(785) 862-2180

NORTH AMERICAN WEED FREE FORAGE
CERTIFICATION PROGRAM

THIS FORAGE/MULCH PRODUCT IS CERTIFIED TO
THE NORTH AMERICAN STANDARDS

NO. ■ 11713



KANSAS DEPARTMENT OF AGRICULTURE
Plant Protection & Weed Control
(785) 862-2180

NORTH AMERICAN WEED FREE FORAGE
CERTIFICATION PROGRAM

THIS FORAGE/MULCH PRODUCT IS CERTIFIED TO
THE NORTH AMERICAN STANDARDS

NO. ■ 11708



KANSAS DEPARTMENT OF AGRICULTURE
Plant Protection & Weed Control
(785) 862-2180

**NORTH AMERICAN WEED FREE FORAGE
CERTIFICATION PROGRAM**

**THIS FORAGE/MULCH PRODUCT IS CERTIFIED TO
THE NORTH AMERICAN STANDARDS**

NO. ■ 11707

THIS MEMORANDUM

is an acknowledgment that a bill of lading has been issued and is not the Original Bill of Lading, not a copy or duplicate, covering the property named herein, and is intended solely for filing or record.

Shipper's No. 1

(Carrier) IBBETSON Bros SCAC. _____
 Received, subject to the classifications and tariffs in effect on the date of this Bill of Lading:

Carrier's No. 11-18

at Yates Center, KS, date 1-1-04 from IBBETSON Bros
The property described below, in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as indicated below, which said company (the word company being understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agree to carry to its usual place of delivery at said destination, if on its own road or its own water line, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed, as to each carrier of all or any of said property over all or any portion of said route to destination, and as to each party at any time interested in all or any of said property, that every service to be performed hereunder shall be subject to all the conditions not prohibited by law, whether printed or written, herein contained (as specified in Appendix B to Part 1035) which are hereby agreed to by the shipper and accepted for himself and his assigns.

(Mail or street address of consignee for purposes of notification only.)
 TO: Ruby Mountain
 Consignee PO Box 1100
 Street Yates Center, KS
 Destination Yates Center, KS Zip 67570

FROM: IBBETSON Bros
 Shipper 1016 Rd 1507
 Street Yates Center, KS Zip 67570
 Origin Yates Center, KS

Route: Clayton M.M. Hwy Yates Center @ CAFB Sewage LA LAGONS

No. of packages	HM	Description of articles, special marks, and exceptions	Hazard Class	I.D. Number	Packing Group	*Weight (subject to correction)	Class or rate	Labels required (or exemption)	Check column
40		<u>Round Sales Gross PAY</u>							
		<u>US A</u>							

Remit C.O.D. to: IBBETSON Bros
 Address: 1016 Rd 1507
 City: Yates Center, KS State: KS Zip: 67570

COD AMT:
 \$ _____
 Charges Advanced \$ _____

Subject to Section 7 of conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement:
 The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges.
 (Signature of consignor)

C. O. D. FEE:
 Prepaid
 Collect \$ _____
FREIGHT CHARGES
 Prepaid Collect

If the shipment moves between two ports by a carrier by water, the law requires that the bill of lading shall state whether it is "carrier's or shipper's weight". Note: - where this rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property. The agreed or declared value of the property is hereby specifically stated by the shipper to be not exceeding _____ per _____
 This is to certify that the above-named materials are properly classified, described, packaged, marked and labeled and are in proper condition for transportation according to the applicable regulations of the Department of Transportation.

PLACARDS REQUIRED **PLACARDS SUPPLIED** **DRIVER'S SIGNATURE:** YES NO - FURNISHED BY CARRIER

SHIPPER: IBBETSON Bros CARRIER: IBBETSON Bros
 PER: IBBETSON Bros DATE: 1-1-04 PER: IBBETSON Bros DATE: 1-1-04

CUSTOM **WOODSON COUNTY COOP**
 Permanent post office address: _____
 Virgil, KS / Yates Center, KS
 620-678-3466 / 620-625-3151 **76320 13:54 01 06 04**

DATE _____ GROSS **26440 11:17 12 29 03**
 CUSTOMER IBBETSON Bros TARE _____
 NET 49860

SPLIT 6
 HAULED BY _____
 WHEAT _____ BEANS _____ CORN _____
 MILO _____ OATS _____ OTHER _____
 _____ SELL AT MARKET _____ CONTRACT _____
 _____ STORAGE _____ OTHER _____
 DRIVER _____ ON _____ OFF _____

BUSHELS 2493

DISCOUNTS	
MOISTURE	
TEST WEIGHT	
FM.	
OTHER	
BASE PRICE	

to transportation (\$172.604)
 BLS-A3 (Rev. 7/95)

CONSIGNOR
COMBINATION MOTOR VEHICLE BILL OF LADING AND FREIGHT BILL (IN TRIPLICATE)

Shipper's No. _____

Agent No. _____

Carrier of Ibbetson Bros

Address Yates Center KS 66783

TYPE OF SHIPMENT ICC <input type="checkbox"/> KCC <input type="checkbox"/>	ROUTE NO.	NAME AND OR UNIT NO. 117	LENGTH OF LOADING SPACE Straight Truck <input type="checkbox"/> Semi-Trailer <input type="checkbox"/>		DRIVER Nichols	212073
---	-----------	-----------------------------	--	--	-------------------	--------

Received From (Shipper) Ibbetson Bros
 AT 1275 70th Rd
Yates Center KS 66783
 Date 11-7-04

The following described property in apparent good order (except as shown hereon) subject to tariffs in effect on the date of the issue of this bill of lading and conditions as shown on reverse side hereof.

Consigned to Rocky Mountain Reclamation Service WY
 Destination CAFB NM - LAGOONS
Clovis NM
 PREPAID \$ _____
 TOTAL MILES HAULED _____

QUANTITY	DESCRIPTION OF SHIPMENT — SPECIAL MARKS	WEIGHT	RATE	PER*	AMOUNT
45	Big Roundbales Prairie Hay	46,200			

per Cwt. Veh. — per Vehicle Bu. — per Bushel T. — per Ton
 Shipper, per _____
 Carrier, per _____
 TOTAL CHARGES _____
 Date Delivered _____ A.M.
 _____ P.M.

Consignee X SIGNATURE OF AGENT _____
 Order From KANSAS MOTOR CUSTOM

WOODSON COUNTY COOP

Virgil, KS / Yates Center, KS
 620-678-3466 / 620-625-3151 72720 16:51 01 06 04

DATE _____
 CUSTOMER IBBETSON Bros GROSS 26520 11:33 01 06 04
 TARE _____

SPLIT 7#
 HAULED BY _____
 WHEAT _____ BEANS _____ CORN Hay
 MILO _____ OATS _____ OTHER _____

NET 46700
 BUSHELS 73

SELL AT MARKET _____ CONTRACT _____
 STORAGE _____ OTHER _____
 DRIVER _____ ON _____ OFF _____
 WEIGHER _____

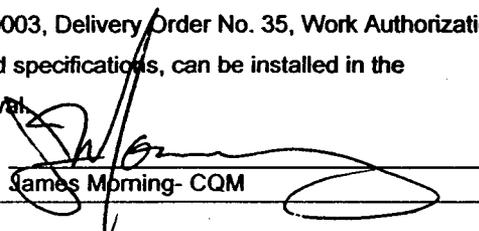
DISCOUNTS	
MOISTURE	
TEST WEIGHT	
FM	
OTHER	
BASE PRICE	

SUBMITTAL REVIEW VERIFICATION SHEET

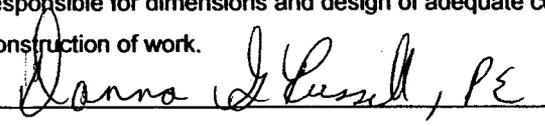
Date: April 27 2004

Submittal No.: 02921-1

Foster Wheeler Environmental Corporation Stamp

SWMU 101 Sewage Lagoons Closure, Cannon AFB, NM	
Certified for approval as indicated below:	
<input checked="" type="radio"/> A -	Approved as submitted
<input type="radio"/> B -	Approved except as noted on the drawings and/or attached sheets.
It is hereby certified that the (equipment) (material) shown and marked in this submittal is that proposed to be incorporated into Contract Number DACW45-94-D-0003, Delivery Order No. 35, Work Authorization Directive 1 is in compliance with the contract drawings and specifications, can be installed in the allocated spaces, and is submitted for Government approval.	
Reviewed/Certified By:	 James Morning- CQM
Description of items reviewed: Certificates- Seed	

U.S. Army Corps of Engineers Stamp

U.S. Army Engineer District, Albuquerque Corps of Engineers	
Certified for approval as indicated below:	
<input type="radio"/> A -	Approved as submitted.
<input type="radio"/> B -	Approved except as noted on the drawings and/or attached sheet(s). Resubmission not required.
<input type="radio"/> C -	Approved except as noted on the drawings and/or attached sheet(s). Resubmission required.
<input type="radio"/> D -	Will be returned by separate correspondence.
<input type="radio"/> E -	Disapproved; see comments on attached sheet.
<input checked="" type="radio"/> F -	Receipt acknowledged.
<input type="radio"/> G -	Other: Specify.
Note: Items approved as to general layout only. Dimensions and quantities checked. Approval does not relieve contractor of responsibilities for errors that may exist, as contractor shall be responsible for dimensions and design of adequate corrections. Details and satisfactory construction of work.	
Signature:  Donna J Russell, PE	Date: 29 Apr 04

Reviewer's Signature: _____

APR-21-04 WED 02:19 PM

GRANITE SEED CO

FAX NO. 801 768 3967

P. 02

Granite Seed Company
1697 West 2100 North
Lehi, Utah 84043

CERTIFIED COPY OF SEED ANALYSIS

Lot Number: BOCU -31328

Kind and Variety: VAUGHN - SIDEOATS GRAMA

Scientific Name: BOUTELOUA CURTIPENDULA

Pure Seed %: 85.99 Total Viable %: 96.00

Crop %: 0.19 Germination %: 80.00

Inert %: 13.34 Hard Seed %: 16.00

Weed %: 0.48 Date of Test: 12/18/2003

Pure Live Seed %: 82.55 Origin: TX

Name of Lab: HUL=P&G

Noxious or Restricted Weeds (all 50 States):

BARNYARDGRASS

Granite Seed Company certifies that this analysis accurately represents the original copy of seed analysis and, where applicable, all testing has been conducted by a certified Seed Technologist using the sanctioned rules established by the Association of Official Seed Analysts.

Signature: *William J. ...*

Date: 4/21/04

APR-21-04 WED 02:20 PM GRANITE SEED CO

FAX NO. 801 768 3967

P. 03

Granite Seed Company
1697 West 2100 North
Lehi, Utah 84043

CERTIFIED COPY OF SEED ANALYSIS

Lot Number: BOGR -31125

Kind and Variety: HACHITA - BLUE GRAMA

Scientific Name: BOUTELOUA GRACILIS

Pure Seed %: 67.50 Total Viable %: 76.00

Crop %: 0.00 Germination %: 76.00

Inert %: 32.33 Hard Seed %: 0.00

Weed %: 0.17 Date of Test: 11/26/2003

Pure Live Seed %: 51.30 Origin: TX

Name of Lab: N/A

Noxious or Restricted Weeds (all 50 States):

NONE

Granite Seed Company certifies that this analysis accurately represents the original copy of seed analysis and, where applicable, all testing has been conducted by a certified Seed Technologist using the sanctioned rules established by the Association of Official Seed Analysts.

Signature: *William J. [Signature]*

Date: 4/21/04

Granite Seed Company
1697 West 2100 North
Lehi, Utah 84043

CERTIFIED COPY OF SEED ANALYSIS

Lot Number: SCSC -31335

Kind and Variety: ITASCA - LITTLE BLUESTEM

Scientific Name: SCHIZACHYRIUM SCOPARIUM

Pure Seed %: 88.79 Total Viable %: 93.00

Crop %: 0.00 Germination %: 40.00

Inert %: 11.21 Hard Seed %: 53.00

Weed %: 0.00 Date of Test: 03/10/2004

Pure Live Seed %: 82.57 Origin: MN

Name of Lab: MID-WEST=P&G

Noxious or Restricted Weeds (all 50 States):

NONE

Granite Seed Company certifies that this analysis accurately represents the original copy of seed analysis and, where applicable, all testing has been conducted by a certified Seed Technologist using the sanctioned rules established by the Association of Official Seed Analysts.

Signature: _____



Date: 4/21/04

Granite Seed Company
1697 West 2100 North
Lehi, Utah 84043

CERTIFIED COPY OF SEED ANALYSIS

Lot Number: SONU -31209

Kind and Variety: TOMAHAWK - INDIAN GRASS

Scientific Name: SORGASTRUM NUTANS

Pure Seed %: 89.91 Total Viable %: 82.00

Crop %: 0.06 Germination %: 82.00

Inert %: 10.03 Hard Seed %: 0.00

Weed %: 0.00 Date of Test: 11/12/2003

Pure Live Seed %: 73.73 Origin: SD

Name of Lab: N/A

Noxious or Restricted Weeds (all 50 States):

NONE

Granite Seed Company certifies that this analysis accurately represents the original copy of seed analysis and, where applicable, all testing has been conducted by a certified Seed Technologist using the sanctioned rules established by the Association of Official Seed Analysts.

Signature: 

Date: 4/22/04

APR-21-04 WED 02:20 PM

GRANITE SEED CO

FAX NO. 801 768 3967

P. 06

Granite Seed Company
1697 West 2100 North
Lehi, Utah 84043

CERTIFIED COPY OF SEED ANALYSIS

Lot Number: PAVI -31205

Kind and Variety: DAKOTAH - SWITCHGRASS

Scientific Name: PANICUM VIRGATUM

Pure Seed %: 98.26 Total Viable %: 96.00

Crop %: 0.00 Germination %: 60.00

Inert %: 0.41 Hard Seed %: 36.00

Weed %: 1.33 Date of Test: 11/13/2003

Pure Live Seed %: 94.33 Origin: CAN

Name of Lab: PRI=P&G

Noxious or Restricted Weeds (all 50 States):

BRASSICA SPP.	11/#
GREEN FOXTAIL	10/#
BA GREEN FOXTAIL	10/#
BA	
GREEN FOXTAIL	10/#
BA	

Granite Seed Company certifies that this analysis accurately represents the original copy of seed analysis and, where applicable, all testing has been conducted by a certified Seed Technologist using the sanctioned rules established by the Association of Official Seed Analysts.

Signature: *Matthew J. [Signature]* Date: 4/21/04

APR-21-04 WED 02:20 PM

GRANITE SEED CO

FAX NO. 801 768 3967

P. 07

Granite Seed Company
1697 West 2100 North
Lehi, Utah 84043

CERTIFIED COPY OF SEED ANALYSIS

Lot Number: PEPU -30725

Kind and Variety: KANAB-HULLED - PURPLE PRAIRIE CLOVER

Scientific Name: DALEA PURPUREUM VAR. PURPUREUM

Pure Seed %: 99.49 Total Viable %: 88.00

Crop %: 0.19 Germination %: 86.00

Inert %: 0.16 Hard Seed %: 2.00

Weed %: 0.16 Date of Test: 09/02/2003

Pure Live Seed %: 87.55 Origin: MN

Name of Lab: NE=P&G

Noxious or Restricted Weeds (all 50 States):

PIG WEED 3/#
GR EEN FOXTAIL 3/#

Granite Seed Company certifies that this analysis accurately represents the original copy of seed analysis and, where applicable, all testing has been conducted by a certified Seed Technologist using the sanctioned rules established by the Association of Official Seed Analysts.

Signature: *M. J. [Signature]*

Date: 4/21/04

Granite Seed Company
1697 West 2100 North
Lehi, Utah 84043

CERTIFIED COPY OF SEED ANALYSIS

Lot Number: ATCO -31138

Kind and Variety: VNS - SHADSCALE

Scientific Name: ATRIPLEX CONFERTIFOLIA

Pure Seed %: 94.41 Total Viable %: 58.00

Crop %: 0.00 Germination %: 55.00

Inert %: 5.58 Hard Seed %: 3.00

Weed %: 0.01 Date of Test: 12/23/2003

Pure Live Seed %: 54.76 Origin: UT

Name of Lab: ID=P&TZ

Noxious or Restricted Weeds (all 50 States):

DOWNY BROME 29/#

Granite Seed Company certifies that this analysis accurately represents the original copy of seed analysis and, where applicable, all testing has been conducted by a certified Seed Technologist using the sanctioned rules established by the Association of Official Seed Analysts.

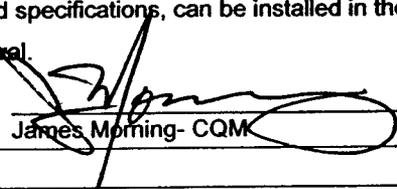
Signature:  Date: 4/23/04

SUBMITTAL REVIEW VERIFICATION SHEET

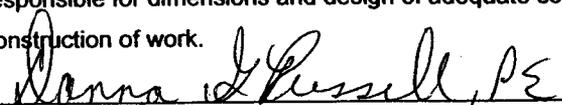
Date: April 27 2004

Submittal No.: 02921-3

Foster Wheeler Environmental Corporation Stamp

SWMU 101 Sewage Lagoons Closure, Cannon AFB, NM	
Certified for approval as indicated below:	
<input checked="" type="radio"/> A -	Approved as submitted
<input type="radio"/> B -	Approved except as noted on the drawings and/or attached sheets.
It is hereby certified that the (equipment) (material) shown and marked in this submittal is that proposed to be incorporated into Contract Number DACW45-94-D-0003, Delivery Order No. 35, Work Authorization Directive 1 is in compliance with the contract drawings and specifications, can be installed in the allocated spaces, and is submitted for Government approval.	
Reviewed/Certified By:	 James Morning- CQM
Description of items reviewed: Certificates- Fertilizer	

U.S. Army Corps of Engineers Stamp

U.S. Army Engineer District, Albuquerque Corps of Engineers	
Certified for approval as indicated below:	
A -	Approved as submitted.
B -	Approved except as noted on the drawings and/or attached sheet(s). Resubmission not required.
C -	Approved except as noted on the drawings and/or attached sheet(s). Resubmission required.
D -	Will be returned by separate correspondence.
E -	Disapproved; see comments on attached sheet.
<input checked="" type="radio"/> F -	Receipt acknowledged.
G -	Other: Specify.
Note: Items approved as to general layout only. Dimensions and quantities checked. Approval does not relieve contractor of responsibilities for errors that may exist, as contractor shall be responsible for dimensions and design of adequate corrections. Details and satisfactory construction of work.	
Signature: 	Date: <u>4/29/04</u>

Reviewer's Signature: _____

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR
 MANUFACTURER'S CERTIFICATES OF COMPLIANCE

DATE
04/22/2004

TRANSMITTAL NO.
02921-4

(Read instructions on the reverse side prior to initiating this form)

APR 27 2004

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS (This section will be initiated by the contractor)

TO: Cannon AFB Resident Office
 US Army Corps of Engineers
 201 N. Perimeter Rd.
 Cannon AFB, NM 88103

FROM: Foster Wheeler Environmental C
 6605 Uptown Blvd, NE Suite 220
 Albuquerque, NM 87110

CONTRACT NO.
DACW45-94-D-0003 0035

CHECK ONE:
 THIS IS A NEW TRANSMITTAL
 THIS IS A RESUBMITTAL OF TRANSMITTAL _____

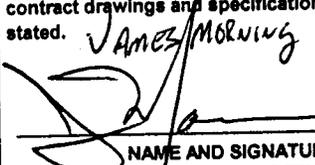
SPECIFICATION SEC. NO. (Cover only one section with each transmittal)
02921

PROJECT TITLE AND LOCATION
SWMU 101 - Sewage Lagoons Cannon AFB

CHECK ONE: THIS TRANSMITTAL IS FOR
 FIO GOVT. APPROVAL

ITEM NO.	DESCRIPTION OF ITEM SUBMITTED (Type size, model number/etc.)	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. (See Instruction no. 8)	NO. OF COPIES	CONTRACT REFERENCE DOCUMENT		FOR CONTRACTOR USE CODE	VARIATION (See Instruction No. 6)	FOR CE USE CODE
				SPEC. PARA. NO.	DRAWING SHEET NO.			
a.	b.	c.	d.	e.	f.	g.	h.	i.
6	Mulch- 2nd Installation for seeding	CERTIFICATES	3	1.3 C		A		F

REMARKS
Mulch- Certification of Materials

I certify that the above submitted items have been reviewed in detail and are correct and in the strict conformance with the contract drawings and specifications except as otherwise stated.
JAMES MORNING

 4/22/04
 NAME AND SIGNATURE OF CONTRACTOR

SECTION II - APPROVAL ACTION

ENCLOSURES RETURNED (List by item No.)

NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY

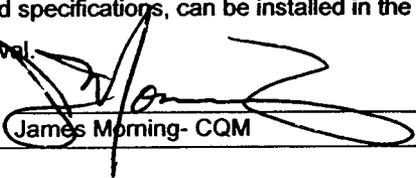

DATE
4-29-04

SUBMITTAL REVIEW VERIFICATION SHEET

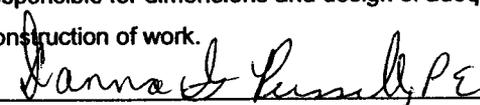
Date: April 27 2004

Submittal No.: 02921-4

Foster Wheeler Environmental Corporation Stamp

SWMU 101 Sewage Lagoons Closure, Cannon AFB, NM	
Certified for approval as indicated below:	
<input checked="" type="radio"/> A -	Approved as submitted
<input type="radio"/> B -	Approved except as noted on the drawings and/or attached sheets.
It is hereby certified that the (equipment) (material) shown and marked in this submittal is that proposed to be incorporated into Contract Number DACW45-94-D-0003, Delivery Order No. 35, Work Authorization Directive 1 is in compliance with the contract drawings and specifications, can be installed in the allocated spaces, and is submitted for Government approval.	
Reviewed/Certified By:	 James Morning- CQM
Description of items reviewed: Certificates- Mulch-	

U.S. Army Corps of Engineers Stamp

U.S. Army Engineer District, Albuquerque Corps of Engineers	
Certified for approval as indicated below:	
A -	Approved as submitted.
B -	Approved except as noted on the drawings and/or attached sheet(s). Resubmission not required.
C -	Approved except as noted on the drawings and/or attached sheet(s). Resubmission required.
D -	Will be returned by separate correspondence.
E -	Disapproved; see comments on attached sheet.
<input checked="" type="radio"/> F -	Receipt acknowledged.
G -	Other: Specify.
Note: Items approved as to general layout only. Dimensions and quantities checked. Approval does not relieve contractor of responsibilities for errors that may exist, as contractor shall be responsible for dimensions and design of adequate corrections. Details and satisfactory construction of work.	
Signature: 	Date: <u>4/29/04</u>

Reviewer's Signature: _____

WYDOT FORM T-168
Rev 8/00

CERTIFICATION OF MATERIALS

WYDOT Project No. Cannon AFB

Location: Clovis, NM

WYDOT Field Identification
<small>(Date - Sequence Rec'd - Inspector's Initials)</small>

The Ibbetson Bros. 1275 70th Rd Yates Center, KS 66783
(Name of Manufacturer/Supplier) (Address) (City, State)

has furnished to Rocky Mountain Reclamation P.O. Box 1695 Laramie WY 82073
(Name of Contractor) (Address) (City, State)

the following materials for use in the construction of the above referenced project.

WYDOT Bid Item Number	Product Description or Use	Quantity	Unit LF, YD, m, m ² , etc.	Manufacturer	Applicable Specification (AASHTO, ASTM, WYDOT, etc.)
	Hay mulch		tons	Ibbetson Bros.	certified noxious weed free

(Mill Test Reports, Heat Numbers, Chemical Analysis Reports, Coating Thickness Reports, Seed Analysis Reports, Transit Certificates, etc. must accompany this form where applicable.)

Statement of Certification

I hereby certify that the above listed items of materials do meet the requirements as set forth in the plans and/or specifications.

By: Jodi Johnson Title: Executive Assistant
(Name Typed or Printed)

Jodi Johnson Date: 4/20/04
(Signature)

Note: This certification and attachments must be furnished in triplicate to the contractor who, in turn, must submit two copies to the engineer before the material can be incorporated into this project.

Distribution:	
White :	Materials Laboratory
Yellow:	Resident Engineer
Pink:	Contractor
Gold:	Manufacturer/Supplier

Copies of this form are available from:	
WYDOT Purchasing Program	
Attn: Storeroom Manager	
5300 Bishop Blvd	
Cheyenne, WY 82009-3340	

SUBMITTAL REVIEW VERIFICATION SHEET

Date: July 8 2004

Submittal No.: 02921-5

Foster Wheeler Environmental Corporation Stamp

SWMU 101 Sewage Lagoons Closure, Cannon AFB, NM Certified for approval as indicated below:	
A -	[REDACTED]
B -	Approved except as noted on the drawings and/or attached sheets.
It is hereby certified that the (equipment) (material) shown and marked in this submittal is that proposed to be incorporated into Contract Number DACW45-94-D-0003, Delivery Order No. 35, Work Authorization Directive 1 is in compliance with the contract drawings and specifications, can be installed in the allocated spaces, and is submitted for Government approval.	
Reviewed/Certified By:	 James Morning- CQM
Description of items reviewed: Certificates- Irrigation O&M data	

U.S. Army Corps of Engineers Stamp

U.S. Army Engineer District, Albuquerque Corps of Engineers Certified for approval as indicated below:	
A -	Approved as submitted.
B -	Approved except as noted on the drawings and/or attached sheet(s). Resubmission not required.
C -	Approved except as noted on the drawings and/or attached sheet(s). Resubmission required.
D -	Will be returned by separate correspondence.
E -	Disapproved; see comments on attached sheet.
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G -	Other: Specify.
Note: Items approved as to general layout only. Dimensions and quantities checked. Approval does not relieve contractor of responsibilities for errors that may exist, as contractor shall be responsible for dimensions and design of adequate corrections. Details and satisfactory construction of work.	
Signature: _____	Date: _____

Reviewer's Signature: _____



TETRA TECH FW, INC.

SWMU 101 Cannon AFB N.M
Irrigation and Maintenance Log

Site Irrigated	Date/Who	Start Meter	End Meter	Total Gallons	Areas Re-seeded	Other Maint.	Truck Loads
SWMU 101	5/14 JAM	20949	21114	115K	NONE	NONE	NA
SWMU 101	5/18 JAM	21114	21314	200K	NONE	NONE	NA
SWMU 101	5/19 JAM	21314	21467	153K	NONE	NONE	NA
old Staging Area	5/14 JAM	-	-	4800	NONE	NONE	4
old Staging Area	5/18 JAM	-	-	4800	NONE	NONE	4
old Staging Area	5/19 JAM	-	-	4800	NONE	NONE	4
LF25	5/14 JAM	-	-	4800	NONE	NONE	4
LF25	5/18 JAM	-	-	2400	NONE	NONE	2
LF25	5/19 JAM	-	-	4800	NONE	NONE	4
WEST Fence	5/14 JAM	-	-	4800	NONE	NONE	4
WEST Fence	5/18 JAM	-	-	4800	NONE	NONE	4
WEST Fence	5/19 JAM	-	-	4800	NONE	NONE	4
SWMU 101	5/25/CAM	21467	21614	147K	NONE	NONE	NA
SWMU 101	5/26 CAM	21614	21745	131K	NONE	NONE	NA
SWMU 101	6/1 JAM	21745	21942	197K	NONE	NONE	NA
SWMU 101	6/2 JAM	21942	22082	140K	NONE	NONE	NA
LF25	6/1 JAM	-	-	7200	NONE	NONE	6
West Fence	6/1 JAM	-	-	4800	NONE	NONE	4
Mid Fence	6/1 JAM	-	-	4800	NONE	NONE	4
Staging Area	6/1 + 6/2	-	-	9600	NONE	NONE	8
SWMU 101	6/8 CAM	22082	22267	185K	NONE	NONE	NA
SWMU 101	6/9 CAM	22267	22442	175K	NONE	NONE	NA
SWMU 101	6/10 CAM	Rain Fall	0.58"	NO WATER	NONE	NONE	NA

SUBMITTAL REVIEW VERIFICATION SHEET

Date: Aug 06 2004

Submittal No.: 02921-6

Foster Wheeler Environmental Corporation Stamp

SWMU 101 Sewage Lagoons Closure, Cannon AFB, NM

Certified for approval as indicated below:

- A - Approved as submitted
- B - Approved except as noted on the drawings and/or attached sheets.

It is hereby certified that the (equipment) (material) shown and marked in this submittal is that proposed to be incorporated into Contract Number DACW45-94-D-0003, Delivery Order No. 35, Work Authorization Directive 1 is in compliance with the contract drawings and specifications, can be installed in the allocated spaces, and is submitted for Government approval.

Reviewed/Certified By:


James Morning- CQM

Description of items reviewed: Re Vegetation Maintenance - Mowing

U.S. Army Corps of Engineers Stamp

U.S. Army Engineer District, Albuquerque Corps of Engineers

Certified for approval as indicated below:

- A - Approved as submitted.
- B - Approved except as noted on the drawings and/or attached sheet(s). Resubmission not required.
- C - Approved except as noted on the drawings and/or attached sheet(s). Resubmission required.
- D - Will be returned by separate correspondence.
- E - Disapproved; see comments on attached sheet.
- F - Receipt acknowledged.
- G - Other: Specify.

Note: Items approved as to general layout only. Dimensions and quantities checked. Approval does not relieve contractor of responsibilities for errors that may exist, as contractor shall be responsible for dimensions and design of adequate corrections. Details and satisfactory construction of work.

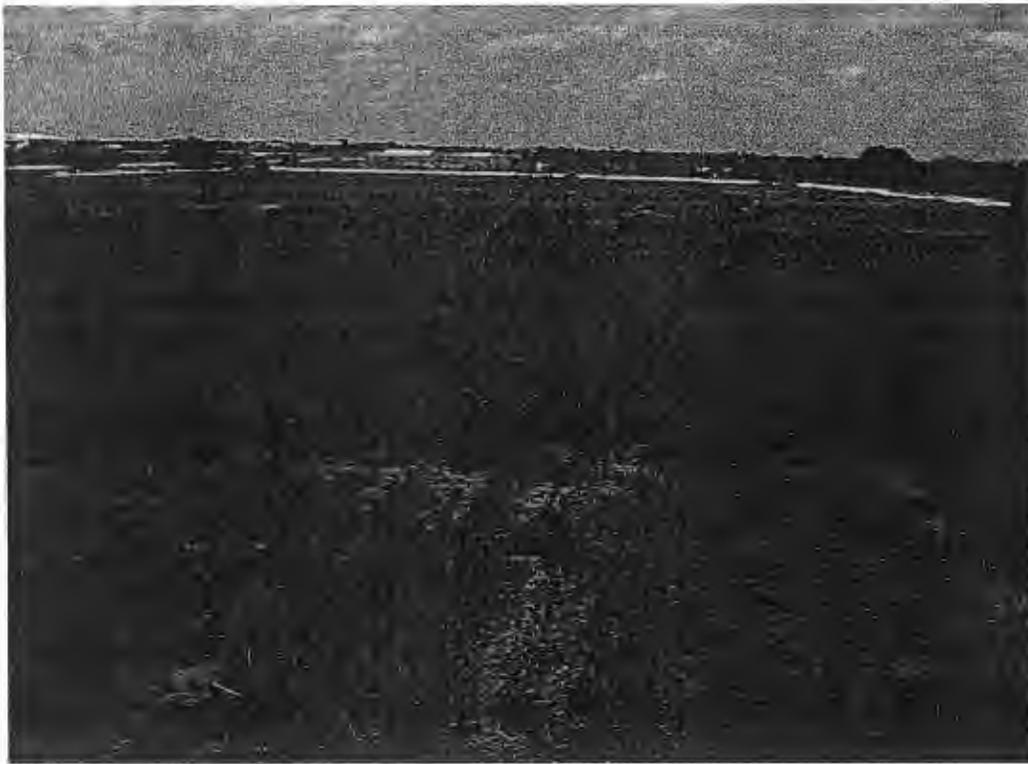
Signature:



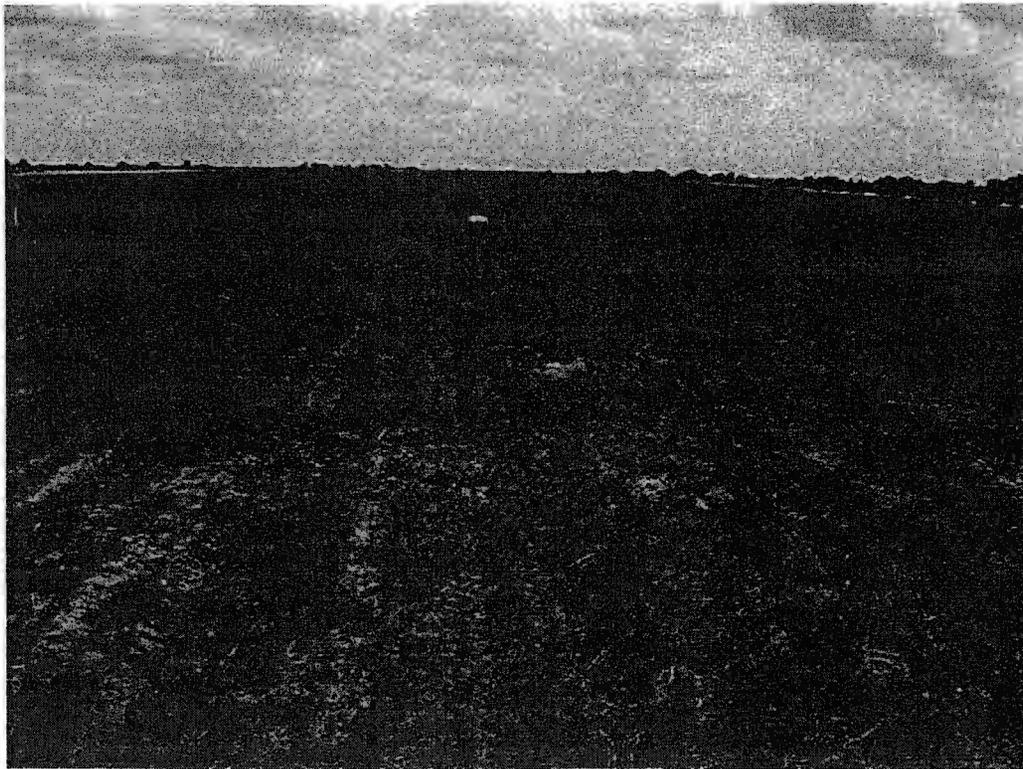
Date:

8/24/04

Reviewer's Signature: _____



North view of the North and South Lagoon



South view of the South Lagoon





Appendix B

**Field Change Requests,
Design Change Notices,
and Requests for Information**

Field Change Request (FCR) Log

FCR #	Content	Dollar Value	Date Signed
1	Specification 01351—Revisions to Site Safety and Health Plan.	\$ 0	3/19/03
2	Specification 02111—Modifications to eliminate sludge drying and subgrade preparation	\$ 0	3/27/03
3	Specification 02377—Removal of central berm for use as soil barrier layer. Prepared in conjunction with DCN 1.	\$ 0	3/31/03
4	Specification 02111—Request to remove sludge outside of project boundary.	\$ 0	3/31/03 Rejected—No sludge removal outside project boundaries.
5	Specification 01450—Excavation of additional sludge material in North Lagoon.	\$ 0	5/21/03
6	Specification 02115—Placement of offsite and onsite biota barrier materials in two lifts. Prepared in conjunction with DCN 2.	\$ 0	6/18/03
7	Specification 02111—Backfill of North Lagoon.	\$ 0	6/18/03
8.	Fence installation	Pending	9/24/03
9	Specification 02115 BIOTA—Use of Keel material for biota barrier.	\$ 0	8/21/03
10	Specification 02377—Adjust specification for thickness of soil barrier layer. Prepared in conjunction with DCN 3.	\$ 0	9/22/03
11	Specifications 02140 and 02921—Delay of reseeding effort and in soil moisture testing.	\$ 0	9/26/03
12	Specification 02921—Revision to reseeding specification and erosion protection over winter.	\$ 0	12/2/03
13	Specification 02921—Revision to reseeding specification for amount of seeding and seed mix.	\$ 0	4/3/04

Design Change Notice (DCN) Log

DCN #	Content	Assoc. FCR	Date Signed
1	Eliminate the berm between the north and south lagoons.	3	5/21/03
2	Specification 02115—Biota barrier, offsite and SWMU material placement, including lifts.	6	6/18/03
3	Specification 02377—Change wording of Specification 02377, Part 3, Section 3.1.3.	10	9/19/03

Request for Information (RFI) Log

RFI #	Content	Specification	Date Signed
1	Is ASTM D 1557 necessary in the borrow source assessment report if all in-place density tests are based on ASTM D 698?	02377	4/25/03
2	Would the biota barrier layer have to meet the requirements of the crushed concrete, or the specification for the offsite source?	02115	Not Processed 6/5/03
3	Would the inclusion of crushed brick and cinderblock be acceptable as biota barrier layer material?	02115	6/17/03
4	The lab is not certified to perform ASTM D 2974-00 and 4972. Is this acceptable?	02140	9/10/03

TERC CONTRACT NO.: DACW45-94-D-0003

DELIVERY ORDER: 35

PROJECT TITLE AND LOCATION: Work Plan for the Closure of SWMU 101 - Sewage Lagoons, Cannon AFB

FIELD CHANGE REQUEST

PROJECT Closure of SWMU 101 Sewage Lagoons	PROJ. NO. 5155.0035.0001	FIELD CHANGE NO. 1
---	-----------------------------	-----------------------

TO Tom Zink DEPT. USACE LOCATION Omaha DATE 3/11/03

RE: DRAWING NO. _____ TITLE _____
 SPEC NO. 1351 TITLE Safety, Health and Emergency Response
 OTHER. _____

- DESCRIPTION (Items involved, submit sketch if applicable)
 - Modification of personnel responsibilities is requested.
 - Section 1.10.1.2) c. Performance of initial site specific training by safety and Health Manager
 - Section 1.10.1.2)d. Safety and Health Manager presence during the first 3 days of activities and during startup of any new activity
 - Section 1.10.1.2)e. Monthly site visits by Safety and Health Manager
 - Section 1.10.3.2)b. The Site Safety and Health Officer shall have no other duties
 - Section 1.27.1 Work zones; Exclusion zone and contamination reduction zone are not required for this effort
 - Section 1.28 Personal Hygiene and Decontamination; decontamination facilities and equipment decontamination are not required for this project.
- REASONS FOR CHANGE (If from disposition of nonconformance report, list report number)
 - Cost savings to project
- RECOMMENDED DISPOSITION MINOR CHANGE MAJOR CHANGE
 - Section 1.10.1.2) c. Recommend the Site Safety and Health officer perform the initial site-specific training versus the Safety and Health Manager
 - Section 1.10.1.2)d. Recommend Site Safety and Health Officer attend these meetings, not the Safety and Health Manager
 - Section 1.10.1.2)e. Recommend quarterly site visits by Safety and Health Manager or ESO Representative, monthly site visits by Delivery Order Manager, or Designee
 - Section 1.10.3.2)b. Recommend the Site Safety and Health Officer is allowed to perform addition duties (OC, Superintendent) since the Subcontractor will have a full time Health and Safety Officer on the site
 - Section 1.27.1. Work Zones. Subcontractor will operate a support zone in the contractor staging area shown in Drawing C-1 of Appendix A and submittal 01351, Shop Drawing/Work Zone.
 - Section 1.28.1, Decontamination facilities and equipment decontamination are not required for this project. Appropriate personal hygiene practices will be implemented during construction as provided in Section 3.4 of the SHERP-See attached

4. RESIDENT ENGINEER or designee (Signature)	DATE	PROJECT SUPERVISOR CONCURRENCE (Signature)	DATE
Donna Russell		James Morning	3/13/03

- DISPOSITION
 - NOT APPROVED (Give Reason)
 - CONSIDERED MINOR CHANGE - Approval per Recommended Disposition - Design Documents will not be normally revised; field to maintain as-built records
 - CONSIDERED MAJOR CHANGE - Action will be taken as prescribed on DCN -

LEAD DISCIPLINE ENGINEER OR DESIGNEE (Signature)	DATE	PROJECT ENGR OR DESIGNEE (Signature)	DATE
		Malcolm [Signature]	3-19-03

FIELD CHANGE REQUEST

PROJECT Closure of SWMU 101 Sewage Lagoons	PROJ. NO. 5155.0035.0001	FIELD CHANGE NO. 02
---	-----------------------------	------------------------

TO Donna Russell DEPT. USACE LOCATION Cannon AFB DATE 3/27/03

RE: DRAWING NO. _____ TITLE _____
 SPEC NO. 02111 TITLE Excavation and Handling of Contaminated Material
 OTHER _____

1. DESCRIPTION (Items involved, submit sketch if applicable.)

Section 3.2. Based on current field conditions (test pit excavations), sludge in the south lagoon does not require drying to meet the density requirement.

Section 3.2 Based on test pits excavations and visual inspections, the sludge in the north lagoon does not require drying

2. REASONS FOR CHANGE (If from disposition of nonconformance report, list report number)

Sludge has less moisture than specified and dryer than anticipated.

3. RECOMMENDED DISPOSITION XX MINOR CHANGE MAJOR CHANGE

Recommend the requirement for filling and drying for 48 hours be eliminated from the current SOW.

4. RESIDENT ENGINEER or designee (Signature)	DATE	PROJECT SUPERVISOR CONCURRENCE (Signature)	DATE
<u>Donna Russell</u>		<u>James Morning</u>	<u>3/27/03</u>

5. DISPOSITION

NOT APPROVED (Give Reason)

CONSIDERED MINOR CHANGE - Approval per Recommended Disposition - Design Documents will not be normally revised; field to maintain as-built records

CONSIDERED MAJOR CHANGE - Action will be taken as prescribed on DCN -

LEAD DISCIPLINE ENGINEER OR DESIGNEE (Signature)	DATE	PROJECT ENGINEER OR DESIGNEE (Signature)	DATE
		<u>Max Pastor</u>	<u>3-27-03</u>

Project Engineer signs and returns to LDE for transmittal to Resident Engineer with copies to:

Cc:

- Max Pastor, USACE-Albuquerque
- C. Bieniulis/TTFWI, Albuquerque
- R. Ederer/TTFWI, Albuquerque
- W. Migdal/TTFWI, Albuquerque
- J. Morning/TTFWI, Cannon AFB
- K. Omerik/TTFWI, Denver
- SW TERC Project Files (DO 35 Wad 1)

TERC CONTRACT NO.: DACW45-94-D-0003

DELIVERY ORDER: 35

PROJECT TITLE AND LOCATION: Work Plan for the Closure of SWMU 101 - Sewage Lagoons, Cannon AFB

FIELD CHANGE REQUEST

PROJECT Closure of SWMU 101 Sewage Lagoons	PROJ. NO. 5155.0035.0001	FIELD CHANGE NO. 3
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TO Donna Russell DEPT. USACE LOCATION Cannon AFB DATE 3/28/03

RE: DRAWING NO. C-4 TITLE _____
 SPEC NO. 02377 TITLE Soil Barrier Layer
 OTHER _____

1. DESCRIPTION (Items involved, submit sketch if applicable)

Drawing C-4 does not include removal of the earthen berm between Areas A and B. Based on reduced quantities being removed from Area B, the toe of slope will not hit the top of the berm. The resulting material from this berm and portions of Area B including the south 50% of the East and West side berms will/may be used for the soil barrier layer. All soils will be tested according to the specification 02377. This will allow all of the Keel material to be used as random fill. The cover design concept (3% slopes and 42 inch cover will not be modified. This is contingent upon final approval from CAFB and USACE.

2. REASONS FOR CHANGE (If from disposition of nonconformance report, list report number)
Thickness of sludge is less than specified, resulting in a modified cover design (footprint), and CAFB recently decided that these berms were available for use.

3. RECOMMENDED DISPOSITION MINOR CHANGE MAJOR CHANGE
Recommend lowering the toe of slope for the north end of the cover system to incorporate the reduced quantities and to allow the berm material to be used for the soil barrier layer, including East and west areas.

4. <u>Donna Russell</u>	DATE	PROJECT SUFF. CONCURRENCE (Signature) <u>James Morning</u>	DATE <u>3/29/03</u>
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5. DISPOSITION
 NOT APPROVED (Give Reason)
 CONSIDERED MINOR CHANGE - Approval per Recommended Disposition - Design Documents will not be normally revised; field to maintain as-built records
 CONSIDERED MAJOR CHANGE - Action will be taken as prescribed on DCN -

LEAD DISCIPLINE ENGINEER OR DESIGNEE (Signature) <u>Max A. Pastor</u>	DATE	PROJECT ENGR OR DESIGNEE (Signature) <u>Max A. Pastor</u>	DATE <u>3-31-03</u>
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Project Engineer signs and returns to LDE for transmittal to Resident Engineer with copies to:

- Cc:
 Max Pastor, USACE-Albuquerque
 C. Bieniulis/TTFWI, Albuquerque
 R. Ederer/TTFWI, Albuquerque
 W. Migdal/TTFWI, Albuquerque
 J. Morning/TTFWI, Cannon AFB
 K. Omernik/TTFWI, Denver
 SW TERC Project Files (DO 35 Wad 1)

FIELD CHANGE REQUEST

PROJECT Closure of SWMU 101 Sewage Lagoons	PROJ. NO. 5155.0035.0001	FIELD CHANGE NO. 4
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TO Donna Russell DEPT. USACE LOCATION Cannon AFB DATE 3/28/03

RE: DRAWING NO. _____ TITLE _____
 SPEC NO. 02111 TITLE Excavation Contaminated Mat'L

OTHER _____

1. DESCRIPTION (Items involved, submit sketch if applicable)

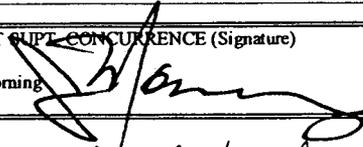
Due to years of high winds and drought conditions, the east side of the project area has accumulated 1-3 inches of dried sludge between outer toe and the fence line/ and or ditch line.

2. REASONS FOR CHANGE (If from disposition of nonconformance report, list report number) In order to provide the finished project with areas free of contamination, it would be in the best interest of the project to remove this area while equipment and personnel are mobilized.

3. RECOMMENDED DISPOSITION MINOR CHANGE MAJOR CHANGE

Recommend excavating area until visually clean and collect 1 composite sample during the confirmation sampling of the North lagoons.

Existing funds will be utilized.

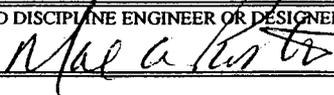
4.	DATE	PROJECT ENGR CONCURRENCE (Signature)	DATE
Donna Russell		James Morning 	3/28/03

5. DISPOSITION

NOT APPROVED (Give Reason) Do not perform any work outside of project area.

CONSIDERED MINOR CHANGE - Approval per Recommended Disposition - Design Documents will not be normally revised; field to maintain as-built records

CONSIDERED MAJOR CHANGE - Action will be taken as prescribed on DCN -

LEAD DISCIPLINE ENGINEER OR DESIGNEE (Signature)	DATE	PROJECT ENGR OR DESIGNEE (Signature)	DATE
	3-31-03		

Project Engineer signs and returns to LDE for transmittal to Resident Engineer with copies to:

- Cc:
- Max Pastor, USACE-Albuquerque
 - C. Bieniulis/TTFWI, Albuquerque
 - R. Ederer/TTFWI, Albuquerque
 - W. Migdal/TTFWI, Albuquerque
 - J. Morning/TTFWI, Cannon AFB
 - K. Omernik/TTFWI, Denver
 - SW TERC Project Files (DO 35 Wad 1)

TERC CONTRACT NO.: DACW45-94-D-0003

DELIVERY ORDER: 35

PROJECT TITLE AND LOCATION: Work Plan for the Closure of SWMU 101 – Sewage Lagoons, Cannon AFB

FIELD CHANGE REQUEST

PROJECT Closure of SWMU 101 Sewage Lagoons	PROJ. NO. 5155.0035.0001	FIELD CHANGE NO. 5
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TO Tom Zink DEPT. USACE LOCATION Omaha DATE 5/16/03

RE: DRAWING NO. C-4 TITLE Area A Removal Plan
 SPEC NO. 01450 TITLE Chemical Data Quality Control
 OTHER. _____

1. DESCRIPTION (Items involved, submit sketch if applicable) Additional sludge material was located in the North Lagoon. Based on a phone conversation between the USACE and Foster Wheeler Environmental, verbal direction to excavate the material was given. A survey will be performed to determine the additional amount of material excavated. Based on the excavated sludge, Keel material may not be required as random fill for the South Lagoon. Additional confirmation samples will be collected under the excavated areas at a rate of one composite sample per 40,000 square feet (Spec 01450)

2. REASONS FOR CHANGE (If from disposition of nonconformance report, list report number) _____
Additional contaminated Soils located in the north lagoon.

3. RECOMMENDED DISPOSITION MINOR CHANGE MAJOR CHANGE
Excavate additional quantity and place in the south lagoon. Perform a survey of the excavated material (north lagoon) and of the current pile in the south lagoon to determine if keel material will be required as random fill for the cover system.

4. RESIDENT ENGINEER or designee (Signature) Max Pastor <i>Max Pastor</i>	DATE <u>5-19-03</u>	PROJECT ENGR. CONCURRENCE (Signature) James Morning <i>James Morning</i>	DATE <u>5-16-03</u>
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5. DISPOSITION
 NOT APPROVED (Give Reason)
 CONSIDERED MINOR CHANGE – Approval per Recommended Disposition - Design Documents will not be normally revised; field to Maintain as-built records
 CONSIDERED MAJOR CHANGE – Action will be taken as prescribed on DCN -

LEAD DISCIPLINE ENGINEER OR DESIGNEE (Signature)	DATE	PROJECT ENGR OR DESIGNEE (Signature)	DATE
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Project Engineer signs and returns to LDE for transmittal to Resident Engineer with copies to:

- Cc:
Max Pastor, USACE-Albuquerque
C. Bieniulis/TTFWI, Albuquerque
R. Ederer/TTFWI, Albuquerque
W. Migdal/TTFWI, Albuquerque
J. Morning/TTFWI, Cannon AFB
K. Omerik/TTFWI, Denver
SW TERC Project Files (DO 35 Wad 1)

TERC CONTRACT NO.: DACW45-94-D-0003

DELIVERY ORDER: 35

PROJECT TITLE AND LOCATION: Work Plan for the Closure of SWMU 101 – Sewage Lagoons, Cannon AFB

FIELD CHANGE REQUEST

PROJECT Closure of SWMU 101 Sewage Lagoons	PROJ. NO. 5155.0035.0001	FIELD CHANGE NO. 6
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TO Tom Zink DEPT. USACE LOCATION Omaha DATE 6/16/03

RE: DRAWING NO. _____ TITLE _____
 SPEC NO. 02115 TITLE Biota Barrier Layer
 OTHER. _____

DESCRIPTION (Items involved, submit sketch if applicable). Due to the amount of fine material in the crushed concrete stockpile at SWMU 97 (LF-25), imported material will be required to meet the 3 inch to 6 inch specification. The biota barrier will be placed in two lifts to facilitate the existing material. The bottom lift will consist of the 3 inch to 6-inch material and the top lift will consist of the SWMU 97 crushed concrete stockpile as discussed in DCN 2. It is anticipated that the additional cost of 2 lifts will be accomplished within the current project budget.

3. RECOMMENDED DISPOSITION MINOR CHANGE MAJOR CHANGE

Place crushed concrete from SWMU 97 (LF-25) stockpile and imported biota barrier material in two lifts, per DCN 2.

4. RESIDENT ENGINEER or designee (Signature)	DATE	PROJECT SUPR. CONCURRENCE (Signature)	DATE
<u>Max Pastor</u> <i>M. Pastor</i>	<u>6-18-03</u>	<u>James Morning</u> <i>J. Morning</i>	<u>6/18/03</u>

5. DISPOSITION

NOT APPROVED (Give Reason)

CONSIDERED MINOR CHANGE – Approval per Recommended Disposition - Design Documents will not be normally revised; field to Maintain as-built records

CONSIDERED MAJOR CHANGE – Action will be taken as prescribed on DCN -

LEAD DISCIPLINE ENGINEER OR DESIGNEE (Signature)	DATE	PROJECT ENGR OR DESIGNEE (Signature)	DATE

Project Engineer signs and returns to LDE for transmittal to Resident Engineer with copies to:

- Cc:
M. Pastor, USACE-Albuquerque
J. Davey, USACE-Omaha
C. Bieniulis/TTFWI, Albuquerque
R. Ederer/TTFWI, Albuquerque
W. Migdal/TTFWI, Albuquerque
J. Morning/TTFWI, Cannon AFB
K. Omernik/TTFWI, Denver
SW TERC Project Files (DO 35 Wad 1)

TERC CONTRACT NO.: DACW45-94-D-0003

DELIVERY ORDER: 35

PROJECT TITLE AND LOCATION: Work Plan for the Closure of SWMU 101 – Sewage Lagoons, Cannon AFB

FIELD CHANGE REQUEST

PROJECT Closure of SWMU 101 Sewage Lagoons	PROJ. NO. 5155.0035.0001	FIELD CHANGE NO. 7
TO Tom Zink	DEPT. USACE	LOCATION Omaha
		DATE 6/16/03
RE: DRAWING NO.	TITLE	
SPEC NO. 02111	Excavation and Handling of Contaminated Material	
<input checked="" type="checkbox"/> OTHER		

DESCRIPTION (Items involved, submit sketch if applicable) The over excavation of contaminated materials in the North lagoon resulted in depressions in the grade that need to be back-filled to prevent ponding of water.

3. RECOMMENDED DISPOSITION MINOR CHANGE MAJOR CHANGE
Backfill and grade area to drain to the east ditch line utilizing the Keel Material Stockpile. Material to be placed in 10 inch lifts and compacted with no less than 3 passes of compactor. Moisture will be added as needed to control dust and achieve compaction. This will be completed within the current budget of the project after the erosion/vegetative layer have been completed, unless current schedule allows it to be accomplished prior to it.

4. RESIDENT ENGINEER or designee (Signature)	DATE	PROJECT SUPT. CONCURRENCE (Signature)	DATE
Max Pastor <i>Max Pastor</i>	6-18-03	James Morning <i>[Signature]</i>	6/18/03

5. DISPOSITION
 NOT APPROVED (Give Reason)
 CONSIDERED MINOR CHANGE – Approval per Recommended Disposition - Design Documents will not be normally revised; field to Maintain as-built records
 CONSIDERED MAJOR CHANGE – Action will be taken as prescribed on DCN -

LEAD DISCIPLINE ENGINEER OR DESIGNEE (Signature)	DATE	PROJECT ENGR OR DESIGNEE (Signature)	DATE

Project Engineer signs and returns to LDE for transmittal to Resident Engineer with copies to:

- Cc:
M. Pastor, USACE-Albuquerque
J. Davey, USACE-Omaha
C. Bieniulis/TTFWI, Albuquerque
R. Ederer/TTFWI, Albuquerque
W. Migdal/TTFWI, Albuquerque
J. Morning/TTFWI, Cannon AFB
K. Omemik/TTFWI, Denver
SW TERC Project Files (DO 35 Wad 1)

TERC CONTRACT NO.: DACW45-94-D-0003

DELIVERY ORDER: 35

PROJECT TITLE AND LOCATION: Work Plan for the Closure of SWMU 101 - Sewage Lagoons, Cannon AFB

FIELD CHANGE REQUEST

PROJECT Closure of SWMU 101 Sewage Lagoons		PROJ. NO. 5155.0035.0001	FIELD CHANGE NO. 8
TO	Max Pastor	DEPT.	USACE
		LOCATION	Cannon AFB
		DATE	8/18/03
RE:	DRAWING NO.	TITLE	
	SPEC NO.	TITLE	
X	OTHER: Cap Perimeter Fencing		

DESCRIPTION (Items involved, submit sketch if applicable) Construct approximately 1400 Linear Feet of Barb wire fence with one 16 foot gate, between North and South lagoons. Fence to match existing perimeter fence construction. (4 ft high, 4 wire with 10 foot spacing). Procure and install signage as directed by Cannon AFB. Fence is from east to west, with gate location as directed. This task will be completed within current project funding

3. RECOMMENDED DISPOSITION MINOR CHANGE MAJOR CHANGE

4. RESIDENT ENGINEER or designee (Signature)	DATE	PROJECT SMT. CONCURRENCE (Signature)	DATE
Max Pastor		James Morning	8/18/03

5. DISPOSITION

NOT APPROVED (Give Reason)

CONSIDERED MINOR CHANGE - Approval per Recommended Disposition - Design Documents will not be normally revised; field to Maintain as-built records

CONSIDERED MAJOR CHANGE - Action will be taken as prescribed on DCN -

LEAD DISCIPLINE ENGINEER OR DESIGNEE (Signature)	DATE	PROJECT ENGR OR DESIGNEE (Signature)	DATE
Rick Macfarlane	9/24/03	Brad Jones	

Project Engineer signs and returns to LDE for transmittal to Resident Engineer with copies to:

- Cc:
- R. Macfarlane, USACE-Cannon AFB
- Jane Davey, USACE-Omaha
- B. Jones, USACE-Omaha
- C. Bienialis/TTFWI, Albuquerque
- W. Migdal/TTFWI, Albuquerque
- J. Morning/TTFWI, Cannon AFB
- K. Omernik/TTFWI, Denver
- SW TERC Project Files (DO 35 Wad 1)

Provide 5 wire ^{match existing} ~~with 16' to~~ spacing
~~per Detail.~~ Locate fence along
old berm line.

TERC CONTRACT NO.: DACW45-94-D-0003

DELIVERY ORDER: 35

PROJECT TITLE AND LOCATION: Work Plan for the Closure of SWMU 101 - Sewage Lagoons, Cannon AFB

FIELD CHANGE REQUEST

PROJECT Closure of SWMU 101 Sewage Lagoons	PROJ. NO. 5155.0035.0001	FIELD CHANGE NO. 9
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TO	Max Pastor	DEPT.	USACE	LOCATION	Cannon AFB	DATE	8/21/03
RE:	DRAWING NO.	TITLE					
	SPEC NO. 02115 BIOTA	TITLE					
	OTHER						

DESCRIPTION (Items involved, submit sketch if applicable) Utilize Keel material to supplement the Landfill 25 Biota material for use on 2nd lift of Biota layer, per progress meeting of 8-20-03. Collect 3 grain size samples for project records. Material to be field checked for objectionable materials and any objectionable materials found will be removed. This task will be completed within current project funding

3. RECOMMENDED DISPOSITION MINOR CHANGE MAJOR CHANGE

4. RESIDENT ENGINEER or designee (Signature)	DATE	PROJECT SUPT. CONCURRENCE (Signature)	DATE
Max Pastor		James Morning	8/21/03

5. DISPOSITION

NOT APPROVED (Give Reason)

CONSIDERED MINOR CHANGE - Approval per Recommended Disposition - Design Documents will not be normally revised; field to Maintain as-built records

CONSIDERED MAJOR CHANGE - Action will be taken as prescribed on DCN -

LEAD DISCIPLINE ENGINEER OR DESIGNEE (Signature)	DATE	PROJECT ENGR OR DESIGNEE (Signature)	DATE
<i>[Signature]</i>	8-21-03	Brad Jones	

Project Engineer signs and returns to LDE for transmittal to Resident Engineer with copies to:

- Cc:
- R. Macfarlane, USACE-Cannon AFB
- J. Davey, USACE-Omaha
- B. Jones, USACE-Omaha
- C. Bieniulis/TTFWI, Albuquerque
- W. Migdal/TTFWI, Albuquerque
- J. Morning/TTFWI, Cannon AFB
- K. Omemik/TTFWI, Denver
- SW TERC Project Files (DO 35 Wad 1)

TERC CONTRACT NO.: DACW45-94-D-0003

DELIVERY ORDER: 35

PROJECT TITLE AND LOCATION: Work Plan for the Closure of SWMU 101 – Sewage Lagoons, Cannon AFB

FIELD CHANGE REQUEST

PROJECT Closure of SWMU 101 Sewage Lagoons	PROJ. NO. 5155.0035.0001	FIELD CHANGE NO. 10
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TO Max Pastor DEPT. USACE LOCATION Cannon AFB DATE 9/08/03

RE: DRAWING NO. _____ TITLE _____
 SPEC NO. 02377 3.2.1 and 3.3 TITLE Soil Barrier Layer
 OTHER _____

DESCRIPTION (Items involved, submit sketch if applicable) The soil barrier layer has been installed and the post placement survey shows that the layer thickness exceeds the specification by approx. 1 inch. Section 3.2.1 Survey states an average of 21 inches of cover. 20 inches is the maximum per the specification.

3. RECOMMENDED DISPOSITION MINOR CHANGE MAJOR CHANGE

Request a variance to the 2 inch tolerance section 3.3. This does not effect the designs purpose of a barrier layer and is a no cost change.

4. RESIDENT ENGINEER or designee (Signature)	DATE	PROJECT SUPT. CONCURRENCE (Signature)	DATE
Max Pastor		James Morning	

5. DISPOSITION

NOT APPROVED (Give Reason)

CONSIDERED MINOR CHANGE – Approval per Recommended Disposition - Design Documents will not be normally revised; field to Maintain as-built records

CONSIDERED MAJOR CHANGE – Action will be taken as prescribed on DCN -

LEAD DISCIPLINE ENGINEER OR DESIGNEE (Signature)	DATE	PROJECT ENGR OR DESIGNEE (Signature)	DATE
		Brad Jones	

Project Engineer signs and returns to LDE for transmittal to Resident Engineer with copies to:

Cc:

R. Macfarlane, USACE-Cannon AFB

J. Davey, USACE-Omaha

B. Jones, USACE-Omaha

C. Bieniulis/TTFWI, Albuquerque

W. Migdal/TTFWI, Albuquerque

J. Morning/TTFWI, Cannon AFB

K. Omerik/TTFWI, Denver

SW TERC Project Files (DO 35 Wad 1)

TERC CONTRACT NO.: DACW45-94-D-0003

PROJECT TITLE AND LOCATION: Work Plan for the Closure of SWMU 101 - 1

FIELD CHANGE REQUEST

PROJECT Closure of SWMU 101 Sewage Lagoons		PROJ. NO. 5153.0035.0001	FIELD CHANGE NO. 10
TO: Max Pastor	DEPT.	USACE	LOCATION Common AFB
RE: DRAWING NO.	TITLE		DATE
SPEC. NO. 02377 3.2.1 and 3.3	TITLE Soil Barrier Layer		
OTHER:			

DESCRIPTION (Items involved, submit sketch if applicable) The soil barrier layer has been installed and the post placement survey shows that the layer thickness exceeds the specification by approx. 1 inch. Section 3.2.1 Survey states an average of 21 inches of cover. 20 inches is the minimum per the specification.

3. RECOMMENDED DISPOSITION MINOR CHANGE MAJOR CHANGE
 Request a variance to the 2 inch tolerance section 3.3. This does not affect the decision impact of a barrier layer as it is a non-suit change.

4. RESIDENT ENGINEER or designer (Signature)	DATE	PROJECT SECT. CONCURRENCE (Signature)	DATE
Max Pastor		James Manning	9/18/03

5. DISPOSITION

NOT APPROVED (Give Reason)

CONSIDERED MINOR CHANGE - Approval per Recommended Disposition - Design Documents will not be normally revised, field to maintain as-built records

CONSIDERED MAJOR CHANGE - Action will be taken as prescribed on DCN -

LEAD DISCIPLINE ENGINEER OR DESIGNER (Signature)	DATE	PROJECT ENGR OR DESIGNER (Signature)	DATE
		Brad Jones	9/22/03

Project Engineer signs and returns to LDE for transmittal to Resident Engineer with copies to:

- Cc:
- R. Macfarlane, USACE-Common AFB
- J. Davy, USACE-Omaha
- B. Jones, USACE-Omaha
- C. Bianchi/TTFW1, Albuquerque
- W. Migda/TTFW1, Albuquerque
- J. Manning/TTFW1, Cannon AFB
- K. Omerik/TTFW1, Denver
- SW TERC Project Files (DO 35 Wad 1)

TERC CONTRACT NO.: DACW45-94-D-0003

DELIVERY ORDER: 35

PROJECT TITLE AND LOCATION: Work Plan for the Closure of SWMU 101 - Sewage Lagoons, Cannon AFB

FIELD CHANGE REQUEST

PROJECT Closure of SWMU 101 Sewage Lagoons		PROJ. NO. 5155.0035.0001	FIELD CHANGE NO. 11
TO	Max Pastor	DEPT.	USACE
		LOCATION	Cannon AFB
		DATE	9/25/03
RE:	DRAWING NO.	TITLE	
	SPEC NO. 02140 3.4 and 02921 1.1	TITLE	Erosion/Vegetation Layer 02140 Seeding 02921
	OTHER		

DESCRIPTION (Items involved, submit sketch if applicable) The Erosion Vegetation layer will not be installed before the seeding installation window date of no later than September 1 of the current growing season. (02921 3.1.1) This FCR request seeding be postponed and that in-place moisture content testing (02140 3.4.2 table 3) be eliminated in the construction of the erosion vegetation layer. A Erosion plan for the fall and spring seeding plan to be submitted separately.

3. RECOMMENDED DISPOSITION MINOR CHANGE MAJOR CHANGE

These test are for the proper moisture content to ensure seeding success. Since no seeding can be done, these test are not necessary.

4. RESIDENT ENGINEER or designee (Signature)	DATE	PROJECT SUPV. CONCURRENCE (Signature)	DATE
Max Pastor		James Morning	9/25/03

5. DISPOSITION

NOT APPROVED (Give Reason)

CONSIDERED MINOR CHANGE - Approval per Recommended Disposition - Design Documents will not be normally revised; field to Maintain as-built records

CONSIDERED MAJOR CHANGE - Action will be taken as prescribed on DCN -

LEAD DISCIPLINE ENGINEER OR DESIGNEE (Signature)	DATE	PROJECT ENGR OR DESIGNEE (Signature)	DATE
<i>Max C. Carter</i>	9-26-03	Brad Jones	

Project Engineer signs and returns to LDE for transmittal to Resident Engineer with copies to:

- Cc:
- R. Macfarlane, USACE-Cannon AFB
 - J. Davey, USACE-Omaha
 - B. Jones, USACE-Omaha
 - C. Bieniulis/TTFWI, Albuquerque
 - W. Migdal/TTFWI, Albuquerque
 - J. Morning/TTFWI, Cannon AFB
 - K. Omerik/TTFWI, Denver
 - R. Versaw/TTFWI, Denver
 - SW TERC Project Files (DO 35 Wad 1)

TERC CONTRACT NO.: DACW45-94-D-0003

DELIVERY ORDER: 35

PROJECT TITLE AND LOCATION: Work Plan for the Closure of SWMU 101 - Sewage Lagoons, Cannon AFB

FIELD CHANGE REQUEST

PROJECT Closure of SWMU 101 Sewage Lagoons	PROJ. NO. 5155.0035.0001	FIELD CHANGE NO. 12
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TO	Max Pastor	DEPT	USACE	LOCATION	Cannon AFB	DATE	11/22/03
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RE: DRAWING NO.		TITLE	
SPEC NO.	02921	TITLE	Seeding
OTHER.			

DESCRIPTION (Items involved, submit sketch if applicable) Revise the current specification (02921) with the following changes:

Section 3.1.1 Modify section to allow seeding April 1 through September 1.

Per FCR 11 "Erosion Control Plan" Crimp Mulching per section 3.3.3.1 will be done.

Section 3.3.3.1 Crimp mulching of the existing topsoil will be completed after demobilization efforts to stabilize the site until seeding can be accomplished in April 2004. Hay will be the chosen material and will be installed early December 2003.

Section 3.3.4. Watering seed-It is understood that a water truck will travel over seeded areas and will be kept to a minimum and be staggered paths. This will be the secondary plan. Foster Wheeler Environmental is currently planning on installing temporary irrigation pipe for watering.

Section 3.6.2 Change this section of the specification. It is very difficult to determine species at 1-inch height., therefor 4 inches will be the height.

Section 3.6.3.1 Remove mowing of the site from this section.

Section 3.6.3. No weed control (herbicides) will be used to control weeds during the establishment period. If the grass exceeds 7 inches during the establishment period, the site will be mowed to 4 inches.

3. RECOMMENDED DISPOSITION

MINOR CHANGE

MAJOR CHANGE

4. RESIDENT ENGINEER or designee (Signature)	DATE	PROJECT SUPT. CONCURRENCE (Signature)	DATE
Max Pastor SEE PAGE 2		James Morning	11/24/03

5. DISPOSITION

NOT APPROVED (Give Reason)

CONSIDERED MINOR CHANGE - Approval per Recommended Disposition - Design Documents will not be normally revised; field to Maintain as-built records

CONSIDERED MAJOR CHANGE - Action will be taken as prescribed on DCN -

FCR12

TERC CONTRACT NO.: DACW45-94-D-0003

DELIVERY ORDER: 35

PROJECT TITLE AND LOCATION: Work Plan for the Closure of SWMU 101 – Sewage Lagoons, Cannon AFB

LEAD DISCIPLINE ENGINEER OR DESIGNEE (Signature)	DATE	PROJECT ENGR OR DESIGNEE (Signature)	DATE
<i>Maria Pastor</i>	<i>12-2-03</i>	Brad Jones	

Project Engineer signs and returns to LDE for transmittal to Resident Engineer with copies to:

- Cc:
- D. Russell, USACE-Cannon AFB
- J. Davey, USACE-Omaha
- B. Jones, USACE-Omaha
- C. Bieniulis/TTFWI, Albuquerque
- W. Migdal/TTFWI, Albuquerque
- J. Morning/TTFWI, Cannon AFB
- K. Omernik/TTFWI, Denver
- R. Versaw/TTFWI, Denver
- SW TERC Project Files (DO 35 Wad 1)

FIELD CHANGE REQUEST

PROJECT Closure of SWMU 101 Sewage Lagoons	PROJ. NO. 5155.0035.0001	FIELD CHANGE NO. 13
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TO	Max Pastor	DEPT	USACE	LOCATION	Cannon AFB	DATE	5/3/04
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RE: DRAWING NO.		TITLE	
SPEC NO.	02921	TITLE	Seeding
OTHER.			

DESCRIPTION (Items involved, submit sketch if applicable) Revise the current specification (02921) with the following changes:

- Section 3.3.1.1 **Drill Seeding**. This section states that 12 pounds of pure live seed per acre, while Table 1 in section 2.1.2 shows 40.2 Pounds per acre. That amount of seeding would create too much plant competition. Contractor 's Reclamation vendor and third party review suggest that the 12 pounds per acre is the best rate. TTFWI request this rate be applied as such.
- Section 2.1.5 **Substitution**. The seed mix in Table 1 has a large amount of Fourwing Saltbush,. Contractor request that the seed mix be per attached mix, reducing the percentage of this species. The Cannon AFB surrounding area is more Grassland/Prairie land, and does not have much Saltbush in the area. The attached seed mix is designed toward local vegetation. The table also shows a different botanical name than what Saltbush is. Seed mix is matched to the Botanical name, which is a Shadscale Saltbush. (Atriplex Confertifolia) per Table 1.

3. RECOMMENDED DISPOSITION MINOR CHANGE MAJOR CHANGE

4. RESIDENT ENGINEER or designee (Signature)	DATE	PROJECT Supt. CONCURRENCE (Signature)	DATE
Max Pastor <i>Max a Pastor</i>	5-3-04	James Morning <i>[Signature]</i>	5/3/04

5. DISPOSITION

- NOT APPROVED (Give Reason)
- CONSIDERED MINOR CHANGE – Approval per Recommended Disposition - Design Documents will not be normally revised; field to Maintain as-built records
- CONSIDERED MAJOR CHANGE – Action will be taken as prescribed on DCN -

LEAD DISCIPLINE ENGINEER OR DESIGNEE (Signature)	DATE	PROJECT ENGR OR DESIGNEE (Signature)	DATE

TERC CONTRACT NO.: DACW45-94-D-0003

DELIVERY ORDER: 35

PROJECT TITLE AND LOCATION: Work Plan for the Closure of SWMU 101 – Sewage Lagoons, Cannon AFB

Project Engineer signs and returns to LDE for transmittal to Resident Engineer with copies to:

Cc:

D. Russell, USACE-Cannon AFB

J. Davey, USACE-Omaha

B. Jones, USACE-Omaha

C. Bieniulis/TTFWI, Albuquerque

W. Migdal/TTFWI, Albuquerque

J. Morning/TTFWI, Cannon AFB

K. Omernik/TTFWI, Denver

R. Versaw/TTFWI, Denver

SW TERC Project Files (DO 35 Wad 1)

Revegetation/Reclamation
Rangeland Rehabilitation
Fencing
Hydroseeding
Environmental Consulting



ROCKY MOUNTAIN RECLAMATION

Phone (307) 745-5235
Fax (307) 745-5230

rmr1@vca.com
www.RockyMountainReclamation.com

P.O. Box 1695
Laramie, WY 82073

TETRA TECH FW CANNON AIR FORCE BASE

SOUTH LANDFILL

SUGGESTED REVISED SEED MIXTURE

April 26, 2004

Species - Common Name	Variety	Pounds/Acre	seeds/lb	seeds/sq. ft.	seeds/acre	Percent of Mix
sideoats grama	Vaughn	1.75	191,000	7.87	334,250	13.98
blue grama	Hachita	0.50	825,000	9.47	412,500	17.22
little bluestem	Pastura	1.35	260,000	8.08	351,000	14.66
Indian grass	Cheyenne	2.00	170,000	7.81	340,000	14.20
switchgrass	Blackwell	1.00	389,000	8.93	389,000	18.24
purple prairie clover	Kaneb	1.50	210,000	7.23	315,000	13.15
shadscale saltbush	VNS, So. Utah	3.90	64,900	5.81	253,110	10.57
Total		12.00		64.98	2,394,860	100.00

TERC CONTRACT NO.: DACW45-94-D-0003

DELIVERY ORDER: 35

PROJECT TITLE AND LOCATION: Work Plan for the Closure of SWMU 101 – Sewage Lagoons, Cannon AFB

Project Engineer signs and returns to LDE for transmittal to Resident Engineer with copies to:

Cc:

D. Russell, USACE-Cannon AFB

J. Davey, USACE-Omaha

B. Jones, USACE-Omaha

C. Bieniulis/TTFWI, Albuquerque

W. Migdal/TTFWI, Albuquerque

J. Morning/TTFWI, Cannon AFB

K. Omernik/TTFWI, Denver

R. Versaw/TTFWI, Denver

SW TERC Project Files (DO 35 Wad 1)

FIELD CHANGE REQUEST

PROJECT Closure of SWMU 101 Sewage Lagoons	PROJ. NO. 5155.0035.0001	FIELD CHANGE NO. 13
TO Max Pastor	DEPT USACE	LOCATION Cannon AFB
		DATE 5/3/04
RE: DRAWING NO.	TITLE	
SPEC NO. 02921	TITLE Seeding	
OTHER.		

DESCRIPTION (Items involved, submit sketch if applicable) Revise the current specification (02921) with the following changes:

- Section 3.3.1.1 **Drill Seeding**. This section states that 12 pounds of pure live seed per acre, while Table 1 in section 2.1.2 shows 40.2 Pounds per acre. That amount of seeding would create too much plant competition. Contractor 's Reclamation vendor and third party review suggest that the 12 pounds per acre is the best rate. TTFWI request this rate be applied as such.
- Section 2.1.5 **Substitution**. The seed mix in Table 1 has a large amount of Fourwing Saltbush,. Contractor request that the seed mix be per attached mix, reducing the percentage of this species. The Cannon AFB surrounding area is more Grassland/Prairie land, and does not have much Saltbush in the area. The attached seed mix is designed toward local vegetation. The table also shows a different botanical name than what Saltbush is. Seed mix is matched to the Botanical name, which is a Shadscale Saltbush. (Atriplex Confertifolia) per Table 1.

3. RECOMMENDED DISPOSITION MINOR CHANGE MAJOR CHANGE

4. RESIDENT ENGINEER or designee (Signature)	DATE	PROJECT SUPT. CONCURRENCE (Signature)	DATE
Max Pastor		James Morning	

5. DISPOSITION

- NOT APPROVED (Give Reason)
- CONSIDERED MINOR CHANGE – Approval per Recommended Disposition - Design Documents will not be normally revised; field to Maintain as-built records

CONSIDERED MAJOR CHANGE – Action will be taken as prescribed on DCN -

LEAD DISCIPLINE ENGINEER OR DESIGNEE (Signature)	DATE	PROJECT ENGR OR DESIGNEE (Signature)	DATE
<i>Carol L. Bienholz</i>	4/3/2004		



FOSTER WHEELER ENVIRONMENTAL CORPORATION

TERC CONTRACT NO.: DACW45-94-D-0003

DELIVERY ORDER: 35

PROJECT TITLE AND LOCATION: Work Plan for the Closure of SWMU 101 - Sewage Lagoons, Cannon AFB

DESIGN CHANGE NOTICE

PROJECT CLOSURE OF SWMU 101 - SEWAGE LAGOONS		PROJ. NO. 519500350001	DESIGN CHANGE NO. 1
TO	BRAD JONES	DEPT.	LOCATION OMAHA DATE 5-19-03
RE: <input checked="" type="checkbox"/> DRAWING NO. C-8	TITLE Cover Sections		
<input type="checkbox"/> SPEC. NO.	PAGE		
<input type="checkbox"/> OTHER	ANTICIPATED REVISION DATE OF FORMAL DOCUMENTS		
<input type="checkbox"/> ENGINEERING "HOLD" PLACED ON CONSTRUCTION ACTIVITIES IN AREA DEFINED HEREIN PENDING RECEIPT OF FORMALLY REVISED DOCUMENT (S) AND/OR REVISED DCN, PE SIGNATURE NOT REQUIRED.			
<input checked="" type="checkbox"/> RELEASED FOR CONSTRUCTION ON BASIS OF MODIFICATION (S) PRESCRIBED BY THIS DCN.			
APPLICABLE DOCUMENTS WILL BE REVISED BY:			
<input type="checkbox"/> HOME OFFICE		<input type="checkbox"/> SITE (Project Engineer to assign Open Engineering Item No.)	
<input type="checkbox"/> AS-BUILT DRAWING BY RESIDENT ENGINEER'S STAFF		<input checked="" type="checkbox"/> OTHER (Contractor Provided Record Drawings)	

PROPOSED CHANGE	DESCRIPTION	REASON FOR CHANGE
	Eliminate the berm between the north and south lagoons	<input checked="" type="checkbox"/> FIELD CHANGE REQUEST (FCR No. 2)
		<input type="checkbox"/> REQUIRED MODIFICATIONS TO DESIGN OR SPECIFICATION
		<input type="checkbox"/> DISPOSITION OF NONCONFORMING ITEM
		<input type="checkbox"/> CHANGES IN REGULATORY OR OTHER REQUIREMENTS
		<input type="checkbox"/> OPERATIONAL EXPERIENCE
		<input type="checkbox"/> OTHER

EXHIBITS ATTACHED NO YES - IF YES, CHECK APPLICABLE BOX(ES)

COPIES OF MARKED-UP AREA OF DRAWING(S)

FIELD CHANGE REQUEST (FCR No. 2) OTHER (Describe)

COMMENTS _____ SCHEDULED ERECT/REPLACEMENT DATE(S) _____

ORIGINATOR _____ DATE _____

DISTRIBUTION (Check as applicable and fill in name. Indicate with an asterisk (*) personnel who are to perform a QA review.)

<input type="checkbox"/> Project Manager	<input type="checkbox"/> Health and Safety	<input type="checkbox"/> Chemical
<input type="checkbox"/> Project Engineer	<input type="checkbox"/> Construction	<input type="checkbox"/> Regulatory
<input type="checkbox"/> Architectural	<input type="checkbox"/> Electrical	<input type="checkbox"/> Structural
<input type="checkbox"/> CAD	<input type="checkbox"/> Environmental	<input type="checkbox"/> Science (Specify)
<input type="checkbox"/> Building	<input type="checkbox"/> IBC	<input type="checkbox"/> PQAE
<input type="checkbox"/> Mechanical	<input type="checkbox"/> Security	<input type="checkbox"/> Project Supt.
<input type="checkbox"/> Process	<input type="checkbox"/> Estimating	<input type="checkbox"/> Vendor Supt.
<input type="checkbox"/> Civil	<input type="checkbox"/> Quality Assurance	<input type="checkbox"/> Site Manager

NOTE: Personnel indicated with an asterisk (*) are to perform a QA review and inform Originator of any comments, or approve and sign, as applicable, by (date).

LEAD DISCIPLINE ENGINEER OR DESIGNER (Signature) <i>Brad Jones</i>	DATE 5-21-03	PROJECT ENGR OR DESIGNER (Signature) Brad Jones	DATE
QA REVIEWER (if included above) <input type="checkbox"/> COMMENTS (Attached) <input type="checkbox"/> NO COMMENTS		PROJECT MANAGER (After acceptance of all reviews)	
SIGNATURE	DATE	SIGNATURE	DATE

FIELD EVALUATION

IMPLEMENT RECOMMENDED DISPOSITION

DEFER RECOMMENDED DISPOSITION *To be signed*

Maria Foster
RESIDENT ENGINEER (Signature)

5-19-03
DATE



FOSTER WHEELER ENVIRONMENTAL CORPORATION

TERC CONTRACT NO.: DACW45-94-D-0003

DELIVERY ORDER: 35

PROJECT TITLE AND LOCATION: Work Plan for the Closure of SWMU 101 - Sewage Lagoons, Cannon AFB

DESIGN CHANGE NOTICE

PROJECT CLOSURE OF SWMU 101 - SEWAGE LAGOONS	PROJ. NO. <u>515560350001</u>	DESIGN CHANGE NO. <u>1</u>
---	----------------------------------	-------------------------------

TO BRAD JONES DEPT. _____ LOCATION OMaha DATE 5-19-03

RE: DRAWING NO. C-8 TITLE Cover Sections
 SPEC NO. _____ PAGE _____
 OTHER _____ ANTICIPATED REVISION DATE OF FORMAL DOCUMENTS _____

ENGINEERING "HOLD" PLACED ON CONSTRUCTION ACTIVITIES IN AREA DEFINED HEREIN PENDING RECEIPT OF FORMALLY REVISED DOCUMENT (S) AND/OR REVISED DCN, PE SIGNATURE NOT REQUIRED.
 RELEASED FOR CONSTRUCTION ON BASIS OF MODIFICATION (S) PRESCRIBED BY THIS DCN.

APPLICABLE DOCUMENTS WILL BE REVISED BY:
 HOME OFFICE SITE (Project Engineer to assign Open Engineering Item No.) _____
 AS-BUILT DRAWING BY RESIDENT ENGINEER'S STAFF OTHER Contractor Provided Record Drawings

PROPOSED CHANGE	DESCRIPTION	REASON FOR CHANGE
	Eliminate the berm between the north and south lagoons	<input checked="" type="checkbox"/> FIELD CHANGE REQUEST (FCR No.) <u>3</u> <input type="checkbox"/> REQUIRED MODIFICATIONS TO DESIGN OR SPECIFICATION <input type="checkbox"/> DISPOSITION OF NONCONFORMING ITEM <input type="checkbox"/> CHANGES IN REGULATORY OR OTHER REQUIREMENTS <input type="checkbox"/> OPERATIONAL EXPERIENCE <input type="checkbox"/> OTHER _____

EXHIBITS ATTACHED NO YES - IF YES, CHECK APPLICABLE BOX(ES)
 COPIES OF MARKED-UP AREA OF DRAWING(S)
 FIELD CHANGE REQUEST (FCR No. 3) OTHER (Describe) _____

COMMENTS _____ SCHEDULED ERECTED/PLACEMENT DATE(S) _____
 ORIGINATOR _____ DATE _____

DISTRIBUTION (Check as applicable and fill in name. Indicate with an asterisk (*) personnel who are to perform a QA review.)

<input type="checkbox"/> Project Manager	<input type="checkbox"/> Health and Safety	<input type="checkbox"/> Chemical
<input type="checkbox"/> Project Engineer	<input type="checkbox"/> Construction	<input type="checkbox"/> Regulatory
<input type="checkbox"/> Architectural	<input type="checkbox"/> Electrical	<input type="checkbox"/> Structural
<input type="checkbox"/> CAD	<input type="checkbox"/> Environmental	<input type="checkbox"/> Science (Specify) _____
<input type="checkbox"/> Building	<input type="checkbox"/> I&C	<input type="checkbox"/> PQAE
<input type="checkbox"/> Mechanical	<input type="checkbox"/> Security	<input type="checkbox"/> Project Supt
<input type="checkbox"/> Process	<input type="checkbox"/> Estimating	<input type="checkbox"/> Vendor Supt
<input type="checkbox"/> Civil	<input type="checkbox"/> Quality Assurance	<input type="checkbox"/> Site Manager

NOTE: Personnel indicated with an asterisk (*) are to perform a QA review and inform Originator of any comments, or approve and sign, as applicable, by (date).

LEAD DISCIPLINE ENGINEER OR DESIGNEE (Signature)	DATE	PROJECT ENGR OR DESIGNEE (Signature) Brad Jones	DATE
QA REVIEWER (if indicated above) <input type="checkbox"/> COMMENTS (Attached) <input type="checkbox"/> NO COMMENTS		PROJECT MANAGER (After acceptance of all reviews)	
SIGNATURE	DATE	SIGNATURE	DATE

FIELD EVALUATION
 IMPLEMENT RECOMMENDED DISPOSITION
 DEFER RECOMMENDED DISPOSITION *To discuss*
Mala Pastor RESIDENT ENGINEER (signature) 5-19-03 DATE



FOSTER WHEELER ENVIRONMENTAL CORPORATION

TERC CONTRACT NO.: DACW45-94-D-0003

DELIVERY ORDER: 35

PROJECT TITLE AND LOCATION: Work Plan for the Closure of SWMU 101 – Sewage Lagoons, Cannon AFB

DESIGN CHANGE NOTICE

PROJECT CLOSURE OF SWMU 101 – SEWAGE LAGOONS		PROJ. NO. 515500350001C4000	DESIGN CHANGE NO. 2
TO	Brad Jones	DEPT.	USACE
		LOCATION	Omaha
		DATE	6-16-03
RE:	DRAWING NO.	TITLE	Biota Barrier Layer
<input checked="" type="checkbox"/>	SPEC NO. 02115, Part 2	PAGE	2 and 3
<input type="checkbox"/>	OTHER	ANTICIPATED REVISION DATE OF FORMAL DOCUMENTS	
<input type="checkbox"/>	ENGINEERING "HOLD" PLACED ON CONSTRUCTION ACTIVITIES IN AREA DEFINED HEREIN PENDING RECEIPT OF FORMALLY REVISED DOCUMENT (S) AND/OR REVISED DCN, PE SIGNATURE NOT REQUIRED.		
<input checked="" type="checkbox"/>	RELEASED FOR CONSTRUCTION ON BASIS OF MODIFICATION (S) PRESCRIBED BY THIS DCN.		
APPLICABLE DOCUMENTS WILL BE REVISED BY:			
<input type="checkbox"/>	HOME OFFICE	<input type="checkbox"/>	SITE (Project Engineer to assign Open Engineering Item No.)
<input type="checkbox"/>	AS-BUILT DRAWING BY RESIDENT ENGINEER'S STAFF	<input checked="" type="checkbox"/>	OTHER <u>Changed specification will be reflected in record drawings and completion report</u>

PROPOSED CHANGE	DESCRIPTION	REASON FOR CHANGE
	Place Biota Barrier materials in 2 separate lifts due to difference in Materials.	FIELD CHANGE REQUEST FCR 6
	Place SWMU 97 (LF-25) material in a 7 to 9 inch top lift and imported 3 to 6-inch crushed concrete in a 7 to 9 inch bottom lift, for a total lift thickness of 15 to 18 inches. Each lift shall meet compaction requirements (Part 3.3) and material Properties listed in Part 2.	<input checked="" type="checkbox"/> REQUIRED MODIFICATIONS TO DESIGN OR SPECIFICATION
	Off-site material will be screened to only include 3 inch to 6-inch material.	<input type="checkbox"/> DISPOSITION OF NONCONFORMING ITEM
		<input type="checkbox"/> CHANGES IN REGULATORY OR OTHER REQUIREMENTS
		<input type="checkbox"/> OPERATIONAL EXPERIENCE
		<input type="checkbox"/> OTHER

EXHIBITS ATTACHED	<input type="checkbox"/> NO	<input type="checkbox"/> YES - IF YES, CHECK APPLICABLE BOX(ES)
<input type="checkbox"/> COPIES OF MARKED-UP AREA OF DRAWING(S)		<input type="checkbox"/> OTHER (Describe)
<input checked="" type="checkbox"/> FIELD CHANGE REQUEST (FCR No. 6)		

COMMENTS _____ SCHEDULED ERECTED/PLACEMENT DATE(S) _____

ORIGINATOR _____ DATE _____

DISTRIBUTION (Check as applicable and fill in name. Indicate with an asterisk (*) personnel who are to perform a QA review.)

<input type="checkbox"/> Project Manager	<input type="checkbox"/> Health and Safety	<input type="checkbox"/> Chemical
<input type="checkbox"/> Project Engineer	<input type="checkbox"/> Construction	<input type="checkbox"/> Regulatory
<input type="checkbox"/> Architectural	<input type="checkbox"/> Electrical	<input type="checkbox"/> Structural
<input type="checkbox"/> CAD	<input type="checkbox"/> Environmental	<input type="checkbox"/> Science (Specify)
<input type="checkbox"/> Building	<input type="checkbox"/> I&C	<input type="checkbox"/> PQAE
<input type="checkbox"/> Mechanical	<input type="checkbox"/> Security	<input type="checkbox"/> Project Supt
<input type="checkbox"/> Process	<input type="checkbox"/> Estimating	<input type="checkbox"/> Vendor Supt
<input type="checkbox"/> Civil	<input type="checkbox"/> Quality Assurance	<input type="checkbox"/> Site Manager

NOTE: Personnel indicated with an asterisk (*) are to perform a QA review and inform Originator of any comments, or approve and sign, as applicable, by (date).

LEAD DISCIPLINE ENGINEER OR DESIGNEE (Signature)	DATE	PROJECT ENGR OR DESIGNEE (Signature)	DATE
		Brad Jones	

QA REVIEWER (if indicated above)	PROJECT MANAGER (After acceptance of all reviews)
<input type="checkbox"/> COMMENTS (Attached) <input type="checkbox"/> NO COMMENTS	

SIGNATURE	DATE	SIGNATURE	DATE
-----------	------	-----------	------

FIELD EVALUATION

IMPLEMENT RECOMMENDED DISPOSITION DEFER RECOMMENDED DISPOSITION

Max Pastor
RESIDENT ENGINEER (signature)

6-18-03
DATE



FOSTER WHEELER ENVIRONMENTAL CORPORATION

TERC CONTRACT NO.: DACW45-94-D-0003

DELIVERY ORDER: 35

PROJECT TITLE AND LOCATION: Work Plan for the Closure of SWMU 101—Sewage Lagoons, Cannon AFB

DESIGN CHANGE NOTICE

PROJECT Sewage Lagoon Closure	PROJ. NO. 5155.0035.0001	DESIGN CHANGE NO. 3
---	------------------------------------	-------------------------------

TO Brad Jones DEPT. USACE LOCATION Omaha DATE 9/18/03

RE: DRAWING NO. _____ TITLE _____
 SPEC NO. Section No. 02377, Part 3 Execution, Section 3.1 - Borrow Source Assessment, 3.1.3 Hydraulic Conductivity Testing PAGE _____
 OTHER _____ ANTICIPATED REVISION DATE OF FORMAL DOCUMENTS _____

- ENGINEERING "HOLD" PLACED ON CONSTRUCTION ACTIVITIES IN AREA DEFINED HEREIN PENDING RECEIPT OF FORMALLY REVISED DOCUMENT(S) AND/OR REVISED DCN, PE SIGNATURE NOT REQUIRED.
 RELEASED FOR CONSTRUCTION ON BASIS OF MODIFICATION(S) PRESCRIBED BY THIS DCN.

APPLICABLE DOCUMENTS WILL BE REVISED BY:

- HOME OFFICE SITE (Project Engineer to assign Open Engineering Item No.) _____
 AS-BUILT DRAWING BY RESIDENT ENGINEER'S STAFF OTHER _____

PROPOSED CHANGE	DESCRIPTION	REASON FOR CHANGE
Current language: "A set of tests shall consist of one hydraulic conductivity test run on a representative sample corresponding to each point from each compaction curve at or above ASTM D 698 optimum moisture content."		<input type="checkbox"/> FIELD CHANGE REQUEST (FCR No.) _____ <input checked="" type="checkbox"/> REQUIRED MODIFICATIONS TO DESIGN OR SPECIFICATION <input type="checkbox"/> DISPOSITION OF NONCONFORMING ITEM <input type="checkbox"/> CHANGES IN REGULATORY OR OTHER REQUIREMENTS <input type="checkbox"/> OPERATIONAL EXPERIENCE <input type="checkbox"/> OTHER _____
Proposed language: "A set of tests shall consist of two hydraulic conductivity tests run on a representative sample. One test shall correspond to the optimum moisture content as defined by ASTM D 698 and the other shall correspond to a moisture content of at least 2 percent above optimum."	<i>between 1-3 percent above optimum</i>	

EXHIBITS ATTACHED NO YES - IF YES, CHECK APPLICABLE BOX(ES)
 COPIES OF MARKED-UP AREA OF DRAWING(S) OTHER (Describe) _____
 FIELD CHANGE REQUEST (FCR No. _____)

COMMENTS _____ SCHEDULED ERECTED/PLACEMENT DATE(S) _____
 ORIGINATOR _____ DATE _____

DISTRIBUTION (Check as applicable and fill in name. Indicate with an asterisk (*) personnel who are to perform a QA review.)

<input type="checkbox"/> Project Manager <u>Jane Davy</u>	<input type="checkbox"/> Health and Safety _____	<input type="checkbox"/> Chemical _____
<input type="checkbox"/> Project Engineer _____	<input type="checkbox"/> Construction _____	<input type="checkbox"/> Regulatory _____
<input type="checkbox"/> Architectural _____	<input type="checkbox"/> Electrical _____	<input type="checkbox"/> Structural _____
<input type="checkbox"/> CAD _____	<input type="checkbox"/> Environmental _____	<input type="checkbox"/> Science (Specify) _____
<input type="checkbox"/> Building _____	<input type="checkbox"/> I&C _____	<input type="checkbox"/> PQAE _____
<input type="checkbox"/> Mechanical _____	<input type="checkbox"/> Security _____	<input type="checkbox"/> Project Supt _____
<input type="checkbox"/> Process _____	<input type="checkbox"/> Estimating _____	<input type="checkbox"/> Vendor Supt _____
<input type="checkbox"/> Civil _____	<input type="checkbox"/> Quality Assurance _____	<input type="checkbox"/> Site Manager _____

NOTE: Personnel indicated with an asterisk (*) are to perform a QA review and inform Originator of any comments, or approve and sign, as applicable, by (date).

LEAD DISCIPLINE ENGINEER OR DESIGNEE (Signature) <u>Brad Jones</u>	DATE _____	PROJECT ENGR OR DESIGNEE (Signature) <u>Brad Jones</u>	DATE <u>9-19-03</u>
NMED (Signature if required)	DATE _____	CANNON AFB PROJECT MANAGER (Signature)	DATE _____
QA REVIEWER (if indicated above) <input type="checkbox"/> COMMENTS (Attached) <input type="checkbox"/> NO COMMENTS	PROJECT MANAGER (After acceptance of all reviews)		
SIGNATURE _____	DATE _____	SIGNATURE _____	DATE _____

FIELD EVALUATION
 IMPLEMENT RECOMMENDED DISPOSITION DEFER RECOMMENDED DISPOSITION
 Max Pastor Max Pastor RESIDENT ENGINEER (signature) _____ DATE _____



FOSTER WHEELER ENVIRONMENTAL CORPORATION

TERC CONTRACT NO.: DACW45-94-D-0003

DELIVERY ORDER: 35

PROJECT TITLE AND LOCATION: Work Plan for the Closure of SWMU 101 - Sewage Lagoons, Cannon AFB

REQUEST FOR ENGINEERING INFORMATION

(REI)

REI No. 001 Issue Date 4/24/03 Closure Date _____ Sheet 1 of 1

Work Area: Sail Baroxe Layer Subcontractor: Headhead Contracting

Applicable Plans, Drawings, Specifications: Spec Section 02377

Information Requested: In paragraph 2.1.2 of spec Section 02377 Compaction testing for Barrier Source Assessment requires that each source of borrow material be tested to establish compaction curves using ASTM D 698 (Standard Practice) and ASTM D 1557 (modified Proctor). In paragraph 2.1.4, the "Acceptable Zone" development requires that in-place densities of each type of borrow material take no less than 90% of minimum dry density based on ASTM D 698. Is ASTM D 1557 necessary in the Barrier Source Assessment report if all in-place density tests are based on ASTM D 698.

Subcontractor Signature: _____ Date: 4/24/03

Foster Wheeler Environmental Response: The USACE is attempting to evaluate the most appropriate degree of compaction for the barrier layer based on the two methods. Unless directed by USACE, complete the tests as stipulated in the Specifications.

Project Engineer Signature: [Signature] Date: 4/25/03

Project Manager Signature: _____ Date: _____

- Distribution:
- AFB Project Manager
 - DOM
 - Task Manager/Engineer
 - QCM
 - CQC Systems Manager
 - Site Superintendent
 - USACE QA
 - Subcontractor: _____



FOSTER WHEELER ENVIRONMENTAL CORPORATION

TERC CONTRACT NO.: DACW45-94-D-0003

DELIVERY ORDER: 35

PROJECT TITLE AND LOCATION: Work Plan For the Closure of SWMU 101 - Sewage Lagoons, Cannon AFB

REQUEST FOR INFORMATION (RFI)

Sheet 1 of 1

RFI No. 002

Issue Date 6/4/2003

Closure Date _____

Work Area: Biota Barrier

Applicable Plans, Drawings, Specifications: Specification 02115

Information Requested: In Part 2 of Specification 02115, Biota Barrier layer requirements are specified for the crushed concrete pile at LF-25 and from off-site sources. Keel material is currently being evaluated for use as biota barrier and is not discussed in the specification. Would it have to meet the requirements of the crushed concrete, or the specification for the off-site source (3-inch to 6 inch)?

Project Quality Control Manager Signature: _____ Date: _____

USACE QA Response: _____

USACE QA Signature: _____ Date: _____

Distribution:

AFB Project Manager
DOM
Task Manager/Engineer
QCM

CQC Systems Manager
Site Superintendent
USACE QA
Subcontractor: Arrowhead Contracting Inc.

NOT PROCESSED
JAM
6/5/03



FOSTER WHEELER ENVIRONMENTAL CORPORATION

TERC CONTRACT NO.: DACW45-94-D-0003

DELIVERY ORDER: 35

PROJECT TITLE AND LOCATION: Work Plan For the Closure of SWMU 101 - Sewage Lagoons, Cannon AFB

REQUEST FOR INFORMATION (RFI)

Sheet 1 of 1

RFI No. 003

Issue Date 6/16/2003

Closure Date _____

Work Area: Biota Barrier Material

Applicable Plans, Drawings, Specifications: Specification 02115

Information Requested: In Part 2 of Specification 02115, Biota Barrier material requirements are specified for the crushed concrete pile at SWMU 97 (LP-25) and from off-site sources. The proposed off-site source (concrete stockpile) contains small quantities of brick, cinderblock, metal debris and asphalt (in discrete areas).

Would the inclusion of crushed brick and cinderblock be acceptable as biota barrier material? The material would be selectively crushed to exclude any metal or asphalt debris and screened to only include particles ranging from 3 inch to 6 inch. A magnet would be used to eliminate the metallic debris. Foster Wheeler Environmental would have a Field Engineer/OC person at the pit/stockpile during crushing operations.

Project Quality Control Manager Signature: Walt Migdal Date: 6/16/03

USACE QA Response:

THE ABOVE PROCEDURE IS ACCEPTABLE PROVIDED THE PROCESSED MATERIAL MEETS ALL REMAINING REQUIREMENTS OF PART 2 BIOTA BARRIER MATERIAL IN SPECIFICATION SECTION 02115.

USACE QA Signature: Brad Jones Date: 6-17-03



FOSTER WHEELER ENVIRONMENTAL CORPORATION

TERC CONTRACT NO.: DACW45-94-D-0003

DELIVERY ORDER: 35

PROJECT TITLE AND LOCATION: Work Plan for the Closure of SWMU 101 - Sewage Lagoons, Cannon AFB

REQUEST FOR INFORMATION

(RFI)

RFI No. 4

Issue Date 9/10/03

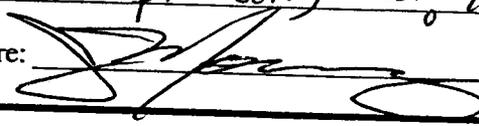
Closure Date _____

Sheet 1 of 1

Work Area: EROSION/VEGETATION Layer

Applicable Plans, Drawings, Specifications: 02140 31. Borrow Source Assessment Report

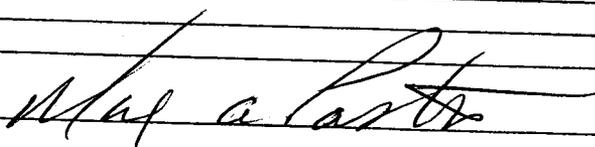
Information Requested: Section does not specify that this TESTING be done by a USACE CERT Lab. AS SECTION 02372 DOES. THERE IS NOT A SUBMITTAL ITEM IN APPROVED WP SUBCONTRACTOR LAB IS NOT CERTIFIED TO PERFORM ASTM D 2974-00 AND 4972 (ASH + ORGANIC MATTER - pH SOIL) - ? IS THIS ACCEPTABLE?

Project Quality Control Manager Signature: 

Date: 9/10/03

USACE QA Response: concur with Ctr

the test report are acceptable as submitted

USACE QA Signature: 

Date: 9-10-03

Distribution:

AFB Project Manager
DOM
Task Manager/Engineer
QCM

CQC Systems Manager
Site Superintendent
USACE QA
Subcontractor: _____

ATTACHMENTS Provided for Review

pg 1 of 6

Appendix C

Site Photographs



Photo 1. Area A—Placed Concrete Rubble in the South Lagoon



Photo 2. General Site Work—Tumbleweeds and Brush Removed



Photo 3. Area B—Removal of Pipe from the North Lagoon



Photo 4. Area B—Removal of Concrete Slope from East Berm



Photo 5. General Site Work—Demolition and Sludge Removal



Photo 6. Area B—Northeast Corner Sludge and Contaminated Soil Excavation



Photo 7. Area A—Contaminated Material Lift Compaction



Photo 8. Area B—Graded Lagoon, Post-Excavation



Photo 9. Area B—Additional Sludge Removal from Trench



Photo 10. General Site Work—Lift Construction



Photo 11. Geotechnical Testing of the Soil Barrier Layer with a "Density Shot"



Photo 12. Geotechnical Testing of the Soil Barrier Layer Sand Cone



Photo 13. Placement of the Biota Barrier Layer



Photo 14. Profile of the Soil Barrier Layer, Biota Barrier Layer, and Erosion-Vegetation Layer

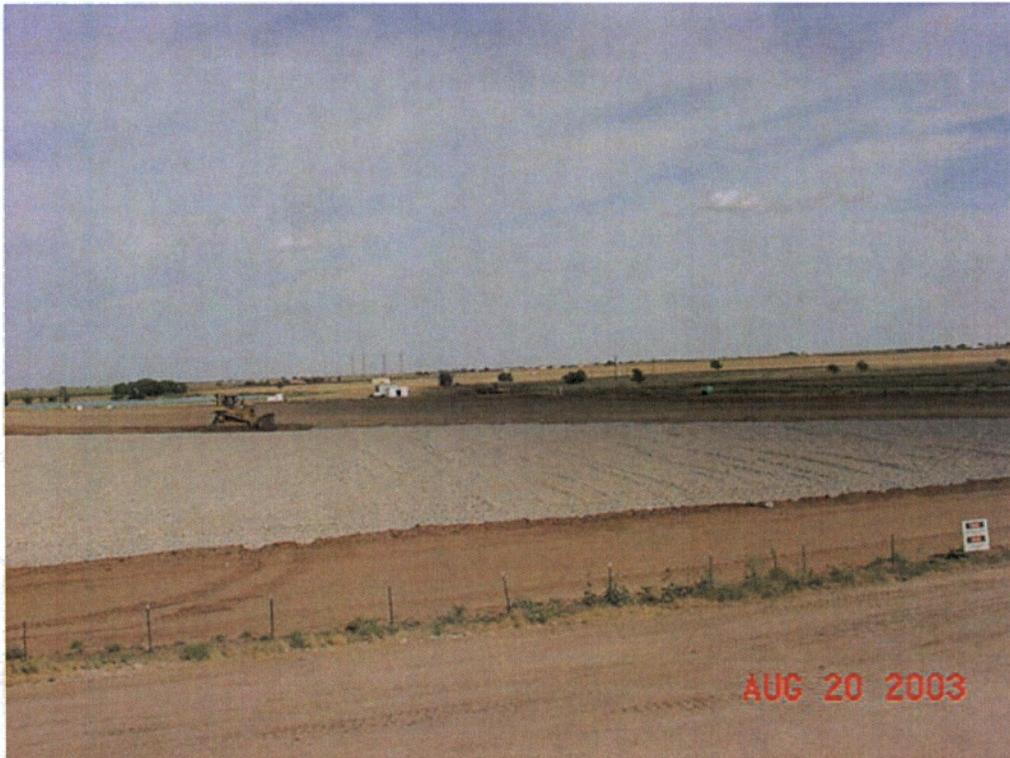


Photo 15. Area A—Biota Barrier Layer Construction, Southwest Corner



Photo 16. Erosion-Vegetation Layer Construction



Photo 17. Crimp-Mulch Soil Stabilization



Photo 18. Northern Slope, Seeded and Crimp-Mulched



Photo 19. Area A—Irrigation, Southwest Corner



Photo 20. Area B—Post Mowing



Photo 21. Area A—Post Mowing

Appendix D

Site Inspections

PREPARATORY INSPECTION WORKSHEET

DEFINABLE FEATURE OF WORK **Excav & Hnding of Contam Mat**

A. ACTIVITIES INCLUDED UNDER Excav & Hnding of Contam Mat. -

B. QUALITY CONTROL REQUIREMENTS -

C. QA/QC PUNCH LIST ITEMS -

INCLUDE ADDITIONAL COMMENTS ON DAILY REPORT

D. LABOR RATES -

LABOR CLASSIFICATIONS	BASIC RATE	FRINGE BENEFITS	PLUS %	TOTAL WAGE/HR
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

REVIEW CONTRACT DRAWINGS AND SPECIFICATIONS -

DRAWING / SPEC. NO

COMMENTS / CONFLICTS

DISCUSSED
Yes/ No/ NA

1. Review of 02111, Approved Plan, Digging Permit, Survey scheduled/completed, MW's Protected, tanks relocated.

Yes

2. *OK*

3. _____

4. _____

5. _____

F. REPETITIVE DEFICIENCIES FOUND ON PREVIOUS PROJECTS -

DISCUSSED
Yes/ No/ NA

1. _____

2. _____

3. _____

4. _____

PREPARATORY INSPECTION WORKSHEET

DEFINABLE FEATURE OF WORK: Excav & Handling of Contam Mat

G. INSPECTION CHECKS -

IN COMPLIANCE
Yes/ No/ NA

- | | IN COMPLIANCE |
|----------|---------------|
| | Yes/ No/ NA |
| 1. _____ | _____ |
| 2. _____ | _____ |
| 3. _____ | _____ |
| 4. _____ | _____ |

H. JOB SITE SAFETY -

IN COMPLIANCE
Yes/ No/ NA

- | | IN COMPLIANCE |
|---|---------------|
| | Yes/ No/ NA |
| 1. Proper PPE being worn, Safety briefing completed, Dust control | _____ |
| 2. _____ | _____ |
| 3. _____ | _____ |
| 4. _____ | _____ |
| 5. _____ | _____ |

I. QUALITY ASSURANCE EVALUATION NOTES -

DISCUSSED
Yes/ No/ NA

- | | DISCUSSED |
|----------|-------------|
| | Yes/ No/ NA |
| 1. _____ | _____ |
| 2. _____ | _____ |
| 3. _____ | _____ |
| 4. _____ | _____ |

Provisional
[Signature] COE 3-21-03
[Signature] CQM 3-21-03

INITIAL INSPECTION WORKSHEET

DEFINABLE FEATURE OF WORK *Excav & Hndng of Contam Mat.*

A. ACTIVITIES INCLUDED UNDER Excav & Hndng of Contam Mat. -

B. QUALITY CONTROL REQUIREMENTS -

C. QA/QC PUNCH LIST ITEMS -

INCLUDE ADDITIONAL COMMENTS ON DAILY REPORT

D. LABOR RATES -

LABOR CLASSIFICATIONS	BASIC RATE	FRINGE BENEFITS	PLUS %	TOTAL WAGE/HR
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

INSPECTION CHECKS -

		IN COMPLIANCE Yes/ No/ NA
1.	02111 3.3 Sludge drying, - verify moisture and compaction features- 02111 3.2 Subgrade prep- Verify conditon of materials, moisture, Compaction- 1 inch deflection. <i>O/C</i>	<i>Yes</i>
2.	_____	___
3.	_____	___
4.	_____	___
5.	_____	___

F. JOB SITE SAFETY -

		IN COMPLIANCE Yes/ No/ NA
1.	_____	___
2.	_____	___
3.	_____	___
4.	_____	___

G. QA Evaluation Notes -

		DISCUSSED Yes/ No/ NA
1.	_____	___
2.	_____	___
3.	_____	___
4.	_____	___

THREE-PHASE INSPECTION SCHEDULE

ACTIVITY NUMBER	ACTIVITY DESCRIPTION	DATE STARTED	DATE FINISHED	FINAL FOLLOW-UP	QC RATING
-----------------	----------------------	--------------	---------------	-----------------	-----------

- DEMOLITION AND REMOVAL -

PREPARATORY INSPECTION CONDUCTED _____
INITIAL INSPECTION CONDUCTED _____

- Excav & Hndng of Contam Mat. -

PREPARATORY INSPECTION CONDUCTED _____
INITIAL INSPECTION CONDUCTED _____

 CQM 3/21/03
Ponnir K. Abhi COE 3-21-03
(Signature Sheet for (Initial))

3/24/03

PREPARATORY INSPECTION WORKSHEET

DEFINABLE FEATURE OF WORK - DEMOLITION AND REMOVAL

A. ACTIVITIES INCLUDED UNDER DEMOLITION AND REMOVAL -

B. QUALITY CONTROL REQUIREMENTS -

C. QA/QC PUNCH LIST ITEMS -

INCLUDE ADDITIONAL COMMENTS ON DAILY REPORT

NONE

D. LABOR RATES -

LABOR CLASSIFICATIONS	BASIC RATE	FRINGE BENEFITS	PLUS %	TOTAL WAGE/HR
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

E. REVIEW CONTRACT DRAWINGS AND SPECIFICATIONS -

DRAWING / SPEC. NO

COMMENTS / CONFLICTS

DRAWING / SPEC. NO	COMMENTS / CONFLICTS
_____	_____
_____	_____
_____	_____

1. Review items to be demo, Section 1.2 Work Plan approved 1.3
2. _____
3. _____
4. _____
5. _____

DISCUSSED
Yes/ No/ NA

_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

F. REPETITIVE DEFICIENCIES FOUND ON PREVIOUS PROJECTS -

1. _____
2. _____
3. _____
4. _____

DISCUSSED
Yes/ No/ NA

_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

G. INSPECTION CHECKS -

1. _____
2. _____

IN COMPLIANCE
Yes/ No/ NA

_____	_____	_____
_____	_____	_____

PREPARATORY INSPECTION WORKSHEET

DEFINABLE FEATURE OF WORK - DEMOLITION AND REMOVAL

G. INSPECTION CHECKS - Cont.

- 3. _____
- 4. _____

H. JOB SITE SAFETY -

- | | IN COMPLIANCE
Yes/ No/ NA |
|---|------------------------------|
| 1. PPE, Hot work Permit, Dust controls, Backup Alarms | Yes/ No/ NA |
| 2. _____ | _____ |
| 3. _____ | _____ |
| 4. _____ | _____ |
| 5. _____ | _____ |

I. QUALITY ASSURANCE EVALUATION NOTES -

- | | DISCUSSED
Yes/ No/ NA |
|----------|--------------------------|
| 1. _____ | _____ |
| 2. _____ | _____ |
| 3. _____ | _____ |
| 4. _____ | _____ |

Ronnie K. Wzli COE
JH G... CQM

3/24/03

INITIAL INSPECTION WORKSHEET

DEFINABLE FEATURE OF WORK - DEMOLITION AND REMOVAL

A. ACTIVITIES INCLUDED UNDER DEMOLITION AND REMOVAL -

B. QUALITY CONTROL REQUIREMENTS -

C. QA/QC PUNCH LIST ITEMS -

INCLUDE ADDITIONAL COMMENTS ON DAILY REPORT

D. LABOR RATES -

LABOR CLASSIFICATIONS	BASIC RATE	FRINGE BENEFITS	PLUS %	TOTAL WAGE/HR
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

E. INSPECTION CHECKS -

	IN COMPLIANCE Yes/ No/ NA
1. Concrete Rubble sized less than 36 inches. mW /Tanks protected, maintained flagging. Confirm depth of random fill. <i>OK</i>	<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
2. _____	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
3. _____	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
4. _____	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
5. _____	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>

F. JOB SITE SAFETY -

	IN COMPLIANCE Yes/ No/ NA
1. Visual Dust monitoring, Dust control measures in place. PPE <i>OK</i>	<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
2. _____	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
3. _____	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
4. _____	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
5. _____	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>

G. QA Evaluation Notes -

	DISCUSSED Yes/ No/ NA
1. Spot check debris w/ measuring device.	<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
2. _____ <i>OK</i>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
3. <i>TREE TRIM - OK</i>	<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
4. _____	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
5. _____	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>

INITIAL INSPECTION WORKSHEET

DEFINABLE FEATURE OF WORK DEMOLITION AND REMOVAL

G. QA Evaluation Notes - Cont.

Ronnie K. Hylle
JM 3/24/03

PREPARATORY INSPECTION WORKSHEET

DEFINABLE FEATURE OF WORK: Soil Barrier Layer Constructio

A. ACTIVITIES INCLUDED UNDER Soil Barrier Layer Constructio -

B. QUALITY CONTROL REQUIREMENTS -

C. QA/QC PUNCH LIST ITEMS -

INCLUDE ADDITIONAL COMMENTS ON DAILY REPORT

D. LABOR RATES -

LABOR CLASSIFICATIONS	BASIC RATE	FRINGE BENEFITS	PLUS %	TOTAL WAGE/HR
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

E. REVIEW CONTRACT DRAWINGS AND SPECIFICATIONS -

DRAWING / SPEC. NO	COMMENTS / CONFLICTS
Review 02377	
815 CAT	Compactor -OK
Road Grader	Scarification Equip -OK

- | | DISCUSSED |
|-------------------------------------|-------------|
| | Yes/ No/ NA |
| 1. Pre Constuction survey- Approved | OK |
| 2. _____ | _____ |
| 3. _____ | _____ |
| 4. _____ | _____ |
| 5. _____ | _____ |

F. REPETITIVE DEFICIENCIES FOUND ON PREVIOUS PROJECTS -

- | | DISCUSSED |
|----------|-------------|
| | Yes/ No/ NA |
| 1. _____ | _____ |
| 2. _____ | _____ |
| 3. _____ | _____ |
| 4. _____ | _____ |

G. INSPECTION CHECKS -

- | | IN COMPLIANCE |
|---------------------------|---------------|
| | Yes/ No/ NA |
| 1. Grade staking Controls | OK |

PREPARATORY INSPECTION WORKSHEET

DEFINABLE FEATURE OF WORK: Soil Barrier Layer Constructio

G. INSPECTION CHECKS - Cont.

- 2. observed density TEST - 2464 Failed _____
- 3. checked MARKING OF TEST PLOTS - OK _____
- 4. Checked STAKE Log + Locations - OK _____
- 5. _____

H. JOB SITE SAFETY -

- | | IN COMPLIANCE |
|--|---------------|
| | Yes/No/NA |
| 1. <u>check Film Badge - SITE TECH DID NOT HAVE Film Badge</u> | NO |
| 2. <u>NUKE huc - SITE TECH HAD CERT-CARD</u> | YES |
| 3. _____ | _____ |
| 4. _____ | _____ |

I. QUALITY ASSURANCE EVALUATION NOTES -

- | | DISCUSSED |
|----------|-------------|
| | Yes/ No/ NA |
| 1. _____ | _____ |
| 2. _____ | _____ |
| 3. _____ | _____ |
| 4. _____ | _____ |

CA:
Verbally gave TECH WARNING on wearing of Film Badge.

6/3/03
JAMES MORNING JAM.
Faun Fet

INITIAL INSPECTION WORKSHEET

DEFINABLE FEATURE OF WORK: Soil Barrier Layer Constructio

A. ACTIVITIES INCLUDED UNDER Soil Barrier Layer Constructio -

B. QUALITY CONTROL REQUIREMENTS -

C. QA/QC PUNCH LIST ITEMS -

INCLUDE ADDITIONAL COMMENTS ON DAILY REPORT

D. LABOR RATES -

LABOR CLASSIFICATIONS	BASIC RATE	FRINGE BENEFITS	PLUS %	TOTAL WAGE/HR
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

E. INSPECTION CHECKS -

	IN COMPLIANCE Yes/ No/ NA
1. Additional Borrow sources approved <i>NONE Submitted</i> Confirm and perform inspection and test frequency per testing plan Confirm maximum lift thickness <i>OK</i> Confirm Compaction <i>Field Density</i>	 Yes/ No/ NA OK OK OK
2. _____	_____
3. _____	_____
4. _____	_____
5. _____	_____

F. JOB SITE SAFETY -

	IN COMPLIANCE Yes/ No/ NA
1. PPE on crews Operation Equipment Safely Speed limits	 Yes/ No/ NA OK OK OK
2. _____	_____
3. _____	_____
4. _____	_____
5. _____	_____

G. QA Evaluation Notes -

	DISCUSSED Yes/ No/ NA
1. <i>AT WORKING AT RISK AWAITING Additional Borrow</i>	 Yes/ No/ NA Yes
2. <i>SOURCE ASSESSMENTS - informed cos - EW</i>	_____

INITIAL INSPECTION WORKSHEET

DEFINABLE FEATURE OF WORK - Soil Barrier Layer Construction

G. QA Evaluation Notes - Cont.

3. _____

4. _____

JAN 6/14/03

*Inspection
1*

PREPARATORY INSPECTION WORKSHEET

DEFINABLE FEATURE OF WORK *Biota Barrier Layer*

A. ACTIVITIES INCLUDED UNDER Biota Barrier Layer -

B. QUALITY CONTROL REQUIREMENTS -

C. QA/QC PUNCH LIST ITEMS -

INCLUDE ADDITIONAL COMMENTS ON DAILY REPORT

D. LABOR RATES -

LABOR CLASSIFICATIONS	BASIC RATE	FRINGE BENEFITS	PLUS %	TOTAL WAGE/HR
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

E. REVIEW CONTRACT DRAWINGS AND SPECIFICATIONS -

DRAWING / SPEC. NO

COMMENTS / CONFLICTS

DISCUSSED
Yes/No/NA

A 4/25/03

- 02115- Part 1-
1.2 Submittals- Excavation and Handling Plan
1.3 Topographic Survey- Prior to Placement
1.3 Topographic Survey- Post Placement

- _____
- _____
- _____
- _____
- _____

F. REPETITIVE DEFICIENCIES FOUND ON PREVIOUS PROJECTS -

DISCUSSED
Yes/ No/ NA

- _____
- _____
- _____
- _____

PREPARATORY INSPECTION WORKSHEET

DEFINABLE FEATURE OF WORK *Biota Barrier Layer*

G. INSPECTION CHECKS -

	IN COMPLIANCE
	Yes/No/NA
1. 02115 Part 2- Materials- Visual inspection of material size, reasonably free of organic, soft, and friable materials and of objectional materials determined by CO	<u>6/30/3</u>
2. Placement- 2 lifts per FCR 6 total of 15-18 inches, off site materials first lift	---
3. Compaction- 10 ton roller -2 passes	---
4. _____	---
5. _____	---
6. _____	---
7. _____	---

H. JOB SITE SAFETY -

	IN COMPLIANCE
	Yes/ No/ NA
1. PPE, equipment safety and traffic controls, dust controls	---
2. _____	---
3. _____	---
4. _____	---
5. _____	---

I. QUALITY ASSURANCE EVALUATION NOTES -

	DISCUSSED
	Yes/ No/ NA
1. Visual checks of material size.	---
2. Placed Material complies with section of 02115 Part 2	---
3. _____	---
4. _____	---
5. _____	---
6. _____	---

(G) A Pre Inspection of the off site Product WAS conducted 6/30/03 with USAKE and considered out of compliance due to objectional materials found in stock piles.

USAKE Jay G. H DATE 6/30/03
EWENC JWS DATE 6/30/03

INITIAL INSPECTION WORKSHEET

DEFINABLE FEATURE OF WORK - Biota Barrier Layer

A. ACTIVITIES INCLUDED UNDER Biota Barrier Layer -

B. QUALITY CONTROL REQUIREMENTS -

C. QA/QC PUNCH LIST ITEMS -

INCLUDE ADDITIONAL COMMENTS ON DAILY REPORT

D. LABOR RATES -

LABOR CLASSIFICATIONS	BASIC RATE	FRINGE BENEFITS	PLUS %	TOTAL WAGE/HR
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

E. INSPECTION CHECKS -

	IN COMPLIANCE Yes/ No/ NA
1. Verify Maximum Particle Size Confirm Lift thickness — <i>South Half Survey - Approved 9/22</i> Confirm compaction- (2 passes)	<input checked="" type="checkbox"/> Yes / <input type="checkbox"/> No / <input type="checkbox"/> NA
2. _____	_____
3. _____	_____
4. _____	_____
5. _____	_____

F. JOB SITE SAFETY -

	IN COMPLIANCE Yes/ No/ NA
1. _____	_____
2. _____	_____
3. _____	_____
4. _____	_____

G. QA Evaluation Notes -

	DISCUSSED Yes/ No/ NA
1. _____	_____
2. _____	_____
3. _____	_____
4. _____	_____

COB [Signature] DATE 9-23-03
QCM [Signature] DATE 9-23-03

PREPARATORY INSPECTION WORKSHEET

DEFINABLE FEATURE OF WORK: Erosion and Vegetation layer

A. ACTIVITIES INCLUDED UNDER Erosion and Vegetation layer -

B. QUALITY CONTROL REQUIREMENTS -

C. QA/QC PUNCH LIST ITEMS -

INCLUDE ADDITIONAL COMMENTS ON DAILY REPORT

D. LABOR RATES -

LABOR CLASSIFICATIONS	BASIC RATE	FRINGE BENEFITS	PLUS %	TOTAL WAGE/HR
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

E. REVIEW CONTRACT DRAWINGS AND SPECIFICATIONS -

DRAWING / SPEC. NO

COMMENTS / CONFLICTS

_____	_____
_____	_____
_____	_____

DISCUSSED
Yes/ No/ NA

1. Review of Spec's
 Confirm submittals have been approved
 Pre placement survey approved
 Basic staking

✓	✓	✓	✓
✓	✓	✓	✓
✓	✓	✓	✓

2. _____			
3. _____			
4. _____			
5. _____			

F. REPETITIVE DEFICIENCIES FOUND ON PREVIOUS PROJECTS -

DISCUSSED
Yes/ No/ NA

1. _____			
2. _____			
3. _____			
4. _____			

PREPARATORY INSPECTION WORKSHEET

DEFINABLE FEATURE OF WORK - Erosion and Vegetation layer

G. INSPECTION CHECKS -

	IN COMPLIANCE		
	Yes	No	NA
1. _____	_____	_____	_____
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____

H. JOB SITE SAFETY -

	IN COMPLIANCE		
	Yes	No	NA
1. <u>Crews have PPE</u>	<input checked="" type="checkbox"/>	_____	_____
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____

I. QUALITY ASSURANCE EVALUATION NOTES -

	DISCUSSED		
	Yes	No	NA
1. <u>Samples being collected per WP</u>	<input checked="" type="checkbox"/>	_____	_____
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____

COE Roussie K. Wynn DATE 9-23-03

QCM [Signature] DATE 9-23-03

INITIAL CONTROL WORKSHEET

DEFINABLE FEATURE OF WORK: Erosion and Vegetation layer

A. ACTIVITIES INCLUDED UNDER Erosion and Vegetation layer -

B. QUALITY CONTROL REQUIREMENTS -

C. QA/QC PUNCH LIST ITEMS -

INCLUDE ADDITIONAL COMMENTS ON DAILY REPORT

D. LABOR RATES -

LABOR CLASSIFICATIONS	BASIC RATE	FRINGE BENEFITS	PLUS %	TOTAL WAGE/HR
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

E. CONTROL CHECKS -

1. Confirm Additional Borrow Sources have been approved.
Confirm Lift thickness and compaction
Confirm testing frequency
2. Final Survey Approved 1-7-04
3. Final Soil Test Approved 1-7-04
4. _____
5. _____

IN COMPLIANCE
Yes/ No/ NA

OK
OK
OK

F. JOB SITE SAFETY -

1. _____
2. _____
3. _____
4. _____

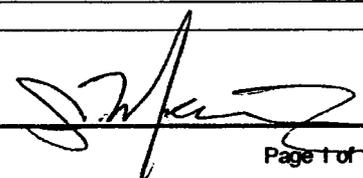
IN COMPLIANCE
Yes/ No/ NA

OK

G. QA Evaluation Notes -

1. _____
2. _____
3. _____
4. _____

DISCUSSED
Yes/ No/ NA

Completed 1-8-03  CRM

1/8/04

PREPARATORY CONTROL WORKSHEET

DEFINABLE FEATURE OF WORK : Seeding

A. ACTIVITIES INCLUDED UNDER Seeding -

B. QUALITY CONTROL REQUIREMENTS -

C. QA/QC PUNCH LIST ITEMS -

INCLUDE ADDITIONAL COMMENTS ON DAILY REPORT

D. LABOR RATES -

LABOR CLASSIFICATIONS	BASIC RATE	FRINGE BENEFITS	PLUS %	TOTAL WAGE/HR
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

REVIEW CONTRACT DRAWINGS AND SPECIFICATIONS -

DRAWING / SPEC. NO	COMMENTS / CONFLICTS
_____	_____
_____	_____

1. Check Mulch Certificates- Composition and Source
Seed Mix-Classification
Fertilizer Chemical analysis and composition

DISCUSSED
Yes/ No/ NA
OK
Spring 2004
Spring 2004

2. _____
3. _____
4. *Seeding to be DONE April 2004*
5. *Mulching ONLY JAN 2004*

F. REPETITIVE DEFICIENCIES FOUND ON PREVIOUS PROJECTS -

- | | DISCUSSED
Yes/ No/ NA |
|----------|--------------------------|
| 1. _____ | _____ |
| 2. _____ | _____ |
| 3. _____ | _____ |
| 4. _____ | _____ |

PREPARATORY CONTROL WORKSHEET

DEFINABLE FEATURE OF WORK - Seeding

G. CONTROL CHECKS -

	IN COMPLIANCE		
	Yes	No	NA
1. <u>check Total Tonnage -OK</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

H. JOB SITE SAFETY -

	IN COMPLIANCE		
	Yes	No	NA
1. <u>Crews Briefed, Equipment checked for leaks.</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

I. QUALITY ASSURANCE EVALUATION NOTES -

	DISCUSSED		
	Yes	No	NA
1. _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

[Signature] L&M
1-8-04

[Signature] COE
1-8-04

INITIAL CONTROL WORKSHEET

DEFINABLE FEATURE OF WORK: Seeding

A. ACTIVITIES INCLUDED UNDER Seeding -

Crimp Mulch only

B. QUALITY CONTROL REQUIREMENTS -

C. QA/QC PUNCH LIST ITEMS -

INCLUDE ADDITIONAL COMMENTS ON DAILY REPORT

D. LABOR RATES -

LABOR CLASSIFICATIONS	BASIC RATE	FRINGE BENEFITS	PLUS %	TOTAL WAGE/HR
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

E. CONTROL CHECKS -

1. Check crimp mulch installation.
Check tonage ratio 2 tons per acre.
Mulch certificates submitted.

IN COMPLIANCE
Yes/ No/ NA

X _____
X _____

F. JOB SITE SAFETY -

1. *PPE Equip OK*

IN COMPLIANCE
Yes/ No/ NA

Yes _____

G. QA Evaluation Notes -

1. _____
2. _____
3. _____

DISCUSSED
Yes/ No/ NA

James 1-9-04 CAM *Ronnie K. Dyla 1-9-04 COE*



FOSTER WHEELER ENVIRONMENTAL CORPORATION

TERC CONTRACT NO.: DACW45-94-D-0003

DELIVERY ORDER: 35

PROJECT TITLE AND LOCATION: Work Plan for the Closure of SWMU 101 - Sewage Lagoons, Cannon AFB

FOLLOW-UP INSPECTION CHECKLIST FORM

DATE/SHIFT 5-7-03 DAY		REPORT NO. 2			
PROJECT NAME/NUMBER SWMU 101 SEWAGE LAGOONS CLOSURE					
ITEM/ACTIVITY INSPECTED Excavation & Handling of Contaminated Material					
DRAWING REFERENCE 02111		REV.	DRAWING REFERENCE		REV.
INSPECTION ATTRIBUTE		SPECIFICATION REFERENCE	ACCEPTANCE CRITERIA	INSPECTION RESULT	ACCEPT/REJECT
Check Subgrade prep		02111 3.2			A
Check Contaminated material -		3.3			A
- Removal		-			A
check material placement		3.5.2			
REQUESTS FOR INFORMATION ISSUED/SUBJECT NA				REFERENCE NO.	
FCRs ISSUED/SUBJECT NA				REFERENCE NO.	
NONCONFORMANCES ISSUED/SUBJECT NA				REFERENCE NO.	
REINSPECTION REQUIRED NO		YES	NO		
COMMENTS Sampling, Post Excavation Survey, TEST Accepted TO BE Inspected when completed - Next Follow up Inspection This inspection is for N 1/2 only, of North Lagoon.					

NAME: JAMES MORNING
 SIGNATURE:
 TITLE: CQM
 CE Tech
 5/7/03

W FOSTER WHEELER ENVIRONMENTAL CORPORATION

TERC CONTRACT NO.: DACW45-94-D-0003

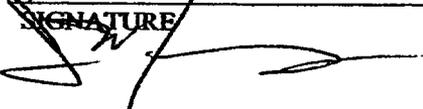
DELIVERY ORDER: 35

PROJECT TITLE AND LOCATION: Work Plan for the Closure of SWMU 101 - Sewage Lagoons, Cannon AFB

FOLLOW-UP INSPECTION CHECKLIST FORM

DATE/SHIFT 5/16/03		REPORT NO. 3		
PROJECT NAME/NUMBER SWMU 101 - Lagoons Closure 515500350001				
ITEM/ACTIVITY INSPECTED Excavation and Handling of Contaminated Material				
DRAWING REFERENCE G2111	REV.	DRAWING REFERENCE	REV.	
INSPECTION ATTRIBUTE		SPECIFICATION REFERENCE	ACCEPTANCE CRITERIA	INSPECTION RESULT
Verify Sub-Grade prep		3.2		A
Verify Contaminated Mat Removal		3.3		A
Verify Material placement		3.5.2		A
REQUESTS FOR INFORMATION ISSUED/SUBJECT NA			REFERENCE NO.	
FCRs ISSUED/SUBJECT NA			REFERENCE NO.	
NONCONFORMANCES ISSUED/SUBJECT NA			REFERENCE NO.	
REINSPECTION REQUIRED		YES	NO <input checked="" type="checkbox"/>	
COMMENTS This inspection is for south 1/2 of North Lagoon Ronnie K. Wylie COE 5/16/03				

NAME **JAMES MORNING**

SIGNATURE 

TITLE **CDM**

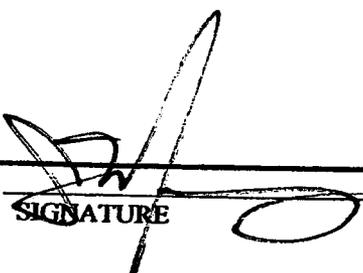
W FOSTER WHEELER ENVIRONMENTAL CORPORATION

TERC CONTRACT NO.: DACW45-94-D-0003

DELIVERY ORDER: 35

PROJECT TITLE AND LOCATION: Work Plan for the Closure of SWMU 101 - Sewage Lagoons, Cannon AFB

FOLLOW-UP INSPECTION CHECKLIST FORM

DATE/SHIFT <i>6/19/03</i>		REPORT NO. <i>4</i>	
PROJECT NAME/NUMBER <i>SWMU 101 Sewage Lagoons Closure</i>			
ITEM/ACTIVITY INSPECTED <i>Excavation and Handling of Contaminated Material</i>			
DRAWING REFERENCE <i>02111</i>	REV.	DRAWING REFERENCE	REV.
INSPECTION ATTRIBUTE		SPECIFICATION REFERENCE	ACCEPTANCE CRITERIA
<i>Verify Sch grade prep</i>		<i>3.2</i>	
<i>Verify Cont. Mat. Removal</i>		<i>3.3</i>	
<i>Verify Cont. Mat. Placement</i>		<i>3.5.2</i>	
<i>Verify Confirmation TEST Accepted</i>		<i>3.5.1</i>	
<i>Confirm Post Excavation TOPO</i>		<i>1.3</i>	
REQUESTS FOR INFORMATION ISSUED/SUBJECT <i>NONE</i>		REFERENCE NO.	
FCRs ISSUED/SUBJECT <i>FCR #2 3/27/03</i> <i>FCR #7 6/18/03</i>		REFERENCE NO.	
NONCONFORMANCES ISSUED/SUBJECT		REFERENCE NO.	
REINSPECTION REQUIRED	YES	NO	
COMMENTS <i>FINAL</i>			
NAME <i>JAMES MORRIS</i>		SIGNATURE 	
		TITLE <i>QCM</i>	
		DATE <i>6/19/03</i>	



FOSTER WHEELER ENVIRONMENTAL CORPORATION

TERC CONTRACT NO.: DACW45-94-D-0003

DELIVERY ORDER: 35

PROJECT TITLE AND LOCATION: Work Plan for the Closure of SWMU 101 - Sewage Lagoons, Cannon AFB

FOLLOW-UP INSPECTION CHECKLIST FORM

DATE/SHIFT 7/17/03 DAY		REPORT NO. 5			
PROJECT NAME/NUMBER SWMU 101 SEWAGE LAGOON CLOSURE					
ITEM/ACTIVITY INSPECTED Excavation and Handling of Contaminated Material					
DRAWING REFERENCE 02111 3.3	REV.	DRAWING REFERENCE	REV.		
INSPECTION ATTRIBUTE		SPECIFICATION REFERENCE	ACCEPTANCE CRITERIA	INSPECTION RESULT	ACCEPT/REJECT
Verify Backfill to Grade		3.5.1		OK	A
Place drainage dike to - divert storm water - towards East.		NA		OK	A
SHAPE Area to minimize Ponding		3.5.1		OK	A
REQUESTS FOR INFORMATION ISSUED/SUBJECT N/A			REFERENCE NO.		
FCRs ISSUED/SUBJECT Backfill of over excavation of additional Sludge resulting in depressions and TRENCH - FCR # 7 and FCR # 2			REFERENCE NO.		
NONCONFORMANCES ISSUED/SUBJECT N/A			REFERENCE NO.		
REINSPECTION REQUIRED	YES	NO <input checked="" type="checkbox"/>			
COMMENTS NONE					

JAMES MORNING
NAME

SIGNATURE

COO
TITLE

RODDIE K WYLIE
2/17/03

1330 hrs.

GOE

FW FOSTER WHEELER ENVIRONMENTAL CORPORATION

TERC CONTRACT NO.: DACW45-94-D-0003

DELIVERY ORDER: 35

PROJECT TITLE AND LOCATION: Work Plan for the Closure of SWMU 101 - Sewage Lagoons, Cannon AFB

FOLLOW-UP INSPECTION CHECKLIST FORM

DATE/SHIFT 9/23/03 DAY		REPORT NO. 6		
PROJECT NAME/NUMBER SWMU 101 SEWAGE LAGOONS				
ITEM/ACTIVITY INSPECTED Soil Barrier Layer 02377				
DRAWING REFERENCE	REV.	DRAWING REFERENCE	REV.	
INSPECTION ATTRIBUTE	SPECIFICATION REFERENCE	ACCEPTANCE CRITERIA	INSPECTION RESULT	ACCEPT/ REJECT
Approved Survey - South	02377-1.5		OK	8/5
Approved Survey - North	02377-1.5		OK	9/22
IN-PLACE TESTING completed	02377 3.4.3		OK	9/9
Retest completed	02377 3.5.3		OK	9/9
REQUESTS FOR INFORMATION ISSUED/SUBJECT			REFERENCE NO.	
FCRs ISSUED/SUBJECT			REFERENCE NO.	
FLR #10 - Approved 9/2 Variation of Survey			02377-1.5	
NONCONFORMANCES ISSUED/SUBJECT			REFERENCE NO.	
REINSPECTION REQUIRED		YES	NO	
COMMENTS SOME in-place, Source Assessments still under review Awaiting Approvals Retest #1 in-place Hydraulic Cond. - under Review.				

NAME: Col. [Signature] SIGNATURE: [Signature] TITLE: Col. Rep
 QCM: [Signature] TITLE: PH COM

FW FOSTER WHEELER ENVIRONMENTAL CORPORATION

TERC CONTRACT NO.: DACW45-94-D-0003

DELIVERY ORDER: 35

PROJECT TITLE AND LOCATION: Work Plan for the Closure of SWMU 101 - Sewage Lagoons, Cannon AFB

FOLLOW-UP INSPECTION CHECKLIST FORM

DATE/SHIFT 10/28/03		REPORT NO. 7			
PROJECT NAME/NUMBER SWMU 101 Sewage Lagoons					
ITEM/ACTIVITY INSPECTED Biota Barrier East SCOPE AREA					
DRAWING REFERENCE 02115	REV.	DRAWING REFERENCE	REV.		
INSPECTION ATTRIBUTE		SPECIFICATION REFERENCE	ACCEPTANCE CRITERIA	INSPECTION RESULT	ACCEPT/REJECT
Confirm MAX Particle Size		PART 1	3-6 umh	PASS	A
Confirm Left Thickness-Tolerance		3.2	15-18 umh	PASS	A
Confirm Compaction		3.3	1.1 PASS	PASS	A
REQUESTS FOR INFORMATION ISSUED/SUBJECT NONE			REFERENCE NO.		
FCRs ISSUED/SUBJECT NONE			REFERENCE NO.		
NONCONFORMANCES ISSUED/SUBJECT NONE			REFERENCE NO.		
REINSPECTION REQUIRED NONE	YES	NO			
COMMENTS ONGOING operations ONGOING material Inspections, sorting.					

Ramona K. White
NAME

Ramona K. White
SIGNATURE

Core Rep.
TITLE

James Moroney
NAME

James Moroney
SIGNATURE

CRM
TITLE

10/29/03

FW FOSTER WHEELER ENVIRONMENTAL CORPORATION

TERC CONTRACT NO.: DACW45-94-D-0003

DELIVERY ORDER: 35

PROJECT TITLE AND LOCATION: Work Plan for the Closure of SWMU 101 - Sewage Lagoons, Cannon AFB

FOLLOW-UP INSPECTION CHECKLIST FORM

DATE/SHIFT 12-10-03		REPORT NO. 8		
PROJECT NAME/NUMBER SWMU 101 Biota - NW Slope				
ITEM/ACTIVITY INSPECTED Biota Layers				
DRAWING REFERENCE 02115	REV.	DRAWING REFERENCE	REV.	
INSPECTION ATTRIBUTE				
Confirm Material Size	SPECIFICATION REFERENCE Part 1	ACCEPTANCE CRITERIA 3-6 in. L	INSPECTION RESULT OK	ACCEPT/REJECT A
Confirm lift thickness	3.2	15-18 in. L	OK	A
Compaction	3.3	2 passes	OK	A
REQUESTS FOR INFORMATION ISSUED/SUBJECT NONE			REFERENCE NO.	
FCRs ISSUED/SUBJECT NONE			REFERENCE NO.	
NONCONFORMANCES ISSUED/SUBJECT			REFERENCE NO.	
REINSPECTION REQUIRED		YES	NO	
COMMENTS Final Placement of North Slope Lifts 1-2 Ongoing Inspection of materials				

Ramona K. Galt NAME Ramona K. Galt SIGNATURE Con. Rep. TITLE

James Morley NAME JM SIGNATURE Con. Rep. TITLE

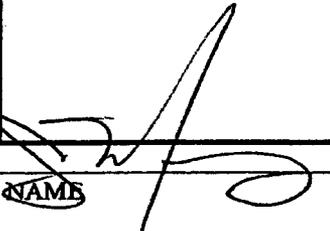
FW FOSTER WHEELER ENVIRONMENTAL CORPORATION

TERC CONTRACT NO.: DACW45-94-D-0003

DELIVERY ORDER: 35

PROJECT TITLE AND LOCATION: Work Plan for the Closure of SWMU 101 - Sewage Lagoons, Cannon AFB

FOLLOW-UP INSPECTION CHECKLIST FORM

DATE/SHIFT 1-8-03		REPORT NO. 9		
PROJECT NAME/NUMBER SWMU 101 Sewage Lagoons				
ITEM/ACTIVITY INSPECTED EROSION VEG Layer - TOP Soil				
DRAWING REFERENCE 02140	REV.	DRAWING REFERENCE	REV.	
INSPECTION ATTRIBUTE	SPECIFICATION REFERENCE	ACCEPTANCE CRITERIA	INSPECTION RESULT	ACCEPT/ REJECT
Confirm Survey Approved	1.3.1	A	OK	A
Check Erosion Frills	3.5.1	>1"	OK	A
Compaction	3.2.1	PASS	OK	A
REQUESTS FOR INFORMATION ISSUED/SUBJECT NA			REFERENCE NO.	
FCRs ISSUED/SUBJECT NA			REFERENCE NO.	
NONCONFORMANCES ISSUED/SUBJECT NONE			REFERENCE NO.	
REINSPECTION REQUIRED		YES	NO	
COMMENTS Removed All Grade stakes				
NAME 		SIGNATURE James Morning		TITLE CQ m 1-8-03

Appendix E

NPDES Permit

NPDES
FORM



United States Environmental Protection Agency
Washington, DC 20460
Notice of Intent (NOI) for Storm Water Discharges Associated with
CONSTRUCTION ACTIVITY Under a NPDES General Permit

Submission of this Notice of Intent constitutes notice that the party identified in Section I of this form intends to be authorized by a NPDES permit issued for storm water discharges associated with construction activity in the State/Indian Country Land identified in Section II of this form. Submission of this Notice of Intent also constitutes notice that the party identified in Section I of this form meets the eligibility requirements in Part I.B. of the general permit (including those related to protection of endangered species determined through the procedures in Addendum A of the general permit), understands that continued authorization to discharge is contingent on maintaining permit eligibility, and that implementation of the Storm Water Pollution Prevention Plan required under Part IV of the general permit will begin at the time the permittee commences work on the construction project identified in Section II below. IN ORDER TO OBTAIN AUTHORIZATION, ALL INFORMATION REQUESTED MUST BE INCLUDED ON THIS FORM. SEE INSTRUCTIONS ON BACK OF FORM.

I. Owner/Operator (Applicant) Information

Name: COMMANDER 27TH FIGHTER WING Phone: 5057842727
Address: 100 S DL INGRAM BLVD STE 100 Status of Owner/Operator: F
City: CANNON AIR FORCE BASE State: NM Zip Code: 88103-5214

II. Project/Site Information

Project Name: CLOSURE OF SEWAGE LAGOONS Is the facility located on Indian Country Lands? Yes No
Project Address/Location: EAST PERIMETER ROAD
City: CANNON AIR FORCE BASE State: NM Zip Code: 88103-5214
Latitude: 342310 Longitude: 1031805 County: GURRY

Has the Storm Water Pollution Prevention Plan (SWPPP) been prepared? Yes No

Optional: Address of location of SWPPP for viewing Address in Section I above Address in Section II above Other address (if known) below:

SWPPP Address: _____ Phone: 5057841099
City: _____ State: _____ Zip Code: _____

Name of Receiving Water: SOUTH PLAYA LAKE

03182003
Month Day Year

03182004
Month Day Year

Estimated Construction Start Date Estimated Completion Date

Estimate of area to be disturbed (to nearest acre): 0.00040

Estimate of Likelihood of Discharge (choose only one):

- 1. Unlikely
- 2. Once per month
- 3. Once per week
- 4. Once per day
- 5. Continual

Based on instruction provided in Addendum A of the permit, are there any listed endangered or threatened species, or designated critical habitat in the project area?

Yes No

I have satisfied permit eligibility with regard to protection of endangered species through the indicated section of Part I.B.3.e.(2) of the permit (check one or more boxes):

(a) (b) (c) (d)

III. Certification

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage this system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

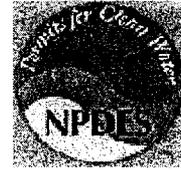
Print Name: JOHN C BOWER

Date: 031103

Signature: _____



**U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)
NATIONAL POLLUTANT DISCHARGE ELIMINATION
SYSTEM (NPDES)
STORM WATER NOTICE OF INTENT CENTER**



08/31/2003

OPERATOR:

**TETRA TECH FW INC.
6650 UPTOWN BLVD NE SUITE 220
ALBUQUERQUE NM 87110**

FACILITY:

**CLOSURE OF SEWAGE LAGOONS
EAST PERIMETER ROAD
CANNON AIR FORCE NM 88103-5214**

This letter acknowledges that you have submitted a complete Notice of Intent form to be covered under the NPDES General Permit for Storm Water Discharges Associated with Construction Activity (Construction General Permit) issued by EPA on July 1, 2003 (FRL 7520 – 7). Please note that this letter is not the permit. The permit provides for authorization to discharge based on submission of a valid and complete Notice of Intent. If you do meet the eligibility requirements, coverage begins 7 days after the postmark date of your Notice of Intent. Your Notice of Intent was postmarked 8/18/2003

As stated above, this letter acknowledges receipt of a complete Notice of Intent. However, it is not an EPA determination of the validity of the information you provided. Your eligibility for coverage under the Permit is based on the validity of the certification you provided. Your signature on the Notice of Intent certifies that you have read, understood, and are implementing all of the applicable requirements. An important aspect of this certification requires that you correctly determine whether you are eligible for coverage under this permit.

As you know, the Construction General Permit requires you to have developed and begun implementing a Storm Water Pollution Prevention Plan (SWPPP) and outlines important inspection and recordkeeping requirements. You must also comply with any additional location-specific requirements applicable to your state or tribal area. A copy of the Construction General Permit must be kept with your SWPPP. An electronic copy of the Permit and additional guidance materials can be viewed and downloaded at www.epa.gov/npdes/stormwater.

For tracking purposes, the following number has been assigned to your Notice of Intent Form: **NM0000966**

If you have general questions regarding the storm water program or your responsibilities under the Construction General Permit, please call

Region: 06 Brent Larsen (214) 665-7523

If you have questions about your Notice of Intent form, please call the EPA NOI Processing Center at 1-866-352-7755 (toll free) or send an inquiry via the online form at <http://www.epa.gov/npdes/noicontact>.

EPA NOI Processing Center
Operated by CTGi
1200 Pennsylvania Ave., NW
Mail Code: 4203M
Washington, DC 20460
1-866-352-7755

NPDES
Form



United States Environmental Protection Agency
Washington, DC 20460

Notice of Termination (NOT) of Coverage Under an NPDES General Permit for Storm
Water Discharges Associated with Construction Activity

Submission of this Notice of Termination constitutes notice that the party identified in Section II of this form is no longer authorized to discharge storm water associated with construction activity under the NPDES program from the site identified in Section III of this form. All necessary information must be included on this form. Refer to the instructions at the end of this form.

I. Permit Information

NPDES Storm Water General Permit Tracking Number: NM0000966

Reason for Termination (Check only one):

- Final stabilization has been achieved on all portions of the site for which you are responsible.
- Another operator has assumed control, according to Appendix G, Section 11.C of the CGP, over all areas of the site that have not been finally stabilized.
- Coverage under an alternative NPDES permit has been obtained.
- For residential construction only, temporary stabilization has been completed and the residence has been transferred to the homeowner.

II. Operator Information

Name: Tetra Tech FW, Inc

IRS Employer Identification Number (EIN): 75 - 2512450

Mailing Address:

Street: 6605 Uptown Blvd NE Ste 220

City: Albuquerque State: NM Zip Code: 87110

Phone: 505 - 878 - 8900 Fax (optional): 505 - 878 - 8933

E-mail (optional):

III. Project/Site Information

Project/Site Name: Closure of Sewage Lagoons

Project Street/Location: East Perimeter Road

City: Cannon Air Force Base State: NN Zip Code: 88103 - 5214

County or similar government subdivision: Curry

IV. Certification Information

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Print Name: Carol Bieniulis

Print Title: Delivery Order Manager

Signature: Carol Bieniulis

Date: 7/12/04

Instructions for Completing EPA Form 3510-13
**Notice of Termination (NOT) of Coverage Under an NPDES General Permit for
Storm Water Discharges Associated with Construction Activity**

NPDES Form

This Form Replaces Form 3517-7 (8-98)

Form Approved OMB Nos. 2040-0086 and 2040-0211

Who May File an NOT Form

Permittees who are presently covered under the EPA-issued National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharges Associated with Construction Activity may submit an NOT form when final stabilization has been achieved on all portions of the site for which you are responsible; another operator has assumed control in accordance with Appendix G, Section 11.C of the General Permit over all areas of the site that have not been finally stabilized; coverage under an alternative NPDES permit has been obtained; or for residential construction only, temporary stabilization has been completed and the residence has been transferred to the homeowner.

"Final stabilization" means that all soil disturbing activities at the site have been completed and that a uniform perennial vegetative cover with a density of at least 70% of the native background vegetative cover for the area has been established on all unpaved areas and areas not covered by permanent structures, or equivalent permanent stabilization measures (such as the use of riprap, gabions, or geotextiles) have been employed. See "final stabilization" definition in Appendix A of the Construction General Permit for further guidance where background native vegetation covers less than 100 percent of the ground, in arid or semi-arid areas, for individual lots in residential construction, and for construction projects on land used for agricultural purposes.

Completing the Form

Type or print, using uppercase letters, in the appropriate areas only. Please place each character between the marks. Abbreviate if necessary to stay within the number of characters allowed for each item. Use only one space for breaks between words, but not for punctuation marks unless they are needed to clarify your response. If you have any questions about this form, refer to www.epa.gov/npdes/stormwater/cgp or telephone the Storm Water Notice Processing Center at (866) 352-7755. Please submit original document with signature in ink - do not send a photocopied signature.

Section I. Permit Number

Enter the existing NPDES Storm Water General Permit Tracking Number assigned to the project by EPA's Storm Water Notice Processing Center. If you do not know the permit tracking number, refer to www.epa.gov/npdes/stormwater/cgp or contact the Storm Water Notice Processing Center at (866) 352-7755.

Indicate your reason for submitting this Notice of Termination by checking the appropriate box. Check only one:

Final stabilization has been achieved on all portions of the site for which you are responsible.

Another operator has assumed control according to Appendix G, Section 11.C over all areas of the site that have not been finally stabilized.

Coverage under an alternative NPDES permit has been obtained.

For residential construction only, if temporary stabilization has been completed and the residence has been transferred to the homeowner.

Section II. Operator Information

Provide the legal name of the person, firm, public organization, or any other entity that operates the project described in this application and is covered by the permit tracking number identified in Section I. The

operator of the project is the legal entity that controls the site operation, rather than the site manager. Provide the employer identification number (EIN from the Internal Revenue Service; IRS). If the applicant does not have an EIN enter "NA" in the space provided. Enter the complete mailing address and telephone number of the operator. *Optional:* enter the fax number and e-mail address of the operator.

Section III. Project/Site Information

Enter the official or legal name and complete street address, including city, state, zip code, and county or similar government subdivision of the project or site. If the project or site lacks a street address, indicate the general location of the site (e.g., Intersection of State Highways 61 and 34). Complete site information must be provided for termination of permit coverage to be valid.

Section IV. Certification Information

All applications, including NOIs, must be signed as follows:

For a corporation: By a responsible corporate officer. For the purpose of this Part, a responsible corporate officer means: (i) a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy- or decision-making functions for the corporation, or (ii) the manager of one or more manufacturing, production, or operating facilities, provided, the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long-term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.

For a partnership or sole proprietorship: By a general partner or the proprietor, respectively; or

For a municipality, state, federal, or other public agency: By either a principal executive officer or ranking elected official. For purposes of this Part, a principal executive officer of a federal agency includes (i) the chief executive officer of the agency, or (ii) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrator of EPA).

Include the name and title of the person signing the form and the date of signing. An unsigned or undated NOT form will not be considered valid termination of permit coverage.

Paperwork Reduction Act Notice

Public reporting burden for this application is estimated to average 0.5 hours per notice, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number. Send comments regarding the burden estimate, any other aspect of the collection of information, or suggestions for improving this form including any suggestions which may increase or reduce this burden to: Chief, Information Policy Branch, 2136, U.S. Environmental Protection Agency, 1200 Pennsylvania Avenue, NW, Washington, DC 20460. Include the OMB number on any correspondence. Do not send the completed form to this address.

Appendix F

Waste Manifests

BILL OF LADING/MANIFEST 1. Shipper's US EPA ID No. (if Applicable) **MESQ.G** Document No. **34.175** 2. Page 1 of 2 **20/175 ST.**

3. Shipper's Name and Mailing Address **DL TRUCK**
1801 E 21st Street
CLOVIS, NM 88101

4. Shipper's Phone (**505 1799-0689**)

5. Transporter 1 Company Name **SAFETY-KLEEN SYSTEMS INC.** 6. US EPA ID Number **TXR000031799** A. Transporter's Phone **806 622-4070**

7. Transporter 2 Company Name _____ 8. US EPA ID Number _____ B. Transporter's Phone _____

9. Designated Facility Name and Site Address **600902 SAFETY-KLEEN SYSTEMS, INC. 1750 WEST LOOP 335 S AMARILLO TX 79118** 10. US EPA ID Number **TXR000031799** C. Facility's Phone **806 632-4070**

11. Shipping Name and Description		12. Commodity		13. Total Quantity	14. Unit
a.	HAZ	No.	Type		
a.					
b.					
c.					
d.					

15. Special Handling Instruction and Additional Information
EMERGENCY RESP 800-468-1760(24 HR). IF UNDELIVERABLE RETURN TO GENERATOR.
SKDOT# A: 12700 B: C: D:

16a. US DOT HAZARDOUS MATERIALS SHIPPER'S CERTIFICATION: **Printed/Typed Name** _____ **Month** _____ **Day** _____ **Year** _____

16b. NON-REGULATED SHIPPER'S CERTIFICATION: **Printed/Typed Name** **LARRY C. SOARS** **Month** **10** **Day** **31** **Year** _____

17. Transporter 1 Acknowledgment of Receipt of Materials
Printed/Typed Name **Teresa L. K. Ker** **Signature** _____ **Month** **10** **Day** **31** **Year** _____

18. Transporter 2 Acknowledgment of Receipt of Materials
Printed/Typed Name _____ **Signature** _____ **Month** _____ **Day** _____ **Year** _____

19. Discrepancy Indication Space

20. Facility Owner or Operator Certification of receipt of materials covered by this form except as noted in item 19.
Printed/Typed Name **Shirley D. D. A. I.** **Signature** _____ **Month** **10** **Day** **31** **Year** _____

IN EVENT OF EMERGENCY CALL
 1-800-468-1760 (24 hours)