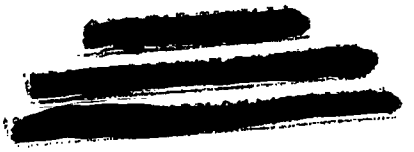
Project 88-131
March 1989

Canonie Environmental

As-Built Report

Evaporation Pond System



Churchrock Site
Gallup, New Mexico

Prepared for:

United Nuclear Corporation
Gallup, New Mexico

CanonieEnvironmental

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88-131

March 17, 1989

Mr. Charles G. Johnson
United Nuclear Corporation
State Road 560
P.O. Drawer QQ
Gallup, NM 87301

Transmittal
As-Built Construction Report
Evaporation Pond System
United Nuclear Church Rock Site
Gallup, New Mexico

Dear Chuck:

Enclosed are three copies of the As-Built Construction Report for the evaporation pond system which Canonie Environmental Services Corp. constructed for United Nuclear Corporation at the Church Rock tailings disposal facility near Gallup, New Mexico.

Please call if you have any questions regarding this report.

Very truly yours,

Oliver P. Wesley
Project Manager

OPW/dis

Enclosures

cc: Michael J. Brennan, Esq., Holland & Hart
Mr. Juan R. Velasquez, United Nuclear

As-Built Report

Evaporation Pond System

Canonie Environmental

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AS-BUILT CONSTRUCTION REPORT
EVAPORATION POND SYSTEM
UNITED NUCLEAR CORPORATION
CHURCH ROCK FACILITY
GALLUP, NEW MEXICO

1.0 INTRODUCTION

This report describes the construction of two synthetically-lined evaporation ponds at United Nuclear Corporation's (United Nuclear) Church Rock uranium mill and tailings disposal facility located northeast of Gallup, New Mexico. The location of the site is shown on Sheet 1. Construction was performed by Canonie Environmental Services Corp. (Canonie) on a design/construct basis primarily during the period from October 25, 1988 to January 10, 1989.

The pond system was constructed as part of scheduled 1988 reclamation activities for this Comprehensive Environmental Response, Compensation, and Liability Act site in accordance with previously prepared technical specifications and construction drawings (Canonie 1988). Sheets 1 through 4 provide as-built construction drawings of the pond system.

The pond system will be used for intermediate storage and eventual evaporation of ground water pumped from beneath the tailings disposal site. Each pond has a bottom surface area of five acres and a total storage capacity of approximately ten million gallons. Each pond has a total depth of 6 feet and interior side slopes of 4:1 (horizontal:vertical). Under normal maximum operating conditions, the ponds will be filled to a depth of 4 feet. The maximum amount of water which will be stored in each pond under these conditions is approximately 6.4 million gallons, leaving adequate freeboard to provide additional storm water capacity for as much as 3.6 million gallons per pond. This additional freeboard is adequate to store the Probable Maximum Precipitation (PMP) event of approximately 8.46 inches of rainfall or approximately 6.7 million gallons of water. As-built area/capacity curves for each pond are provided on Sheet 4.

The following sections of this report describe the pond system design considerations, earthwork construction, quality control procedures which were employed, and operations and maintenance procedures for future use of the pond system.

2.0 DESIGN CONSIDERATIONS

The evaporation pond system was constructed within the existing approximate 100-acre tailings disposal area at the request of United Nuclear so that no contaminated water would be stored outside of the source area. The south cell of the tailings disposal area was selected for the pond system location due to the available surface area and the large depression which exists in the south end of the cell. This depression provides secondary containment in the event of unexpected spills from the pond system. Physical constraints, including the available surface area and the existing spray evaporation system located in the central tailings cell, precluded the use of other locations within the tailings disposal area for evaporation pond construction.

Ten test borings were drilled at the proposed evaporation pond system site at the locations shown on Sheet 2. Logs of the borings are provided in Appendix A. Drilling confirmed that very soft tailings were present in the proposed location of the pond system to depths of up to approximately 15 feet. Embankment foundation conditions were of concern with respect to embankment stability and large anticipated settlements of the embankments caused by consolidation of the underlying soft tailings. These design considerations were addressed as described in the following sections.

2.1 Slope Stability

As part of the quality control procedures implemented by Canonie during construction, and to further verify geotechnical analyses performed during previous evaporation pond system design activities, Canonie performed additional laboratory strength testing and slope stability analyses of the embankments on the soft, underlying foundation materials.

Laboratory test results, including triaxial shear strength testing and index properties of the softest fine-grained tailings encountered are provided in Appendix B. The fine-grained tailings were classified as clays with trace amounts of sand, having the Unified Soil Classification System symbol CH. Results of strength tests performed on three composite

samples of tailings obtained from Boring T-7 from a depth of 0 to 3 feet indicate that the tested fine-grained tailings have low strength characteristics as follows:

Total Strength Parameters		Effective Strength Parameters	
Cohesion[a] (c) (psf)	Friction Angle (Ø)[b] (deg)	Cohesion (c) (psf)	Friction Angle (Ø) (deg)
250 - 350	0 - 7.5	350	0
250 - 350	0 - 7.5	350	0
300 - 390	0 - 7	170 - 250	9 - 11

[a] pounds per square feet
[b] degrees

These low strengths for embankment foundation materials warranted the use of the relatively flat interior and exterior pond embankment side slopes shown on the as-built construction drawings (Sheet 2).

The theoretical stability of the pond embankment side slopes was reconfirmed during construction on the basis of these additional laboratory test results. Both sliding block and circular failure plane analyses were performed for both the south and central evaporation pond system embankments. Results of the analyses indicated that the embankment slopes will be stable for the anticipated minimum strength characteristics of the tailings under full static loading conditions.

2.2 Settlement

Theoretical consolidation analyses indicated that as much as 4 feet of settlement of the central and southern embankments could occur, depending on the actual consolidation properties of the fine-grained tailings, their thicknesses below the embankments, and the amount of embankment fill placed

over the tailings. The large predicted settlements warranted the installation of five settlement monuments in each embankment as shown on Sheet 2.

Settlement monitoring during and after construction was planned for a number of reasons. First, installation of the monuments allowed determination of settlement for final grading purposes to ensure that the design capacity of each pond was attained.

The monuments were also installed to identify when primary consolidation of the tailings, due to the weight of the embankments, was at least 90 percent complete prior to filling of the ponds. Consolidation of the underlying tailings can cause a build up in pore water pressure within the wet tailings and can adversely affect slope stability if not allowed to dissipate. By allowing the majority of consolidation (ie, 90 percent) to occur prior to filling of the ponds, the stability of the retention embankments would be increased.

Finally, it was acknowledged that large settlements could cause localized cracking of the embankments. Potential cracking was the second reason (besides slope stability) for employing relatively flat embankment slopes to maximize the base width of each embankment. If deep cracks were observed, repairs could be made prior to evaporation pond filling. Cracks would be repaired only after primary consolidation was observed to have been complete as indicated by settlement monitoring, so that no additional significant cracking would occur.

Results of the settlement monitoring indicate a maximum observed primary settlement of over 3.25 feet in the vicinity of settlement monument PSM-2, which has occurred over a period of more than 15 weeks after embankment construction completion. Plots of the observed settlement of each monument versus time are provided in Appendix C.

A surfical crack in the embankment was identified approximately 63 feet southeast of settlement monument PSM-2, prior to completion of primary settlement in this area. The crack was investigated by Canonie personnel on March 9 and 10, 1989, at the request of United Nuclear. The crack was

found to be only 4-inches deep and was determined to be caused by shrinkage of the fine-grained soils at the top of the embankment, due to drying. During the investigation, soil in the embankment in the area of the crack was excavated to a depth of approximately 6 feet to verify that the crack did not extend deeper into the embankment. The excavated soils were replaced in 3- to 4-inch lifts and compacted with hand-operated power compactors. Since the crack was confirmed to have been only surfical, it was concluded that no adverse impact to the embankment integrity occurred.

As part of the actual settlement and slope stability evaluation during construction, three open standpipes were driven into the tailings at the locations shown on Sheet 2. The standpipes were used to monitor for a sudden build up of pore water pressures in the tailings during their consolidation. Table 1 provides the observed elevations of the free liquid surface in the standpipes during construction. No water surface, and thus no significant build up in pore water pressure was observed in Standpipe No. 1; however, a gradual and expected increase in pore water pressure was observed in Standpipe Nos. 2 and 3 during embankment construction. This increase in pore water pressure has stabilized and slowly begun to dissipate as primary consolidation of the tailings has been completed.

3.0 EARTHWORK CONSTRUCTION

The evaporation ponds were constructed on an approximate balanced cut/fill basis on the tailings surface. Coarse and fine-grained tailings and alluvial soils were excavated primarily from the north and west ends of each pond and used as fill for each pond's southern embankment. A listing of the types of construction equipment used to perform the earthmoving is presented in Table 2 and included low ground pressure dozers, a smooth steel-wheeled vibratory drum roller, a sheepsfoot compactor, scrapers, and a grader.

3.1 Compaction Criteria

Since it was anticipated that the embankments and other fill areas would be constructed with coarse-grained (ie, sand) tailings, the original specifications required that each lift be compacted to at least 80 percent relative density which is appropriate for a minimum applied compactive effort for granular soils. However, a much larger percentage of alluvial soils were encountered than expected for use as compacted fill. Accordingly, relationships were immediately developed and correlated to ensure that a similar compactive effort would be applied to the finer-grained alluvial soils. Alluvial soils and fine-grained tailings mixtures used as fill were compacted to at least 95 percent of the minimum dry density obtainable by the Standard Proctor method of compaction [American Society for Testing and Materials (ASTM) D 698].

The following sections describe the laboratory tests defining these minimum densities and the field quality control tests employed to confirm that compaction of the fill had met these minimum requirements.

3.1.1 Relative Density (Coarse-Grained Tailings)

Prior to commencement of earthmoving operations, a relative density relationship (ASTM D-4253 and D 4254) was determined in the laboratory for a sample of coarse tailings. This test provided the minimum and maximum attainable density of granular soils, such as coarse-grained tailings.

Results of the relative density test indicated that a coarse-grained sample of tailings had a maximum density of 108.5 pounds per cubic foot (pcf) and a minimum density of 93.2 pcf. The minimum acceptable density of the compacted coarse-grained tailings to meet the minimum 80 percent relative density specification was determined to be 105 pcf. This value was used as the minimum acceptable density for clean, coarse-grained tailings compacted as fill and was also used as a comparative value to the minimum acceptable density determined by the Standard Proctor method of compaction, described in the following section of this report.

3.1.2 Standard Proctor Density (Fine-Grained Materials)

As earthwork initiated, more extensive deposits of both fine-grained tailings and alluvial soils were encountered than originally anticipated. Thus, determination of the acceptable field density on the basis of relative density, applicable only to coarse-grained tailings and granular soils, would have been inappropriate. Accordingly, moisture/density relationships of representative soil mixtures were determined in accordance with the Standard Proctor method of compaction (ASTM D 698). This test method identifies the maximum attainable dry density of a soil under a specified level of compactive effort, as well as the optimal soil moisture content at which that density is attained.

Results of these compaction tests are provided in Appendix D and indicate that representative samples of tailings and/or soils had a maximum dry density ranging from 112.5 pcf to 115.2 pcf with optimum moisture contents ranging from 13.0 to 14.5 percent. In accordance with standard industry practice as well as the general specifications for the entire reclamation plan, a minimum dry density of at least 95 percent of this maximum value, or values ranging from 106.9 pcf to 109.4 pcf, were selected as the minimum acceptable value for earthwork embankment construction. This range of density values compared well with a density of 110 pcf used in slope stability analysis for the pond embankments. Coincidentally, this value also compared with the value of 105 pcf as determined by the relative density method for coarse-grained tailings as previously described.

Prior to any fill placement, the foundation materials were rolled to a minimum density of at least 90 percent of the maximum dry density attainable by the Standard Proctor method of compaction, or approximately 101 pcf. In extremely soft wet areas, the foundation materials were rolled until the maximum attainable in-place density was achieved.

3.2 Field Moisture-Density Testing

As part of Canonie's field quality control, a total of 89 field density tests were obtained, or approximately one test for every 843 cubic yards of fill material placed. A minimum of one test per lift of fill was performed.

Results of the field density tests are presented in Table 3. Fill which initially did not meet the required minimum density as shown on the table was either removed and replaced or reworked until it attained the minimum density requirements. Density testing was performed until the fill was confirmed to have met the minimum density standards.

Density and in-place moisture testing was performed by both nuclear densimeter (ASTM D 2922) and sand cone (ASTM D 1556) methods for correlation purposes. Additionally, in-place soil samples were collected at the location of the nuclear densimeter tests and oven dried for moisture content correlation. This procedure was necessary due to varying amounts of coal fragments encountered in the alluvial fill material. Bituminous materials, such as coal in the soil, cause erroneously high moisture content readings that consequently lead to erroneously low dry density determinations with the nuclear densimeter. Nuclear densimeter moisture contents were thus confirmed or adjusted on the basis of oven drying representative soil samples.

All fill tested met the minimum compaction criteria described previously.

3.3 Sub-drain

Excavation activities in the west side of the South Pond uncovered saturated tailings which temporarily prevented further excavation in this area. A backhoe was mobilized to dig a ditch to drain particularly wet tailings in this area. This trench was later backfilled but a second trench was excavated in the same location in which 4-inch diameter perforated polyvinyl chloride pipe wrapped in a geotextile filter fabric was installed on the trench bottom as a permanent sub-drain. The pipe was installed between 2 and 4 feet below finish grade of the pond bottom in order to direct subsurface water to the area south of the South Pond. Drainage of water in this area improved the stability of the pond bottom in the area and allowed continued excavation in this area. The location of the sub-drain is shown on Sheet 2.

3.4 Drainage Swale

At the request of United Nuclear, Canonie excavated a drainage swale around the pond system. This swale will provide positive drainage of runoff waters from around the ponds, thus substantially reducing the pond storage required to contain water from the design PMP storm event.

4.0 LINER INSTALLATION

Geotextile and synthetic liner installation was performed subsequent to final grading of the ponds and excavation of the anchor trenches by The Snow Company of Albuquerque, New Mexico under subcontract to Canonie. The geotextile used was non-woven, synthetic Polyfelt TS-550 and TS-600. The synthetic liner used was a 36 mil reinforced Hypalon which was factory seamed into segments approximately 90 to 95 feet wide by 263 feet long. A panel layout diagram is presented on Sheet 3. The liner material panels were placed first in the North Pond and then in the South Pond to allow a greater period of time for consolidation of the softest foundation materials under the south embankment to occur.

Geotextile was placed across the width of the ponds approximately 270 feet ahead of the liner in preparation for the overlying liner. The geotextile was overlapped 12 inches and heat tack welded along the seams. The synthetic liner panels were then unfolded along their length and oriented in the pond as shown on Sheet 3. The liner pieces were overlapped a minimum of 6 inches and seamed.

Two seaming processes were used on the synthetic liner. The majority of the seams were made with a heat seaming machine along the edges of each panel which created a 4-inch wide liner-to-liner bond. Patch work, portions of seams along the width of each panel, and seams inaccessible to the heat seaming machine were solvent welded with a minimum 2-inch wide liner-to-liner contact.

All seams were visually inspected and tested for hidden defects and false seams by means of an air-lance. All synthetic liner surfaces showing damage were patched. All defects were repaired and retested. Air-lance testing was performed with approximately 60 pounds per square inch air pressure. All seams and patches were tested in the presence of the on-site Canonie engineer.

As part of Canonie's independent quality control procedures to verify required seam strength, six representative samples of field seams were

fabricated during seaming and laboratory tested for peel adhesion and bonded seam strengths. Strength tests were performed on representative seam samples by Precision Laboratories of Garden Grove, California. Sample field seams were made using excess liner material at random locations in the pond. The test seams were made at the same time and location, under the same conditions, and with the same equipment as the pond liner seam at that location. All seams tested indicate that the liner material failed before the stronger field seam demonstrating seam adequacy. Results of the testing are summarized in Table 4 and presented in Appendix E. All field seams test results met project specifications.

To accommodate the potential for some areas of the pond to settle under the weight of water, all slack in the synthetic liner was pulled into the pond bottom and distributed throughout the pond as wrinkles. These wrinkles were present during the coldest part of the year when the liner is the tightest and should allow the liner to conform itself to the pond bottom under the weight of the water without excessive stress and potential failure of the liner.

After excess slack was pulled into the ponds, the perimeter of the geotextile and synthetic liner was buried in an anchor trench as shown on Sheet 4. The trench was excavated a minimum of 12-inches deep by 12-inches wide with a backhoe. Fill material was backfilled within the trench over the geotextile and synthetic liner and compacted.

Throughout the pond bottom sandbags made of Hypalon liner material were placed on 50-foot centers on top of the liner to prevent uplift of the liner due to wind. Each liner contained approximately 50 pounds of tailings sand.

5.0 CLOSING REMARKS

The North Pond was certified complete and available for water January 3, 1989 in compliance with United Nuclear's Reclamation Plan. Settlement continues in the area of PSM-2 on the south embankment, but this settlement is at an ever-decreasing rate. Continued settlement should not have any deleterious effects on the South Pond and that cell may also be used for water storage. During operations, it is appropriate to maintain at least 6 inches of water in the bottom of each pond to minimize potential damage to the liner due to wind. Inspection of the pond system should be performed on a regular weekly basis to identify any potential problems with the liner system, excessive embankment settlement cracking or other abnormal conditions so that an evaluation of those conditions can be made by a qualified engineer and repairs initiated, if required.

The design/construct approach allowed for quick, effective solutions to unanticipated changes in tailings conditions and engineering properties at no additional cost to United Nuclear.

Canonie appreciated this opportunity to provide engineering and construction services. Please call if you have any questions or comments regarding this report.

Respectfully submitted,

Oliver P. Wesley
Project Manger
New Mexico Professional Engineer License No. 8029

OPW/dis

REFERENCES

REFERENCES

REFERENCES

Canonie Environmental Services Corp., July 1988, "Ground Water Remediation System, Technical Specifications," Church Rock Mill and Tailings Disposal Area, Gallup, New Mexico. Prepared for UNC Mining and Milling.

TABLES

TABLES

TABLE 1

STANDPIPE PIEZOMETER GROUND WATER ELEVATIONS
EVAPORATION POND CONSTRUCTION
UNITED NUCLEAR CHURCH ROCK SITE

Piezometer Number and Location	# 1 South Embankment 3+60W, -1+05N in footing at toe	# 2 South Embankment 5+50W, -0+42N South embankment	# 3 Central Embankment 3+60W, 3+74N middle embankment
Date	Ground Water Elevation		
11/14/88	Dry	---	Dry
11/17/88	Dry	6,944.64	6,950.77
11/18/88	Dry	6,946.12	---
11/19/88	Dry	6,945.44	6,949.42
11/21/88	Dry	6,945.44	6,949.52
11/22/88	Dry	6,945.65	6,949.72
11/23/88	Dry	6,948.31	6,950.37
11/28/88	Dry	6,950.87	6,950.15
11/29/88	Dry	6,950.69	6,950.60
11/30/88	Dry	6,951.41	6,950.94
12/01/88	Dry	6,951.50	6,950.90
12/02/88	Dry	6,951.60	6,950.79
12/05/88	Dry	6,948.44	Plugged
12/06/88	Dry	6,948.52	Plugged
12/07/88	Dry	6,949.48	Plugged
12/08/88	Dry	6,948.55	Plugged
12/12/88	Dry	6,948.54	Plugged
12/14/88	Dry	6,948.50	Plugged
12/15/88	Dry	6,948.53	Plugged
12/17/88	Dry	6,948.48	Plugged
12/19/88	Dry	6,948.60	Plugged
12/22/88	Dry	6,948.44	Plugged
12/31/88	Dry	6,948.62	Plugged
01/03/89	Dry	6,948.51	Plugged
01/06/89	Dry	6,948.86	Plugged
01/09/89	Dry	6,948.58	Plugged

TABLE 2

EARTHWORK EQUIPMENT

Chevrolet Pickup

Ford Pickup

Catepillar D-7-H Dozer

Catepillar 140 G Grader

Catepillar Water Trucks

2 Catepillar 637 Scrapers

Catepillar 553 Vibratory Roller

Catepillar D-7-H Low Ground Pressure (LGP) Dozer

Case 580 Backhoe

Case 480 Backhoe

Catepillar 416 Backhoe

Catepillar D-4-H LGP Dozer

"Jumping Jack" Hand Compactor

TABLE 3

SUMMARY OF IN-PLACE DENSITY TESTS

Project Name: United Nuclear Evaporation Pond Construction

Project No.: 88-131

Period: 11/6/88 to 11/12/88 (Week 2)

Test No.	Date	Location	Elevation	Field Test		Laboratory		Compaction (%)	Comments
				Dry Density (PCF)	Moisture Content (%)	Max. Dry Density (PCF)	Optimum Moisture (%)		
11-7-88-2S	11/7/88	-0+35N, 4+60W	6,942.0	97.3	14.1	112.5	14.5	86.5	Low Density (Retest Required)
11-8-88-1	11/8/88	-0+72N, 4+85W	6,944.0	101.6	16.6	114.8	14.9	88.5	Low Density (Material Removed)
11-8-88-2S	11/8/88	-0+72N, 4+85W	6,944.0	98.8	16.6	114.8	14.9	86.1	Low Density (Material Removed)
11-8-88-3	11/8/88	-0+72N, 4+75W	6,944.0	103.1	16.6	112.5	14.5	91.6	Low Density (Material Removed)
11-8-88-4	11/8/88	1+30N, 5+00W	6,945.0	99.9	14.5	Relative Density		46.0	Low Density (Material Removed)
11-8-88-5	11/8/88	1+20N, 4+10W	6,946.0	106.1	9.8	112.5	14.5	94.3	Acceptable (Subgrade)
11-8-88-6	11/8/88	1+30N, 4+10W	6,943.0	107.3	19.3	112.5	14.5	95.4	Acceptable
11-9-88-1	11/9/88	-0+60N, 1+30W	6,950.0	106.4	17.0	112.5	14.5	94.6	Acceptable
11-9-88-2	11/9/88	-0+60N, 2+70W	6,947.0	107.4	17.0	112.5	14.5	95.5	Acceptable
11-9-88-3	11/9/88	-0+60N, 4+20W	6,947.0	105.5	17.0	112.5	14.5	93.8	Low Density (Retest Required)
11-9-88-4S	11/9/88	-0+60N, 4+20W	6,947.0	114.2	17.0	112.5	14.5	101.5	Acceptable
11-9-88-5	11/9/88	-0+60N, 4+20W	6,945.0	100.0	16.0	112.5	14.5	88.9	Low Density (Material Removed)
11-9-88-6	11/9/88	0+20N, 5+30W	6,949.0	94.5	28.1	Relative Density		NA	Low Density (Retest Required)
11-9-88-7	11/9/88	0+20N, 4+55W	6,944.0	106.5	17.0	112.5	14.5	94.7	Acceptable
11-9-88-8	11/9/88	0+50N, 7+20W	6,948.0	80.7	21.4	Relative Density		NA	Low Density (Retest Required)
11-9-88-9	11/9/88	0+50N, 6+75W	6,948.0	82.5	27.9	Relative Density		NA	Low Density (Retest Required)
11-9-88-10	11/9/88	0+10N, 7+18W	6,948.0	98.1	7.5	Relative Density		34.0	Low Density (Retest Required)
11-9-88-11	11/9/88	4+04N, 7+00W	6,948.0	100.4	13.9	112.5	14.5	89.3	Low Density (Retest Required)

TABLE 3

SUMMARY OF IN-PLACE DENSITY TESTS
(Continued)

Project Name: United Nuclear Evaporation Pond Construction

Project No.: 88-131

Period: 11/6/88 to 11/12/88 (Week 2)

Test No.	Date	Location	Elevation	Field Test		Laboratory		Compaction (%)	Comments
				Dry Density (PCF)	Moisture Content (%)	Max. Dry Density (PCF)	Optimum Moisture (%)		
11-9-88-12	11/9/88	4+20N, 7+00W	6,949.0	118.4	6.5	112.5	14.5	105.2	Acceptable
11-9-88-13	11/9/88	6+80N, 1+00W	6,957.0	100.5	7.7	112.5	14.5	89.3	Low Density (Retest Required)
11-9-88-14	11/9/88	0+10N, 7+00W	6,948.0	62.0	56.6	Relative Density		NA	Low Density (Retest Required)
11-9-88-15	11/9/88	1+90N, 4+00W	6,948.0	103.2	16.0	112.5	14.5	91.7	Low Density (Retest Required)
11-9-88-16	11/9/88	2+30N, 4+00W	6,948.0	100.4	17.0	112.5	14.5	89.3	Low Density (Retest Required)
11-10-88-1	11/10/88	-0+70N, 4+00W	6,944.0	103.8	15.1	112.5	14.5	92.3	Acceptable (Subgrade)
11-10-88-2	11/10/88	-0+60N, 3+00W	6,944.0	102.3	20.7	112.5	14.5	90.7	Acceptable (Subgrade)
11-10-88-3	11/10/88	-0+50N, 3+00W	6,944.5	115.3	11.9	115.2	13.0	100.4	Acceptable
11-10-88-4S	11/10/88	-0+50N, 3+00W	6,944.5	112.6	15.6	115.2	13.0	97.8	Acceptable
11-10-88-5	11/10/88	3+40N, 2+20W	6,950.0	110.6	12.8	115.2	13.0	96.0	Acceptable
11-10-88-6S	11/10/88	-0+60N, 2+00W	6,945.0	113.7	12.2	114.8	14.9	99.0	Acceptable
11-10-88-7S	11/10/88	-0+60N, 2+50W	6,944.0	108.1	13.2	112.5	14.5	96.1	Acceptable
11-10-88-8	11/10/88	-0+60N, 2+50W	6,944.0	106.9	16.4	112.5	14.5	95.0	Acceptable
11-11-88-1	11/11/88	3+60N, 3+20W	6,952.0	106.2	15.6	112.5	14.5	94.5	Acceptable
11-11-88-2	11/11/88	3+20N, 2+90W	6,952.0	102.8	18.0	112.5	14.5	91.4	Low Density (Retest Required)
11-11-88-3	11/11/88	3+45N, 4+20W	6,952.0	106.3	13.5	112.5	14.5	94.5	Acceptable
11-11-88-4	11/11/88	3+65N, 5+70W	6,953.0	106.7	12.4	112.5	14.5	94.8	Acceptable
11-12-88-1	11/12/88	3+50N, 2+20W	6,956.0	107.9	8.8	112.5	14.5	95.9	Acceptable

TABLE 3

SUMMARY OF IN-PLACE DENSITY TESTS
(Continued)

Project Name: United Nuclear Evaporation Pond Construction

Project No.: 88-131

Period: 11/6/88 to 11/12/88 (Week 2)

Test No.	Date	Location	Elevation	Field Test		Laboratory		Compaction (%)	Comments
				Dry Density (PCF)	Moisture Content (%)	Max. Dry Density (PCF)	Optimum Moisture (%)		
11-12-88-2	11/12/88	3+50N, 3+00W	6,958.0	106.1	9.2	112.5	14.5	94.3	Low Density (Retest Required)
11-12-88-3	11/12/88	3+50N, 3+80W	6,958.0	110.0	8.3	112.5	14.5	97.8	Acceptable
11-12-88-4	11/12/88	3+40N, 5+30W	6,957.0	108.2	13.0	112.5	14.5	96.2	Acceptable
11-12-88-5	11/12/88	3+50N, 6+60W	6,960.0	105.9	14.7	112.5	14.5	94.2	Low Density (Retest Required)
11-12-88-6	11/12/88	3+20N, 3+30W	6,958.0	113.9	10.3	112.5	14.5	101.2	Acceptable
11-12-88-7	11/12/88	3+50N, 0+30W	6,960.0	107.0	16.3	112.5	14.5	95.1	Acceptable
11-12-88-8	11/12/88	2+20N, 2+40W	6,958.0	108.2	10.5	112.5	14.5	96.2	Acceptable
11-12-88-9	11/12/88	6+20N, -0+50W	6,960.0	107.6	15.8	112.5	14.5	93.6	Acceptable (Subgrade)
11-12-88-10	11/12/88	4+04N, 0+00W	6,960.0	109.1	17.0	112.5	14.5	97.0	Acceptable
11-12-88-11	11/12/88	3+50N, 7+22W	6,960.0	103.8	17.0	112.5	14.5	92.2	Acceptable (Subgrade)
11-12-88-12	11/12/88	5+04N, 7+30W	6,966.0	109.1	12.0	112.5	14.5	97.0	Acceptable
11-12-88-13	11/12/88	3+50N, 6+90W	6,961.0	103.3	14.5	112.5	14.5	91.8	Acceptable (Subgrade)
11-12-88-14	11/12/88	3+50N, 6+90W	6,961.0	102.3	14.6	112.5	14.5	91.0	Low Density (Retest Required)

TABLE 3

SUMMARY OF IN-PLACE DENSITY TESTS

Project Name: United Nuclear Evaporation Pond Construction

Project No.: 88-131

Period: 10/30/88 to 11/5/88 (Week 1)

Test No.	Date	Location	Elevation	Field Test		Laboratory		Compaction (%)	Comments
				Dry Density (PCF)	Moisture Content (%)	Max. Dry Density (PCF)	Optimum Moisture (%)		
11-3-88-1	11/3/88	1+50N, 4+50W	6,946.0	99.6	13.2	112.5	14.5	88.5	Low Density (Retest Required)
11-3-88-2	11/3/88	-0+64N, 2+00W	6,945.0	87.2	13.1	112.5	14.5	77.5	Low Density (Retest Required)
11-3-88-3	11/3/88	0+35N, 3+00W	6,944.5	103.9	17.9	112.5	14.5	92.4	Low Density (Retest Required)
11-3-88-4	11/3/88	-1+15N, 3+00W	6,943.0	95.3	18.0	112.5	14.5	84.7	Low Density (Retest Required)
11-3-88-5	11/3/88	0+30N, 4+00W	6,943.5	106.0	12.8	112.5	14.5	94.2	Acceptable (Subgrade)
11-4-88-1	11/4/88	-0+55N, 4+70W	6,944.0	109.2	14.7	112.5	14.5	97.1	Acceptable
11-4-88-2	11/4/88	-0+55N, 4+70W	6,944.0	108.8	13.8	112.5	14.5	96.7	Acceptable

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TABLE 3

SUMMARY OF IN-PLACE DENSITY TESTS

Project Name: United Nuclear Evaporation Pond Construction

Project No.: 88-131

Period: 11/13/88 to 11/19/88 (Week 3)

Test No.	Date	Location	Elevation	Field Test		Laboratory		Compaction (%)	Comments
				Dry Density (PCF)	Moisture Content (%)	Max. Dry Density (PCF)	Optimum Moisture (%)		
11-14-88-1	11/14/88	-0+60N, 1+00W	6,947.0	106.7	12.6	112.5	14.5	94.8	Acceptable
11-14-88-2	11/14/88	-0+50N, 2+00W	6,948.0	94.3	20.1	112.5	14.5	88.2	Low Density (Retest Required)
11-14-88-3	11/14/88	-0+40N, 7+00W	6,947.0	112.5	11.6	112.5	14.5	100.1	Acceptable
11-14-88-4	11/14/88	-0+60N, 1+00W	6,947.0	112.2	12.5	112.5	14.5	99.7	Acceptable
11-14-88-5	11/14/88	-0+50N, 2+00W	6,948.0	112.1	6.5	112.5	14.5	99.7	Acceptable
11-14-88-6	11/14/88	-0+20N, 2+90W	6,950.0	103.1	10.7	112.5	14.5	91.6	Low Density (Retest Required)
11-12-88-2A	11/15/88	3+50N, 3+00W	6,958.0	110.5	10.4	112.5	14.5	98.2	Acceptable (Retest of 11-12-88-2)
11-15-88-1	11/15/88	3+50N, 2+20W	6,958.0	109.5	10.4	112.5	14.5	97.3	Acceptable
11-15-88-2	11/15/88	3+40N, 5+30W	6,957.0	107.7	11.8	112.5	14.5	95.7	Acceptable
11-15-88-3	11/15/88	-0+50N, 2+10W	6,950.0	106.4	15.9	112.5	14.5	94.6	Acceptable
11-15-88-4	11/15/88	-0+50N, 3+00W	6,950.0	105.0	15.3	112.5	14.5	93.4	Low Density (Retest Required)
11-12-88-5A	11/15/88	3+50N, 6+60W	6,960.0	109.0	14.0	112.5	14.5	96.9	Acceptable (Retest of 11-12-88-5)
11-15-88-5	11/15/88	3+50N, 7+22W	6,960.0	105.7	14.7	112.5	14.5	93.9	Low Density (Retest Required)
11-12-88-14A	11/15/88	3+50N, 6+90W	6,961.0	104.0	11.9	112.5	14.5	92.4	Low Density (Retest Required)
11-15-88-6	11/15/88	3+50N, 0+30W	6,960.0	102.8	16.4	112.5	14.5	91.4	Low Density (Retest Required)
11-14-88-6A	11/15/88	-0+20N, 2+90W	6,950.0	101.0	14.6	112.5	14.5	89.8	Low Density (Retest Required)
11-14-88-6C	11/15/88	-0+20N, 2+90W	6,950.0	101.6	15.8	112.5	14.5	90.3	Low Density (Retest Required)
11-12-88-10A	11/15/88	0+00N, 4+04W	6,959.0	111.4	11.0	112.5	14.5	99.1	Acceptable (Retest of 11-12-88-10)

TABLE 3

SUMMARY OF IN-PLACE DENSITY TESTS
(Continued)

Project Name: United Nuclear Evaporation Pond Construction

Project No.: 88-131

Period: 11/13/88 to 11/19/88 (Week 3)

Test No.	Date	Location	Elevation	Field Test		Laboratory		Compaction (%)	Comments
				Dry Density (PCF)	Moisture Content (%)	Max. Dry Density (PCF)	Optimum Moisture (%)		
11-12-88-14B	11/15/88	3+50N, 6+90W	6,961.0	107.7	14.9	112.5	14.5	95.8	Acceptable (Retest of 11-12-88-14A)
11-15-88-6A	11/15/88	3+50N, 0+30W	6,961.0	108.9	11.5	112.5	14.5	96.8	Acceptable (Retest of 11-15-88-6)
11-3-88-2A	11/16/88	-0+64N, 2+00W	6,945.0	106.6	10.7	112.5	14.5	94.8	Acceptable (Retest of 11-3-88-2)
11-3-88-4C	11/16/88	-1+15N, 3+00W	6,943.0	94.8	7.2	112.5	14.5	85.0	Low Density (Retest Required)
11-3-88-3A	11/16/88	0+35N, 3+00W	6,944.5	104.4	12.5	112.5	14.5	92.8	Low Density (Retest Required)
11-8-88-1A	11/16/88	-0+72N, 4+80W	6,944.0	109.4	12.2	112.5	14.5	97.2	Acceptable (Retest of 11-8-88-1)
11-12-88-3A	11/16/88	3+25N, 2+00W	6,960.0	108.3	13.9	112.5	14.5	96.2	Acceptable (Retest of 11-12-88-3)
11-16-88-1	11/16/88	3+70N, 3+60W	6,958.0	98.8	15.8	112.5	14.5	87.8	Low Density (Retest Required)
11-9-88-6A	11/16/88	0+20N, 5+20W	6,949.0	107.5	13.1	112.5	14.5	95.6	Acceptable (Retest of 11-9-88-6)
11-16-88-2	11/16/88	-0+35N, 2+40W	6,950.0	108.4	11.9	112.5	14.5	96.3	Acceptable
11-12-88-14A	11/16/88	3+70N, -0+80W	6,961.0	104.5	15.2	112.5	14.5	92.8	Low Density (Retest Required)
11-16-88-3	11/16/88	3+40N, 2+00W	6,961.0	105.2	15.2	112.5	14.5	93.5	Low Density (Retest Required)
11-16-88-4	11/16/88	3+40N, 6+10W	6,961.0	104.0	12.0	112.5	14.5	93.5	Low Density (Retest Required)
11-16-88-5	11/16/88	-0+50N, 4+00W	6,953.0	107.2	14.0	112.5	14.5	95.2	Acceptable
11-3-88-3B	11/17/88	0+35N, 3+00W	6,944.0	106.3	13.0	112.5	14.5	94.5	Acceptable (Retest of 11-3-88-3A)
11-3-88-1A	11/17/88	1+50N, 4+50W	6,946.0	104.7	12.3	112.5	14.5	93.1	Low Density (Retest Required)
11-12-88-14B	11/17/88	3+70N, -0+80W	6,961.0	110.3	11.8	112.5	14.5	98.0	Acceptable (Retest of 11-12-88-14A)
11-16-88-5A	11/17/88	-0+50N, 4+00W	6,953.0	112.6	11.1	112.5	14.5	100.0	Acceptable (Retest of 11-16-88-5)

TABLE 3

SUMMARY OF IN-PLACE DENSITY TESTS
(Continued)

Project Name: United Nuclear Evaporation Pond Construction

Project No.: 88-131

Period: 11/13/88 to 11/19/88 (Week 3)

Test No.	Date	Location	Elevation	Field Test		Laboratory		Compaction (%)	Comments
				Dry Density (PCF)	Moisture Content (%)	Max. Dry Density (PCF)	Optimum Moisture (%)		
11-15-88-4A	11/17/88	-0+50N, 3+00W	6,950.0	105.7	16.2	112.5	14.5	94.0	Low Density (Retest Required)

TABLE 3

SUMMARY OF IN-PLACE DENSITY TESTS

Project Name: United Nuclear Evaporation Pond Construction

Project No.: 88-131

Period: 11/20/88 to 11/26/88 (Week 4)

Test No.	Date	Location	Elevation	Field Test		Laboratory		Compaction (%)	Comments
				Dry Density (PCF)	Moisture Content (%)	Max. Dry Density (PCF)	Optimum Moisture (%)		
11-7-88-2A	11/21/88	-0+35N, 4+60W	6,948.0	106.3	16.0	112.5	14.5	94.5	Acceptable (Retest of 11-7-88-2)
11-16-88-1A	11/21/88	3+70N, 3+60W	6,958.0	107.5	14.0	112.5	14.5	95.5	Acceptable (Retest of 11-16-88-1)
11-21-88-1	11/21/88	3+10N, 4+70W	6,952.0	98.9	17.0	112.5	14.5	88.0	Low Density (Retest Required)
11-21-88-2	11/21/88	3+50N, 3+60W	6,952.0	109.5	9.9	112.5	14.5	97.3	Acceptable
11-9-88-5A	11/21/88	-0+60N, 4+20W	6,948.0	108.3	15.5	112.5	14.5	96.3	Acceptable (Retest of 11-9-88-5)
11-15-88-5A	11/21/88	-0+20N, 2+90W	6,950.0	106.7	14.4	112.5	14.5	94.9	Acceptable (Retest of 11-15-88-5)
11-16-88-3A	11/21/88	3+40N, 2+00W	6,961.0	107.7	11.8	112.5	14.5	95.7	Acceptable (Retest of 11-16-88-3)
11-21-88-3	11/21/88	3+50N, 0+50W	6,962.0	105.9	8.3	Relative Density		80.0	Acceptable
11-21-88-4	11/21/88	3+70N, 6+00W	6,962.0	105.7	6.4	Relative Density		83.0	Acceptable
11-22-88-1	11/22/88	-0+55N, 5+90W	6,945.0	110.8	13.5	112.5	14.5	98.4	Acceptable
11-22-88-2	11/22/88	6+04N, -0+35W	6,963.0	105.0	12.1	112.5	14.5	93.3	Low Density (Retest Required)
11-22-88-3	11/22/88	3+60N, 2+50W	6,961.0	107.2	12.9	112.5	14.5	95.3	Acceptable
11-22-88-4	11/22/88	-0+55N, 5+90W	6,948.0	107.6	8.6	112.5	14.5	95.6	Acceptable
11-22-88-5	11/22/88	3+80N, 7+30W	6,962.0	104.8	8.2	112.5	14.5	93.2	Low Density (Retest Required)
11-22-88-6	11/22/88	-0+35N, 1+90W	6,952.0	111.1	17.3	112.5	14.5	98.8	Acceptable
11-22-88-7	11/22/88	-0+35N, 5+80W	6,952.0	114.1	4.1	Relative Density		100.0	Acceptable
11-9-88-8A	11/22/88	0+50N, 7+20W	6,948.0	82.6	30.7	Relative Density		NA	Low Density (Retest Required)
11-22-88-8	11/22/88	-0+50N, 5+80W	6,949.0	109.4	9.1	114.8	14.9	95.2	Acceptable

TABLE 3

SUMMARY OF IN-PLACE DENSITY TESTS
(Continued)

Project Name: United Nuclear Evaporation Pond Construction

Project No.: 88-131

Period: 11/20/88 to 11/26/88 (Week 4)

Test No.	Date	Location	Elevation	Field Test		Laboratory		Compaction (%)	Comments
				Dry Density (PCF)	Moisture Content (%)	Max. Dry Density (PCF)	Optimum Moisture (%)		
11-22-88-9	11/22/88	-0+35N, 5+80W	6,950.0	118.5	5.6	114.8	14.9	103.3	Acceptable
11-9-88-13A	11/22/88	6+80N, 1+00W	6,957.0	119.0	11.3	117.8	14.9	103.7	Acceptable (Retest of 11-9-88-13)
11-9-88-15A	11/23/88	1+90N, 4+00W	6,948.0	111.7	11.7	112.5	14.5	99.3	Acceptable (Retest of 11-9-88-15)
11-9-88-16A	11/23/88	2+30N, 3+20W	6,948.0	108.3	11.3	112.5	14.5	96.2	Acceptable
11-11-88-2A	11/23/88	3+20N, 2+90W	6,952.0	109.6	14.9	112.5	14.5	97.4	Acceptable
11-8-88-4A	11/23/88	1+30N, 5+00W	6,945.0	111.2	11.8	114.8	14.9	96.8	Acceptable
11-23-88-1	11/23/88	0+60N, 4+10W	6,958.0	111.8	11.7	112.5	14.5	99.4	Acceptable

TABLE 3

SUMMARY OF IN-PLACE DENSITY TESTS

Project Name: United Nuclear Evaporation Pond Construction

Project No.: 88-131

Period: 11/27/88 to 12/3/88 (Week 5)

Test No.	Date	Location	Elevation	Field Test		Laboratory		Compaction (%)	Comments
				Dry Density (PCF)	Moisture Content (%)	Max. Dry Density (PCF)	Optimum Moisture (%)		
11-16-88-4A	11/29/88	3+40N, 6+10W	6,961.0	111.8	8.5	114.8	14.9	97.3	Acceptable (Retest of 11-16-88-4)
11-15-88-3A	11/29/88	3+50N, 7+22W	6,960.0	116.3	10.4	114.8	14.9	101.3	Acceptable (Retest of 11-15-88-3)
11-16-88-2A	11/29/88	-0+35N, 2+40W	6,950.0	112.7	13.6	114.8	14.9	98.3	Acceptable (Retest of 11-16-88--2)
11-3-88-4B	11/29/88	-1+15N, 3+00W	6,943.0	96.1	13.6	112.5	14.5	85.4	Low Density (Retest Required)
11-21-88-1B	11/29/88	3+10N, 4+70W	6,952.0	105.0	12.9	112.5	14.5	93.4	Low Density (Retest Required)
11-29-88-1	11/29/88	3+50N, 7+22W	6,960.0	110.4	10.4	114.8	14.9	96.2	Acceptable
11-30-88-1	11/30/88	4+10N, 2+60W	6,957.0	111.3	10.9	112.5	14.5	98.9	Acceptable
11-14-88-2A	11/30/88	-0+50N, 2+00W	6,948.0	107.3	12.7	112.5	14.5	95.4	Acceptable (Retest of 11-14-88-2)
11-14-88-6D	11/30/88	-0+20N, 2+90W	6,950.0	110.3	14.7	112.5	14.5	98.0	Acceptable (Retest of 11-14-88-6C)
11-9-88-8B	11/30/88	0+50N, 7+20W	6,948.0	109.8	10.2	Relative	Density	101.0	Acceptable (Retest of 11-9-88-8A)
11-9-88-9A	11/30/88	0+50N, 6+75W	6,948.0	110.9	13.8	Relative	Density	102.0	Acceptable (Retest of 11-9-88-9)
11-22-88-2A	12/01/88	6+04N, -0+35N	6,963.0	109.0	12.6	112.5	14.5	96.8	Acceptable (Retest of 11-22-88-2)
11-9-88-10A	12/01/88	0+10N, 7+18W	6,948.0	111.3	10.0	112.5	14.5	98.9	Acceptable (Retest of 11-9-88-10)
11-9-88-14A	12/01/88	0+10N, 7+00W	6,948.0	114.8	11.9	112.5	14.5	102.1	Acceptable (Retest of 11-9-88-14)
11-9-88-6B	12/01/88	0+20N, 5+30W	6,949.0	109.4	13.0	112.5	14.5	97.2	Acceptable (Retest of 11-9-88-6A)
11-9-88-16B	12/01/88	2+30N, 4+00W	6,948.0	103.2	13.8	112.5	14.5	91.7	Low Density (Retest Required)
11-22-88-5A	12/01/88	3+80N, 7+30W	6,962.0	110.4	15.6	112.5	14.5	98.1	Acceptable (Retest of 11-22-88-5)
11-9-88-11A	12/01/88	4+04N, 7+00W	6,957.0	97.5	20.0	112.5	14.5	86.7	Low Density (Retest Required)

TABLE 3

SUMMARY OF IN-PLACE DENSITY TESTS
(Continued)

Project Name: United Nuclear Evaporation Pond Construction

Project No.: 88-131

Period: 11/27/88 to 12/3/88 (Week 5)

Test No.	Date	Location	Elevation	Field Test		Laboratory		Compaction (%)	Comments
				Dry Density (PCF)	Moisture Content (%)	Max. Dry Density (PCF)	Optimum Moisture (%)		
11-3-88-1C	12/01/88	1+50N, 4+50W	6,946.0	102.9	13.4	112.5	14.5	91.5	Low Density (Retest Required)

TABLE 4

FIELD SEAM STRENGTH
EVAPORATION POND IMPERVIOUS LINER
UNITED NUCLEAR CHURCH ROCK SITE

Sample Location	Seam Peel Adhesion Strength (a) (Pounds)	Specified Peel Adhesion Strength (Pounds)	Bonded Seam Strength (b) (Pounds)	Specified Bonded Seam Strength (Pounds)	Comments
6+93N, 2+00W	21.2	8	300	160	Heat welded, liner material failed before seam.
6+93N, 2+00W	21.9	8	274	160	Heat welded, liner material failed before seam.
6+93N, 7+30W	20.0	8	192	160	Solvent welded, liner material failed before seam.
6+93N, 7+30W	23.7	8	222	160	Solvent welded, liner material failed before seam.
2+70N, 6+00W	32.0	8	315	160	Heat welded, liner material failed before seam.
Middle Berm	27.1	8	C	160	Solvent welded, liner material failed before seam.

(a) Performed in accordance with ASTM D-413

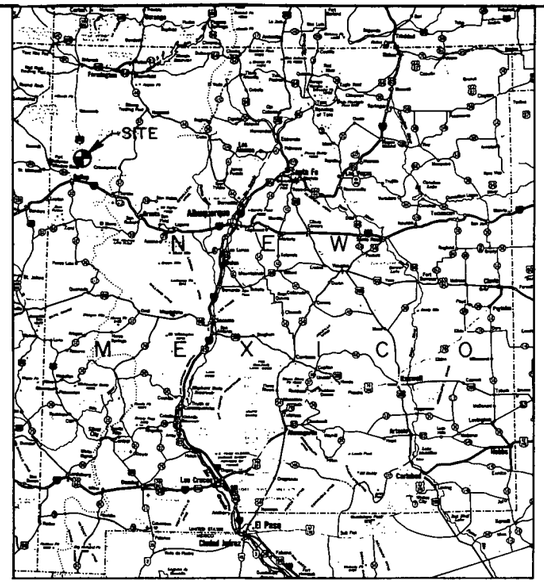
(b) Performed in accordance with ASTM D-751

(c) Not tested due to insufficient material

FIGURES

FIGURES

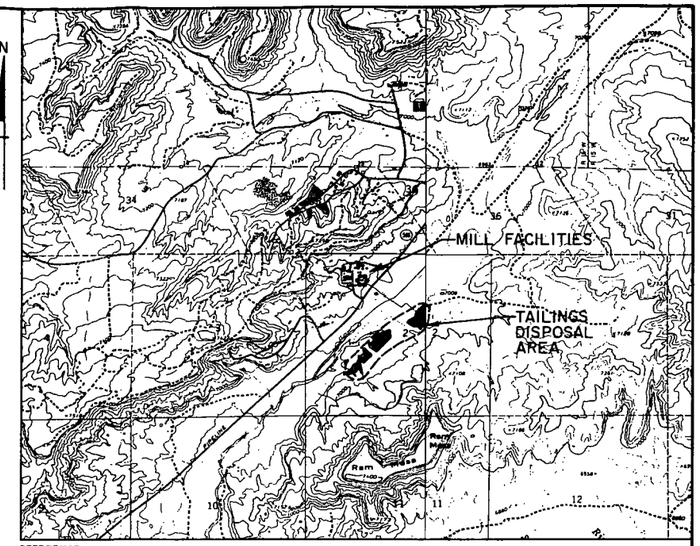
DRAWN BY	J. WADE 1-11-89
CHECKED BY	mpy 3-17-89
APPROVED BY	dpw 3-17-89
DRAWING NUMBER	88-131-E11



VICINITY MAP

SCALE
50 0 50 100 MILES

INDEX OF DRAWINGS		
SHEET NO.	DRAWING NO.	TITLE
SHEET 1 of 4	88-131-E11	TITLE SHEET
SHEET 2 of 4	88-131-E13	PLAN VIEW-EVAPORATION POND
SHEET 3 of 4	88-131-E18	HYPALON PANEL LAYOUT
SHEET 4 of 4	88-131-E14	DETAIL SHEET



REFERENCE:
-U.S.G.S. 7.5' TOPOGRAPHIC MAPS OF HARD GROUND FLATS AND OAK SPRING, NEW MEXICO. DATED: 1963. PHOTO REVISED IN 1979.

LOCATION MAP

SCALE
2000 0 2000 4000 FEET

AS - BUILT CONSTRUCTION DRAWINGS EVAPORATION POND SYSTEM

MC KINLEY COUNTY, NEW MEXICO

PREPARED FOR

UNC MINING AND MILLING GALLUP, NEW MEXICO

No.	DATE	ISSUE NUMBER / REVISIONS	DWN. BY DATE	CK'D BY DATE	AP'D BY DATE
1	3-17-89	ISSUED FOR AS-BUILT CONSTRUCTION SET	J. WADE 1-11-89		

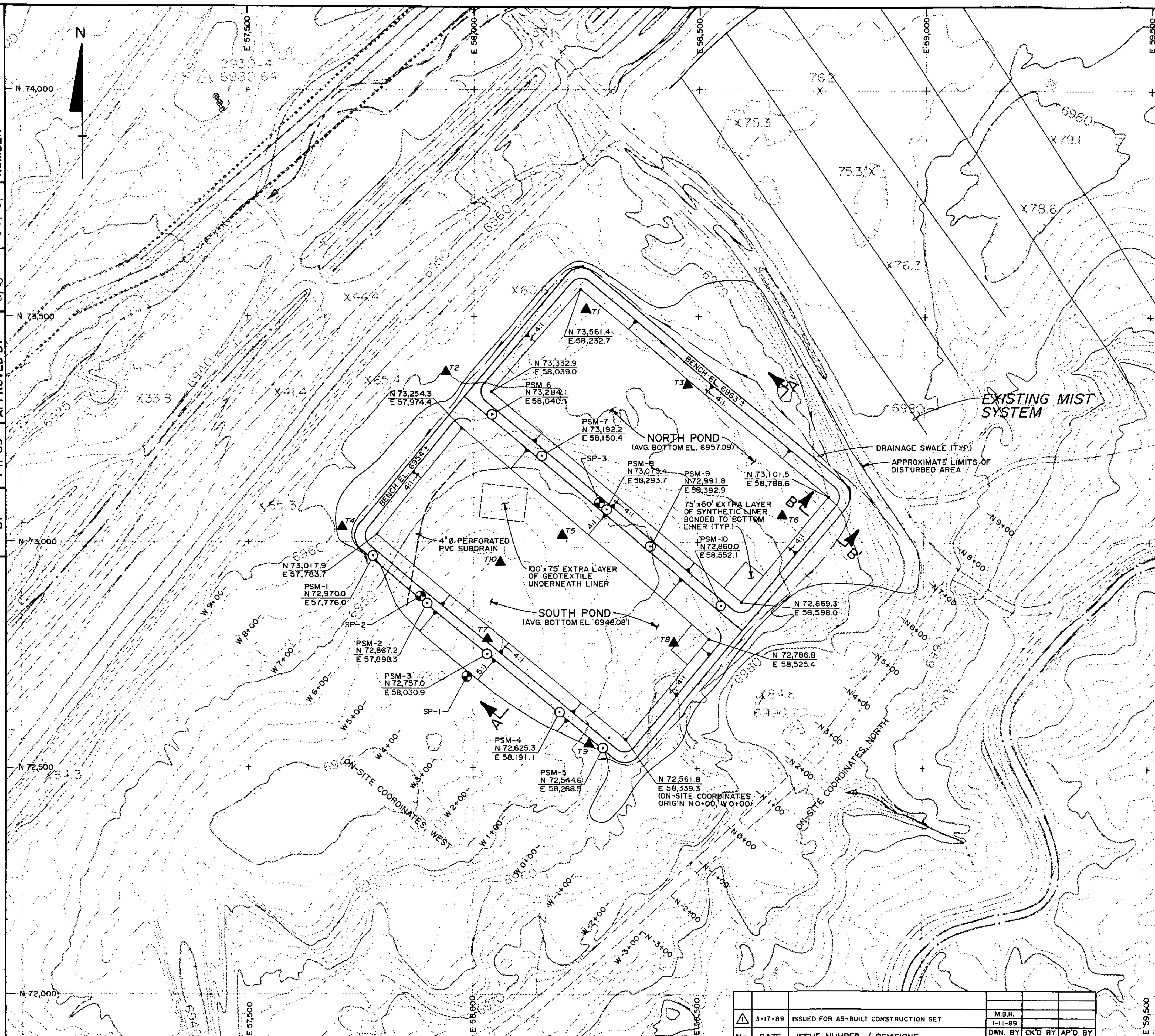
TITLE SHEET

PREPARED FOR

UNC MINING AND MILLING
GALLUP, NEW MEXICO

CanonieEnvironmental

DATE: 1-11-89	SHEET 1 of 4	DRAWING NUMBER 88-131-E11
SCALE: AS SHOWN		



NOTES:

1. EXISTING MIST SYSTEM INSTALLED BY OWNER PRIOR TO CONSTRUCTION OF EVAPORATION PONDS.
2. SEE SHEET 3 FOR HYPALON PANEL SEAM LOCATIONS.
3. SEE SHEET 4 FOR CROSS SECTIONS.
4. SEE SHEET 4 FOR DETAILS.

LEGEND:

- T3 ▲ TAILINGS DESIGN BORING LOCATION, SEE SEE AS-BUILT CONSTRUCTION REPORT, APPENDIX A FOR BORING LOGS
- PSM-8 ⊙ SETTLEMENT MONUMENT LOCATION SEE SHEET 4, DETAIL B
- SP-2 APPROXIMATE STANDPIPE LOCATION

SCALE
100 0 100 200 FEET

PLAN VIEW
EVAPORATION POND

PREPARED FOR

UNC MINING AND MILLING
GALLUP, NEW MEXICO

Canonie Environmental

No.	DATE	ISSUE NUMBER / REVISIONS	DWN. BY DATE	CK'D BY DATE	AP'D BY DATE
1	3-17-89	ISSUED FOR AS-BUILT CONSTRUCTION SET	M.B.H. 1-11-89		

DRAWN BY	CHECKED BY / APPROVED BY			DRAWING NUMBER
M.B.H. 1-11-89	mjy / OPJ	3-17-89 / 3-17-89		88-131-E13

DATE: 1-11-89
SCALE: AS SHOWN
SHEET 2 of 4
DRAWING NUMBER 88-131-E13

88-131-E12

DRAWING NUMBER	88-131-E18
	3-17-89
CHECKED BY	CPJ
APPROVED BY	3-17-89
M.B.H.	3-17-89
DRAWN BY	E12

N

N 74,000
N 73,500
N 73,000
N 72,500
N 72,000

E 57,500
E 58,000
E 58,500
E 59,000
E 59,500

NORTH POND

SOUTH POND

HYPALON PANEL (TYP.)

SEAM (TYP.)

LINER ANCHORED IN TRENCH

75' x 50' EXTRA LAYER OF HYPALON LINER BONDED TO BOTTOM LAYER

SCALE
100 0 100 200 FEET

HYPALON PANEL LAYOUT

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UNC MINING AND MILLING
GALLUP, NEW MEXICO

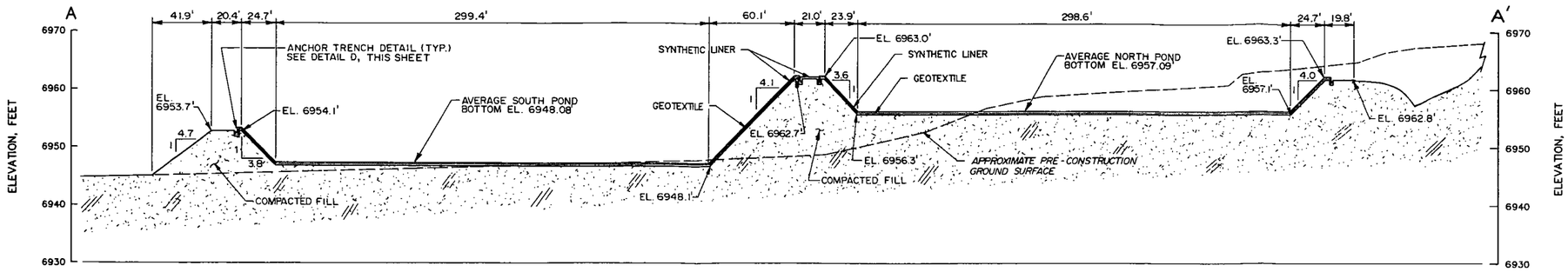
Canonie Environmental

No.	DATE	ISSUE NUMBER / REVISIONS	M.B.H. DWN. BY DATE	CK'D BY DATE	AP'D BY DATE
1	3-17-89	ISSUED FOR AS-BUILT CONSTRUCTION SET	3-17-89		

DATE: 3-17-89
SCALE: AS SHOWN
SHEET 3 of 4
DRAWING NUMBER 88-131-E18

88-131-E12

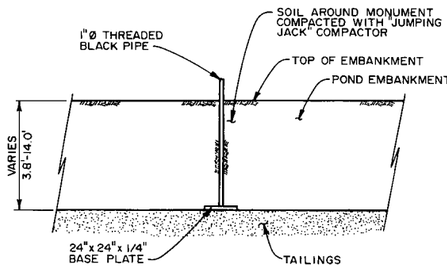
DRAWN BY	CHECKED BY	DRAWING NUMBER
R.H.	CPJ	88-131-E14
1-16-89	APPROVED BY	3-17-89



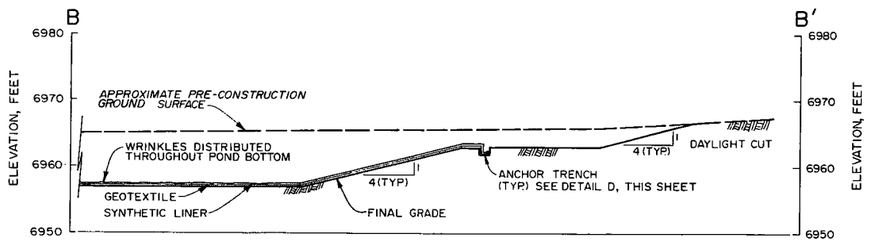
DETAIL A
SECTION A–A'

VERTICAL SCALE 10 0 10 FEET
HORIZONTAL SCALE 40 0 40 FEET
VERTICAL EXAGGERATION = 4X

NOTE:
1. SEE SHEET 2 FOR CROSS SECTION LOCATION.



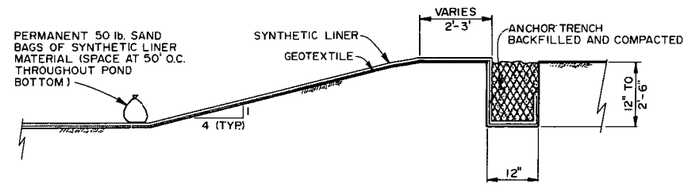
DETAIL B
SETTLEMENT MONUMENT (TYP.)
NOT TO SCALE



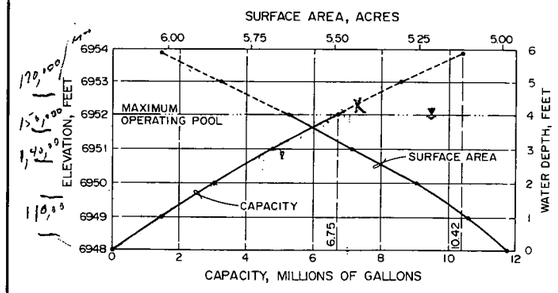
DETAIL C
SECTION B-B'

SCALE 10 0 10 20 FEET

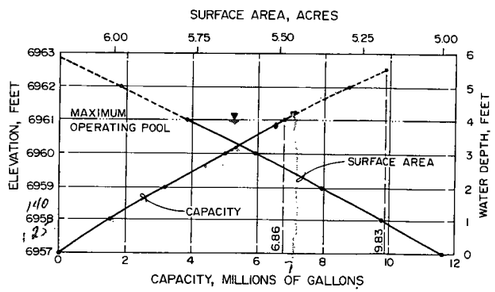
NOTE:
1. SEE SHEET 2 FOR CROSS SECTION LOCATION.



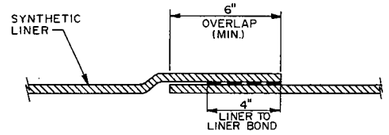
DETAIL D
ANCHOR TRENCH DETAIL (TYP.)
NOT TO SCALE



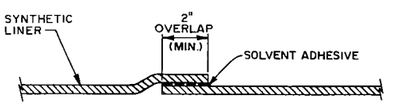
DETAIL E
AREA-CAPACITY CURVE
SOUTH POND



DETAIL F
AREA-CAPACITY CURVE
NORTH POND



DETAIL G
SYNTHETIC LINER HEAT SEAM (TYP.)
NOT TO SCALE



DETAIL H
SYNTHETIC LINER SOLVENT SEAM (TYP)
NOT TO SCALE

No.	DATE	ISSUE NUMBER / REVISIONS	M.B.H.		
⚠	3-17-89	ISSUED FOR AS-BUILT CONSTRUCTION SET	3-17-89		
			DWN. BY DATE	CK'D BY DATE	AP'D BY DATE

DETAIL SHEET
PREPARED FOR
UNC MINING AND MILLING
GALLUP, NEW MEXICO
Canonie Environmental

DATE: 1-16-89	SHEET 4 of 4	DRAWING NUMBER 88-131-E14
SCALE: AS SHOWN		

APPENDIX
A

APPENDIX A

BORING LOGS

Soil Boring Log

PROJECT No. 86-060-04
BORING No. 88-RP-T1
LOGGED BY M. Yovich

PROJECT NAME UNC
BORING LOCATION N 73,516 E 58,248 SURFACE ELEV. 6966.70
DRILLER Heber Mining and Exploration DATE: START 5/18/88 FINISH 5/18/88

DEPTH	SAMPLE No.	SAMPLE TYPE	INTERVAL FROM	INTERVAL TO	BLOW COUNT 0" to 6"	BLOW COUNT 6" to 12"	BLOW COUNT 12" to 18"	REC (in)	USCS SOIL TYPE	WC (%)	qu (TSF)	LAYER DEPTH	SOIL DESCRIPTION AND REMARKS	PIEZO
	1	SS	0.0	1.5	5	7	9	18					ALLUVIUM	
	2	SS	1.5	3.0	5	6	6	18	SM/ML				Medium dense, brown, silty fine SAND	
	3	SS	3.0	4.5	5	4	5	14					and fine sandy SILT, trace clay and	
5													coal. (Fill)	
	4	SS	4.5	6.0	3	4	5	18						
	5	SS	6.0	7.5	5	6	8	18				7.0		
													TAILINGS	
	6	SS	7.5	9.0	6	7	5	18	SP				Medium dense, off-white, fine to medium	
10	7	SS	9.0	10.5	6	6	5	18					SAND. Moist	
	8	SS	10.5	12.0	2	1	2	18					Same. Very Loose.	
	9	SS	12.0	13.5	2	2	3	8						
15	10	SS	13.5	15.0	2	2	1	18	SP/ML				Loose, off-white, fine sandy SILT, trace	
													clay. Wet.	
	11	SS	17.5	19.0	3	5	5	18	SP				Loose, off-white, fine to medium SAND,	
20													some silt. Wet.	
	12	SS	21.5	23.0	1	2	2	18						
25														
	13	SS	25.0	26.5	2	2	1	18	SM			26.5	Loose, off-white, silty fine SAND. Wet.	
													ALLUVIUM	
	14	SS	27.0	29.5	7	10	12	18	ML				Medium dense, dark brown, clayey SILT,	
30													trace fine sand. Wet.	
35													Notes: 1. Bottom of boring at 30.0 feet. 2. Boring backfilled with cuttings, 3. CME 55 rig.	
40														

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Soil Boring Log

PROJECT No. 86-060-04
BORING No. 88-RP-T1A
LOGGED BY M. Yovich

PROJECT NAME UNC
BORING LOCATION N 73,510 E 58,248 SURFACE ELEV. 6966.70
DRILLER Heber Mining and Exploration DATE: START 5/22/88 FINISH 5/22/88

DEPTH	SAMPLE No.	SAMPLE TYPE	INTERVAL FROM	INTERVAL TO	BLOW COUNT 0" to 6"	BLOW COUNT 6" to 12"	BLOW COUNT 12" to 18"	REC (in)	USCS SOIL TYPE	WC (%)	qu (TSF)	LAYER DEPTH	SOIL DESCRIPTION AND REMARKS	PIEZO
5														
10													For description, see boring log for Boring 88-RP-T1.	
15														
20														
25														
													TAILINGS	
									SP				Off-white, fine SAND, some silt. Saturated. (pH=3.0)	
30	1	CR	25.0	30.0				60						
												31.0		
													ALLUVIUM	
									CL				Blue-gray silty CLAY (ph=7.0) grading to brown, fine sandy SILT, some clay (pH=4.5) after 33 ft.	
35	2	CR	30.0	35.0				60	ML				Moist. Sluff in sample at 35 feet. (No pH reading.) pH=6.5 at 37.5 feet.	
40	3	CR	35.0	40.0				60					pH=7.0 at 40.0 feet.	

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Soil Boring Log

PROJECT No. 86-060-04
BORING No. 88-RP-T1A
LOGGED BY M. Yovich

PROJECT NAME UNC
BORING LOCATION N 73,510 E 58,248 SURFACE ELEV. 6966.70
DRILLER Heber Mining and Exploration DATE: START 5/22/88 FINISH 5/22/88

DEPTH	SAMPLE No.	SAMPLE TYPE	SAMPLE INTERVAL FROM	SAMPLE INTERVAL TO	BLOW COUNT 0" to 6"	BLOW COUNT 6" to 12"	BLOW COUNT 12" to 18"	REC (in)	USCS SOIL TYPE	WC (%)	qu (TSF)	LAYER DEPTH	SOIL DESCRIPTION AND REMARKS	PIEZO
									ML				Same. pH=7.0 at 42.5 feet.	
45	4	CR	40.0	45.0				60	SM				pH=7.0 at 45.0 feet. Brown, silty fine SAND. pH=7.0 at 47.5 feet.	
50	5	CR	45.0	50.0				60					pH=7.5 at 50.0 feet.	
55													Notes: 1. Bottom of boring at 50.0 feet. 2. Samples taken with 2-1/2" I.D. soils core barrel lined with clear plastic tubes. 3. Boring backfilled with bentonite grout. 4. CME 55 rig.	
60														
65														
70														
75														
80														

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Soil Boring Log

PROJECT No. 86-060-04
BORING No. 88-RP-T2
LOGGED BY M. Yovich

PROJECT NAME UNC
BORING LOCATION N 73,374 E 57,940 SURFACE ELEV. 6959.70
DRILLER Heber Mining and Exploration DATE: START 5/19/88 FINISH 5/19/88

DEPTH	SAMPLE No.	SAMPLE TYPE	INTERVAL FROM	INTERVAL TO	BLOW COUNT 0" to 6"	BLOW COUNT 6" to 12"	BLOW COUNT 12" to 18"	REC (in)	USCS SOIL TYPE	WC (%)	qu (TSF)	LAYER DEPTH	SOIL DESCRIPTION AND REMARKS	PIEZO
	1	SS	0.0	1.5	1	2	2	18					TAILINGS	
													Very loose, off-white, fine to medium SAND. Dry.	
	2	SS	1.5	3.0	1	1	1	18	SP					
	3	SS	3.0	4.5	3	3	4	18						
5														
	4	SS	4.5	6.0	3	4	3	18						
	5	SS	6.0	7.5	2	4	5	18					Very loose, off-white, fine to medium SAND grading to fine to medium SAND, some silt.	
	6	SS	7.5	9.0	4	5	5	18					Damp.	
10	7	SS	9.0	10.5	4	4	5	18	SP					
	8	SS	10.5	12.0	3	3	4	8					Loose, off-white, fine to medium SAND, some silt.	
	9	SS	12.0	13.5	1	2	2	2					Moist.	
15	10	SS	13.5	15.0	2	2	3	18					Same. Loose.	
	11	SS	17.5	19.0	1	2	2	16						
20														
	12	SS	20.0	21.5	2	2	4	18	SM				Loose, off-white, fine silty SAND. Saturated.	
												23.2		
	13	SS	22.5	24.0	3	1	1	18					ALLUVIUM	
25									SM				Loose, brown fine silty SAND. Wet. pH=3.0.	
	14	SS	24.0	25.5	2	1	2	18					Same, trace clay.	
30														
	15	SS	29.0	30.5	5	7	5	16					Same, some clay. (pH=7.0)	
									SM					
35														
	16	SS	34.0	35.5	4	4	6	18						
													Notes:	
													1. Bottom of boring at 35.5 feet.	
													2. Boring backfilled with cuttings.	
40													3. CME 55 rig.	

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Soil Boring Log

PROJECT No. 86-060-04
BORING No. 88-RP-T2A
LOGGED BY M. Yovich

PROJECT NAME UNC
BORING LOCATION N 73,374 E 57,945 SURFACE ELEV. 6959.70
DRILLER Heber Mining and Exploration DATE: START 5/19/88 FINISH 5/19/88

DEPTH	SAMPLE No.	SAMPLE TYPE	INTERVAL FROM	INTERVAL TO	BLOW COUNT 0" 6"	BLOW COUNT 6" 12"	BLOW COUNT 12" 18"	REC (in)	USCS SOIL TYPE	WC (%)	qu (TSF)	LAYER DEPTH	SOIL DESCRIPTION AND REMARKS	PIEZO
5														
10													For description, see boring log for Boring 88-RP-T2.	
15														
20														
25	1	CR	20.0	25.0				40	SP				TAILINGS Off-white, fine SAND, some silt and medium sand. Saturated. pH=3.0.	
												28.5		
30	2	CR	25.0	30.0				60	SM				ALLUVIUM Brown, silty fine SAND, trace clay. pH=4.5 at 30.0 ft. pH=6.5 at 32.5 ft.	
35	3	CR	30.0	35.0				60	ML				pH=7.0 at 35.0 ft. Dark brown, clayey SILT. pH=7.0 at 37.5 ft.	
40	4	CR	35.0	40.0				60					pH=7.5 at 40.0 ft.	

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Soil Boring Log

PROJECT No. 86-060-04
BORING No. 88-RP-T2A
LOGGED BY M. Yovich

PROJECT NAME UNC
BORING LOCATION N 73,374 E 57,945 SURFACE ELEV. 6959.70
DRILLER Heber Mining and Exploration DATE: START 5/19/88 FINISH 5/19/88

DEPTH	SAMPLE No.	TYPE	INTERVAL FROM	INTERVAL TO	BLOW COUNT 0" to 6"	BLOW COUNT 6" to 12"	BLOW COUNT 12" to 18"	REC (in)	USCS SOIL TYPE	WC (%)	qu (TSF)	LAYER DEPTH	SOIL DESCRIPTION AND REMARKS	PIEZO
	5	SS	40.0	41.5	4	5	7						Medium dense, fine sandy SILT, some clay.	
45													Notes: 1. Bottom of boring at 41.5 feet. 2. Boring backfilled with bentonite grout. 3. Samples taken with 2-1/2" I.D. soil core barrel lined with clear plastic tubes. 4. CME 55 rig.	
50														
55														
60														
65														
70														
75														
80														

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Soil Boring Log

PROJECT No. 86-060-04
BORING No. 88-RP-T3
LOGGED BY M. Yovich

PROJECT NAME UNC
BORING LOCATION N 73,352 E 58,474 SURFACE ELEV. 6961.50
DRILLER Heber Mining and Exploration DATE: START 5/18/88 FINISH 5/18/88

DEPTH	SAMPLE No.	SAMPLE TYPE	INTERVAL FROM	INTERVAL TO	BLOW COUNT 0" to 6"	BLOW COUNT 6" to 12"	BLOW COUNT 12" to 18"	REC (in)	USCS SOIL TYPE	WC (%)	qu (TSF)	LAYER DEPTH	SOIL DESCRIPTION AND REMARKS	PIEZO
	1	SS	0.0	1.5	2	3	4	18	SP/SM				TAILINGS Loose, off-white, fine SAND, trace silt, grading to	
	2	SS	1.5	3.0	3	2	2	12				3.5	loose, off-white,silty fine SAND.	
	3	SS	3.0	4.5	3	5	5	18	SP/SM				Tailings SAND interbedded with medium dense,	
5	4	SS	4.5	6.0	5	7	9	18				6.0	reddish-brown, silty fine alluvium SAND.	
	5	SS	6.0	7.5	4	4	6	8	SP/SM				Loose, off-white, fine SAND, some silt and loose, off-white, silty fine SAND. Moist.	
	6	SS	7.5	9.0	3	3	4	18						
10	7	SS	9.0	10.5	2	2	1	18						
	8	SS	10.5	12.0	2	3	3	18						
	9	SS	12.0	13.5	2	2	2	18						
15														
	10	SS	15.0	16.5	2	1	2	18	ML				Very loose, off-white, clayey SILT, some sand. Moist.	
	11	SS	17.5	19.0	2	3	4	18						
20												20.5	Wet.	
	12	SS	20.0	21.5	4	5	5	18	ML				ALLUVIUM Medium dense, orange and brown, fine sandy	
	13	SS	22.5	24.0	5	9	14	18					SILT, some clay, grading to medium dense, brown, clayey SILT after 22.0 feet.	
25														
30													Notes: 1. Bottom of boring at 24.0 feet. 2. Boring backfilled with cuttings. 3. CME 55 rig.	
35														
40														

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Soil Boring Log

PROJECT No. 86-060-04
BORING No. 88-RP-T4
LOGGED BY M. Yovich

PROJECT NAME UNC
BORING LOCATION N 73,034 E 57,711 SURFACE ELEV. 6959.00
DRILLER Heber Mining and Exploration DATE: START 5/19/88 FINISH 5/19/88

DEPTH	SAMPLE No.	TYPE	INTERVAL FROM	INTERVAL TO	BLOW COUNT 0" 6"	BLOW COUNT 6" 12"	BLOW COUNT 12" 18"	REC (in)	USCS SOIL TYPE	WC (%)	qu (TSF)	LAYER	DEPTH	SOIL DESCRIPTION AND REMARKS	PIEZO
	1	SS	0.0	1.5	1	1	2	18						TAILINGS	
														Loose, off-white, fine SAND. Almost Dry.	
	2	SS	1.5	3.0	1	1	1	18	SP						
	3	SS	3.0	4.5	3	3	2	18						Same. Moist.	
5															
	4	SS	4.5	6.0	2	2	2	18						Same, trace to some medium sand.	
	5	SS	6.0	7.5	2	1	2	18							
	6	SS	7.5	9.0	2	1	2	18						Same, some silt.	
10	7	SS	9.0	10.5	2	2	2	18							
	8	SS	10.5	12.0	2	3	3	18							
	9	SS	12.0	13.5	2	3	4	18							
15	10	SS	13.5	15.0	3	4	3	18						Same, wet after 14.0 feet.	
	11	SS	17.5	19.0	2	2	1	18						Very loose, off-white, silty fine SAND and fine	
20									SP					SAND, some silt.	
	12	SS	20.0	21.5	2	2	2	18							
	13	SS	22.5	24.0	1	1	1	18						Same. Saturated.	
25															
	14	SS	25.0	26.5	2	3	3	18						Very loose, off-white, fine SAND, trace silt.	
														Saturated.	
									SP						
	15	SS	27.5	29.0	1	1/ 12		18							
30															
	16	SS	30.0	31.5	1	1	2	18							
	17	SS	32.5	34.0	2	1	3	18							
35															
	18	SS	35.0	36.5	2	2	1	18							
	19	SS	37.5	39.0	3	3	4	18						Same, loose.	
40															

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Soil Boring Log

PROJECT No. 86-060-04
BORING No. 88-RP-T4
LOGGED BY M. Yovich

PROJECT NAME UNC
BORING LOCATION N 73,034 E 57,711 SURFACE ELEV. 6959.00
DRILLER Heber Mining and Exploration DATE: START 5/19/88 FINISH 5/19/88

DEPTH	SAMPLE No.	SAMPLE TYPE	INTERVAL FROM	INTERVAL TO	BLOW COUNT 0" 6"	BLOW COUNT 6" 12"	BLOW COUNT 12" 18"	REC (in)	USCS SOIL TYPE	WC (%)	qu (TSF)	LAYER DEPTH	SOIL DESCRIPTION AND REMARKS	PIEZO
45	20	SS	43.5	45.0	10	7	6	18*	SP				Loose, off-white, fine SAND, trace silt. Saturated.	
													* Sampler overpacked, standard penetration test (SPT) not valid.	
50	21	SS	48.5	50.0	9	11	13	18*						
													Notes: 1. Bottom of boring at 50.0 feet. Hole abandoned due to loose sands flowing into auger and locking augers up. 2. Boring backfilled with cuttings. 3. CME 55 rig.	
55														
60														
65														
70														
75														
80														

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Soil Boring Log

PROJECT No. 86-060-04
BORING No. 88-RP-T5
LOGGED BY M. Yovich

PROJECT NAME UNC
BORING LOCATION N 73,015 E 58,170 SURFACE ELEV. 6946.70
DRILLER Heber Mining and Exploration DATE: START 5/18/88 FINISH 5/18/88

DEPTH	SAMPLE No.	TYPE	INTERVAL FROM	INTERVAL TO	BLOW COUNT 0" 6"	BLOW COUNT 6" 12"	BLOW COUNT 12" 18"	REC (in)	USCS SOIL TYPE	WC (%)	qu (TSF)	LAYER DEPTH	SOIL DESCRIPTION AND REMARKS	PIEZO
	1	SS	0.0	1.5	1	1	1	14	ML				TAILINGS	
													Very loose, off-white, clayey SILT, trace fine sand	
	2	SS	1.5	3.0	1	2	3	6					and fine sandy silt.	
	3	SS	3.0	4.5	2	2	2	18						
5														
	4	SS	4.5	6.0	2	4	4	18	SM				Loose, off-white, silty fine SAND. Moist.	
	5	SS	6.0	7.5	1	3	4	12				7.0		
													ALLUVIUM	
	6	SS	7.5	9.0	2	3	7	18	SM				Loose to medium dense, brown, silty fine SAND	
10	7	SS	9.0	10.5	3	5	7	18					with interspersed black coal particles. Moist.	
													Notes:	
													1. Bottom of boring at 10.5 feet.	
15													2. Boring backfilled with cuttings.	
													3. CME 55 rig.	
20														
25														
30														
35														
40														

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Soil Boring Log

PROJECT No. 86-060-04
BORING No. 88-RP-T6
LOGGED BY M. Yovich

PROJECT NAME UNC
BORING LOCATION N 73,060 E 58,685 SURFACE ELEV. 6963.20
DRILLER Heber Mining and Milling DATE: START 5/20/88 FINISH 5/20/88

DEPTH	SAMPLE No.	SAMPLE TYPE	INTERVAL FROM	INTERVAL TO	BLOW COUNT 0" to 6"	BLOW COUNT 6" to 12"	BLOW COUNT 12" to 18"	REC (in)	USCS SOIL TYPE	WC (%)	qu (TSF)	LAYER DEPTH	SOIL DESCRIPTION AND REMARKS	PIEZO
	1	SS	0.0	1.5	6	6	7	18	SM				ALLUVIUM Medium dense, brown, silty fine SAND, roots.	
	2	SS	1.5	3.0	13	13	18	14						
	3	SS	3.0	4.5	7	7	8	16					Layers of medium dense black COAL and yellow SANDSTONE (lightly cemented) to 13.0 feet.	
5														
	4	SS	4.5	6.0	3	4	4	18						
	5	SS	6.0	7.5	3	5	5	18						
	6	SS	7.5	9.0	5	5	7	14						
10	7	SS	9.0	10.5	4	5	7	12						
	8	SS	10.5	12.0	5	5	8	6					Medium dense, light brown, clayey SILT and black COAL.	
	9	SS	12.0	13.5	8	8	13	18						
15	10	SS	13.5	15.0	28	14	14	8	ML			15.0	Medium dense, light brown SOAP STONE.	
	11	SS	15.0	16.5	10	10	8	18	SP				TAILINGS Medium dense, off-white, fine to medium SAND.	
	12	SS	17.5	19.0	3	3	4	18					Loose, off-white, clayey SILT, some fine sand.	
20									ML			20.0	ALLUVIUM	
	13	SS	20.0	21.5	17	13	11	18					Medium dense, brown SAND, some silt. Streak of yellow and orange sand.	
									SP					
	14	SS	22.5	24.0	5	5	4	16						
25														
	15	SS	25.0	26.5	4	6	4	18						
30													Notes: 1. Bottom of boring at 26.5 feet. 2. Boring backfilled with cuttings. 3. CME 55 rig.	
35														
40														

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Soil Boring Log

PROJECT No. 86-060-04
BORING No. 88-RP-T7
LOGGED BY D. Kurz, M. Yovich

PROJECT NAME UNC
BORING LOCATION N 72,782 E 58,004 SURFACE ELEV. 6941.10
DRILLER Heber Mining and Exploration DATE: START 5/17/88 FINISH 5/17/88

DEPTH	SAMPLE No.	TYPE	INTERVAL FROM	INTERVAL TO	BLOW COUNT 0" 6"	6" 12"	12" 18"	REC (in)	USCS SOIL TYPE	WC (%)	qu (TSF)	LAYER DEPTH	SOIL DESCRIPTION AND REMARKS	PIEZO
	1	SS	0.0	1.5	1	1	2	18	SM				TAILINGS	
													Very loose, off-white, silty fine SAND and clayey	
	2	SS	1.5	3.0	1	1	2	18	ML				SILT, some fine sand. Wet after 1.0 ft.	
	3	SS	3.0	4.5	1	1	3	18						
5														
	4	SS	4.5	6.0	1	1	3	18				6.5	Very loose, off-white, fine sandy SILT.	
	5	SS	6.0	7.5	1	5	7	8						
													ALLUVIUM	
	6	SS	7.5	9.0	2	2	4	18	SM				Medium dense, brown, silty fine SAND, trace clay.	
10	7	SS	9.0	10.5	7	10	10	18					Moist.	
	8	SS	10.5	12.0	2	5	7	18						
	9	SS	12.0	13.5	4	8	8	18	SM				Same. Trace of soft coal particles and a 1-inch	
													piece of yellow sandstone at 13.5 ft.	
15	10	SS	13.5	15.0	3	3	3	18					Wet after 14.0 ft.	
	11	SS	15.0	16.5	2	2	3	18						
	12	SS	16.5	18.0	3	2	2	18					Same.	
												19.5	Medium dense, orange and brown	
20	13	SS	18.5	20.0	2	4	13	18	SP			20.0	SANDSTONE. Highly fractured and weathered.	
	14	SS	22.5	24.0	2	4	6	18	SP				Medium dense, light brown SAND, some silt.	
25													Moist.	
	15	SS	25.0	26.5	4	4	7	18					Same, some silt.	
	16	SS	27.5	29.0	3	5	6	18					Loose, light brown, silty fine SAND. Wet.	
30									SM					
	17	SS	30.0	31.5	1	2	4	18						
35												35.5		
	18	SS	35.0	36.5	2	6	5	18	CL			36.0	Medium stiff, brown, silty CLAY, some fine sand.	
									SM				Loose, light brown, silty fine SAND. Wet.	
40														

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Soil Boring Log

PROJECT No. 86-060-04
BORING No. 88-RP-T7
LOGGED BY D. Kurz, M. Yovich

PROJECT NAME UNC
BORING LOCATION N 72,782 E 58,004 SURFACE ELEV. 6941.10
DRILLER Heber Mining and Exploration DATE: START 5/17/88 FINISH 5/17/88

DEPTH	SAMPLE No.	SAMPLE TYPE	INTERVAL FROM	INTERVAL TO	BLOW COUNT 0" 6"	BLOW COUNT 6" 12"	BLOW COUNT 12" 18"	REC (in)	USCS SOIL TYPE	WC (%)	qu (TSF)	LAYER DEPTH	SOIL DESCRIPTION AND REMARKS	PIEZO
	19	SS	40.0	41.5	3	3	3	18	SM				Same. Saturated at 41.0 ft.	
45													Notes: 1. Bottom of boring at 42.0 ft. 2. Boring backfilled with bentonite grout. 3. CME 55 rig.	
50														
55														
60														
65														
70														
75														
80														

Soil Boring Log

PROJECT No. 86-060-04
BORING No. 88-RP-T8
LOGGED BY M. Yovich

PROJECT NAME UNC
BORING LOCATION N 72,775 E 78,445 SURFACE ELEV. 6955.40
DRILLER Heber Mining and Exploration DATE: START 5/18/88 FINISH 5/18/88

DEPTH	SAMPLE No.	SAMPLE TYPE	SAMPLE INTERVAL FROM	SAMPLE INTERVAL TO	BLOW COUNT 0" to 6"	BLOW COUNT 6" to 12"	BLOW COUNT 12" to 18"	REC (in)	USCS SOIL TYPE	WC (%)	qu (TSF)	LAYER DEPTH	SOIL DESCRIPTION AND REMARKS	PIEZO
	1	SS	0.0	1.5	2	3	4	18	SM			1.0	TAILINGS	
													Loose, off-white,silty fine SAND, trace clay.	
	2	SS	1.5	3.0	5	7	7	18					ALLUVIUM	
	3	SS	3.0	4.5	8	9	9	18					Medium dense, brown and yellow, fine SAND with yellow sandstone particles.	
5														
	4	SS	4.5	6.0	5	6	7	18						
	5	SS	6.0	7.5	4	6	13	18					Same, some silt.	
	6	SS	7.5	9.0	4	7	8	14						
10														
													Notes:	
													1. Bottom of boring at 9.0 ft.	
													2. Boring backfilled with alluvium cuttings.	
15													3. CME 55 rig.	
20														
25														
30														
35														
40														

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Soil Boring Log

PROJECT No. 86-060-04
BORING No. 88-RP-T9
LOGGED BY M. Yovich

PROJECT NAME UNC
BORING LOCATION N 72,552 E 58,257 SURFACE ELEV. 6951.40
DRILLER Heber Mining and Exploration DATE: START 5/18/88 FINISH 5/18/88

DEPTH	SAMPLE No.	SAMPLE TYPE	INTERVAL FROM	INTERVAL TO	BLOW COUNT 0" to 6"	BLOW COUNT 6" to 12"	BLOW COUNT 12" to 18"	REC (in)	USCS SOIL TYPE	WC (%)	qu (TSF)	LAYER DEPTH	SOIL DESCRIPTION AND REMARKS	PIEZO
	1	SS	0.0	1.5	2	2	1	18	SP				ALLUVIUM	
												2.0	Loose, yellow, fine SAND, trace silt and clay.	
	2	SS	1.5	3.0	2	9	9	18					Medium dense, red SAND with hard particles of	
	3	SS	3.0	4.5	50/3			0					yellow sandstone to 3.0 ft.	
5													Yellow SANDSTONE.	
													Notes:	
													1. Bottom of boring at 5.0 ft.	
													2. Boring backfilled with alluvium cuttings.	
10													3. CME 55 rig.	
15														
20														
25														
30														
35														
40														

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Soil Boring Log

PROJECT No. 86-060-04
BORING No. 88-RP-T10
LOGGED BY M. Yovich

PROJECT NAME UNC
BORING LOCATION N 72,965 E 58,061 SURFACE ELEV. 6942.20
DRILLER Heber Mining and Exploration DATE: START 5/19/88 FINISH 5/19/88

DEPTH	SAMPLE No.	TYPE	INTERVAL FROM	INTERVAL TO	BLOW COUNT 0" 6"	BLOW COUNT 6" 12"	BLOW COUNT 12" 18"	REC (in)	USCS SOIL TYPE	WC (%)	qu (TSF)	LAYER DEPTH	SOIL DESCRIPTION AND REMARKS	PIEZO
	1	SS	0.0	1.5	1	1	1	0	SP				TAILINGS Very loose, off-white, fine SAND.	
	2	SS	1.5	3.0	1	1	2	8	ML				Very soft, off-white, clayey SILT, trace fine sand.	
	3	SS	3.0	4.5	2	2	3	13						
5														
	4	SS	4.5	6.0	3	3	3	15					Same or silty CLAY.	
	5	SS	6.0	7.5	4	5	6	14	ML/CL			7.3		
	6	SS	7.5	9.0	9	11	10	14	ML				ALLUVIUM	
10	7	SS	9.0	10.5	9	11	10	14					Medium dense, dark brown, fine sandy SILT, trace clay.	
	8	SS	12.5	14.0	4	5	5	14	SM				Medium dense, brown, silty fine SAND, some clay. Moist.	
15														
	9	SS	15.0	16.5	2	2	3	18					Same. Wet.	
	10	SS	17.5	19.0	3	3	2	18						
20														
	11	SS	20.0	21.5	3	6	7	18	SM				Same. Fragments of coal and yellow sandstone.	
	12	SS	22.5	24.0	6	8	9	18						
25														
	13	SS	25.0	26.5	6	9	9	18						
30													Notes: 1. Bottom of boring at 26.5 feet. 2. Boring backfilled with bentonite grout. 3. CME 55 rig.	
35														
40														

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APPENDIX
B

APPENDIX B

EMBANKMENT STABILITY ASSESSMENT AND LABORATORY TEST RESULTS

AGUIRRE ENGINEERS, INC.
Geotechnical and Materials Consultants

November 16, 1988

Canonie Environmental
94 Inverness Terrace East, Suite 100
Englewood, Colorado 80112

Attention: Mr. Douglass H. Graves, P.E.
Project Supervisor

Subject: Laboratory Test Results of Samples
Delivered on Novmeber 4, 1988
Our Project No. 18,082

Gentlemen:

As requested by Mr. Douglass H. Graves, P.E., of Canonie Environmental, Aguirre Engineers, Inc. has performed the following laboratory tests on samples delivered to our laboratory on November 4, 1988. The samples delivered to our laboratory consisted of:

1) 2 Tubes of 2.5" Lucite Liner.
2) 6 Jars, containing Standard Split Spoon Samples.

We were requested to obtain the Dry Density ad Moisture Content of soil in the Lucite Liners, and recompact the Standard Spoon samples to appropriate density and perform Consolidated Undrained (CU) Triaxial Testss, with Pore-water pressure measurements. We also were requested to perform Gradation and Atterberg Limits on the material used in Triaxial testing.

The results of the Triaxial tests is shown in Plates 1 through 3. The Gradation and Atterberg Limits Test results are included in Plate 4 and summarized in Table 1, attached.

If you have any questions on the contents of this report, or require additional information, please get in touch with us.

Very truly yours,

AGUIRRE ENGINEERS, INC.

Behzad Mirzayi, P.E.
Project Engineer

BM:pet

Enc: Plates 1 through 4
Table 1

cc: 2 sent

TRI-AXIAL TEST DATA

PROJECT NAME : CONONIE ENVIRONMENTAL DATE : 11-14-88
PROJECT NO. : 18,082
SAMPLE NO. : JAR SAMPLES DEPTH : N/A
SOIL DESCRIPTION : FAT CLAY, GRAY (CH)
TESTED BY : AF

TEST NO. 1

AVE. DIAMETER	1.9320 IN	DRY DENSITY	96.4 PCF
AVE. LENGHT	3.9983 IN	WATER CONTENT	47 %
AREA	2.9318 IN^2	DEGREE OF SAT.	96 %
CELL PRESSURE	10 PSI	BACK PRESSURE	5 PSI
EFF. CONFINING PRESSURE	5 PSI		

	DEVIATOR		EXCESS PORE WATER	TOTAL				EFFECTIVE			
STRAIN (IN/IN)	LOAD (LB)	STRESS (PSI)	PRESSURE PSI	SIGMA1 (psi)	SIGMA3 (psi)	P (psi)	q (psi)	SIGMA1 (psi)	SIGMA3 (psi)	P (psi)	q (psi)
0.00E+00	0	0.0000	0.0000	5.00	5.00	5.00	0.00	5.00	5.00	5.00	0.00
9.85E-05	1.50166	0.5122	0.0364	5.51	5.00	5.26	0.26	5.48	4.96	5.48	0.26
2.46E-04	1.50166	0.5121	0.0910	5.51	5.00	5.26	0.26	5.42	4.91	5.42	0.26
4.92E-04	3.00333	1.0239	0.1274	6.02	5.00	5.51	0.51	5.90	4.87	5.90	0.51
7.39E-04	3.75416	1.2796	0.1456	6.28	5.00	5.64	0.64	6.13	4.85	6.13	0.64
9.85E-04	4.65516	1.5863	0.1820	6.59	5.00	5.79	0.79	6.40	4.82	6.40	0.79
1.23E-03	4.80533	1.6370	0.2184	6.64	5.00	5.82	0.82	6.42	4.78	6.42	0.82
1.48E-03	4.95550	1.6878	0.2548	6.69	5.00	5.84	0.84	6.43	4.75	6.43	0.84
1.97E-03	5.10566	1.7381	0.2912	6.74	5.00	5.87	0.87	6.45	4.71	6.45	0.87
2.46E-03	5.25583	1.7883	0.3276	6.79	5.00	5.89	0.89	6.46	4.67	6.46	0.89
2.95E-03	5.55616	1.8895	0.3822	6.89	5.00	5.94	0.94	6.51	4.62	6.51	0.94
3.45E-03	5.70633	1.9397	0.4186	6.94	5.00	5.97	0.97	6.52	4.58	6.52	0.97
3.94E-03	6.00666	2.0407	0.4550	7.04	5.00	6.02	1.02	6.59	4.55	6.59	1.02
4.43E-03	6.30700	2.1417	0.4914	7.14	5.00	6.07	1.07	6.65	4.51	6.65	1.07
4.92E-03	6.60733	2.2426	0.5096	7.24	5.00	6.12	1.12	6.73	4.49	6.73	1.12
5.66E-03	6.90766	2.3428	0.5460	7.34	5.00	6.17	1.17	6.80	4.45	6.80	1.17
1.06E-02	7.50833	2.5339	0.6006	7.53	5.00	6.27	1.27	6.93	4.40	6.93	1.27
1.26E-02	8.25916	2.7817	0.6188	7.78	5.00	6.39	1.39	7.16	4.38	7.16	1.39
1.55E-02	9.01000	3.0255	0.6370	8.03	5.00	6.51	1.51	7.39	4.36	7.39	1.51
2.54E-02	10.5116	3.4945	0.7280	8.49	5.00	6.75	1.75	7.77	4.27	7.77	1.75
3.52E-02	12.0133	3.9534	0.8008	8.95	5.00	6.98	1.98	8.15	4.20	8.15	1.98
4.50E-02	12.7641	4.1576	0.8554	9.16	5.00	7.08	2.08	8.30	4.14	8.30	2.08
5.49E-02	13.5150	4.3568	0.9100	9.36	5.00	7.18	2.18	8.45	4.09	8.45	2.18
6.47E-02	14.2658	4.5509	1.0010	9.55	5.00	7.28	2.28	8.55	4.00	8.55	2.28
9.43E-02	16.5183	5.1030	1.1102	10.10	5.00	7.55	2.55	8.99	3.89	8.99	2.55
1.24E-01	18.0200	5.3954	1.2012	10.39	5.00	7.69	2.69	9.18	3.80	9.18	2.69
1.53E-01	19.5216	5.6374	1.2012	10.64	5.00	7.82	2.82	9.44	3.80	9.44	2.82
1.83E-01	21.0233	5.8593	1.2376	10.86	5.00	7.93	2.93	9.62	3.76	9.62	2.93

TEST NO. 2

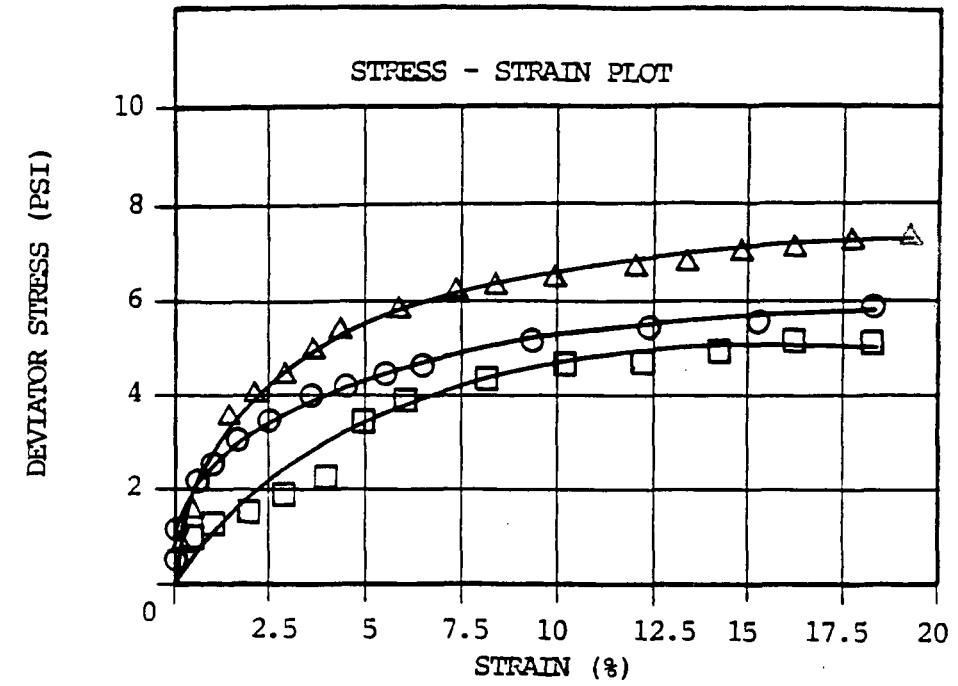
AVE. DIAMETER	1.9250 IN	DRY DENSITY	94.3 PCF
AVE. LENGHT	3.9987 IN	WATER CONTENT	47.1 %
AREA	2.9106 IN^2	DEGREE OF SAT.	94 %
CELL PRESSURE	20 PSI	BACK PRESSURE	10 PSI
EFF. CONFINING PRESSURE	10 PSI		

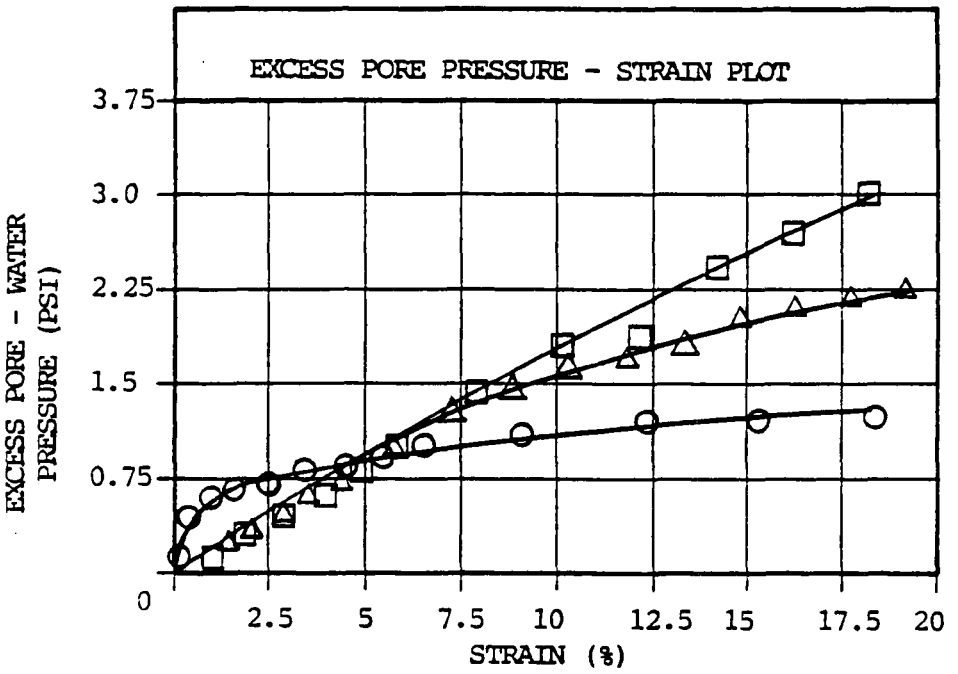
	DEVIATOR		EXCESS PORE WATER	TOTAL				EFFECTIVE			
STRAIN (IN/IN)	LOAD (LB)	STRESS (PSI)	PRESSURE PSI	SIGMA1 (psi)	SIGMA3 (psi)	P (psi)	q (psi)	SIGMA1 (psi)	SIGMA3 (psi)	P (psi)	q (psi)
0.00E+00	0	0.0000	0.0000	10.00	10.00	10.00	0.00	10.00	10.00	10.00	0.00
2.95E-03	3.00333	1.0298	0.0364	11.03	10.00	10.51	0.51	10.99	9.96	10.99	0.51
7.39E-03	4.50500	1.5364	0.0728	11.54	10.00	10.77	0.77	11.46	9.93	11.46	0.77
1.48E-02	10.5116	3.5582	0.2002	13.56	10.00	11.78	1.78	13.36	9.80	13.36	1.78
2.22E-02	12.0133	4.0360	0.3276	14.04	10.00	12.02	2.02	13.71	9.67	13.71	2.02
2.95E-02	13.5150	4.5062	0.4550	14.51	10.00	12.25	2.25	14.05	9.55	14.05	2.25
3.69E-02	15.0166	4.9688	0.5824	14.97	10.00	12.48	2.48	14.39	9.42	14.39	2.48
4.43E-02	16.5183	5.4238	0.7280	15.42	10.00	12.71	2.71	14.70	9.27	14.70	2.71
5.91E-02	18.0200	5.8254	1.0192	15.83	10.00	12.91	2.91	14.81	8.98	14.81	2.91
7.39E-02	19.5216	6.2119	1.2558	16.21	10.00	13.11	3.11	14.96	8.74	14.96	3.11
8.86E-02	20.2725	6.3479	1.4560	16.35	10.00	13.17	3.17	14.89	8.54	14.89	3.17
1.03E-01	21.0233	6.4763	1.6198	16.48	10.00	13.24	3.24	14.86	8.38	14.86	3.24
1.19E-01	21.7741	6.5971	1.7290	16.60	10.00	13.30	3.30	14.87	8.27	14.87	3.30
1.33E-01	22.5250	6.7103	1.9200	16.71	10.00	13.36	3.36	14.89	8.19	14.89	3.36
1.48E-01	24.0266	7.0357	2.0020	17.04	10.00	13.52	3.52	15.03	8.00	15.03	3.52
1.62E-01	24.7775	7.1298	2.1294	17.13	10.00	13.56	3.56	15.00	7.87	15.00	3.56
1.77E-01	25.5283	7.2163	2.2022	17.22	10.00	13.61	3.61	15.01	7.80	15.01	3.61
1.92E-01	26.2791	7.2952	2.2568	17.30	10.00	13.65	3.65	15.04	7.74	15.04	3.65
2.07E-01	27.0300	7.3665	2.2750	17.37	10.00	13.68	3.68	15.09	7.73	15.09	3.68

TEST NO. 3

AVE. DIAMETER	1.9260 IN	DRY DENSITY	93.3 PCF
AVE. LENGHT	3.8990 IN	WATER CONTENT	47.1 %
AREA	2.9136 IN^2	DEGREE OF SAT.	95 %
CELL PRESSURE	30 PSI	BACK PRESSURE	15 PSI
EFF. CONFINING PRESSURE	15 PSI		

	DEVIATOR		EXCESS PORE WATER	TOTAL				EFFECTIVE			
STRAIN (IN/IN)	LOAD (LB)	STRESS (PSI)	PRESSURE PSI	SIGMA1 (psi)	SIGMA3 (psi)	P (psi)	q (psi)	SIGMA1 (psi)	SIGMA3 (psi)	P (psi)	q (psi)
0.00E+00	0	0.0000	0.0000	15.00	15.00	15.00	0.00	15.00	15.00	15.00	0.00
4.05E-03	3.00333	1.0266	0.0546	16.03	15.00	15.51	0.51	15.97	14.95	15.97	0.51
1.01E-02	3.75416	1.2754	0.1274	16.28	15.00	15.64	0.64	16.15	14.87	16.15	0.64
2.03E-02	4.50500	1.5149	0.2730	16.51	15.00	15.76	0.76	16.24	14.73	16.24	0.76
3.04E-02	5.25583	1.7490	0.4550	16.75	15.00	15.87	0.87	16.29	14.55	16.29	0.87
4.05E-02	6.00666	1.9780	0.6006	16.98	15.00	15.99	0.99	16.38	14.40	16.38	0.99
5.07E-02	10.5116	3.4250	0.8008	18.42	15.00	16.71	1.71	17.62	14.20	17.62	1.71
6.08E-02	12.0133	3.8725	1.0192	18.87	15.00	16.94	1.94	17.85	13.98	17.85	1.94
8.11E-02	13.5150	4.2625	1.4196	19.26	15.00	17.13	2.13	17.84	13.58	17.84	2.13
1.01E-01	15.0166	4.6317	1.7654	19.63	15.00	17.32	2.32	17.87	13.23	17.87	2.32
1.22E-01	15.7675	4.7535	2.0930	19.75	15.00	17.38	2.38	17.66	12.91	17.66	2.38
1.42E-01	16.5183	4.8650	2.3842	19.86	15.00	17.43	2.43	17.48	12.62	17.48	2.43
1.62E-01	18.0200	5.1819	2.7300	20.18	15.00	17.59	2.59	17.45	12.27	17.45	2.59
1.82E-01	18.4705	5.1930	3.0030	20.18	15.00	17.59	2.59	17.18	12.00	17.18	2.59
2.03E-01	18.9210	5.1778	3.1850	20.18	15.00	17.59	2.59	16.99	11.82	16.99	2.59
2.23E-01	19.5216	5.2063	3.3124	20.21	15.00	17.60	2.60	16.89	11.69	16.89	2.60
2.43E-01	21.0233	5.4606	3.4216	20.46	15.00	17.73	2.73	17.04	11.58	17.04	2.73
2.63E-01	21.6240	5.4662	3.5126	20.47	15.00	17.73	2.73	16.95	11.49	16.95	2.73
2.84E-01	22.2246	5.4634	3.6946	20.46	15.00	17.73	2.73	16.77	11.31	16.77	2.73
3.04E-01	22.5250	5.3805	3.8220	20.38	15.00	17.69	2.69	16.56	11.19	16.56	2.69





TEST NO.	SYMBOL	BORING NO.	DEPTH (ft)	INITIAL DRY DENSITY (pcf)	INITIAL MOISTURE CONTENT (%)	FINAL DRY DENSITY (pcf)	FINAL MOISTURE CONTENT (%)	CONFINING PRESSURE (psi)	FAILURE STRAIN (%)	MAXIMUM DEVIATOR STRESS (psf)
1	○	N/A	N/A	96.4	47.0	N/A	48.5	5	N/A	N/A
2	△	N/A	N/A	94.3	47.1	N/A	46.4	10	N/A	N/A
3	□	N/A	N/A	93.3	47.1	N/A	35.4	15	N/A	N/A

SOIL DESCRIPTION

FAT CLAY, trace sand, light brown to gray (CH)

SAMPLE FAILURE DIAGRAM

AGUIRRE ENGINEERS, INC.

CONSOLIDATED - UNDRAINED TRIAXIAL TEST

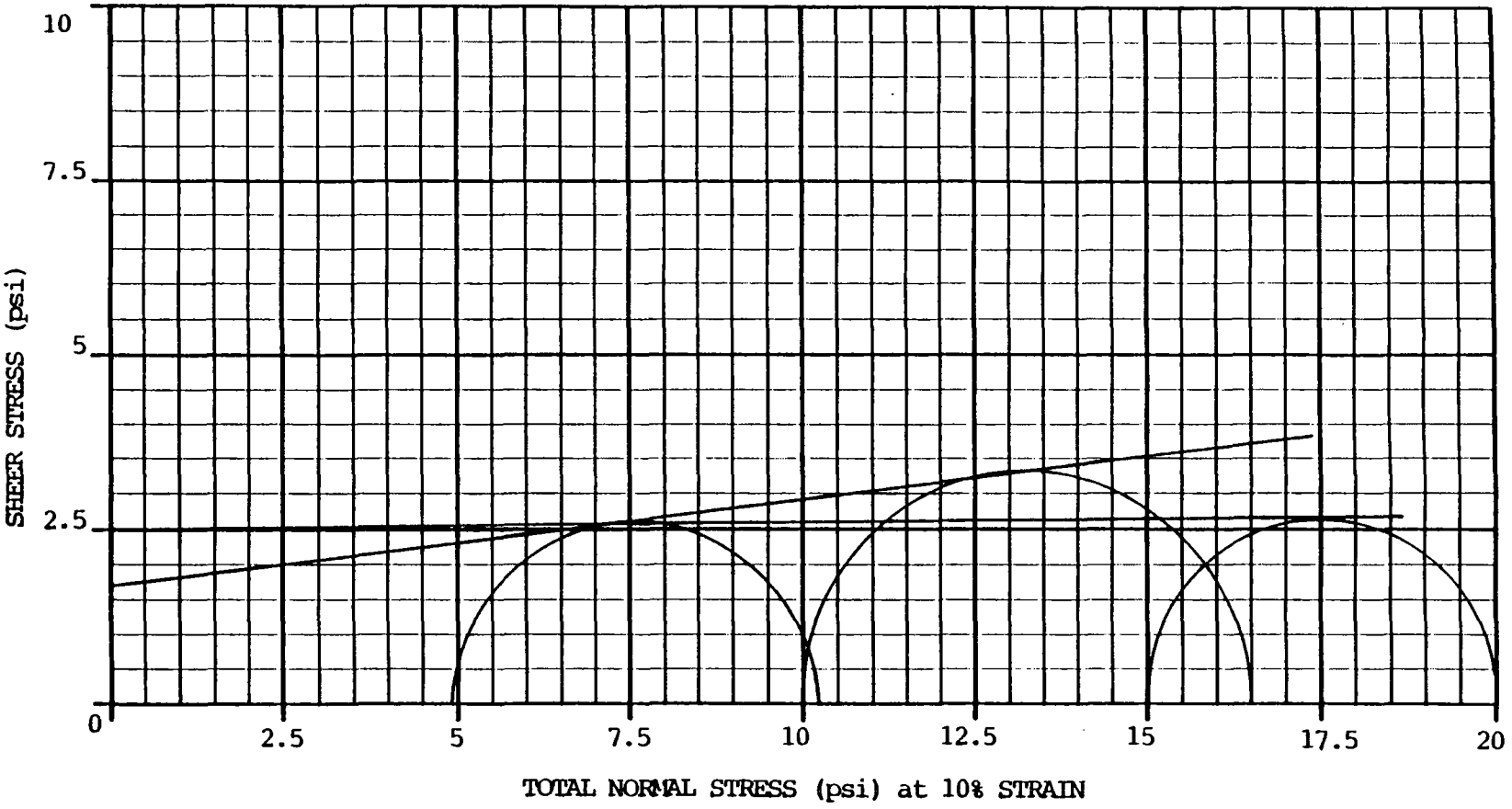
DRAWN BY: AF

CHECKED BY: BM

DATE: 11/16/88

JOB NO. 18,082

PLATE 1



TEST NO.	SYMBOL	BORING NO.	DEPTH (ft)	INITIAL DRY DENSITY (pcf)	INITIAL MOISTURE CONTENT (%)	FINAL DRY DENSITY (pcf)	FINAL MOISTURE CONTENT (%)	CONFINING PRESSURE (psi)	σ_1 (psi)	Δu (psi)	$\bar{\sigma}_3$ (psi)	$\bar{\sigma}_1$ (psi)
1		N/A	N/A	96.4	47.0	N/A	48.5	5	10.10	1.11	3.89	8.99
2		N/A	N/A	94.3	47.1	N/A	46.4	10	16.48	1.62	8.38	14.86
3		N/A	N/A	93.3	47.1	N/A	35.4	15	19.63	1.76	13.23	17.87

SOIL DESCRIPTION

FAT CLAY, trace sand, light brown to gray (CH)

TOTAL STRENGTH PARAMETERS		EFFECTIVE STRENGTH PARAMETERS	
c (psi)	250to350	$\bar{c}$ (psi)	350
ϕ (deg)	0 to 7.5	$\bar{\phi}$ (deg)	0

AGUIRRE ENGINEERS, INC.

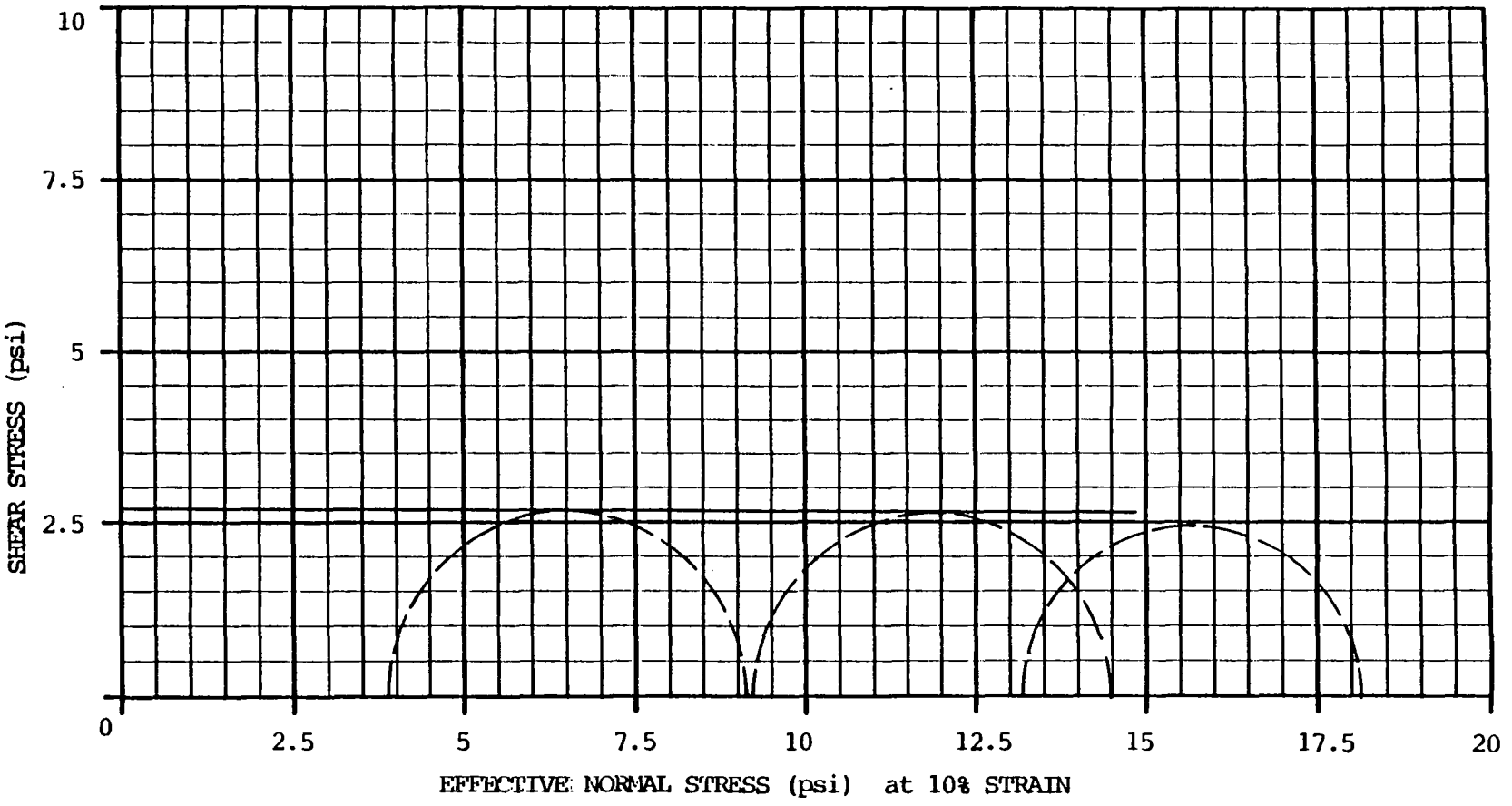
TRIAXIAL COMPRESSION TEST

DRAWN BY: NG
CHECKED BY: BM
DATE: 11/16/88

JOB NO. 18,082

PLATE 2

B-6



TEST NO.	SYMBOL	BORING NO.	DEPTH (ft)	INITIAL DRY DENSITY (pcf)	INITIAL MOISTURE CONTENT (%)	FINAL DRY DENSITY (pcf)	FINAL MOISTURE CONTENT (%)	CONFINING PRESSURE (psi)	σ_1 (psi)	Δu (psi)	$\bar{\sigma}_3$ (psi)	$\bar{\sigma}_1$ (psi)
1		N/A	N/A	96.4	47.0	N/A	N/A	5	10.10	1.11	3.89	8.99
2		N/A	N/A	94.3	47.1	N/A	N/A	10	16.48	1.62	8.38	14.86
3		N/A	N/A	93.3	47.1	N/A	N/A	15	19.63	1.76	13.23	17.87

SOIL DESCRIPTION	TOTAL STRENGTH PARAMETERS	EFFECTIVE STRENGTH PARAMETERS
FAT CLAY, trace sand, light brown to gray (CH)	c (psi) 250to350	$\bar{c}$ (psi) 350
	ϕ (deg) 0 to 7.5	$\bar{\phi}$ (deg) 0

AGUIRRE ENGINEERS, INC.

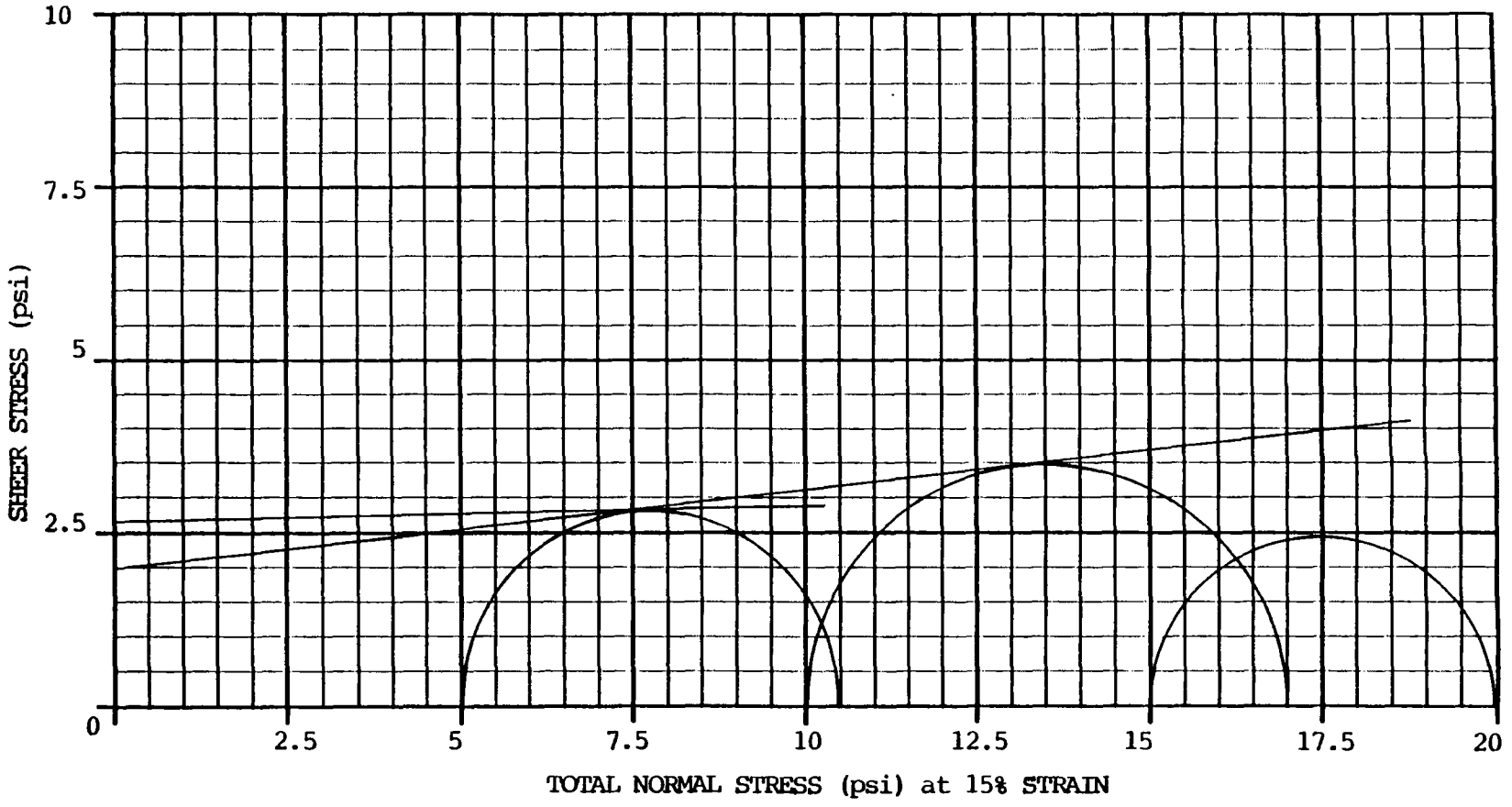
TRIAXIAL COMPRESSION TEST

DRAWN BY: NG
CHECKED BY: BM
DATE: 11/16/88

JOB NO. 18,082

PLATE 2A

B-7



TEST NO.	SYMBOL	BORING NO.	DEPTH (ft)	INITIAL DRY DENSITY (pcf)	INITIAL MOISTURE CONTENT (%)	FINAL DRY DENSITY (pcf)	FINAL MOISTURE CONTENT (%)	CONFINING PRESSURE (psi)	σ_1 (psi)	Δu (psi)	$\bar{\sigma}_3$ (psi)	$\bar{\sigma}_1$ (psi)
1		N/A	N/A	96.4	47.0	N/A	48.5	5	10.6	1.2	2.8	7.8
2		N/A	N/A	94,3	47.1	N/A	46.4	10	17.0	2.0	8.0	15.0
3		N/A	N/A	93.3	47.1	N/A	35.4	15	19.8	2.1	12.9	17.7

SOIL DESCRIPTION

FAT CLAY, trace sand, light brown to gray (CH)

TOTAL STRENGTH PARAMETERS	EFFECTIVE STRENGTH PARAMETERS
c (psi) 300to390	$\bar{c}$ (psi) 170to250
ϕ (deg) 0 to 7	$\bar{\phi}$ (deg) 9 to 11

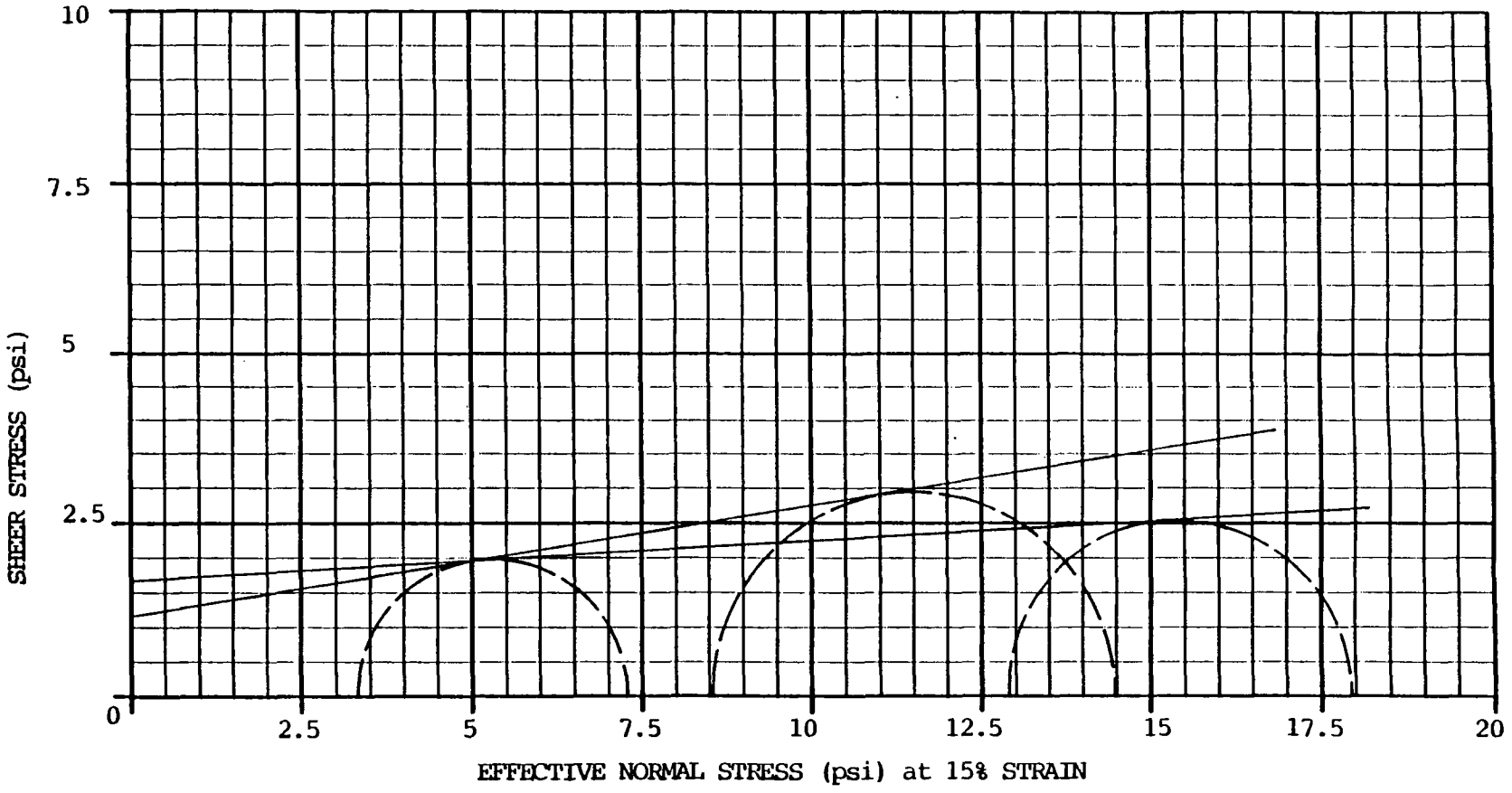
AGUIRRE ENGINEERS, INC.

TRIAXIAL COMPRESSION TEST

DRAWN BY: NG
CHECKED BY: BM
DATE: 11/16/88

JOB NO. 18,082

PLATE 3



TEST NO.	SYMBOL	BORING NO.	DEPTH (ft)	INITIAL DRY DENSITY (pcf)	INITIAL MOISTURE CONTENT (%)	FINAL DRY DENSITY (pcf)	FINAL MOISTURE CONTENT (%)	CONFINING PRESSURE (psi)	σ_1 (psi)	Δu (psi)	$\bar{\sigma}_3$ (psi)	$\bar{\sigma}_1$ (psi)
1		N/A	N/A	96.4	47.0	N/A	48.5	5	10.6	1.2	2.8	7.8
2		N/A	N/A	94.3	47.1	N/A	46.4	10	17.0	2.0	8.0	15.0
3		N/A	N/A	93.3	47.1	N/A	35.4	15	19.8	2.1	12.9	17.7

SOIL DESCRIPTION

FAT CLAY, trace sand, light brown to gray (CH)

TOTAL STRENGTH PARAMETERS	EFFECTIVE STRENGTH PARAMETERS
c (psi) 300to390	$\bar{c}$ (psi) 170to250
ϕ (deg) 0 to 7	$\bar{\phi}$ (deg) 9 to 11

AGUIRRE ENGINEERS, INC.

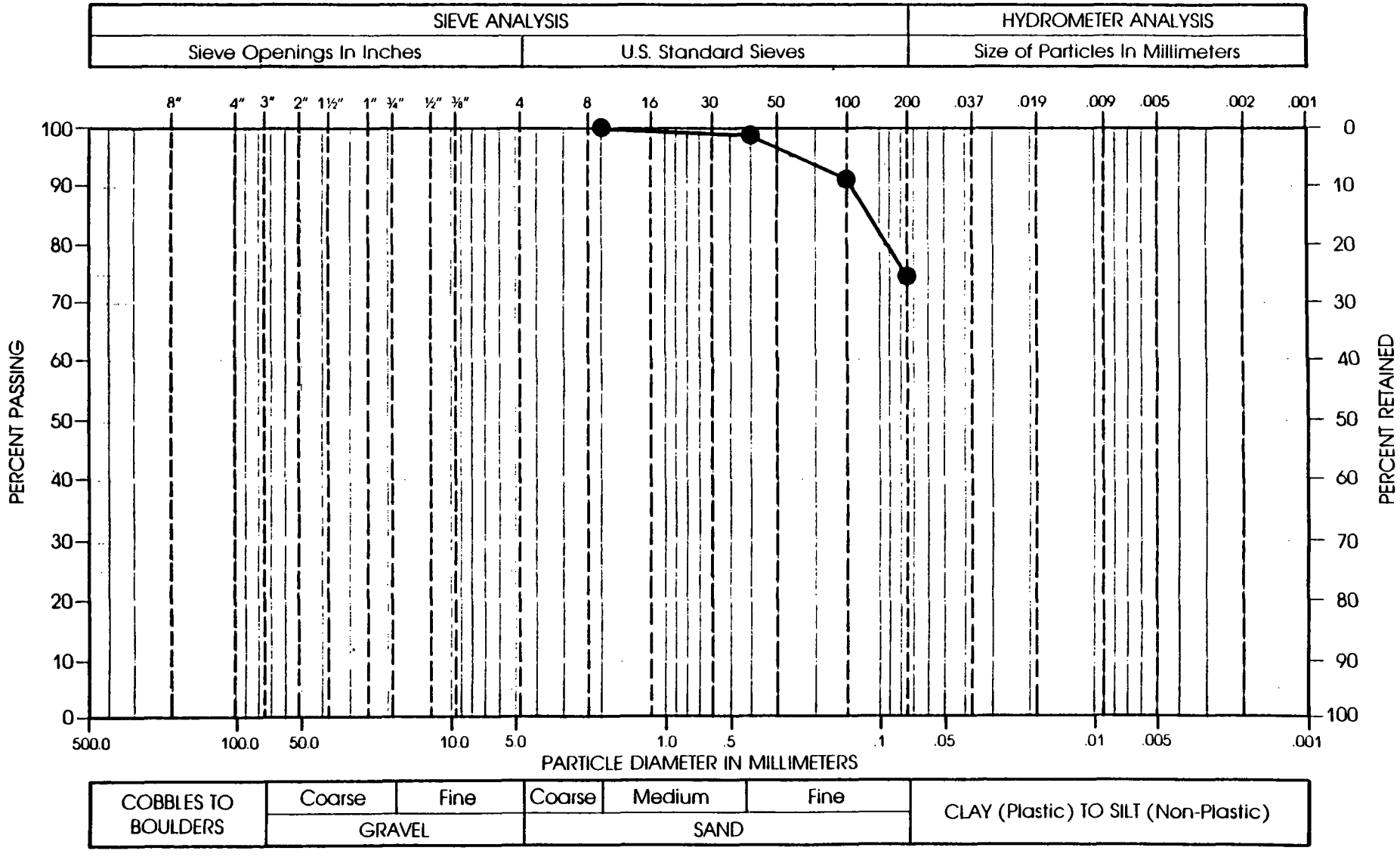
TRIAXIAL COMPRESSION TEST

DRAWN BY: NG
CHECKED BY: BM
DATE: 11/16/88

JOB NO. 18,082

PLATE 3A

B-9



GRAPH NO	BORING NO.	SAMPLE NO.	DEPTH (FEET)	NATURAL DRY DENSITY (PCF)	NATURAL MOISTURE (%)	PL	PI	LL	SOIL DESCRIPTION
						28	25	53	FAT CLAY, trace sand, light brown to gray

AGUIRRE ENGINEERS, INC.

GRADATION ANALYSIS

DRAWN BY: AF
CHECKED BY: BM
DATE: 11/11/88

JOB NO. 18,082

PLATE 4

B-10

BORING NO.	SAMPLE NO.	DEPTH (FEET)	SAMPLE TYPE (SEE NOTE 1)	NATURAL DRY DENSITY (pcf)	NATURAL MOISTURE (%)	FINES (%)	ATTERBERG LIMITS			UNCONFINED COMPRESSIVE STRENGTH (psf)	SWELL INDEX (%)	WATER SOLUBLE SULFATES (%)	ADDITIONAL TEST RESULTS ATTACHED (SEE NOTE 2)	SOIL DESCRIPTION	UNIFIED SOIL CLASSIFICATION
							PL	PI	LL						
1	Tube 1	N/A	ST	102.6	17.5									FAT CLAY, trace sand, light brown to gray	CH
1	Tube 2	N/A	ST	104.3	15.6									FAT CLAY, trace sand, light brown to gray	CH
1	Jar 1-6	N/A	SS		47.1	74.6	28	25	53				TT GA	FAT CLAY, trace sand, light brown to gray	CH
1	Jar 1-6	N/A	SS				22	32	54				TT	FAT CLAY, trace sand, light brown to gray	CH

NOTE 1 - SAMPLE TYPE
AD - Air Dried
AS - Auger Sample
BS - Bag Sample
CA - California Sample
HD - Hand Drive
SS - Standard Spoon
ST - Shelby Tube Sample
RM - Remolded Sample

NOTE 2 -ADDITIONAL TEST RESULTS ATTACHED
C_1 - Unconfined Compression
C_2 - Miniature Vane Shear
C_3 - Pocket Penetrometer
C_4 - Pocket Vane
CT - Consolidation Test
GA - Gradation Analysis
PT - Proctor
SW - Swell-Consolidation Test
TT - Triaxial Test

AGUIRRE ENGINEERS, INC.
Geotechnical and Materials Consultants

SUMMARY OF LABORATORY TEST RESULTS

PROJECT NO. 18,082

B-11

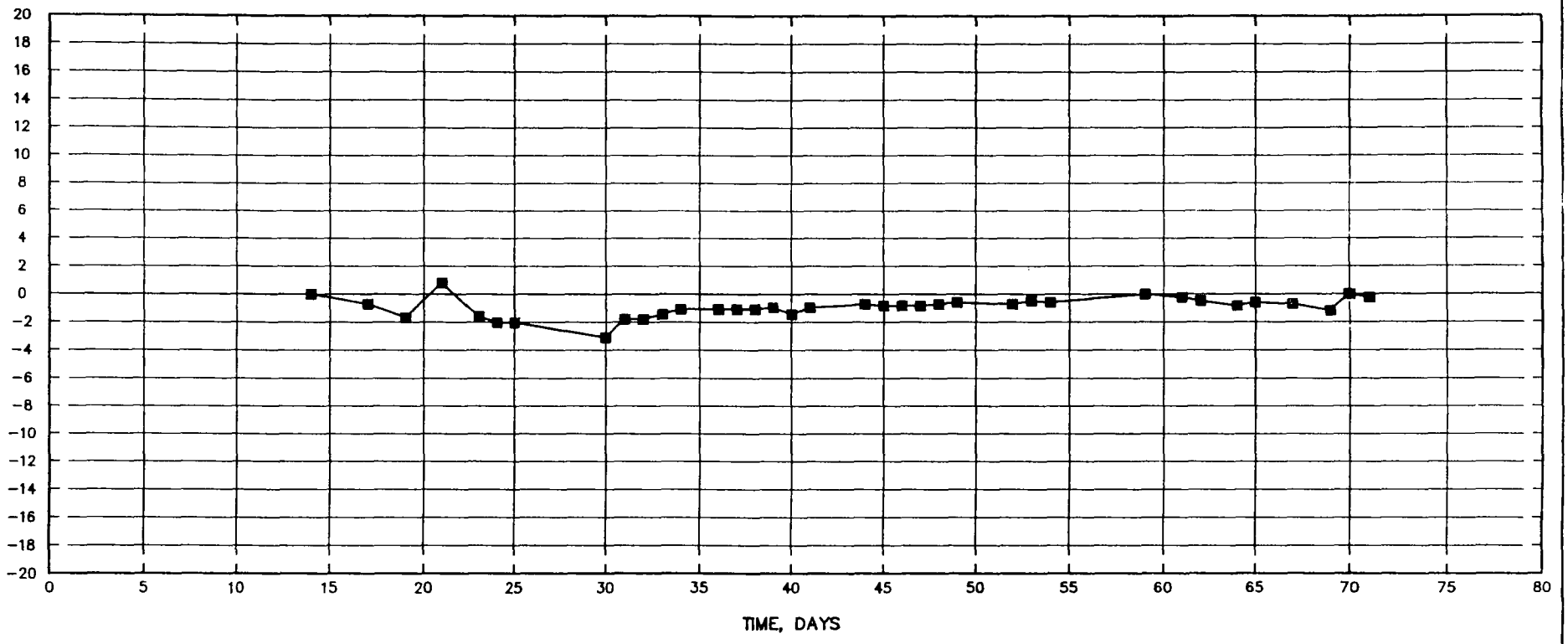
TABLE 1

APPENDIX C

APPENDIX C

SETTLEMENT PLOTS

DRAWN BY	R.H. 11-22-88	CHECKED BY	DHG 01-16-89	DRAWING NUMBER 88-131-B1
		APPROVED BY	CJW 01-16-89	



NOTES:

1. TIME 0 REPRESENTS OCTOBER 29, 1988.
2. NEGATIVE SETTLEMENT INDICATES UPWARD MOVEMENT OF THE SETTLEMENT MONUMENT.
3. INITIAL ELEVATION 6948.60 FEET.
4. INSTALLATION DATE 12 NOVEMBER 1988.

UNC EVAPORATION POND
EMBANKMENT SETTLEMENT DATA
PSM−1

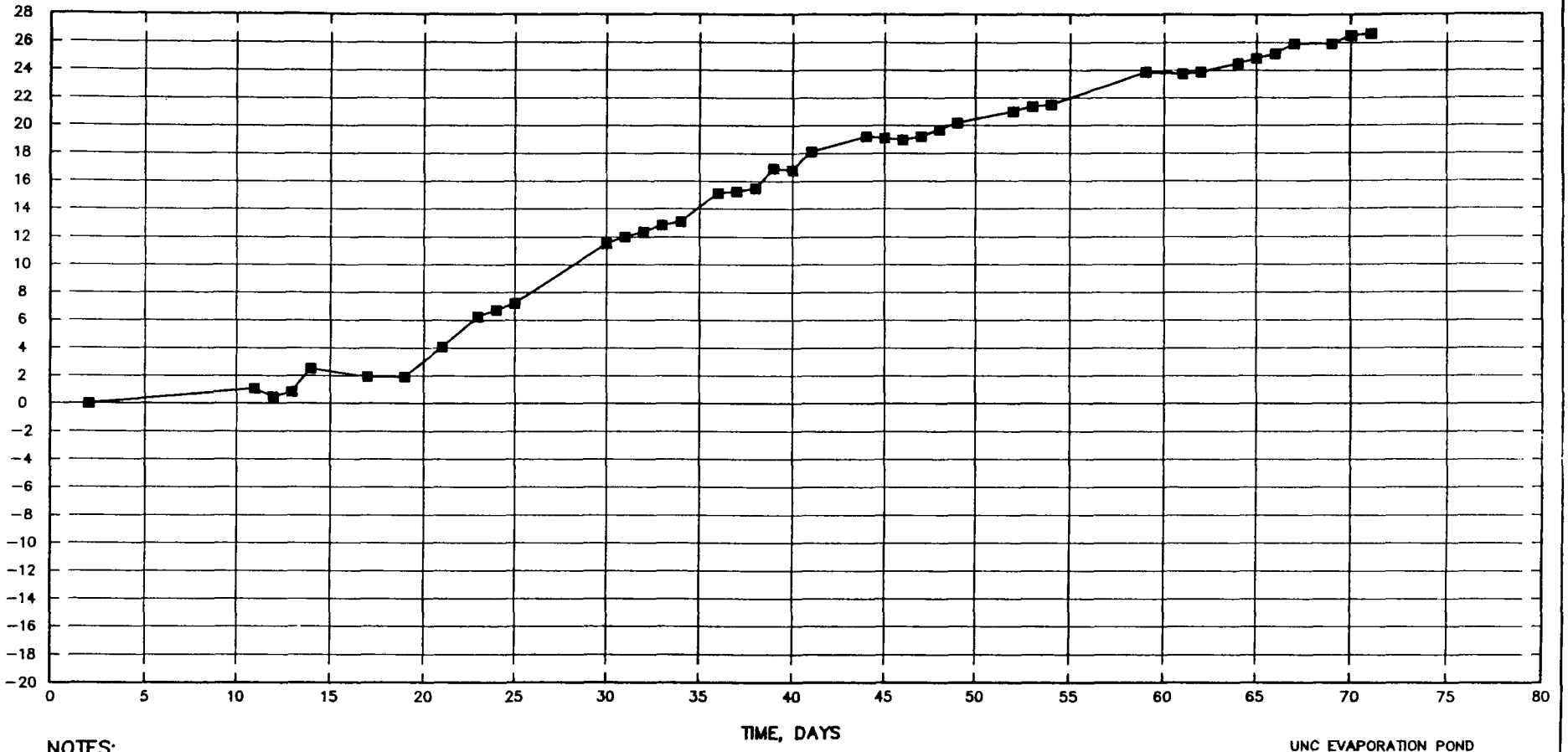
PREPARED FOR

UNC MINING AND MILLING
GALLUP, NEW MEXICO

CanonieEnvironmental

DATE: 11-22-88	FIGURE 1	DRAWING NUMBER 88-131-81
SCALE: AS SHOWN		

DRAWN BY	R.H. 11-22-88	CHECKED BY	DHG	01-16-89	DRAWING NUMBER	88-131-B2
		APPROVED BY	OFW	01-16-89		



NOTES:

1. TIME 0 REPRESENTS OCTOBER 29, 1988.
2. NEGATIVE SETTLEMENT INDICATES UPWARD MOVEMENT OF THE SETTLEMENT MONUMENT.
3. INITIAL ELEVATION 6941.30 FEET.
4. INSTALLATION DATE 31 OCTOBER 1988.

UNC EVAPORATION POND
EMBANKMENT SETTLEMENT DATA
PSM-2

PREPARED FOR

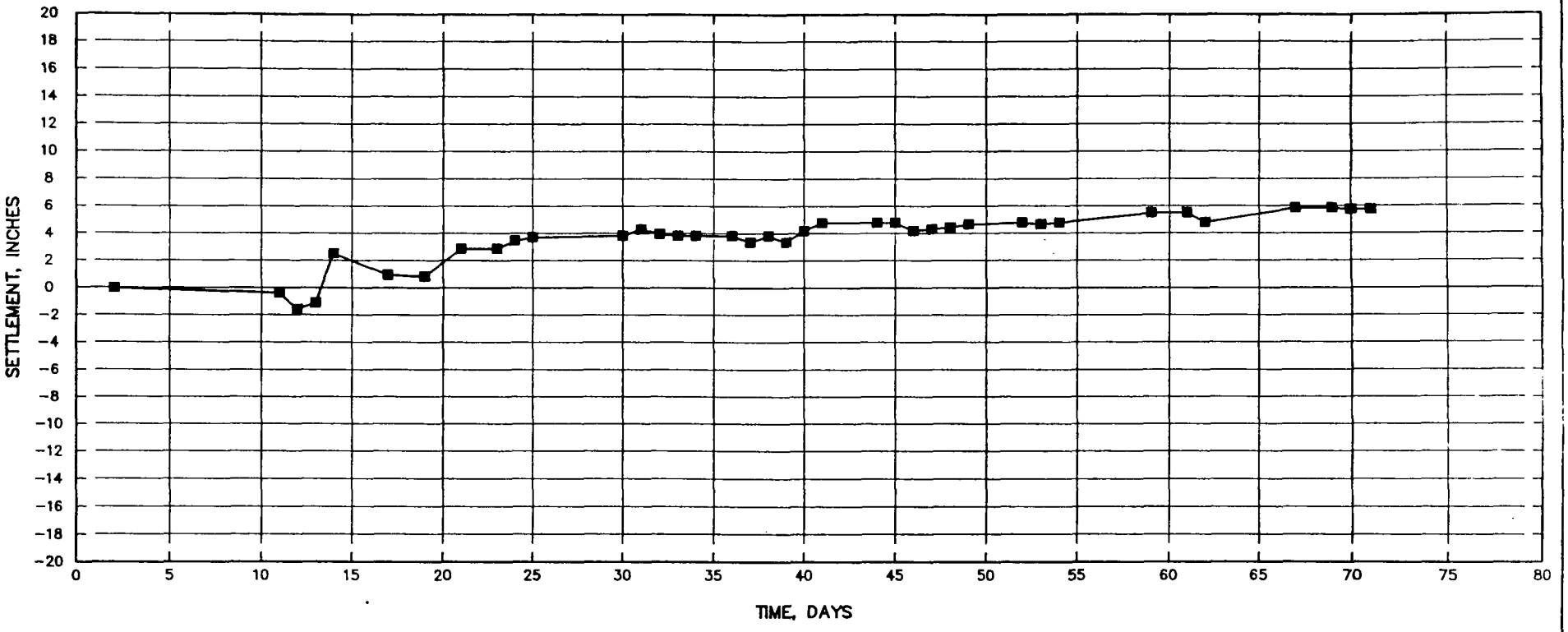
UNC MINING AND MILLING
GALLUP, NEW MEXICO

CanonieEnvironmental

DATE: 11-22-88	FIGURE 2	DRAWING NUMBER 88-131-B2
SCALE: AS SHOWN		

DRAWN BY	R.H. 11-22-88	CHECKED BY	D.H.G.
		APPROVED BY	

DRAWING NUMBER 88-131-B3



NOTES:

1. TIME 0 REPRESENTS OCTOBER 29, 1988.
2. NEGATIVE SETTLEMENT INDICATES UPWARD MOVEMENT OF THE SETTLEMENT MONUMENT.
3. INITIAL ELEVATION 6941.10 FEET.
4. INSTALLATION DATE 31 OCTOBER 1988.

UNC EVAPORATION POND
EMBANKMENT SETTLEMENT DATA
PSM-3

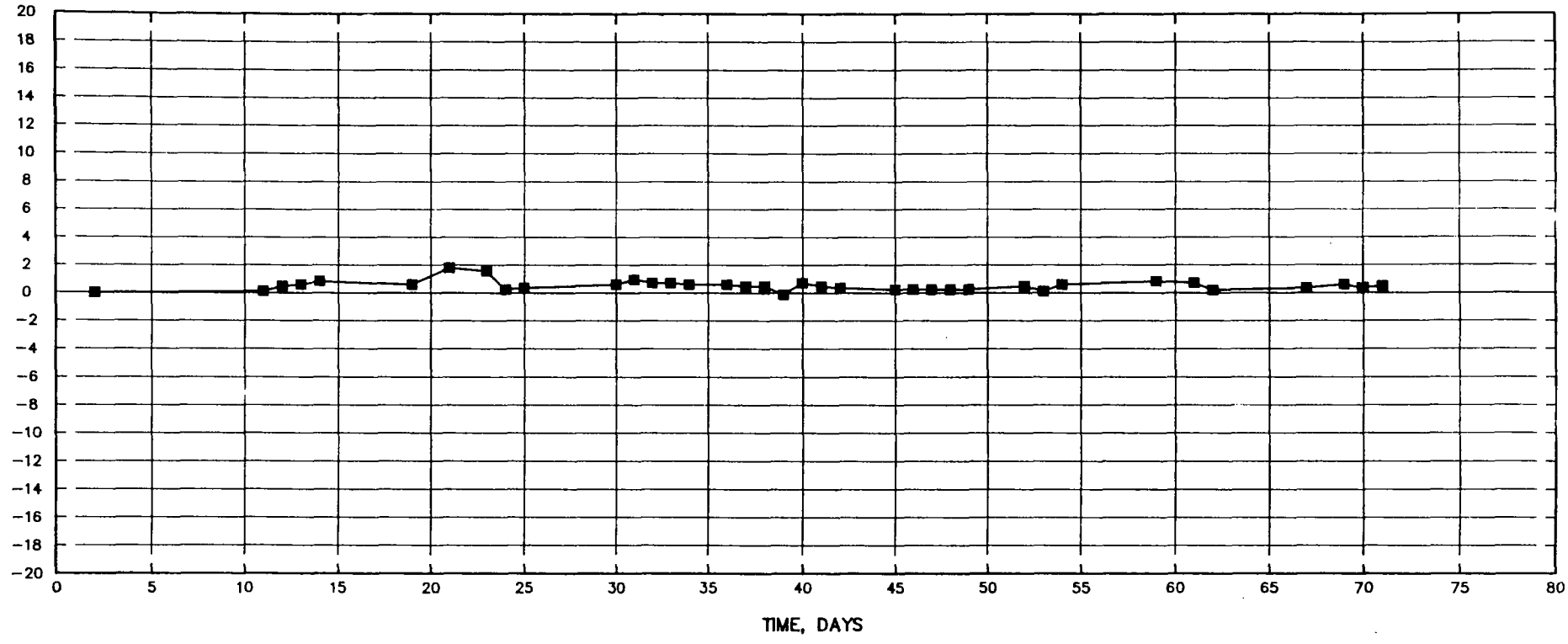
PREPARED FOR

UNC MINING AND MILLING
GALLUP, NEW MEXICO

CanonieEnvironmental

DATE: 11-22-88	FIGURE 3	DRAWING NUMBER 88-131-B3
SCALE: AS SHOWN		

DRAWN BY	R.H. 11-22-88	CHECKED BY	D.H.G.	DRAWING NUMBER	88-131-84
		APPROVED BY:			



NOTES:

1. TIME 0 REPRESENTS OCTOBER 29, 1988.
2. NEGATIVE SETTLEMENT INDICATES UPWARD MOVEMENT OF THE SETTLEMENT MONUMENT.
3. INITIAL ELEVATION 6946.12 FEET.
4. INSTALLATION DATE 31 OCTOBER 1988.

UNC EVAPORATION POND
EMBANKMENT SETTLEMENT DATA
PSM-4

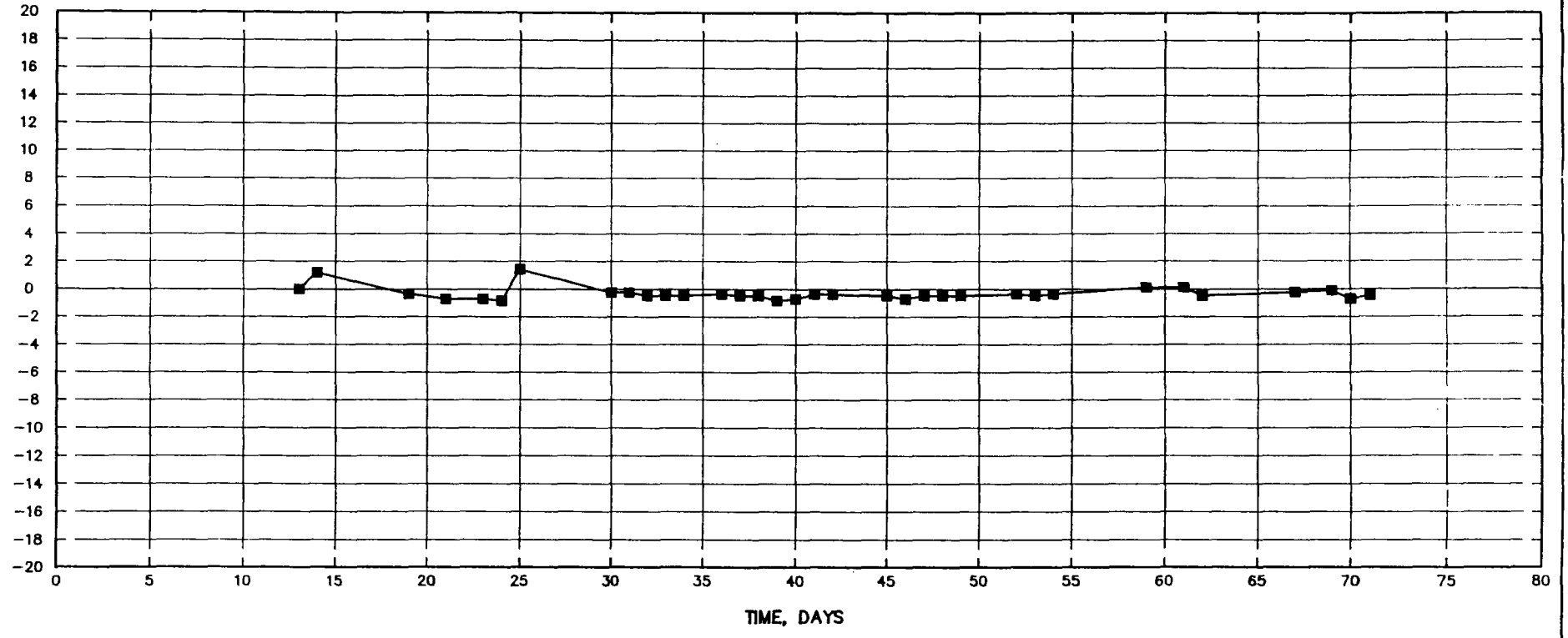
PREPARED FOR

UNC MINING AND MILLING
GALLUP, NEW MEXICO

Canonie Environmental

DATE: 11-22-88	FIGURE 4	DRAWING NUMBER 88-131-84
SCALE: AS SHOWN		

DRAWN BY	R.H. 11-22-88	CHECKED BY DHG	DRAWING NUMBER 88-131-B5
		APPROVED BY CPW 01-16-89	01-16-89



NOTES:

1. TIME 0 REPRESENTS OCTOBER 29, 1988.
2. NEGATIVE SETTLEMENT INDICATES UPWARD MOVEMENT OF THE SETTLEMENT MONUMENT.
3. INITIAL ELEVATION 6949.63 FEET.
4. INSTALLATION DATE 11 NOVEMBER 1988.

UNC EVAPORATION POND
EMBANKMENT SETTLEMENT DATA
PSM-5

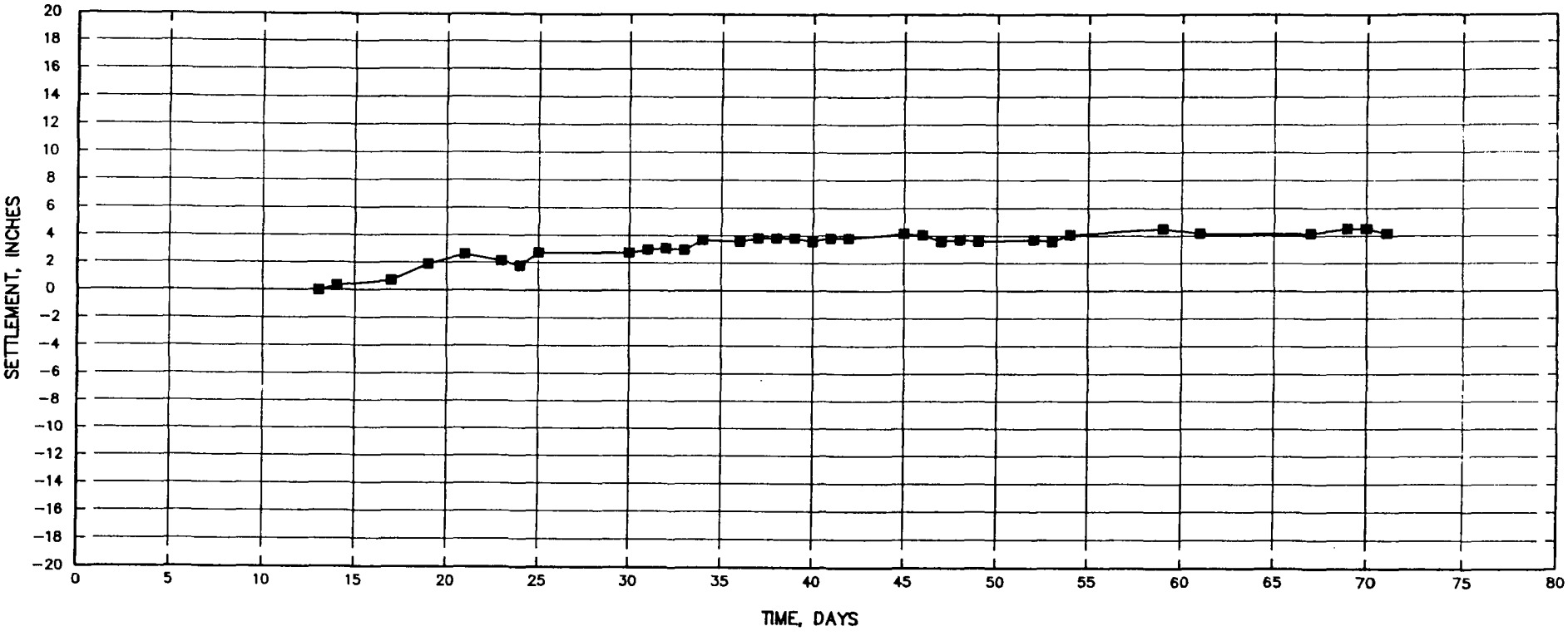
PREPARED FOR

UNC MINING AND MILLING
GALLUP, NEW MEXICO

CanonieEnvironmental

DATE: 11-22-88	FIGURE 5	DRAWING NUMBER 88-131-B5
SCALE: AS SHOWN		

DRAWN BY	CHECKED BY	DRAWING NUMBER
R.H. 11-22-88	APPROVED BY	88-131-B6



NOTES:

1. TIME 0 REPRESENTS OCTOBER 29, 1988.
2. NEGATIVE SETTLEMENT INDICATES UPWARD MOVEMENT OF THE SETTLEMENT MONUMENT.
3. INITIAL ELEVATION 6956.60 FEET.
4. INSTALLATION DATE 11 NOVEMBER 1988.

UNC EVAPORATION POND
EMBANKMENT SETTLEMENT DATA
PSM-6

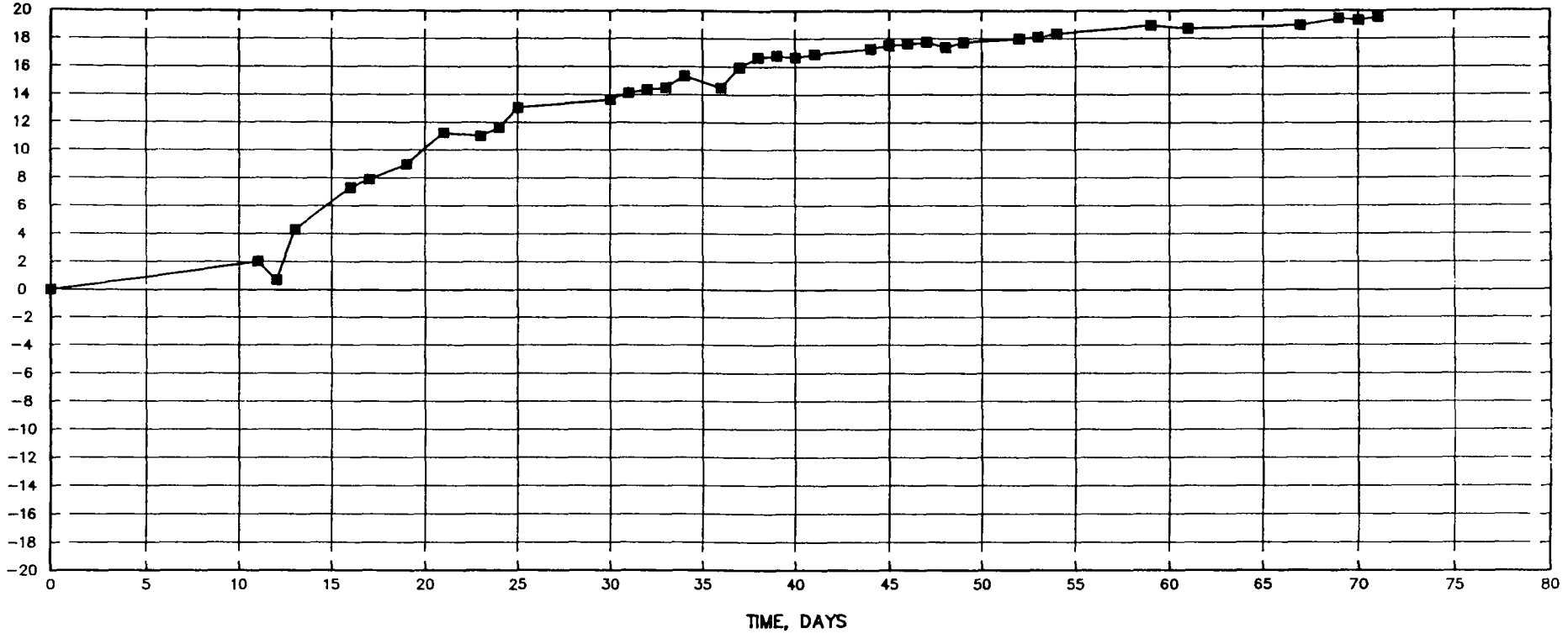
PREPARED FOR

UNC MINING AND MILLING
GALLUP, NEW MEXICO

Canonie Environmental

DATE: 11-22-88	FIGURE 6	DRAWING NUMBER 88-131-B6
SCALE: AS SHOWN		

DRAWN BY	R.H. 11-22-88	CHECKED BY	DHG 01-16-89	DRAWING NUMBER	88-131-B7
		APPROVED BY	CPW 01-16-89		



NOTES:

1. TIME 0 REPRESENTS OCTOBER 29, 1988.
2. NEGATIVE SETTLEMENT INDICATES UPWARD MOVEMENT OF THE SETTLEMENT MONUMENT.
3. INITIAL ELEVATION 6952.81 FEET.
4. INSTALLATION DATE 29 OCTOBER 1988.

UNC EVAPORATION POND
EMBANKMENT SETTLEMENT DATA
PSM-7

PREPARED FOR

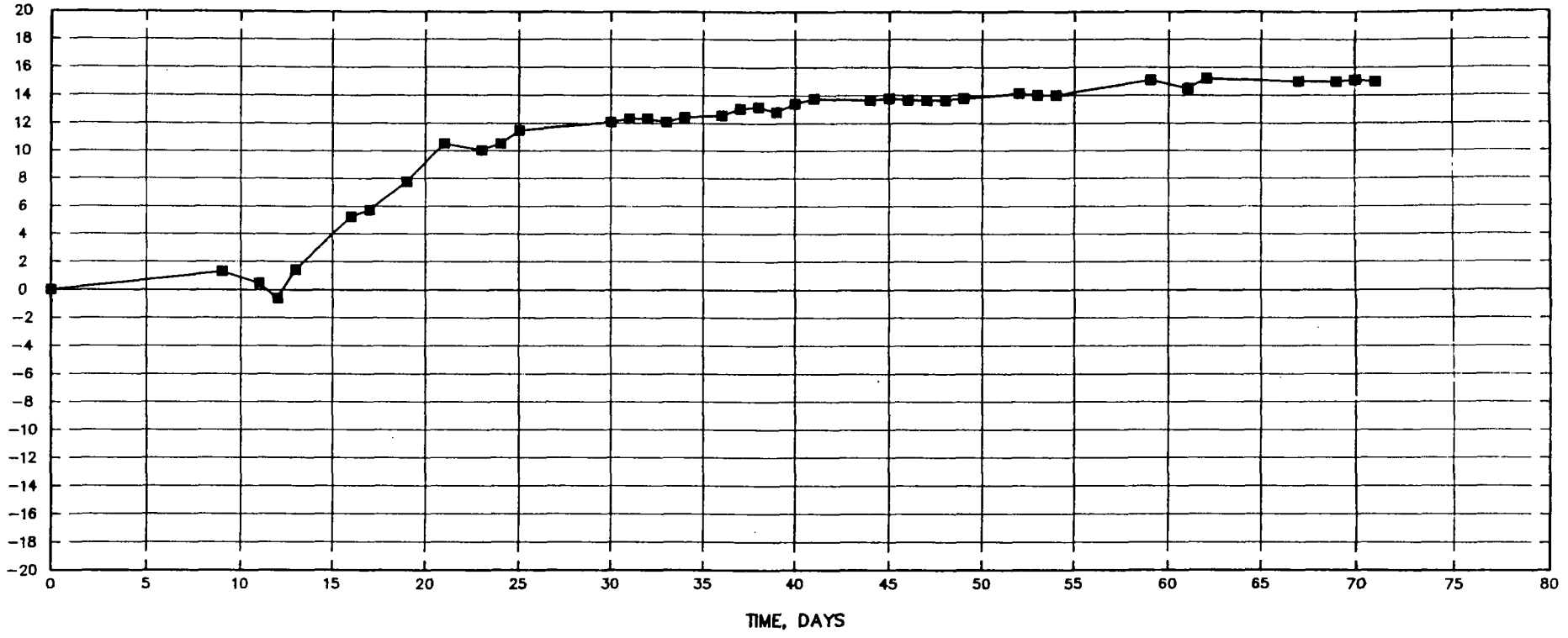
UNC MINING AND MILLING
GALLUP, NEW MEXICO

Canonie Environmental

DATE: 11-22-88	FIGURE 7	DRAWING NUMBER
SCALE: AS SHOWN		88-131-B7

DRAWN BY	R.H. 11-22-88	CHECKED BY	DHG
		APPROVED BY	CPW 12-16-88

DRAWING NUMBER 88-131-88



NOTES:

1. TIME 0 REPRESENTS OCTOBER 29, 1988.
2. NEGATIVE SETTLEMENT INDICATES UPWARD MOVEMENT OF THE SETTLEMENT MONUMENT.
3. INITIAL ELEVATION 6950.21 FEET.
4. INSTALLATION DATE 29 OCTOBER 1988.

UNC EVAPORATION POND
EMBANKMENT SETTLEMENT DATA
PSM-8

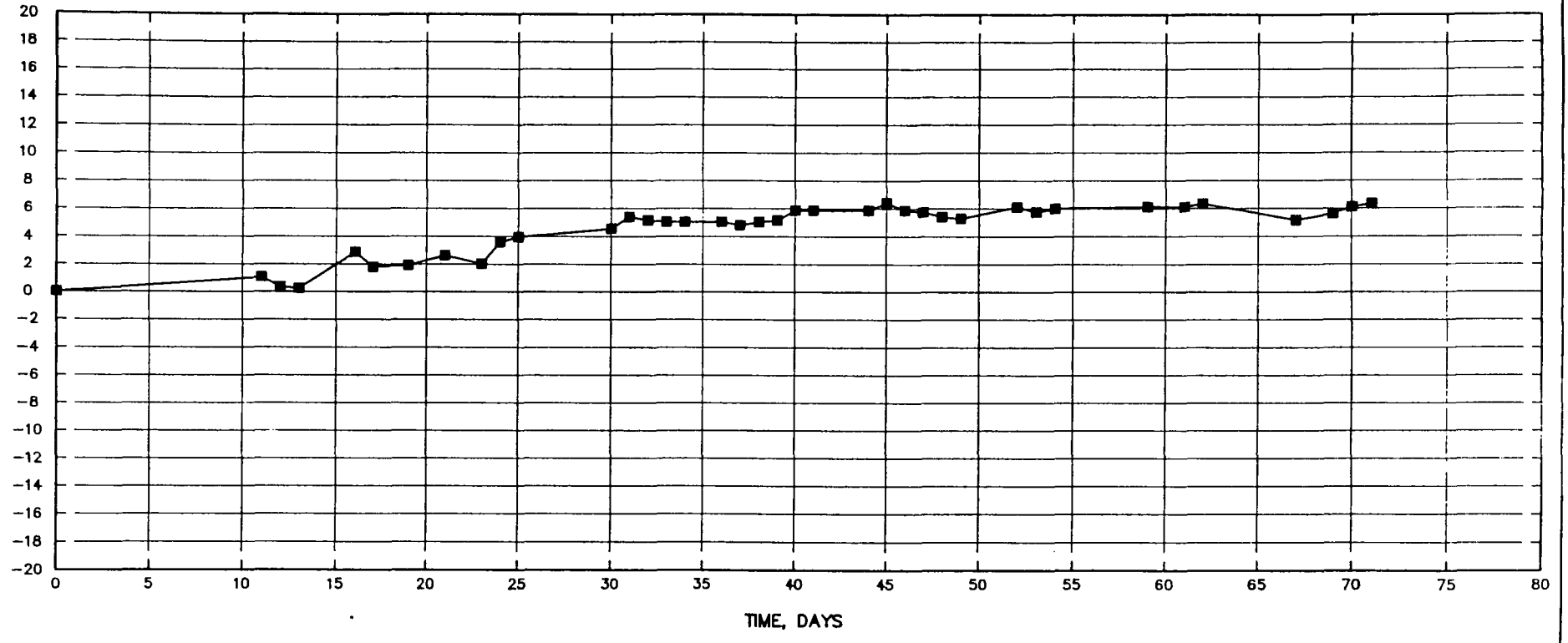
PREPARED FOR

UNC MINING AND MILLING
GALLUP, NEW MEXICO

CanonieEnvironmental

DATE: 11-22-88	FIGURE 8	DRAWING NUMBER 88-131-88
SCALE: AS SHOWN		

DRAWN BY	CHECKED BY	DRAWING NUMBER
R.H. 11-22-88	DHG 01-16-89	88-131-B9
	APPROVED BY OPW 01-16-89	



NOTES:

1. TIME 0 REPRESENTS OCTOBER 29, 1988.
2. NEGATIVE SETTLEMENT INDICATES UPWARD MOVEMENT OF THE SETTLEMENT MONUMENT.
3. INITIAL ELEVATION 6953.77 FEET.
4. INSTALLATION DATE 29 OCTOBER 1988.

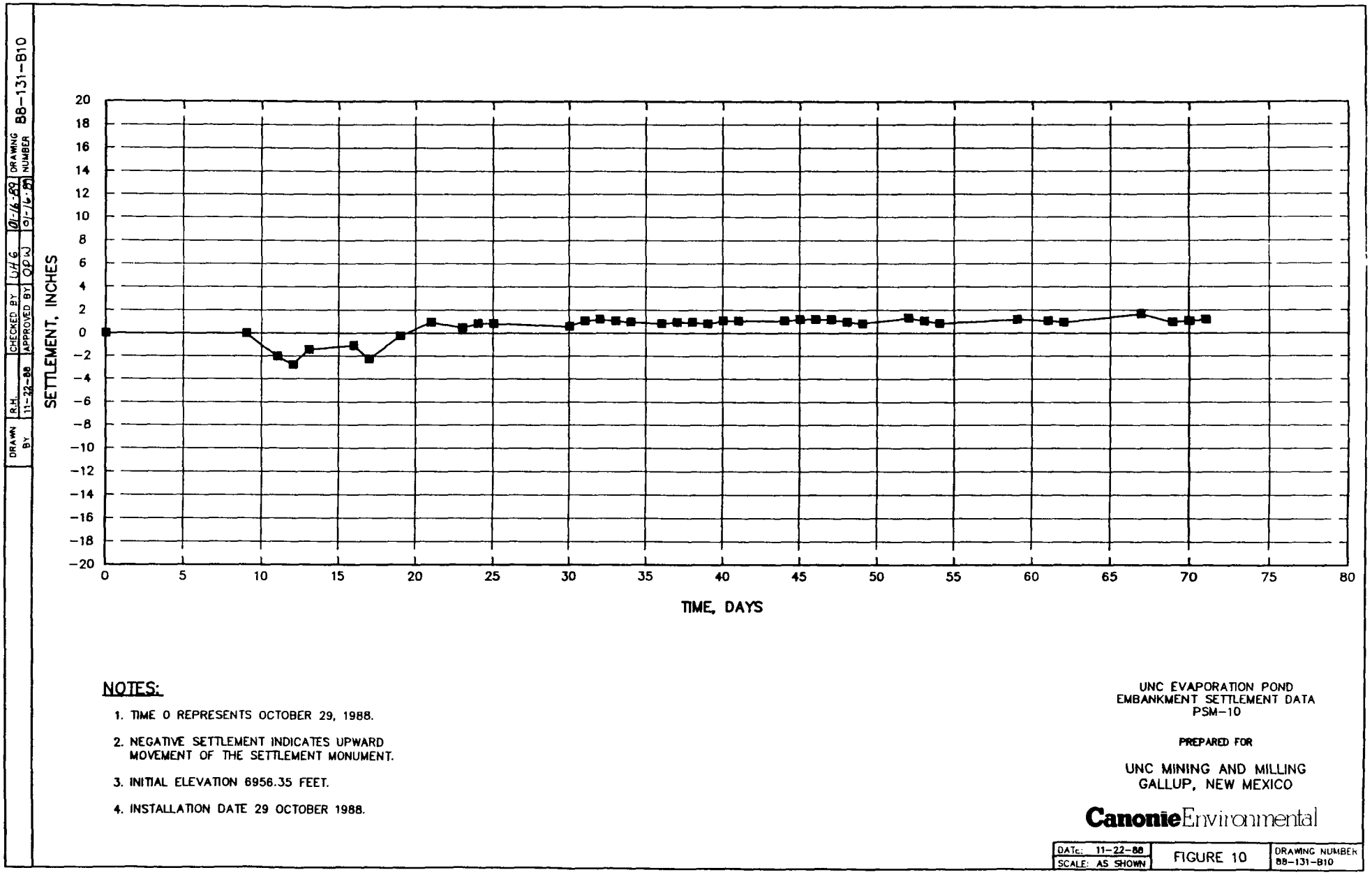
UNC EVAPORATION POND
EMBANKMENT SETTLEMENT MONUMENT
PSM-9

PREPARED FOR

UNC MINING AND MILLING
GALLUP, NEW MEXICO

Canonie Environmental

DATE: 11-22-88	FIGURE 9	DRAWING NUMBER 88-131-B9
SCALE: AS SHOWN		



NOTES:

1. TIME 0 REPRESENTS OCTOBER 29, 1988.
2. NEGATIVE SETTLEMENT INDICATES UPWARD MOVEMENT OF THE SETTLEMENT MONUMENT.
3. INITIAL ELEVATION 6956.35 FEET.
4. INSTALLATION DATE 29 OCTOBER 1988.

UNC EVAPORATION POND
EMBANKMENT SETTLEMENT DATA
PSM−10

PREPARED FOR

UNC MINING AND MILLING
GALLUP, NEW MEXICO

Canonie Environmental

DATE: 11−22−88	FIGURE 10	DRAWING NUMBER 88−131−B10
SCALE: AS SHOWN		

APPENDIX D

APPENDIX D

MOISTURE-DENSITY RELATIONSHIPS
LABORATORY RESULTS

FOX

FOX & ASSOCIATES OF NEW MEXICO, INC.

CONSULTING ENGINEERS AND GEOLOGISTS

ALBUQUERQUE OFFICE 3412 BRYN MAWR DRIVE, NE
ALBUQUERQUE, NEW MEXICO 87107
(505) 884-0900

November 9, 1988

Canonie Environmental
P.O. Box 2139
Gallup, NM 87305

Job No: 3-4574-6571-00

Attn: Matt Yovich

Subject: Laboratory Determinations
Moisture-Density Relations of Soils
Atterberg Limits Test & Sieve Analysis
UNC Pond Construction
#88-131

Gentlemen:

Transmitted herein is the detailed test data for the subject project.

FOX & ASSOCIATES OF NEW MEXICO, INC.

Ann K. Slade
Laboratory Supervisor

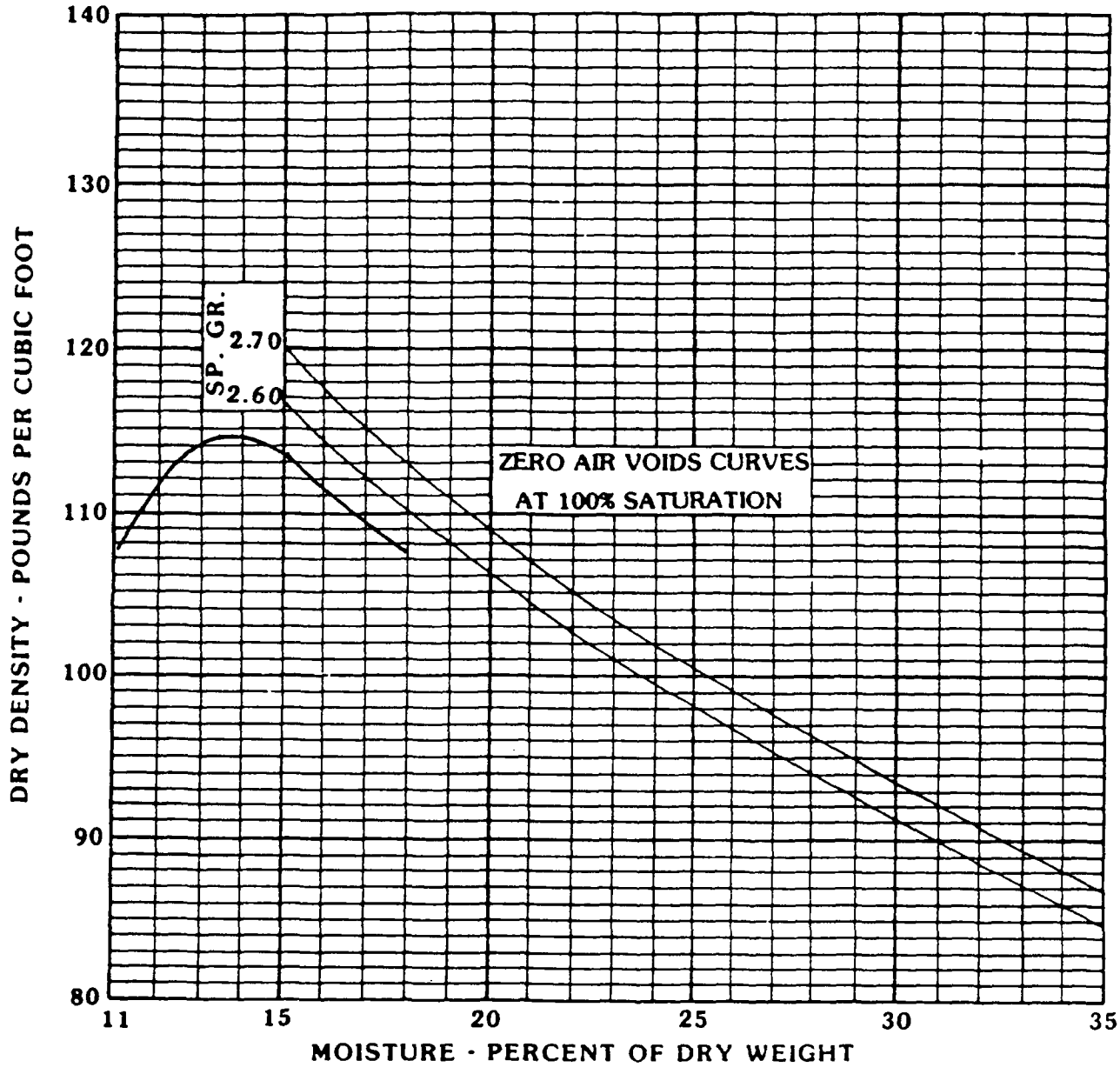
Copies: Addressee (2)

Attached: Data Sheet

cj

D-2

LABORATORY MOISTURE DENSITY TEST RESULTS



MAXIMUM DRY DENSITY : 114.6 pcf **OPTIMUM MOISTURE CONTENT :** 13.5%

SAMPLE DESCRIPTION : CLAY, very sandy, gray green (CL) (TAILINGS SLIME)

LOCATION : On site Date Sampled 10/27/88

PROCTOR MD-5

AMT. OF MAT'L FINER THAN : #4 SIEVE 100 #10 100 #40 95 #200 52.1

ATTERBERG LIMITS : LL : 25 PL : 15 PI : 11

GRAVEL=0
SAND=48
SILT & CLAY=52.1

LABORATORY MOISTURE DENSITY TEST RESULTS	Proctor No. ASTM D
FOX Consulting Engineers and Geologists	Comp. Test Proc. 698 'A'
	Figure

SLR-4

FOX

FOX & ASSOCIATES OF NEW MEXICO, INC.

CONSULTING ENGINEERS AND GEOLOGISTS

ALBUQUERQUE OFFICE 3412 BRYN MAWR DRIVE, NE
ALBUQUERQUE, NEW MEXICO 87107
(505) 884-0900

November 9, 1988

Canonie Environmental
P.O. Box 2139
Gallup, NM 87305

Job No: 3-4574-6571-00

Attn: Matt Yovich

Subject: Laboratory Determinations
Relative-Density Relations of Soils
Sieve Analysis
UNC Pond Construction
#88-131

Gentlemen:

Transmitted herein is the detailed test data for the subject project.

FOX & ASSOCIATES OF NEW MEXICO, INC.

Ann K. Slade

Ann K. Slade
Laboratory Supervisor

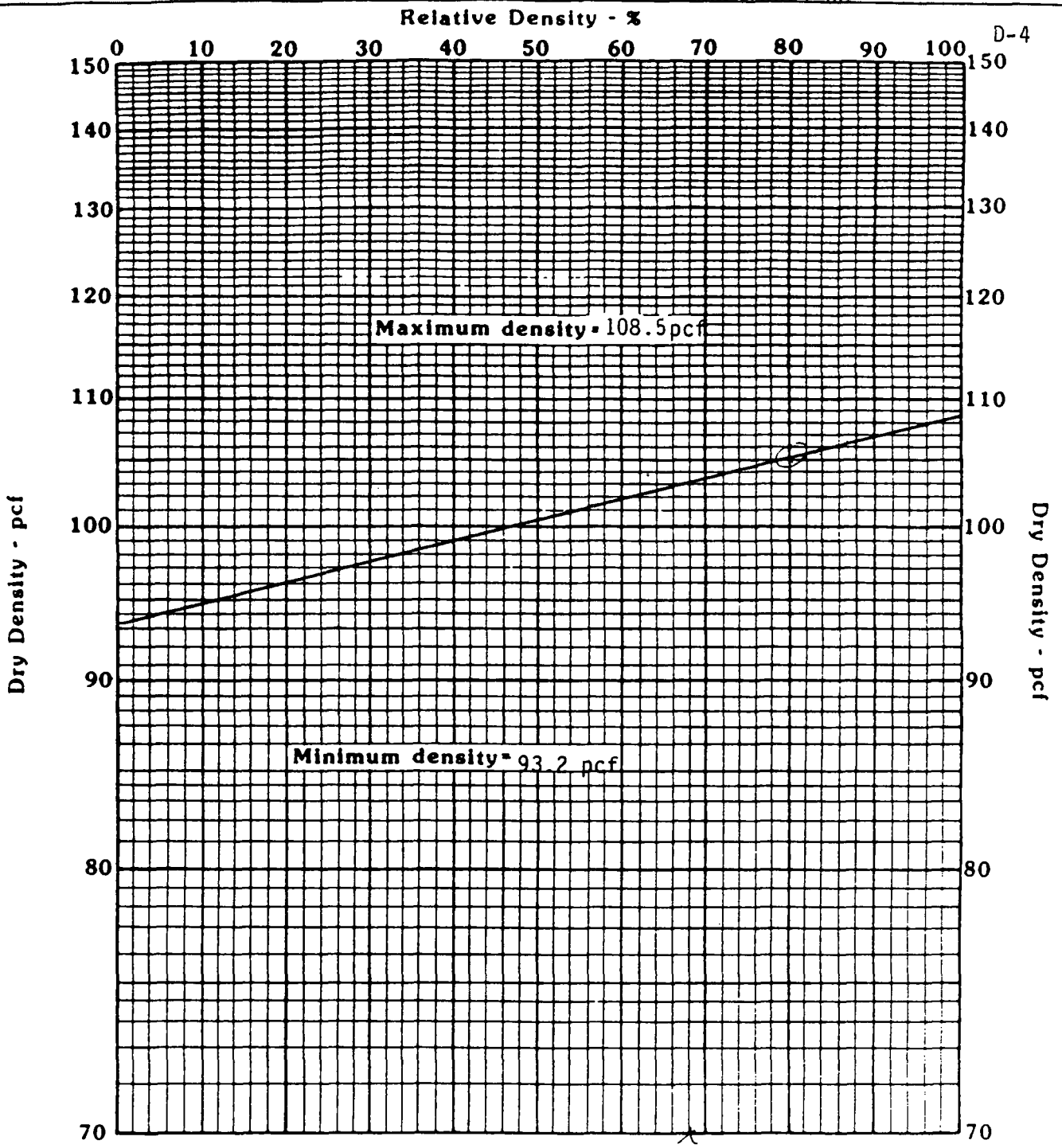
Copies: Addressee (2)

Attached: Data Sheet

cj

JOB No: 3-45/4-65/1-00

D-4



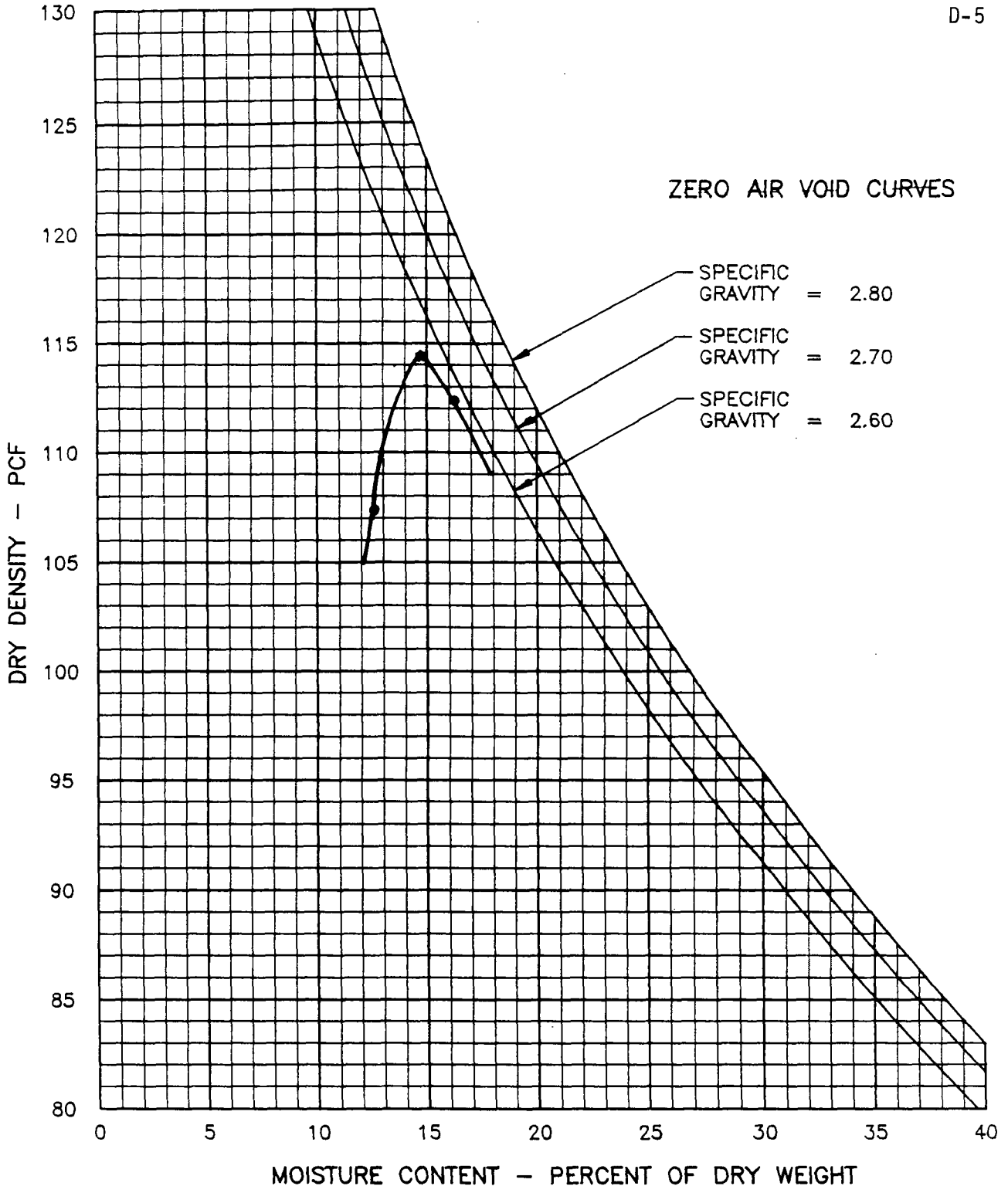
Sieve Analysis

Sieve No.	% Passing
4	100
10	100
40	80
200	11.3

SAND, slightly silty, brown (SP-SM)
TAILINGS SAND
Date Sampled: 10/27/88

PROCTOR MD-6

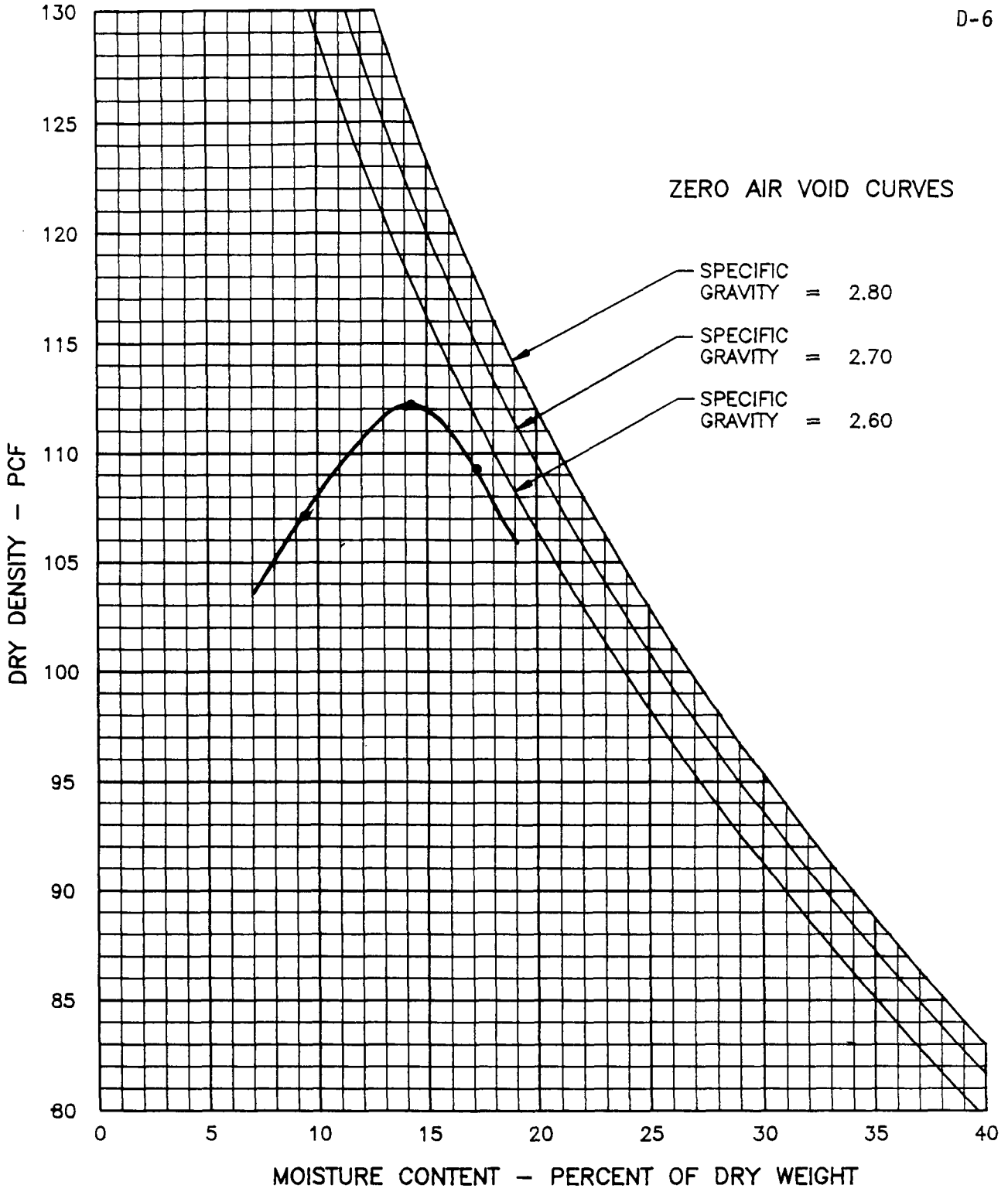
RELATIVE DENSITY TEST RESULTS	Job No:
FOX Consulting Engineers and Geologists	Date:
	Figure



PROJECT:	UNC EVAP. PONDS	MAX. DRY DENSITY:	114.8 PCF
PROJECT NO:	88-131-03	OPTIMUM MOISTURE CONTENT:	14.9%
LOCATION:	MD-1	PROCEDURE:	ASTM-D698
PLASTICITY INDEX:	6%	GRAVEL:	0%
LIQUID LIMIT:	22%	SAND:	53%
SOIL DESCRIPTION:	SC-SM	SAND & CLAY (-200):	47%

MOISTURE - DENSITY RELATIONSHIPS

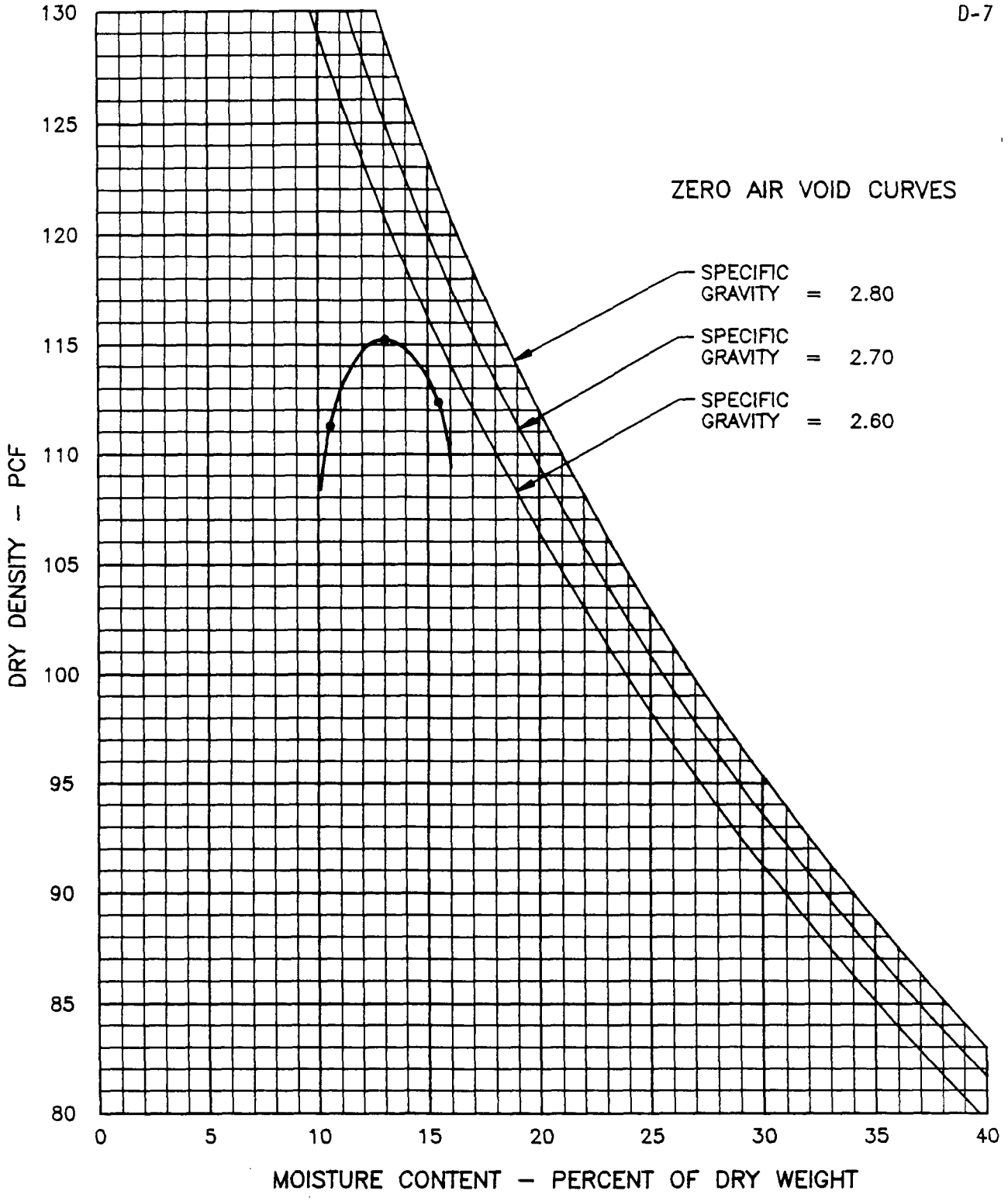
CanonieEnvironmental



PROJECT:	UNC EVAP. PONDS	MAX. DRY DENSITY:	112.5 PCF
PROJECT NO:	88-131-03	OPTIMUM MOISTURE CONTENT:	14.5%
LOCATION:	MD-2	PROCEDURE:	ASTM-D698
PLASTICITY INDEX:	7%	GRAVEL:	0%
LIQUID LIMIT:	22%	SAND:	56%
SOIL DESCRIPTION:	SC-SM	SAND & CLAY (-200):	44%

MOISTURE - DENSITY RELATIONSHIPS

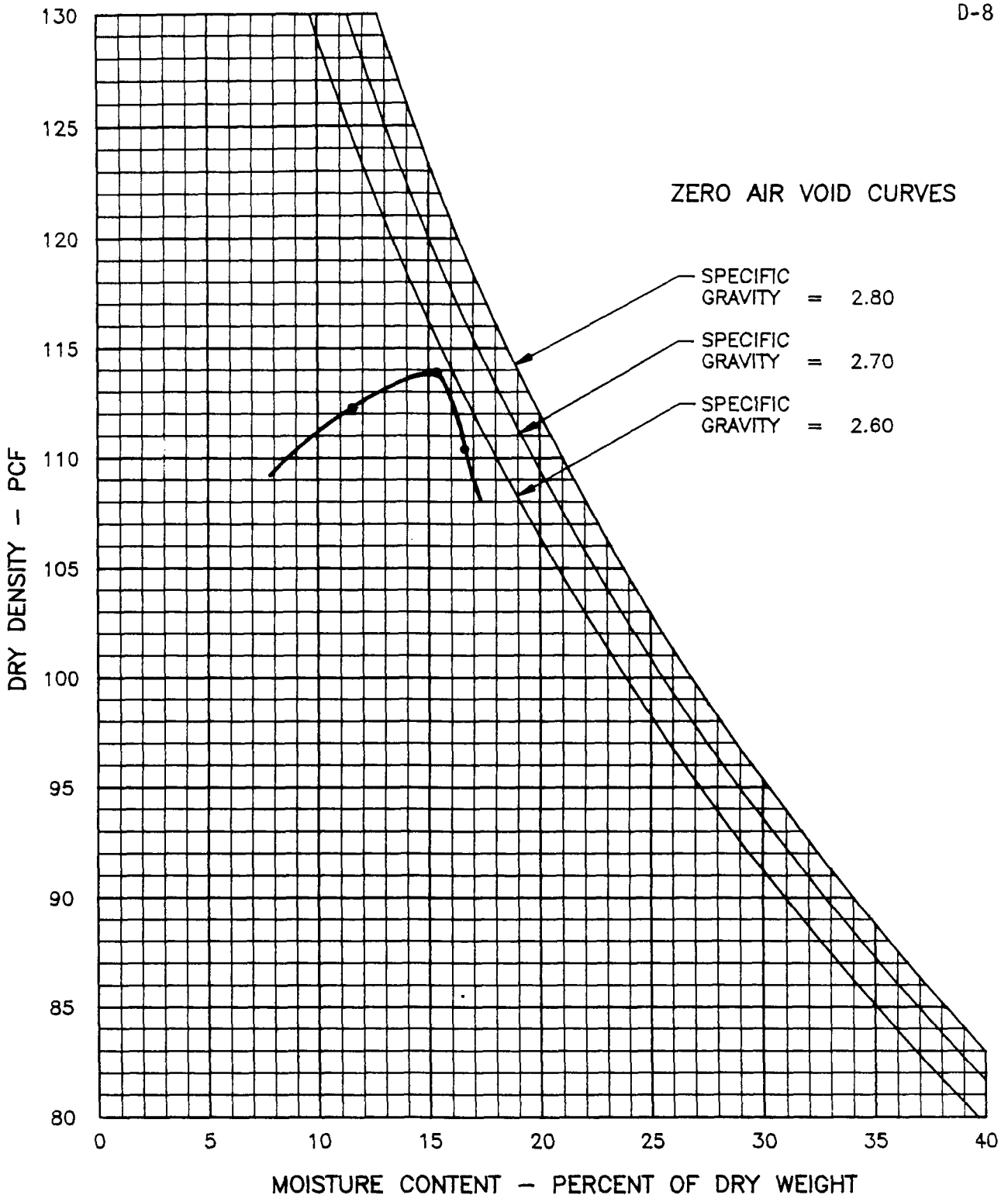
Canonie Environmental



PROJECT:	UNC EVAP. PONDS	MAX. DRY DENSITY:	115.2
PROJECT NO:	88-131-03	OPTIMUM MOISTURE CONTENT:	13.0%
LOCATION:	MD-3	PROCEDURE:	ASTM-D698
PLASTICITY INDEX:	NP	GRAVEL:	0%
LIQUID LIMIT:	–	SAND:	66%
SOIL DESCRIPTION:	SM	SAND & CLAY (-200):	34%

MOISTURE – DENSITY RELATIONSHIPS

CanonieEnvironmental



PROJECT:	UNC EVAP. PONDS	MAX. DRY DENSITY:	114.0
PROJECT NO:	88-131-03	OPTIMUM MOISTURE CONTENT:	15.1%
LOCATION:	MD-4	PROCEDURE:	ASTM-D698
PLASTICITY INDEX:	10%	GRAVEL:	0%
LIQUID LIMIT:	24%	SAND:	52%
SOIL DESCRIPTION:	SC	SAND & CLAY (-200):	48%

MOISTURE - DENSITY RELATIONSHIPS

Canonie Environmental

APPENDIX E

APPENDIX E

FIELD SEAM STRENGTH TESTS
LABORATORY RESULTS

Precision Laboratories
11834 Western Avenue, P.O. Box 915, Garden Grove, California 92642-0915 (714) 891-7832

December 8, 1988

Mr. Matt Yovich
Canonie Environmental, Inc.
94 Inverness Terrace East #100
Englewood, CO 80112

Dear Mr. Yovich:

Thank you for consulting Precision Laboratories for your material testing needs.

Enclosed please find the laboratory report for the testing of the four Hypalon seams we received December 8, 1988.

Be advised that the samples were too small for complete testing. A sample with approximately 30 inches of seam is needed to test 5 specimens for shear and 5 for peel.

If you have any questions or if I may be of further service, please do not hesitate to call.

Sincerely,

PRECISION LABORATORIES

Lance S. Reed
Assistant Laboratory Manager

Enclosure

Precision Laboratories
11834 Western Avenue, P.O. Box 915, Garden Grove, California 92642-0915 (714) 891-7832

December 8, 1988

VERIFICATION OF MATERIAL PROPERTIES
Fiber Reinforced Hypalon Seams
For: Canonie Environmental, Inc.
(Canonie Job No: 88-131-04 - Precision Reference: 881037)

INTRODUCTION

Precision Laboratories conducted physical testing on four (4) fiber reinforced Hypalon seam samples for Canonie Environmental, Inc. of Englewood, Colorado. The samples, identified as *#2 HEAT, #4 HEAT #3 GLUE,* and *#5 GLUE*, were delivered to the laboratory on December 8, 1988 by Federal Express.

TEST PROCEDURES

Each of the seam samples were tested for seam peel adhesion and bonded seam strength. Seam peel adhesion was tested in accordance with ASTM D413 using a one (1) inch wide specimen with a separation rate of 2 inches per minute. Bonded seam strength was tested in accordance with ASTM D751 as modified by the National Sanitation Foundation (NSF) standard 54 using a four (4) inch wide specimen, an initial gage of 6 inches plus the width of the seam and a strain rate of 12 inches per minute.

TEST RESULTS

The results of the testing are reported on Tables 1 and 2, attached. The units in which the data are reported are included on the tables. All break types were film tearing bond (FTB).

PRECISION LABORATORIES

Lance S. Reed
Assistant Laboratory Manager

TABLE 1. MATERIAL PROPERTIES

Fiber Reinforced Hypalon Seam Samples
For: Canonie Environmental, Inc.
(Canonie Job No: 88-131-04 - Precision Reference: 881037)

#2 HEAT

	BONDED SEAM STRENGTH (lbs/inch)	BREAK TYPE	SEAM PEEL ADHESION (lbs/inch)	BREAK TYPE
	300	FTB	19.2	FTB
	301	FTB	23.6	FTB
	*		22.5	FTB
	*		19.4	FTB
	*		*	
Avg:	300		21.2	
SD:	1		2.2	

#4 HEAT

	BONDED SEAM STRENGTH (lbs/inch)	BREAK TYPE	SEAM PEEL ADHESION (lbs/inch)	BREAK TYPE
	268	FTB	21.5	FTB
	280	FTB	18.9	FTB
	*		21.0	FTB
	*		26.2	FTB
	*		*	
Avg:	274		21.9	
SD:	8		3.1	

* Not tested due to insufficient material

TABLE 2. MATERIAL PROPERTIES

Fiber Reinforced Hypalon Seam Samples
For: Canonie Environmental, Inc.
(Canonie Job No: 88-131-04 - Precision Reference: 881037)

SAMPLE #3 GLUE

	BONDED SEAM STRENGTH (lbs/inch)	BREAK TYPE	SEAM PEEL ADHESION (lbs/inch)	BREAK TYPE
	208	FTB	18.7	FTB
	175	FTB	18.5	FTB
	*		17.5	FTB
	*		25.1	FTB
	*		*	
Avg:	192		20.0	
SD:	23		3.5	

SAMPLE #5 GLUE

	BONDED SEAM STRENGTH (lbs/inch)	BREAK TYPE	SEAM PEEL ADHESION (lbs/inch)	BREAK TYPE
	215	FTB	21.3	FTB
	229	FTB	25.1	FTB
	*		27.5	FTB
	*		21.0	FTB
	*		*	
Avg:	222		23.7	
SD:	10		3.1	

* Not tested due to insufficient material

Precision Laboratories
11834 Western Avenue, P.O. Box 915, Garden Grove, California 92642-0915 (714) 891-7832

January 18, 1989

Mr. Matt Yovich
Canonie Environmental, Inc.
94 Inverness Terrace East #100
Englewood, CO 80112

Dear Mr. Yovich:

Thank you for consulting Precision Laboratories for your material testing needs.

Enclosed please find the laboratory report for the testing of the two Hypalon seams we received January 17, 1989.

Be advised that the samples were again too small for complete testing. A sample with a minimum of 30 inches of seam is needed to test 5 specimens for shear and 5 for peel. In addition, the sample marked GLUE did not have any liner overlap. In situations like this we use a pair of needle-nose pliers to peel up enough of the liner to fit into our machines. In so doing, however, two of the five specimens were damaged and had to be excluded from the test.

If you have any questions or if I may be of further service, please do not hesitate to call.

Sincerely,

PRECISION LABORATORIES

Lance S. Reed
Assistant Laboratory Manager

Enclosure

Precision Laboratories
11834 Western Avenue, P.O. Box 915, Garden Grove, California 92642-0915 (714) 891-7832

January 18, 1989

VERIFICATION OF MATERIAL PROPERTIES
Fiber Reinforced Hypalon Seams
For: Canonie Environmental, Inc.
(Canonie Job No: 88-131-04 - Precision Reference: 890006)

INTRODUCTION

Precision Laboratories conducted physical testing on two (2) fiber reinforced Hypalon seam samples for Canonie Environmental, Inc. of Englewood, Colorado. The samples, identified as *HEAT 12-31-88*, and *GLUE 1-10-89*, were delivered to the laboratory on January 17, 1989 by Federal Express.

TEST PROCEDURES

Seam peel adhesion was tested in accordance with ASTM D413 using a one (1) inch wide specimen with a separation rate of 6 inches per minute. Bonded seam strength was tested in accordance with ASTM D751 as modified by the National Sanitation Foundation (NSF) standard 54 using a four (4) inch wide specimen, an initial gage of 6 inches plus the width of the seam and a strain rate of 12 inches per minute.

TEST RESULTS

The results of the testing are reported on Table 1, attached. The units in which the data are reported are included on the tables. All break types were film tearing bond (FTB).

PRECISION LABORATORIES

Lance S. Reed
Assistant Laboratory Manager

TABLE 1. MATERIAL PROPERTIES

Fiber Reinforced Hypalon Seam Samples
For: Canonie Environmental, Inc.
(Canonie Job No: 88-131-04 - Precision Reference: 890006)

HEAT 12-31-88

	BONDED SEAM STRENGTH (lbs/inch)	BREAK TYPE	SEAM PEEL ADHESION (lbs/inch)	BREAK TYPE
	284	FTB	29.9	FTB
	328	FTB	28.6	FTB
	334	FTB	34.6	FTB
	*		35.5	FTB
	*		31.5	FTB
Avg:	315		32.0	
SD:	27		3.0	

GLUE 1-10-89

	BONDED SEAM STRENGTH (lbs/inch)	BREAK TYPE	SEAM PEEL ADHESION (lbs/inch)	BREAK TYPE
	*		27.8	FTB
	*		33.3	FTB
	*		20.3	FTB
	*		**	
	*		**	
Avg:			27.1	
SD:			6.5	

* Not tested due to insufficient material

** Specimens were damaged during preparation. Excluded from test

Precision Laboratories
11834 Western Avenue, P.O. Box 915, Garden Grove, California 92642-0915 (714) 891-7832

LABORATORY MATERIAL REQUIREMENTS

UNSUPPORTED SEAMS (PVC, HDPE, etc.)

A minimum of 1 foot of seam with 6 inches of liner material on each side of the seam. There should also be a minimum of 2 inches of overlap between top and bottom sheets for HDPE samples. There should be a minimum of 6 inches of overlap for PVC samples.

SUPPORTED SEAMS (Hypalon, Dynaloy, etc.)

A minimum of 2 1/2 feet of seam with 6 inches of liner material on each side of the seam. There should also be a minimum of 6 inches overlap between top and bottom sheets for all supported materials.

SPECIMEN SIZE

SHEAR TEST-UNSUPPORTED MATERIAL: one inch wide strips.

SHEAR TEST-SUPPORTED MATERIAL: four inch wide strips

PEEL TEST-ALL MATERIAL: one inch wide strips