APPENDIX
B

APPENDIX B

GEOTECHNICAL TEST RESULTS

IN-PLACE DENSITY TEST RESULTS
MOISTURE DENSITY RELATIONSHIP TEST RESULTS
SOIL COVER PERMEABILITY TEST RESULTS

SERGENT, HAUSKINS & BECKWITH CONSULTING GEOTECHNICAL ENGINEERS
SOIL & FOUNDATION ENGINEERING • ENGINEERING GEOLOGY • HYDROGEOLOGY
MATERIALS ENGINEERING • MATERIALS TESTING • ENVIRONMENTAL SERVICES

November 21, 1989

United Nuclear Corporation
P.O. Drawer QQ
Gallup, New Mexico 87301

SHB Job No. C89-5034
Revision No.1

Attention: Mr. Charles G. Johnson

Re: Churchrock Reclamation Project
Churchrock, New Mexico

Gentlemen:

Our final summary report on the referenced project concerning the interim clay radon barrier and underlying subbase fill placement on the north tailings cell at United Nuclear Corporation's Churchrock (UNC) mining operation is herewith submitted. The results of all testing and inspection performed during construction are attached. Persons involved over the course of this coordinated effort included:

David MacKenzie/Rick Roth - Sergent, Hauskins & Beckwith (SHB)
Matt Yovich - Canonie Environmental
Bruce Berry - Contractor Superintendent (Nielson's)
James Fletcher - UNC Mining Engineer at Churchrock

The primary objective of this work was to reclaim any and all radioactive contaminated soils that may have been wind-scattered, place the material at the bottom of the disposal cell (insofar as practical) and backfill the cell to a pre-designed "line and grade" which would subsequently receive a one-foot thick "interim" radon gas-attenuating barrier.

1959-1989 SHB 30 YEARS OF SERVICE

REPLY TO: 4700 LINCOLN ROAD, N.E., ALBUQUERQUE, NEW MEXICO 87109

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FAX 272-7239	FAX 620-6622	FAX 884-1694	FAX 438-7156	FAX 266-0727	FAX 562-7739	FAX 331-4153

To comply with project specifications established by Canonie Environmental, and approved by the Nuclear Regulatory Commission (NRC), SHB was contracted to perform full-time in-place density testing services on the fill materials, as well as the clay barrier, and also sample and perform specified tests on the materials comprising these two cross-sections. SHB also observed methods employed by Nielson's, as well as any unusual or detrimental circumstances (i.e. adverse weather, changes in material, methodology of placement, etc.) which could adversely impact project progress or quality of the work and reported these observations to UNC. SHB has a field trailer on-site to assist in our testing efforts.

Specifications governing material placement were as follows:

Subbase fill materials - the top foot was compacted to a minimum of 90 percent of maximum dry density as determined by ASTM D698

1 foot clay barrier - compacted to a minimum of 95 percent of maximum dry density as determined by ASTM D698 with soil moisture, at time of compaction, being no less than optimum and no higher than 2 percent above optimum of the material being placed.

All field density testing was performed using either a nuclear densometer (ASTM D2922) or by sand cone methods (ASTM D1556). Earthwork on the project commenced on June 5, 1989 and by mid-July, 1989, the north cell backfilling operation was approaching the designated grade elevations. Upon additional processing and compaction efforts, the subbase fill

materials were ultimately formed to be in compliance with the project specifications.

Placement of the clay cover was initiated during the third week of July beginning in the northern portion of the north cell using material excavated from the north embankment. Placement of the clay cover proceeded southward (using scrapers in an east to west fashion).

Considerable difficulty was being experienced in achieving the required moisture/density requirements. However, by the end of August, after considerable reprocessing and additional compactive efforts, the clay liner was found to be within project specifications.

In summary, it is our opinion that the fill materials and cover placed and compacted during our involvement on-site meet or exceed project plans and specification requirements.

If you have any questions or if we may be of further assistance, please do not hesitate to contact us.

Respectfully submitted,
Sergent, Hauskins & Beckwith Engineers

By _____
Robert E. Grandin
Field and Laboratory Supervisor

Reviewed by _____
Robert D. Booth, P.E.

REG:vr

Copies: Addressee (2)

David MacKenzie
Engineering Technician
Sergent, Hauskins & Beckwith
Geotechnical Engineers

AREAS OF EXPERTISE

- Field soil compaction control
- Concrete, mortar, and/or grout sampling and testing
- Field control of asphalt paving operations
- Laboratory analysis of soils and rock aggregate
- Reinforcing steel observation
- Quality control testing and observation at remote project sites

EDUCATION Engineering Curriculum (sophmore status)
University of New Mexico

YEARS OF EXPERIENCE - 4

CERTIFICATIONS - ACI Concrete
Seaman Nuclear Corporation

REPRESENTATIVE PROJECTS

Academy Boulevard
Road, Water & Sewer Rehab.
Albuquerque, New Mexico

Womens Correctional Facility
Grants, New Mexico

Pojoaque Water Reservoir
Pojoaque, New Mexico

Special Assessment District #218
Albuquerque, New Mexico

Churchrock Uranium
Tailings Reclamation
Churchrock, New Mexico

Neutral Particle Beam/
Microwave Laboratory
Kirtland AFB, New Mexico

Antelope Run Subdivision
Albuquerque, New Mexico

Richard Roth
Engineering Technician
Sergent, Hauskins & Beckwith
Geotechnical Engineers

AREAS OF EXPERTISE

- Concrete sampling and field testing
- Reinforcing steel placement observations
- Soil/asphalt compaction testing
- Soils analysis (proctors, gradations, Atterberg limits)
- Asphalt testing and placement observations
- Quality Control Testing at remote project sites

YEARS OF EXPERIENCE - 6

CERTIFICATIONS - NICET Level II (Soils and Concrete)

REPRESENTATIVE PROJECTS

150 Public Rental Units
Window Rock, Arizona

Radiation Hardened Integrated Circuit Facility
Kirtland Air Force Base
Albuquerque, New Mexico

Navajo Indian Housing
Window Rock, Arizona

Junior High School Addition
Taos, New Mexico

Grindstone Canyon Dam
Ruidoso, New Mexico

Tailings Dam-Gold Fields Mining Corporations
Cerrillos, New Mexico

Espanola Hospital-Phase 2
Espanola, New Mexico

Smith Lake Housing 15-62
Smith Lake, Arizona

Villa Caballero
Santa Fe, New Mexico

State Office Building
Phase 2
Santa Fe, New Mexico

College Plaza South
Santa Fe, New Mexico

Richard Roth
Engineering Technician
Sergent, Hauskins & Beckwith
Geotechnical Engineers

Mutual Help Housing
Tuba City, Arizona

Central Guard Facility
Los Alamos, New Mexico

El Dorado Hotel
Santa Fe, New Mexico

La Quinta Motor Inn
Santa Fe, New Mexico

Police Administration Bldg.
Santa Fe, New Mexico

PNM Santa Fe Service Center
Santa Fe, New Mexico

SEAMAN NUCLEAR CORPORATION

7315 South First Street
Oak Creek, Wisconsin 53154-2095

HEREBY CERTIFIES THAT ON

APRIL 19, 1986

RICHARD J. ROTH

HAS SUCCESSFULLY COMPLETED THE FACTORY PRESCRIBED RADIOLOGICAL SAFETY TRAINING COURSE, THEORY, MAINTENANCE, AND OPERATION OF THE SEAMAN NUCLEAR SERIES OF NUCLEAR METERS.

THIS FURTHER ATTESTS THAT THE ABOVE NAMED HAS MET ALL THE REQUIREMENTS OF ACCURACY IN TESTING SOILS, AGGREGATES, CONCRETES, ASPHALTIC CONCRETES, AND/OR ROOFING MOISTURE.

IN TESTIMONY WHEREOF, THIS CERTIFICATE HAS BEEN ISSUED BY AUTHORITY OF THE CORPORATION.

W. E. Rice, Jr.
XXXXXXXXXXXXXXXX Licensed Instructor

Donald J. Seaman
PRESIDENT

SERGENT, HAUSKINS & BECKWITH CONSULTING GEOTECHNICAL ENGINEERS

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ALBERT C. RUCKMAN, P.E.
PAUL KAPLAN, P.E.

June 22, 1989

United Nuclear Corporation
P.O. Drawer QQ
Gallup, New Mexico 87301

SHB Job No. C89-5034

Attention: Charles G. Johnson

FIELD DENSITY TESTS

Project: 1989 Reclamation Work
Church Rock Uranium Mill

Test dates: June 5 through June 9, 1989
Moisture-density curve #1348: Max. density 115.5 pcf @ 13.4% optimum moisture
#1350: Max. density 113.2 pcf @ 13.3% optimum moisture
#1364: Max. density 114.7 pcf @ 10.1% optimum moisture
#1366: Max. density 113.7 pcf @ 14.0% optimum moisture
#1437: Max. density 112.2 pcf @ 12.8% optimum moisture

Original ground prep, fill

Test No.	Location & Elevation	% Moisture	Dry Density (pcf)	Maximum Density (pcf)	% Compaction	% Compaction Required	
1	74860 N and 59080 E, OGP	11.5	115.7	113.2	102	95	- HAUL RD
2 *	74860 N and 59080 E, OGP	8.7	116.8	113.2	103	95	- HAUL RD
3	75000 N and 59200 E, OGP	12.7	110.0	113.2	97	95	
4	75190 N and 59300 E, OGP	12.8	107.5	113.2	95	95	HAUL RD
Test date: June 6, 1989							
5	75230 N and 59390 E, OGP +1.0'	14.8	113.2	113.7	100	95	
6 *	75230 N and 59390 E, OGP +1.0'	16.1	111.9	113.7	98	95	
7	75090 N and 59290 E, OGP +1.0'	10.7	110.2	113.7	97	95	
8	75400 N and 59470 E, OGP	8.2	106.3	112.2	95	95	
9	75400 N and 59470 E, OGP +1.0'	13.1	115.8	113.7	102	95	
10	74700 N and 58950 E, OGP +1.0'	11.5	114.8	113.7	101	95	

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Test No.	Location & Elevation	% Moisture	Dry Density (pcf)	Maximum Density (pcf)	% Compaction	% Compaction Required
11*	74700 N and 58950 E, OGP +1.0'	10.9	116.1	113.7	102	95
Test date: June 7, 1989						
12	75140 N and 59325 E, OGP +2.0'	15.5	108.2	113.7	95	95
13	57250 N and 59400 E, OGP +1.0'	14.3	114.2	113.7	100	95
14	75030 N and 59225 E, OGP +2.5'	12.1	115.3	113.7	101	95
15	75190 N and 59240 E, OGP +3.0'	13.0	114.0	113.7	100	95
16	75400 N and 59470 E, OGP +3.0'	12.5	114.2	113.7	100	95
17 *	75400 N and 59470 E, OGP +3.0'	14.6	105.5	113.7	93	95
18	75400 N and 59470 E, OGP +4.0'	13.1	113.4	113.7	100	95
19	74685 N and 58915 E, OGP +4.0'	14.4	109.7	113.7	97	95
20	74760 N and 58890 E, OGP +5.0'	13.0	112.2	113.7	99	95
21 *	74760 N and 58890 E, OGP +5.0'	12.0	121.6	113.7	104	95
22	74660 N and 58910 E, OGP +6.0	12.4	114.1	113.7	100	95
Test date: June 8, 1989						
23	75400 N and 59470 E, OGP +5.5'	11.8	117.2	115.5	101	95

Test No.	Location & Elevation	% Moisture	Dry Density (pcf)	Maximum Density (pcf)	% Compaction	% Compaction Required
24	Tailings pile at D-5, FSG -8.0'	5.0	115.5	---	---	---
25	Tailings pile at F-9, FSG -6.0'	11.4	116.7	---	---	---
26	Tailings pile at I-14, FSG -7.5'	4.6	105.6	---	---	---
27	Tailings pile at F-14, FSG -3.5'	9.1	106.3	---	---	---
28	74690 N and 58930 E, OGP +7.0'	6.0	111.6	114.7	97	95
29 *	74690 N and 58930 E, OGP +7.0'	6.1	109.7	114.7	92	95
Test date: June 9, 1989						
30	74610 N and 58740 E, OGP	9.0	109.9	114.7	96	95
31	74600 N and 58720 E, OGP +1.0'	4.0	108.5	114.7	95	95
32	74590 N and 58740 E, OGP +2.0'	10.1	111.7	114.7	97	95

* Sand Cone Method

Robert R. Randall

RR/pa

Copies: Addressee (2)

89-3334 Cowell Ph. Uranium Mine June 5-9, 1989

Mon. DSP was done on area between the Toe Dam and the W. Embankment. Filling of this area for Haul Road began.

Tues. Filling continued on the Haul Road using fill material cut from the W. Embankment.
DSP was done on the ditch on the S. side of the Toe Dam where the Haul Road will cross. This was done on a snow material and a water sample was collected.
Two lifts were then placed on this area; one with material from the W. Embankment, the other with material from the Toe Dam.

Wed. Filling of ditch on the S. side of the Toe Dam was done to completion today. Haul Road was near grade at the N. end.
In afternoon filling work was concentrated at the S. end of the Haul Road where it goes up hill to meet the Central Haul Road.

Thur. Only one lift at the Toe Dam and one on the hill were placed today. Immediate supply of fill material was exhausted and a borrow area was not designated until Fri.
Matt Yovich, Cameco rep, requested that

four tests be taken on the tailings at designated areas. These were done, Matt has results.

Fri. Only work done on Haul Road today was on the berm at the W. end of the Central Haul Road OGP and two lifts were done. Work ended early (3:00).

Four of the six sand cone tests taken this week diverged significantly from the nuclear machine readings. Three of the tests were above the machine reading (5% to 8%) and one was below (3%). The other two tests were within normal range.

The problems were found to be: 1.) a sand density at least 3 lbs. too high; 2.) possible moisture in the sand, causing "sticking" in the cone + bottle; 3.) possible sticking of the scale.

The sand density was recalibrated. The scale will be replaced. Moisture tests will be run on the sand to determine if "sticking" was taking place in the test equipment

(Sand Cone Method)

Project: Church Rd U. Plins Project No. 89-5034

Client UNC Req. By —

(A) Sand Density 82.9 PCF, Technician R Roth Date 6-5-89 Mon

Test No.						
Material, Location & Remarks	Correlation w/ Test #1 6-5-89 #SC-1 J					
Sand Jar No.						
(B) Initial Wt.	5442.0					
(C) Final Wt.	1896.0					
(D) Wt. Sand Used	3546.0 / 2.916					
(E) Total Sand Vol.	0.0953					
(F) Cone/Plate Vol	0.0404					
(G) Net Hole Vol.	0.0549					
Sample Can No.						
(H) Tare Wt.	206.0					
(I) Wet Wt. & Tare	3371.0					
(J) Wet Sample Wt.	3165.0 / 1.9975					
(K) Wet Density, PCF	127.0					
Moisture Method		oven		oven		oven		oven		oven
Moisture Pan No.										
(P) Tare Wt.	206									
(N) Wet Wt. & Tare	3371									
(O) Dry Wt. & Tare	3119									
(R) Water Wt.	252.0									
(S) % Moisture	8.7									
(T) Dry Density, PCF	116.8									
Proctor Curve No.	#1350									
(U) Max. Dry Density	113.3									
(V) % Compaction	103									

Computations: D=B-C, E=D/A, G=E-F, K=J-H, L=K/G, R=N-P
S=(R/(P-M))100, T=L/(1+(S/100)), V=(T/U)100

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ROBERT L. FREW
ALLON C. OWEN, JR., P.E.

DAILY INSPECTION REPORT

Job No. 89-5034 Report No. — Date 6-5-89 Mon

Project Church Rk Un. Mine

Location Church Rk Nm

Client UNC

Contractor Nielson's

Superintendent Bruce Berry

Weather Pt/cy (Wy & Wm

Travel Time 3 Time Arrived 10:00 Time Left 4:00 Total Time 9.0

REMARKS O&P and fill work for haul road began on the area between the W. embankment & the Tow Dam. Last Fri OB was ripped watered & covered w/ thin lift of material from the W. embankment (WEm) to hold the moisture. Rolling w/ sheepsfoot was done this morning.

Three nuclear tests were taken on flat-cut areas. All three tests passed, but moisture was up 1-8% below optimum & all moistures were below optimum. A sand-cone test was done on the same spot as nuclear test #1.

In the afternoon contractor continued watering & filling w/ material from the WEm. Material is being placed in 3 to 4 in. lifts. Tests will be taken every 8 to 12 inches.

Sand cone test came out very high (116%). There was a fairly strong wind blowing @ the time, and may of effective shielding so [illegible].

Inspector [signature]

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(Sand Cone Method)

ject: Church Rk Ill. Mine Project No. 89-5034

ent UNC Req. By —

A) Sand Density 82.9 PCF, Technician R. Roth Date 6-6-89 Tues

Test No.										
Material, Location & Remarks	Correlation w/ Test #1 6-6-89 SC-2 6									
Sand Jar No.	—									
Initial Wt.	5176.0									
) Final Wt.	1739.0									
` Wt. Sand Used	3437.0/2537									
, Total Sand Vol.	0.092									
` Cone/Plate Vol	0.0404									
Net Hole Vol.	0.052									
Sample Can No.	—									
Tare Wt.	206.0									
T) Wet Wt. & Tare	3272.0									
Wet Sample Wt.	3066.0/2330									
) Wet Density, PCF	130.0									
Moisture Method		oven		oven		oven		oven		oven
Moisture Pan No.										
Tare Wt.	206.0									
N) Wet Wt. & Tare	3272.0									
Dry Wt. & Tare	2846.0									
), Water Wt.	426.0									
` % Moisture	16.1									
, Dry Density, PCF	111.9									
Proctor Curve No.	1366									
Max. Dry Density	113.2									
7) % Compaction	98									

omputations: D=B-C, E=D/A, G=E-F, K=J-H, L=K/G, R=N-P
S=(R/(P-M))100, T=L/(1+(S/100)), V=(T/U)100

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(Sand Cone Method)

Project: Church Rd Ur. Maine Project No. 89-5034

Client: LINC Req. By

(A) Sand Density 82.9 PCF, Technician R. Pate Date 6-6-89 Tues

Test No.										
Material, Location & Remarks	Correlation w/ Test #5 6-6-89 SC-3									
Sand Jar No.										
) Initial Wt.	5329.0									
L) Final Wt.	1582.0									
) Wt. Sand Used	3747.0 / 8.261									
) Total Sand Vol.	0.1007									
) Cone/Plate Vol	0.0404									
) Net Hole Vol.	0.0603									
Sample Can No.										
) Tare Wt.	329.0									
J) Wet Wt. & Tare	3854.0									
) Wet Sample Wt.	3525 / 7.771									
L) Wet Density, PCF	128.8									
Moisture Method		oven		oven		oven		oven		oven
Moisture Pan No.										
) Tare Wt.	329.0									
N) Wet Wt. & Tare	1070.0									
) Dry Wt. & Tare	997.0									
) Water Wt.	73.0									
) % Moisture	10.9									
) Dry Density, PCF	116.1									
Proctor Curve No.	1366									
) Max. Dry Density	113.7									
V) % Compaction	102									

Computations: D=B-C, E=D/A, G=E-F, K=J-H, L=K/G, R=N-P
S=(R/(P-M))100, T=L/(1+(S/100)), V=(T/U)100

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NORMAN H WETZ, P E
ROBERT L FREW
ALLON C OWEN, JR, P E

DAILY INSPECTION REPORT

Job No. 89-5034 Report No. — Date 6-6-89 Tues

Project Church Rk Va. Mine

Location Church Rk NM

Client UNC

Contractor Nielson's

Superintendent Bruce

Weather Sunny & Warm

Travel Time 1 Time Arrived 7:30 Time Left 5:00 Total Time 10.5

REMARKS Haul road filling continued w/ material from the W. embankment (W. Em). The second lift was placed on all but the S end of the haul road fill area.

OGP was done on the drainage ditch at the base of the Toe Dam (S side) where the haul road will cross. This is new material and a proctor sample was collected. Test looked good so the first lift of fill was also placed on this area. Later in the day a third lift was placed w/ material from the Toe Dam, but it was not compacted.

Despite very careful procedure, w/ Economic rep watching, sand cones are still giving high readings. Rough calibration of the sand indicates weight being used is too high. Careful calibration will be done in the morning.

Inspector [signature]

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(Sand Cone Method)

Project: Church Rk Un. Min. Project No. 89-5034

Client: UNOC Req. By

(A) Sand Density 82.9 PCF, Technician K. Roth, Date 6-7-89 Wed.

Test No.						
Material, Location & Remarks	Correlation w/ Test #5 6-7-89 SC-4 17					
Sand Jar No.						
) Initial Wt.	5216.0					
L) Final Wt.	1690.0					
Wt. Sand Used	3526.0/=.7223					
) Total Sand Vol.	0.0548					
) Cone/Plate Vol	0.0404					
, Net Hole Vol.	0.0544					
Sample Can No.						
Tare Wt.	329.0					
I) Wet Wt. & Tare	3312.0					
Wet Sample Wt.	2983.0 6.37%					
L) Wet Density, PCF	120.9					
Moisture Method		oven		oven		oven		oven		oven
Moisture Pan No.										
Tare Wt.	329.0									
N) Wet Wt. & Tare	1081.0									
Dry Wt. & Tare	985.0									
) Water Wt.	36.0									
% Moisture	14.6									
) Dry Density, PCF	105.5									
Proctor Curve No.	1356									
) Max. Dry Density	113.7									
W) % Compaction	93									

Computations: D=B-C, E=D/A, G=E-F, K=J-H, L=K/G, R=N-P
S=(R/(P-M))100, T=L/(1+(S/100)), V=(T/U)100

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ROBERT L FREW
ALLON C OWEN, JR, P E

DAILY INSPECTION REPORT

Job No. 89-5034 Report No. — Date 6-7-89 Wed.

Project Church Rk Vr. Mine

Location Church Rk NM

Client UNC

Contractor Nielsons

Superintendent Bruce

Weather Sunny & Warm

Travel Time 1 Time Arrived 7:15 Time Left 5:15 Total Time 10.75

REMARKS Filling on haul road continued today. Ditch on S. side of Toe Dam is almost filled; road is near grade at N. end.

In afternoon work was concentrated at S. end of road where it goes up hill. This area was filled to take out "sag" & level roadway.

Fill materials were taken from the W. embankment, the W embankment/central haul road area, and the Toe dam (to fill the ditch - one lift only today).

Sand cones are still off & recalibrated sand this morning. Weight is at least 3 lbs lighter than office calibration. First SC test matched nuclear machine closely. Afternoon test came over 7 lbs/ft³ lighter than machine for wet wt. Afternoon SC test was observed by Tim Fletcher & Matt Yovich.

Have run out of ideas to fix problem.

Inspector P L Roth

REPLY TO 4700 LINCOLN ROAD, N.E., ALBUQUERQUE, NEW MEXICO 87109

PHOENIX (602) 272-6848 ALBUQUERQUE (505) 884-0950 SANTA FE (505) 471-7836 SALT LAKE CITY (801) 566-5411 EL PASO (915) 778-3369

(Sand Cone Method)

-ject Church Rd Ur Mine Project No. 89-5034

ent UWC Req. By —

) Sand Density 82.9 PCF, Technician P. Roth Date 6-7-89 Wed

Test No.						
Material, Location & Remarks	Correlates w/ Test #8 5-7-89 SC-5 21					
Sand Jar No.						
Initial Wt.	5481.0					
) Final Wt.	1869.0					
Wt. Sand Used	3612.0/2363					
, Total Sand Vol.	0.0871					
Cone/Plate Vol	0.0404					
, Net Hole Vol.	0.0567					
Sample Can No.						
Tare Wt.	276.0					
) Wet Wt. & Tare	3541.0					
Wet Sample Wt.	3535.0/2351					
) Wet Density, PCF	132.8					

Moisture Method		oven		oven		oven		oven		oven
Moisture Pan No.										
Tare Wt.	106.0									
) Wet Wt. & Tare	1062.0									
Dry Wt. & Tare	970.0									
) Water Wt.	92.0									
% Moisture	12.0									
, Dry Density, PCF	121.6									
Proctor Curve No.	1366									
Max. Dry Density	113.7									
) % Compaction	104									

mputations: D=B-C, E=D/A, G=E-F, K=J-H, L=K/G, R=N-P
S=(R/(P-M))100, T=L/(1+(S/100)), V=(T/U)100

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ALLON C. OWEN, JR., P.E.

DAILY INSPECTION REPORT

Job No. 89-5034 Report No. — Date 6-8-89 Thur.

Project Church Rk Uc. Mine

Location Church Rk NM

Client UNC

Contractor Nielsons

Superintendent Bruce

Weather Sunny + Warm

Travel Time 1 Time Arrived 7:30 Time Left 4:05 Total Time 8½

REMARKS Only light work was done on the haul road today. One lift was placed in the ditch on the S. side of the tailings dam + one lift was placed on the S. end of the haul road at the base of the hill. Immediate supply of fill material is exhausted + new area for borrow hasn't been OK'd.

Sand cones still don't match nuclear machine. One SC test was done on a different material than others; resulting wet density was below nuclear machine. Bob Franklin has been given all recorded data to date.

Matt Yovich, Cameron rep, requested that four nuclear tests be taken on the tailings (to get wet densities). Holes were cut at designated locations by the contractor + tests were made. Results were recorded by Matt Yovich.

Inspector [signature]

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(Sand Cone Method)

ject Thunder Ridge Mine Project No. 89-5034

ent LINC Req. By —

) Sand Density 82.9 PCF, Technician P. Roth Date 6-8-89 Thur.

Test No.										
Material, Location & Remarks	Correlates w/ Test #6 6-8-89 SC-6 D1									
Sand Jar No.										
Initial Wt.	5511.0									
) Final Wt.	1648.0									
Wt. Sand Used	3863 / 5.543									
, Total Sand Vol.	0.1039									
Cone/Plate Vol	0.0404									
Net Hole Vol.	0.0635									
Sample Can No.										
Tare Wt.	206.0									
) Wet Wt. & Tare	3426.0									
Wet Sample Wt.	3220.0 / 2.099									
) Wet Density, PCF	111.9									
Moisture Method		oven		oven		oven		oven		oven
Moisture Pan No.										
Tare Wt.	206.0									
) Wet Wt. & Tare	3426.0									
Dry Wt. & Tare	3240.0									
) Water Wt.	186.0									
% Moisture	6.1									
, Dry Density, PCF	109.7									
Proctor Curve No.	1364									
Max. Dry Density	114.7									
) % Compaction	92									

omputations: D=B-C, E=D/A, G=E-F, K=J-H, L=K/G, R=N-P
S=(R/(P-M))100, T=L/(1+(S/100)), V=(T/U)100

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DAILY INSPECTION REPORT

Job No. 89-5034 Report No. — Date 6-9-89 Fri

Project Church Rk Ur. Mine

Location Church Rk NM

Client UNC

Contractor Nielson's

Superintendent Bruce

Weather Sunny/Hot

Travel Time 2 3/4 Time Arrived 7:25 Time Left 4:00 Total Time 11:25

REMARKS Very little work was done on the haul road area today. OGR 5 times lifts were done on the burn at the W. end of the central haul road. Material was met at top of embankment & then pushed over the edge and placed with a dozer. Moisture fluctuated, but to be passed.

UNC wants all available fill material used before any borrow is brought in.

Starting Monday fill material for haul road will be taken from embankment (54 lift & up to 300') S. of Central haul road.

Inspector [signature]

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PAUL KAPLAN, P.E.

June 22, 1989

United Nuclear Corporation
P.O. Drawer QQ
Gallup, New Mexico 87301

SHB Job No. C89-5034

Attention: Mr. Charles G. Johnson

FIELD DENSITY TESTS

Project: 1989 Reclamation Work
Church Rock Uranium Mill

Test dates: June 12 through June 15, 1989

Moisture-density curve #1364: Max. density 114.7 pcf @ 10.1% optimum moisture
#1366: Max. density 113.7 pcf @ 14.0% optimum moisture

Original ground prep., fill

Test No.	Location & Elevation	% Moisture	Dry Density (pcf)	Maximum Density (pcf)	% Compaction	% Compaction Required
Test date: June 12, 1989						
33	74590 N and 58730 E, OGP	8.0	108.8	114.7	95	95
34	74835 N and 58985 E, OGP +7.0'	13.3	115.0	113.7	101	95
35	75050 N and 59200 E, OGP +3.0'	12.5	114.4	113.7	101	95
36 *	75050 N and 59200 E, OGP +3.0'	12.7	115.0	113.7	101	95
37	75310 N and 59460 E, OGP +3.0'	15.0	112.6	113.7	99	95
Test date: June 13, 1989						
38	74690 N and 58910 E, OGP +8.0'	8.3	110.6	114.7	96	95
39	74900 N and 59140 E, OGP +4.5'	7.7	112.6	114.7	98	95
40 *	74900 N and 59140 E, OGP +4.5'	6.8	119.4	114.7	104	95

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Test No.	Location & Elevation	% Moisture	Dry Density (pcf)	Maximum Density (pcf)	% Compaction	% Compaction Required
41	75190 N and 59360 E, OGP +4.0'	8.7	116.2	114.7	101	95
42	75310 N and 59470 E, OGP +3.0'	12.9	113.4	113.7	100	95
Test date: June 14, 1989						
43	75250 N and 59375 E, OGP +4.0'	13.9	110.2	113.7	97	95
44	74860 N and 59060 E, FSG -3.5'	13.8	116.3	113.7	102	95
45 *	74860 N and 59060 E, FSG -3.5'	13.8	118.1	113.7	104	95
46	74680 N and 58920 E, FSG -3.5'	13.5	113.5	113.7	100	95
47	74675 N and 58925 E, FSG -2.5'	13.1	117.2	113.7	103	95
48	74850 N and 59060 E, FSG -2.5'	8.0	114.3	114.7	100	95
49	75300 N and 59425 E, FSG -0.5'	10.5	117.0	113.7	103	95
50 *	75300 N and 59425 E, FSG -0.5'	10.7	116.3	113.7	102	95
51	74680 N and 58925 E, FSG -1.5'	9.1	112.7	114.7	98	95
52	74840 N and 59055 E, FSG -1.5'	10.3	114.2	114.7	100	95
53	75075 N and 59240 E, FSG -0.5'	9.1	111.6	114.7	97	95

Test No.	Location & Elevation	% Moisture	Dry Density (pcf)	Maximum Density (pcf)	% Compaction	% Compaction Required
54	74770 N and 59000 E, FSG -0.5'	8.6	113.5	114.7	99	95
55 *	74770 N and 59000 E, FSG -0.5'	9.3	117.5	114.7	102	95

* Sand Cone Method

Robert E. Chandler

RR/pa

Copies: Addressee (2)

Church Pl. Ur. Hline 89-5034 June 12-16, 1989

Mon. First half of morning was spent hauling over material to the pond area from the N. side of the site.
One complete lift was placed on the East Road and part of a second lift was started. Work was also started on the berm at the W. end of the Central East Road.

Tues. Contractor worked on the East Road all day. One complete lift was placed and most of a second lift.
Sand for sand cones was recalibrated according to ASTM D-1556 procedure. Sand weight now being used is 82.0 PCF. Cone and plate were also recalibrated.
All previous sand cone tests were then recalculated. Results are now more in line with another machine test.

Wed. Filling continued on East Road. N. end was near FSL by end of the work day. S. end was backing up to 3 ft.
Proctor check point was done on soil at N. end of East Road. (See 5C-10 and Test #6, 6-14-89) Weight was within range of proctor curve.

Thur. Fill on Haul Road was brought to within ½ ft. of FSG. Contractor's plan was to do final spot filling and final grading and compaction on Fri.

Fri. No work was done on Haul Road while I was on site. Contractor worked at removing large fill from center of site.

Jim Fletcher and me home at approx. noon.

Sand cone tests are now correlating with nuclear tests better than last week, although matching of numbers isn't perfect.

(Sand Cone Method)

Project: Church Rk. Ur. Mine Project No. 89-5034

Client: UNC Req. By: —

(A) Sand Density 82.0 PCF, Technician R. Roth Date 6-12-89 Mon

Test No.						
Material, Location & Remarks	Correlates w/ Test #3 6-12-89 SC-7 Sg					
Sand Jar No.						
Initial Wt.	5358.0					
(C) Final Wt.	1694.0					
Wt. Sand Used	3664.0/5.028					
(E) Total Sand Vol.	0.097					
(F) Cone/Plate Vol	0.0404					
(G) Net Hole Vol.	0.058					
Sample Can No.						
Tare Wt.	702.0					
(T) Wet Wt. & Tare	3619.0					
Wet Sample Wt.	3417.0/7.533					
(L) Wet Density, PCF	129.6					
Moisture Method		oven		oven		oven		oven		oven
Moisture Pan No.										
Tare Wt.	702.0									
(N) Wet Wt. & Tare	3619.0									
Dry Wt. & Tare	3234.0									
(K) Water Wt.	385.0									
% Moisture	12.7	12.5								
(V) Dry Density, PCF	115.0									
Proctor Curve No.	1366									
Max. Dry Density	113.7									
(U) % Compaction	101	101								

Computations: D=B-C, E=D/A, G=E-F, K=J-H, L=K/G, R=N-P
S=(R/(P-M))100, T=L/(1+(S/100)), V=(T/U)100

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DAILY INSPECTION REPORT

Job No. 69-5034 Report No. — Date 6-12-89 Mon

Project Church Rk Ur Mine

Location Church Rk NM

Client UNC

Contractor Nielson's

Superintendent Bruce Berry

Weather Sunny & Warm in morning; Overcast & windy by late afternoon

Travel Time 3 Time Arrived 7:55 Time Left 4:15 Total Time 11.25

REMARKS First half of morning was spent hauling cover material to pond area from the N. side of site.

By mid-morning work began on Haul Road using fill material from S. of the Central Haul Road. One lift was placed on entire fill area and a second lift was begun. One lift was placed on the berm to the W. of the borrow area.

Three nuclear tests & a sand cone were taken on today's fill on the Haul Road; all passed. One test was taken on berm; it, too, passed, but moisture was low, SC wet density was above machine density, by 5.7 lbs/ft³ and final compaction was 105% (compared to 96% on the machine

Inspector [signature]

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(Sand Cone Method)

ject Church Rk Un. Mine Project No. 89-5034

ent UMC Req. By —

) Sand Density 82.0 PCF, Technician R Roth Date 6-13-89 Tues

Test No.						
Material, Location & Remarks	Correlates w/ Test #2 6-13-89 SC-8 40					
Sand Jar No.						
Initial Wt.	5399.0					
) Final Wt.	1935.0					
Wt. Sand Used	3464.0 / 7.637					
, Total Sand Vol.	0.093					
Cone/Plate Vol	0.0404					
, Net Hole Vol.	0.053					
Sample Can No.						
Tare Wt.	202.0					
) Wet Wt. & Tare	3252.0					
Wet Sample Wt.	3050.0 / 6.724					
) Wet Density, PCF	127.5					

Moisture Method		oven		oven		oven		oven		oven
Moisture Pan No.										
Tare Wt.	202.0									
) Wet Wt. & Tare	3252.0									
Dry Wt. & Tare	3059.0									
) Water Wt.	193.0									
% Moisture	6.8	2.7								
, Dry Density, PCF	119.4									
Proctor Curve No.	1364									
, Max. Dry Density	114.7									
) % Compaction	104	38								

mputations: D=B-C, E=D/A, G=E-F, K=J-H, L=K/G, R=N-P
S=(R/(P-M))100, T=L/(1+(S/100)), V=(T/U)100

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ROBERT L FREW
ALLON C OWEN, JR, P E

DAILY INSPECTION REPORT

Job No. 89-5034 Report No. — Date 6-13-89 Tues

Project Church Rk Ur. Mine

Location Church Rk NM

Client UNC

Contractor Nielsons

Superintendent Bruce Berry

Weather Mostly Sunny + Warm

Travel Time 1 Time Arrived 7:30 Time Left 4:30 Total Time 10.0

REMARKS Filling continued on Haul Road using material from S. of the Central Haul Road. One full lift was placed + the better part of a second was started.

Sand for sand cone was recalibrated using ASTM D-1557 method. Cone + plate were also recalibrated. Sand is 87.0 lb/ft³. Cone is 0.0404 ft³ (from 0.0419 ft³). 22 SC tests were then recalibrated.

Inspector [signature]

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(Sand Cone Method)

Project Church Pk Hr. [illegible] Project No. [illegible]

Client [illegible] Req. By —

(A) Sand Density 82.0 PCF, Technician [illegible] Date 6-14-89 [illegible]

Test No.										
Material, Location & Remarks	Corrected w/ Test #2 6-14-89 SC-9 45									
Sand Jar No.										
) Initial Wt.	[illegible]									
C) Final Wt.	1823.0									
) Wt. Sand Used	3591.0/7.917									
) Total Sand Vol.	0.097									
) Cone/Plate Vol	0.0404									
) Net Hole Vol.	0.056									
Sample Can No.										
) Tare Wt.	326.5									
T) Wet Wt. & Tare	3749.0									
) Wet Sample Wt.	[illegible]/7.545									
L) Wet Density, PCF	134.4									
Moisture Method		oven		oven		oven		oven		oven
Moisture Pan No.										
) Tare Wt.	326.5									
N) Wet Wt. & Tare	3749.0									
) Dry Wt. & Tare	3335.0									
K) Water Wt.	414.0									
) % Moisture	13.8	13.8								
) Dry Density, PCF	118.1									
Proctor Curve No.	1366									
) Max. Dry Density	113.2									
W) % Compaction	104	102								

Computations: D=B-C, E=D/A, G=E-F, K=J-H, L=K/G, R=N-P
S=(R/(P-M))100, T=L/(1+(S/100)), V=(T/U)100

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ALLON C OWEN, JR, P E

DAILY INSPECTION REPORT

Job No. 89-5034 Report No. —— Date 6-14-89 Wed.

Project Church Rk Ur.

Location Church Rk NM

Client UNC

Contractor Nielson's

Superintendent Bruce Berry

Weather Sunny & warm

Travel Time 1 Time Arrived 7:30 Time Left 4:30 Total Time 10:0

REMARKS Filling continued on Haul Road. N. end of road was brought to FSL today. Middle and S end lacked less than 3 ft to reach FSL. Two sand cone tests were done today. Both turned out within modeling range of nuclear machine.

Check point was done on material tested in SC-10 (at "excavation of Canonie rep, Matt Yovich). Point was within one pound of proctor weight for the moisture content.

Inspector [signature]

REPLY TO 4700 LINCOLN ROAD, N.E., ALBUQUERQUE, NEW MEXICO 87109

PHOENIX (602) 272-6848 ALBUQUERQUE (505) 884-0950 SANTA FE (505) 471-7836 SALT LAKE CITY (801) 566-5411 EL PASO (915) 778-3369

(Sand Cone Method)

Project Church Rk Un. Mine Project No. 89-5034

Client UMC Req. By R. Roth

(A) Sand Density 82.0 PCF, Technician R. Roth Date 6-14-89 Wed.

Test No.										
Material, Location & Remarks	Correlates w/ Test #6 6-14-89 SC-10 SD									
Sand Jar No.										
) Initial Wt.	5277.0									
) Final Wt.	1774.0									
Wt. Sand Used	3503.0/7.723									
) Total Sand Vol.	0.094									
Cone/Plate Vol	0.0404									
) Net Hole Vol.	0.054									
Sample Can No.										
Tare Wt.	202.0									
(T) Wet Wt. & Tare	3343.0									
Wet Sample Wt.	3141.0/6.925									
(L) Wet Density, PCF	128.8									
Moisture Method		oven		oven		oven		oven		oven
Moisture Pan No.										
Tare Wt.	202.0									
(N) Wet Wt. & Tare	3343.0									
Dry Wt. & Tare	3039.0									
) Water Wt.	304.0									
% Moisture	10.2	10.5								
) Dry Density, PCF	116.3									
Proctor Curve No.	1366									
Max. Dry Density	113.7									
(V) % Compaction	102	103								

Computations: D=B-C, E=D/A, G=E-F, K=J-H, L=K/G, R=N-P
S=(R/(P-M))100, T=L/(1+(S/100)), V=(T/U)100

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ALLON C OWEN, JR, P E

DAILY INSPECTION REPORT

Job No. 89-5034 Report No. — Date 6-15-89

Project Church Rk U4 Mine

Location Church Rk NM

Client UNC

Contractor Williams

Superintendent Bruce Berry

Weather Sunny & Warm

Travel Time 1 Time Arrived 7:30 Time Left 3:30 Total Time 9

REMARKS Fill on Haul Road was brought to near FSG. Area will be surveyed + final fill will be placed tomorrow.

One sand cone test was done. Results were within acceptable range of nuclear machine.

Inspector [signature]

REPLY TO: 4700 LINCOLN ROAD, N.E., ALBUQUERQUE, NEW MEXICO 87109

PHOENIX (602) 272-6848 ALBUQUERQUE (505) 884-0950 SANTA FE (505) 471-7836 SALT LAKE CITY (801) 566-5411 EL PASO (915) 778-3369

(Sand Cone Method)

ject [illegible] Project No. 89-5034

ent [illegible] Req. By —

A) Sand Density 82.0 PCF, Technician [illegible] Date 6-15-89 [illegible]

Test No.										
Material, Location & Remarks	Correlates w/ Test #4 6-15-89 SC-11 [illegible]									
Sand Jar No.										
Initial Wt.	5277.0									
Final Wt.	1735.0									
Wt. Sand Used	3542.0 [illegible]									
Total Sand Vol.	0.095									
Cone/Plate Vol	0.0404									
Net Hole Vol.	0.055									
Sample Can No.										
Tare Wt.	202.0									
J) Wet Wt. & Tare	3395.0									
Wet Sample Wt.	3193/2.039									
L) Wet Density, PCF	128.4									
Moisture Method		oven		oven		oven		oven		oven
Moisture Pan No.										
Tare Wt.	207.0									
N) Wet Wt. & Tare	3395.0									
Dry Wt. & Tare	3123.0									
Water Wt.	272.0									
% Moisture	9.3	8.6								
Dry Density, PCF	117.5									
Proctor Curve No.	1364									
Max. Dry Density	114.7									
V) % Compaction	102	99								

Computations: D=B-C, E=D/A, G=E-F, K=J-H, L=K/G, R=N-P
S=(R/(P-M))100, T=L/(1+(S/100)), V=(T/U)100

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July 10, 1989

United Nuclear Corporation
P.O. Drawer QQ
Gallup, New Mexico 87301

SHB Job No. C89-5034

Attetion: Mr. Charles G. Johnson

FIELD DENSITY TESTS

Project: 1989 Reclamation Work
Church Rock Uranium Mill

Test dates: July 5 & 6, 1989

Moisture-density curve #1366: Max. density 113.7 pcf @ 14.0% optimum moisture

Tailings fill

Test No.	Location & Elevation	% Moisture	Dry Density (pcf)	Maximum Density (pcf)	% Compaction	% Compaction Required
Test date: July 5, 1989						
56	N end of Haul Road, 45' W of A-10, FSG	6.9	105.7	113.7	93	95
57	Center of Haul Road, 20' W of A-6, FSG	9.3	109.0	113.7	96	95
Test date: July 6, 1989						
58	90% subgrade tailings cover for N cell at E 59520, N 75100, FSG	14.3	115.0	113.7	100	95
59	90% subgrade tailings cover for N cell at E 59580, N 74990, FSG	13.6	110.5	113.7	97	90
60 *	90% subgrade tailings cover for N cell at E 59580, N 74990, FSG, Sand cone taken on 7/5/89	14.0	112.7	113.7	99	90

REPLY TO: 4700 LINCOLN ROAD, N.E., ALBUQUERQUE, NEW MEXICO 87109

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Test No.	Location & Elevation	% Moisture	Dry Density (pcf)	Maximum Density (pcf)	% Compaction	% Compaction Required
61	90% subgrade tailings cover for N cell at E 59870, N 75040, FSG	14.6	112.6	113.7	99	90

* Sand Cone

Robert E. Chandler

DM/pa

Copies: Addressee (2)

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ALLON C. OWEN, JR., P.E.

DAILY INSPECTION REPORT

Job No. C89-5034 Report No. _____ Date 7-5-89

Project CHURCHROCK URANIUM MINE TAILINGS

Location CHURCHROCK, NM

Client UNITED NEUCLEAR CORP.

Contractor NIELSON'S

Superintendent BRUCE

Weather CLEAR & DRY (HOT)

Travel Time _____ Time Arrived 1:00 Time Left 6:00 Total Time _____

REMARKS Upon arrival @ site I met w/ Jim Fletcher & Matt Sowick. I asked them to briefly go over what was happening & where they wanted me to test. They said that the Haul road was pretty close to finish grade, and that it could be tested. The other area to be tested was the fill on top of the N. section of the N. cell. This was to be compacted to 90% density in preparation for an additional 1' of clay to be placed over this entire cell at a later date. ② tests were made on the Haul road, of which one failed (too dry) & one passed. I told Jim & Matt that since the next group of tests would require a sand cone, that I would wait until tomorrow to do this (because of time involved). I also talked w/ Bruce regarding the failure on the Haul road. He said he would scarify its entire length & water it 1st thing in the morning - then wheel-roll until density was achieved.

Inspector David McKenzie

REPLY TO: 4700 LINCOLN ROAD, N.E., ALBUQUERQUE, NEW MEXICO 87109

PHOENIX (602) 272-6848 ALBUQUERQUE (505) 884-0950 SANTA FE (505) 471-7836 SALT LAKE CITY (801) 566-5411 EL PASO (915) 778-3369

BY THE SANDCONE METHOD
D1556-64

JOB NO. C89-5034

PROJECT CHURCH ROCK DATE 7-5-89

LOCATION GALLUP, NM

CLIENT U.N.C. CONTRACTOR NIELSON'S

MATERIAL DENSITY NO. S.C. #12

SAND CALIBRATION:

1. Wt. of Sand + Apparatus _____ lbs.
2. Wt. of Apparatus _____ lbs.
3. Wt. of Sand (1-2) _____ lbs.
4. Vol. of Apparatus _____ cf
5. Unit Wt. of Sand 72.0 pcf
   Yd = (3/4)

SURFACE CALIBRATION:

6. Initial Wt. 4062 _____ lbs.
7. Wt. After 4522 _____ lbs.
8. Wt. of Sand Used (6-7) 3.395 lbs.
   1540

9. Initial Wt. 6062 _____ lbs.
10. Wt. After 2673 _____ lbs.
11. Wt. of Sand 3389 _____ lbs.
12. Wt. of Sand Used (11-8) 1849 4.076 lbs.
13. Vol. of Hole (12/5) 0.0497 pcf

Lab No. #1366

Max. Unit Weight 113.7

Opt. Moisture Content 14.0

14. Sample Can No. _____
15. Wet Wt. of Soil + Tare 2800 _____ lbs.
16. Wt. of Tare — lbs.
17. Wet Wt. 2800 6.173 lbs.
18. Wet Density (17/13) 124.2 pcf
19. Dry Density 112.7 pcf
    Yd = 18/(24 + 100)

MOISTURE CONTENT:

20. Wet Wt. + Tare 2800 gm
21. Dry Wt. + Tare 2541 gm
22. Tare Wt. (#) — gm
23. Wt. of Water 259 gm
24. Moisture 10.2 %
25. % Compaction 99 %
26. % Compaction Required 90 %

REMARKS:

NEUCLEAR TEST
YIELDED A DRY DENSITY OF:
110.5 W/MOIST. OF 14.3 %

THIS COMPUTED AGAINST SAME
PROCTOR OF 113.7 YIELDS A
COMPACTION OF 97 %.
SEE NEUCLEAR TEST #2 ON 7-6-89

TEST BY:

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PHOENIX • TUCSON • ALBUQUERQUE • EL PASO

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NORMAN H WETZ, P E
ROBERT L FREW
ALLON C OWEN, JR, P E

DAILY INSPECTION REPORT

Job No. C89-5034 Report No. _____ Date 7-6-89

Project CHURCH ROCK URANIUM MINE TAILINGS

Location CHURCHROCK, NM

Client UNITED NEUCLEAR CORP.

Contractor NIELSON'S

Superintendent BRUCE

Weather CLEAR & VERY DRY

Travel Time _____ Time Arrived 7:45 Time Left 3:00 Total Time _____

REMARKS When I arrived Haul road was being scarified in preparation for watering. (3) spots were scraped-off in the N. part of the N. cell so I could test the lift concerned. All (3) tests passed against the 113.7 proctor. A sand cone was performed on the 2nd test and, as well, it too passed.

The Haul road was wheel rolled however, when I began to test it, Bruce began to winnow the top 6" of processed mat'l (the very part I was testing). With this in mind I told Jim Matt & also Bruce himself that the final testing for the road could be accomplished whenever more tests were ready in the cell (probably next week). Jim said he would call when additional tests were needed.

I left @ 3:00 pm

[signature]

Inspector David McKenzie

REPLY TO: 4700 LINCOLN ROAD, N.E., ALBUQUERQUE, NEW MEXICO 87109

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ALBERT C. RUCKMAN, P.E.
PAUL KAPLAN, P.E.

July 13, 1989

United Nuclear Corporation
P. O. Drawer QQ
Gallup, New Mexico 87301
Atten: Mr. Charles G. Johnson

SHB Job No. C89-5034

FIELD DENSITY TESTS

Project: 1989 Reclamation Work
Church Rock Uranium Mill

Test date: July 11, 1989

Moisture-density curve #1366: Max. density 113.7 pcf @14.0% optimum moisture

Fill - Haul road and tailings

Test No.	Location & Elevation	% Moisture	Dry Density (pcf)	Maximum Density (pcf)	% Compaction	% Compaction Required
62	N end of Haul Road, 45' W of A-10, FSG, RETEST of #56 on 7/5/89	10.7	110.1	113.7	97	95
63	Compacted fill for Ramp on W side of Haul Road at E 59100, N 74960, FSG	11.3	112.1	113.7	99	95
64	Haul Road at E 58780 and N 74480, FSG	13.4	112.9	113.7	99	95
65	Fill for N cell at N 74970 E 59340, FSG	16.7	106.7	113.7	94	90

Robert E. Thornhill

DM/mjd
Copies: Addressee (2)

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ALLON C OWEN, JR, P E

DAILY INSPECTION REPORT

Job No. C89-5034 Report No. _____ Date 7-11-89

Project CHURCHROCK URANIUM TAILINGS

Location CHURCHROCK, NM

Client UNITED NEUCLEAR

Contractor NIELSON'S

Superintendent Bauer

Weather Pt. Cloudy. Rain & cool 50° B/ 4:00 Am

Travel Time _____ Time Arrived 12:15 Time Left 5:20 Total Time _____

REMARKS Arrived & talked to Jim Fletcher & Matt Smith. Haul road was ready for final testing as well as sand on side with. Jim said that permeabilities would need to be run on material from different areas. [illegible] for [illegible]. In maintaining a density [illegible] cold. It began raining @ 4:00 Am. I unpacked [illegible] & Jim's request. Was still raining @ 5:20 when I left.

7-14-89

Inspector David McKeon

REPLY TO 4700 LINCOLN ROAD, N.E., ALBUQUERQUE, NEW MEXICO 87109

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ALBERT C. RUCKMAN, P.E.
PAUL KAPLAN, P.E.

July 18, 1989

United Nuclear Corporation
P.O. Drawer QQ
Gallup, New Mexico 87301

SHB Job No. C89-5034

Attention: Mr. Charles G. Johnson

FIELD DENSITY TESTS

Project: 1989 Reclamation Work
Church Rock Uranium Mill

Test date: July 14, 1989

Moisture-density curve #1366: Max. density 113.7 pcf @ 14.0% optimum moisture

Tailings fill

Test No.	Location & Elevation	% Moisture	Dry Density (pcf)	Maximum Density (pcf)	% Compaction	% Compaction Required
66	N 75100 & E 60275, FSG	14.3	108.0	113.7	95	90
67 *	N 75100 & E 60275, FSG	11.9	102.7	113.7	90	90
68	N 75070 & E 59620, FSG	16.9	88.5	113.7	78	90
69 *	N 75070 & E 59620, FSG	18.2	92.1	113.7	81	90
70	N 75070 & E 59800, FSG	17.0	105.2	113.7	93	90
71	N 75060 & E 60060, FSG	15.6	98.5	113.7	87	90

* Sand Cone Method

DM/pa

Copies: Addressee (2)

REPLY TO: 4700 LINCOLN ROAD, N.E., ALBUQUERQUE, NEW MEXICO 87109

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ALLON C. OWEN, JR., P.E.

DAILY INSPECTION REPORT

Job No. C89-5034 Report No. _____ Date 7-14-89

Project CHURCHROCK, RECLAMATION PROJECT

Location CHURCHROCK, NM

Client UNITED NUCLEAR CORP.

Contractor NIELSON'S

Superintendent BRUCE

Weather PT. CLOUDY & DRY W/LT. WINDS

Travel Time _____ Time Arrived 2:25 Time Left 7:00 Total Time _____

REMARKS Upon arrival, I immediately talked w/ Jim regarding where to test. He said that Matt requested @ least (2) Densities be performed along w/ (2) Sand cones in the same blocks, on finish fill in the N. section of the N. cell. By the time I finished my 2nd Sand cone test, I was accidentally locked inside the tailings area. Once I realized this I immediately looking for ways to exit and ended-up walking up to the operations building to see if anyone was still there who might be able to unlock the gate. There was, and when I returned to the site, I finished (2) more nuclear densities @ the request of Jim and finished weighing the wet sand cone samples. Once I had finished the wet densities, I told Jim to call us in ABQ. on Mon. morning, @ which time he could also let us know if he needed a tech. too. Dropped-off sand cone equip & finally left site @ approx. 7:00 PM

Inspector David McAlleer

REPLY TO 4700 LINCOLN ROAD, N.E., ALBUQUERQUE, NEW MEXICO 87109

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DENSITY OF SOIL IN PLACE
BY THE SANDCONE METHOD
D1556-64

JOB NO.

PROJECT CHURCHROCK RECLAMATION PROJECT DATE 7-14-89

LOCATION CHURCHROCK, NM

CLIENT UNITED NEUCLEAR CONTRACTOR NIELSON'S

MATERIAL DENSITY NO. S.C. 13

SAND CALIBRATION:

1. Wt. of Sand + Apparatus _____ lbs.
2. Wt. of Apparatus _____ lbs.
3. Wt. of Sand (1-2) _____ lbs.
4. Vol. of Apparatus _____ cf
5. Unit Wt. of Sand 82.0 pcf
   Yd = (3/4)

SURFACE CALIBRATION: 67

	1	2	
6. Initial Wt.	6241	4699	_____ lbs.
7. Wt. After	4699	3152	_____ lbs.
8. Wt. of Sand Used (6-7)			3.400 lbs.

9. Initial Wt. 6237 _____ lbs.
10. Wt. After 2657 _____ lbs.
11. Wt. of Sand 3580 7.89 lbs.
12. Wt. of Sand Used (11-8) 4.49 lbs.
13. Vol. of Hole (12/5) 0.0547 pcf
    Lab No. #1366
    Max. Unit Weight 113.7
    Opt. Moisture Content 14.0 %

14. Sample Can No. _____
15. Wet Wt. of Soil + Tare 2855g _____ lbs.
16. Wt. of Tare _____ lbs.
17. Wet Wt. 2855g 6.294 lbs.
18. Wet Density (17/13) 114.9 pcf
19. Dry Density 102.7 pcf
    Yd = 18/(24 + 100)

MOISTURE CONTENT:

20. Wet Wt. + Tare 2855 gm
21. Dry Wt. + Tare 2552 gm
22. Tare Wt. (#) — gm
23. Wt. of Water 303 gm
24. Moisture 11.9 %
25. % Compaction 90 %
26. % Compaction Required 90 %

REMARKS:

THIS SAND CONE CORRELATES w/ NEUCLEAR TEST # 1 ON 7-14-89

RESULTS WERE: 95 % w/ 14.3 % MOIST.

TEST BY: D. McGinnis

SERGENT, HAUSKINS & BECKWITH
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DENSITY OF SOIL IN PLACE
BY THE SANDCONE METHOD
D1556-64

JOB NO.

PROJECT CHURCHROCK RECLAMATION PROJECT DATE 7-14-89

LOCATION CHURCHROCK NM

CLIENT UNITED NEUCLEAR CONTRACTOR NIELSON'S

MATERIAL DENSITY NO. S.C. 14 89

SAND CALIBRATION:

1. Wt. of Sand + Apparatus _____ lbs.
2. Wt. of Apparatus _____ lbs.
3. Wt. of Sand (1-2) _____ lbs.
4. Vol. of Apparatus _____ cf
5. Unit Wt. of Sand 92.0 pcf
   Yd = (3/4)

SURFACE CALIBRATION:

6. Initial Wt. _____ lbs.
7. Wt. After _____ lbs.
8. Wt. of Sand Used (6-7) 3.400 lbs.

9. Initial Wt. 6210 _____ lbs.
10. Wt. After 2736 _____ lbs.
11. Wt. of Sand 3474 7.659 lbs.
12. Wt. of Sand Used (11-8) 4.259 lbs.
13. Vol. of Hole (12/5) 0.0519 pcf

Lab No. #1366

Max. Unit Weight 113.7

Opt. Moisture Content 14.0 %

14. Sample Can No. _____
15. Wet Wt. of Soil + Tare 2564 g 5.653 lbs.
16. Wt. of Tare _____ lbs.
17. Wet Wt. 2564 g 5.653 lbs.
18. Wet Density (17/13) 108.9 pcf
19. Dry Density 92.1 pcf
    Yd = 18/(24 + 100)

MOISTURE CONTENT:

20. Wet Wt. + Tare 2564 gm
21. Dry Wt. + Tare 2169 gm
22. Tare Wt. (#) — gm
23. Wt. of Water 395 gm
24. Moisture 18.2 %
25. % Compaction 81 %
26. % Compaction Required 90 %

REMARKS:

THIS SAND CONE CORRELATES w/ NEUCLER TEST # 2 MADE ON 7-14-89
RESULTS WERE: 78 % w/ 16.9 % MOIST.

TEST BY: D. MACVENDIE

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July 26, 1989

United Nuclear Corporation
P. O. Drawer QQ
Gallup, New Mexico 87301
Atten: Mr. Charles G. Johnson

SHB Job No. C89-5034

FIELD DENSITY TESTS

Project: 1989 Reclamation Work
Church Rock Uranium Mill

Test date: July 18, 1989

Moisture-density curve #1366: Max. density 113.7 pcf @14.0% optimum moisture
#1364: Max. density 114.7 pcf @10.1% optimum moisture

Tailings fill material

Test No.	Location & Elevation	% Moisture	Dry Density (pcf)	Maximum Density (pcf)	% Compaction	% Compaction Required
72	N 75070 & E 59620, FSG, RETEST of #68 &#69 on 7-14-89	13.4	104.2	113.7	92	90
73 *	N 75070 & E 59620, FSG	13.4	103.2	113.7	91	90
74	N 75060 & E 60060, FSG, RETEST of #71 on 7/14/89	12.6	104.1	113.7	92	90
75	Tailings fill at N 74865 & E 59405, Finish fill	10.4	105.8	114.7	92	90
76	Tailings fill at N 74790 & E 59190, Finish fill	10.7	105.3	114.7	92	90
77 *	Tailings fill at N 74790 & E 59190, Finish fill	10.7	105.9	114.7	92	90

* Sand Cone Method

Robert C. Chandler

DM/mjd
Copies: Addressee (2)

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DAILY INSPECTION REPORT

Job No. C89-5034 Report No. _____ Date 7-18-89

Project CHURCHROCK RECLAMATION PROJECT

Location CHURCHROCK, NM

Client UNITED NEUCLEAR CORP.

Contractor NIELSON'S

Superintendent BRUCE

Weather PT CLOUDY & DRY

Travel Time _____ Time Arrived 9:30 Time Left 6:00 Total Time _____

REMARKS When I arrived contractor had started to place clay barrier over Northern 200' of N. cell. However, Jim told him that he didn't want to see any more clay placed until the area in the middle of the cell passed 90% density. The E. central portion as well as the Southern half of the cell was not even @ grade let alone compacted. Mark told me that I would need to start writing down the standard counts for each test performed in order to comply w/ new N.R.C. specs.

Inspector David McFerrin

REPLY TO 4700 LINCOLN ROAD, N.E., ALBUQUERQUE, NEW MEXICO 87109

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DENSITY OF SOIL IN PLACE
BY THE SANDCONE METHOD
D1556-64

JOB NO. C89-5034

PROJECT CHURCHROCK RECLAMATION PROJECT DATE 7-18-89

LOCATION CHURCHROCK, NM

CLIENT UNITED NEUCLEAR CORP. CONTRACTOR NIELSON'S

MATERIAL DENSITY NO. #S.C. 15

SAND CALIBRATION:

1. Wt. of Sand + Apparatus _____ lbs.
2. Wt. of Apparatus _____ lbs.
3. Wt. of Sand (1-2) _____ lbs.
4. Vol. of Apparatus _____ cf
5. Unit Wt. of Sand 92.0 pcf
   Yd = (3/4)

SURFACE CALIBRATION:

6. Initial Wt. 6389 _____ lbs.
7. Wt. After 4846 _____ lbs.
8. Wt. of Sand Used (6-7) 3.402 lbs.
   1543

9. Initial Wt. 6387 _____ lbs.
10. Wt. After 3037 _____ lbs.
11. Wt. of Sand 3350 _____ lbs.
12. Wt. of Sand Used (11-8) 1807 = 3.984 lbs.
13. Vol. of Hole (12/5) 0.0486 pcf

Lab No. #1366

Max. Unit Weight 113.7

Opt. Moisture Content 14.0

14. Sample Can No. —
15. Wet Wt. of Soil + Tare 2560 g = lbs.
16. Wt. of Tare — lbs.
17. Wet Wt. 2560 g = 5.644 lbs.
18. Wet Density (17/13) 116.1 pcf
19. Dry Density 103.2 pcf
    Yd = 18/(24 + 100)

MOISTURE CONTENT:

20. Wet Wt. + Tare 2560 gm
21. Dry Wt. + Tare 2276 gm
22. Tare Wt. (#) — gm
23. Wt. of Water 284 gm
24. Moisture 12.5 %
25. % Compaction 91 %
26. % Compaction Required 90 %

REMARKS:

THIS SAND CONE CORRELATES W/ NEUCLER TEST #1 ON 7-18-89 W/ RESULTS AS FOLLOWS: 92%
13.4% MOIST.

TEST BY: D. MACKENZIE

SERGENT, HAUSKINS & BECKWITH
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DENSITY OF SOIL IN PLACE
BY THE SANDCONE METHOD
D1556-64

JOB NO. C79-5034

PROJECT CHURCHROCK RECLAMATION PROJECT DATE 7-18-89

LOCATION CHURCHROCK NM

CLIENT UNITED NUCLEAR CONTRACTOR NIELSONS

MATERIAL

DENSITY NO. #S.C. 16

SAND CALIBRATION:

1. Wt. of Sand + Apparatus _____ lbs.
2. Wt. of Apparatus _____ lbs.
3. Wt. of Sand (1-2) _____ lbs.
4. Vol. of Apparatus _____ cf
5. Unit Wt. of Sand 92.0 pcf
   Yd = (3/4)

SURFACE CALIBRATION:

6. Initial Wt. _____ lbs.
7. Wt. After _____ lbs.
8. Wt. of Sand Used (6-7) = 3.402 lbs.
   1543

9. Initial Wt. 6267 _____ lbs.
10. Wt. After 2666 _____ lbs.
11. Wt. of Sand 3601 _____ lbs.
12. Wt. of Sand Used (11-8) 2058 = 4.537 lbs.
13. Vol. of Hole (12/5) 0.0553 pcf

Lab No. #1364

Max. Unit Weight 114.7

Opt. Moisture Content 10.1

14. Sample Can No. _____
15. Wet Wt. of Soil + Tare 2880 g ~~lbs.~~
16. Wt. of Tare — lbs.
17. Wet Wt. 2880 = 6.349 lbs.
18. Wet Density (17/13) 114.8 pcf
19. Dry Density 105.9 pcf
    Yd = 18/(24 + 100)

MOISTURE CONTENT:

20. Wet Wt. + Tare 2880 gm
21. Dry Wt. + Tare 2657 gm
22. Tare Wt. (#) — gm
23. Wt. of Water 223 gm
24. Moisture 8.4 %
25. % Compaction 92 %
26. % Compaction Required 90 %

REMARKS:

THIS SAND CONE CORRELATES W/ NEUCLEAR TEST #4 ON 7-18-89 W/ RESULTS AS FOLLOWS:

92 %

10.7 % MOIST.

TEST BY: D. MACKENZIE

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PAUL KAPLAN, P.E.

July 26, 1989

United Nuclear Corporation
P. O. Drawer QQ
Gallup, New Mexico 87301
Atten: Mr. Charles G. Johnson

SHB Job No. C89-5034

FIELD DENSITY TESTS

Project: 1989 Reclamation Work
Church Rock Uranium Mill

Test date: July 19, 1989

Moisture-density curve #1366: Max. density 113.7 pcf @ 14.0% optimum moisture

Tailings fill material

Test No.	Location & Elevation	% Moisture	Dry Density (pcf)	Maximum Density (pcf)	% Compaction	% Compaction Required
78	Tailings fill at N 74895 & E 59760, Finish fill	14.8	100.9	113.7	89	90
79	Tailings fill at N 74860 & E 60100, Finish fill	16.0	99.5	113.7	88	90

DM/mjd
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DAILY INSPECTION REPORT

Job No. C89-5034 Report No. _____ Date 7-19-89

Project CHURCHROCK RECLAMATION PROJECT

Location CHURCHROCK, NM

Client UNITED NEUCLEAR CORP.

Contractor NIELSON'S

Superintendent BRUCE

Weather PT. CLOUDY & DRY

Travel Time _____ Time Arrived 9:25 Time Left 6:00 Total Time _____

REMARKS When I arrived only one scraper was running & would continue w/ only one scraper until such time as more of the filled area was passed (over 90%). As the (2) Nuclear Tests show, Bruce was having difficulty passing the center portion of the cell by compacting it w/ a "Cat" sheep's-foot roller. This method of compaction seemed only to leave the top 8" of Mat'l @ about 88 - 90% compaction. To ensure that the proctor I had been using was correct (113.7 @ 14.0%) Mark & I decided to sample the mat'l & run a (4)-point D-698 proctor in the trailer. It proved to be even higher @ 114.2 @ 13.4%.

7-27-89

Inspector David McKenzie

REPLY TO 4700 LINCOLN ROAD, N.E., ALBUQUERQUE, NEW MEXICO 87109

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ALBERT C. RUCKMAN, P.E.
PAUL KAPLAN, P.E.

July 26, 1989

United Nuclear Corporation
P. O. Drawer QQ
Gallup, New Mexico 87301
Atten: Mr. Charles G. Johnson

SHB Job No. C89-5034

FIELD DENSITY TESTS

Project: 1989 Reclamation Work
Church Rock Uranium Mill

Test date: July 20, 1989

Moisture-density curve #F-1001: Max. density 114.2 pcf @13.4% optimum moisture

Tailings fill material

Test No.	Location & Elevation	% Moisture	Dry Density (pcf)	Maximum Density (pcf)	% Compaction	% Compaction Required
80	Tailings fill at N 74580 & E 59115, Finish Fill	9.6	98.4	114.2	86	90
81	Tailings fill at N 74895 & E 59760, Finish fill, RETEST of #78 on 7/19/89	14.5	109.3	114.2	96	90
82 *	Tailings fill at N 74895 & E 59760, Finish fill	14.5	111.1	114.2	97	90
83	Tailings fill at N 74780 & E 59790, Finish fill	12.8	108.3	114.2	95	90
84	Tailings fill at N 74865 & E 59405, Finish fill, RETEST of #75 on 7/18/89 due to reprocessed mat'l at this location	13.8	104.1	114.2	91	90

* Sand Cone Method

DM/mjd
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DAILY INSPECTION REPORT

Job No. C89-5034 Report No. _____ Date 7-20-89

Project CHURCHROCK RECLAMATION PROJECT

Location CHURCHROCK, NM

Client UNITED NEUCLEAR CORP.

Contractor NIELSON'S

Superintendent BRUCE

Weather PT. CLOUDY & DRY

Travel Time _____ Time Arrived 7:15 Time Left 5:00 Total Time _____

REMARKS After telling Jim Flitcher & Bruce what the new moisture results were, we then came up w/ ideas on how to achieve density in the problem area. We all concluded that a high moisture content, & wheel-rolling w/ the scrapers was the best way to tackle the problem.

After trying this method on a small test area, I tested it & saw enough densities around from 93% to 96%. After lunch, Bruce had all (3) scrapers wheel rolling the entire problem area & they continued to follow the depression @ the East center portion of the cell. By the end of the day the problem area had met compaction results to the satisfaction of Mark. Bruce said that he would try to get a steel-wheel vibratory roller on site for tomorrow. Mr Matt's request some re-checks were made on areas previously tested which were disturbed by the processing of the problem area.

Inspector David McAlenzi

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BY THE SANDCONE METHOD
D1556-64

JOB NO. C89-5034

PROJECT CHURCHROCK RECLAMATION PROJECT DATE 7-20-89

LOCATION CHURCHROCK NM

CLIENT UNITED NEUCLEAR CORP. CONTRACTOR NIELSON'S

MATERIAL

DENSITY NO. S.C. 17

SAND CALIBRATION:

1. Wt. of Sand + Apparatus _____ lbs.
2. Wt. of Apparatus _____ lbs.
3. Wt. of Sand (1-2) _____ lbs.
4. Vol. of Apparatus _____ cf
5. Unit Wt. of Sand 82.0 pcf
   Yd = (3/4)

SURFACE CALIBRATION:

6. Initial Wt. _____ lbs.
7. Wt. After _____ lbs.
8. Wt. of Sand Used (6-7) 3.402 lbs.
   1543

9. Initial Wt. 6529 _____ lbs.
10. Wt. After 3216 _____ lbs.
11. Wt. of Sand 3313 _____ lbs.
12. Wt. of Sand Used (11-8) 1770 3.902 lbs.
13. Vol. of Hole (12/5) 0.0476 pcf

Lab No. #F-1001

Max. Unit Weight 114.2

Opt. Moisture Content 13.4

14. Sample Can No. —
15. Wet Wt. of Soil + Tare 2721 _____ lbs.
16. Wt. of Tare — _____ lbs.
17. Wet Wt. 2721 = 5.999 lbs.
18. Wet Density (17/13) 126.0 pcf
19. Dry Density 111.1 pcf
    Yd = 18/(24 + 100)

MOISTURE CONTENT:

20. Wet Wt. + Tare 2721 gm
21. Dry Wt. + Tare 2400 gm
22. Tare Wt. (#) — gm
23. Wt. of Water 321 gm
24. Moisture 13.4 %
25. % Compaction 97 %
26. % Compaction Required 90 %

REMARKS:

THIS SAND CONE CORRELATES w/ NUCLEAR TEST # 2 ON 7-20-89 w/ RESULTS AS FOLLOWS:
96 %
14.5 % MOIST.

TEST BY: D. MACKENZIE

SERGENT, HAUSKINS & BECKWITH
CONSULTING SOIL AND FOUNDATION ENGINEERS
PHOENIX • TUCSON • ALBUQUERQUE • EL PASO

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August 1, 1989

United Nuclear Corporation
P.O. Drawer QQ
Gallup, New Mexico 87301

SHB Job No. C89-5034

Attention: Mr. Charles G. Johnson

FIELD DENSITY TESTS

Project: 1989 Reclamation Work
Church Rock Uranium Mill

Test dates: July 24 through July 28, 1989

Moisture-density curve #1366: Max. density 113.7 pcf @ 14.6% optimum moisture
#1492: Max. density 118.3 pcf @ 11.2% optimum moisture
F-1001: Max. density 114.2 pcf @ 13.4% optimum moisture
F-1002: Max. density 115.6 pcf @ 13.9% optimum moisture

Fill Test No.	Location & Elevation	% Moisture	Dry Density (pcf)	Maximum Density (pcf)	% Compaction	% Compaction Required
Test date: July 24, 1989						
85	Tailings fill at N74860 & E 60100, Finish fill, RETEST of test #79 on July 19, 1989	13.0	113.7	113.7	100	90
86	Finished tailings at 59440 E & 74685 N, FSG	12.9	116.8	113.7	103	90
87 *	Finished tailings at 59440 E & 74685 N, FSG	14.0	115.8	113.7	102	90
Test date: July 25, 1989						
88	Tailings fill at N 74580 & E 59115, finish fill, RETEST of test #80 on July 20, 1989	13.2	103.4	114.2	91	90
89 *	Tailings fill at N 74580 & E 59115, finish fill	13.1	107.6	114.2	94	90

REPLY TO: 4700 LINCOLN ROAD, N.E., ALBUQUERQUE, NEW MEXICO 87109

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Test No.	Location & Elevation	% Moisture	Dry Density (pcf)	Maximum Density (pcf)	% Compaction	% Compaction Required
90	Finish tailings fill at 59250 E & 74460 N, FSG	6.4	91.2	114.2	80	90
91	Finish tailings fill at 60300 E & 74600 N, FSG	14.8	107.0	114.2	94	90
92	Finish tailing fill at 60250 E & 75800 N, FSG	15.7	111.5	114.2	98	90
93	Finish tailing fill at 59580 E & 74600 N, FSG	12.1	96.8	112.8	86	90
Test date: July 26, 1989						
94	Finish tailings fill at 59940 E & 74700 N, FSG	12.0	114.6	112.8	97	90
95	Finish tailings fill at 59250 E & 74460 N, FSG, RETEST of test #90	12.5	102.7	114.2	90	90
96 *	Finish tailings fill at 59250 E & 74460 N, FSG	12.8	102.7	114.2	90	90
97	Finish tailing fill at 59580 E & 74600 N, FSG, RETEST of test #93	13.8	112.7	112.8	100	90
Test date: July 28, 1989						
98	Cap fill at 59510 E & 75085 N, 40' SE of B-11, FSG	12.6	109.2	113.7	96	95
99	Cap fill at 59510 E & 75085 N, 40' SE of B-11, FSG, RETEST of test #98	12.8	117.5	113.7	103	95
100	Cap fill at 59785 E & 75100 N, 45' NE of D-12, FSG	12.8	105.3	114.2	92	95

* Sand Cone Method

RR/pa
Copies: Addressee (2)

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DAILY INSPECTION REPORT

Job No. 89-5034 Report No. — Date 7-24-89

Project Church Rk Uv. Mine

Location Church Rk NM

Client UNC

Contractor Nielson's

Superintendent Bruce Berry

Weather

Travel Time 2 3/4 Time Arrived 7:45 Time Left 4:30 Total Time 11.5

REMARKS Tailings fill is just about complete. Today & tomorrow finish up and cover on tailings fill material (soil was retest from D Martinez). Several pennyroyal, grass checks were done at the end of the day at request of Matt Yovich & Jim Pletcher.

The Finish cover field has been started; about ½ is in place, but has not been rolled to point where tool reader.

Note: Matt Yovich of Cannon, has requested that standard cont. be taken for each load at site of test. Am complying w/ request.

Inspector [signature]

REPLY TO 4700 LINCOLN ROAD, N.E., ALBUQUERQUE, NEW MEXICO 87109

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DENSITY OF SOIL IN PLACE
BY THE SANDCONE METHOD
D1556-64

JOB NO. [illegible]

PROJECT [illegible]

DATE [illegible]

LOCATION [illegible]

CLIENT [illegible]

CONTRACTOR [illegible]

MATERIAL #SC-1R / [illegible]

DENSITY NO. SC-18

SAND CALIBRATION:

1. Wt. of Sand + Apparatus _____ lbs.
2. Wt. of Apparatus _____ lbs.
3. Wt. of Sand (1-2) _____ lbs.
4. Vol. of Apparatus _____ cf
5. Unit Wt. of Sand 82.0 pcf
   Yd = (3/4)

SURFACE CALIBRATION: 87

6. Initial Wt. _____ lbs.
7. Wt. After _____ lbs.
8. Wt. of Sand Used (6-7) 3.313 lbs.

9. Initial Wt. 5746.0 ~~lbs~~.
10. Wt. After 1992.0 ~~lbs~~.
11. Wt. of Sand 3754.0 ~~lbs~~. 8.371
12. Wt. of Sand Used (11-8) 4.963 lbs.
13. Vol. of Hole (12/5) .061 pcf

Lab No. 1366

Max. Unit Weight 113.7

Opt. Moisture Content 14.0

14. Sample Can No. _____
15. Wet Wt. of Soil + Tare 3556.0 7.844 lbs.
16. ~~Wt. of Tare~~ _____ lbs.
17. Wet Wt. 7.844 lbs.
18. Wet Density (17/13) 129.6 pcf
19. Dry Density 115.8 pcf
    Yd = 18/(24 + 100)

MOISTURE CONTENT:

20. Wet Wt. ~~+ Tare~~ 3556.0 gm
21. Dry Wt. + ~~Tare~~ 3181.0 gm
22. ~~Tare Wt. (#~~) _____ gm
23. Wt. of Water 377.0 gm
24. Moisture 11.9 %
25. % Compaction 102 %
26. % Compaction Required 90 %

REMARKS:

TEST BY: Roth

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(Sand Cone Method)

Project Church Rd 1½ Mi Project No. 89-5124

Client UNI Req. By

(A) Sand Density 82.0 PCF, Technician [illegible] Date 7-25-89 [illegible]

Test No.						
Material, Location & Remarks	Corrected for wt Test #1 7-25-89 89 SC-19					
Sand Jar No.						
(B) Initial Wt.	5824.0					
(C) Final Wt.	1508.0					
(D) Wt. Sand Used	3516.0/2.75					
(E) Total Sand Vol.	0.095					
(F) Cone/Plate Vol	[illegible]					
(G) Net Hole Vol.	0.054					
Sample Can No.	—					
(H) Tare Wt.	326.0					
(J) Wet Wt. & Tare	3285.0					
(K) Wet Sample Wt.	2959					
(L) Wet Density, PCF	121.[illegible]					
Moisture Method		oven		oven		oven		oven		oven
Moisture Pan No.										
(P) Tare Wt.	326.0									
(N) Wet Wt. & Tare	3285.0									
(M) Dry Wt. & Tare	[illegible]									
(R) Water Wt.	[illegible]									
(S) % Moisture	[illegible]									
(T) Dry Density, PCF	107.602									
Proctor Curve No.	—									
(U) Max. Dry Density	114.2									
(V) % Compaction	94									

Computations: D=B-C, E=D/A, G=E-F, K=J-H, L=K/G, R=N-P
S=(R/(P-M))100, T=L/(1+(S/100)), V=(T/U)100

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DAILY INSPECTION REPORT

Job No. 89-5034 Report No. — Date 7-25-89

Project Church Rk Uz Mine

Location Church Rk NM

Client UNC

Contractor Nielson

Superintendent Bud Berry

Weather Sunny & Warm

Travel Time 1 Time Arrived 8:00 Time Left 4:30 Total Time 9.5

REMARKS Tailings fill is virtually finished except for finishing bund/fill slopes.

Approx. ½ of cover fill is in place & rolling has begun. Dust mitigation was ready for testing today.

Tests on tailings fill were mixed. There are wide moisture fluctuations & therefore wide density fluctuations. Much of SE ¼ of tailings fill needs moisture & more compaction.

One point was done on sample from E-11 and complete proctor was done on another sample from NE corner of fill, as set down.

A permeability sample was collected from C-10 at request of Matt Yovich.

One sand cone test was done. Moisture was very close; dry density was 3% higher than max line.

Inspector [signature]

REPLY TO 4700 LINCOLN ROAD, N.E., ALBUQUERQUE, NEW MEXICO 87109

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(Sand Cone Method)

Project [illegible] Project No. 89-[illegible]

ient [illegible] Req. By —

A) Sand Density [illegible] PCF, Technician [illegible] Date 7-26-89 [illegible]

Test No.					
Material, Location & Remarks	Completes w/ Test #2 7-26-89 96 SC-20				
Sand Jar No.					
) Initial Wt.	5550.0				
C) Final Wt.	2157.0				
) Wt. Sand Used	3393.0/2.470				
E) Total Sand Vol.	0.091				
) Cone/Plate Vol	0.0414				
G) Net Hole Vol.	0.050				
Sample Can No.					
H) Tare Wt.	326.0				
) Wet Wt. & Tare	2946.0				
J) Wet Sample Wt.	2620.0/5.726				
) Wet Density, PCF	115.934				
Moisture Method		oven		oven		oven		oven		oven
Moisture Pan No.										
) Tare Wt.	326.0									
N) Wet Wt. & Tare	[illegible]46.0									
) Dry Wt. & Tare	2647.0									
R) Water Wt.	299.0									
S) % Moisture	12.89									
T) Dry Density, PCF	102.702									
Proctor Curve No.	—									
U) Max. Dry Density	114.2/13.8									
) % Compaction	90									

Computations: D=B-C, E=D/A, G=E-F, K=J-H, L=K/G, R=N-P
S=(R/(P-M))100, T=L/(1+(S/100)), V=(T/U)100

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DAILY INSPECTION REPORT

Job No. 89-5034-1 Report No. — Date 2-26-89 Wed

Project Church Rk Ur. Mine

Location Church Rk NM

Client UNC

Contractor Nielson

Superintendent Bruce Berry

Weather Partly Cldy - Cool - Rain start 2:30

Travel Time 1 Time Arrived 2:30 Time Left 4:00 Total Time

REMARKS Most of fill area was saturated by heavy rain last night. Cover fill was continued in the central area, with the exception of existing material from 6th street and Pitts Street, that dried quite a bit last week.

All retests have been done & passed. All finished tailings fill is in place & tested. Entire site has been cleared for final cover fill.

Jim Hatch has requested that I give a summary of test results to Superintendent after each test.

One point test from yesterday was redone due to using wrong material. Density sand was collected at Sta. E-11 (clay). Gauge 2 was very wet due to rain.

Inspector [signature]

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DAILY INSPECTION REPORT

Job No. 89-5034 Report No. — Date 7-28-89, Fri.

Project Church Rk Ur. Mine

Location Church Rk NM

Client URC

Contractor Nilson

Superintendent Bruce Barry

Weather PH, HD, W - Rain in afternoon after ≈1:45

Travel Time 2 3/4 Time Arrived 7:33 Time Left _____ Total Time _____

REMARKS Work continued on cap fill. Clay area of fill that had been rolled was flashed & two test areas were cut in afternoon during a lull in the rain. First test was taken on clay; density passed but was insufficient moisture.

Second test was taken on the sand material. Test failed due to excessive moisture.

8-1-89

Inspector [signature]

REPLY TO: 4700 LINCOLN ROAD, N.E., ALBUQUERQUE, NEW MEXICO 87109

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August 7, 1989

United Nuclear Corporation
P. O. Drawer QQ
Gallup, New Mexico 87301
Atten: Mr. Charles G. Johnson

SHB Job No. C89-5034

FIELD DENSITY TESTS

Project: 1989 Reclamation Work
Church Rock Uranium Mill

Test date: July 31, 1989

Moisture-density curve #1366: Max. density 113.7 pcf @14.0% optimum moisture
#F-1001: Max. density 114.2 pcf @13.4% optimum moisture

Clay overlay

Test No.	Location & Elevation	% Moisture	Dry Density (pcf)	Maximum Density (pcf)	% Compaction	% Compaction Required
101	Compacted clay barrier at N 75,085 & E 59,510, FSG, RETEST of #99	11.7	112.4	113.7	99	95
102	Compacted clay barrier at 75,100 & E 59,805, correlates w/sand cone #S.C.21, FSG	15.8	108.4	114.2	95	95
103 *	Compacted clay barrier at N 75,100 & E 59,805, #S.C.21, FSG, RETEST of #100	14.9	111.8	113.7	98	95

* Sand cone method

Robert E. Thandel

DM/mjd
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ALLON C. OWEN, JR., P.E.

DAILY INSPECTION REPORT

Job No. C89-5034 Report No. _____ Date 7-31-89

Project CHURCHROCK RECLAMATION PROJECT

Location CHURCHROCK, NM

Client UNITED NUCLEAR CORP.

Contractor NIELSON'S

Superintendent BRUCE

Weather PT. CLOUDY & DRY

Travel Time _____ Time Arrived 10:00 Time Left 5:00 Total Time _____

REMARKS At Tailings site entrance, I met w/ Matt & Jim Fletcher. Matt informed me of revised testing procedures which were to take effect immediately. These were: - Re-Calibrate Sand for Sand Cones @ beginning of each week.
- Take a moisture sample from directly beneath area written Nuclear test, and use the oven-dried moist. to re-calc. Nuclear results.
- Use new Sand each time a Sand Cone is run, however, all sand used will be salvaged for other SHB jobs.

Where Nuclear Test data are separated by a slash, the upper represents direct readings, while the lower represents re-calculated dry-densities and moistures as well as relative compaction based on the more reliable oven-dried moisture content.

Standard counts will now be taken @ each place a density test is performed.

Inspector David McKenzie

REPLY TO: 4700 LINCOLN ROAD, N.E., ALBUQUERQUE, NEW MEXICO 87109

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DENSITY OF SOIL IN PLACE
BY THE SANDCONE METHOD
D1556-64

JOB NO. C79-5034

PROJECT CHURCHROCK RECLAMATION PROJECT DATE 7-31-89

LOCATION CHURCHROCK, NM

CLIENT UNITED NUCLEAR CORP. CONTRACTOR NIELSONS

MATERIAL

DENSITY NO. #S.C. 21

SAND CALIBRATION:

1. Wt. of Sand + Apparatus _____ lbs.
2. Wt. of Apparatus _____ lbs.
3. Wt. of Sand (1-2) _____ lbs.
4. Vol. of Apparatus _____ cf
5. Unit Wt. of Sand 82.0 pcf
   Yd = (3/4)

SURFACE CALIBRATION:

6. Initial Wt. _____ lbs.
7. Wt. After _____ lbs.
8. Wt. of Sand Used (6-7) 3.41 lbs.
   1541

9. Initial Wt. 6272 _____ lbs.
10. Wt. After 3056 _____ lbs.
11. Wt. of Sand 2356 _____ lbs.
12. Wt. of Sand Used (11-8) 3.99 lbs.
    1909
13. Vol. of Hole (12/5) 1.0497 pcf

Lab No. F-1001

Max. Unit Weight 114.2

Opt. Moisture Content 13.4 %

14. Sample Can No. _____
15. Wet Wt. of Soil + ~~Tare~~ 2828 _____ lbs.
16. Wt. of Tare — _____ lbs.
17. Wet Wt. 2828 6.257 lbs.
18. Wet Density (17/13) 128.5 pcf
19. Dry Density 111.9 pcf
    Yd = 18/(24 + 100)

MOISTURE CONTENT:

20. Wet Wt. + Tare 2828 gm
21. Dry Wt. + Tare 2470 gm
22. Tare Wt. (#) — gm
23. Wt. of Water 358 gm
24. Moisture 14.9 %
25. % Compaction 98 %
26. % Compaction Required 95 %

REMARKS:

THIS SAND CONE CORRELATES w/ NUCLEAR TEST #2 ON 7-31-89 w/ RESULTS AS FOLLOWS:

COMPACTION = 95 %
MOIST. = 15.8 %

TEST BY: D. MEC KENZIE

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August 7, 1989

United Nuclear Corporation
P. O. Drawer QQ
Gallup, New Mexico 87301
Atten: Mr. Charles G. Johnson

SHB Job No. C89-5034

FIELD DENSITY TESTS

Project: 1989 Reclamation Work
Church Rock Uranium Mill

Test date: August 1, 1989

Moisture-density curve #F-1001: Max. density 114.2 pcf @13.4% optimum moisture

Clay Barrier

Test No.	Location & Elevation	% Moisture	Dry Density (pcf)	Maximum Density (pcf)	% Compaction	% Compaction Required
104	Compacted clay barrier at N 74,930 & E 60,380 correlates w/sand cone #S.C.22, FSG	12.5	103.5	114.2	91	95
105*	Compacted clay barrier at N 74,930 & E 60,380, #S.C.22, FSG	12.2	106.1	114.2	93	95

* Sand cone method

DM/mjd
Copies: Addressee (2)

REPLY TO: 4700 LINCOLN ROAD, N.E., ALBUQUERQUE, NEW MEXICO 87109

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ALLON C. OWEN, JR., P.E.

DAILY INSPECTION REPORT

Job No. C89-5034 Report No. _____ Date 8-1-89

Project CHURCHROCK RECLAMATION PROJECT

Location CHURCHROCK NM

Client United Nuclear Corp.

Contractor Nielson's

Superintendent BRUCE

Weather Mostly Cloudy w/ sprinkles by P.M. - Shower @ 6:00 PM

Travel Time _____ Time Arrived 1:00 Time Left 6:00 Total Time _____

REMARKS Contractor had started filling the E.-Center portion of the N. cell w/ clay material using 2) scrapers. However most of this crew (2) scrapers, small dozer & a Grader) were busy for most of the day in the area where the fill was being excavated from - N. of the entrance gate. In all, the contractor did not accomplish much as far as the soil cover was concerned.

Matt requested that a Nuclear Test be performed @ an arbitrary location which happened to be @ N. 74,930 & E. 60,380.

Inspector Daniel MacKenzie

REPLY TO: 4700 LINCOLN ROAD, N.E., ALBUQUERQUE, NEW MEXICO 87109

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DENSITY OF SOIL IN PLACE
BY THE SANDCONE METHOD
D1556-64

JOB NO. C89-5034

PROJECT [illegible]

DATE 8-1-89

LOCATION [illegible]

CLIENT [illegible]

CONTRACTOR [illegible]

MATERIAL

DENSITY NO. # S.C. 22

SAND CALIBRATION:

1. Wt. of Sand + Apparatus _____ lbs.
2. Wt. of Apparatus _____ lbs.
3. Wt. of Sand (1-2) _____ lbs.
4. Vol. of Apparatus _____ cf
5. Unit Wt. of Sand 92.0 pcf
   Yd = (3/4)

SURFACE CALIBRATION:

6. Initial Wt. _____ lbs.
7. Wt. After _____ lbs.
8. Wt. of Sand Used (6-7) 3.402 lbs.
   1542

9. Initial Wt. 6363 _____ lbs.
10. Wt. After 3126 _____ lbs.
11. Wt. of Sand 3237 _____ lbs.
12. Wt. of Sand Used (11-8) = 3.735 lbs.
    1692
13. Vol. of Hole (12/5) 0.0455 pcf

Lab No. = F-1041

Max. Unit Weight 114.2

Opt. Moisture Content 13.4 %

14. Sample Can No. _____
15. Wet Wt. of Soil + Tare 2456 _____ lbs.
16. Wt. of Tare _____ lbs.
17. Wet Wt. 2456 5.42 lbs.
18. Wet Density (17/13) 119.0 pcf
19. Dry Density 106.1 pcf
    Yd = 18/(24 + 100)

MOISTURE CONTENT:

20. Wet Wt. + Tare 2456 gm
21. Dry Wt. + Tare 2187 gm
22. Tare Wt. (#) — gm
23. Wt. of Water 269 gm
24. Moisture 12.2 %
25. % Compaction 93 %
26. % Compaction Required 95 %

REMARKS:

THIS SAND CONE CORRELATES W/ NUCLEAR TEST # 1 ON 8-1-89 W/ RESULTS AS FOLLOWS:

COMPACTION = 91 %
MOIST. = 12.5 %

TEST BY: D. MACKENZIE

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August 7, 1989

United Nuclear Corporation
P. O. Drawer QQ
Gallup, New Mexico 87301
Atten: Mr. Charles G. Johnson

SHB Job No. C89-5034

FIELD DENSITY TESTS

Project: 1989 Reclamation Work
Church Rock Uranium Mill

Test date: August 2, 1989

Moisture-density curve #F-1001: Max. density 114.2 pcf @13.4% optimum moisture

Clay barrier

Test No.	Location & Elevation	% Moisture	Dry Density (pcf)	Maximum Density (pcf)	% Compaction	% Compaction Required
106	Compacted clay barrier at N 74,930 & E 60,380 correlates w/sand cone #S.C.22, FSG, RETEST of #104 on 8/1/89	16.9	106.0	114.2	93	95

DM/mjd
Copies: Addressee (2)

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DAILY INSPECTION REPORT

Job No. C89-5034 Report No. _____ Date 8-2-89

Project CHURCHROCK RECLAMATION PROJECT

Location CHURCHROCK, NM

Client UNITED NUCLEAR CORP.

Contractor NIELSON'S

Superintendent BRUCE

Weather PT. CLOUDY HUMID, WET SOIL CONDITIONS

Travel Time _____ Time Arrived 7:30 Time Left 5:00 Total Time _____

REMARKS I spent the first part of this morning very carefully calibrating the Sand Cone sand. A copy of the procedure used is attached w/ this report. After several trials of weighing a full bottle filled w/ the very same Cone & Valve asembly as the one used for field tests, it was found that the sand unit weight was actually 82.6 P.C.F. - an increase of 0.6 P.C.F. over the value previously used. This had an effect of enhancing wet density values when compared w/ the previous value.

The contractor continued to place fill working from E. to W. Meanwhile a re-test was performed @ the same location of yesterday's failure. This time a moisture sample was taken from directly below the Guage. The oven-dried moisture value would then be used to re-calculate the dry density & ultimately the % compaction.

Inspector David McKenzie

REPLY TO: 4700 LINCOLN ROAD, N.E., ALBUQUERQUE, NEW MEXICO 87109

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COMPUTATIONS FOR UNIT WT. OF SAND (ON WED. 8-2-89)

	1	2	3	4	5	6	7
						GIVEN	
						453.6 g = 1 pound	
WT. SAND + BOTTLE	5672	5668	5672				
WT. BOTTLE	196	→	→				
WT. OF SAND	5476	5472	5476				
VOL. OF BOTTLE (SEE BELOW ⊛)	0.1462	cu.ft. →	→				
UNIT WT. OF SAND P.C.F.	82.6	82.5	82.6				

[redacted]

				GIVEN	
⊛ VOL. OF BOTTLE	USING	TAP WATER		2.54 cm per inch	
MASS BOTTLE w/ H_2O	4337			$(2.54)^3$ = 16.387 cm^3 per cu in	
MASS OF BOTTLE	196		AND	γ_{H_2O} = 1.0 g/cm^3	
MASS OF H_2O	4141				
VOL OF BOTTLE	4141 cm^3		[16.387 cm^3/cu in.] × [1728 cu in./cu ft.]		
↓ CONVERSION ↓		→			
VOL. OF BOTTLE (cu ft)	0.1462		= [28316.846 cm^3/cu ft.]		
			∴ 4141 cm^3 / 28316.846 cm^3/cu ft.		
			= 0.1462 cu ft.		

DATE MON. 0-17-17

DATA SHEET FOR COMPUTING UNIT WT. OF SAND

	1	2	3	4	5	6	7
WT. SAND + BOTTLE	6533	6546	6537	6530		GIVEN	
WT. OF BOTTLE	195	→	→	→		453.6 g = 1 POUND	
WT. OF SAND	6338	6351	6342	6335			
VOL. OF BOTTLE (*)	0.1463 CU. FT.						
-SEE BELOW-							
UNIT WT. OF SAND P.C.F.	95.5	95.7	95.6	95.5			

95.6 P.C.F. AVERAGE

(*) VOLUME OF BOTTLE (USING TAP WATER)

MASS BOTTLE w/ H_2O	4339				GIVEN
MASS OF BOTTLE	195				2.54 cm PER INCH
MASS OF H_2O g	4144				$(2.54)^3$ = 16.387 cm^3 PER CU. IN.
VOL. OF BOTTLE (cm^3)	4144			AND	γ_{H_2O} = 1.0 g/cm^3
CONVERSION TO CU. FT. ↓			[16.387 cm^3/CU. IN]		× [1728 CU. IN./CU. FT.]
VOL. OF BOTTLE (CU. FT.)	0.1463		= [28316.846 cm^3/CU. FT.]		

∴ 4144 cm^3 / 28316.846 cm^3/CU. FT.

= 0.1463 CU. FT.

DATE TUE. 8-15-89

DATA SHEET FOR COMPUTING UNIT WT. OF SAND

	1	2	3	4	5	6	7
WT. SAND + BOTTLE	6521	6518	6516	6521		GIVEN	
WT. OF BOTTLE	195	→				453.6 g = 1 POUND	
WT. OF SAND	6326	6323	6321	6326			
VOL. OF BOTTLE (*) -SEE BELOW-	0.1463 CU. FT.						
UNIT WT. OF SAND P.C.F.	95.3	95.3	95.3	95.3			

95.3 P.C.F. AVERAGE

(*) VOLUME OF BOTTLE (USING TAP WATER)

MASS BOTTLE w/ H_2O	4339	GIVEN
MASS OF BOTTLE	195	2.54 cm PER INCH
MASS OF H_2O g	4144	$(2.54)^3$ = 16.387 cm^3 PER CU. IN.
VOL. OF BOTTLE (cm^3)	4144	AND γH_2O = 1.0 g/cm^3
CONVERSION TO CU. FT. ↓		[16.387 cm^3/CU. IN] x [1728 CU. IN./CU. FT.]
VOL. OF BOTTLE (CU. FT.)	0.1463	= [28316.846 cm^3/CU. FT.]

∴ 4144 cm^3 / 28316.846 cm^3/CU. FT.

= 0.1463 CU. FT.

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August 7, 1989

United Nuclear Corporation
P. O. Drawer QQ
Gallup, New Mexico 87301
Atten: Mr. Charles G. Johnson

SHB Job No. C89-5034

FIELD DENSITY TESTS

Project: 1989 Reclamation Work
Church Rock Uranium Mill

Test date: August 3, 1989

Moisture-density curve #F-1001: Max. density 114.2 pcf @13.4% optimum moisture

Clay barrier

	Test No.	Location & Elevation	% Moisture	Dry Density (pcf)	Maximum Density (pcf)	% Compaction	% Compaction Required
	107	Clay barrier at N 74,945 & E 60,275, average of 7 tests at this location, FSG -0.3'	16.8	105.5	114.2	92	95
	108	Clay barrier at N 74,910 & E 60,250, correlates w/sand cone #S.C.23, FSG	15.6	105.3	114.2	92	95
	109*	Clay barrier at N 74,910 & E 60,250, #S.C.23, FSG RETEST of #108 (footnote)	14.1	111.4	114.2	98	95
*	110	Clay barrier at N 74,930 & E 60,260, after 6 passes w/vibratory roller, FSG	14.8	108.2	114.2	95	95
*	111	Clay barrier at N 74,930 & E 60,260, after 6 passes w/vibratory roller, gauge rotated 180° from test #110, FSG	14.8	107.3	114.2	94	95
*	112	Clay barrier at N 74,905 & E 60,215, after 4 passes w/vibratory roller, FSG	16.8	105.4	114.2	92	95

On test #109 - sand cone appeared to be more accurate at this location

SHB Job No. C89-5034

	Test No.	Location & Elevation	% Moisture	Dry Density (pcf)	Maximum Density (pcf)	% Compaction	% Compaction Required
*	113	Clay barrier at N 74,905 & E 60,215, after 4 passes w/vibratory roller, gauge rotated 180° from test #112, FSG	17.1	105.9	114.2	93	95

* Sand cone method

* Test strip only - retest not required.

DM/mjd
Copies: Addressee (2)

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ALLON C. OWEN JR., P.E.

DAILY INSPECTION REPORT

Job No. C89-5034 Report No. _____ Date 8-3-89

Project CHURCHROCK RECLAMATION PROJECT

Location CHURCHROCK, NM

Client UNITED NUCLEAR CORP.

Contractor NIELSON'S

Superintendent BRUCE

Weather PT. CLOUDY SOME SHOWERS BY P.M.

Travel Time _____ Time Arrived 9:30 Time Left 6:30 Total Time _____

REMARKS Posed w/ the problem of failing densities, Ralph, (Bruce's direct superior) was touring the site w/ Bruce & Jim when I entered the site. Jim & Ralph requested a Nuclear Test be done on a representative fill section which had been rolled w/ the sheeps foot. Using the Sheeps foot front blade the top 4-5 inches was cut & a test was taken. I took @ least 7 tests & the ave. was 92% as shown. However the extremes were 91% & 96%. With the extremes indicating a passing test @ one point and a 91% failure @ another. The conclusions for everyone seemed to be leaning towards testing w/ the sand cone devices exclusively — with the Nuclear gauge being used when time would not permit a S.C. test. For one particular spot, a Nuclear test, a sand cone test and a proctor sample was obtained. The proctor was run per ASTM D-698 meth "A". The results of all would be ready tomorrow morning. The objective was to eliminate the possibility of any variables which may adversely affect test results (i.e. wrong proctor value, tailings affecting Nuclear gauge density & moisture, etc.)

Inspector David McKenzie

REPLY TO: 4700 LINCOLN ROAD, N.E., ALBUQUERQUE, NEW MEXICO 87109

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2-3-87

1 POINT PROCTOR - (PLATE [illegible] I-15)

		1	2	3	4	5	6	7
1								
2	WET WT. + MOLD	6170						
3	WT. OF MOLD	4218						
4	WET WT. + SOIL	1952						
5	MOIST. SAMPLE WT.	1052						
6	" DRY	929						
7	% MOIST.	13.2						
8								
9	WET DENS.	129.1						
10	DRY DENS.	114.0						
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								
31								

MATCHES-UP CLOSEST WITH PROCTOR #F-1001 114.2 @ 13.4 %

AMPAD EFFICIENCY LINE 22 207

DENSITY OF SOIL IN PLACE
BY THE SANDCONE METHOD
D1556-64

JOB NO. [illegible]

PROJECT Churchrock Reclamation Project DATE [illegible]

LOCATION Churchrock, N.M.

CLIENT United Nuclear Corp. CONTRACTOR Wilson

MATERIAL

DENSITY NO. #S.C.23

SAND CALIBRATION:

1. Wt. of Sand + Apparatus _____ lbs.
2. Wt. of Apparatus _____ lbs.
3. Wt. of Sand (1-2) _____ lbs.
4. Vol. of Apparatus _____ cf
5. Unit Wt. of Sand 92.6 pcf
   Yd = (3/4)

SURFACE CALIBRATION:

6. Initial Wt. _____ lbs.
7. Wt. After _____ lbs.
8. Wt. of Sand Used (6-7) 3.643 lbs.
   1553

9. Initial Wt. 6207 _____ lbs.
10. Wt. After 3000 _____ lbs.
11. Wt. of Sand 3207 _____ lbs.
12. Wt. of Sand Used (11-8) 3.6446 lbs.
    1654
13. Vol. of Hole (12/5) 0.04414 pcf

Lab No. #F-1001

Max. Unit Weight 114.2

Opt. Moisture Content 12.4 %

14. Sample Can No. _____
15. Wet Wt. of Soil + Tare 2545 _____ lbs.
16. Wt. of Tare — _____ lbs.
17. Wet Wt. 2545 5.611 lbs.
18. Wet Density (17/13) 127.1 pcf
19. Dry Density 111.4 pcf
    Yd = 18/(24 + 100)

MOISTURE CONTENT:

20. Wet Wt. + Tare 2545.7 gm
21. Dry Wt. + Tare 2231.3 gm
22. Tare Wt. (#) — gm
23. Wt. of Water 314 gm
24. Moisture 14.1 %
25. % Compaction 97 %
26. % Compaction Required 95 %

REMARKS:

THIS SAND CONE CORRELATES W/ MODIFIED TEST #2 ON 8-3-79 W/RESULTS AS FOLLOWS:

COMPACTION = 92 %

MOISTURE = 15.6 %

TEST BY: D. MacKenzie

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PAUL KAPLAN, P.E.

August 14, 1989

United Nuclear Corporation
P.O. Drawer QQ
Gallup, New Mexico 87301

SHB Job No. C89-5034

Attention: Mr. Charles G. Johnson

FIELD DENSITY TESTS

Project: 1989 Reclamation Work
Church Rock Uranium Mill

Test dates: August 7, 8, 9, and 10, 1989

Moisture-density curve #F-1002: Max. density 115.6 pcf @ 13.9% optimum moisture
#1366: Max. density 113.7 pcf @ 14.0% opitmum moisture
#F-1001: Max. density 114.2 pcf @ 13.4% optimum moisture

Clay soil cover

Test No.	Location & Elevation	% Moisture	Dry Density (pcf)	Maximum Density (pcf)	% Compaction	% Compaction Required
114 *	N 74710, E 60080, FSG	16.7	108.2	115.6	94	95
Test date: August 8, 1989						
115 *	N 75030, E 59390, FSG	15.9	113.5	115.6	98	95
101 116 *	N 75085, E 59510, FSG RETEST of #101 (footnote)	14.5	115.4	115.6	100	95
117 *	N 74875, E 59750, FSG	11.6	110.4	113.7	97	95
Test date: August 9, 1989						
118 *	N 74945, E 60275, FSG -0.3' RETEST of test #107 on August 3, 1989	12.9	119.0	115.6	103	95
119 *	N 75120, E 60110, FSG	14.2	118.1	115.6	102	95
Test date: August 10, 1989						
120 *	N 74590, E 59300, FSG	12.4	111.5	114.2	98	95

Test #116- Additional proctor was run on this material to check unit weight. The new value was used for the retest of #101.

REPLY TO: 4700 LINCOLN ROAD, N.E., ALBUQUERQUE, NEW MEXICO 87109

PHOENIX (602) 272-6848 | TUCSON (602) 792-2779 | ALBUQUERQUE (505) 884-0950 | SANTA FE (505) 471-7836 | SALT LAKE CITY (801) 266-0720 | EL PASO (915) 778-3369

1989 Reclamation Work
Church Rock Uranium Mill
SHB Job No. C89-5034

Test No.	Location & Elevation	% Moisture	Dry Density (pcf)	Maximum Density (pcf)	% Compaction	% Compaction Required
121 *	N 74630, E 59690, FSG	11.5	104.4	114.2	91	95
122 *	N 74740, E 59460, FSG	12.8	106.8	114.2	94	95

* Sand Cone Method

Robert E. Drandin

DM/pa

Copies: Addressee (2)

DENSITY OF SOIL IN PLACE
BY THE SANDCONE METHOD
D1556-64

JOB NO. C89-5034

PROJECT CHURCHROCK RECLAMATION PROJECT DATE 8-7-89

LOCATION CHURCHROCK, NM

CLIENT UNITED NUCLEAR CORP. CONTRACTOR NIELSON'S

MATERIAL DENSITY NO. #S.C.24

114

SAND CALIBRATION:

1. Wt. of Sand + Apparatus _____ lbs.
2. Wt. of Apparatus _____ lbs.
3. Wt. of Sand (1-2) _____ lbs.
4. Vol. of Apparatus _____ cf
5. Unit Wt. of Sand 82.6 pcf
   Yd = (3/4)

SURFACE CALIBRATION:

6. Initial Wt. _____ lbs.
7. Wt. After _____ lbs.
8. Wt. of Sand Used (6-7) 3.373 lbs.
   1530 g = AVE. OF (3) TRIALS

9. Initial Wt. 6336 _____ lbs.
10. Wt. After 3014 _____ lbs.
11. Wt. of Sand 3322 _____ lbs.
12. Wt. of Sand Used (11-8) 1792 3.951 lbs.
13. Vol. of Hole (12/5) 0.04783 pcf

Lab No. #F-1002

Max. Unit Weight 115.6

Opt. Moisture Content 13.9 %

14. Sample Can No. _____
15. Wet Wt. of Soil + Tare 2740 _____ lbs.
16. Wt. of Tare — _____ lbs.
17. Wet Wt. 2740 6.041 lbs.
18. Wet Density (17/13) 126.3 pcf
19. Dry Density 108.2 pcf
    Yd = 18/(24 + 100)

MOISTURE CONTENT:

20. Wet Wt. + Tare 2740 gm
21. Dry Wt. + Tare 2348 gm
22. Tare Wt. (#) — gm
23. Wt. of Water 392 gm
24. Moisture 16.7 %
25. % Compaction 94 %
26. % Compaction Required 95 %

REMARKS:

CLAY SOIL COVER
@ N. 74,710 &
E. 60,080

TEST FAILED REQ'D DENSITY SPEC.

TEST BY: D. MACKENZIE

SERGENT, HAUSKINS & BECKWITH
CONSULTING SOIL AND FOUNDATION ENGINEERS
PHOENIX • TUCSON • ALBUQUERQUE • EL PASO

BY THE SANDCONE METHOD
D1556-64

JOB NO. C89-5034

PROJECT CHURCHROCK RECLAMATION PROJECT DATE 8-8-89

LOCATION CHURCHROCK, NM

CLIENT UNITED NUCLEAR CORP. CONTRACTOR NIELSON'S

MATERIAL DENSITY NO. #S.C.25

SAND CALIBRATION:

1. Wt. of Sand + Apparatus _____ lbs.
2. Wt. of Apparatus _____ lbs.
3. Wt. of Sand (1-2) _____ lbs.
4. Vol. of Apparatus _____ cf
5. Unit Wt. of Sand 95.4 pcf
   Yd = (3/4) NEW SAND

SURFACE CALIBRATION: 115

6. Initial Wt. _____ lbs.
7. Wt. After _____ lbs.
8. Wt. of Sand Used (6-7) = 3.897 lbs.
   1762

9. Initial Wt. 6472 _____ lbs.
10. Wt. After 2715 _____ lbs.
11. Wt. of Sand 3757 _____ lbs.
12. Wt. of Sand Used (11-8) = 4.325 lbs. (1929)
13. Vol. of Hole (12/5) 0.04598 pcf

Lab No. #F-1002

Max. Unit Weight 115.6

Opt. Moisture Content 13.9

14. Sample Can No. _____
15. Wet Wt. of Soil + Tare 2745 _____ lbs.
16. Wt. of Tare _____ lbs.
17. Wet Wt. _____ lbs.
18. Wet Density (17/13) 131.6 pcf
19. Dry Density 113.5 pcf
    Yd = 18/(24 + 100)

MOISTURE CONTENT:

20. Wet Wt. + Tare 2745 gm
21. Dry Wt. + Tare 2369 gm
22. Tare Wt. (#) _____ gm
23. Wt. of Water 376 gm
24. Moisture 15.9 %
25. % Compaction 98 %
26. % Compaction Required 95 %

REMARKS:
CLAY SOIL COVER @
N. 75,030 & E. 59,390

TEST PASSED REQ'D MOISTURE & DENSITY SPECS.

TEST BY: D. MACKENZIE

#1-A

SERGENT, HAUSKINS & BECKWITH
CONSULTING SOIL AND FOUNDATION ENGINEERS
PHOENIX • TUCSON • ALBUQUERQUE • EL PASO

BY THE SANDCONE METHOD
D1556-64

JOB NO. C89-5034

PROJECT CHURCHROCK RECLAMATION PROJECT DATE 8-8-89

LOCATION CHURCHROCK, NM

CLIENT UNITED NUCLEAR CORP. CONTRACTOR NIELSON'S

MATERIAL DENSITY NO. #S.C.26

SAND CALIBRATION:

1. Wt. of Sand + Apparatus _____ lbs.
2. Wt. of Apparatus _____ lbs.
3. Wt. of Sand (1-2) _____ lbs.
4. Vol. of Apparatus _____ cf
5. Unit Wt. of Sand 95.4 pcf
   Yd = (3/4) NEW SAND

SURFACE CALIBRATION: Density #116

6. Initial Wt. _____ lbs.
7. Wt. After _____ lbs.
8. Wt. of Sand Used (6-7) = 3.897 lbs.
   1762 g

9. Initial Wt. 6500 _____ lbs.
10. Wt. After 2988 _____ lbs.
11. Wt. of Sand 3522 _____ lbs.
12. Wt. of Sand Used (11-8) 1744 = 3.845 lbs.
13. Vol. of Hole (12/5) 0.04031 pcf

Lab No. #F-1002

Max. Unit Weight 115.6

Opt. Moisture Content 13.9 %

14. Sample Can No. _____
15. Wet Wt. of Soil + Tare 2416 5.326 lbs.
16. Wt. of Tare — lbs.
17. Wet Wt. 5.326 lbs.
18. Wet Density (17/13) 132.1 pcf
19. Dry Density 115.4 pcf
    Yd = 18/(24 + 100)

MOISTURE CONTENT:

20. Wet Wt. + Tare 2416 gm
21. Dry Wt. + Tare 2110 gm
22. Tare Wt. (#) — gm
23. Wt. of Water 306 gm
24. Moisture 14.5 %
25. % Compaction 100 %
26. % Compaction Required 95 %

REMARKS:

CLAY SOIL COVER @
N. 75,085 & E. 59,510
RETEST OF NUCLEAR TEST
#1 ON 7-31-89

TEST PASSED REQ'D MOISTURE & DENSITY SPECS.

TEST BY: D. MACKENZIE

#1-B

SERGENT, HAUSKINS & BECKWITH
CONSULTING SOIL AND FOUNDATION ENGINEERS
PHOENIX • TUCSON • ALBUQUERQUE • EL PASO

DENSITY OF SOIL IN PLACE
BY THE SANDCONE METHOD
D1556-64

JOB NO. C89-5034

PROJECT CHURCHROCK RECLAMATION PROJECT DATE 8-8-89

LOCATION CHURCHROCK, NM

CLIENT UNITED NUCLEAR CORP. CONTRACTOR NIELSON'S

MATERIAL

DENSITY NO. #S.C.27

SAND CALIBRATION:

1. Wt. of Sand + Apparatus _____ lbs.
2. Wt. of Apparatus _____ lbs.
3. Wt. of Sand (1-2) _____ lbs.
4. Vol. of Apparatus _____ cf
5. Unit Wt. of Sand 95.4 pcf
   Yd = (3/4) NEW SAND

SURFACE CALIBRATION: 117

6. Initial Wt. _____ lbs.
7. Wt. After _____ lbs.
8. Wt. of Sand Used (6-7) = 3.898 lbs.
   1768

9. Initial Wt. 6329 _____ lbs.
10. Wt. After 2438 _____ lbs.
11. Wt. of Sand 3891 _____ lbs.
12. Wt. of Sand Used (11-8) 2122 4.680 lbs.
13. Vol. of Hole (12/5) 0.04906 pcf

Lab No. #1366

Max. Unit Weight 113.7

Opt. Moisture Content 14.0 %

14. Sample Can No. _____
15. Wet Wt. of Soil + Tare 2742 _____ lbs.
16. Wt. of Tare — _____ lbs.
17. Wet Wt. 2742 = 6.045 lbs.
18. Wet Density (17/13) 123.2 pcf
19. Dry Density 110.4 pcf
    Yd = 18/(24 + 100)

MOISTURE CONTENT:

20. Wet Wt. + Tare 2742 gm
21. Dry Wt. + Tare 2456 gm
22. Tare Wt. (#) — gm
23. Wt. of Water 286 gm
24. Moisture 11.6 %
25. % Compaction 97 %
26. % Compaction Required 95 %

REMARKS: CLAY SOIL COVER @ N. 74,875 & E. 59,750

ALSO SAMPLED MAT'L FOR A 1-POINT PROCTOR FROM SAME LOCATION.

TEST FAILED ON MOISTURE SPEC.

TEST BY: D. MACKENZIE

SERGENT, HAUSKINS & BECKWITH
CONSULTING SOIL AND FOUNDATION ENGINEERS
PHOENIX • TUCSON • ALBUQUERQUE • EL PASO

FOR SAND CONE #27

SERGENT, HAUSKINS & BECKWITH CONSULTING SOIL AND FOUNDATION ENGINEERS

APPLIED SOIL MECHANICS • ENGINEERING GEOLOGY • MATERIALS ENGINEERING

Project CHURCHROCK RECLAMATION Job No. C39-5034
Client UNITED NUCLEAR CORP.
Contractor NIELSON'S
A/E
Sampled By D. MCKENZIE Date Sampled 8-9-89

Sample No. 1-POINT FOR #S.C. 27
Method ASTM D-698 "A"
Date 8-9-89 Tested By D. MCKENZIE
To Be Used For CLAY/SOIL COVER

Density

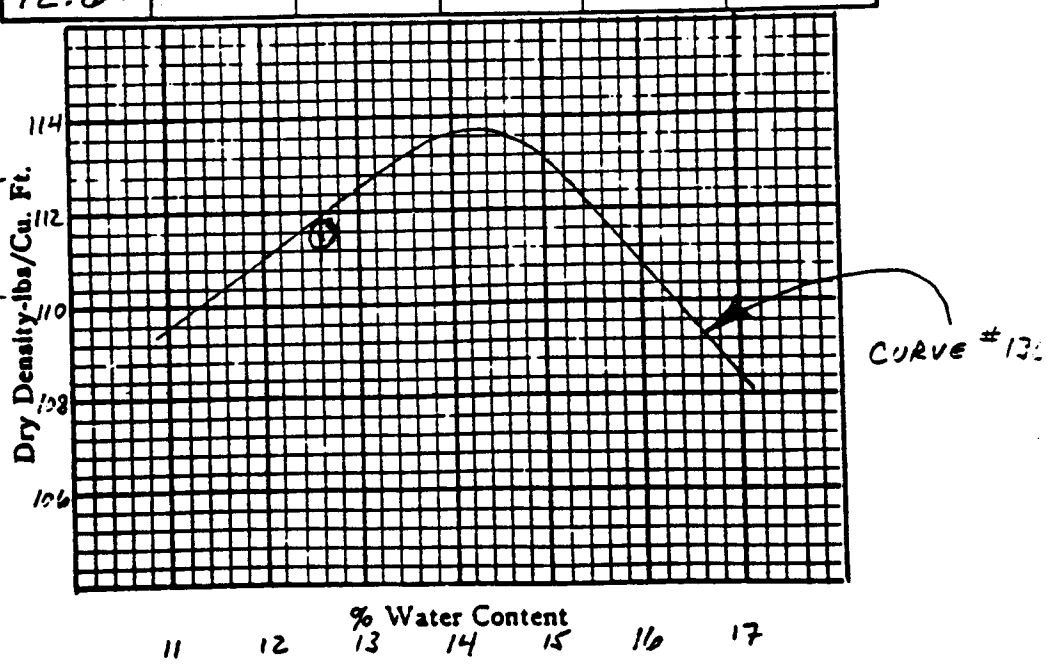
Determination No.	1	2	3	4	5	Lousest State
Wt. Mold & Comp. Soil in Grams	6115					
Wt. Mold in Grams	4216					
Wt. Comp. Soil in Grams	1899					
Wet Density in lbs/ft^3	125.6					
Dry Density in lbs/ft^3	111.5					

Water Content

Container No.						
Wet soil + can grams	920.6					
Dry soil + can grams	817.4					
Wt. water grams	103.2					
Wt. Container grams	—					
Wt. Dry Soil grams	817.4					
Water Content in %	12.6					

1-POINT PROCTOR
SAMPLED FROM N. 74,875
& E 59,750

SAMPLED @
SAME LOCATION AS
SAND CONE #S.C. 27
USING LAB #1366
W/CURVE AS SHOWN



BY THE SANDCONE METHOD
D1556-64

JOB NO. C89-5034

PROJECT CHURCHROCK RECLAMATION PROJECT DATE 8-9-89

LOCATION CHURCHROCK, NM

CLIENT UNITED NUCLEAR CORP. CONTRACTOR NIELSON'S

MATERIAL DENSITY NO. # S.C. 28

SAND CALIBRATION:

1. Wt. of Sand + Apparatus _____ lbs.
2. Wt. of Apparatus _____ lbs.
3. Wt. of Sand (1-2) _____ lbs.
4. Vol. of Apparatus _____ cf
5. Unit Wt. of Sand 95.4 pcf
   Yd = (3/4)

SURFACE CALIBRATION: 112

6. Initial Wt. _____ lbs.
7. Wt. After _____ lbs.
8. Wt. of Sand Used (6-7) = 3.899 lbs.
   1769

9. Initial Wt. 6436 _____ lbs.
10. Wt. After 2618 _____ lbs.
11. Wt. of Sand 3818 _____ lbs.
12. Wt. of Sand Used (11-8) 2050 = 4.519 lbs.
13. Vol. of Hole (12/5) 0.04737 pcf

Lab No. # F-1002

Max. Unit Weight 115.6

Opt. Moisture Content 13.9

14. Sample Can No. _____
15. Wet Wt. of Soil + Tare 2887g _____ lbs.
16. Wt. of Tare _____ lbs.
17. Wet Wt. 2887g = 6.365 lbs.
18. Wet Density (17/13) 134.4 pcf
19. Dry Density 119.0 pcf
    Yd = 18/(24 + 100)

MOISTURE CONTENT:

20. Wet Wt. + Tare 2887 gm
21. Dry Wt. + Tare 2557 gm
22. Tare Wt. (#) _____ gm
23. Wt. of Water 330 gm
24. Moisture 12.9 %
25. % Compaction 103 %
26. % Compaction Required 95 %

REMARKS: CLAY SOIL COVER @ N. 74,945 & E. 60,275 RETEST OF NUCLEAR TEST #1 ON 8-3-89

ALSO - (2) 1-POINTS WERE PERFORMED ON THIS MAT'L TO VERIFY CORRECT PROCTOR USE. - SEE DATA SHEET 8-10-89

TEST BY: D. McKENZIE

TEST FAILED REQ'D MOISTURE SPEC.

SERGENT, HAUSKINS & BECKWITH
CONSULTING SOIL AND FOUNDATION ENGINEERS
PHOENIX • TUCSON • ALBUQUERQUE • EL PASO

CORRELATES w/ SAND CONE #28

SERGENT, HAUSKINS & BECKWITH

CONSULTING SOIL AND FOUNDATION ENGINEERS

APPLIED SOIL MECHANICS • ENGINEERING GEOLOGY • MATERIALS ENGINEERING

8

Project CHURCHROCK RECLAMATION Job No. C89-5034 Sample No.
Client UNITED NUCLEAR CORP. Method ASTM D-698 METH. "A"
Contractor NIELSON'S Date 8-10-89 Tested By D. MACKENZIE
A/E To Be Used For CLAY SOIL COVER
Sampled By D. MACKENZIE Date Sampled 8-10-89 N. 74,945 & E 60 275

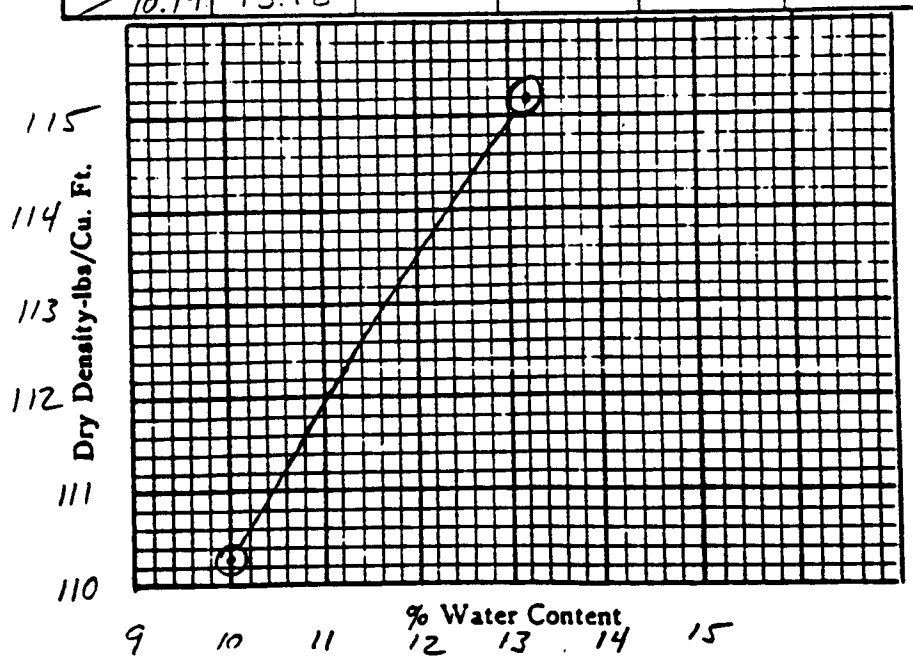
Density

Determination No.	1	2	3	4	5	Loosest State
Wt. Mold & Comp. Soil in Grams	6051	6187				
Wt. Mold in Grams	4216	~~7~~				
Wt. Comp. Soil in Grams	1835	1971				
Wet Density in lbs/ft^3	121.36	130.36				
Dry Density in lbs/ft^3	110.5 / 110.14	115.2				

Water Content

Container No.						
Wet soil + can grams	504.8 / 507.6	1099.3		SLASH SEPARATES DATA		
Dry soil + can grams	479.0 / 515.1	971.3		AS FOLLOWS:		
Wt. water grams	25.8 / 52.5	128.0		UPPER - MICROWAVE DRIED MOISTURE		
Wt. Container grams	217.3 / —	—		LOWER - OVEN DRIED MOISTURE		
Wt. Dry Soil grams	261.7 / 515.1	971.3		2ND POINT USED AN		
Water Content in %	9.86 / 10.19	13.18		OVEN DRIED MOISTURE		

MATCHES CURVE w/LAB # F:1002:
115.6 @ 13.7 %



BY THE SANDCONE METHOD
D1556-64

JOB NO. C89-5034

PROJECT CHURCHROCK RECLAMATION PROJECT DATE 7-9-89

LOCATION CHURCHROCK, NM

CLIENT UNITED NUCLEAR CORP. CONTRACTOR NIELSON'S

MATERIAL

DENSITY NO. # S.C. 29

SAND CALIBRATION:

1. Wt. of Sand + Apparatus _____ lbs.
2. Wt. of Apparatus _____ lbs.
3. Wt. of Sand (1-2) _____ lbs.
4. Vol. of Apparatus _____ cf
5. Unit Wt. of Sand 95.4 pcf
   Yd = (3/4)

SURFACE CALIBRATION: 119

6. Initial Wt. _____ lbs.
7. Wt. After _____ lbs.
8. Wt. of Sand Used (6-7) = 3.898 lbs.
   1768 g

9. Initial Wt. 6674 _____ lbs.
10. Wt. After 2859 _____ lbs.
11. Wt. of Sand 3815 _____ lbs.
12. Wt. of Sand Used (11-8) 2047 = 4.513 lbs.
13. Vol. of Hole (12/5) 0.04730 pcf

Lab No. # F-1002

Max. Unit Weight 115.6

Opt. Moisture Content 13.9 %

14. Sample Can No. _____
15. Wet Wt. of Soil + Tare 2894 g _____ lbs.
16. Wt. of Tare — _____ lbs.
17. Wet Wt. 2894 g = 6.380 lbs.
18. Wet Density (17/13) 134.9 pcf
19. Dry Density 118.1 pcf
    Yd = 18/(24 + 100)

MOISTURE CONTENT:

20. Wet Wt. + Tare 2894 gm
21. Dry Wt. + Tare 2535 gm
22. Tare Wt. (#) — gm
23. Wt. of Water 359 gm
24. Moisture 14.2 %
25. % Compaction 102 %
26. % Compaction Required 95 %

REMARKS: CLAY SOIL COVER @ N 75,120 & E. 60,110

TEST PASSED REQ'D MOISTURE & DENSITY SPECS.

TEST BY: D. MACKENZIE

#1-B

SERGENT, HAUSKINS & BECKWITH
CONSULTING SOIL AND FOUNDATION ENGINEERS
PHOENIX • TUCSON • ALBUQUERQUE • EL PASO

BY THE SANDCONE METHOD
D1556-64

JOB NO. C89-5034

PROJECT CHURCHROCK RECLAMATION PROJECT DATE 8-10-89

LOCATION CHURCHROCK, NM

CLIENT UNITED NUCLEAR CORP. CONTRACTOR NIELSON'S

MATERIAL

DENSITY NO. #S.C. 30

SAND CALIBRATION:

1. Wt. of Sand + Apparatus _____ lbs.
2. Wt. of Apparatus _____ lbs.
3. Wt. of Sand (1-2) _____ lbs.
4. Vol. of Apparatus _____ cf
5. Unit Wt. of Sand 95.4 pcf
   Yd = (3/4)

SURFACE CALIBRATION: 120

6. Initial Wt. _____ lbs.
7. Wt. After _____ lbs.
8. Wt. of Sand Used (6-7) = 3.898 lbs.
   1768

9. Initial Wt. 6351 _____ lbs.
10. Wt. After 2390 _____ lbs.
11. Wt. of Sand 3961 _____ lbs.
12. Wt. of Sand Used (11-8) 2193 4.835 lbs.
13. Vol. of Hole (12/5) 0.05068 pcf

Lab No. #1001

Max. Unit Weight 114.2

Opt. Moisture Content 13.4 %

14. Sample Can No. _____
15. Wet Wt. of Soil + Tare 2882 _____ lbs.
16. Wt. of Tare — _____ lbs.
17. Wet Wt. 2881 = 6.351 lbs.
18. Wet Density (17/13) 125.3 pcf
19. Dry Density 111.5 pcf
    Yd = 18/(24 + 100)

MOISTURE CONTENT:

20. Wet Wt. + Tare 2881 gm
21. Dry Wt. + Tare 2563 gm
22. Tare Wt. (#) — _____ gm
23. Wt. of Water 318 gm
24. Moisture 12.4 %
25. % Compaction 98 %
26. % Compaction Required 95 %

REMARKS: CLAY SOIL COVER @ N. 74,590 & E. 59,300

TEST FAILED REQ'D. MOISTURE SPEC.

TEST BY: D. MACKENZIE

SERGENT, HAUSKINS & BECKWITH
CONSULTING SOIL AND FOUNDATION ENGINEERS
PHOENIX • TUCSON • ALBUQUERQUE • EL PASO

BY THE SANDCONE METHOD
D1556-64

JOB NO. C89-5034

PROJECT CHURCHROCK RECLAMATION PROJECT DATE 8-10-89

LOCATION CHURCHROCK, NM

CLIENT UNITED NUCLEAR CORP. CONTRACTOR NIELSON'S

MATERIAL

DENSITY NO. #S.C.31

SAND CALIBRATION:

1. Wt. of Sand + Apparatus _____ lbs.
2. Wt. of Apparatus _____ lbs.
3. Wt. of Sand (1-2) _____ lbs.
4. Vol. of Apparatus _____ cf
5. Unit Wt. of Sand 95.4 pcf
   Yd = (3/4)

SURFACE CALIBRATION: 121

6. Initial Wt. _____ lbs.
7. Wt. After _____ lbs.
8. Wt. of Sand Used (6-7) = 3.898 lbs.
   1768g

9. Initial Wt. 6097 _____ lbs.
10. Wt. After 2387g _____ lbs.
11. Wt. of Sand 3710 _____ lbs.
12. Wt. of Sand Used (11-8) 1942 = 4.281 lbs.
13. Vol. of Hole (12/5) 0.04487 pcf

Lab No. #F-1001

Max. Unit Weight 114.2

Opt. Moisture Content 13.4%

14. Sample Can No. _____
15. Wet Wt. of Soil + Tare 2370 _____ lbs.
16. Wt. of Tare _____ lbs.
17. Wet Wt. 2370g = 5.225 lbs.
18. Wet Density (17/13) 116.4 pcf
19. Dry Density 104.4 pcf
    Yd = 18/(24 + 100)

MOISTURE CONTENT:

20. Wet Wt. + Tare 2370 gm
21. Dry Wt. + Tare 2126 gm
22. Tare Wt. (#) — gm
23. Wt. of Water 244 gm
24. Moisture 11.5 %
25. % Compaction 91 %
26. % Compaction Required 95 %

REMARKS: CLAY SOIL COVER @ N. 74,630 & E. 59,690

TEST FAILED BOTH MOISTURE & DENSITY REQ'MTS

TEST BY: D. MACKENZIE

F1-A

SERGENT, HAUSKINS & BECKWITH
CONSULTING SOIL AND FOUNDATION ENGINEERS
PHOENIX • TUCSON • ALBUQUERQUE • EL PASO

BY THE SANDCONE METHOD
D1556-64

JOB NO. C89-5034

PROJECT CHURCHROCK RECLAMATION PROJECT DATE 8-10-89

LOCATION CHURCHROCK, NM

CLIENT UNITED NUCLEAR CORP. CONTRACTOR NIELSON'S

MATERIAL

DENSITY NO. #S.C. 32

SAND CALIBRATION:

1. Wt. of Sand + Apparatus _____ lbs.
2. Wt. of Apparatus _____ lbs.
3. Wt. of Sand (1-2) _____ lbs.
4. Vol. of Apparatus _____ cf
5. Unit Wt. of Sand 95.4 pcf
   Yd = (3/4)

SURFACE CALIBRATION: 122

6. Initial Wt. _____ lbs.
7. Wt. After _____ lbs.
8. Wt. of Sand Used (6-7) = 3.898 lbs.
   1768 g

9. Initial Wt. 6466 _____ lbs.
10. Wt. After 2748 _____ lbs.
11. Wt. of Sand 3718 _____ lbs.
12. Wt. of Sand Used (11-8) 1950 = 4.279 lbs.
13. Vol. of Hole (12/5) 0.04506 pcf

Lab No. #F-1001

Max. Unit Weight 114.2

Opt. Moisture Content 13.4%

14. Sample Can No. _____
15. Wet Wt. of Soil + Tare 2462 g _____ lbs.
16. Wt. of Tare — _____ lbs.
17. Wet Wt. 2462 = 5.428 lbs.
18. Wet Density (17/13) 120.5 pcf
19. Dry Density 106.8 pcf
    Yd = 18/(24 + 100)

MOISTURE CONTENT:

20. Wet Wt. + Tare 2462 gm
21. Dry Wt. + Tare 2182 gm
22. Tare Wt. (#) — gm
23. Wt. of Water 280 gm
24. Moisture 12.8 %
25. % Compaction 94 %
26. % Compaction Required 95 %

REMARKS: CLAY SOIL COVER @ N. 74,740 & E. 59,460

TEST FAILED BOTH MOISTURE & DENSITY REQ'MTS.

TEST BY: D. McKENZIE

SERGENT, HAUSKINS & BECKWITH
CONSULTING SOIL AND FOUNDATION ENGINEERS
PHOENIX • TUCSON • ALBUQUERQUE • EL PASO

NEW SAND FROM
GALLUP SAND & GRAVEL CO.

DATE TUE. 8-8-89

DATA SHEET FOR COMPUTING UNIT WT. OF SAND

	1	2	3	4
WT. SAND + BOTTLE	6519	6523	6528	6533
WT. OF BOTTLE	195	→	→	→
WT OF SAND g	6324	6328	6333	6338
VOL. OF BOTTLE (*) - SEE BELOW	0.1463 cu. FT.	→	→	→
UNIT WT. OF SAND (P.C.F.)	95.3	95.4	95.4	95.5

GIVEN
453.6 g = 1 POUND

95.4 P.C.F. AVERAGE

(*) VOLUME OF BOTTLE (USING TAP WATER)

MASS BOTTLE w/ H_2O	4339
MASS OF BOTTLE	195
MASS OF H_2O g	4144
VOL. OF BOTTLE (cm^3)	4144

GIVEN
2.54 cm PER INCH
$(2.54)^3 = 16.387\ cm^3$ PER CU. IN.
AND $\gamma\ H_2O = 1.0\ g/cm^3$

CONVERSION TO CU. FT. ↓

$[16.387\ cm^3/cu.\ in] \times [1728\ cu.\ in./cu.\ ft]$

$= [28316.846\ cm^3/cu.\ ft.]$

VOL. OF BOTTLE (CU. FT.) 0.1463

$\therefore 4144\ cm^3 / 28316.846\ cm^3/cu.\ ft.$

$= 0.1463$ cu. FT.

ADDITIONAL SILICA SAND PURCHASED FROM GALLUP SAND & GRAVEL CO. TODAY

DATE FRI 8-11-89

DATA SHEET FOR COMPUTING UNIT WT. OF SAND

	1	2	3	4
WT. SAND + BOTTLE	6518	6514	6510	6514
WT. OF BOTTLE	195	→		
WT. OF SAND	6323	6319	6315	6319
VOL. OF BOTTLE (*)	0.1463 CU. FT.			
- SEE BELOW -				
UNIT WT. OF SAND P.C.F.	95.3	95.2	95.2	95.2

GIVEN

453.6 g = 1 POUND

95.2 P.C.F. AVERAGE

(*) VOLUME OF BOTTLE (USING TAP WATER)

MASS BOTTLE w/ H_2O	4339
MASS OF BOTTLE	195
MASS OF H_2O g	4144
VOL. OF BOTTLE (cm^3)	4144
CONVERSION TO CU. FT. ↓	
VOL. OF BOTTLE (CU. FT.)	0.1463

GIVEN

2.54 cm PER INCH

$(2.54)^3 = 16.387\ cm^3$ PER CU. IN.

AND $\gamma_{H_2O} = 1.0\ g/cm^3$

$[16.387\ cm^3/CU.\ IN] \times [1728\ CU.\ IN./CU.\ FT.]$

$= [28316.846\ cm^3/CU.\ FT.]$

$\therefore 4144\ cm^3 / 28316.846\ cm^3/CU.\ FT.$

$= 0.1463$ CU. FT.

SERGENT, HAUSKINS & BECKWITH CONSULTING GEOTECHNICAL ENGINEERS

APPLIED SOIL MECHANICS • ENGINEERING GEOLOGY • MATERIALS ENGINEERING • HYDROLOGY

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LAWRENCE A HANSEN, PH D, P E
RALPH E WEEKS, P G
DARREL L BUFFINGTON, P E
DONALD VAN BUSKIRK, P G
JOHN B. HAUSKINS, P E
DALE V. BEDENKOP, P E
DONALD L CURRAN, P E
J DAVID DEATHERAGE, P E
GEORGE H BECKWITH, P E
ROBERT W CROSSLEY, P E
DONALD G METZGER, P G
JOHN A CRYSTAL, P E
ROBERT D BOOTH, P E
NORMAN H WETZ, P E
ROBERT L FREW
ALLON C OWEN JR, P E

DAILY INSPECTION REPORT

Job No. C89-5034 Report No. _____ Date 8-7-89

Project CHURCHROCK RECLAMATION PROJECT

Location CHURCHROCK, NM

Client UNITED NUCLEAR CORP.

Contractor NIELSON'S

Superintendent BRUCE

Weather PT. CLOUDY, MILD, LT. WINDS

Travel Time _____ Time Arrived 9:45 Time Left 5:00 Total Time _____

REMARKS Contractor was continuing w/ fill for soil cover from mat'l excavated from diversion ditch N. of gravel road. Most of the fill was being placed in an East-West fashion @ the center portion of the N. cell - roughly 100' wide. This was being compacted exclusively w/ the "Cat" 825 sheeps-foot roller. After Matt Yarnell had arrived, the (2) of us along w/ Jim Fletcher consulted w/ Bruce regarding where he was ready to test. He told us a spot was designated as being representative for the fill which had been placed today. I performed a sand cone & promptly took the mat'l back to the trailer to obtain a wet density. I also performed several calibrations on how much sand was being occupied by the cone itself, since this figure will be used in successive tests made during the week.

(1530g)

(THIS SHEET TO ACCOMPANY SAND CONE #S.C 24)

Inspector David McKenzie

REPLY TO: 4700 LINCOLN ROAD, N.E., ALBUQUERQUE, NEW MEXICO 87109

PHOENIX (602) 272-6848 ALBUQUERQUE (505) 884-0950 SANTA FE (505) 471-7836 SALT LAKE CITY (801) 566-5411 EL PASO (915) 778-3369

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ALLON C. OWEN, JR., P.E.

DAILY INSPECTION REPORT

Job No. C89-5034 Report No. _____ Date 8-8-89

Project CHURCHROCK RECLAMATION PROJECT

Location CHURCHROCK NM

Client UNITED NUCLEAR CORP.

Contractor NIELSON'S

Superintendent BRUCE

Weather PT. CLOUDY & MILD

Travel Time _____ Time Arrived 8:30 Time Left 5:00 Total Time _____

REMARKS While in Gallup this morning, went over to Gallup Sand & Gravel to buy a 100 lb. sack of Silica Sand for Sand cones ($6.25). After arriving @ inspection trailer I immediately began procedures to calc. its unit weight. After several trials, this turned-out to be 95.4 P.C.F. The large beam-balance scale was also checked for accuracy (as is done almost daily) using (3) "1000 gram" fixed-mass counter-weights for the smaller beam balance. Calibration of the Cone was performed several times yielding an ave. of 1768g w/plate. - SEE DATA SHEET FOR NEW SAND -

Inspector David McKeen

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JOHN A CRYSTAL, P E
ROBERT D BOOTH, P E
NORMAN H WETZ, P E
ROBERT L FREW
ALLON C OWEN JR, P E

DAILY INSPECTION REPORT

Job No. C89-5034 Report No. _____ Date 7-9-89

Project CHURCHROCK RECLAMATION PROJECT

Location CHURCHROCK, NM

Client UNITED NUCLEAR CORP.

Contractor NIELSON'S

Superintendent BRUCE

Weather PT. CLOUDY - MOSTLY CLOUDY, MILD

Travel Time _____ Time Arrived 7:00 Time Left 5:00 Total Time _____

REMARKS After determining the moisture results for the previous day's (3) Sand Cones, Matt suggested that a 1-point proctor be performed to verify proctor accuracy & also to consult w/the N.R.C. specs. The area chosen was the same exact spot where I'd done sand cone #27 (yesterday). A sand cone was performed on newly compacted Clay soil cones. Compaction & moisture results pending oven-dried weights (Tomorrow). Sand Cone #28.

Inspector David McKenzie

REPLY TO 4700 LINCOLN ROAD, N.E., ALBUQUERQUE, NEW MEXICO 87109

PHOENIX (602) 272-6848 ALBUQUERQUE (505) 884-0950 SANTA FE (505) 471-7836 SALT LAKE CITY (801) 566-5411 EL PASO (915) 778-3369

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ROBERT D BOOTH, P E
NORMAN H WETZ, P E
ROBERT L FREW
ALLON C OWEN JR , P E

DAILY INSPECTION REPORT

Job No. C89-5034 Report No. _____ Date 8-10-89

Project CHURCHROCK RECLAMATION PROJECT

Location CHURCHROCK NM

Client UNITED NUCLEAR CORP.

Contractor NIELSON'S

Superintendent BRUCE

Weather PT. CLOUDY - THREATENING 3:4 P.M.

Travel Time _____ Time Arrived 7:45 Time Left 5:00 Total Time _____

REMARKS Results were obtained for yesterday's Sand Cone TEST and again a sample was obtained @ THE same location as S.C. # 28 for a (2) point proctor - SEE DATA SHEET - Although the dry density was 119.0 P.C.F. the (2)-point proctor results would show that the mat'l. did indeed compl. w/ Curve # F-1002: 115.6 @ 13.9%. (3) more Sand cones were performed today @ the locations given for tests #'s 30, 31, & 32. Contractor continued hauling mat'l excavated from N. ditch area. He also began watering the cones more, upon Matt & myself suggesting this in light of the relatively low moisture.

Inspector David McKenzie

REPLY TO 4700 LINCOLN ROAD, N.E., ALBUQUERQUE, NEW MEXICO 87109

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ROBERT L. FREW
ALLON C. OWEN, JR., P.E.

DAILY INSPECTION REPORT

Job No. C89-5034 Report No. _____ Date 8-11-89

Project CHURCHROCK RECLAMATION PROJECT

Location CHURCHROCK, NM

Client UNITED NUCLEAR CORP.

Contractor NIELSON'S

Superintendent BRUCE

Weather PT. CLOUDY & DRY, MILD, SPRINKLES 3:15 P.M.

Travel Time _____ Time Arrived 8:00 Time Left 5:00 Total Time _____

REMARKS Went over to Gallup Sand & Gravel again to buy another 100 lb sack of Silica sand. This as usual was checked for unit wt. - SEE DATA SHEET - and was found to have a unit wt. of 95.2 P.C.F. (slightly heavier than before of 95.4 P.C.F.) The sand was was well mixed before performing this check and as usual, only new sand was used for each test performed. (2) Tests were performed @ S.G. corner of Soil cover, moisture were placed in the oven & results will be computed on Monday 8-14-89.

8-17-89

Inspector David McKenzie

REPLY TO: 4700 LINCOLN ROAD, N.E., ALBUQUERQUE, NEW MEXICO 87109

PHOENIX (602) 272-6848 ALBUQUERQUE (505) 884-0950 SANTA FE (505) 471-7836 SALT LAKE CITY (801) 566-5411 EL PASO (915) 778-3369

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JAMES H. CLARY, C.P.G.
NICHOLAS T. KORECKI, P.E.
GERALD P. LINDSEY, P.G.
RONALD E. RAGER, P.G.
ROBERT D. BOOTH, P.E.
SUANG CHENG, P.E.
JAMES R. FAHY, P.E.
MICHAEL HULPKE, P.G.
DAVID E. PETERSON, P.G.
ALBERT C. RUCKMAN, P.E.
PAUL KAPLAN, P.E.

August 21, 1989

United Nuclear Corporation
P.O. Drawer QQ
Gallup, New Mexico 87301

SHB Job No. C89-5034

Attention: Mr. Charles G. Johnson

FIELD DENSITY TESTS

Project: 1989 Reclamation Work
Church Rock Uranium Mill

Test date: August 14, 16 and 17, 1989

Moisture-density curve #F-1001: Max. density 114.2 pcf @ 13.4% optimum moisture
#F-1002: Max. density 115.6 pcf @ 13.9% optimum moisture
#F-1003: Max. density 114.4 pcf @ 11.1% optimum moisture

Clay soil cover, tailings

Test No.	Location & Elevation	% Moisture	Dry Density (pcf)	Maximum Density (pcf)	% Compaction	% Compaction Required
Test date: August 14, 1989						
123 *	Clay soil cover at N 74535, E 59965, FSG	10.3	116.3	115.6	101	95
124 *	Clay soil cover at N 74500, E 59515, FSG	13.9	118.9	115.6	103	95
Test date: August 16, 1989						
125 *	Clay soil cover at N 74940, E 60005, FSG	12.9	109.7	114.2	96	95
126 *	Clay soil cover at N 74955, E 59585, FSG	12.9	117.4	115.6	102	95
127 *	Regraded tailings at S end of N cell at N 74205, E 59345, FSG	9.1	112.2	114.4	98	95
Test date: August 17, 1989						
128 *	Clay soil cover at N 74400 and E 59700, FSG	14.6	112.9	115.6	98	95

REPLY TO: 4700 LINCOLN ROAD, N.E., ALBUQUERQUE, NEW MEXICO 87109

PHOENIX (602) 272-6848 | TUCSON (602) 792-2779 | ALBUQUERQUE (505) 884-0950 | SANTA FE (505) 471-7836 | SALT LAKE CITY (801) 266-0720 | EL PASO (915) 778-3369

Test No.	Location & Elevation	% Moisture	Dry Density (pcf)	Maximum Density (pcf)	% Compaction	% Compaction Required
129 *	Clay soil cover at N 74345, E 59355, FSG	16.5	110.9	115.6	96	95
130 *	Clay soil caver at N 74450, E 59175, FSG	13.1	108.8	114.2	95	95

* Sand Cone Method

DM/pa

Copies: Addressee (2)

DENSITY OF SOIL IN PLACE
BY THE SANDCONE METHOD
D1556-64

JOB NO. C89-5034

PROJECT CHURCHROCK RECLAMATION PROJECT DATE 9-14-89

LOCATION CHURCHROCK, NM

CLIENT UNITED NUCLEAR CORP. CONTRACTOR NIELSON'S

MATERIAL DENSITY NO. #S.C.35

SAND CALIBRATION:

1. Wt. of Sand + Apparatus _____ lbs.
2. Wt. of Apparatus _____ lbs.
3. Wt. of Sand (1-2) _____ lbs.
4. Vol. of Apparatus _____ cf
5. Unit Wt. of Sand 95.6 pcf
   Yd = (3/4)

SURFACE CALIBRATION: 123

6. Initial Wt. _____ lbs.
7. Wt. After _____ lbs.
8. Wt. of Sand Used (6-7) = 3.989 lbs.
   1764g

9. Initial Wt. 6384 _____ lbs.
10. Wt. After 2573 _____ lbs.
11. Wt. of Sand 3811 _____ lbs.
12. Wt. of Sand Used (11-8) 2047 = 4.513 lbs.
13. Vol. of Hole (12/5) 0.04720 pcf
    Lab No. #T-1002
    Max. Unit Weight 115.6
    Opt. Moisture Content 13.9 %

14. Sample Can No. _____
15. Wet Wt. of Soil + Tare 2747 _____ lbs.
16. Wt. of Tare — _____ lbs.
17. Wet Wt. 2747 = 6.056 lbs.
18. Wet Density (17/13) 128.3 pcf
19. Dry Density 116.3 pcf
    Yd = 18/(24 + 100)

MOISTURE CONTENT:

20. Wet Wt. + Tare 2747 gm
21. Dry Wt. + Tare 2491 gm
22. Tare Wt. (#) — gm
23. Wt. of Water 256 gm
24. Moisture 10.3 %
25. % Compaction 101 %
26. % Compaction Required 95 %

REMARKS: CLAY SOIL COVER @ N. 74,535 & E. 59,965

TEST FAILED REQ'D MOISTURE SPEC.

TEST BY: D. MACKENZIE

SERGENT, HAUSKINS & BECKWITH

BY THE SANDCONE METHOD
D1556-64

JOB NO. C89-5034

PROJECT CHURCHROCK RECLAMATION PROJECT DATE 8-14-89

LOCATION CHURCHROCK, NM

CLIENT UNITED NUCLEAR CORP. CONTRACTOR NIELSON'S

MATERIAL DENSITY NO. #S.C. 361

SAND CALIBRATION:

1. Wt. of Sand + Apparatus _____ lbs.
2. Wt. of Apparatus _____ lbs.
3. Wt. of Sand (1-2) _____ lbs.
4. Vol. of Apparatus _____ cf
5. Unit Wt. of Sand 95.6 pcf
   Yd = (3/4)

SURFACE CALIBRATION: 124

6. Initial Wt. _____ lbs.
7. Wt. After _____ lbs.
8. Wt. of Sand Used (6-7) 1764g = 3.889 lbs.

9. Initial Wt. 6687g _____ lbs.
10. Wt. After 3016 _____ lbs.
11. Wt. of Sand 3671 _____ lbs.
12. Wt. of Sand Used (11-8) 1907 = 4.204 lbs.
13. Vol. of Hole (12/5) 0.04398 pcf
    Lab No. #F-1002
    Max. Unit Weight 115.6
    Opt. Moisture Content 13.9 %

14. Sample Can No. _____
15. Wet Wt. of Soil + Tare 2700 _____ lbs.
16. Wt. of Tare — _____ lbs.
17. Wet Wt. 2700g = 5.952 lbs.
18. Wet Density (17/13) 135.3 pcf
19. Dry Density 118.9 pcf
    Yd = 18/(24 + 100)

MOISTURE CONTENT:

20. Wet Wt. + Tare 2700 gm
21. Dry Wt. + Tare 2372 gm
22. Tare Wt. (#) — _____ gm
23. Wt. of Water 328 gm
24. Moisture 13.9 %
25. % Compaction 103 %
26. % Compaction Required 95 %

REMARKS: CLAY SOIL COVER @ N. 74,500 & E. 59,515

TEST PASSED BOTH MOISTURE & DENSITY REQ'MTS.

TEST BY: D. McKENZIE

#1-B

SERGENT, HAUSKINS & BECKWITH

DENSITY OF SOIL IN PLACE
BY THE SANDCONE METHOD
D1556-64

JOB NO. C89-5034

PROJECT CHURCHROCK RECLAMATION PROJECT DATE 8-16-89

LOCATION CHURCHROCK, NM

CLIENT UNITED NUCLEAR CORP. CONTRACTOR NIELSON'S

MATERIAL DENSITY NO. #S.C.37

SAND CALIBRATION:

1. Wt. of Sand + Apparatus _____ lbs.
2. Wt. of Apparatus _____ lbs.
3. Wt. of Sand (1-2) _____ lbs.
4. Vol. of Apparatus _____ cf
5. Unit Wt. of Sand 95.3 pcf
   Yd = (3/4)

SURFACE CALIBRATION: 125

6. Initial Wt. _____ lbs.
7. Wt. After _____ lbs.
8. Wt. of Sand Used (6-7) 1762 = 3.984 lbs.

9. Initial Wt. 6409 _____ lbs.
10. Wt. After 2685 _____ lbs.
11. Wt. of Sand 3724 _____ lbs.
12. Wt. of Sand Used (11-8) 1962 = 4.325 lbs.
13. Vol. of Hole (12/5) 0.04539 pcf

Lab No. #F-1001

Max. Unit Weight 114.2

Opt. Moisture Content 13.4 %

14. Sample Can No. _____
15. Wet Wt. of Soil + Tare 2549 _____ lbs.
16. Wt. of Tare — _____ lbs.
17. Wet Wt. 2549 = 5.619 lbs.
18. Wet Density (17/13) 123.8 pcf
19. Dry Density 109.7 pcf
    Yd = 18/(24 + 100)

MOISTURE CONTENT:

20. Wet Wt. + Tare 2549 gm
21. Dry Wt. + Tare 2258 gm
22. Tare Wt. (#) — _____ gm
23. Wt. of Water 291 gm
24. Moisture 12.9 %
25. % Compaction 96 %
26. % Compaction Required 95 %

REMARKS: CLAY SOIL COVER @ N. 74,940 & E. 60,005

TEST FAILED MOISTURE REQ'MT.

TEST BY: D. MACKENZIE

#1.A.

SERGENT, HAUSKINS & BECKWITH

DENSITY OF SOIL IN PLACE
BY THE SANDCONE METHOD
D1556-64

JOB NO. C89-5034

PROJECT CHURCHROCK RECLAMATION PROJECT DATE 8-16-89

LOCATION CHURCHROCK, NM

CLIENT UNITED NUCLEAR CORP. CONTRACTOR NIELSON'S

MATERIAL DENSITY NO. #38

SAND CALIBRATION:

1. Wt. of Sand + Apparatus _____ lbs.
2. Wt. of Apparatus _____ lbs.
3. Wt. of Sand (1-2) _____ lbs.
4. Vol. of Apparatus _____ cf
5. Unit Wt. of Sand 95.3 pcf
   Yd = (3/4)

SURFACE CALIBRATION: 126

6. Initial Wt. _____ lbs.
7. Wt. After _____ lbs.
8. Wt. of Sand Used (6-7) 1762 = 3.884 lbs.

9. Initial Wt. 6337 _____ lbs.
10. Wt. After 2683 _____ lbs.
11. Wt. of Sand 3654 _____ lbs.
12. Wt. of Sand Used (11-8) 1892 = 4.171 lbs.
13. Vol. of Hole (12/5) 0.04377 pcf

Lab No. #F-1002

Max. Unit Weight 115.6

Opt. Moisture Content 13.9 %

14. Sample Can No. _____
15. Wet Wt. of Soil + Tare 2632 _____ lbs.
16. Wt. of Tare — _____ lbs.
17. Wet Wt. 2632 g = 5.802 lbs.
18. Wet Density (17/13) 132.6 pcf
19. Dry Density 117.4 pcf
    Yd = 18/(24 + 100)

MOISTURE CONTENT:

20. Wet Wt. + Tare 2632 gm
21. Dry Wt. + Tare 2331 gm
22. Tare Wt. (#) — gm
23. Wt. of Water 301 gm
24. Moisture 12.9 %
25. % Compaction 102 %
26. % Compaction Required 95 %

REMARKS:

CLAY SOIL COVER @
N. 74,955 & E. 59,585

TEST FAILED MOISTURE REQ'MT.

TEST BY: D. MACKENZIE

SERGENT, HAUSKINS & BECKWITH

DENSITY OF SOIL IN PLACE
BY THE SANDCONE METHOD
D1556-64

JOB NO. C89-5034

PROJECT CHURCHROCK RECLAMATION PROJECT DATE 8-16-89

LOCATION CHURCHROCK, NM

CLIENT UNITED NUCLEAR CORP. CONTRACTOR NIELSON'S

MATERIAL DENSITY NO. #S.C.39

SAND CALIBRATION:

1. Wt. of Sand + Apparatus _____ lbs.
2. Wt. of Apparatus _____ lbs.
3. Wt. of Sand (1-2) _____ lbs.
4. Vol. of Apparatus _____ cf
5. Unit Wt. of Sand 95.3 pcf
   Yd = (3/4)

SURFACE CALIBRATION: 127

6. Initial Wt. _____ lbs.
7. Wt. After _____ lbs.
8. Wt. of Sand Used (6-7) 1762 = 3.884 lbs.

9. Initial Wt. 6349 _____ lbs.
10. Wt. After 2751 _____ lbs.
11. Wt. of Sand 3598 _____ lbs.
12. Wt. of Sand Used (11-8) 1836 = 4.048 lbs.
13. Vol. of Hole (12/5) 0.04247 pcf

Lab No. #F-1003

Max. Unit Weight 114.4

Opt. Moisture Content 11.1 %

14. Sample Can No. _____
15. Wet Wt. of Soil + Tare 2358 _____ lbs.
16. Wt. of Tare — _____ lbs.
17. Wet Wt. 2358 = 5.198 lbs.
18. Wet Density (17/13) 122.4 pcf
19. Dry Density 112.2 pcf
    Yd = 18/(24 + 100)

MOISTURE CONTENT:

20. Wet Wt. + Tare 2358 gm
21. Dry Wt. + Tare 2162 gm
22. Tare Wt. (#) — gm
23. Wt. of Water 196 gm
24. Moisture 9.1 %
25. % Compaction 98 %
26. % Compaction Required 90 %

REMARKS: REGRADED TAILINGS @ S. END OF N. CELL @ N. 74,205 & E. 59,345

TEST PASSED 90% TAILINGS FILL REQ'MT.

TEST BY: D. MACKENZIE

SERGENT, HAUSKINS & BECKWITH

BY THE SANDCONE METHOD
D1556-64

JOB NO. C89-5034

PROJECT CHURCHROCK RECLAMATION PROJECT DATE 8-17-89

LOCATION CHURCHROCK, NM

CLIENT UNITED NUCLEAR CORP. CONTRACTOR NIELSON'S

MATERIAL

DENSITY NO. #S.C. 40

SAND CALIBRATION:

1. Wt. of Sand + Apparatus _____ lbs.
2. Wt. of Apparatus _____ lbs.
3. Wt. of Sand (1-2) _____ lbs.
4. Vol. of Apparatus _____ cf
5. Unit Wt. of Sand 95.3 pcf
   Yd = (3/4)

SURFACE CALIBRATION: 122

6. Initial Wt. _____ lbs.
7. Wt. After _____ lbs.
8. Wt. of Sand Used (6-7) 1762 = 3.884 lbs.

9. Initial Wt. 6253 _____ lbs.
10. Wt. After 2720 _____ lbs.
11. Wt. of Sand 3533 _____ lbs.
12. Wt. of Sand Used (11-8) 1771 = 3.904 lbs.
13. Vol. of Hole (12/5) 0.04097 pcf

Lab No. #F-1002

Max. Unit Weight 115.6

Opt. Moisture Content 13.9 %

14. Sample Can No. _____
15. Wet Wt. of Soil + Tare 2404 _____ lbs.
16. Wt. of Tare — _____ lbs.
17. Wet Wt. 2404 = 5.300 lbs.
18. Wet Density (17/13) 129.4 pcf
19. Dry Density 112.9 pcf
    Yd = 18/(24 + 100)

MOISTURE CONTENT:

20. Wet Wt. + Tare 2404 gm
21. Dry Wt. + Tare 2098 gm
22. Tare Wt. (#) — gm
23. Wt. of Water 306 gm
24. Moisture 14.6 %
25. % Compaction 98 %
26. % Compaction Required 95 %

REMARKS:

CLAY SOIL COVER @
N. 74,400 & E. 59,700

TEST PASSED BOTH MOISTURE & DENSITY REQ'MTS.

TEST BY: D. MACKENZIE

SERGENT, HAUSKINS & BECKWITH

DENSITY OF SOIL IN PLACE
BY THE SANDCONE METHOD
D1556-64

JOB NO. C89-5034

PROJECT CHURCHROCK RECLAMATION PROJECT DATE 8-17-89

LOCATION CHURCHROCK, NM

CLIENT UNITED NUCLEAR CORP. CONTRACTOR NIELSON'S

MATERIAL DENSITY NO. #S.C. 41

SAND CALIBRATION:

1. Wt. of Sand + Apparatus _____ lbs.
2. Wt. of Apparatus _____ lbs.
3. Wt. of Sand (1-2) _____ lbs.
4. Vol. of Apparatus _____ cf
5. Unit Wt. of Sand 95.3 pcf
   Yd = (3/4)

SURFACE CALIBRATION: 129

6. Initial Wt. _____ lbs.
7. Wt. After _____ lbs.
8. Wt. of Sand Used (6-7) 1762 = 3.884 lbs.

9. Initial Wt. 6319 _____ lbs.
10. Wt. After 2787 _____ lbs.
11. Wt. of Sand 3532 _____ lbs.
12. Wt. of Sand Used (11-8) 1770 = 3.902 lbs.
13. Vol. of Hole (12/5) 0.04095 pcf

Lab No. #F-1002

Max. Unit Weight 115.6

Opt. Moisture Content 13.9 %

14. Sample Can No. _____
15. Wet Wt. of Soil + Tare _____ lbs.
16. Wt. of Tare — lbs.
17. Wet Wt. 2400 = 5.291 lbs.
18. Wet Density (17/13) 129.2 pcf
19. Dry Density 110.9 pcf
    Yd = 18/(24 + 100)

MOISTURE CONTENT:

20. Wet Wt. + Tare 2400 gm
21. Dry Wt. + Tare 2060 gm
22. Tare Wt. (#) — gm
23. Wt. of Water 340 gm
24. Moisture 16.5 %
25. % Compaction 96 %
26. % Compaction Required 95 %

REMARKS: CLAY SOIL COVER @ N. 74,345 & E. 59,355

TEST PASSED REQ'D MOISTURE & DENSITY

TEST BY: D. MACKENZIE

#1-A

SERGENT, HAUSKINS & BECKWITH

DENSITY OF SOIL IN PLACE
BY THE SANDCONE METHOD
D1556-64

JOB NO. C89-5034

PROJECT CHURCHROCK RECLAMATION PROJECT DATE 8-17-89

LOCATION CHURCHROCK, NM

CLIENT UNITED NUCLEAR CORP. CONTRACTOR NIELSON'S

MATERIAL DENSITY NO. #S.C. 42

SAND CALIBRATION:

1. Wt. of Sand + Apparatus _____ lbs.
2. Wt. of Apparatus _____ lbs.
3. Wt. of Sand (1-2) _____ lbs.
4. Vol. of Apparatus _____ cf
5. Unit Wt. of Sand 95.3 pcf
   Yd = (3/4)

SURFACE CALIBRATION: 130

6. Initial Wt. _____ lbs.
7. Wt. After _____ lbs.
8. Wt. of Sand Used (6-7) 1762 = 3.884 lbs.

9. Initial Wt. 6264 _____ lbs.
10. Wt. After 2767 _____ lbs.
11. Wt. of Sand 3497 _____ lbs.
12. Wt. of Sand Used (11-8) 1735 = 3.825 lbs.
13. Vol. of Hole (12/5) 0.040121 pcf

Lab No. #F-1001

Max. Unit Weight 114.2

Opt. Moisture Content 13.4 %

14. Sample Can No. _____
15. Wet Wt. of Soil + Tare _____ lbs.
16. Wt. of Tare — lbs.
17. Wet Wt. 2240 = 4.938 lbs.
18. Wet Density (17/13) 123.0 pcf
19. Dry Density 108.8 pcf
    Yd = 18/(24 + 100)

MOISTURE CONTENT:

20. Wet Wt. + Tare 2240 gm
21. Dry Wt. + Tare 1981 gm
22. Tare Wt. (#) — gm
23. Wt. of Water 259 gm
24. Moisture 13.1 %
25. % Compaction 95 %
26. % Compaction Required 95 %

REMARKS:

CLAY SOIL COVER @
N. 74,450 & E. 59,175

TEST FAILED MOISTURE REQ'MT.

TEST BY: D. McKENZIE

1-3

SERGENT, HAUSKINS & BECKWITH

DATE MON. 8-14-99

DATA SHEET FOR COMPUTING UNIT WT. OF SAND

	1	2	3	4	5	6	7
WT. SAND + BOTTLE	6533	6546	6537	6530			
WT. OF BOTTLE	195	→	→	→			
WT OF SAND	6338	6351	6342	6335			
VOL. OF BOTTLE (*) -SEE BELOW-	0.1463 CU. FT.						
UNIT WT. OF SAND P.C.F.	95.5	95.7	95.6	95.5			

GIVEN
453.6 g = 1 POUND

95.6 P.C.F. AVERAGE

(*) VOLUME OF BOTTLE (USING TAP WATER)

MASS BOTTLE w/ H_2O	4339
MASS OF BOTTLE	195
MASS OF H_2O g	4144
VOL. OF BOTTLE (cm^3)	4144

GIVEN
2.54 cm PER INCH
$(2.54)^3 = 16.387\ cm^3$ PER CU. IN.
AND $\gamma\ H_2O = 1.0\ g/cm^3$

CONVERSION TO CU. FT. ↓

$[16.387\ cm^3/CU.IN] \times [1728\ CU.IN./CU.FT.]$

$= [28316.846\ cm^3/CU.FT.]$

VOL. OF BOTTLE (CU. FT.) 0.1463

$\therefore 4144\ cm^3 / 28316.846\ cm^3/CU.FT.$

$= 0.1463$ CU. FT.

DATE TUE. 8-15-89

DATA SHEET FOR COMPUTING UNIT WT. OF SAND

	1	2	3	4	5	6	7
WT. SAND + BOTTLE	6521	6519	6516	6521		GIVEN 453.6 g = 1 POUND	
WT. OF BOTTLE	195	→					
WT. OF SAND	6326	6323	6321	6326			
VOL. OF BOTTLE (*) - SEE BELOW -	0.1463 CU. FT.						
UNIT WT. OF SAND P.C.F.	95.3	95.3	95.3	95.3			

95.3 P.C.F. AVERAGE

(*) VOLUME OF BOTTLE (USING TAP WATER)

MASS BOTTLE w/H_2O	4339	GIVEN
MASS OF BOTTLE	195	2.54 cm PER INCH
MASS OF H_2O g	4144	$(2.54)^3$ = 16.387 cm^3 PER CU. IN.
VOL. OF BOTTLE (cm^3)	4144	AND γH_2O = 1.0 g/cm^3

CONVERSION TO CU. FT. ↓

$[16.387\ cm^3/CU.IN] \times [1728\ CU.IN./CU.FT.]$

$= [28316.846\ cm^3/CU.FT.]$

VOL. OF BOTTLE (CU. FT.) 0.1463

$\therefore 4144\ cm^3 / 28316.846\ cm^3/CU.FT.$

$= 0.1463$ CU. FT.

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J DAVID DEATHERAGE, P E
GEORGE H BECKWITH, P E.
ROBERT W CROSSLEY, P E
DONALD G METZGER, P G
JOHN A CRYSTAL, P E
ROBERT D BOOTH, P E
NORMAN H WETZ, P E
ROBERT L FREW
ALLON C OWEN JR , P E

DAILY INSPECTION REPORT

Job No. C89-5034 Report No. _____ Date 8-14-89

Project CHURCHROCK RECLAMATION PROJECT

Location CHURCHROCK, NM

Client UNITED NUCLEAR CORP.

Contractor NIELSON'S

Superintendent BRUCE

Weather PT. CLOUDY

Travel Time _____ Time Arrived 9:30 Time Left 5:00 Total Time _____

REMARKS Contractor was considerably short-handed of operators, said that he almost didn't end up working today. However, some fill was placed, at least enough to warrant taking (2) sand cone tests by afternoon. The fill was being placed @ the extreme S. end of the N. cell.

Inspector David McKenzie

REPLY TO 4700 LINCOLN ROAD, N.E., ALBUQUERQUE, NEW MEXICO 87109

PHOENIX (602) 272-6848 ALBUQUERQUE (505) 884-0950 SANTA FE (505) 471-7836 SALT LAKE CITY (801) 566-5411 EL PASO (915) 778-3369

SERGENT, HAUSKINS & BECKWITH CONSULTING GEOTECHNICAL ENGINEERS

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JOHN A CRYSTAL, P E
ROBERT D BOOTH, P E
NORMAN H WETZ, P E
ROBERT L FREW
ALLON C OWEN, JR, P E

DAILY INSPECTION REPORT

Job No. C89-5034 Report No. _____ Date 8-15-89

Project CHURCHROCK RECLAMATION PROJECT

Location CHURCHROCK NM

Client UNITED NUCLEAR CORP.

Contractor NIELSON'S

Superintendent BRUCE

Weather PT. CLOUDY W/SCATTERED P.M. SHOWERS

Travel Time _____ Time Arrived 8:45 Time Left 4:30 Total Time _____

REMARKS Dry wts. were obtained from yesterday's Sand cone tests and compaction and moisture results were calculated.

Sand Cone sand was also re-calibrated (as it was yesterday) and this revealed about a 0.3 lb. drop from what was previously being used.

Inspector David McKenzie

REPLY TO 4700 LINCOLN ROAD, N.E., ALBUQUERQUE, NEW MEXICO 87109

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DAILY INSPECTION REPORT

Job No. C89-5034 Report No. _____ Date 8-16-89

Project CHURCHROCK RECLAMATION

Location CHURCHROCK, NM

Client UNITED NUCLEAR CORP.

Contractor NIELSON'S

Superintendent BRUCE

Weather PT. CLOUDY - MOSTLY CLOUDY

Travel Time _____ Time Arrived 8:00 Time Left 5:00 Total Time _____

REMARKS Went over to Gallup Sand & Gravel to pick up another bag of Silica Sand. This should be the last bag needed until the job ends - however.

Fill operations continued toward the S. end of the N. cell. At one point, it was realized by Jim & Matt that there was no proctor on the tailings mat'l that had been exposed @ the extreme S. end of the N. cell - which had to be compacted to 90% in order to cover it w/ clay. With this in mind, it was determined that a proctor should be done on this mat'l. & @ least 0 density performed before placement of the clay cover. This was done in the afternoon.

Inspector David McKenzie

REPLY TO 4700 LINCOLN ROAD, N.E., ALBUQUERQUE, NEW MEXICO 87109

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ROBERT D BOOTH, P E
NORMAN H WETZ, P E
ROBERT L FREW
ALLON C OWEN JR, P E

DAILY INSPECTION REPORT

Job No. C89-5034 Report No. _____ Date 8-17-89

Project CHURCHROCK RECLAMATION PROJECT

Location CHURCHROCK, NM

Client UNITED NUCLEAR CORP.

Contractor NIELSON'S

Superintendent BRUCE BERRY

Weather P. CLOUDY W/ SCATTERED AM THUNDER

Travel Time _____ Time Arrived 8:30 Time Left 5:00 Total Time _____

REMARKS Results of proctor sounded yesterday were voided & points plotted producing the curve #F-1003 as shown (114.4 @ 11.1 %) d
The sand cone test which used this value as a proctor passed too. This now cleared the way for Bruce to fill this area w/ the clay cover mat'l. However, Bruce upon Matt's suggestion, used some of a Geo-textile matting after over-excavating a "soft" spot in the tailings - in order to prevent a "pumping" condition as much as possible @ the surface.

Inspector David McKenzie

REPLY TO 4700 LINCOLN ROAD, N.E., ALBUQUERQUE, NEW MEXICO 87109

PHOENIX (602) 272-6848 ALBUQUERQUE (505) 884-0950 SANTA FE (505) 471-7836 SALT LAKE CITY (801) 566-5411 EL PASO (915) 778-3369

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ALLON C. OWEN, JR., P.E.

DAILY INSPECTION REPORT

Job No. C29-5034 Report No. _____ Date 8-18-89

Project CHURCHROCK RECLAMATION PROJECT.

Location CHURCHROCK, NM

Client UNITED NUCLEAR CORP.

Contractor NIELSON'S

Superintendent BRUCE BERRY

Weather RAINING SINCE LAST NIGHT - CLEARING BY NOON

Travel Time _____ Time Arrived 8:00 Time Left 12:15 Total Time _____

REMARKS It started to rain the previous night in Gallup. Although @ the site it looked as though it may have started much later. Rain was consistent throughout mid-morning, which prompted Bruce to send his crew home for the day. I obtained results for yesterday's sand cones & made copies of the week's spec work for Jim Fletcher. By 10 to 10:30 AM rain started to subside until it eventually stopped. Tailings cover was quite wet (Top 2") - Matt & Jim said they would suggest to Bruce to have him work-in some of the non-soaked top layer - in order to elevate existing (DRY) moisture conditions. Jim told me that I may as well leave in light of the weather's impact on the soil cover.

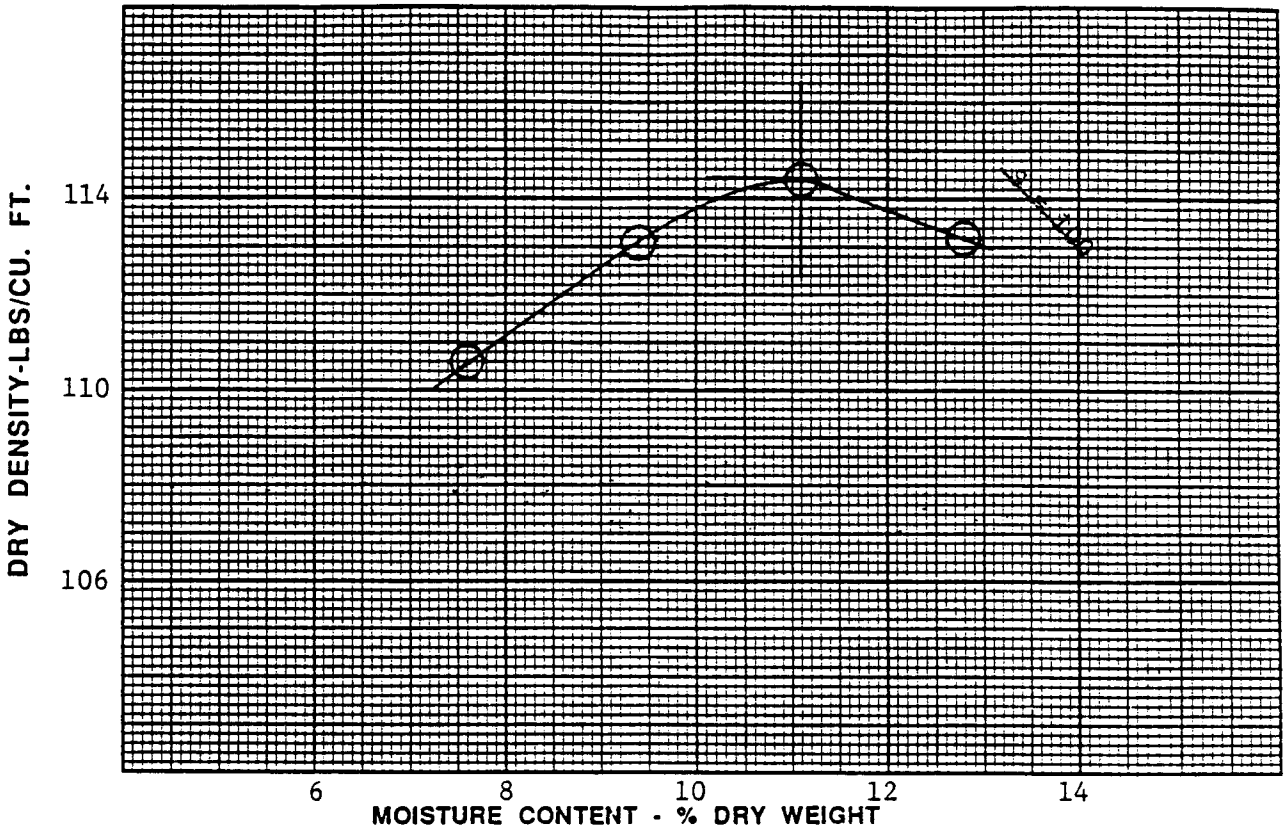
Inspector David McKenzie

REPLY TO: 4700 LINCOLN ROAD, N.E., ALBUQUERQUE, NEW MEXICO 87109

PHOENIX (602) 272-6848 ALBUQUERQUE (505) 884-0950 SANTA FE (505) 471-7836 SALT LAKE CITY (801) 566-5411 EL PASO (915) 778-3369

SUMMARY OF MOISTURE DENSITY RELATIONSHIP TESTS

PROJECT 1989 Reclamation Work - Church Rock **JOB NO.** C89-5034



CURVE	SOURCE	OPTIMUM MOISTURE CONTENT % DRY WT.	MAXIMUM DRY DENSITY LBS/CU. FT.	TEST DESIGNATION	TEST METHOD	LAB NO.
	Regraded tailings at S end of N cell at N.74,245 &	11.1	114.4	ASTM D698	A	F-1003
	E.59,365					

MOISTURE-DENSITY RELATIONSHIP TEST METHOD DATA

ASTM D698 (Standard Proctor)

METHOD	MATERIAL	MOLD DIAMETER	MOLD HEIGHT	NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS./CU. FT.
A	-#4	4"	4.58"	3	25	5.5 lbs	12"	12,375
B	-#4	6"	4.58"	3	56	5.5 lbs	12"	12,317
C	-3/4	6"	4.58"	3	56	5.5 lbs	12"	12,317
D	-3/4	6"	4.58"	3	56	5.5 lbs	12"	12,317

ASTM D1557 (Modified Proctor)

METHOD	MATERIAL	MOLD DIAMETER	MOLD HEIGHT	NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS./CU. FT.
A	-#4	4"	4.58"	5	25	10.0 lbs	18"	56,250
B	-#4	6"	4.58"	5	56	10.0 lbs	18"	55,986
C	-3/4	6"	4.58"	5	56	10.0 lbs	18"	55,986
D	-3/4	6"	4.58"	5	56	10.0 lbs	18"	55,986

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MICHAEL HULPKE, P.G.
DAVID E. PETERSON, P.G.
ALBERT C. RUCKMAN, P.E.
PAUL KAPLAN, P.E.

August 28, 1989

United Nuclear Corporation
P.O. Drawer QQ
Gallup, New Mexico 87301

SHB Job No. C89-5034

Attention: Mr. Charles G. Johnson

FIELD DENSITY TESTS

Project: 1989 Reclamation Work
Church Rock Uranium Mill

Test date: August 11, 1989

Moisture-density curve #F-1002: Max. density 115.6 pcf @ 13.9% optimum moisture

Clay soil cover

Test No.	Location & Elevation	% Moisture	Dry Density (pcf)	Maximum Density (pcf)	% Compaction	% Compaction Required
123A*	N 74745 & E 60210, FSG	12.6	115.3	115.6	100	95
124A*	N 74770 & E 59850, FSG	15.4	110.7	115.6	96	95

* Sand Cone Method

DM/pa

Copies: Addressee (2)

DENSITY OF SOIL IN PLACE
BY THE SANDCONE METHOD
D1556-64

JOB NO. C89-5034

PROJECT CHURCHROCK RECLAMATION PROJECT DATE 8-11-89

LOCATION CHURCHROCK, NM

CLIENT UNITED NUCLEAR CORP. CONTRACTOR NIELSON'S

MATERIAL DENSITY NO. #S.C.33

SAND CALIBRATION:

1. Wt. of Sand + Apparatus _____ lbs.
2. Wt. of Apparatus _____ lbs.
3. Wt. of Sand (1-2) _____ lbs.
4. Vol. of Apparatus _____ cf
5. Unit Wt. of Sand 95.2 pcf
   Yd = (3/4)

SURFACE CALIBRATION:

6. Initial Wt. _____ lbs.
7. Wt. After _____ lbs.
8. Wt. of Sand Used (6-7) =3.889 lbs.
   1764

9. Initial Wt. 6606 _____ lbs.
10. Wt. After 2996 _____ lbs.
11. Wt. of Sand 3620 _____ lbs.
12. Wt. of Sand Used (11-8) 1856 =4.092 lbs.
13. Vol. of Hole (12/5) 0.04298 pcf

Lab No. #F-1002

Max. Unit Weight 115.6

Opt. Moisture Content 13.9 %

14. Sample Can No. _____
15. Wet Wt. of Soil + Tare 2531 g _____ lbs.
16. Wt. of Tare _____ lbs.
17. Wet Wt. 2531 g = 5.580 lbs.
18. Wet Density (17/13) 129.8 pcf
19. Dry Density 115.3 pcf
    Yd = 18/(24 + 100)

MOISTURE CONTENT:

20. Wet Wt. + Tare 2531 gm
21. Dry Wt. + Tare 2248 gm
22. Tare Wt. (#) _____ gm
23. Wt. of Water 283 gm
24. Moisture 12.6 %
25. % Compaction 100 %
26. % Compaction Required 95 %

REMARKS: CLAY SOIL COVER @ N. 74,745 & E. 60,210

TEST FAILED REQ'D MOISTURE SPEC.

TEST BY: D. MACKENZIE

#1.A

SERGENT, HAUSKINS & BECKWITH

DENSITY OF SOIL IN PLACE
BY THE SANDCONE METHOD
D1556-64

JOB NO. C89-5034

PROJECT CHURCHROCK RECLAMATION PROJECT DATE 8-11-89

LOCATION CHURCHROCK, NM

CLIENT UNITED NUCLEAR CORP. CONTRACTOR NIELSON'S

MATERIAL DENSITY NO. #S.C. 34

SAND CALIBRATION:

1. Wt. of Sand + Apparatus _____ lbs.
2. Wt. of Apparatus _____ lbs.
3. Wt. of Sand (1-2) _____ lbs.
4. Vol. of Apparatus _____ cf
5. Unit Wt. of Sand 95.2 pcf
   Yd = (3/4)

SURFACE CALIBRATION: 124A

6. Initial Wt. _____ lbs.
7. Wt. After _____ lbs.
8. Wt. of Sand Used (6-7) = 3.889 lbs.
   1764

9. Initial Wt. 6354 _____ lbs.
10. Wt. After 2898 _____ lbs.
11. Wt. of Sand 3466 _____ lbs.
12. Wt. of Sand Used (11-8) 1702 = 3.752 lbs.
13. Vol. of Hole (12/5) 0.03941 pcf

Lab No. #F-1002

Max. Unit Weight 115.6

Opt. Moisture Content 13.9 %

14. Sample Can No. _____
15. Wet Wt. of Soil + Tare 2284 _____ lbs.
16. Wt. of Tare — _____ lbs.
17. Wet Wt. 2284 = 5.035 lbs.
18. Wet Density (17/13) 127.8 pcf
19. Dry Density 110.7 pcf
    Yd = 18/(24 + 100)

MOISTURE CONTENT:

20. Wet Wt. + Tare 2284 gm
21. Dry Wt. + Tare 1979 gm
22. Tare Wt. (#) — _____ gm
23. Wt. of Water 305 gm
24. Moisture 15.4 %
25. % Compaction 96 %
26. % Compaction Required 95 %

REMARKS:
CLAY SOIL COVER @
N 74,770 & E. 59,850

TEST PASSED BOTH MOISTURE & DENSITY REQ'MTS.

TEST BY: D. MACKENZIE

#1-B

SERGENT, HAUSKINS & BECKWITH
CONSULTING SOIL AND FOUNDATION ENGINEERS
PHOENIX • TUCSON • ALBUQUERQUE • EL PASO

SERGENT, HAUSKINS & BECKWITH CONSULTING GEOTECHNICAL ENGINEERS

APPLIED SOIL MECHANICS • ENGINEERING GEOLOGY • MATERIALS ENGINEERING • HYDROLOGY

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August 28, 1989

United Nuclear Corporation
P.O. Drawer QQ
Gallup, New Mexico 87301

SHB Job No. C89-5034

Attention: Mr. Charles G. Johnson

FIELD DENSITY TESTS

Project: 1989 Reclamation Work
Church Rock Uranium Mill

Test dates: August 21 through 25, 1989

Moisture-density curve #F-1001: Max. density 114.2 pcf @ 13.4% optimum moisture
#F-1002: Max. density 115.6 pcf @ 13.9% optimum moisture
#F-1004: Max. density 114.7 pcf @ 14.4% optimum moisture
#1366: Max. density 113.7 pcf @ 14.0% optimum moisture

Clay soil cover

Test No.	Location & Elevation	% Moisture	Dry Density (pcf)	Maximum Density (pcf)	% Compaction	% Compaction Required
Test date: August 21, 1989						
131 *	N 74410 & E 58955, FSG	12.1	110.7	115.6	96	95
132 *	N 74280 & E 59135, FSG	14.4	118.9	114.7	104	95
133 *	N 74250 & E 59530, FSG	14.5	114.7	114.7	100	95
Test date: August 22, 1989						
134 *	N 74535 & E 59965, FSG RETEST of test #123 on August 14, 1989	12.9	118.5	115.6	103	95
135 *	N 74710 & 60080, FSG RETEST of test #114 on August 7, 1989	17.6	111.2	115.6	96	95
136 *	N 74625 & E 59100, FSG	14.9	111.7	113.7	98	95
137 *	N 74760 & E 59250, FSG	13.4	117.3	113.7	103	95

REPLY TO: 4700 LINCOLN ROAD, N.E., ALBUQUERQUE, NEW MEXICO 87109

PHOENIX (602) 272-6848 TUCSON (602) 792-2779 ALBUQUERQUE (505) 884-0950 SANTA FE (505) 471-7836 SALT LAKE CITY (801) 266-0720 EL PASO (915) 778-3369

Test No.	Location & Elevation	% Moisture	Dry Density (pcf)	Maximum Density (pcf)	% Compaction	% Compaction Required
Test date: August 23, 1989						
138 *	N 74630 & E 59690, FSG, RETEST of test #121 on August 10, 1989	14.4	116.3	114.2	102	95
139 *	N 74740 & E 59460, FSG, RETEST of test #122 on August 10, 1989	16.5	116.8	114.2	102	95
140 *	N 74590 & E 59300, FSG RETEST of #120 on 8/10/89	15.2	114.8	113.7	101	95
141 *	N 74450 & E 59175, FSG RETEST of test #130 on August 17, 1989	17.1	114.0	114.2	100	95
142 *	N 74410 & E 58955, FSG RETEST of test #131	12.5	115.8	115.6	100	95
143 *	N 74760 & E 59250, FSG RETEST of test #137	15.5	114.0	113.7	100	95
144 *	N 74875 & E 59750, FSG RETEST of test #117 on August 8, 1989	15.7	113.7	113.7	100	95
145 *	N 74945 & E 60275, FSG RETEST of test #118 on August 9, 1989	14.0	114.6	115.6	99	95
146 *	Compacted clay barrier at N 74930 & E 60380, FSG RETEST of test #106 on August 2, 1989	13.7	110.9	114.2	97	95
Test date: August 24, 1989						
147 *	N 74535 & E 59965, FSG RETEST of test #134	14.4	113.7	115.6	98	95
148 *	N 74745 & E 60210, FSG RETEST of test #123A on August 11, 1989	13.0	116.5	115.6	101	95
149 *	N 74410 & E 58955, FSG RETEST of #142	15.8	113.6	115.6	98	95

Test No.	Location & Elevation	% Moisture	Dry Density (pcf)	Maximum Density (pcf)	% Compaction	% Compaction Required
150 *	N 74875 & E 59415, FSG	14.9	112.3	115.6	97	95
151 *	N 74955 & E 59585, FSG RETEST of #126 on Aug. 16, 1989	14.0	115.0	115.6	99	95
152 *	N 74940 & E 60005, FSG RETEST of #125 on Aug. 16, 1989	16.1	114.0	114.2	100	95
153 *	N 74745 & E 60210, FSG RETEST of test #148	13.3	112.7	112.7	97	95
Test date: August 25, 1989						
154 *	N 74745 & E 60210, FSG RETEST of test #153	13.9	113.3	115.6	98	95

* Sand Cone Method

DM/pa

Copies: Addressee (2)

BY THE SANDCONE METHOD
D1556-64

JOB NO. C89-5034

PROJECT CHURCHROCK RECLAMATION PROJECT DATE 8-21-89

LOCATION CHURCHROCK, NM

CLIENT UNITED NUCLEAR CORP. CONTRACTOR NIELSON'S

MATERIAL DENSITY NO. #S.C. 43

SAND CALIBRATION:

1. Wt. of Sand + Apparatus _____ lbs.
2. Wt. of Apparatus _____ lbs.
3. Wt. of Sand (1-2) _____ lbs.
4. Vol. of Apparatus _____ cf
5. Unit Wt. of Sand 95.3 pcf
   Yd = (3/4)

SURFACE CALIBRATION: 131

6. Initial Wt. _____ lbs.
7. Wt. After _____ lbs.
8. Wt. of Sand Used (6-7) 17.65 - 3.884 lbs.

9. Initial Wt. 5889 _____ lbs.
10. Wt. After 3107 _____ lbs.
11. Wt. of Sand 3782 _____ lbs.
12. Wt. of Sand Used (11-8) 7.889 - 4.453 lbs.
13. Vol. of Hole (12/5) 0.04672 pcf
    Lab No. # F-1002
    Max. Unit Weight 115.6
    Opt. Moisture Content 13.9 %

14. Sample Can No. _____
15. Wet Wt. of Soil + Tare _____ lbs.
16. Wt. of Tare _____ lbs.
17. Wet Wt. 2631 - 5.800 lbs.
18. Wet Density (17/13) 124.1 pcf
19. Dry Density 110.7 pcf
    Yd = 18/(24 + 100)

MOISTURE CONTENT:

20. Wet Wt. + Tare 2631 gm
21. Dry Wt. + Tare 2346 gm
22. Tare Wt. (#) — gm
23. Wt. of Water 285 gm
24. Moisture 12.1 %
25. % Compaction 96 %
26. % Compaction Required 95 %

REMARKS: CLAY SOIL COVER @ N. 74,410 & E. 58,955

TEST FAILED MOISTURE REQ'MT

TEST BY: D. McKENZIE

SERGENT, HAUSKINS & BECKWITH

BY THE SANDCONE METHOD
D1556-64

JOB NO. C89-5034

PROJECT CHURCHROCK RECLAMATION PROJECT DATE 8-21-89

LOCATION CHURCHROCK, NM

CLIENT UNITED NUCLEAR CORP. CONTRACTOR NIELSON'S

MATERIAL DENSITY NO. #S.C. 414

SAND CALIBRATION:

1. Wt. of Sand + Apparatus _____ lbs.
2. Wt. of Apparatus _____ lbs.
3. Wt. of Sand (1-2) _____ lbs.
4. Vol. of Apparatus _____ cf
5. Unit Wt. of Sand 95.2 pcf
   Yd = (3/4)

SURFACE CALIBRATION: 132

6. Initial Wt. _____ lbs.
7. Wt. After _____ lbs.
8. Wt. of Sand Used (6-7) 1764 = 3.889 lbs.

9. Initial Wt. 6436 _____ lbs.
10. Wt. After 2911 _____ lbs.
11. Wt. of Sand 3525 _____ lbs.
12. Wt. of Sand Used (11-8) 1761 = 3.882 lbs.
13. Vol. of Hole (12/5) 0.04082 pcf

Lab No. #F-1005

Max. Unit Weight 114.7

Opt. Moisture Content 14.4 %

14. Sample Can No. _____
15. Wet Wt. of Soil + Tare _____ lbs.
16. Wt. of Tare _____ lbs.
17. Wet Wt. 2519 = 5.553 lbs.
18. Wet Density (17/13) 136.0 pcf
19. Dry Density 118.9 pcf
    Yd = 18/(24 + 100)

MOISTURE CONTENT:

20. Wet Wt. + Tare 2519 gm
21. Dry Wt. + Tare 2202 gm
22. Tare Wt. (#) — gm
23. Wt. of Water 317 gm
24. Moisture 14.4 %
25. % Compaction 104 %
26. % Compaction Required 95 %

REMARKS: CLAY SOIL COVER @ N. 74,280 & E. 59,135

TEST PASSED BOTH MOISTURE & DENSITY REQ'MT.

TEST BY: D. MACKENZIE

SERGENT, HAUSKINS & BECKWITH

BY THE SANDCONE METHOD
D1556-64

JOB NO. C89-5034

PROJECT CHURCHROCK RECLAMATION PROJECT DATE 8-21-89

LOCATION CHURCHROCK, NM

CLIENT UNITED NUCLEAR CORP. CONTRACTOR NIELSON'S

MATERIAL DENSITY NO. #S.C.45

SAND CALIBRATION:

1. Wt. of Sand + Apparatus _____ lbs.
2. Wt. of Apparatus _____ lbs.
3. Wt. of Sand (1-2) _____ lbs.
4. Vol. of Apparatus _____ cf
5. Unit Wt. of Sand 95.2 pcf
   Yd = (3/4)

SURFACE CALIBRATION: 133

6. Initial Wt. _____ lbs.
7. Wt. After _____ lbs.
8. Wt. of Sand Used (6-7) 1764 = 3.889 lbs.

9. Initial Wt. 6365 _____ lbs.
10. Wt. After 2899 _____ lbs.
11. Wt. of Sand 3464 _____ lbs.
12. Wt. of Sand Used (11-8) 1702 = 3.752 lbs.
13. Vol. of Hole (12/5) 0.03941 pcf

Lab No. #1005

Max. Unit Weight 114.7

Opt. Moisture Content 14.4 %

14. Sample Can No. _____
15. Wet Wt. of Soil + Tare _____ lbs.
16. Wt. of Tare — lbs.
17. Wet Wt. 2347 = 5.174 lbs.
18. Wet Density (17/13) 131.3 pcf
19. Dry Density 114.7 pcf
    Yd = 18/(24 + 100)

MOISTURE CONTENT:

20. Wet Wt. + Tare 2347 gm
21. Dry Wt. + Tare 2049 gm
22. Tare Wt. (#) — gm
23. Wt. of Water 298 gm
24. Moisture 14.5 %
25. % Compaction 100 %
26. % Compaction Required 95 %

REMARKS: CLAY SOIL COVER @ N. 74,250 & E. 59,530

TEST PASSED BOTH MOISTURE & DENSITY REQUIRMT.

TEST BY: D. MACKEY

#1-B

SERGENT, HAUSKINS & BECKWITH

BY THE SANDCONE METHOD
D1556-64

JOB NO. C89-5034

PROJECT CHURCHROCK RECLAMATION PROJECT DATE 8-22-89

LOCATION CHURCHROCK, NM

CLIENT UNITED NUCLEAR CORP. CONTRACTOR NIELSON'S

MATERIAL DENSITY NO. #S.C. 46

SAND CALIBRATION:

1. Wt. of Sand + Apparatus _____ lbs.
2. Wt. of Apparatus _____ lbs.
3. Wt. of Sand (1-2) _____ lbs.
4. Vol. of Apparatus _____ cf
5. Unit Wt. of Sand 95.2 pcf
   Yd = (3/4)

SURFACE CALIBRATION: 134

6. Initial Wt. _____ lbs.
7. Wt. After _____ lbs.
8. Wt. of Sand Used (6-7) 1764 = 3.889 lbs.

9. Initial Wt. 6604 _____ lbs.
10. Wt. After 3151 _____ lbs.
11. Wt. of Sand 3453 _____ lbs.
12. Wt. of Sand Used (11-8) 1689 = 3.724 lbs.
13. Vol. of Hole (12/5) 0.03911 pcf

Lab No. # F-1002

Max. Unit Weight 115.6

Opt. Moisture Content 13.9 %

14. Sample Can No. _____
15. Wet Wt. of Soil + Tare _____ lbs.
16. Wt. of Tare — lbs.
17. Wet Wt. 2374 = 5.234 lbs.
18. Wet Density (17/13) 133.8 pcf
19. Dry Density 118.5 pcf
    Yd = 18/(24 + 100)

MOISTURE CONTENT:

20. Wet Wt. + Tare 2374 gm
21. Dry Wt. + Tare 2102 gm
22. Tare Wt. (#) — gm
23. Wt. of Water 272 gm
24. Moisture 12.9 %
25. % Compaction 103 %
26. % Compaction Required 95 %

REMARKS: CLAY SOIL COVER @ N. 74,535 & E. 59,965

TEST FAILED MOISTURE REQ'MT.

RETEST OF #S.C. 35 ON 8-14-89

TEST BY: D. MACKENZIE

SERGENT, HAUSKINS & BECKWITH

BY THE SANDCONE METHOD
D1556-64

JOB NO. C89-5034

PROJECT CHURCHROCK RECLAMATION PROJECT DATE 8-22-89

LOCATION CHURCHROCK, NM

CLIENT UNITED NUCLEAR CORP. CONTRACTOR NIELSON'S

MATERIAL DENSITY NO. #S.C. 47

SAND CALIBRATION:

1. Wt. of Sand + Apparatus _____ lbs.
2. Wt. of Apparatus _____ lbs.
3. Wt. of Sand (1-2) _____ lbs.
4. Vol. of Apparatus _____ cf
5. Unit Wt. of Sand 95.2 pcf
   Yd = (3/4)

SURFACE CALIBRATION: 135

6. Initial Wt. _____ lbs.
7. Wt. After _____ lbs.
8. Wt. of Sand Used (6-7) 1764 = 3.889 lbs.

9. Initial Wt. 6278 _____ lbs.
10. Wt. After 2837 _____ lbs.
11. Wt. of Sand 3441 _____ lbs.
12. Wt. of Sand Used (11-8) 1677 = 3.697 lbs.
13. Vol. of Hole (12/5) 0.03883 pcf

Lab No. # F-1002

Max. Unit Weight 115.6

Opt. Moisture Content 13.9 %

14. Sample Can No. _____
15. Wet Wt. of Soil + Tare _____ lbs.
16. Wt. of Tare — lbs.
17. Wet Wt. 2303 = 5.077 lbs.
18. Wet Density (17/13) 130.8 pcf
19. Dry Density 111.2 pcf
    Yd = 18/(24 + 100)

MOISTURE CONTENT:

20. Wet Wt. + Tare 2303 gm
21. Dry Wt. + Tare 1959 gm
22. Tare Wt. (#) — gm
23. Wt. of Water 344 gm
24. Moisture 17.6 %
25. % Compaction 96 %
26. % Compaction Required 95 %

REMARKS: CLAY SOIL COVER @ N. 74,710 & E. 60,080

TEST PASSED MOISTURE & DENSITY REQMT.
RETEST OF #S.C. 24 ON 8-7-89

TEST BY: D. MACKENZIE

SERGENT, HAUSKINS & BECKWITH

BY THE SANDCONE METHOD
D1556-64

JOB NO. C89-5034

PROJECT CHURCHROCK RECLAMATION PROJECT DATE 8-22-89

LOCATION CHURCHROCK, NM

CLIENT UNITED NUCLEAR CORP. CONTRACTOR NIELSON'S

MATERIAL DENSITY NO. #S.C. 48

SAND CALIBRATION:

1. Wt. of Sand + Apparatus _____ lbs.
2. Wt. of Apparatus _____ lbs.
3. Wt. of Sand (1-2) _____ lbs.
4. Vol. of Apparatus _____ cf
5. Unit Wt. of Sand 95.2 pcf
   Yd = (3/4)

SURFACE CALIBRATION: 136

6. Initial Wt. _____ lbs.
7. Wt. After _____ lbs.
8. Wt. of Sand Used (6-7) 1764 = 3.887 lbs.

9. Initial Wt. 5789 _____ lbs.
10. Wt. After 2144 _____ lbs.
11. Wt. of Sand 3645 _____ lbs.
12. Wt. of Sand Used (11-8) 1881 = 4.147 lbs.
13. Vol. of Hole (12/5) 0.04356 pcf

Lab No. #1366

Max. Unit Weight 113.7

Opt. Moisture Content 14.0%

14. Sample Can No. _____
15. Wet Wt. of Soil + Tare _____ lbs.
16. Wt. of Tare — lbs.
17. Wet Wt. 2536 = 5.591 lbs.
18. Wet Density (17/13) 128.3 pcf
19. Dry Density 111.7 pcf
    Yd = 18/(24 + 100)

MOISTURE CONTENT:

20. Wet Wt. + Tare 2536 gm
21. Dry Wt. + Tare 2207 gm
22. Tare Wt. (#) — gm
23. Wt. of Water 329 gm
24. Moisture 14.9 %
25. % Compaction 98 %
26. % Compaction Required 95 %

REMARKS: CLAY SOIL COVER @ N. 74,625 & E. 59,100

TEST PASSED BOTH MOISTURE & DENSITY REQ'MTS.

TEST BY: D. MACKENZIE

SERGENT, HAUSKINS & BECKWITH

BY THE SANDCONE METHOD
D1556-64

JOB NO. C89-5034

PROJECT CHURCHROCK RECLAMATION PROJECT DATE 8-22-89

LOCATION CHURCHROCK, NM

CLIENT UNITED NUCLEAR CORP. CONTRACTOR NIELSON'S

MATERIAL DENSITY NO. #S.C. 49

SAND CALIBRATION:

1. Wt. of Sand + Apparatus _____ lbs.
2. Wt. of Apparatus _____ lbs.
3. Wt. of Sand (1-2) _____ lbs.
4. Vol. of Apparatus _____ cf
5. Unit Wt. of Sand 95.2 pcf
   Yd = (3/4)

SURFACE CALIBRATION: 137

6. Initial Wt. _____ lbs.
7. Wt. After _____ lbs.
8. Wt. of Sand Used (6-7) 1764 = 3.889 lbs.

9. Initial Wt. 5996 _____ lbs.
0. Wt. After 2324 _____ lbs.
11. Wt. of Sand 3672 _____ lbs.
12. Wt. of Sand Used (11-8) 1908 = 4.206 lbs.
13. Vol. of Hole (12/5) 0.04418 pcf
    Lab No. = 1366
    Max. Unit Weight 113.7
    Opt. Moisture Content 14.0 %

14. Sample Can No. _____
15. Wet Wt. of Soil + Tare _____ lbs.
16. Wt. of Tare — lbs.
17. Wet Wt. 2666 = 5.877 lbs.
18. Wet Density (17/13) 133.0 pcf
19. Dry Density 117.3 pcf
    Yd = 18/(24 + 100)

MOISTURE CONTENT:

20. Wet Wt. + Tare 1016.2 gm
21. Dry Wt. + Tare 896.3 gm
22. Tare Wt. (#) — gm
23. Wt. of Water 120.5 gm
24. Moisture 13.4 %
25. % Compaction 103 %
26. % Compaction Required 95 %

REMARKS: CLAY SOIL COVER @ N. 74,760 & E. 59,250

TEST FAILED MOISTURE REQ'MT.

TEST BY: D. MACKENZIE

SERGENT, HAUSKINS & BECKWITH

DENSITY OF SOIL IN PLACE
BY THE SANDCONE METHOD
D1556-64

JOB NO. C89-5034

PROJECT CHURCHROCK RECLAMATION PROJECT DATE 8-23-89

LOCATION CHURCHROCK, NM

CLIENT UNITED NUCLEAR CORP. CONTRACTOR NIELSON'S

MATERIAL DENSITY NO. #S.C. 50

SAND CALIBRATION:

1. Wt. of Sand + Apparatus _____ lbs.
2. Wt. of Apparatus _____ lbs.
3. Wt. of Sand (1-2) _____ lbs.
4. Vol. of Apparatus _____ cf
5. Unit Wt. of Sand 95.2 pcf
   Yd = (3/4)

SURFACE CALIBRATION: 13%

6. Initial Wt. _____ lbs.
7. Wt. After _____ lbs.
8. Wt. of Sand Used (6-7) 1764 = 3.859 lbs.

9. Initial Wt. 5953 _____ lbs.
10. Wt. After 2414 _____ lbs.
11. Wt. of Sand 3539 7.802 lbs.
12. Wt. of Sand Used (11-8) 3.859 lbs.
13. Vol. of Hole (12/5) 0.04110 pcf

Lab No. #F-1001

Max. Unit Weight 114.2

Opt. Moisture Content 13.4 %

14. Sample Can No. _____
15. Wet Wt. of Soil + Tare _____ lbs.
16. Wt. of Tare _____ lbs.
17. Wet Wt. 2480 = 5467 lbs.
18. Wet Density (17/13) 133.0 pcf
19. Dry Density 116.3 pcf
    Yd = 18/(24 + 100)

MOISTURE CONTENT:

20. Wet Wt. + Tare 743.5 gm
21. Dry Wt. + Tare 677.3 gm
22. Tare Wt. (#) 216.6 gm
23. Wt. of Water 66.2 gm
24. Moisture 14.4 %
25. % Compaction 102 %
26. % Compaction Required 95 %

REMARKS: CLAY SOIL COVER @ N 74,630 & E 59,690
RETEST OF #S.C. 31 ON 8-10-89

TEST PASSED BOTH MOISTURE & DENSITY REQ'MT.

TEST BY: D. MACKENZIE

SERGENT, HAUSKINS & BECKWITH

DENSITY OF SOIL IN PLACE
BY THE SANDCONE METHOD
D1556-64

JOB NO. C89-5034

PROJECT CHURCHROCK RECLAMATION PROJECT DATE 8-23-89

LOCATION CHURCHROCK, NM

CLIENT UNITED NUCLEAR CORP. CONTRACTOR NIELSON'S

MATERIAL DENSITY NO. #S.C. 51

SAND CALIBRATION:

1. Wt. of Sand + Apparatus _____ lbs.
2. Wt. of Apparatus _____ lbs.
3. Wt. of Sand (1-2) _____ lbs.
4. Vol. of Apparatus _____ cf
5. Unit Wt. of Sand 95.2 pcf
   Yd = (3/4)

SURFACE CALIBRATION: 139

6. Initial Wt. _____ lbs.
7. Wt. After _____ lbs.
8. Wt. of Sand Used (6-7) 1764 = 3.889 lbs.

9. Initial Wt. 6130 lbs.
10. Wt. After 2561 lbs.
11. Wt. of Sand 3569 lbs.
12. Wt. of Sand Used (11-8) 1805 = 3.979 lbs.
13. Vol. of Hole (12/5) 0.04180 pcf

Lab No. #F-1001

Max. Unit Weight 114.2

Opt. Moisture Content 13.4

14. Sample Can No. _____
15. Wet Wt. of Soil + Tare _____ lbs.
16. Wt. of Tare _____ lbs.
17. Wet Wt. 2580 = 5.688 lbs.
18. Wet Density (17/13) 136.1 pcf
19. Dry Density 116.8 pcf
    Yd = 18/(24 + 100)

MOISTURE CONTENT:

20. Wet Wt. + Tare 866.0 gm
21. Dry Wt. + Tare 760.9 gm
22. Tare Wt. (#) 123.2 gm
23. Wt. of Water 105.1 gm
24. Moisture 16.5 %
25. % Compaction 102 %
26. % Compaction Required 95 %

REMARKS: CLAY SOIL COVER @ N. 74,740 & E. 59,460
RETEST OF #S.C.32 ON 8-10-89

TEST PASSED BOTH MOISTURE & DENSITY REQ'MT.

TEST BY: D. MACKENZIE

SERGENT, HAUSKINS & BECKWITH

DENSITY OF SOIL IN PLACE
BY THE SANDCONE METHOD
D1556-64

JOB NO. C89-5034

PROJECT CHURCHROCK RECLAMATION PROJECT DATE 8-23-89

LOCATION CHURCHROCK, NM

CLIENT UNITED NUCLEAR CORP. CONTRACTOR NIELSON'S

MATERIAL DENSITY NO. #S.C.52

SAND CALIBRATION:

1. Wt. of Sand + Apparatus _____ lbs.
2. Wt. of Apparatus _____ lbs.
3. Wt. of Sand (1-2) _____ lbs.
4. Vol. of Apparatus _____ cf
5. Unit Wt. of Sand 95.2 pcf
   Yd = (3/4)

SURFACE CALIBRATION: 1/10

6. Initial Wt. _____ lbs.
7. Wt. After _____ lbs.
8. Wt. of Sand Used (6-7) 1764 = 3.889 lbs.

9. Initial Wt. 5909 lbs.
10. Wt. After 2362 lbs.
11. Wt. of Sand 3547 lbs.
12. Wt. of Sand Used (11-8) 1783 = 3.931 lbs.
13. Vol. of Hole (12/5) 0.04129 pcf

Lab No. #13660

Max. Unit Weight 113.7

Opt. Moisture Content 14.0

14. Sample Can No. _____
15. Wet Wt. of Soil + Tare _____ lbs.
16. Wt. of Tare _____ lbs.
17. Wet Wt. 2481 = 5.470 lbs.
18. Wet Density (17/13) 132.5 pcf
19. Dry Density 114.8 pcf
    Yd = 18/(24 + 100)

MOISTURE CONTENT:

20. Wet Wt. + Tare 1021.0 gm
21. Dry Wt. + Tare 941.7 gm
22. Tare Wt. (#) 418.5 gm
23. Wt. of Water 79.3 gm
24. Moisture 15.2 %
25. % Compaction 101 %
26. % Compaction Required 95 %

REMARKS: CLAY SOIL COVER @ N. 74,590 & E. 59,300

~~RETEST OF #S.C.49 ON 8-22-89~~

100% RETEST OF #20 ON 8-10-89

TEST PASSED BOTH MOISTURE & DENSITY REQ'MT.

TEST BY: D. MACKENZIE

SERGENT, HAUSKINS & BECKWITH

DENSITY OF SOIL IN PLACE
BY THE SANDCONE METHOD
D1556-64

JOB NO. C89-5034

PROJECT CHURCHROCK RECLAMATION PROJECT DATE 8-23-89

LOCATION CHURCHROCK, NM

CLIENT UNITED NUCLEAR CORP. CONTRACTOR NIELSON'S

MATERIAL DENSITY NO. #S.C. 53

SAND CALIBRATION:

1. Wt. of Sand + Apparatus _____ lbs.
2. Wt. of Apparatus _____ lbs.
3. Wt. of Sand (1-2) _____ lbs.
4. Vol. of Apparatus _____ cf
5. Unit Wt. of Sand 95.2 pcf
   Yd = (3/4)

SURFACE CALIBRATION: 1211

6. Initial Wt. _____ lbs.
7. Wt. After _____ lbs.
8. Wt. of Sand Used (6-7) 1764 = 3.935 lbs.

9. Initial Wt. 5812 _____ lbs.
10. Wt. After 2276 _____ lbs.
11. Wt. of Sand 3536 _____ lbs.
12. Wt. of Sand Used (11-8) 1772 = 3.9065 lbs.
13. Vol. of Hole (12/5) 0.041035 pcf

Lab No. F-1601

Max. Unit Weight 114.2

Opt. Moisture Content 13.4

14. Sample Can No. _____
15. Wet Wt. of Soil + Tare 2484 _____ lbs.
16. Wt. of Tare — _____ lbs.
17. Wet Wt. 2484 5.476 lbs.
18. Wet Density (17/13) 133.454 pcf
19. Dry Density 114.0 pcf
    Yd = 18/(24 + 100)

MOISTURE CONTENT:

20. Wet Wt. + Tare 1095.3 gm
21. Dry Wt. + Tare 996.7 gm
22. Tare Wt. (#) 419.8 gm
23. Wt. of Water 98.6 gm
24. Moisture 17.1 %
25. % Compaction 100 %
26. % Compaction Required 95 %

REMARKS: CLAY SOIL COVER @ N. 74,450 & E. 59,175
RETEST OF #S.C. 42 ON 8-17-89

TEST PASSED BOTH MOISTURE & DENSITY REQ'MT.

TEST BY: D. MACKENZIE

SERGENT, HAUSKINS & BECKWITH

DENSITY OF SOIL IN PLACE
BY THE SANDCONE METHOD
D1556-64

JOB NO. C89-5034

PROJECT CHURCHROCK RECLAMATION PROJECT DATE 8-23-89

LOCATION CHURCHROCK NM

CLIENT UNITED NUCLEAR CORP. CONTRACTOR NIELSON'S

MATERIAL DENSITY NO. #S.C. 54

SAND CALIBRATION:

1. Wt. of Sand + Apparatus _____ lbs.
2. Wt. of Apparatus _____ lbs.
3. Wt. of Sand (1-2) _____ lbs.
4. Vol. of Apparatus _____ cf
5. Unit Wt. of Sand 95.2 pcf
   Yd = (3/4)

SURFACE CALIBRATION: 1412

6. Initial Wt. _____ lbs.
7. Wt. After _____ lbs.
8. Wt. of Sand Used (6-7) 1764 3.849 lbs.

9. Initial Wt. 6223 _____ lbs.
10. Wt. After 2610 _____ lbs.
11. Wt. of Sand 3618 _____ lbs.
12. Wt. of Sand Used (11-8) 1834 = 4.0873 lbs.
13. Vol. of Hole (12/5) 0.042934 pcf

Lab No. F-1002

Max. Unit Weight 115.6

Opt. Moisture Content 13.9 %

14. Sample Can No. _____
15. Wet Wt. of Soil + Tare 2537 _____ lbs.
16. Wt. of Tare — lbs.
17. Wet Wt. 2537 5.593 lbs.
18. Wet Density (17/13) 130.270 pcf
19. Dry Density 115.8 pcf
    Yd = 18/(24 + 100)

MOISTURE CONTENT:

20. Wet Wt. + Tare 811.1 gm
21. Dry Wt. + Tare 734.9 gm
22. Tare Wt. (#) 123.2 gm
23. Wt. of Water 76.2 gm
24. Moisture 12.5 %
25. % Compaction 100 %
26. % Compaction Required 95 %

REMARKS: CLAY SOIL COVER @ N. 74,410 & E. 58,955
RETEST OF #S.C. 43 ON 8-21-89

TEST FAILED MOISTURE REQ'MT.

TEST BY: D. MACKENZIE

SERGENT, HAUSKINS & BECKWITH

DENSITY OF SOIL IN PLACE
BY THE SANDCONE METHOD
D1556-64

JOB NO. C89-5034

PROJECT CHURCHROCK RECLAMATION PROJECT DATE 8-23-89

LOCATION CHURCHROCK, NM

CLIENT UNITED NUCLEAR CORP. CONTRACTOR NIELSON'S

MATERIAL DENSITY NO. #S.C. 55

SAND CALIBRATION:

1. Wt. of Sand + Apparatus _____ lbs.
2. Wt. of Apparatus _____ lbs.
3. Wt. of Sand (1-2) _____ lbs.
4. Vol. of Apparatus _____ cf
5. Unit Wt. of Sand 95.2 pcf
   Yd = (3/4)

SURFACE CALIBRATION: 142

6. Initial Wt. _____ lbs.
7. Wt. After _____ lbs.
8. Wt. of Sand Used (6-7) 17604 = 3.9999 lbs.

9. Initial Wt. 6357 _____ lbs.
10. Wt. After 2790 _____ lbs.
11. Wt. of Sand 3567 _____ lbs.
12. Wt. of Sand Used (11-8) 1803 = 3.9749 lbs.
13. Vol. of Hole (12/5) 0.0417513 pcf

Lab No. 1336

Max. Unit Weight 113.7

Opt. Moisture Content 14.0

14. Sample Can No. _____
15. Wet Wt. of Soil + Tare 2484 _____ lbs.
16. Wt. of Tare _____ lbs.
17. Wet Wt. 2484 5.476 lbs.
18. Wet Density (17/13) 131.6 pcf
19. Dry Density 114.0 pcf
    Yd = 18/(24 + 100)

MOISTURE CONTENT:

20. Wet Wt. + Tare 639.4 gm
21. Dry Wt. + Tare 582.7 gm
22. Tare Wt. (#) 216.6 gm
23. Wt. of Water 56.7 gm
24. Moisture 15.5 %
25. % Compaction 100 %
26. % Compaction Required 95 %

REMARKS: CLAY SOIL COVER @ N. 74,760 & 59,250

RETEST OF #S.C. 49 ON 8-22-89

TEST PASSED BOTH MOISTURE & DENSITY REQ'MT.

TEST BY: D. MACKENZIE

SERGENT, HAUSKINS & BECKWITH

DENSITY OF SOIL IN PLACE
BY THE SANDCONE METHOD
D1556-64

JOB NO. C89-5034

PROJECT CHURCHROCK RECLAMATION PROJECT DATE 8-23-89

LOCATION CHURCHROCK NM

CLIENT UNITED NUCLEAR CORP. CONTRACTOR NIELSON'S

MATERIAL DENSITY NO. SC#56

SAND CALIBRATION:

1. Wt. of Sand + Apparatus _____ lbs.
2. Wt. of Apparatus _____ lbs.
3. Wt. of Sand (1-2) _____ lbs.
4. Vol. of Apparatus _____ cf
5. Unit Wt. of Sand 95.5 pcf
   Yd = (3/4) NEW SAND

SURFACE CALIBRATION: 144

6. Initial Wt. _____ lbs.
7. Wt. After _____ lbs.
8. Wt. of Sand Used (6-7) 1764 3.889 lbs.

9. Initial Wt. 5830 _____ lbs.
10. Wt. After 2298 _____ lbs.
11. Wt. of Sand 3532 _____ lbs.
12. Wt. of Sand Used (11-8) 1768 3.898 lbs.
13. Vol. of Hole (12/5) 0.040814 pcf

Lab No. 1366

Max. Unit Weight 113.7

Opt. Moisture Content 14.0

14. Sample Can No. _____
15. Wet Wt. of Soil + Tare _____ lbs.
16. Wt. of Tare _____ lbs.
17. Wet Wt. 2435 = 5.368 lbs.
18. Wet Density (17/13) 131.53 pcf
19. Dry Density 113.7 pcf
    Yd = 18/(24 + 100)

MOISTURE CONTENT:

20. Wet Wt. + Tare 2435 gm
21. Dry Wt. + Tare 2105 gm
22. Tare Wt. (#) — gm
23. Wt. of Water 330 gm
24. Moisture 15.7 %
25. % Compaction 100 %
26. % Compaction Required 95 %

REMARKS: CLAY SOIL COVER @ N. 74,875 & E. 59,750
RETEST OF #S.C.27 ON 8-8-89

TEST PASSED BOTH MOISTURE & DENSITY REQ'MT.

TEST BY: D. MACKENZIE

SERGENT, HAUSKINS & BECKWITH

DENSITY OF SOIL IN PLACE
BY THE SANDCONE METHOD
D1556-64

JOB NO. C89-5034

PROJECT CHURCHROCK RECLAMATION PROJECT DATE 8-23-89

LOCATION CHURCHROCK, NM

CLIENT UNITED NUCLEAR CORP. CONTRACTOR NIELSON'S

MATERIAL DENSITY NO. S.C #57

SAND CALIBRATION:

1. Wt. of Sand + Apparatus _____ lbs.
2. Wt. of Apparatus _____ lbs.
3. Wt. of Sand (1-2) _____ lbs.
4. Vol. of Apparatus _____ cf
5. Unit Wt. of Sand 95.5 pcf
   Yd = (3/4)

SURFACE CALIBRATION: 1/5

6. Initial Wt. _____ lbs.
7. Wt. After _____ lbs.
8. Wt. of Sand Used (6-7) 1764 3.889 lbs.

9. Initial Wt. 5881 _____ lbs.
10. Wt. After 2234 _____ lbs.
11. Wt. of Sand 3647 _____ lbs.
12. Wt. of Sand Used (11-8) 1883 4.151 lbs.
13. Vol. of Hole (12/5) 0.043468 pcf

Lab No. F-1002

Max. Unit Weight 115.6

Opt. Moisture Content 12.9

14. Sample Can No. _____
15. Wet Wt. of Soil + Tare _____ lbs.
16. Wt. of Tare _____ lbs.
17. Wet Wt. 2564 = 5.653 lbs.
18. Wet Density (17/13) 130.04 pcf
19. Dry Density 114.6 pcf
    Yd = 18/(24 + 100)

MOISTURE CONTENT:

20. Wet Wt. + Tare 2564 gm
21. Dry Wt. + Tare 2250 gm
22. Tare Wt. (#) — gm
23. Wt. of Water 304 gm
24. Moisture 14.0 %
25. % Compaction 99 %
26. % Compaction Required 95 %

REMARKS: CLAY SOIL COVER @ N. 74,945 & E. 60,275
RETEST OF #S.C. 28 ON 8-9-89

TEST PASSED BOTH MOISTURE & DENSITY REQ'MT.

TEST BY: D. MACKENZIE

SERGENT, HAUSKINS & BECKWITH

DENSITY OF SOIL IN PLACE
BY THE SANDCONE METHOD
D1556-64

JOB NO. C89-5034

PROJECT CHURCHROCK RECLAMATION PROJECT DATE 8-23-89

LOCATION CHURCHROCK NM

CLIENT UNITED NUCLEAR CORP. CONTRACTOR NIELSON'S

MATERIAL DENSITY NO. S.C. # 58

SAND CALIBRATION:

1. Wt. of Sand + Apparatus _____ lbs.
2. Wt. of Apparatus _____ lbs.
3. Wt. of Sand (1-2) _____ lbs.
4. Vol. of Apparatus _____ cf
5. Unit Wt. of Sand 95.5 pcf
   Yd = (3/4)

SURFACE CALIBRATION: 12/6

6. Initial Wt. _____ lbs.
7. Wt. After _____ lbs.
8. Wt. of Sand Used (6-7) 1764 3.889 lbs.

9. Initial Wt. 5811 _____ lbs.
10. Wt. After 2083 _____ lbs.
11. Wt. of Sand 3728 _____ lbs.
12. Wt. of Sand Used (11-8) 1964 = 4.3298 lbs.
13. Vol. of Hole (12/5) 0.045338 pcf

Lab No. #F-1001

Max. Unit Weight 114.2

Opt. Moisture Content 13.4 %

14. Sample Can No. _____
15. Wet Wt. of Soil + Tare _____ lbs.
16. Wt. of Tare _____ lbs.
17. Wet Wt. 2592 = 5.714 lbs.
18. Wet Density (17/13) 126.04 pcf
19. Dry Density 110.9 pcf
    Yd = 18/(24 + 100)

MOISTURE CONTENT:

20. Wet Wt. + Tare 2592 gm
21. Dry Wt. + Tare 2280 gm
22. Tare Wt. (#) — gm
23. Wt. of Water 312 gm
24. Moisture 13.7 %
25. % Compaction 97 %
26. % Compaction Required 95 %

REMARKS: CLAY SOIL COVER @ N. 74,930 & E. 60,380
RETEST OF: NUCLEAR TEST # 1 ON 8-2-89
SAND CONE # S.C. 22 ON 8-1-89
NUCLEAR TEST # 1 ON 8-1-89

TEST BY: D. MACKENZIE

TEST PASSED BOTH MOISTURE & DENSITY REQ'MT

SERGENT, HAUSKINS & BECKWITH

DENSITY OF SOIL IN PLACE
BY THE SANDCONE METHOD
D1556-64

JOB NO. C89-5034

PROJECT CHURCHROCK RECLAMATION PROJECT DATE 8-24-89

LOCATION CHURCHROCK, NM

CLIENT UNITED NUCLEAR CORP. CONTRACTOR NIELSON'S

MATERIAL DENSITY NO. #S.C.59

SAND CALIBRATION:

1. Wt. of Sand + Apparatus _____ lbs.
2. Wt. of Apparatus _____ lbs.
3. Wt. of Sand (1-2) _____ lbs.
4. Vol. of Apparatus _____ cf
5. Unit Wt. of Sand 95.5 pcf
   Yd = (3/4)

SURFACE CALIBRATION: 1/7

6. Initial Wt. _____ lbs.
7. Wt. After _____ lbs.
8. Wt. of Sand Used (6-7) 1764 = 3.889 lbs.

9. Initial Wt. 6140 _____ lbs.
10. Wt. After 2585 _____ lbs.
11. Wt. of Sand 3555 _____ lbs.
12. Wt. of Sand Used (11-8) 1791 = 3.948 lbs.
13. Vol. of Hole (12/5) 0.04134 pcf

Lab No. #F-1002

Max. Unit Weight 115.6

Opt. Moisture Content 13.9

14. Sample Can No. _____
15. Wet Wt. of Soil + Tare _____ lbs.
16. Wt. of Tare _____ lbs.
17. Wet Wt. 2440 = 5.379 lbs.
18. Wet Density (17/13) 130.1 pcf
19. Dry Density 113.7 pcf
    Yd = 18/(24 + 100)

MOISTURE CONTENT:

20. Wet Wt. + Tare 1092.3 gm
21. Dry Wt. + Tare 1007.6 gm
22. Tare Wt. (#) 419.8 gm
23. Wt. of Water 84.7 gm
24. Moisture 14.4 %
25. % Compaction 98 %
26. % Compaction Required 95 %

REMARKS:

CLAY SOIL COVER @
N. 74,535 & 59,965
RETEST OF SAND CONE #S.C.35
ON 8-14-89 AND #S.C.46 ON 8-22-89

TEST PASSED BOTH MOISTURE & DENSITY REQ'MT.

TEST BY: D. MACKENZIE

SERGENT, HAUSKINS & BECKWITH

DENSITY OF SOIL IN PLACE
BY THE SANDCONE METHOD
D1556-64

JOB NO. C89-5034

PROJECT CHURCHROCK RECLAMATION PROJECT DATE 8-24-89

LOCATION CHURCHROCK, NM

CLIENT UNITED NUCLEAR CORP. CONTRACTOR NIELSON'S

MATERIAL DENSITY NO. #S.C.60

SAND CALIBRATION:

1. Wt. of Sand + Apparatus _____ lbs.
2. Wt. of Apparatus _____ lbs.
3. Wt. of Sand (1-2) _____ lbs.
4. Vol. of Apparatus _____ cf
5. Unit Wt. of Sand 95.5 pcf
   Yd = (3/4)

SURFACE CALIBRATION: 142

6. Initial Wt. _____ lbs.
7. Wt. After _____ lbs.
8. Wt. of Sand Used (6-7) 1764 = 3.889 lbs.

9. Initial Wt. 5975 _____ lbs.
10. Wt. After 2304 _____ lbs.
11. Wt. of Sand 3671 _____ lbs.
12. Wt. of Sand Used (11-8) 1907 = 4.204 lbs.
13. Vol. of Hole (12/5) 0.04402 pcf

Lab No. #F-1002

Max. Unit Weight 115.6

Opt. Moisture Content 13.9

14. Sample Can No. _____
15. Wet Wt. of Soil + Tare _____ lbs.
16. Wt. of Tare _____ lbs.
17. Wet Wt. 2629 = 5.796 lbs.
18. Wet Density (17/13) 131.7 pcf
19. Dry Density 116.5 pcf
    Yd = 18/(24 + 100)

MOISTURE CONTENT:

20. Wet Wt. + Tare 1120.0 gm
21. Dry Wt. + Tare 1039.2 gm
22. Tare Wt. (#) 418.5 gm
23. Wt. of Water 80.7 gm
24. Moisture 13.0 %
25. % Compaction 101 %
26. % Compaction Required 95 %

REMARKS: CLAY SOIL COVER @ N. 74,745 & E. 60,210
RETEST OF SAND CONE #S.C.33 ON 8-11-89

TEST FAILED MOISTURE REQ'MT.

TEST BY: D. MACKENZIE

SERGENT, HAUSKINS & BECKWITH

DENSITY OF SOIL IN PLACE
BY THE SANDCONE METHOD
D1556-64

JOB NO. C89-5034

PROJECT CHURCHROCK RECLAMATION PROJECT DATE 8-24-89

LOCATION CHURCHROCK, NM

CLIENT UNITED NUCLEAR CORP. CONTRACTOR NIELSON'S

MATERIAL DENSITY NO. #S.C.61

149

SAND CALIBRATION:

1. Wt. of Sand + Apparatus _____ lbs.
2. Wt. of Apparatus _____ lbs.
3. Wt. of Sand (1-2) _____ lbs.
4. Vol. of Apparatus _____ cf
5. Unit Wt. of Sand 95.5 pcf
   Yd = (3/4)

SURFACE CALIBRATION:

6. Initial Wt. _____ lbs.
7. Wt. After _____ lbs.
8. Wt. of Sand Used (6-7) 1764 - 3.889 lbs.

9. Initial Wt. 5585 _____ lbs.
10. Wt. After 1977 _____ lbs.
11. Wt. of Sand 3608 _____ lbs.
12. Wt. of Sand Used (11-8) 1844 = 4.065 lbs.
13. Vol. of Hole (12/5) 0.04257 pcf

Lab No. #F-1002

Max. Unit Weight 115.6

Opt. Moisture Content 13.9 %

14. Sample Can No. _____
15. Wet Wt. of Soil + Tare _____ lbs.
16. Wt. of Tare _____ lbs.
17. Wet Wt. 2540 = 5.600 lbs.
18. Wet Density (17/13) 131.5 pcf
19. Dry Density 113.6 pcf
    Yd = 18/(24 + 100)

MOISTURE CONTENT:

20. Wet Wt. + Tare 809.4 gm
21. Dry Wt. + Tare 715.6 gm
22. Tare Wt. (#) 123.2 gm
23. Wt. of Water 93.8 gm
24. Moisture 15.8 %
25. % Compaction 98 %
26. % Compaction Required 95 %

REMARKS: CLAY SOIL COVER @ N. 74,410 & E. 58,955
RETEST OF: #S.C.54 ON 8-23-89
& #S.C.43 ON 8-21-89

TEST PASSED BOTH MOISTURE & DENSITY REQ'MT.

TEST BY: D. MACKENZIE

SERGENT, HAUSKINS & BECKWITH

DENSITY OF SOIL IN PLACE
BY THE SANDCONE METHOD
D1556-64

JOB NO. C89-5034

PROJECT CHURCHROCK RECLAMATION PROJECT DATE 8-24-89

LOCATION CHURCHROCK, NM

CLIENT UNITED NUCLEAR CORP. CONTRACTOR NIELSON'S

MATERIAL DENSITY NO. #S.C. 62

SAND CALIBRATION:

1. Wt. of Sand + Apparatus _____ lbs.
2. Wt. of Apparatus _____ lbs.
3. Wt. of Sand (1-2) _____ lbs.
4. Vol. of Apparatus _____ cf
5. Unit Wt. of Sand 95.5 pcf
   Yd = (3/4)

SURFACE CALIBRATION:

6. Initial Wt. 150 lbs.
7. Wt. After _____ lbs.
8. Wt. of Sand Used (6-7) 1764 = 3.829 lbs.

9. Initial Wt. 5580 _____ lbs.
10. Wt. After 1971 _____ lbs.
11. Wt. of Sand 3609 _____ lbs.
12. Wt. of Sand Used (11-8) 1845 = 4.067 lbs.
13. Vol. of Hole (12/5) 0.04259 pcf

Lab No. #F-1002

Max. Unit Weight 115.6

Opt. Moisture Content 13.9 %

14. Sample Can No. _____
15. Wet Wt. of Soil + Tare _____ lbs.
16. Wt. of Tare _____ lbs.
17. Wet Wt. 2492 = 5.494 lbs.
18. Wet Density (17/13) 129.0 pcf
19. Dry Density 112.3 pcf
    Yd = 18/(24 + 100)

MOISTURE CONTENT:

20. Wet Wt. + Tare 617.1 gm
21. Dry Wt. + Tare 546.9 gm
22. Tare Wt. (#) 74.0 gm
23. Wt. of Water 70.2 gm
24. Moisture 14.9 %
25. % Compaction 97 %
26. % Compaction Required 95 %

REMARKS: CLAY SOIL COVER @ N. 74,875 & E. 59,415

TEST PASSED BOTH MOISTURE & DENSITY REQ'MT.

TEST BY: D. MACKENZIE

SERGENT, HAUSKINS & BECKWITH

DENSITY OF SOIL IN PLACE
BY THE SANDCONE METHOD
D1556-64

JOB NO. C89-5034

PROJECT CHURCHROCK RECLAMATION PROJECT DATE 8-24-89

LOCATION CHURCHROCK, NM

CLIENT UNITED NUCLEAR CORP. CONTRACTOR NIELSON'S

MATERIAL DENSITY NO. #S.C. 63

SAND CALIBRATION:

1. Wt. of Sand + Apparatus _____ lbs.
2. Wt. of Apparatus _____ lbs.
3. Wt. of Sand (1-2) _____ lbs.
4. Vol. of Apparatus _____ cf
5. Unit Wt. of Sand 95.5 pcf
   Yd = (3/4)

SURFACE CALIBRATION: 151

6. Initial Wt. _____ lbs.
7. Wt. After _____ lbs.
8. Wt. of Sand Used (6-7) 1764 = 3.889 lbs.

9. Initial Wt. 6033 lbs.
10. Wt. After 2580 lbs.
11. Wt. of Sand 3453 lbs.
12. Wt. of Sand Used (11-8) 1689 = 3.724 lbs.
13. Vol. of Hole (12/5) 0.03899 pcf

Lab No. # F-1002

Max. Unit Weight 115.6

Opt. Moisture Content 13.9

14. Sample Can No. _____
15. Wet Wt. of Soil + Tare _____ lbs.
16. Wt. of Tare _____ lbs.
17. Wet Wt. 2319 = 5.112 lbs.
18. Wet Density (17/13) 131.1 pcf
19. Dry Density 115.0 pcf
    Yd = 18/(24 + 100)

MOISTURE CONTENT:

20. Wet Wt. + Tare 2319 gm
21. Dry Wt. + Tare 2034 gm
22. Tare Wt. (#) — gm
23. Wt. of Water 285 gm
24. Moisture 14.0 %
25. % Compaction 99 %
26. % Compaction Required 95 %

REMARKS: CLAY SOIL COVER @ N. 74,955 & E. 59,585
RETEST OF #S.C. 38 ON 8-16-89

TEST PASSED BOTH MOISTURE & DENSITY REQ'MT.

TEST BY: D. MACKENZIE

#1-9

SERGENT, HAUSKINS & BECKWITH
CONSULTING SOIL AND FOUNDATION ENGINEERS
PHOENIX • TUCSON • ALBUQUERQUE • EL PASO

DENSITY OF SOIL IN PLACE
BY THE SANDCONE METHOD
D1556-64

JOB NO. C89-5034

PROJECT CHURCHROCK RECLAMATION PROJECT DATE 8-24-89

LOCATION CHURCHROCK NM

CLIENT UNITED NUCLEAR CORP. CONTRACTOR NIELSON'S

MATERIAL DENSITY NO. #S.C. 64

152

SAND CALIBRATION:

1. Wt. of Sand + Apparatus _____ lbs.
2. Wt. of Apparatus _____ lbs.
3. Wt. of Sand (1-2) _____ lbs.
4. Vol. of Apparatus _____ cf
5. Unit Wt. of Sand 95.5 pcf
   Yd = (3/4)

SURFACE CALIBRATION:

6. Initial Wt. _____ lbs.
7. Wt. After _____ lbs.
8. Wt. of Sand Used (6-7) 1764 = 3.889 lbs.

9. Initial Wt. 5351 _____ lbs.
10. Wt. After 1847 _____ lbs.
11. Wt. of Sand 3504 _____ lbs.
12. Wt. of Sand Used (11-8) 1740 = 3.836 lbs.
13. Vol. of Hole (12/5) 0.04017 pcf

Lab No. # F-1001

Max. Unit Weight 114.2

Opt. Moisture Content 13.4 %

14. Sample Can No. _____
15. Wet Wt. of Soil + Tare _____ lbs.
16. Wt. of Tare _____ lbs.
17. Wet Wt. 2411 = 5.315 lbs.
18. Wet Density (17/13) 132.3 pcf
19. Dry Density 114.0 pcf
    Yd = 18/(24 + 100)

MOISTURE CONTENT:

20. Wet Wt. + Tare 2411 gm
21. Dry Wt. + Tare 2076 gm
22. Tare Wt. (#) — gm
23. Wt. of Water 335 gm
24. Moisture 16.1 %
25. % Compaction 100 %
26. % Compaction Required 95 %

REMARKS: CLAY SOIL COVER @ N. 74,940 & E. 60,005
RETEST OF #S.C. 37 ON 8-16-89

TEST PASSED BOTH MOISTURE & DENSITY REQ'MT.

TEST BY: D. MACKENZIE

SERGENT, HAUSKINS & BECKWITH

BY THE SANDCONE METHOD
D1556-64

JOB NO. C89-5034

PROJECT CHURCHROCK RECLAMATION PROJECT DATE 8-24-89

LOCATION CHURCHROCK, NM

CLIENT UNITED NUCLEAR CORP. CONTRACTOR NIELSON'S

MATERIAL

DENSITY NO. #S.C. 65

SAND CALIBRATION:

1. Wt. of Sand + Apparatus _____ lbs.
2. Wt. of Apparatus _____ lbs.
3. Wt. of Sand (1-2) _____ lbs.
4. Vol. of Apparatus _____ cf
5. Unit Wt. of Sand 95.5 pcf
   Yd = (3/4)

SURFACE CALIBRATION: 153

6. Initial Wt. _____ lbs.
7. Wt. After _____ lbs.
8. Wt. of Sand Used (6-7) 1764 = 3.889 lbs.

9. Initial Wt. 5612 _____ lbs.
10. Wt. After 2124 _____ lbs.
11. Wt. of Sand 3488 _____ lbs.
12. Wt. of Sand Used (11-8) 1724 = 3.801 lbs.
13. Vol. of Hole (12/5) 0.03980 pcf

Lab No. # F-1002

Max. Unit Weight 115.6

Opt. Moisture Content 13.9 %

14. Sample Can No. _____
15. Wet Wt. of Soil + Tare _____ lbs.
16. Wt. of Tare _____ lbs.
17. Wet Wt. 2305 = 5.082 lbs.
18. Wet Density (17/13) 127.7 pcf
19. Dry Density 112.7 pcf
    Yd = 18/(24 + 100)

MOISTURE CONTENT:

20. Wet Wt. + Tare 2305 gm
21. Dry Wt. + Tare 2034 gm
22. Tare Wt. (#) — gm
23. Wt. of Water 271 gm
24. Moisture 13.3 %
25. % Compaction 97 %
26. % Compaction Required 95 %

REMARKS: CLAY SOIL COVER @ N. 74,745 & E. 60,210
RETEST OF: #S.C. 60 ON 8-24-89
#S.C. 33 ON 8-11-89

TEST FAILED MOISTURE REQ'MT

TEST BY: D. MACKENZIE

#1-C

SERGENT, HAUSKINS & BECKWITH

DENSITY OF SOIL IN PLACE
BY THE SANDCONE METHOD
D1556-64

JOB NO. C89-5034

PROJECT CHURCHROCK RECLAMATION PROJECT DATE 8-25-89

LOCATION CHURCHROCK, NM

CLIENT UNITED NUCLEAR CORP. CONTRACTOR NIELSON'S

MATERIAL DENSITY NO. #S.C. 66

SAND CALIBRATION:

1. Wt. of Sand + Apparatus _____ lbs.
2. Wt. of Apparatus _____ lbs.
3. Wt. of Sand (1-2) _____ lbs.
4. Vol. of Apparatus _____ cf
5. Unit Wt. of Sand 95.5 pcf
   Yd = (3/4)

SURFACE CALIBRATION: 154

6. Initial Wt. _____ lbs.
7. Wt. After _____ lbs.
8. Wt. of Sand Used (6-7) 1764 = 3.889 lbs.

9. Initial Wt. 6007 _____ lbs.
10. Wt. After 2449 _____ lbs.
11. Wt. of Sand 3558 _____ lbs.
12. Wt. of Sand Used (11-8) 1794 = 3.955 lbs.
13. Vol. of Hole (12/5) 0.04141 pcf

Lab No. #F-1002

Max. Unit Weight 115.6

Opt. Moisture Content 13.9 %

14. Sample Can No. _____
15. Wet Wt. of Soil + Tare _____ lbs.
16. Wt. of Tare _____ lbs.
17. Wet Wt. 2425 = 5.346 lbs.
18. Wet Density (17/13) 129.1 pcf
19. Dry Density 113.3 pcf
    Yd = 18/(24 + 100)

MOISTURE CONTENT:

20. Wet Wt. + Tare 807.9 gm
21. Dry Wt. + Tare 724.1 gm
22. Tare Wt. (#) 123.2 gm
23. Wt. of Water 83.8 gm
24. Moisture 13.9 %
25. % Compaction 98 %
26. % Compaction Required 95 %

REMARKS: CLAY SOIL COVER @ N. 74,745 & E. 60,210
RETEST OF: #S.C.65 ON 8-24-89
#S.C.60 ON 8-24-89
#S.C. 33 ON 8-11-89

TEST PASSED BOTH MOISTURE & DENSITY REQ'MT.

TEST BY: D. MACKENZIE

SERGENT, HAUSKINS & BECKWITH

SERGENT, HAUSKINS & BECKWITH CONSULTING SOIL AND FOUNDATION ENGINEERS

APPLIED SOIL MECHANICS • ENGINEERING GEOLOGY • MATERIALS ENGINEERING

Project CHURCHROCK RECLAMATION Job No. C87-5034
Client UNITED NUCLEAR CORP.
Contractor NIELSONS
A/E
Sampled By D. MCKENZIE Date Sampled 8-22-89

Sample No. 1-POINT FOR S.C. #49
Method ASTM D-698
Date 8-22-89 Tested By D. MCKENZIE
To Be Used For CLAY SOIL COVER @ N. 74,760 E. 59,250

Density

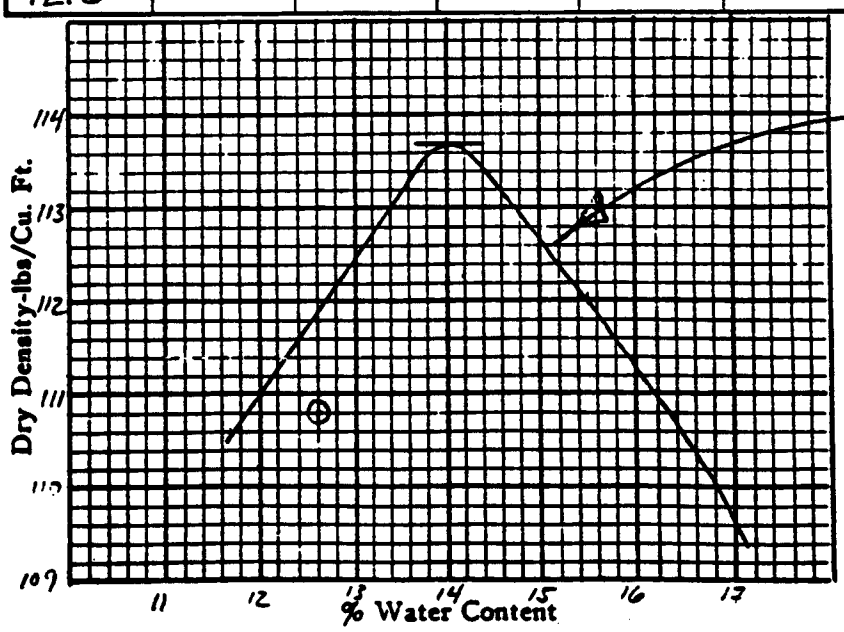
Determination No.	1	2	3	4	5	Loosest State
Wt. Mold & Comp. Soil in Grams	6101					
Wt. Mold in Grams	4215					
Wt. Comp. Soil in Grams	1886					
Wet Density in lbs/ft^3	124.7					
Dry Density in lbs/ft^3	110.76					

Water Content

Container No.						
Wet soil + can grams	918.4					
Dry soil + can grams	815.5					
Wt. water grams	102.9					
Wt. Container grams	—					
Wt. Dry Soil grams	815.5					
Water Content in %	12.6					

RESULTS OF 1-POINT AS COMPARED W/ PROCTOR CURVE # 1366:

113.7 @ 14.0 %



CURVE # 1366

SERGENT, HAUSKINS & BECKWITH

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APPLIED SOIL MECHANICS • ENGINEERING GEOLOGY • MATERIALS ENGINEERING

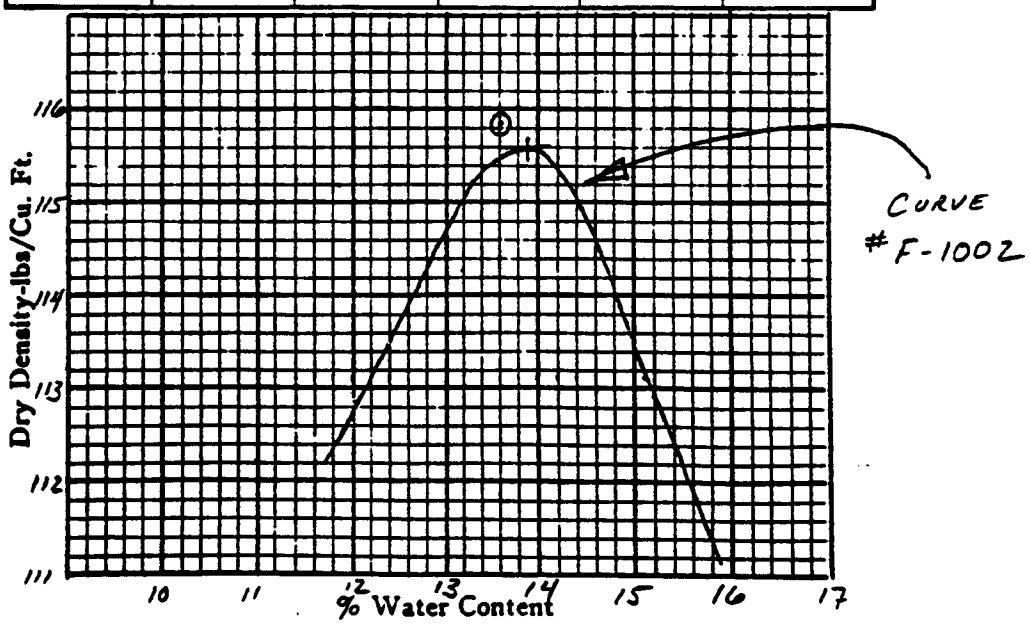
1-POINT FROM # S.C. 59

Project CHURCHROCK DECONTAMINATION Job No. C89-5034 Sample No.
Client UNITED NUCLEAR CORP. Method ASTM D-698
Contractor NIELSON'S Date 8-24-89 Tested By D. MCKENZIE
A/E To Be Used For CLAY SOIL COVER @ N. 74,745 & E. 60,210
Sampled By D. MCKENZIE Date Sampled 8-24-89

Density

Determination No.	1	2	3	4	5	Loosest State
Wt. Mold & Comp. Soil in Grams	6206					
Wt. Mold in Grams	4216					
Wt. Comp. Soil in Grams	1990					
Wet Density in lbs/ft^3	131.6					
Dry Density in lbs/ft^3	115.85					
Water Content						
Container No.						
Wet soil + can grams	1023.0					
Dry soil + can grams	900.4					
Wt. water grams	122.6					
Wt. Container grams	—					
Wt. Dry Soil grams	900.4					
Water Content in %	13.6					

RESULTS OF 1-POINT AS COMPARED W/ PROCTOR CURVE # F-1002:
MAX DRY DENS. 115.6 P.C.F.
@ OPT. MOIST. 13.9 %



DATE 8-21-89

DATA SHEET FOR COMPUTING UNIT WT. OF SAND

	1	2	3	4	5	6	7
WT. SAND + BOTTLE	6511	6514	6504	6507		GIVEN	
WT. OF BOTTLE	195	→	→	→		453.6 g = 1 POUND	
WT. OF SAND	6316	6319	6309	6312			
VOL. OF BOTTLE (*)	0.1463 CU. FT.						
-SEE BELOW-							
UNIT WT. OF SAND P.C.F.	95.2	95.2	95.1	95.1			

95.2 P.C.F. AVERAGE

(*) VOLUME OF BOTTLE (USING TAP WATER)

MASS BOTTLE w/ H_2O	4339	GIVEN
MASS OF BOTTLE	195	2.54 cm PER INCH
MASS OF H_2O g	4144	$(2.54)^3$ = 16.387 cm^3 PER CU. IN.
VOL. OF BOTTLE (cm^3)	4144	AND γH_2O = 1.0 g/cm^3

CONVERSION TO CU. FT. ↓

$[16.387\ cm^3/CU.IN] \times [1728\ CU.IN./CU.FT.]$

$= [28316.846\ cm^3/CU.FT.]$

VOL. OF BOTTLE (CU. FT.) 0.1463

$\therefore 4144\ cm^3 / 28316.846\ cm^3/CU.FT.$

$= 0.1463$ CU. FT.

DATE 8-23-89

USED FOR TEST #S.C. 56 & ON.

DATA SHEET FOR COMPUTING UNIT WT. OF SAND

	1	2	3	4	5	6	7
WT. SAND + BOTTLE	6533	6534	6534	6542		GIVEN 453.6 g = 1 POUND	
WT. OF BOTTLE	196	→	→	→			
WT OF SAND	6337	6338	6338	6346			
VOL. OF BOTTLE (*) -SEE BELOW-	0.1463 CU. FT.						
UNIT WT. OF SAND P.C.F.	95.5	95.5	95.5	95.6			

95.5 P.C.F. AVERAGE

(*) VOLUME OF BOTTLE (USING TAP WATER)

MASS BOTTLE w/ H_2O	4339	GIVEN
MASS OF BOTTLE	195	2.54 cm PER INCH
MASS OF H_2O g	4144	$(2.54)^3 = 16.387\ cm^3$ PER CU. IN.
VOL. OF BOTTLE (cm^3)	4144	AND $\gamma\ H_2O = 1.0\ g/cm^3$

CONVERSION TO CU. FT. ↓

$[16.387\ cm^3/CU.IN] \times [1728\ CU.IN./CU.FT.]$

$= [28316.846\ cm^3/CU.FT.]$

VOL. OF BOTTLE (CU. FT.) 0.1463

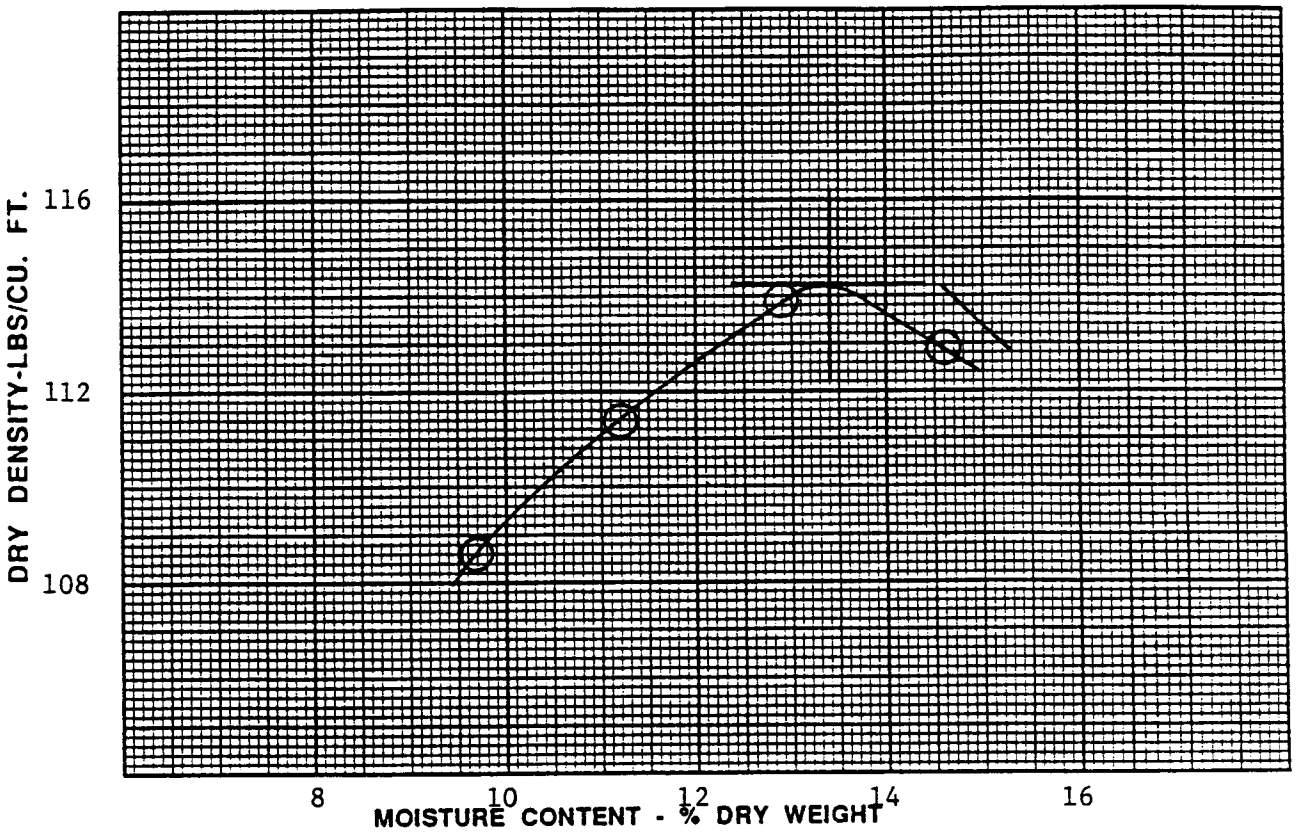
$\therefore 4144\ cm^3 / 28316.846\ cm^3/CU.FT.$

$= 0.1463$ CU. FT.

LABORATORY TEST RESULTS

SUMMARY OF MOISTURE DENSITY RELATIONSHIP TESTS

PROJECT 1989 Reclamation Work - Church Rock **JOB NO.** C89-5034



CURVE	SOURCE	OPTIMUM MOISTURE CONTENT % DRY WT.	MAXIMUM DRY DENSITY LBS/CU. FT.	TEST DESIGNATION	TEST METHOD	LAB NO.
	59,260 E & 74,570 N	13.4	114.2	ASTM D698	A	F-1001

MOISTURE-DENSITY RELATIONSHIP TEST METHOD DATA

ASTM D698 (Standard Proctor)

METHOD	MATERIAL	MOLD DIAMETER	MOLD HEIGHT	NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS./CU. FT.
A	-#4	4"	4.58"	3	25	5.5 lbs	12"	12,375
B	-#4	6"	4.58"	3	56	5.5 lbs	12"	12,317
C	-3/4	6"	4.58"	3	56	5.5 lbs	12"	12,317
D	-3/4	6"	4.58"	3	56	5.5 lbs	12"	12,317

ASTM D1557 (Modified Proctor)

METHOD	MATERIAL	MOLD DIAMETER	MOLD HEIGHT	NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS./CU. FT.
A	-#4	4"	4.58"	5	25	10.0 lbs	18"	56,250
B	-#4	6"	4.58"	5	56	10.0 lbs	18"	55,986
C	-3/4	6"	4.58"	5	56	10.0 lbs	18"	55,986
D	-3/4	6"	4.58"	5	56	10.0 lbs	18"	55,986

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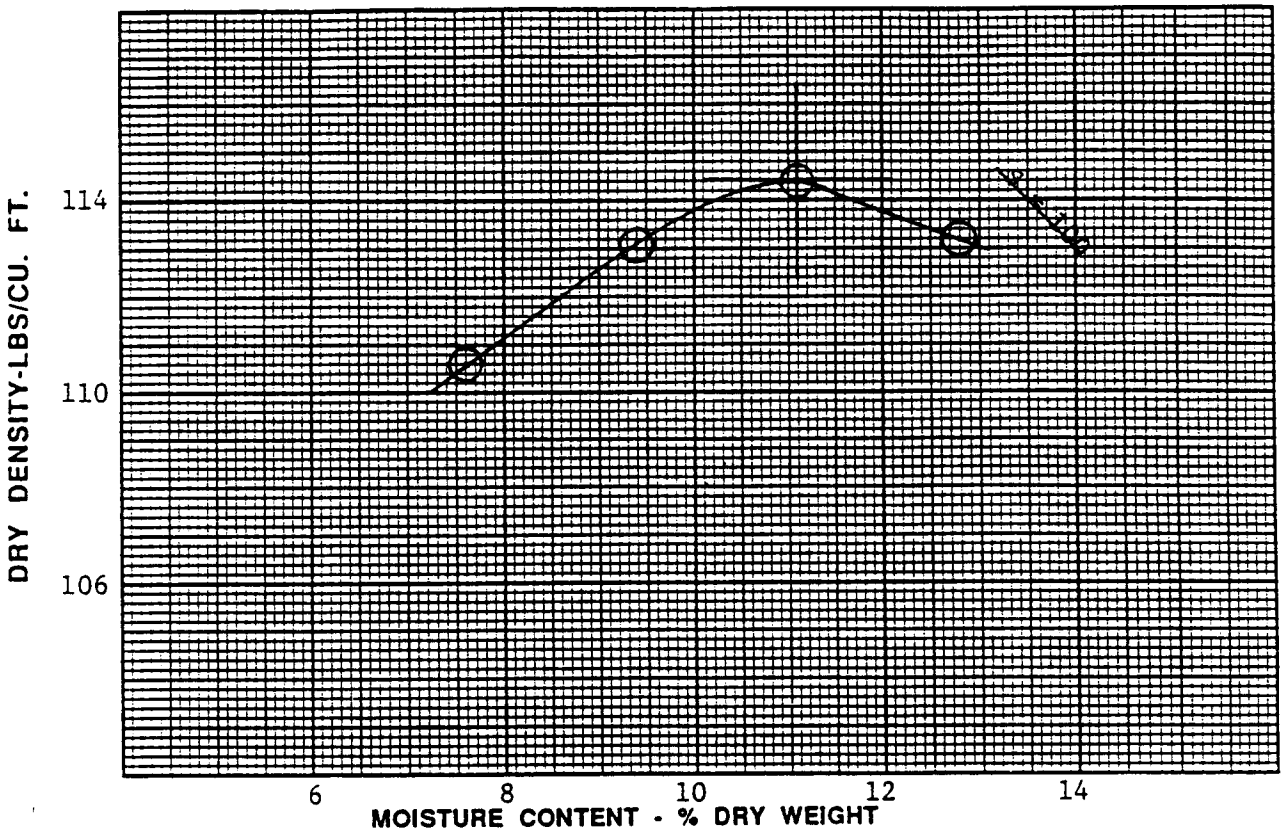
SUMMARY OF MOISTURE DENSITY RELATIONSHIP TESTS

PROJECT 1989 Reclamation Work - Church Rock **JOB NO.** C89-5034



CURVE	SOURCE	OPTIMUM MOISTURE CONTENT % DRY WT.	MAXIMUM DRY DENSITY LBS/CU. FT.	TEST DESIGNATION	TEST METHOD	LAB NO.
	Regraded tailings at S end of N cell at N.74,245 &	11.1	114.4	ASTM D698	A	F-1003
	E.59,365					

MOISTURE-DENSITY RELATIONSHIP TEST METHOD DATA

ASTM D698 (Standard Proctor)

METHOD	MATERIAL	MOLD DIAMETER	MOLD HEIGHT	NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS./CU. FT.
A	-#4	4"	4.58"	3	25	5.5 lbs	12"	12,375
B	-#4	6"	4.58"	3	56	5.5 lbs	12"	12,317
C	-3/4	6"	4.58"	3	56	5.5 lbs	12"	12,317
D	-3/4	6"	4.58"	3	56	5.5 lbs	12"	12,317

ASTM D1557 (Modified Proctor)

METHOD	MATERIAL	MOLD DIAMETER	MOLD HEIGHT	NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS./CU. FT.
A	-#4	4"	4.58"	5	25	10.0 lbs	18"	56,250
B	-#4	6"	4.58"	5	56	10.0 lbs	18"	55,986
C	-3/4	6"	4.58"	5	56	10.0 lbs	18"	55,986
D	-3/4	6"	4.58"	5	56	10.0 lbs	18"	55,986

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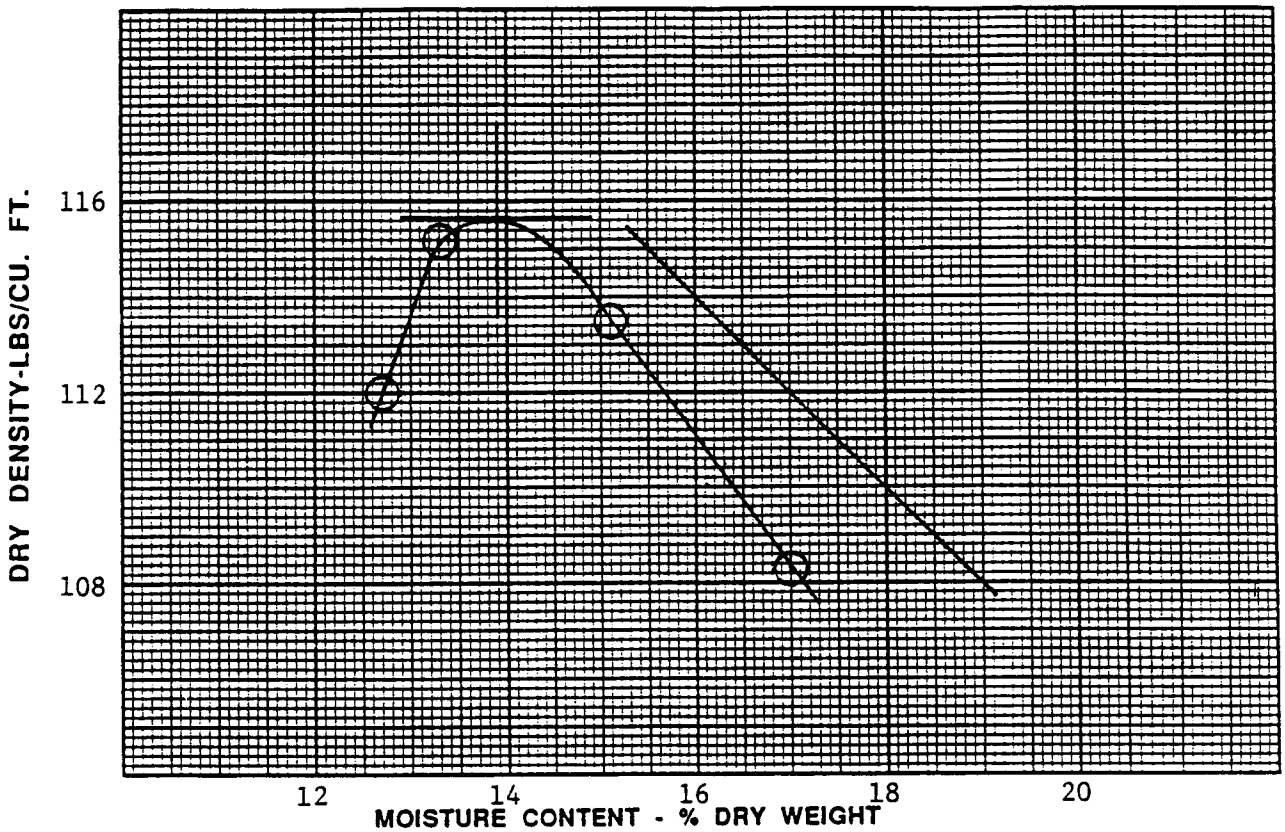
SUMMARY OF MOISTURE DENSITY RELATIONSHIP TESTS

PROJECT 1989 Reclamation Work - Church Rock **JOB NO.** C89-5034



CURVE	SOURCE	OPTIMUM MOISTURE CONTENT % DRY WT.	MAXIMUM DRY DENSITY LBS/CU. FT.	TEST DESIGNATION	TEST METHOD	LAB NO.
	Soils at N74,600, E59,580	13.9	115.6	ASTM D698	A	F-1002

MOISTURE-DENSITY RELATIONSHIP TEST METHOD DATA

ASTM D698 (Standard Proctor)

METHOD	MATERIAL	MOLD DIAMETER	MOLD HEIGHT	NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS./CU. FT.
A	-#4	4"	4.58"	3	25	5.5 lbs	12"	12,375
B	-#4	6"	4.58"	3	56	5.5 lbs	12"	12,317
C	-3/4	6"	4.58"	3	56	5.5 lbs	12"	12,317
D	-3/4	6"	4.58"	3	56	5.5 lbs	12"	12,317

ASTM D1557 (Modified Proctor)

METHOD	MATERIAL	MOLD DIAMETER	MOLD HEIGHT	NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS./CU. FT.
A	-#4	4"	4.58"	5	25	10.0 lbs	18"	56,250
B	-#4	6"	4.58"	5	56	10.0 lbs	18"	55,986
C	-3/4	6"	4.58"	5	56	10.0 lbs	18"	55,986
D	-3/4	6"	4.58"	5	56	10.0 lbs	18"	55,986

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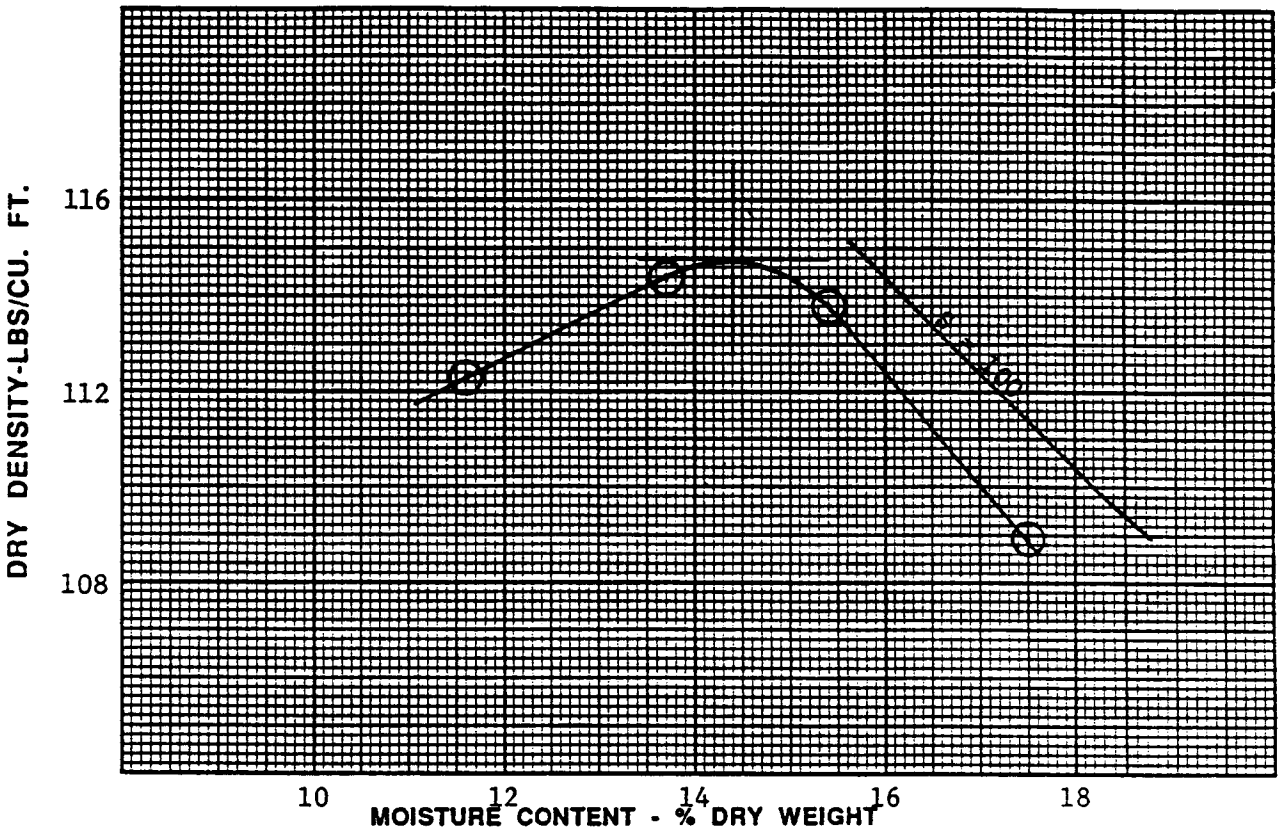
SUMMARY OF MOISTURE DENSITY RELATIONSHIP TESTS

PROJECT 1989 Reclamation Work - Church Rock **JOB NO.** C89-5034



CURVE	SOURCE	OPTIMUM MOISTURE CONTENT % DRY WT.	MAXIMUM DRY DENSITY LBS/CU. FT.	TEST DESIGNATION	TEST METHOD	LAB NO.
	Clay soil cover at S end of N cell	14.4	114.7	ASTM D698	A	F-1004

MOISTURE-DENSITY RELATIONSHIP TEST METHOD DATA

ASTM D698 (Standard Proctor)

METHOD	MATERIAL	MOLD DIAMETER	MOLD HEIGHT	NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS./CU. FT.
A	-#4	4"	4.58"	3	25	5.5 lbs	12"	12,375
B	-#4	6"	4.58"	3	56	5.5 lbs	12"	12,317
C	-3/4	6"	4.58"	3	56	5.5 lbs	12"	12,317
D	-3/4	6"	4.58"	3	56	5.5 lbs	12"	12,317

ASTM D1557 (Modified Proctor)

METHOD	MATERIAL	MOLD DIAMETER	MOLD HEIGHT	NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS./CU. FT.
A	-#4	4"	4.58"	5	25	10.0 lbs	18"	56,250
B	-#4	6"	4.58"	5	56	10.0 lbs	18"	55,986
C	-3/4	6"	4.58"	5	56	10.0 lbs	18"	55,986
D	-3/4	6"	4.58"	5	56	10.0 lbs	18"	55,986

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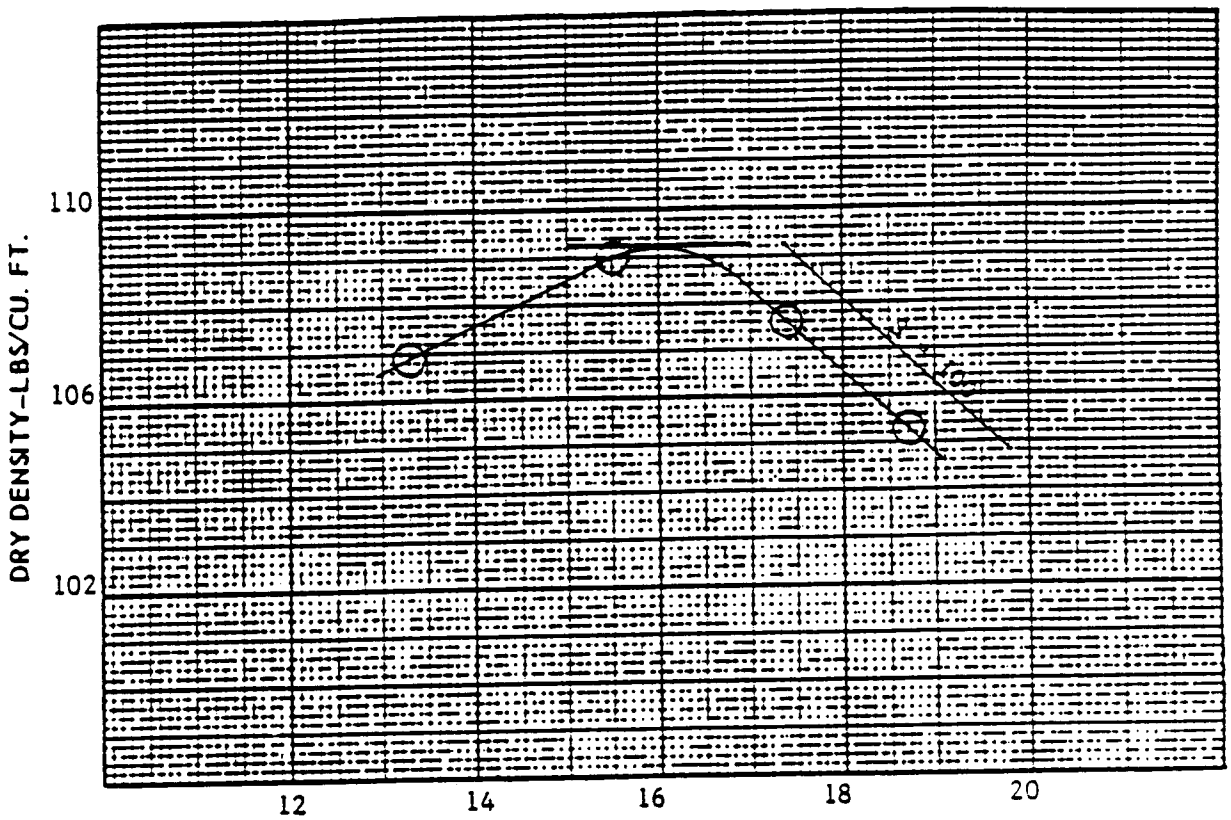
SUMMARY OF MOISTURE DENSITY RELATIONSHIP TESTS

PROJECT 1989 Recalmation Work - Church Rock **JOB NO.** C89-5034



CURVE	SOURCE	OPTIMUM MOISTURE CONTENT % DRY WT.	MAXIMUM DRY DENSITY LBS/CU. FT.	TEST DESIGNATION	TEST METHOD	LAB NO.
	Borrow pit, Sta. N 76+00,	16.0	109.2	ASTM D698	A	1217
	E 61+00					

MOISTURE-DENSITY RELATIONSHIP TEST METHOD DATA

AASHTO T99 and ASTM D698 (Standard Proctor)

METHOD	MATERIAL	MOLD		NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS/CU. FT.
		DIAMETER	HEIGHT					
A	-#4	4"	4.58"	3	25	5.5 LBS.	12"	12,375
B	-#4	6"	4.58"	3	56	5.5 LBS.	12"	12,317
C	-3/4	6"	4.58"	3	56	5.5 LBS.	12"	12,317
D	-3/4	6"	4.58"	3	56	5.5 LBS.	12"	12,317

AASHTO T180 and ASTM D1557 (Modified Proctor)

METHOD	MATERIAL	MOLD		NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS/CU. FT.
		DIAMETER	HEIGHT					
A	-#4	4"	4.58"	5	25	10.0 LBS.	18"	56,250
B	-#4	6"	4.58"	5	56	10.0 LBS.	18"	55,966
C	-3/4	6"	4.58"	5	56	10.0 LBS.	18"	55,966
D	-3/4	6"	4.58"	5	56	10.0 LBS.	18"	55,966

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April 26, 1989

United Nuclear Corporation
P.O. Drawer QQ
Gallup, New Mexico 87301

SHB Job No. C89-5034

Attention: Mr. Charles G. Johnson

Project: 1989 Reclamation Work
Church Rock Uranium Mill

Lab No. 1217: Sandy clay, trace of gravel, low plasticity, dark brown sampled from borrow area, N 76+00, E 61+00 by SHB on April 12, 1989.

SIEVE ANALYSIS

Sieve Size	Percent Passing
3/4 inch	100
1/2 inch	99
3/8 inch	97
No. 4	96
No. 10	96
No. 40	94
No. 100	80
No. 200	61

LIQUID LIMIT 26

PLASTICITY INDEX 10

U.S. CLASSIFICATION CL

MOISTURE-DENSITY RELATIONSHIP (ASTM D698)

Maximum Dry Density 109.2 pcf

Optimum Moisture 16.0%

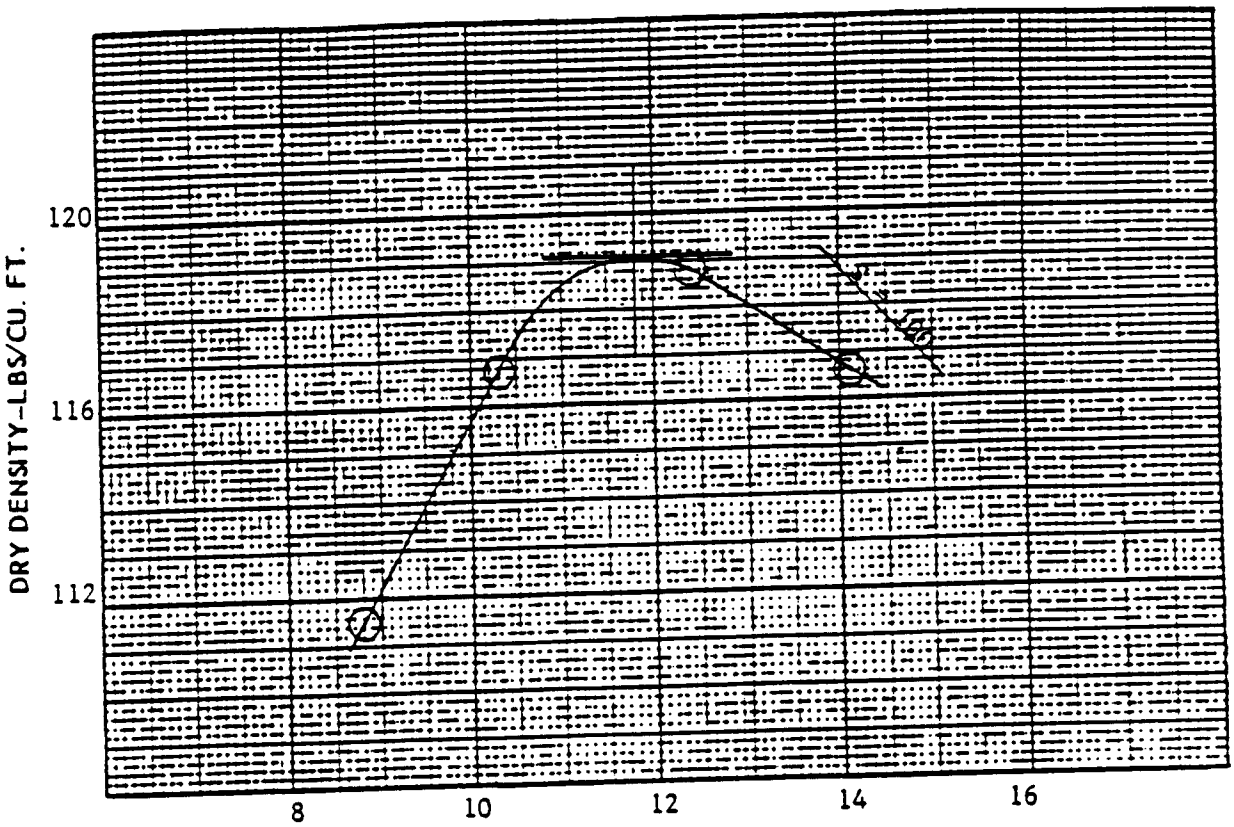
Copies: Addressee (2)

REPLY TO: 4700 LINCOLN ROAD, N.E., ALBUQUERQUE, NEW MEXICO 87109

PHOENIX (602) 272-6848 | TUCSON (602) 792-2779 | ALBUQUERQUE (505) 884-0880 | SANTA FE (505) 471-7636 | SALT LAKE CITY (801) 266-0720 | EL PASO (915) 564-1017

SUMMARY OF MOISTURE DENSITY RELATIONSHIP TESTS

PROJECT 1989 Reclamation Work - Church Rock **JOB NO.** C89-5034



CURVE	SOURCE	OPTIMUM MOISTURE CONTENT % DRY WT.	MAXIMUM DRY DENSITY LBS/CU. FT.	TEST DESIGNATION	TEST METHOD	LAB NO.
	Borrow area, N 75+30	11.8	119.1	ASTM D698	A	1218
	E 59+80					

MOISTURE-DENSITY RELATIONSHIP TEST METHOD DATA

AASHTO T99 and ASTM D698 (Standard Proctor)

METHOD	MATERIAL	MOLD		NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS/CU. FT.
		DIAMETER	HEIGHT					
A	-#4	4"	4.58"	3	25	5.5 LBS.	12"	12,375
B	-#4	6"	4.58"	3	56	5.5 LBS.	12"	12,317
C	-3/4	6"	4.58"	3	56	5.5 LBS.	12"	12,317
D	-3/4	6"	4.58"	3	56	5.5 LBS.	12"	12,317

AASHTO T180 and ASTM D1557 (Modified Proctor)

METHOD	MATERIAL	MOLD		NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS/CU. FT.
		DIAMETER	HEIGHT					
A	-#4	4"	4.58"	5	25	10.0 LBS.	18"	56,250
B	-#4	6"	4.58"	5	56	10.0 LBS.	18"	55,966
C	-3/4	6"	4.58"	5	56	10.0 LBS.	18"	55,966
D	-3/4	6"	4.58"	5	56	10.0 LBS.	18"	55,966

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April 26, 1989

United Nuclear Corporation
P.O. Drawer QQ
Gallup, New Mexico 87301

SHB Job No. C89-5034

Attention: Mr. Charles G. Johnson

Project: 1989 Reclamation Work
Church Rock Uranium Mill

Lab No. 1218: Silty sand, trace of gravel, nonplastic, medium brown, sampled from borrow area, N 75+30, E 59+80, by SHB on April 12, 1989.

SIEVE ANALYSIS

Sieve Size	Percent Passing
3/8 inch	100
No. 4	99
No. 10	98
No. 40	92
No. 100	70
No. 200	47

LIQUID LIMIT NV

PLASTICITY INDEX NP

U.S. CLASSIFICATION SM

MOISTURE-DENSITY RELATIONSHIP (ASTM D698)

Maximum Dry Density 119.1 pcf

Opitmum Moisture 11.8%

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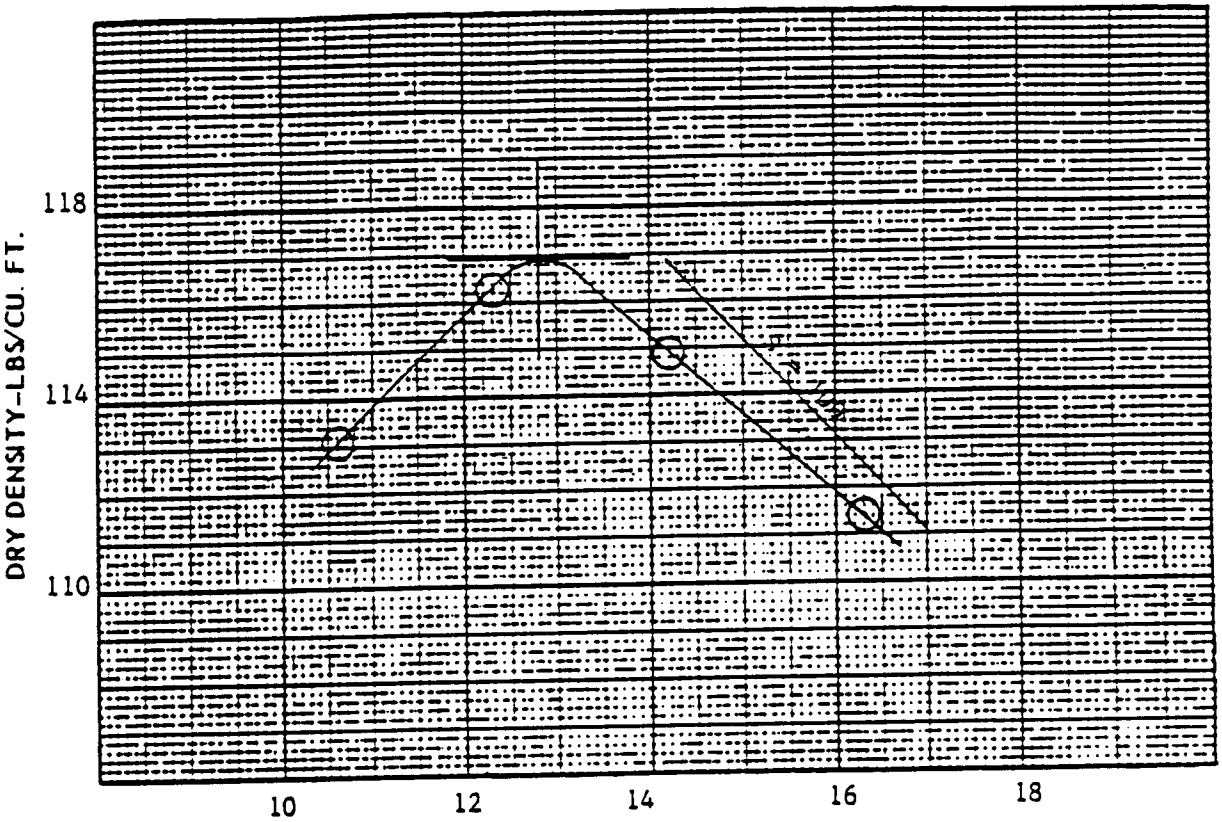
SUMMARY OF MOISTURE DENSITY RELATIONSHIP TESTS

PROJECT 1989 Reclamation Work - Church Rock **JOB NO.** C89-5034



CURVE	SOURCE	OPTIMUM MOISTURE CONTENT % DRY WT.	MAXIMUM DRY DENSITY LBS/CU. FT.	TEST DESIGNATION	TEST METHOD	LAB NO.
	Borrow area N 72+40,	12.8	116.9	ASTM D698	A	1219
	E 60+80					

MOISTURE-DENSITY RELATIONSHIP TEST METHOD DATA

AASHTO T99 and ASTM D698 (Standard Proctor)

METHOD	MATERIAL	MOLD DIAMETER	MOLD HEIGHT	NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS/CU. FT.
A	-#4	4"	4.58"	3	25	5.5 LBS.	12"	12,375
B	-#4	6"	4.58"	3	56	5.5 LBS.	12"	12,317
C	-3/4	6"	4.58"	3	56	5.5 LBS.	12"	12,317
D	-3/4	6"	4.58"	3	56	5.5 LBS.	12"	12,317

AASHTO T180 and ASTM D1557 (Modified Proctor)

METHOD	MATERIAL	MOLD DIAMETER	MOLD HEIGHT	NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS/CU. FT.
A	-#4	4"	4.58"	5	25	10.0 LBS.	18"	56,250
B	-#4	6"	4.58"	5	56	10.0 LBS.	18"	55,966
C	-3/4	6"	4.58"	5	56	10.0 LBS.	18"	55,966
D	-3/4	6"	4.58"	5	56	10.0 LBS.	18"	55,966

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April 26, 1989

United Nuclear Corporation
P.O. Drawer QQ
Gallup, New Mexico 87301

SHB Job No. C89-5034

Attention: Mr. Charles G. Johnson

Project: 1989 Reclamation Plant
Church Rock Uranium Mill

Lab No. 1219: Sandy silt, predominantly fine, nonplastic, medium brown, sampled from borrow area, N 72+40, E 60+80 by SHB on April 12, 1989.

SIEVE ANALYSIS

Sieve Size	Percent Passing
No. 4	100
No. 10	99
No. 40	97
No. 100	80
No. 200	55

LIQUID LIMIT NV

PLASTICITY INDEX NP

U.S. CLASSIFICATION ML

MOISTURE-DENSITY RELATIONSHIP (ASTM D698)

Maximum Dry Density 116.9 pcf

Optimum Moisture 12.8%

Robert E. Chandler

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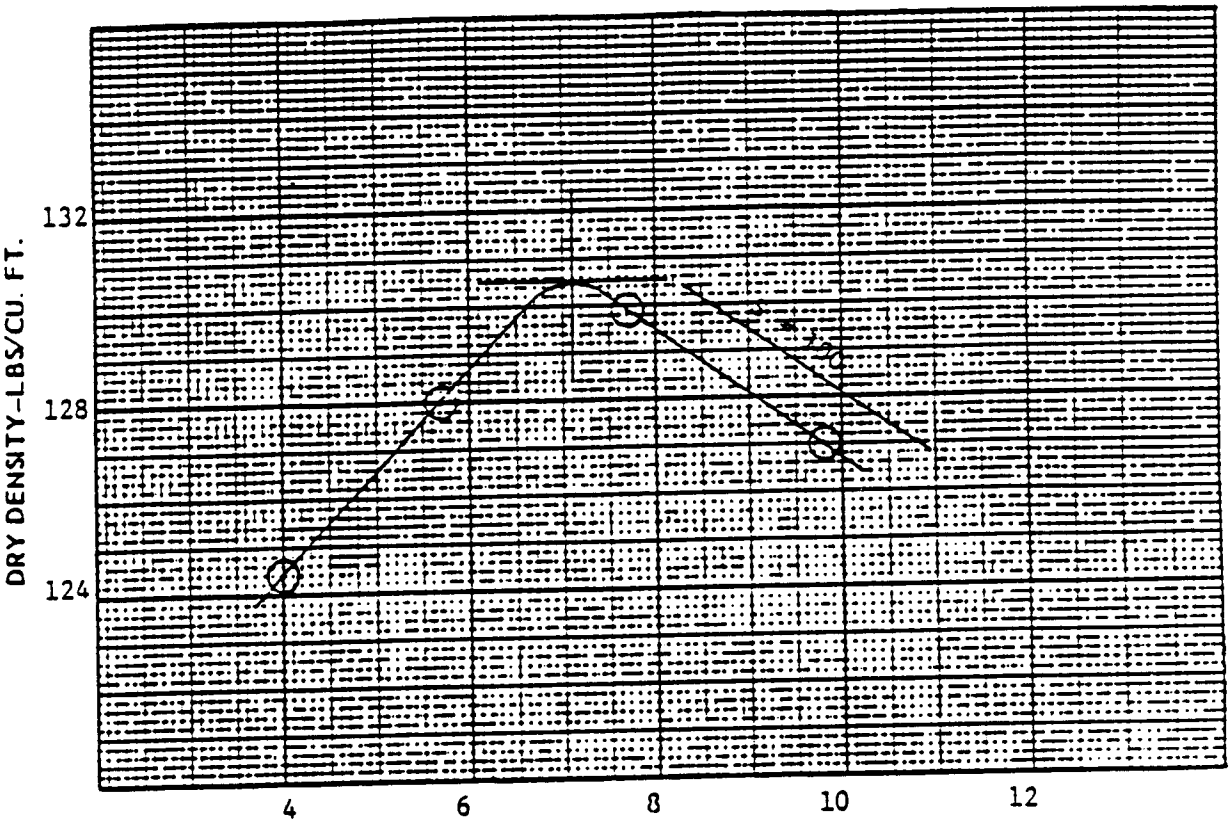
SUMMARY OF MOISTURE DENSITY RELATIONSHIP TESTS

PROJECT 1989 Reclamation Work-Church Rock Uranium Mill JOB NO. C89-5034



CURVE	SOURCE	OPTIMUM MOISTURE CONTENT % DRY WT.	MAXIMUM DRY DENSITY LBS/CU. FT.	TEST DESIGNATION	TEST METHOD	LAB NO.
	Stockpile	7.1	130.5	ASTM D698	D	1238

MOISTURE-DENSITY RELATIONSHIP TEST METHOD DATA

AASHTO T99 and ASTM D698 (Standard Proctor)

METHOD	MATERIAL	MOLD		NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS/CU. FT.
		DIAMETER	HEIGHT					
A	-#4	4"	4.58"	3	25	5.5 LBS.	12"	12.375
B	-#4	6"	4.58"	3	56	5.5 LBS.	12"	12.317
C	-3/4	6"	4.58"	3	56	5.5 LBS.	12"	12.317
D	-3/4	6"	4.58"	3	56	5.5 LBS.	12"	12.317

AASHTO T180 and ASTM D1557 (Modified Proctor)

METHOD	MATERIAL	MOLD		NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS/CU. FT.
		DIAMETER	HEIGHT					
A	-#4	4"	4.58"	5	25	10.0 LBS.	18"	56.250
B	-#4	6"	4.58"	5	56	10.0 LBS.	18"	55.986
C	-3/4	6"	4.58"	5	56	10.0 LBS.	18"	55.986
D	-3/4	6"	4.58"	5	56	10.0 LBS.	18"	55.986

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May 12, 1989

United Nuclear Corporation
P. O. Drawer QQ
Gallup, New Mexico 87301

SHB Job No. C89-5034

Atten: Mr. Charles G. Johnson

Project: 1989 Reclamation Work
Church Rock Uranium Mill

Lab No. 1238: Aggregate base course sampled from stockpile, by SHB on 4/19/89

SIEVE ANALYSIS

Sieve Size	Percent Passing
1 1/2 inch	100
1 inch	97
3/4 inch	73
1/2 inch	51
3/8 inch	42
No. 4	21
No. 8	21
No. 16	16
No. 30	13
No. 50	11
No. 100	10
No. 200	8

LIQUID LIMIT NV

PLASTICITY INDEX NP

MOISTURE-DENSITY RELATIONSHIP (ASTM D698)

Maximum Dry Density 130.5 pcf

Optimum Moisture 7.1%

Robert E. Crandall

mjd
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May 12, 1989

United Nuclear Corporation
P. O. Drawer QQ
Gallup, New Mexico 87301

SHB Job No. C89-5034

Atten: Mr. Charles G. Johnson

Project: 1989 Reclamation Work
Church Rock Uranium Mill

Lab No. 1276: Aggregate base course, sampled from Gallup Sand and Gravel Crusher Plant (stockpile), by SHB on 5/1/89

SIEVE ANALYSIS

Sieve Size	Percent Passing
1 1/2 inch	100
1 inch	99
3/4 inch	95
1/2 inch	78
3/8 inch	70
No. 4	51
No. 10	33
No. 40	21
No. 100	17
No. 200	13

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June 1, 1989

SHB Job No. C89-5034

United Nuclear Corporation
P.O. Drawer QQ
Gallup, New Mexico 87301

Attention: Mr. Charles G. Johnson

Project: 1989 Reclamation Work
Church Rock Uranium Mill

Lab No. 1351: Aggregate base course sampled from access road by SHB on May 27, 1989.

SIEVE ANALYSIS

Sieve Size	Percent Passing	Specifications
1 1/2 inches	100	100
1 inch	96	---
3/4 inch	84	---
1/2 inch	63	---
3/8 inch	53	---
No. 4	38	30-40
No. 10	25	---
No. 40	16	---
No. 100	14	---
No. 200	10	6-15

Robert D. Booth

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June 1, 1989

United Nuclear Corporation
P.O. Drawer QQ
Gallup, New Mexico 87301

SHB Job No. C89-5034

Attention: Mr. Charles G. Johnson

Project: 1989 Reclamation Work
Church Rock Uranium Mill

Lab No. 1344: Aggregate base course sampled from Gallup Sand & Gravel Co. crusher plant stockpile by SHB on May 19, 1989.

SIEVE ANALYSIS

Sieve Size	Percent Passing	Specifications
1 1/2 inches	100	100
1 inch	99	---
3/4 inch	85	---
1/2 inch	69	---
3/8 inch	62	---
No. 4	47	30-45
No. 10	31	---
No. 40	20	---
No. 100	16	---
No. 200	11	10-15

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June 15, 1989

SHB Job No. C89-5034

United Nuclear Corporation
P.O. Drawer QQ
Gallup, New Mexico 87301

Attention: Mr. Charles G. Johnson

Project: 1989 Reclamation Work
Church Rock Uranium Mill

Lab No. 1365: Soil sampled from N 74450, E 58770, -1.0' to 4.5' by SHB on May 26, 1989.

SIEVE ANALYSIS

Sieve Size	Percent Passing
3/4 inch	100
1/2 inch	99
3/8 inch	99
No. 4	97
No. 10	96
No. 40	92
No. 100	69
No. 200	54

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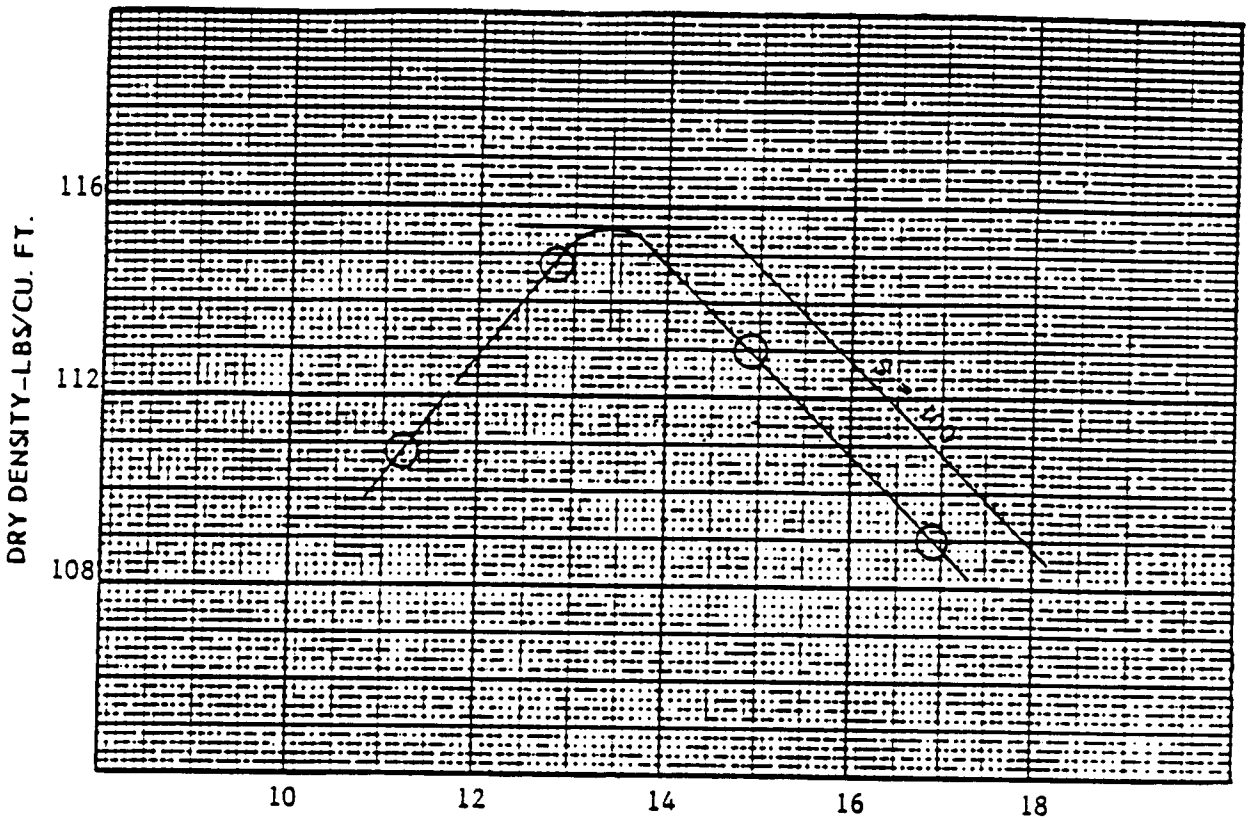
SUMMARY OF MOISTURE DENSITY RELATIONSHIP TESTS

PROJECT 1989 Reclamation Work, Church Rock Uranium Mill **JOB NO.** C89-5034



CURVE	SOURCE	OPTIMUM MOISTURE CONTENT % DRY WT.	MAXIMUM DRY DENSITY LBS/CU. FT.	TEST DESIGNATION	TEST METHOD	LAB NO.
	Toe Dam, N 75250, E 59200	13.4	115.5	ASTM D698	C	1348

MOISTURE-DENSITY RELATIONSHIP TEST METHOD DATA

AASHTO T99 and ASTM D698 (Standard Proctor)

METHOD	MATERIAL	MOLD		NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS/CU. FT.
		DIAMETER	HEIGHT					
A	-#4	4"	4.58"	3	25	5.5 LBS.	12"	12,375
B	-#4	6"	4.58"	3	56	5.5 LBS.	12"	12,317
C	-3/4	6"	4.58"	3	56	5.5 LBS.	12"	12,317
D	-3/4	6"	4.58"	3	56	5.5 LBS.	12"	12,317

AASHTO T180 and ASTM D1557 (Modified Proctor)

METHOD	MATERIAL	MOLD		NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS/CU. FT.
		DIAMETER	HEIGHT					
A	-#4	4"	4.58"	5	25	10.0 LBS.	18"	56,250
B	-#4	6"	4.58"	5	56	10.0 LBS.	18"	55,986
C	-3/4	6"	4.58"	5	56	10.0 LBS.	18"	55,986
D	-3/4	6"	4.58"	5	56	10.0 LBS.	18"	55,986

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June 15, 1989

United Nuclear Corporation
P.O. Drawer QQ
Gallup, New Mexico 87301

SHB Job No. C89-5034

Attention: Mr. Charles G. Johnson

Project: 1989 Reclamation Work
Church Rock Uranium Mill

Lab No. 1348: Clayey sand, considerable amount of gravel, low plasticity, dark brown sampled from Toe Dam, N 75250, E 59200 by SHB on May 22, 1989.

SIEVE ANALYSIS

Sieve Size	Percent Passing
2 inches	100
1 1/2 inches	95
1 inch	95
3/4 inch	93
1/2 inch	89
3/8 inch	86
No. 4	79
No. 10	74
No. 40	70
No. 100	63
No. 200	48

LIQUID LIMIT 27

PLASTICITY INDEX 8

U.S. CLASSIFICATION SC - SM

MOISTURE-DENSITY RELATIONSHIP (ASTM D698)

Maxmimum Dry Density 115.5 pcf

Opitmum Moisture 13.4%

Robert E. Dunn

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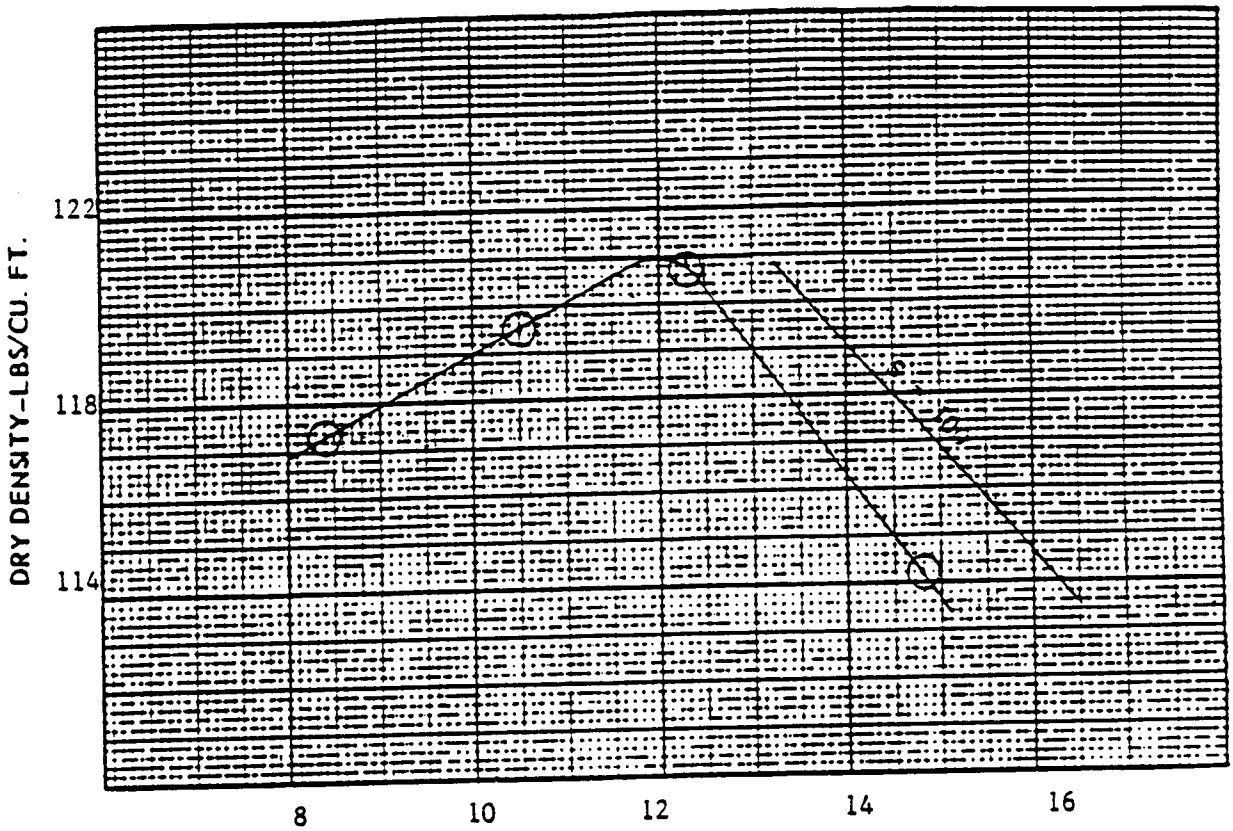
SUMMARY OF MOISTURE DENSITY RELATIONSHIP TESTS

PROJECT 1989 Reclamation Work, Church Rock Uranium Mill JOB NO. C89-5034



CURVE	SOURCE	OPTIMUM MOISTURE CONTENT % DRY WT.	MAXIMUM DRY DENSITY LBS/CU. FT.	TEST DESIGNATION	TEST METHOD	LAB NO.
	NW embankment (surface)	12.0	121.0	ASTM D698	A	1349

MOISTURE-DENSITY RELATIONSHIP TEST METHOD DATA

AASHTO T99 and ASTM D698 (Standard Proctor)

METHOD	MATERIAL	MOLD		NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS/CU. FT.
		DIAMETER	HEIGHT					
A	-#4	4"	4.58"	3	25	5.5 LBS.	12"	12,375
B	-#4	6"	4.58"	3	56	5.5 LBS.	12"	12,317
C	-3/4	6"	4.58"	3	56	5.5 LBS.	12"	12,317
D	-3/4	6"	4.58"	3	56	5.5 LBS.	12"	12,317

AASHTO T180 and ASTM D1557 (Modified Proctor)

METHOD	MATERIAL	MOLD		NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS/CU. FT.
		DIAMETER	HEIGHT					
A	-#4	4"	4.58"	5	25	10.0 LBS.	18"	56,250
B	-#4	6"	4.58"	5	56	10.0 LBS.	18"	55,966
C	-3/4	6"	4.58"	5	56	10.0 LBS.	18"	55,966
D	-3/4	6"	4.58"	5	56	10.0 LBS.	18"	55,966

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June 15, 1989

SHB Job No. C89-5034

United Nuclear Corporation
P.O. Drawer QQ
Gallup, New Mexico 87301

Attention: Mr. Charles G. Johnson

Project: 1989 Reclamation Work
Church Rock Uranium Mill

Lab No. 1349: Clayey sand, trace of gravel, low plasticity, greyish brown sampled from NW embankment (surface) by SHB on May 22, 1989.

SIEVE ANALYSIS

Sieve Size	Percent Passing
3/4 inch	100
1/2 inch	99
3/8 inch	99
No. 4	99
No. 10	98
No. 40	90
No. 100	63
No. 200	43

LIQUID LIMIT 22

PLASTICITY INDEX 7

U.S. CLASSIFICATION SC - SM

MOISTURE-DENISTY RELATIONSHIP (ASTM D698)

Maximum Dry Density 121.0 pcf

Opitimum Moisture 12.0%

Copies: Addressee (2)

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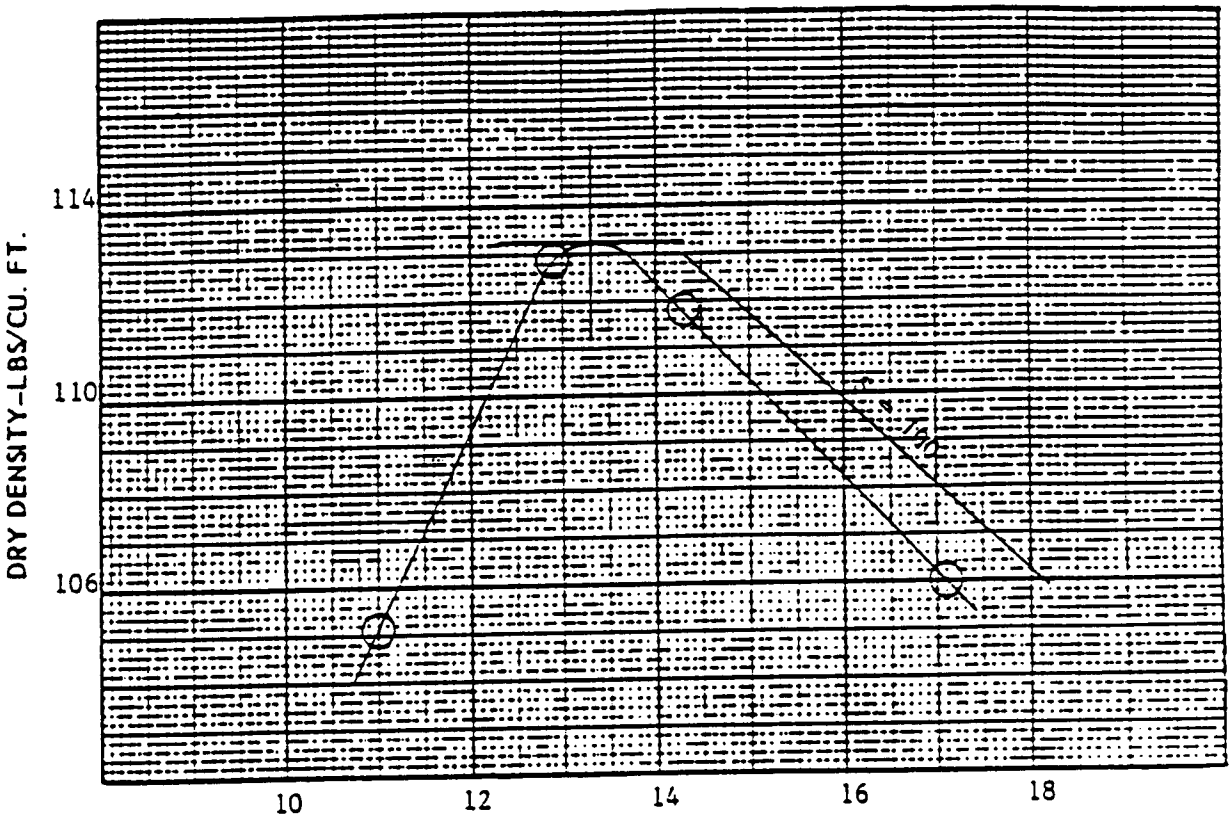
SUMMARY OF MOISTURE DENSITY RELATIONSHIP TESTS

PROJECT 1989 Reclamation Work, Church Rock Uranium Mill **JOB NO.** C89-5034



CURVE	SOURCE	OPTIMUM MOISTURE CONTENT % DRY WT.	MAXIMUM DRY DENSITY LBS/CU. FT.	TEST DESIGNATION	TEST METHOD	LAB NO.
	Area between NW embankment	13.3	113.2	ASTM D698	A	1350
	and Toe Dam					

MOISTURE-DENSITY RELATIONSHIP TEST METHOD DATA

AASHTO T99 and ASTM D698 (Standard Proctor)

METHOD	MATERIAL	MOLD		NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS/CU. FT.
		DIAMETER	HEIGHT					
A	-#4	4"	4.58"	3	25	5.5 LBS.	12"	12.375
B	-#4	6"	4.58"	3	56	5.5 LBS.	12"	12.317
C	-3/4	6"	4.58"	3	56	5.5 LBS.	12"	12.317
D	-3/4	6"	4.58"	3	56	5.5 LBS.	12"	12.317

AASHTO T180 and ASTM D1557 (Modified Proctor)

METHOD	MATERIAL	MOLD		NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS/CU. FT.
		DIAMETER	HEIGHT					
A	-#4	4"	4.58"	5	25	10.0 LBS.	18"	56.250
B	-#4	6"	4.58"	5	56	10.0 LBS.	18"	55.966
C	-3/4	6"	4.58"	5	56	10.0 LBS.	18"	55.966
D	-3/4	6"	4.58"	5	56	10.0 LBS.	18"	55.966

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June 15, 1989

United Nuclear Corporation
P.O. Drawer QQ
Gallup, New Mexico 87301

SHB Job No. C89-5034

Attention: Mr. Charles G. Johnson

Project: 1989 Reclamation Work
Church Rock Uranium Mill

Lab No. 1350: Sandy clay, trace of gravel, medium plasticity, dark brown, sampled from area between NW embankment & Toe Dam by SHB on May 22, 1989.

SIEVE ANALYSIS

Sieve Size	Percent Passing
3/4 inch	100
1/2 inch	99
3/8 inch	99
No. 4	98
No. 10	97
No. 40	96
No. 100	80
No. 200	63

LIQUID LIMIT 31

PLASTICITY INDEX 13

U.S. CLASSIFICATION CL

MOISTURE-DENSITY RELATIONSHIP (ASTM D698)

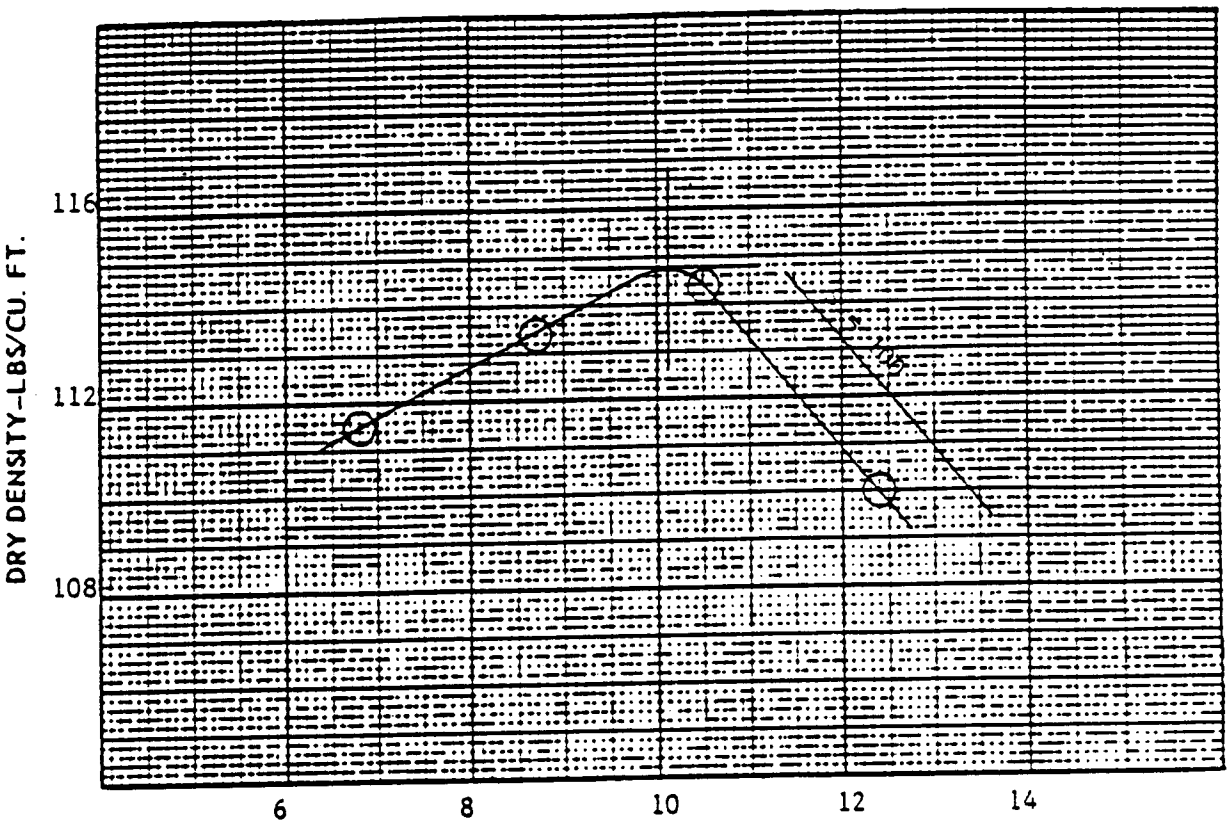
Maximum Dry Density 113.2 pcf

Optimum Moisture 13.3%

Copies: Addressee (2)

SUMMARY OF MOISTURE DENSITY RELATIONSHIP TESTS

PROJECT 1989 Reclamation Work, Church Rock Uranium Mill **JOB NO.** C89-5034



CURVE	SOURCE	OPTIMUM MOISTURE CONTENT % DRY WT.	MAXIMUM DRY DENSITY LBS/CU. FT.	TEST DESIGNATION	TEST METHOD	LAB NO.
	N 74450, E 58770, FSG	10.1	114.7	ASTM D698	A	1364
	-5.0'					

MOISTURE-DENSITY RELATIONSHIP TEST METHOD DATA

AASHTO T99 and ASTM D698 (Standard Proctor)

METHOD	MATERIAL	MOLD		NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS/CU. FT.
		DIAMETER	HEIGHT					
A	-#4	4"	4.58"	3	25	5.5 LBS.	12"	12.375
B	-#4	6"	4.58"	3	56	5.5 LBS.	12"	12.317
C	-3/4	6"	4.58"	3	56	5.5 LBS.	12"	12.317
D	-3/4	6"	4.58"	3	56	5.5 LBS.	12"	12.317

AASHTO T180 and ASTM D1557 (Modified Proctor)

METHOD	MATERIAL	MOLD		NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS/CU. FT.
		DIAMETER	HEIGHT					
A	-#4	4"	4.58"	5	25	10.0 LBS.	18"	56.250
B	-#4	6"	4.58"	5	56	10.0 LBS.	18"	55.966
C	-3/4	6"	4.58"	5	56	10.0 LBS.	18"	55.966
D	-3/4	6"	4.58"	5	56	10.0 LBS.	18"	55.966

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June 15, 1989

United Nuclear Corporation
P.O. Drawer QQ
Gallup, NEw Mexico 87301

SHB Job No. C89-5034

Attention: Mr. Charles G. Johnson

Project: 1989 Reclamation Work
Church Rock Uranium Mill

Lab No. 1364: Silty sand, some gravel, nonplastic, light brown, sampled from N 74450, E 58770, FSG -5.0' by SHB on May 26, 1989.

SIEVE ANALYSIS

Sieve Size	Percent Passing
1 1/2 inches	100
1 inch	90
3/4 inch	89
1/2 inch	89
3/8 inch	86
No. 4	85
No. 10	84
No. 40	64
No. 100	22
No. 200	13

LIQUID LIMIT NV

PLASTICITY INDEX NP

U.S. CLASSIFICATION SM

MOISTURE-DENSITY RELATIONSHIP (ASTM D698)

Maximum Dry Density 114.7 pcf

Optimum Moisture 10.1%

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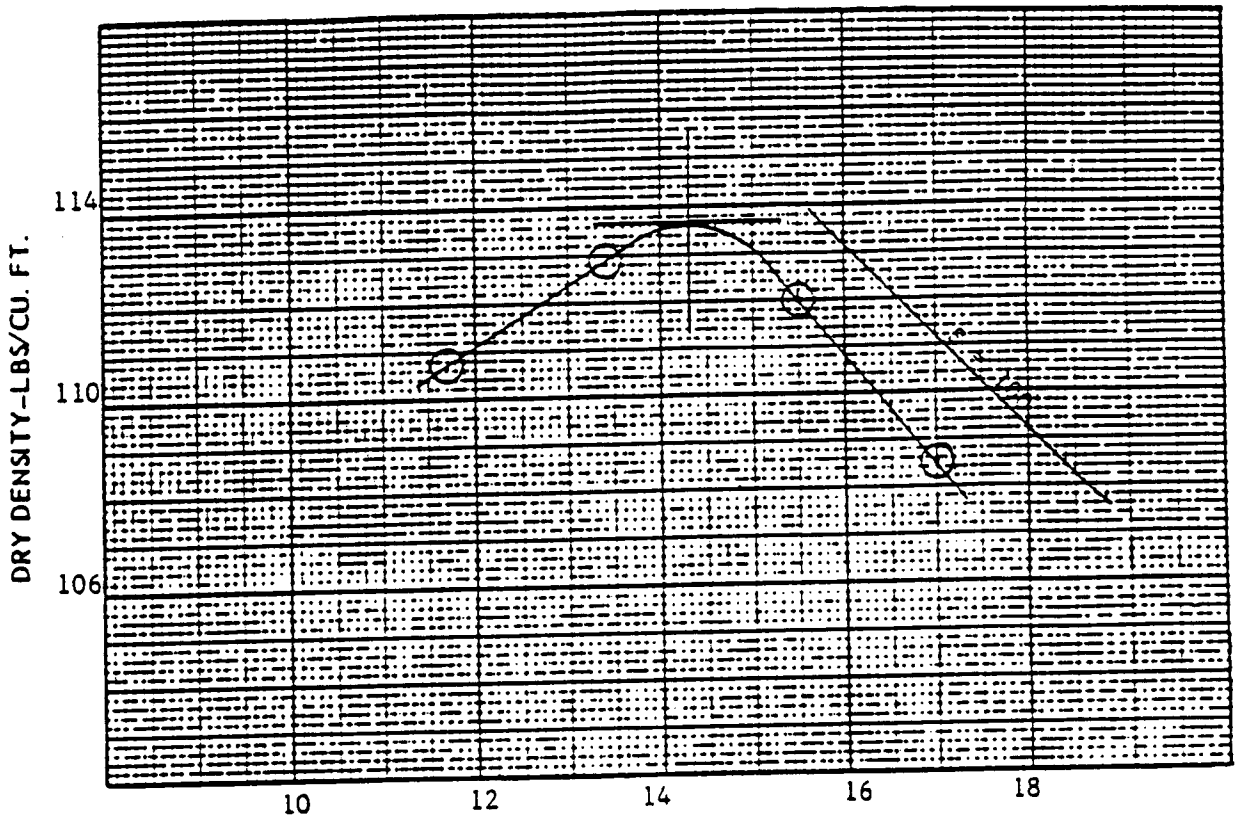
SUMMARY OF MOISTURE DENSITY RELATIONSHIP TESTS

PROJECT 1989 Reclamation Work, Church Rock Uranium Mill JOB NO. C89-5034



CURVE	SOURCE	OPTIMUM MOISTURE CONTENT % DRY WT.	MAXIMUM DRY DENSITY LBS/CU. FT.	TEST DESIGNATION	TEST METHOD	LAB NO.
	N 75140, E 59350, FSG	14.0	113.7	ASTM D698	A	1366
	-5.0'					

MOISTURE-DENSITY RELATIONSHIP TEST METHOD DATA

AASHTO T99 and ASTM D698 (Standard Proctor)

METHOD	MATERIAL	MOLD DIAMETER	MOLD HEIGHT	NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS/CU. FT.
A	-#4	4"	4.58"	3	25	5.5 LBS.	12"	12.375
B	-#4	6"	4.58"	3	56	5.5 LBS.	12"	12.317
C	-3/4	6"	4.58"	3	56	5.5 LBS.	12"	12.317
D	-3/4	6"	4.58"	3	56	5.5 LBS.	12"	12.317

AASHTO T180 and ASTM D1557 (Modified Proctor)

METHOD	MATERIAL	MOLD DIAMETER	MOLD HEIGHT	NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS/CU. FT.
A	-#4	4"	4.58"	5	25	10.0 LBS.	18"	56.250
B	-#4	6"	4.58"	5	56	10.0 LBS.	18"	55.966
C	-3/4	6"	4.58"	5	56	10.0 LBS.	18"	55.966
D	-3/4	6"	4.58"	5	56	10.0 LBS.	18"	55.966

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United Nuclear Corporation
P.O. Drawer QQ
Gallup, New Mexico 87301

SHB Job No. C89-5034

Attention: Mr. Charles G. Johnson

Project: 1989 Reclamation Work
Church Rock Uranium Mill

Lab No. 1366: Sandy clay, predominantly fine, low plasticity, dark brown, sampled from N 75140, E 59350, FSG -5.0' by SHB on May 26, 1989.

SIEVE ANALYSIS

Sieve Size	Percent Passing
No. 4	100
No. 10	98
No. 40	95
No. 100	84
No. 200	61

LIQUID LIMIT 27

PLASTICITY INDEX 10

U.S. CLASSIFICATION CL

MOISTURE-DENSITY RELATIONSHIP (ASTM D698)

Maximum Dry Density 113.7 pcf

Optimum Moisture 14.0%

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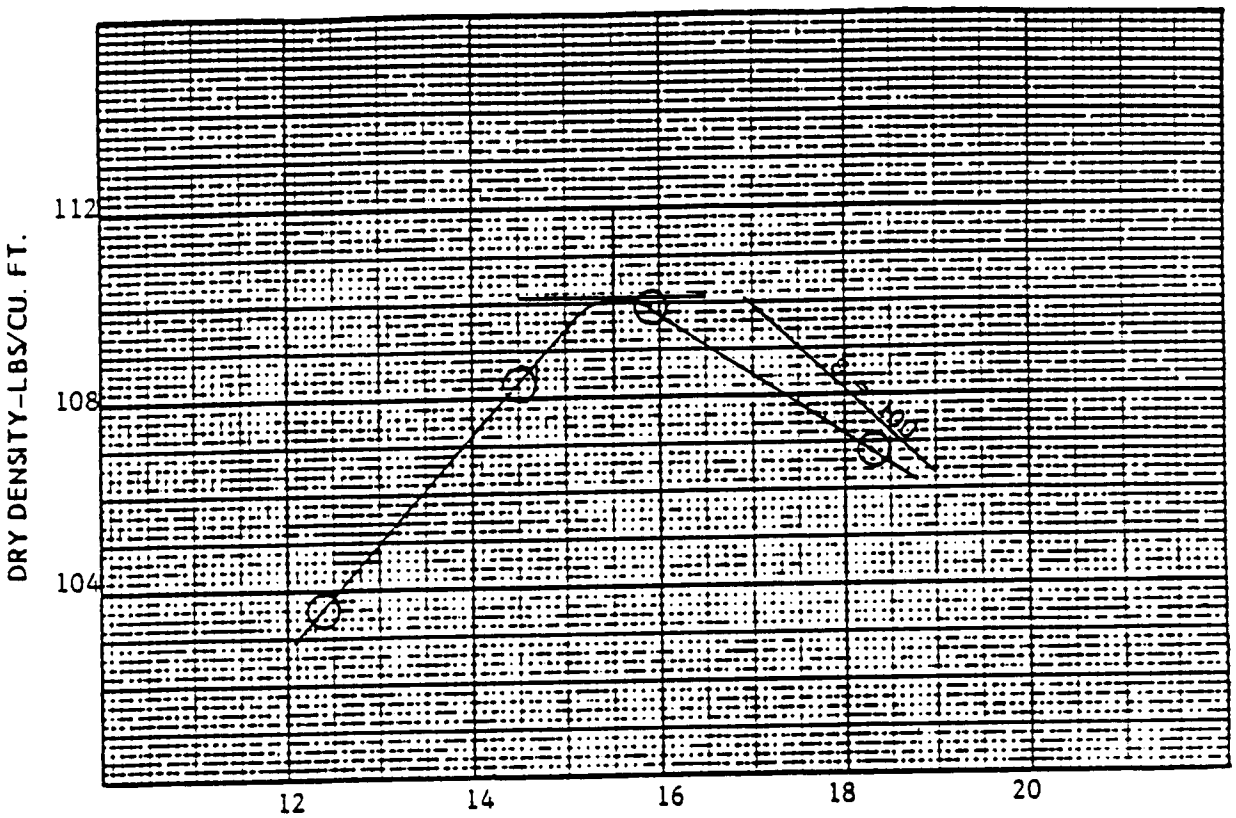
SUMMARY OF MOISTURE DENSITY RELATIONSHIP TESTS

PROJECT 1989 Reclamation Work, Church Rock Uranium Mill **JOB NO.** C89-5034



CURVE	SOURCE	OPTIMUM MOISTURE CONTENT % DRY WT.	MAXIMUM DRY DENSITY LBS/CU. FT.	TEST DESIGNATION	TEST METHOD	LAB NO.
	N 75890, E 59130, FSG	15.5	110.1	ASTM D698	A	1367
	-4.0'					

MOISTURE-DENSITY RELATIONSHIP TEST METHOD DATA

AASHTO T99 and ASTM D698 (Standard Proctor)

METHOD	MATERIAL	MOLD DIAMETER	MOLD HEIGHT	NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS/CU. FT.
A	-#4	4"	4.58"	3	25	5.5 LBS.	12"	12,375
B	-#4	6"	4.58"	3	56	5.5 LBS.	12"	12,317
C	-3/4	6"	4.58"	3	56	5.5 LBS.	12"	12,317
D	-3/4	6"	4.58"	3	56	5.5 LBS.	12"	12,317

AASHTO T180 and ASTM D1557 (Modified Proctor)

METHOD	MATERIAL	MOLD DIAMETER	MOLD HEIGHT	NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS/CU. FT.
A	-#4	4"	4.58"	5	25	10.0 LBS.	18"	56,250
B	-#4	6"	4.58"	5	56	10.0 LBS.	18"	55,000
C	-3/4	6"	4.58"	5	56	10.0 LBS.	18"	55,000
D	-3/4	6"	4.58"	5	56	10.0 LBS.	18"	55,000

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June 15, 1989

United Nuclear Corporation
P.O. Drawer QQ
Gallup, New Mexico 87301

SHB Job No. C89-5034

Attention: Mr. Charles G. Johnson

Project: 1989 Reclamation Work
Church Rock Uranium Mill

Lab No. 1367: Sandy clay, predominantly fine, medium plasticity, dark brown sampled from N 74890, E 59130, FSG -4.0' by SHB on May 26, 1989.

SIEVE ANALYSIS

Sieve Size	Percent Passing
No. 4	100
No. 10	99
No. 40	97
No. 100	89
No. 200	70

LIQUID LIMIT 33

PLASTICITY INDEX 16

U.S. CLASSIFICATION CL

MOISTURE-DENSITY RELATIONSHIP (ASTM D698)

Maximum Dry Density 110.1 pcf

Optimum Moisture 15.5%

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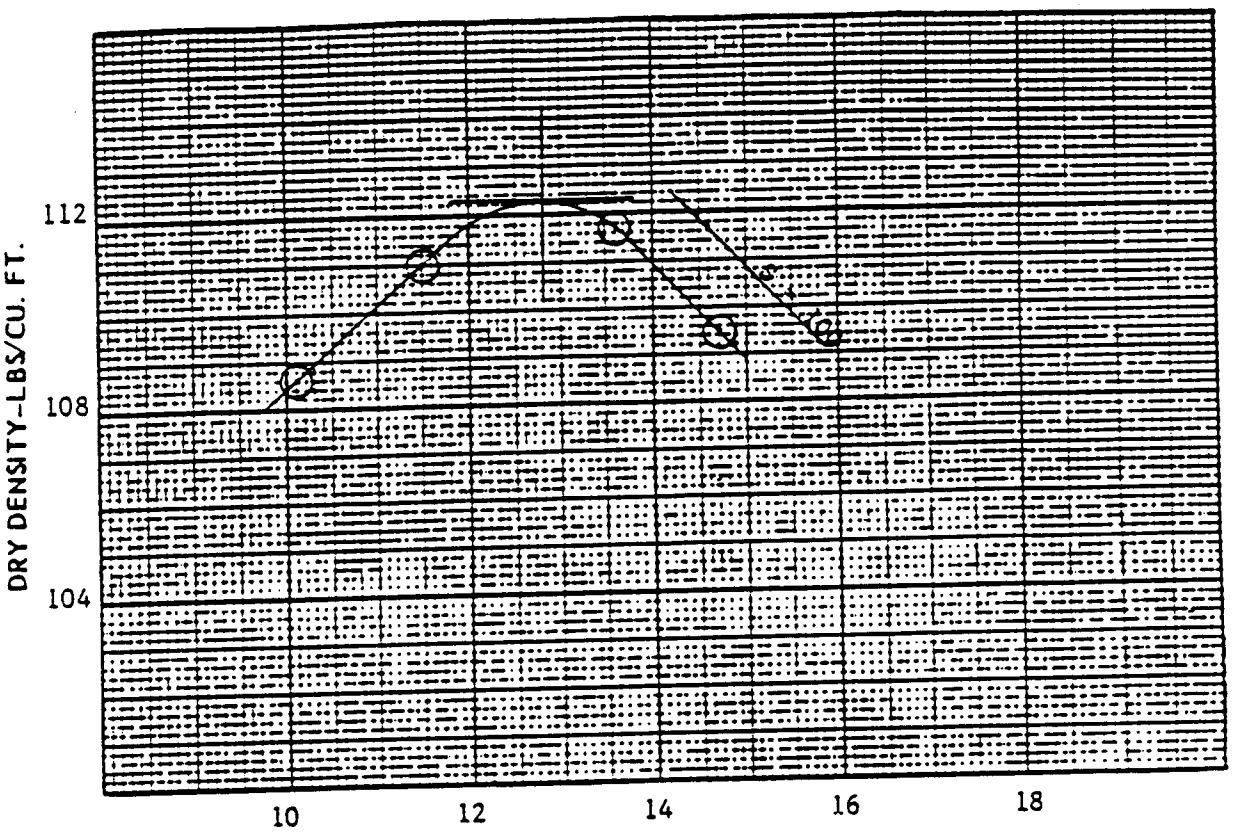
SUMMARY OF MOISTURE DENSITY RELATIONSHIP TESTS

PROJECT 1989 Reclamarion Work - Churchrock Uranium Mill JOB NO. C89-5034



CURVE	SOURCE	OPTIMUM MOISTURE CONTENT % DRY WT.	MAXIMUM DRY DENSITY LBS/CU. FT.	TEST DESIGNATION	TEST METHOD	LAB NO.
	Haul road, ditch on S side	12.8	112.2	ASTM D698	A	1437
	of Toe Dam, OGP					

MOISTURE-DENSITY RELATIONSHIP TEST METHOD DATA

AASHTO T99 and ASTM D698 (Standard Proctor)

METHOD	MATERIAL	MOLD		NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS/CU. FT.
		DIAMETER	HEIGHT					
A	-#4	4"	4.58"	3	25	5.5 LBS.	12"	12,375
B	-#4	6"	4.58"	3	56	5.5 LBS.	12"	12,317
C	-3/4	6"	4.58"	3	56	5.5 LBS.	12"	12,317
D	-3/4	6"	4.58"	3	56	5.5 LBS	12"	12,317

AASHTO T180 and ASTM D1557 (Modified Proctor)

METHOD	MATERIAL	MOLD		NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS/CU. FT.
		DIAMETER	HEIGHT					
A	-#4	4"	4.58"	5	25	10.0 LBS.	18"	56,250
B	-#4	6"	4.58"	5	56	10.0 LBS.	18"	55,944
C	-3/4	6"	4.58"	5	56	10.0 LBS.	18"	55,944
D	-3/4	6"	4.58"	5	56	10.0 LBS.	18"	55,944

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July 20, 1989

United Nuclear Corporation
P.O. Drawer QQ
Gallup, New Mexico 87301

SHB Job No. C89-5034

Attention: Mr. Charles G. Johnson

Project: 1989 Reclamation Work
Churchrock Uranium Mill

Lab No. 1437: Silty sand, predominantly fine, nonplastic, tan sampled form Haul road, ditch on S side of Toe Dam (OGP), by SHB on June 16, 1989.

SIEVE ANALYSIS

Sieve Size	Percent Passing
3/8 inch	100
No. 4	99
No. 10	97
No. 40	95
100	51
No. 200	30

LIQUID LIMIT NV

PLASTICITY INDEX NP

U.S. CLASSIFICATION SM

MOISTURE-DENSITY RELATIONSHIP (ASTM D698)

Maximum Dry Density 112.2 pcf

Optimum Moisture 12.8%

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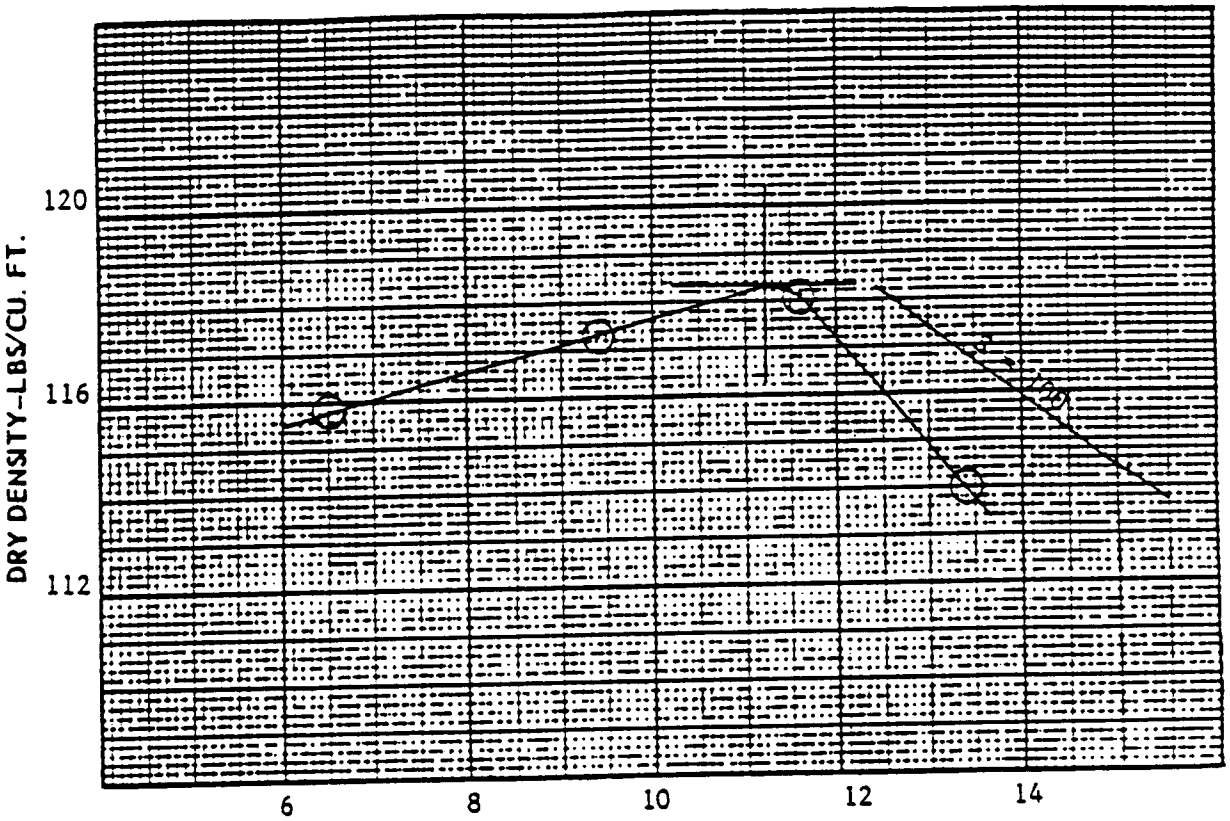
SUMMARY OF MOISTURE DENSITY RELATIONSHIP TESTS

PROJECT 1989 Reclamarion Work - Church Rock Uranium Mill **JOB NO.** C89-5034



CURVE	SOURCE	OPTIMUM MOISTURE CONTENT % DRY WT.	MAXIMUM DRY DENSITY LBS./CU. FT.	TEST DESIGNATION	TEST METHOD	LAB NO.
	Existing fill area at F6,	11.2	118.3	ASTM D698	C	1492
	N cell					

MOISTURE-DENSITY RELATIONSHIP TEST METHOD DATA

AASHTO T99 and ASTM D698 (Standard Proctor)

METHOD	MATERIAL	MOLD DIAMETER	MOLD HEIGHT	NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS/CU. FT.
A	-#4	4"	4.58"	3	25	5.5 LBS.	12"	12.375
B	-#4	6"	4.58"	3	56	5.5 LBS.	12"	12.317
C	-3/4	6"	4.58"	3	56	5.5 LBS.	12"	12.317
D	-3/4	6"	4.58"	3	56	5.5 LBS.	12"	12.317

AASHTO T180 and ASTM D1557 (Modified Proctor)

METHOD	MATERIAL	MOLD DIAMETER	MOLD HEIGHT	NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS/CU. FT.
A	-#4	4"	4.58"	5	25	10.0 LBS.	18"	56.250
B	-#4	6"	4.58"	5	56	10.0 LBS.	18"	55.966
C	-3/4	6"	4.58"	5	56	10.0 LBS.	18"	55.966
D	-3/4	6"	4.58"	5	56	10.0 LBS.	18"	55.966

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July 20, 1989

SHB Job No. C89-5034

United Nuclear Corporation
P.O. Drawer QQ
Gallup, New Mexico 87301

Attention: Mr. Charles G. Johnson

Project: 1989 Reclamation Work
Church Rock Uranium Mill

Lab No. 1492: Silty sand, gravelly, nonplastic, tan, sampled from existing fill area at F6, N cell by SHB on July 12, 1989.

SIEVE ANALYSIS

Sieve Size	Percent Passing
3 inches	100
2 inches	91
1 1/2 inches	83
1 inch	79
3/4 inch	73
1/2 inch	67
3/8 inch	63
No. 4	56
No. 10	48
No. 40	43
No. 100	25
No. 200	20

LIQUID LIMIT NV

PLASTICITY INDEX NP

U.S.CLASSIFICATION SM

MOISTURE-DENSITY RELATIONSHIP (ASTM D698)

Maximum Dry Density 118.3 pcf

Optimum Moisture 11.2%

Robert E. Dendel

Copies: Addressee (2)

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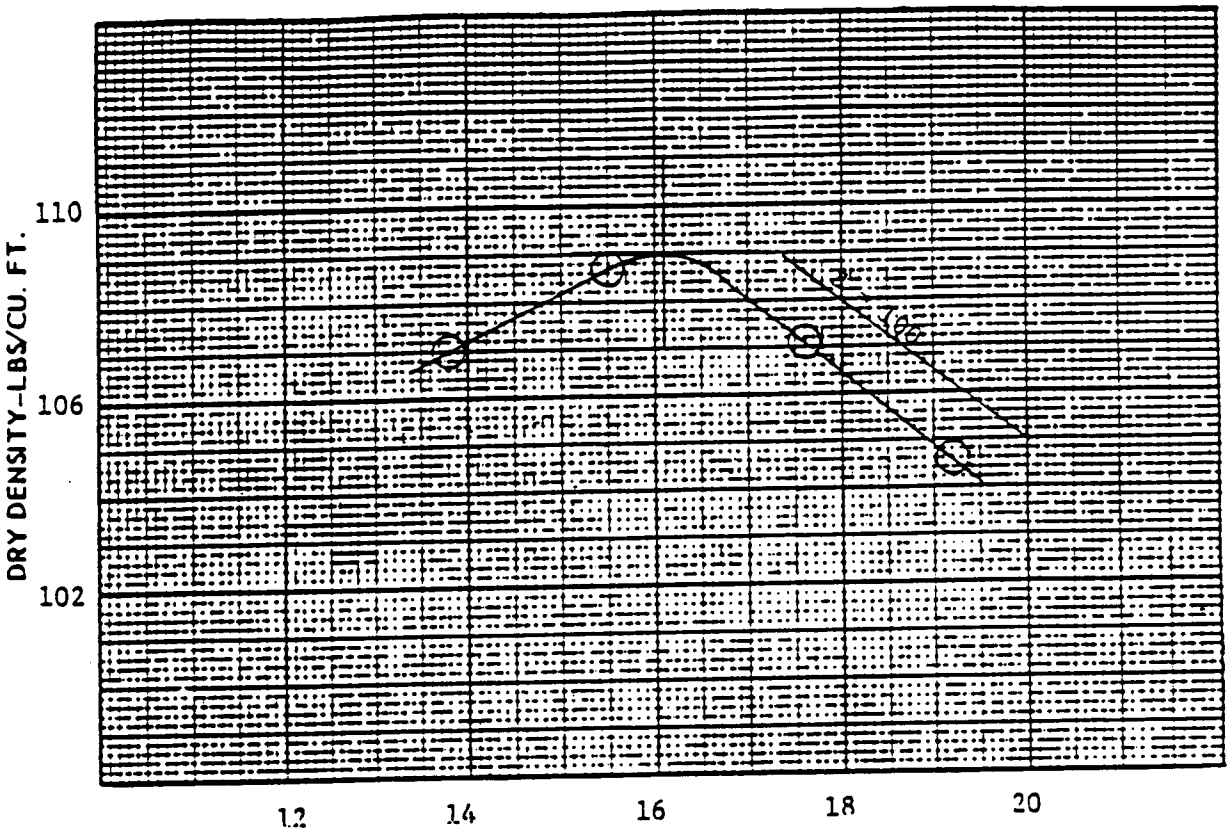
SUMMARY OF MOISTURE DENSITY RELATIONSHIP TESTS

PROJECT 1989 Reclamation Work
Church Rock Uranium Mill

JOB NO. C89-5034



CURVE	SOURCE	OPTIMUM MOISTURE CONTENT % DRY WT.	MAXIMUM DRY DENSITY LBS/CU. FT.	TEST DESIGNATION	TEST METHOD	LAB NO.
	North embankment	16.1	109.0	ASTM D698	A	1509

MOISTURE-DENSITY RELATIONSHIP TEST METHOD DATA

AASHTO T99 and ASTM D698 (Standard Proctor)

METHOD	MATERIAL	MOLD		NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS/CU. FT.
		DIAMETER	HEIGHT					
A	-#4	4"	4.58"	3	25	5.5 LBS.	12"	12,375
B	-#4	6"	4.58"	3	56	5.5 LBS.	12"	12,317
C	-3/4	6"	4.58"	3	56	5.5 LBS.	12"	12,317
D	-3/4	6"	4.58"	3	56	5.5 LBS.	12"	12,317

AASHTO T180 and ASTM D1557 (Modified Proctor)

METHOD	MATERIAL	MOLD		NO. OF LAYERS	BLOWS PER LAYER	HAMMER WEIGHT	HEIGHT OF FALL	COMPACTIVE EFFORT FT. LBS/CU. FT.
		DIAMETER	HEIGHT					
A	-#4	4"	4.58"	5	25	10.0 LBS.	18"	56,250
B	-#4	6"	4.58"	5	56	10.0 LBS.	18"	55,966
C	-3/4	6"	4.58"	5	56	10.0 LBS.	18"	55,966
D	-3/4	6"	4.58"	5	56	10.0 LBS.	18"	55,966

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August 29, 1989

United Nuclear Corporation
P. O. Drawer QQ
Gallup, New Mexico 87301
Atten: Mr. Charles G. Johnson

SHB Job No. C89-5034

Project: 1989 Reclamation Work
Church Rock Uranium Mill

Lab No. 1509: Sandy clay, fine, medium plasticity, medium brown, sampled from North embankment, by SHB on 7/18/89.

SIEVE ANALYSIS

Sieve Size	Percent Passing
No. 4	100
No. 10	99
No. 40	98
No. 100	85
No. 200	60

LIQUID LIMIT 34

PLASTICITY INDEX 17

U. S. CLASSIFICATION CL

MOISTURE-DENSITY RELATIONSHIP (ASTM D698)

Maximum Dry Density 109.0 pcf

Optimum Moisture 16.1%

mjd
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August 31, 1989

United Nuclear Corporation
P.O. Box Drawer QQ
Gallup, New Mexico 87301

SHB Job No. C89-5034

Attention: Mr. Charles G. Johnson

Project: 1989 Reclamation Work
Church Rock Uramium Mill

Lab No. 1595: Aggregate base course sampled from zone 3 wells, access rd. at N 76100 & E 61300 by SHB on August 17, 1989.

SEIVE ANALYSIS

Sieve Size	Percent Passing
1 1/2 inch	100
1 inch	94
3/4 inch	86
1/2 inch	69
3/8 inch	59
No. 4	51
No. 10	42
No. 40	29
No. 100	16
No. 200	12

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August 31, 1989

United Nuclear Corporation
P.O. Drawer QQ
Gallup, New Mexico 87301

SHB Job No. C89-5034

Attention: Mr. Charles G. Johnson

Project: 1989 Reclamation Work
Church Rock Uranium Mill

Lab No. 1596: Aggregate base course sampled from zone 3 wells, access rd. at N 76100 & E 61200 by SHB on August 17, 1989.

SIEVE ANALYSIS

Sieve Size	Percent Passing
1 1/2 inch	100
1 inch	95
3/4 inch	85
1/2 inch	72
3/8 inch	64
No. 4	49
No. 10	34
No. 40	22
No. 100	19
No. 200	14

Robert C. Hendrix

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DEC 2 6 1989

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PAUL KAPLAN, P.E.

Date: December 18, 1989

To: United Nuclear Corporation
P. O. Drawer QQ
Gallup, New Mexico 87301

SHB Job No. C89-5034

Attn: Mr. Charles G. Johnson

Re: 1989 Reclamation Work
Church Rock Uranium Mill

We are sending ___ As requested x For your use ___ For comment

x Enclosed ___ Under separate cover via ___

Description: Report of Sieve Analysis and Remolded Permiability for the referenced project dated July 18, 1989

Remarks: Should you have any questions, please do not hesitate to contact us.

Copies: Addressee (2)

By Robert E. Randall

REPLY TO: 4700 LINCOLN ROAD, N.E., ALBUQUERQUE, NEW MEXICO 87109

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December 18, 1989

United Nuclear Corporation
P. O. Drawer QQ
Gallup, New Mexico 87301
Atten: Mr. Charles G. Johnson

SHB Job No. C89-5034

Project: 1989 Reclamation Work
Church Rock Uranium Mill

Lab No. 1548: Silty sand, very fine, nonplastic, tan sampled from 59, 260 E and 74, 570 N by SHB on 7/18/89

SIEVE ANALYSIS

Sieve Size	Percent Passing
No. 10	100
No. 40	99
No. 100	69
No. 200	45

LIQUID LIMIT NV

PLASTICITY INDEX NP

U. S. CLASSIFICATION SM

1959-1989 SHB 30 YEARS OF SERVICE

REPLY TO: 4700 LINCOLN ROAD. N.E.. ALBUQUERQUE. NEW MEXICO 87109

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EL PASO (915) 564-1017 FAX 562-7739
RENO/SPARKS (702) 331-2375 FAX 331-4153

1989 Reclamation Work
Church Rock Uranium Mill

SHB Job No. C89-5034

REMOLDED PERMIABILITY

95% of ASTM D698 Method "A", Field Lab #F-1001, Maximum Density 114.2 pcf
@ Optimum Moisture 13.4%

Beginning Moisture	13.4%
Final Moisture	14.6%

Flow 3.48×10^{-8} CM/SEC

mjd
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PAUL KAPLAN, P.E.

Date: December 18, 1989

To: United Nuclear Corporation
P. O. Drawer QQ
Gallup, New Mexico 87301

SHB Job No. C89-5034

Attn.: Mr. Charles G. Johnson

Re: 1989 Reclamation Work
Church Rock Uranium Mill

We are sending ___ As requested x For your use ___ For comment

x Enclosed ___ Under separate cover via ___

Description: Report of Sieve Analysis and Remolded Permiability for the referenced project dated 8/28/89

Remarks: Should you have any questions, please do not hesitate to contact us.

Copies: Addressee (2)

By Robert E. Chandler

REPLY TO: 4700 LINCOLN ROAD, N.E., ALBUQUERQUE, NEW MEXICO 87109

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December 18, 1989

United Nuclear Corporation
P. O. Drawer QQ
Gallup, New Mexico 87301
Atten: Mr. Charles G. Johnson

SHB Job No. C89-5034

Project: 1989 Reclamation Work
Church Rock Uranium Mill

Lab No. 1614: Sandy clay, very fine, medium high plasticity, dark brown sampled from clay barrier @ South end of North cell by SHB on August 28, 1989

SIEVE ANALYSIS

Sieve Size	Percent Passing
No. 10	100
No. 40	100
No. 100	82
No. 200	63

LIQUID LIMIT	43
PLASTICITY INDEX	21
U. S. CLASSIFICATION	CL

1959-1989 SHB 30 YEARS OF SERVICE

REPLY TO: 4700 LINCOLN ROAD, N.E., ALBUQUERQUE, NEW MEXICO 87109

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EL PASO (915) 564-1017 FAX 562-7739
RENO/SPARKS (702) 331-2375 FAX 331-4153

1989 Reclamation Work
Church Rock Uranium Mill

SHB Job No. C89-5034

REMOLDED PERMIABILITY

95% of ASTM D-698 Method "A", Field Lab #F-1004, Maximum Density 114.7 pcf @ Optimum Moisture 14.4%

Beginning Moisture	14.5%
Final Moisture	19.1%

Flow 1.38×10^{-6} CM/SEC

mjd
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Date: December 18, 1989

To: United Nuclear Corporation
P. O. Drawer QQ
Gallup, New Mexico 87301

SHB Job No. C89-5034

Attn: Mr. Charles G. Johnson

Re: 1989 Reclamation Work
Church Rock Uranium Mill

We are sending ___ As requested _x_ For your use ___ For comment

_X_ Enclosed ___ Under separate cover via _____

Description: Report of Sieve Analysis and Remolded Permiability for the referenced project dated July 28, 1989

Remarks: Should you have any questions, please do not hesitate to contact us.

Copies: Addressee (2)

By Robert E. Chandler

REPLY TO: 4700 LINCOLN ROAD, N.E., ALBUQUERQUE, NEW MEXICO 87109

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December 18, 1989

United Nuclear Corporation
P. O. Drawer QQ
Gallup, New Mexico 87301
Atten: Mr. Charles G. Johnson

SHB Job No. C89-5034

Project: 1989 Reclamation Work
Church Rock Uranium Mill

Lab No. 1547: Sandy clay, trace of gravel, low plasticity, dark brown sampled from North embankment, 59, 500 E & 74, 970 N by SHB on 7/28/89

SIEVE ANALYSIS

Sieve Size	Percent Passing
1/2 inch	100
3/8 inch	100
No. 4	97
No. 10	92
No. 40	87
No. 100	76
No. 200	56

LIQUID LIMIT	25
PLASTICITY INDEX	8
U. S. CLASSIFICATION	CL

1959-1989 SHB 30 YEARS OF SERVICE

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EL PASO (915) 564-1017 FAX 562-7739
RENO/SPARKS (702) 331-2375 FAX 331-4153

1989 Reclamation Work
Church Rock Uranium Mill

SHB Job No. C89-5034

REMOLDED PERMIABILITY

95% of ASTM D-698 Method "A", Lab #1509, Maximum Density 109.0 pcf @ Optimum Moisture 16.1%

Beginning Moisture	16.1%
Final Moisture	16.7%

Flow 3.87×10^{-8} CM/SEC

mjd
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