1/257

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Geological Engineering

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June 3, 1994

Original

A. Chowdhury
Center for Nuclear Waste Regulatory Analyses
Southwest Research Institute
6220 Culebra Rd.
San Antonio, TX 78284

Dear Dr. Chowdhury:

Enclosed are the results of contract PO93534, "Mechanical Characterization of Tuff", that were performed at the Geomechanics Laboratory at the University of Arizona, Tucson, AZ. The results include 37 uniaxial compression tests without strain gages, 10 uniaxial compression tests with strain gages (for the calculation of Young's modulus and Poisson's ratio), 10 triaxial compression tests, and 40 Brazilian disk tension tests . The results are summarized in Figures 1-5 and Tables 1-4. The complete package of results, including data sheets, photographs (before and after failure), and notebooks, follow the Figures and Tables. Some comments on the results from each type of test are given below.

Uniaxial Compressive Strength
The results are presented in Table 1. Of the 47 uniaxial compressive tests conducted, 38 tests satisfy the ASTM standards for both perpendicularity and smoothness. These 38 tests are summarized in Figure 1. The mean and standard deviation for uniaxial compressive strength for these 38 tests are 168 MPa and 89 MPa, respectively. With the exception of one sample, the failure plane (or planes) did not follow any apparent pre-existing weakness. The one sample that did break along a pre-existing weakness has a very low uniaxial strength 15 MPa (2175 psi).

Young's modulus and Poisson's ratio
The results are presented in Table 2. Of the 10 uniaxial tests with strain gages conducted, 9 tests satisfy the ASTM standard for both perpendicularity and smoothness. These 9 tests are summarized in Figures 2 and 3. The mean and standard deviation for Young's modulus are 52 and 19 GPa, respectively. The mean and standard deviation for Poisson's ratio are 0.174 and 0.044, respectively. It should be noted that the 10 samples for uniaxial testing with strain gages were picked at random from the 57 previously prepared samples shipped to us.

Triaxial Compressive Strength
The results are presented in Table 3. Of the 10 triaxial compression tests conducted, 8 satisfy the ASTM standard for both perpendicularity and smoothness. Also, one of these tests broke while preparing for the test. The results of the remaining 7 tests are summarized in Figure 4. The average of the 38 uniaxial tests is also shown on Figure 4. With the exception of one sample, the failure plane (or planes) did not follow any apparent pre-existing weakness. The one sample that did break along a pre-existing weakness has a low triaxial strength 107 MPa (15,458 psi).The results in Figure 4 indicate a significant amount of variation from sample to sample. In fact, 3 of the 7

RECYCLED
RECYCLABLE

triaxial strengths are lower than the average uniaxial compressive strength. Because of this variation, the friction angle has not been calculated. It is recommended that in the future, triaxial results be conducted at higher values of confinement (at least up to 5000 psi). It should be noted that the 10 samples for triaxial testing were picked at random from the 57 previously prepared samples shipped to us.

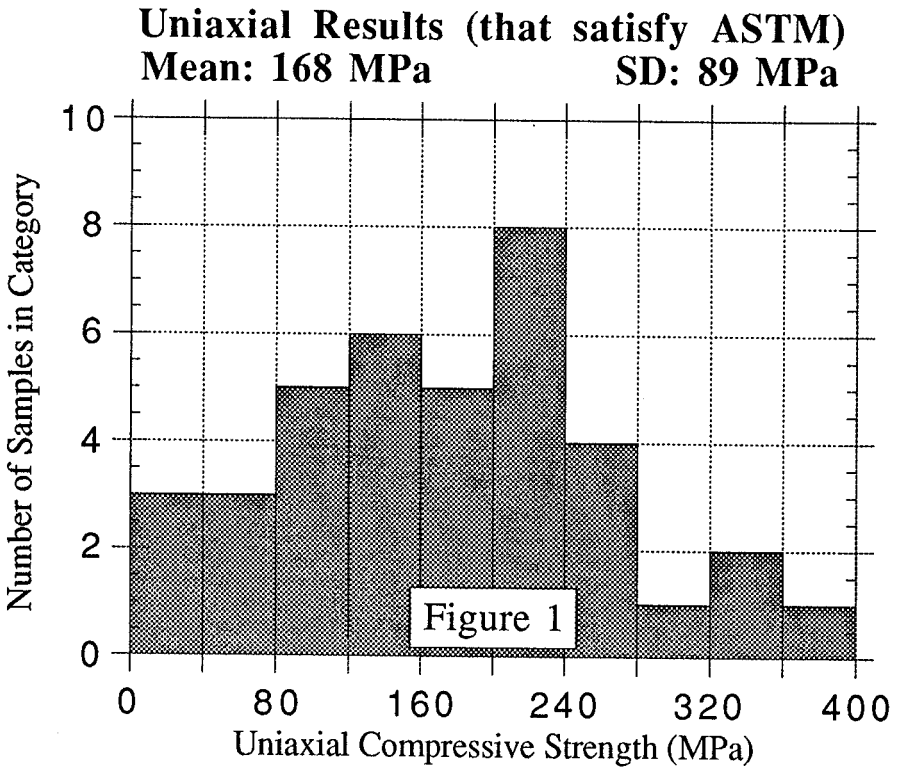
Brazilian tensile strength

The results are presented in Table 4. Of the 40 Brazilian tests conducted, 13 satisfy the ASTM standard for both perpendicularity and smoothness. But all the tests are summarized in Figure 5. The mean and standard deviation for tensile strength are 7.9 and 5.5 MPa, respectively.

Again, if you have any additional questions, please let me know.

Sincerely,

John M. Kemeny
(602) 621-4448


Uniaxial Results (that satisfy ASTM)
Mean: 168 MPa
SD: 89 MPa
Number of Samples in Category
0
2
4
6
8
10
0
80
160
240
320
400
Uniaxial Compressive Strength (MPa)
Figure 1

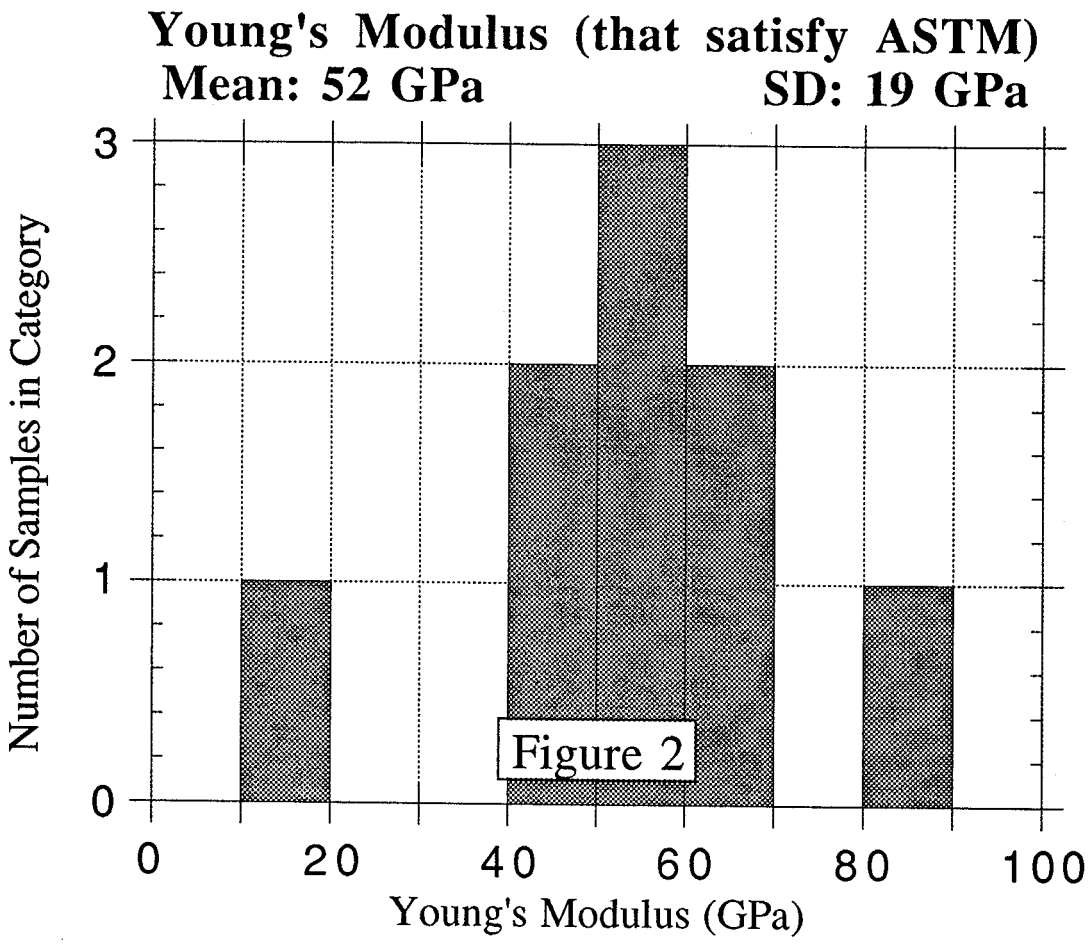

Young's Modulus (that satisfy ASTM)
Mean: 52 GPa
SD: 19 GPa
Number of Samples in Category
0
1
2
3
0
20
40
60
80
100
Young's Modulus (GPa)

Figure 2

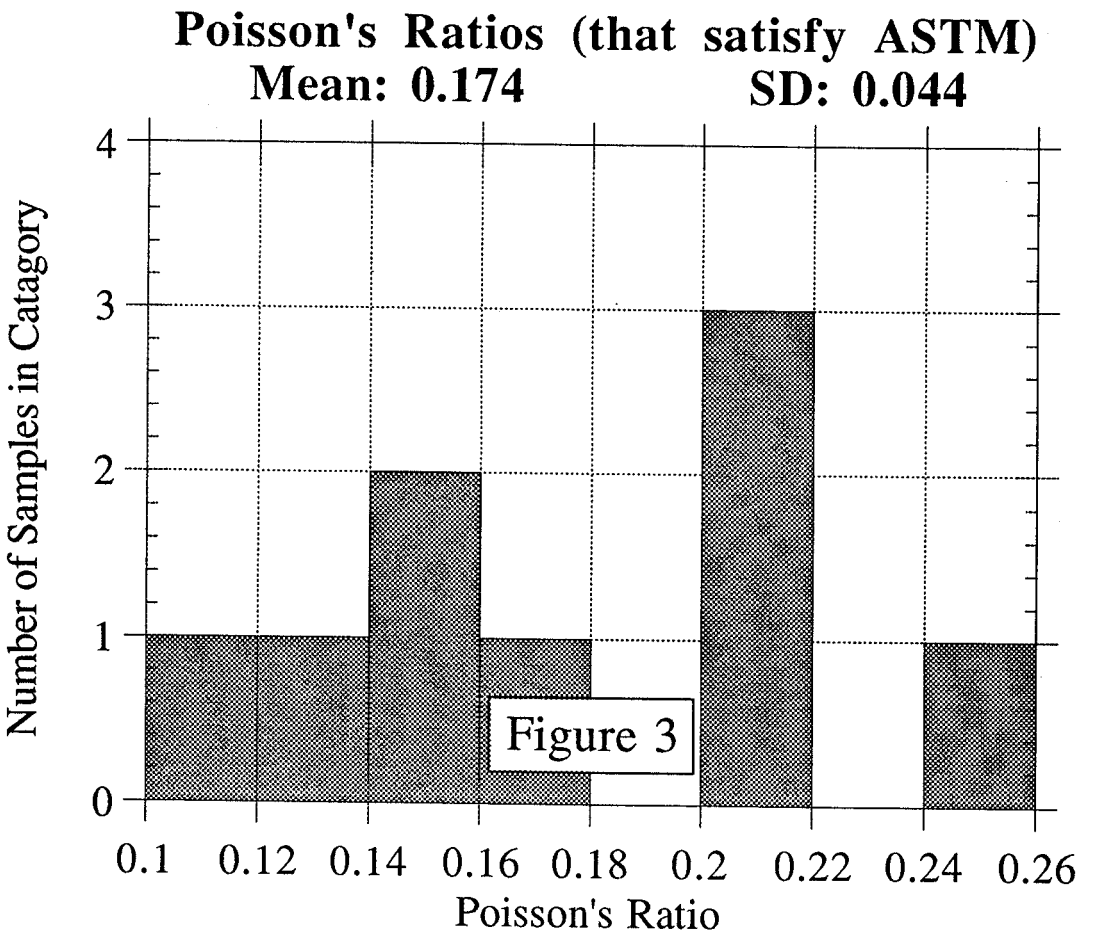

Poisson's Ratios (that satisfy ASTM)
Mean: 0.174
SD: 0.044
Number of Samples in Catagory
0
1
2
3
4
0.1
0.12
0.14
0.16
0.18
0.2
0.22
0.24
0.26
Poisson's Ratio

Figure 3

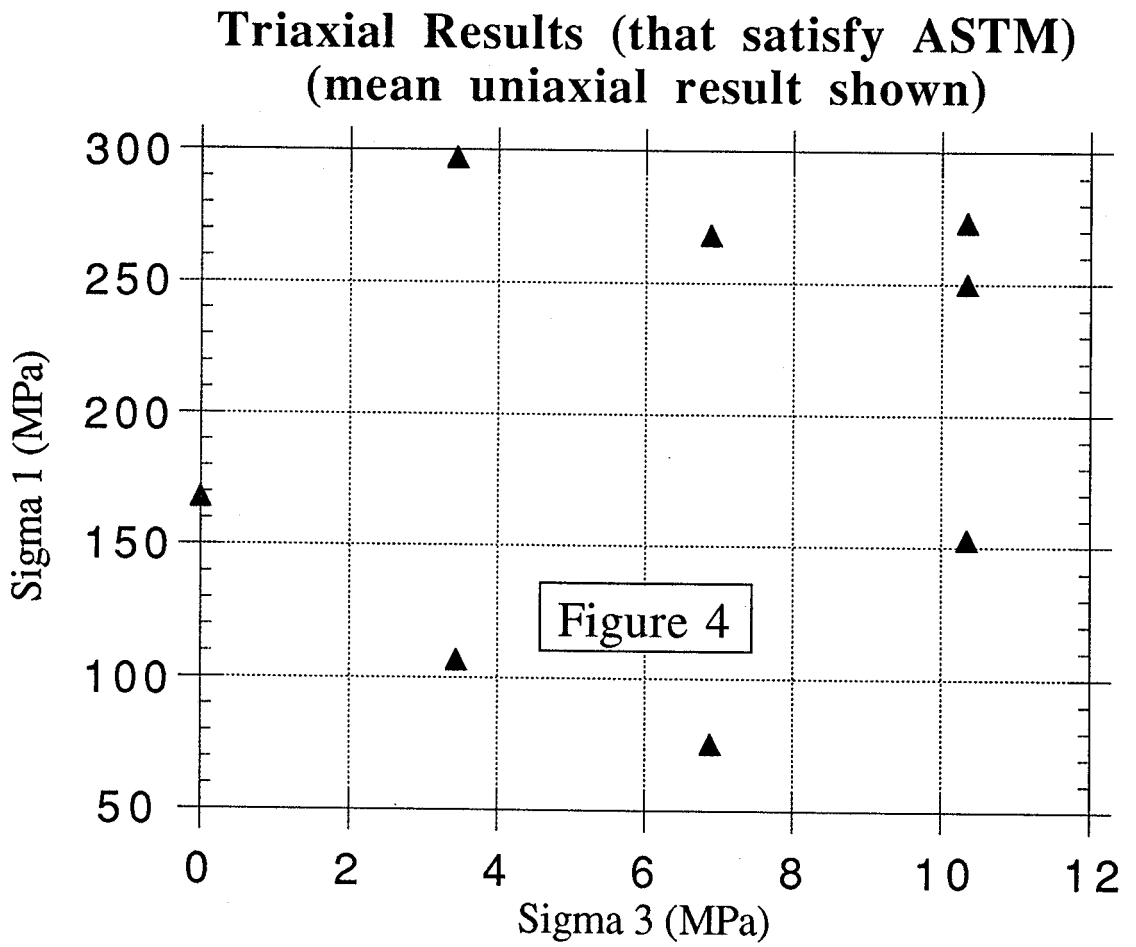

Triaxial Results (that satisfy ASTM)
(mean uniaxial result shown)
300
250
200
150
100
50
Sigma 1 (MPa)
0
2
4
6
8
10
12
Sigma 3 (MPa)

Figure 4

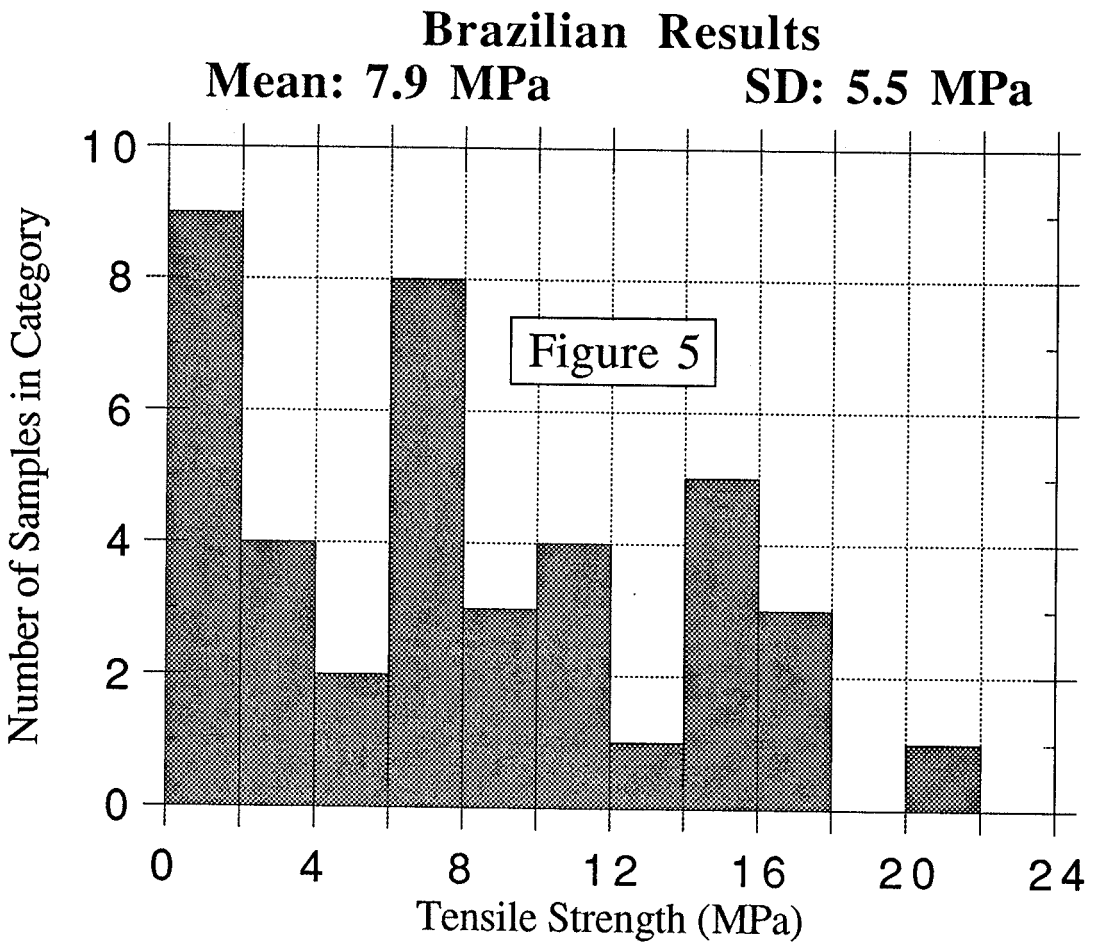

Brazilian Results
Mean: 7.9 MPa
SD: 5.5 MPa
Number of Samples in Category
10
8
6
4
2
0
0
4
8
12
16
20
24
Tensile Strength (MPa)

Figure 5

Table 1.Uniaxial Compression Test Results

Sample No.	Satisfy ASTM Perpendicularity	Standard? Smoothness	Strength (MPa)	Note
LFM 57-73 U-031	yes	yes	220	
LFM 57-73 U-026	yes	yes	250	
LFM 57-73 U-023	no	yes	111	
LFM 95c2-7 U-014	yes	yes	242	
LFM 57-73 U-019b	yes	yes	90.2	
LFM 57-73 U-017	yes	yes	90.2	
LFM 57-73 U-028	yes	yes	15.0	failure along weakness
LFM 57-73 U-041	yes	yes	86.4	
LFM 57-73 U-025b	yes	yes	291	
LFM 57-73 U-043	yes	yes	133	
LFM 95-c2-6 U-001	no	no	97.9	
LFM 95-c2-6 U-002	yes	yes	73.2	
LFM 95-c2-3A U-010	yes	no	307	
LFM 57-73 U-020	yes	yes	72.9	
LFM 57-73 U-025a	yes	yes	202	
LFM 57-73 U-036a	yes	yes	121	
LFM 57-73 U-037	yes	yes	164	
LFM 57-73 U-038	yes	yes	169	
LFM 57-73 U-044	yes	yes	153	
LFM 57-73 U-052	no	no	92.1	
LFM 57-73 U-054	yes	yes	78.3	
LFM 57-73 U-056a	yes	yes	139	
LFM 57-73 U-056b	yes	yes	169	
LFM 57-73 U-035	no	no	83.5	
LFM 57-73 U-046	yes	yes	327	
LFM 57-73 U-049	yes	yes	245	
LFM 95-c2-2 U-009	no	yes	50.6	
LFM 57-73 U-030	yes	yes	214	
LFM 57-73 U-024a	yes	yes	340	
LFM 57-73 U-024b	yes	yes	247	

LFM 57-73 U-057	yes	no	270	
LFM 57-73 U-039	yes	yes	170	
LFM 57-73 U-040	yes	yes	175	
LFM 57-73 U-047	yes	yes	213	
LFM 57-73 U-048	yes	yes	200	
LFM 95-c2-6 U-004	yes	no	123	
LFM 95-c2-2 U-006	yes	yes	227	
LFM 57-73 U-053	yes	yes	217	with strain gage
LFM 95-c2-3A U011	no	no	304	with strain gage
LFM 57-73 U-045	yes	yes	374	with strain gage
LFM 57-73 U-018	yes	yes	105	with strain gage
LFM 57-73 U-036b	yes	yes	215	with strain gage
LFM 95-c2-2 U-007c	yes	yes	260	with strain gage
LFM 95-c2-2 U-007b	yes	yes	214	with strain gage
LFM 95-c2-2 U-008a	yes	yes	151	with strain gage
LFM 95-c2-2 U-008b	yes	yes	126	with strain gage
LFM 57-73 U-027	yes	yes	87.9	with strain gage

Table 2. Results of Uniaxial Compression Tests with Strain Gauges

Sample No.	Strength		Young's Modulus		Poisson's Ratio	Note
	(psi)	(MPa)	(10^6 psi)	(GPa)		
LFM 95-c2-2 U-007b	31,080	214	7.42	51	0.20	
LFM 95-c2-2 U-007c	37,660	260	8.68	60	0.20	
LFM 95-c2-2 U-008a	21,910	151	7.58	52	0.15	
LFM 95-c2-2 U-008b	18,280	126	6.78	47	0.21	
LFM 95-c2-3A U-011	44,050	304	11.0	76	0.18	
LFM 57-73 U-018	15,250	105	1.68	12	0.13	
LFM 57-73 U-027	12,750	88	6.92	48	0.11	
LFM 57-73 U-036b	31,180	215	9.74	67	0.17	
LFM 57-73 U-045	54,260	374	11.8	81	0.15	
LFM 57-73 U-053	31,410	217	7.74	53	0.25	

Table 3.Triaxial Compression Test Results

Sample No.	Satisfy ASTM Standard? Perpendicularity	Smoothness	σ_3 (MPa)	σ_1 (MPa)	Note
LFM 95-c2-6 U-005	yes	yes	3.45	297	
LFM 95-c1-5 U-012	yes	no	3.45	179	
LFM 95-c2-2 U-15	yes	yes	3.45	107	along weakness
LFM 95-c2-2 U-007d	yes	yes	6.90	268	
LFM 95-c1-5 U-013	no	no	6.90	234	
LFM 57-73 U-055	yes	yes	6.90	75.6	
LFM 57-73 U-016	yes	yes	10.3	153	
LFM 57-73 U-022	yes	yes			broken
LFM 57-73 U-033	yes	yes	10.3	273	
LFM 57-73 U-050	yes	yes	10.3	250	

Table 4. Results of Brazilian (Indirect Tension) Tests

Sample No.	Satisfy ASTM Standards?		Strength (MPa)	Note
	Perpendicularity	Smoothness		
LFM 95-c2-6 B-001	no	yes	12.1	VersaTester
LFM 95-c1-4 B-002	yes	yes	4.1	VersaTester
LFM 95-c1-4 B-003b	no	yes	6.8	VersaTester
LFM 95-c2-6 B-005	no	yes	6.6	VersaTester
LFM 95-c2-6 B-006a	no	yes	1.7	VersaTester
LFM 95-c2-6 B-007	no	yes	1.5	VersaTester
LFM 95-c2-6 B-009	no	yes	1.5	VersaTester
LFM 95-c2-6 B-010	no	yes	1.4	VersaTester
LFM 95-c2-2 B-014c	yes	yes	7.1	VersaTester
LFM 95-c1-5 B-021a	yes	yes	1.7	VersaTester
LFM 95-c1-5 B-022	no	yes	1.7	VersaTester
LFM 95-c2-7 B-024	no	yes	1.7	VersaTester
LFM 95-c2-2 B-028	no	yes	1.6	VersaTester
LFM 57-73 B-054	no	yes	2.2	VersaTester
LFM 57-73 B-055	no	yes	2.3	VersaTester
LFM 57-73 B-062	yes	yes	1.9	VersaTester
LFM 57-73 B-063a	yes	yes	2.5	VersaTester
LFM 95-c2-6 B-011	no	yes	14.0	SBEL
LFM 95-c2-2 B-029	yes	yes	15.2	SBEL
LFM 95-c-4 B-031	no	yes	9.8	SBEL
LFM 57-73 B-032	no	yes	14.0	SBEL
LFM 57-73 B-035	no	yes	7.0	SBEL

LFM 57-73 B-037	no	yes	6.4	SBEL
LFM 57-73 B-040a	no	yes	11.5	SBEL
LFM 57-73 B-042	no	yes	10.1	SBEL
LFM 57-73 B-045	yes	yes	11.4	SBEL
LFM 57-73 B-046a	no	yes	17.5	SBEL
LFM 57-73 B-047	yes	yes	8.9	SBEL
LFM 57-73 B-048	no	yes	10.6	SBEL
LFM 57-73 B-050	no	yes	7.9	SBEL
LFM 57-73 B-051	no	yes	3.7	SBEL
LFM 57-73 B-052	no	yes	17.3	SBEL
LFM 57-73 B-056	no	yes	14.0	SBEL
LFM 57-73 B-057	yes	yes	8.5	SBEL
LFM 57-73 B-059a	yes	yes	20.6	SBEL
LFM 57-73 B-060b	yes	yes	16.9	SBEL
LFM 57-73 B-064b	yes	yes	5.8	SBEL
LFM 57-73 B-065	yes	yes	6.2	SBEL
LFM 57-73 B-066	no	yes	6.1	SBEL
LFM 57-73 B-067a	no	yes	15.2	SBEL

Uniaxial Compression Test Results

LFM95-C2-6

Sample Number: U-002

Hole Number:

Depth:

Rock Type:

Job: SRI (CNWRA)

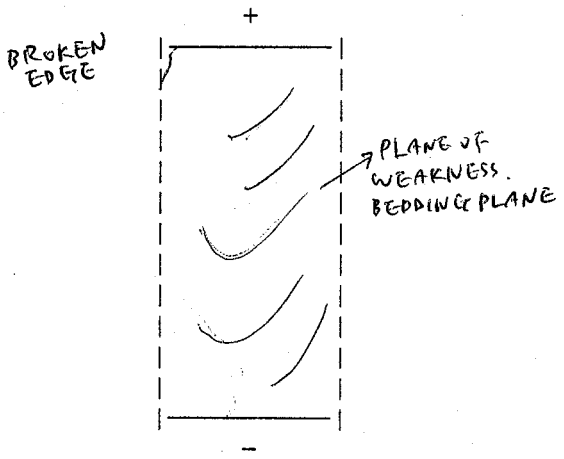
Location:

Prepped By/Date: RW 5/4/94

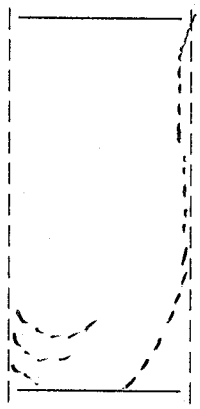
Tested By/Date: S. Jeon / 5-10-94

Reviewed By/Date: A. Bridges 6/2/94

Equipment Used: Caliper / SBEL



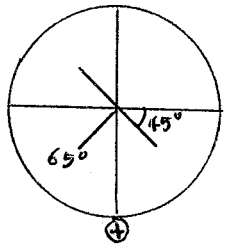
PREFAILURE SKETCH



POSTFAILURE

SHEAR FAILURE. ON THE EDGE (TOP), SOME AXIAL CLEAVAGE EXAMINED.

SHEAR PLANE



Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.110 − 0.095 = 0.015 in Δ_{90} = 0.109 − 0.094 = 0.015 in

Δ_{180} = 0.108 − 0.098 = 0.010 in Δ_{270} = 0.105 − 0.097 = 0.008 in

2. Perpendicularity

Δ_1 = 0.101 − 0.098 = 0.003 in Δ_2 = 0.101 − 0.097 = 0.004 in

Δ'_1 = 0.091 − 0.084 = 0.007 in Δ'_2 = 0.090 − 0.085 = 0.005 in

3. Diameter

D_1 = 1.8620 in D_2 = 1.8650 in

D_3 = 1.8662 in D_4 = 1.8655 in

D_5 = 1.8672 in D_6 = 1.8670 in

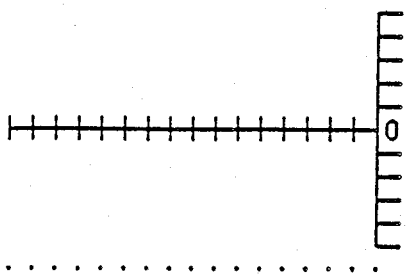
4. Height

H_1 = 4.1820 in H_2 = 4.1810 in

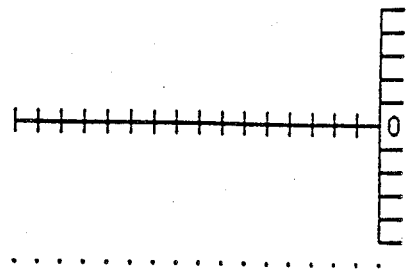
H_3 = 4.1800 in H_4 = 4.1788 in

LFM 95-C2-6

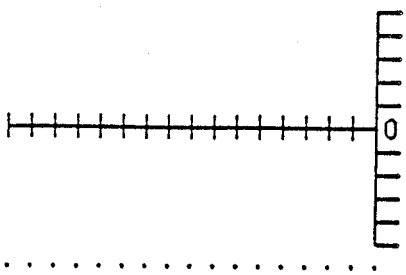
Sample Number: U-002



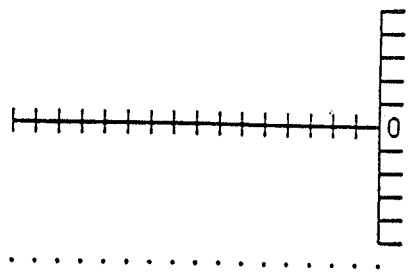
Maximum slope: _____



Maximum slope: _____



Maximum slope: _____



Maximum slope: _____

TIME ELAPSED : 2 min 35 sec

Avg. Diameter (in):	1.865	Disp. Rate (in/s):	0.000295
Avg. Height (in):	4.181 s.fcon	Gauge Reading (lb):	29,000
Area (in^2):	2.732	Gauge Correction (lb):	
Volume (in^3):	11.422 s.fcon	Failure Load (lb):	29,000 (2.9×10^4)
Weight (g):	294.60	Failure Stress (psi):	10610 psi
Density (lb/ft^3):	166.48 s.fcon		(≃73 MPa)

$$\gamma = \frac{W}{V} \times \frac{1728}{454}$$

Comments: failure load has 2 s.fcon digits of significant figure, since the minimum reading scale is 1000 lbs/division.

Therefore, the failure stress is, strictly speaking, 11000 psi. But, in the lab manual, the result is to be reported to the nearest 10 psi.

Uniaxial Compression Test Results

LFM 95-C2-6

Sample Number: 11-004 Job: SBI (CNWRA)

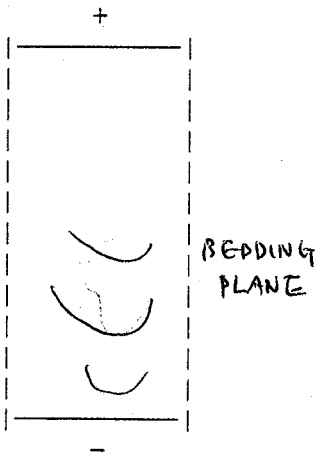
Hole Number: Location:

Depth: Prepped By/Date: RW 5/4/94

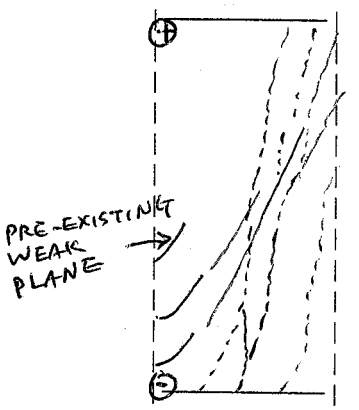
Rock Type: Tested By/Date: S. Jeon / 5-10-94

Reviewed By/Date: M. Bridges 6/2/94

Equipment Used: caliper (0.001") / SBEL

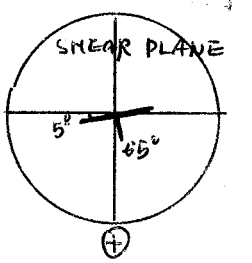


PREFAILURE SKETCH



POSTFAILURE

SHEAR FAILURE WITH SEVERAL SPLITTING WEDGES



Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.015 − 0.000 = 0.015 in Δ_{90} = 0.107 − 0.095 = 0.012 in

Δ_{180} = 0.100 − 0.085 = 0.015 in Δ_{270} = 0.112 − 0.095 = 0.017 in

2. Perpendicularity

Δ_1 = 0.100 − 0.097 = 0.003 in Δ_2 = 0.115 − 0.100 = 0.015 in

Δ'_1 = 0.100 − 0.096 = 0.004 in Δ'_2 = 0.100 − 0.090 = 0.01 in

3. Diameter

D_1 = 1.8672 in D_2 = ~~1.8669~~ 1.865 in

D_3 = 1.867 in D_4 = 1.866 in

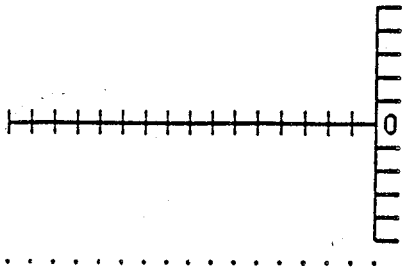
D_5 = 1.867 in D_6 = 1.867 in

4. Height

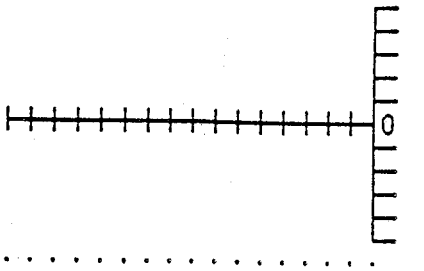
H_1 = 4.153 in H_2 = 4.152 in

H_3 = 4.154 in H_4 = 4.161 in

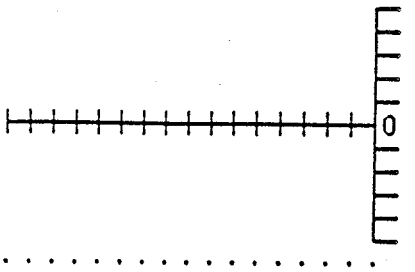
Sample Number: LFM 95-C2-6 U-004



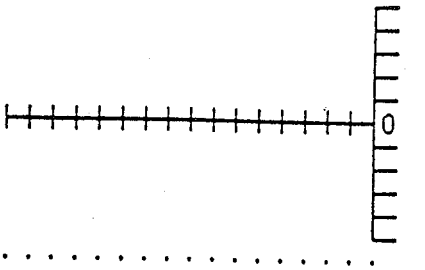
Maximum slope: _____



Maximum slope: _____



Maximum slope: _____



Maximum slope: _____

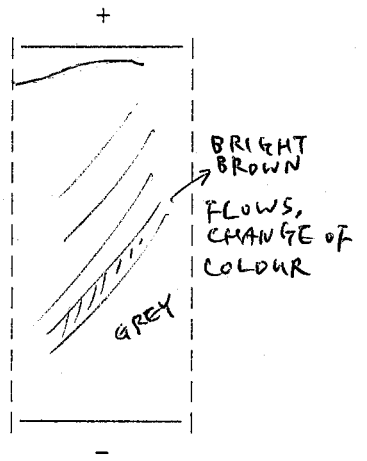
Avg. Diameter (in):	1.867	TIME ELAPSED :	2:39
Avg. Height (in):	4.155	Disp. Rate (in/s):	0.000295
Area (in^2):	2.738	Gauge Reading (lb):	49,000
Volume (in^3):	11.375	Gauge Correction (lb):	
Weight (g):	448.33	Failure Load (lb):	49,000 (4.9×10^4)
Density (lb/ft^3):	166.75	Failure Stress (psi):	17,900 ($\simeq$123 MPa)

$$\gamma = \frac{W}{V} \times \frac{1728}{454}$$

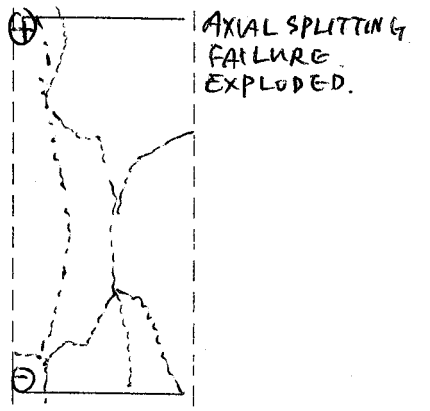
Comments: _____

Uniaxial Compression Test Results

Sample Number: LFM95-C2-2 U-006
Job: CNWRA
Hole Number:
Location:
Depth:
Prepped By/Date: RW 5/5/94
Rock Type:
Tested By/Date: S. Jeon / 5-10-94
Reviewed By/Date: M. Bridges 6/2/94
Equipment Used: caliper (0.001") / SBEL



PREFAILURE SKETCH



POSTFAILURE

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.096 − 0.094 = 0.002 in Δ_{90} = 0.098 − 0.097 = 0.001 in

Δ_{180} = 0.096 − 0.094 = 0.002 in Δ_{270} = 0.098 − 0.098 = 0 in

2. Perpendicularity

Δ_1 = 0.104 − 0.103 = 0.001 in Δ_2 = 0.105 − 0.102 = 0.003 in

Δ'_1 = 0.108 − 0.107 = 0.001 in Δ'_2 = 0.108 − 0.108 = 0 in

3. Diameter

D_1 = 1.865 in D_2 = 1.866 in

D_3 = 1.864 in D_4 = 1.868 in

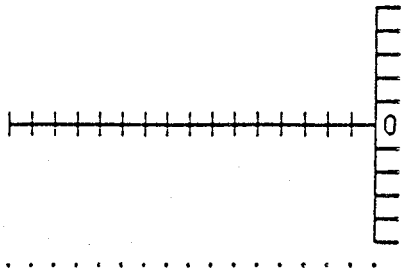
D_5 = 1.869 in D_6 = 1.866 in

4. Height

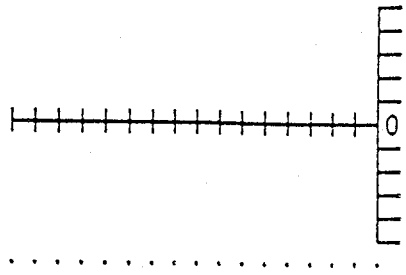
H_1 = 4.141 in H_2 = 4.146 in

H_3 = 4.142 in H_4 = 4.142 in

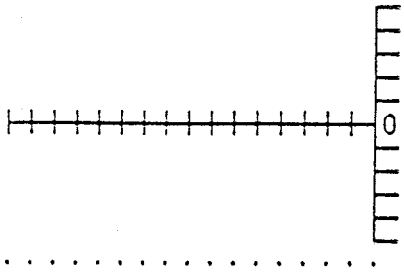
Sample Number: LFM95-C2-2 U-006



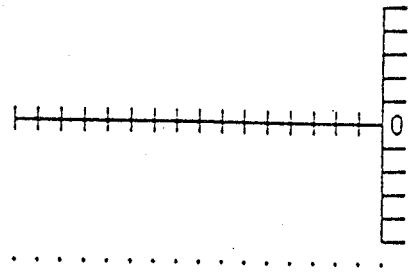
Maximum slope: _____



Maximum slope: _____



Maximum slope: _____



Maximum slope: _____

TIME ELAPSED : 3:56

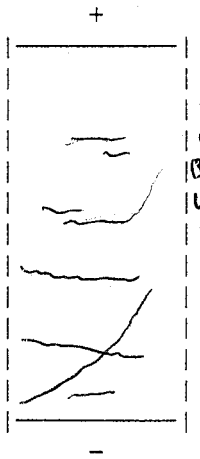
Avg. Diameter (in):	1.866	Disp. Rate (in/s):	0.000295
Avg. Height (in):	4.143	Gauge Reading (lb):	90,000
Area (in^2):	2.735	Gauge Correction (lb):	
Volume (in^3):	11.33	Failure Load (lb):	90,000 (9.0×10^4)
Weight (g):	491.60	Failure Stress (psi):	32,910
Density (lb/ft^3):	165.15		(≃ 227 MPa)

$$\gamma = \frac{W}{V} \times \frac{1728}{454}$$

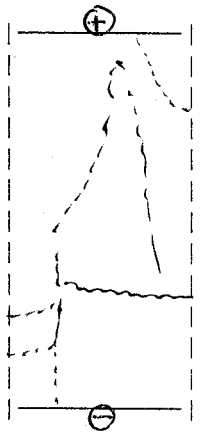
Comments: _____

Uniaxial Compression Test Results

Sample Number: LFM95-C2-3A U-010 Job: CNWRA
Hole Number: Location:
Depth: Prepped By/Date: RW 5/6/94
Rock Type: Tested By/Date: S. Jeon / 5-10-94
Reviewed By/Date: M. Bridges 6/2/94
Equipment Used: caliper (0.001") / SBEL



PREFAILURE SKETCH



BURST OUT INTO SPLITTING FAILURE

ALONG THE BREAKAGE, ROCK POWDER EXAMINED.

POSTFAILURE

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.104 − 0.094 = 0.01 in Δ_{90} = 0.110 − 0.095 = 0.015 in

Δ_{180} = 0.104 − 0.094 = 0.01 in Δ_{270} = 0.110 − 0.093 = 0.017 in

2. Perpendicularity

Δ_1 = 0.108 − 0.106 = 0.002 in Δ_2 = 0.109 − 0.100 = 0.009 in

Δ'_1 = 0.110 − 0.105 = 0.005 in Δ'_2 = 0.108 − 0.107 = 0.001 in

3. Diameter

D_1 = 1.868 in D_2 = 1.868 in

D_3 = 1.867 in D_4 = 1.868 in

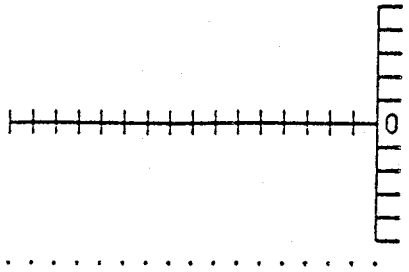
D_5 = 1.863 in D_6 = 1.865 in

4. Height

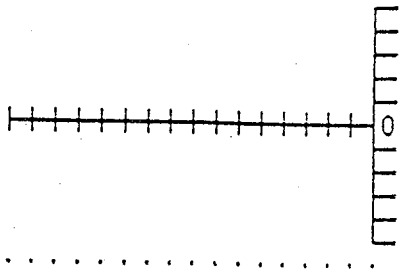
H_1 = 4.115 in H_2 = 4.123 in

H_3 = 4.122 in H_4 = 4.116 in

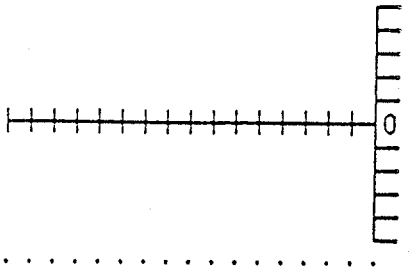
Sample Number: LFM 95-C2-3A M-010



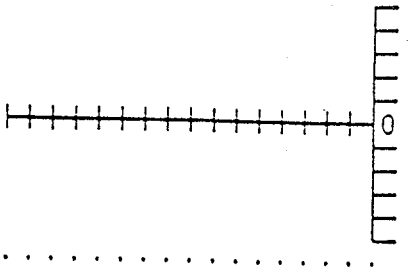
Maximum slope: _____



Maximum slope: _____



Maximum slope: _____



Maximum slope: _____

TIME ELAPSED : 4:47

Avg. Diameter (in):	1.867	Disp. Rate (in/s):	0.000295
Avg. Height (in):	4.119	Gauge Reading (lb):	122,000
Area (in^2):	2.738	Gauge Correction (lb):	
Volume (in^3):	11.28	Failure Load (lb):	122,000 (1.22×10^4)
Weight (g):	491.30	Failure Stress (psi):	44560
Density (lb/ft^3):	~~165.83~~ 165.78 pcf		(≃ 307 MPa)

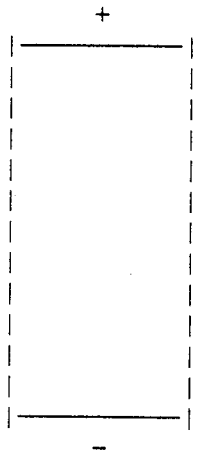
$$\gamma = \frac{W}{V} \times \frac{1728}{454}$$

Comments: _____

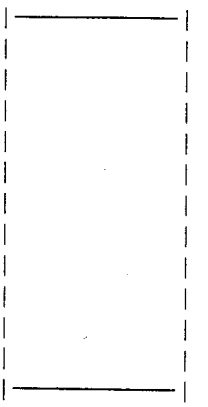
Uniaxial Compression Test Results

Sample Number: U-031
Hole Number: LFM 57-73
Depth:
Rock Type:
Equipment Used: Caliper (0.001")

Job: CNWRA
Location:
Prepped By/Date: RW 5/14/94
Tested By/Date: RW 5/17/94
Reviewed By/Date: M. Bridges 6/2/94
SBEL



PREFAILURE SKETCH



POSTFAILURE

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.088 − 0.080 = 0.008 in
Δ_{180} = 0.087 − 0.079 = 0.008 in
Δ_{90} = 0.086 − 0.077 = 0.009 in
Δ_{270} = 0.085 − 0.077 = 0.008 in

2. Perpendicularity

Δ_1 = 0.105 − 0.102 = 0.003 in
Δ'_1 = 0.103 − 0.103 = 0 in
Δ_2 = 0.110 − 0.109 = 0.001 in
Δ'_2 = 0.066 − 0.065 = 0.001 in

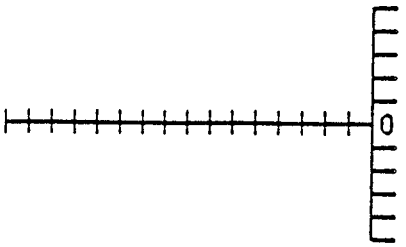
3. Diameter

D_1 = 1.875 in
D_3 = 1.875 in
D_5 = 1.875 in
D_2 = 1.874 in
D_4 = 1.874 in
D_6 = 1.873 in

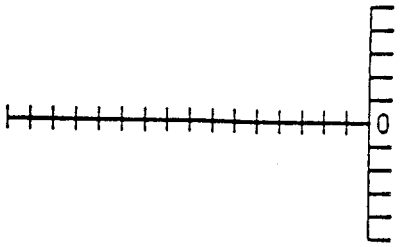
4. Height

H_1 = 4.052 in
H_3 = 4.053 in
H_2 = 4.053 in
H_4 = 4.054 in

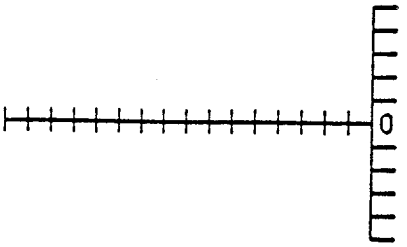
Sample Number: _____



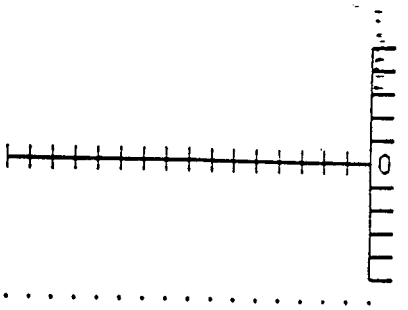
Maximum slope: _____



Maximum slope: _____



Maximum slope: _____



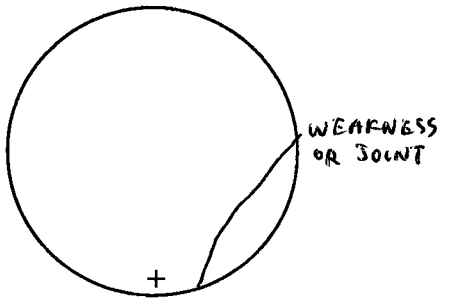
Maximum slope: _____

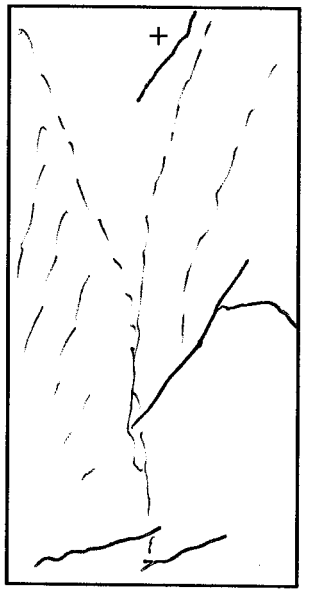
Avg. Diameter (in):	1.874	Disp. Rate (in/s):	0.000295
Avg. Height (in):	4.053	Gauge Reading (lb):	~~3.8×10⁴~~
Area (in^2):	2.758	Gauge Correction (lb):	
Volume (in^3):	11.179	Failure Load (lb):	8.8×10^4
Weight (g):	~~491.4~~ 487.71	Failure Stress (psi):	31,907.18
Density (lb/ft^3):	166.05		220.00 MPa

$$\gamma = \frac{W}{V} \times \frac{1728}{454}$$

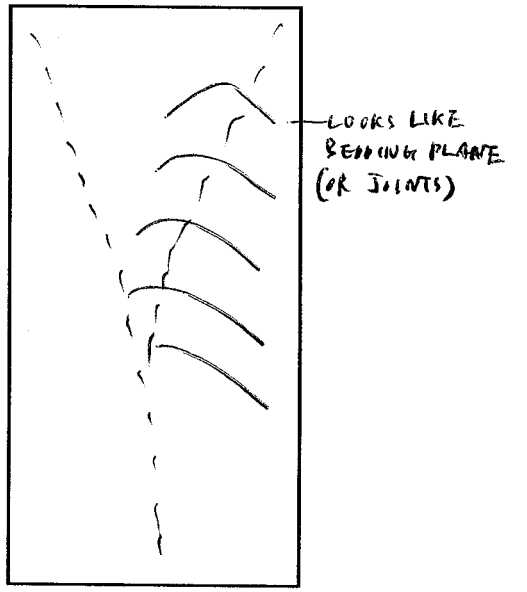
Comments: _____

Sample Number: U-031

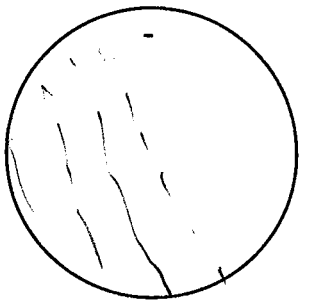




Front



Back

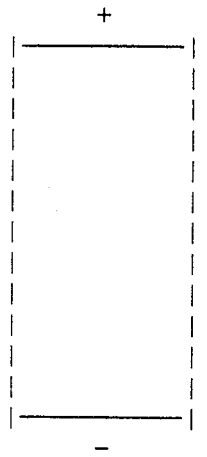


Solid Line: Pre-existing Structure
Dashed Line: Post-Failure

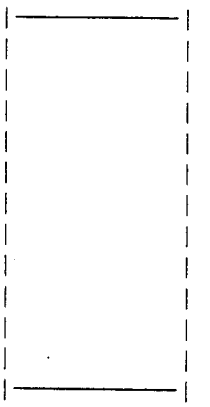
Uniaxial Compression Test Results

Sample Number: 1)-02b
Hole Number: LFM57-73
Depth:
Rock Type:
Equipment Used: Caliper (0.001")

Job: CNWRA
Location:
Prepped By/Date: RW 5/13/94
Tested By/Date: RW 5/17/94
Reviewed By/Date: M. Bridges 6/2/94
SBEL



PREFAILURE SKETCH



POSTFAILURE

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.075 − 0.070 = 0.005 in
Δ_{180} = 0.077 − 0.072 = 0.005 in
Δ_{90} = 0.075 − 0.067 = 0.008 in
Δ_{270} = 0.078 − 0.072 = 0.006 in

2. Perpendicularity

Δ_1 = 0.093 − 0.091 = 0.002 in
Δ'_1 = 0.103 − 0.103 = 0 in
Δ_2 = 0.106 − 0.104 = 0.002 in
Δ'_2 = 0.102 − 0.102 = 0 in

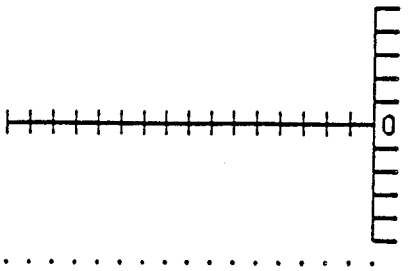
3. Diameter

D_1 = 1.361 in
D_3 = 1.363 in
D_5 = 1.365 in
D_2 = 1.361 in
D_4 = 1.364 in
D_6 = 1.365 in

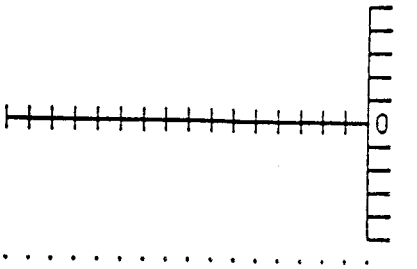
4. Height

H_1 = 4.005 in
H_3 = 4.005 in
H_2 = 4.004 in
H_4 = 4.005 in

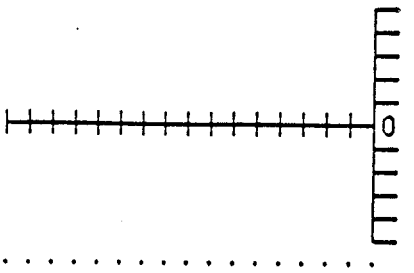
Sample Number: _____



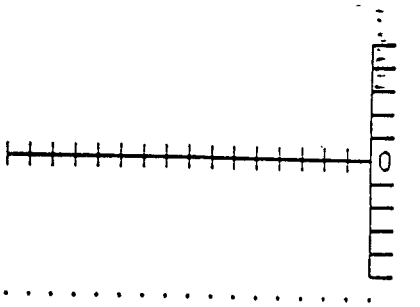
Maximum slope: _____



Maximum slope: _____



Maximum slope: _____



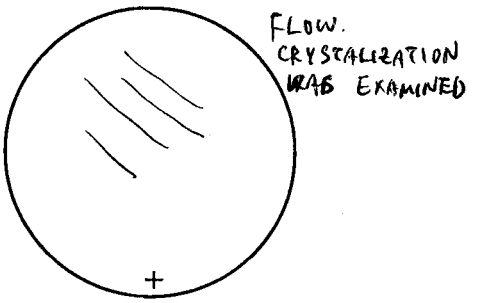
Maximum slope: _____

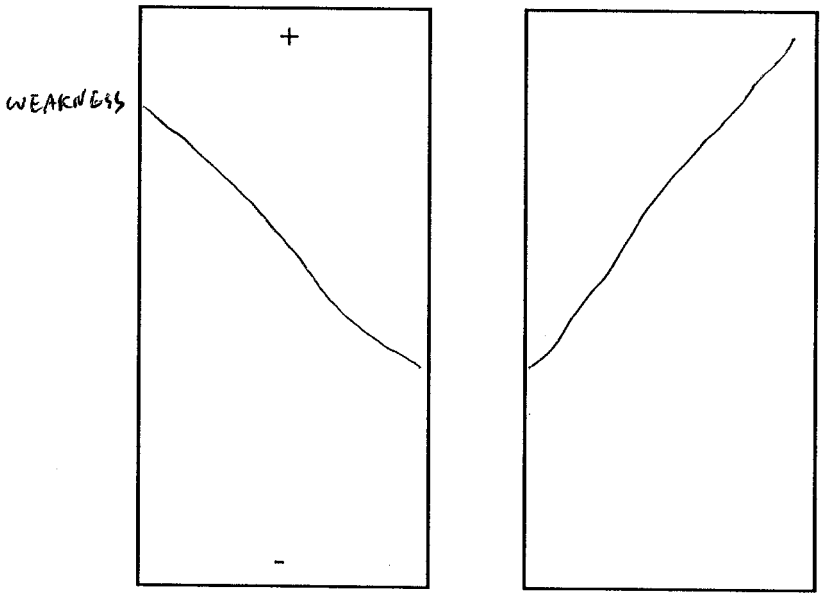
Avg. Diameter (in):	1.864	Disp. Rate (in/s):	0.000295
Avg. Height (in):	4.005	Gauge Reading (lb):	9.9 x 10⁴
Area (in^2):	2.729	Gauge Correction (lb):	
Volume (in^3):	10.929	Failure Load (lb):	9.9x10⁴
Weight (g):	491.10	Failure Stress (psi):	36,277.02
Density (lb/ft^3):	171.03		250.13 MPa

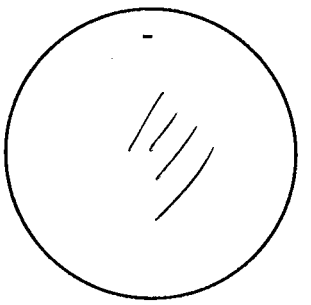
$$\gamma = \frac{W}{V} \times \frac{1728}{454}$$

Comments: _____

Sample Number: U-026 [redacted] Dam







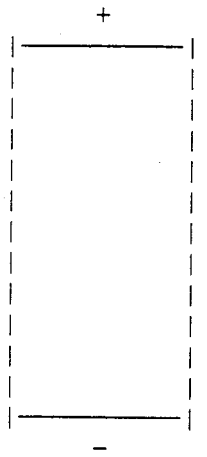
Solid Line: Pre-existing Structure
Dashed Line: Post-Failure

Uniaxial Compression Test Results

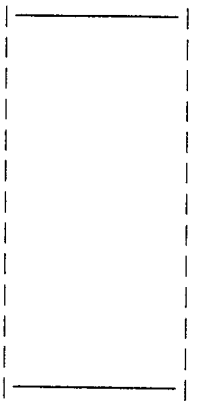
Sample Number: U-023
Hole Number: LFM 57-73
Depth:
Rock Type:

Job: CNWRA
Location:
Prepped By/Date: RW 5/13/94
Tested By/Date: RW 5/17/94
Reviewed By/Date: M. Bridges 6/2/94

Equipment Used: caliper (0.001") SBEL



PREFAILURE SKETCH



POSTFAILURE

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.094 − 0.087 = 0.007 in Δ_{90} = 0.105 − 0.084 = 0.021 in

Δ_{180} = 0.086 − 0.077 = 0.009 in Δ_{270} = 0.105 − 0.077 = 0.028 in

2. Perpendicularity

Δ_1 = 0.114 − 0.104 = 0.01 in Δ_2 = 0.104 − 0.097 = 0.007 in

Δ'_1 = 0.101 − 0.105 = 0.004 in Δ'_2 = 0.105 − 0.105 = 0 in

3. Diameter

D_1 = 1.370 in D_2 = 1.368 in

D_3 = 1.369 in D_4 = 1.368 in

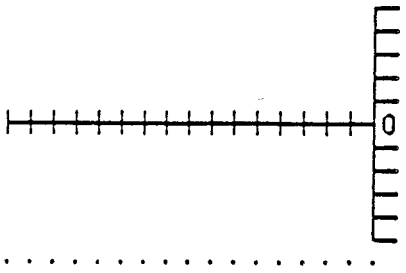
D_5 = 1.371 in D_6 = 1.369 in

4. Height

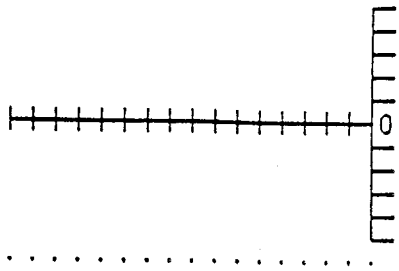
H_1 = 4.002 in H_2 = 4.003 in

H_3 = 4.000 in H_4 = 4.000 in

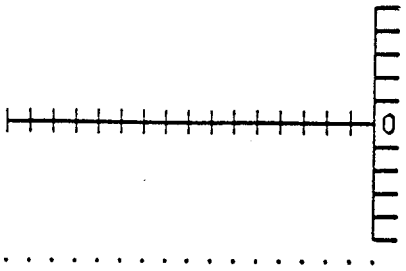
Sample Number: U-023



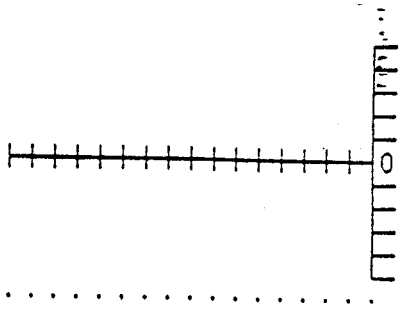
Maximum slope: _____



Maximum slope: _____



Maximum slope: _____



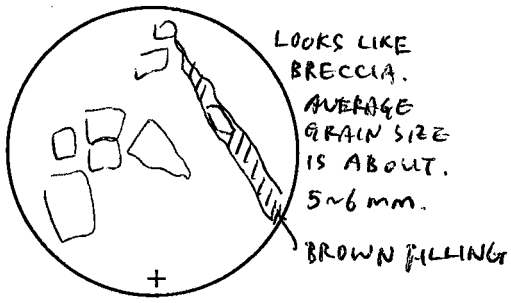
Maximum slope: _____

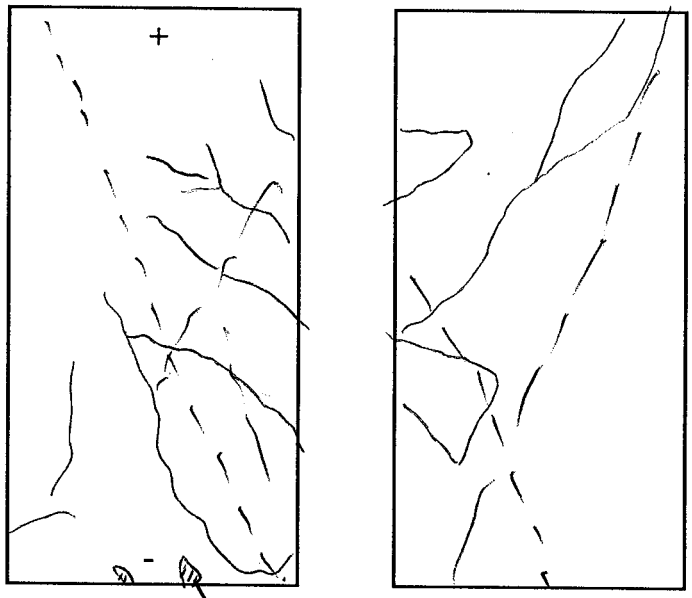
Avg. Diameter (in):	1.869	Disp. Rate (in/s):	0.000295
Avg. Height (in):	4.001	Gauge Reading (lb):	4.4×10^4
Area (in^2):	2.744	Gauge Correction (lb):	
Volume (in^3):	10.977	Failure Load (lb):	4.4×10^4
Weight (g):	498.03	Failure Stress (psi):	16,034.99
Density (lb/ft^3):	172.69		110.56 MPa

$$\gamma = \frac{W}{V} \times \frac{1728}{454}$$

Comments: _____

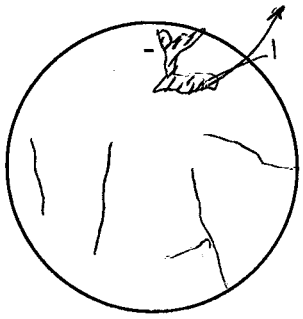
Sample Number: U-023





Front → BROWN INCLUSION

Back

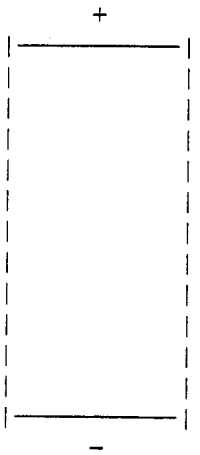


Solid Line: Pre-existing Structure
Dashed Line: Post-Failure

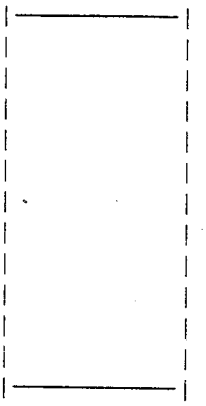
Uniaxial Compression Test Results

Sample Number: U-014
Hole Number: LFM95-C2-7
Depth:
Rock Type:
Equipment Used: Caliper (0.001") SBEL

Job: CNWRA
Location:
Prepped By/Date: RW 5/13/94
Tested By/Date: RW 5/17/94
Reviewed By/Date: M. Bridges 6/2/94



PREFAILURE SKETCH



POSTFAILURE

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.097 - 0.097 = 0.02 in
Δ_{180} = 0.084 - 0.074 = 0.01 in
Δ_{90} = 0.087 - 0.076 = 0.011 in
Δ_{270} = 0.084 - 0.071 = 0.013 in

2. Perpendicularity

Δ_1 = 0.112 - 0.109 = 0.003 in
Δ'_1 = 0.109 - 0.103 = 0.006 in
Δ_2 = 0.108 - 0.106 = 0.002 in
Δ'_2 = 0.089 - 0.085 = 0.004 in

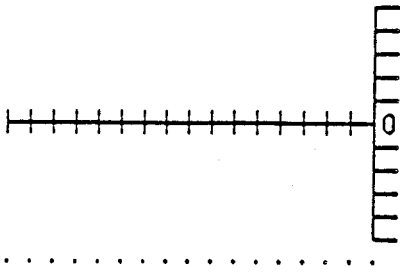
3. Diameter

D_1 = 1.867 in
D_3 = 1.868 in
D_5 = 1.868 in
D_2 = 1.865 in
D_4 = 1.867 in
D_6 = 1.866 in

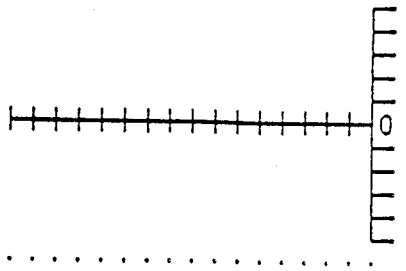
4. Height

H_1 = 4.184 in
H_3 = 4.187 in
H_2 = 4.183 in
H_4 = 4.188 in

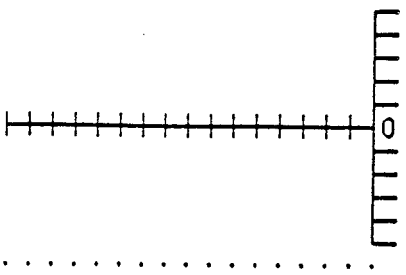
Sample Number: U-014



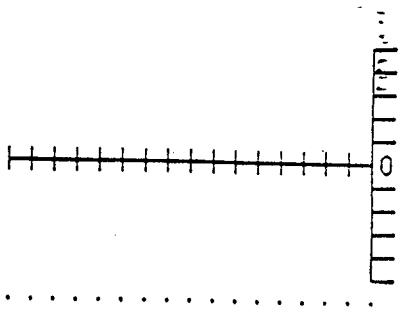
Maximum slope: _____



Maximum slope: _____



Maximum slope: _____



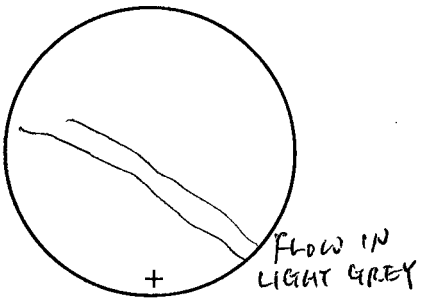
Maximum slope: _____

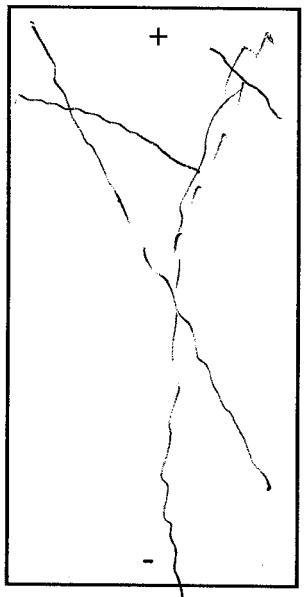
Avg. Diameter (in):	1.867	Disp. Rate (in/s):	0.00295
Avg. Height (in):	4.186	Gauge Reading (lb):	9.6x10⁴
Area (in^2):	2.738	Gauge Correction (lb):	
Volume (in^3):	11.460	Failure Load (lb):	9.6x10⁴
Weight (g):	492.59	Failure Stress (psi):	35,062.09
Density (lb/ft^3):	163.60		241.75 MPa

$$\gamma = \frac{W}{V} \times \frac{1728}{454}$$

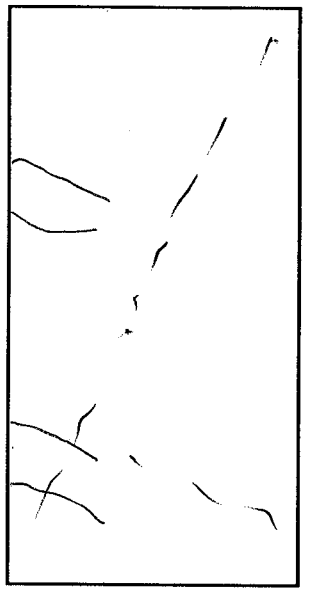
Comments: _____

Sample Number: U-014

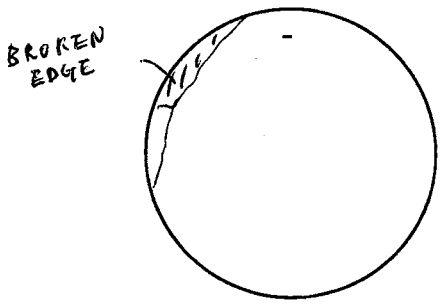




Front



Back

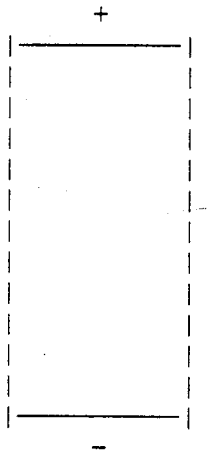


Solid Line: Pre-existing Structure
Dashed Line: Post-Failure

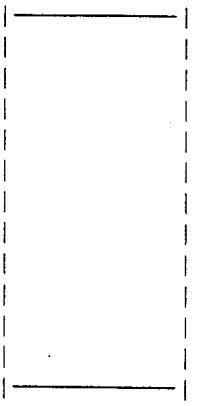
Uniaxial Compression Test Results

Sample Number: U-0196
Hole Number: LFM57-73
Depth:
Rock Type:
Equipment Used: Caliper (0.001")

Job: CNWRA
Location:
Prepped By/Date: RW 5/13/94
Tested By/Date: RW 5/17/94
Reviewed By/Date: M. Bridges 6/2/94



PREFAILURE SKETCH



POSTFAILURE

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.090 - 0.083 = 0.007 in
Δ_{180} = 0.087 - 0.080 = 0.007 in
Δ_{90} = 0.088 - 0.082 = 0.006 in
Δ_{270} = 0.089 - 0.080 = 0.009 in

2. Perpendicularity

Δ_1 = 0.106 - 0.100 = 0.006 in
Δ'_1 = 0.105 - 0.100 = 0.005 in
Δ_2 = 0.038 - 0.032 = 0.006 in
Δ'_2 = 0.082 - 0.080 = 0.002 in

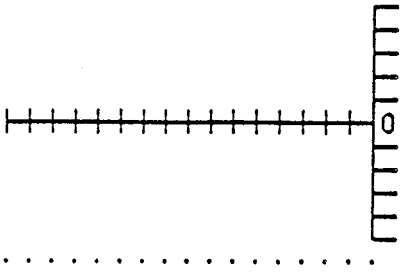
3. Diameter

D_1 = 1.871 in
D_3 = 1.872 in
D_5 = 1.871 in
D_2 = 1.871 in
D_4 = 1.872 in
D_6 = 1.872 in

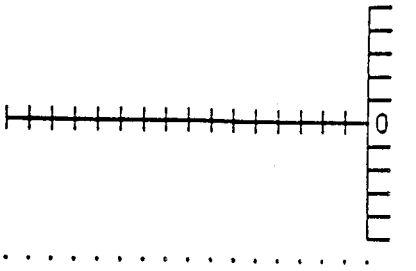
4. Height

H_1 = 4.136 in
H_3 = 4.123 in
H_2 = 4.138 in
H_4 = 4.130 in

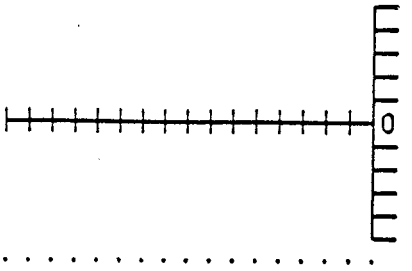
Sample Number: U-019b



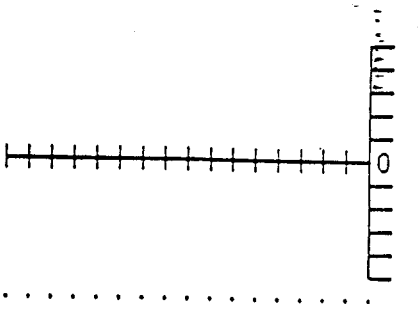
Maximum slope: _____



Maximum slope: _____



Maximum slope: _____



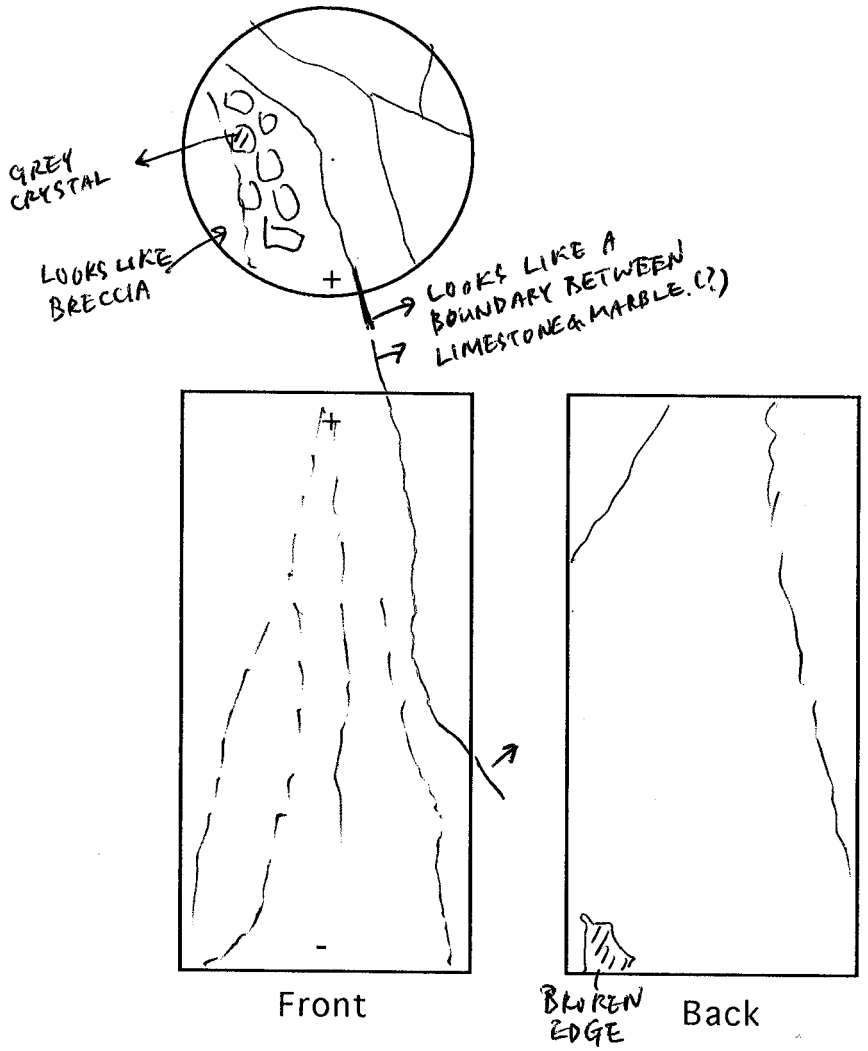
Maximum slope: _____

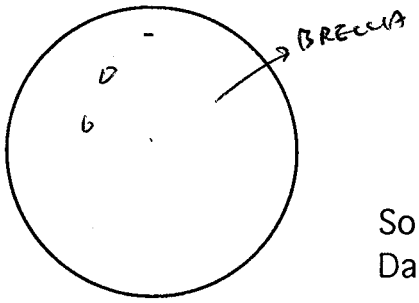
Avg. Diameter (in):	1.872	Disp. Rate (in/s):	0.000295
Avg. Height (in):	4.132	Gauge Reading (lb):	3.6×10^4
Area (in^2):	2.752	Gauge Correction (lb):	
Volume (in^3):	11.373	Failure Load (lb):	3.6×10^4
Weight (g):	192.59	Failure Stress (psi):	13,081.40
Density (lb/ft^3):	164.86		90.20 MPa

$$\gamma = \frac{W}{V} \times \frac{1728}{454}$$

Comments: _____

Sample Number: 4-019b





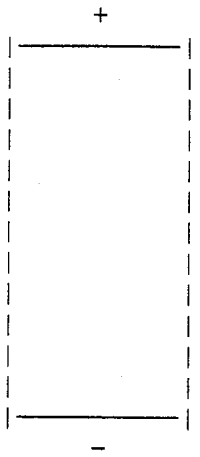
Solid Line: Pre-existing Structure
Dashed Line: Post-Failure

Uniaxial Compression Test Results

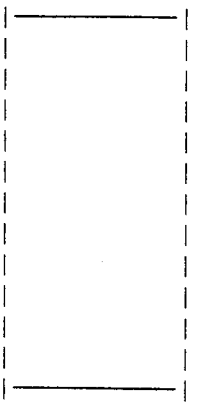
Sample Number: 1)-017
Hole Number: LFM 57-73
Depth:
Rock Type:

Job: CNWRA
Location:
Prepped By/Date: RW 5/13/94
Tested By/Date: RW 5/17/94
Reviewed By/Date: M. Bridges 6/2/94

Equipment Used: caliper (0.001")



PREFAILURE SKETCH



POSTFAILURE

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.111 - 0.108 = 0.003 in Δ_{90} = 0.113 - 0.109 = 0.004 in

Δ_{180} = 0.109 - 0.109 = 0.001 in Δ_{270} = 0.109 - 0.106 = 0.003 in

2. Perpendicularity

Δ_1 = 0.111 - 0.108 = 0.003 in Δ_2 = 0.110 - 0.109 = 0.001 in

Δ'_1 = 0.112 - 0.110 = 0.002 in Δ'_2 = 0.103 - 0.101 = 0.002 in

3. Diameter

D_1 = 1.871 in D_2 = 1.871 in

D_3 = 1.870 in D_4 = 1.871 in

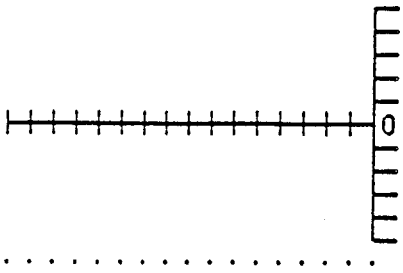
D_5 = 1.871 in D_6 = 1.871 in

4. Height

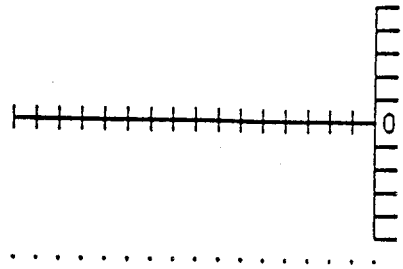
H_1 = 4.049 in H_2 = 4.049 in

H_3 = 4.049 in H_4 = 4.049 in

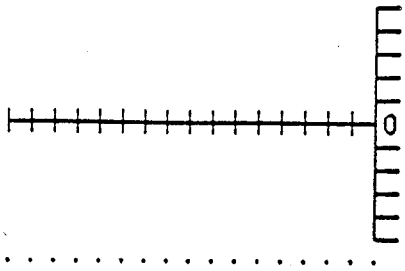
Sample Number: 4-017



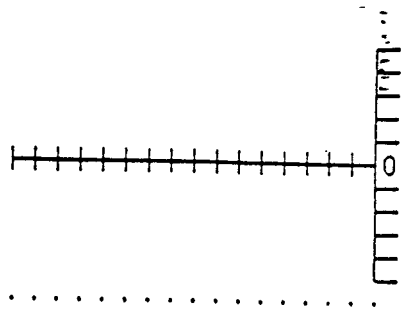
Maximum slope: _____



Maximum slope: _____



Maximum slope: _____



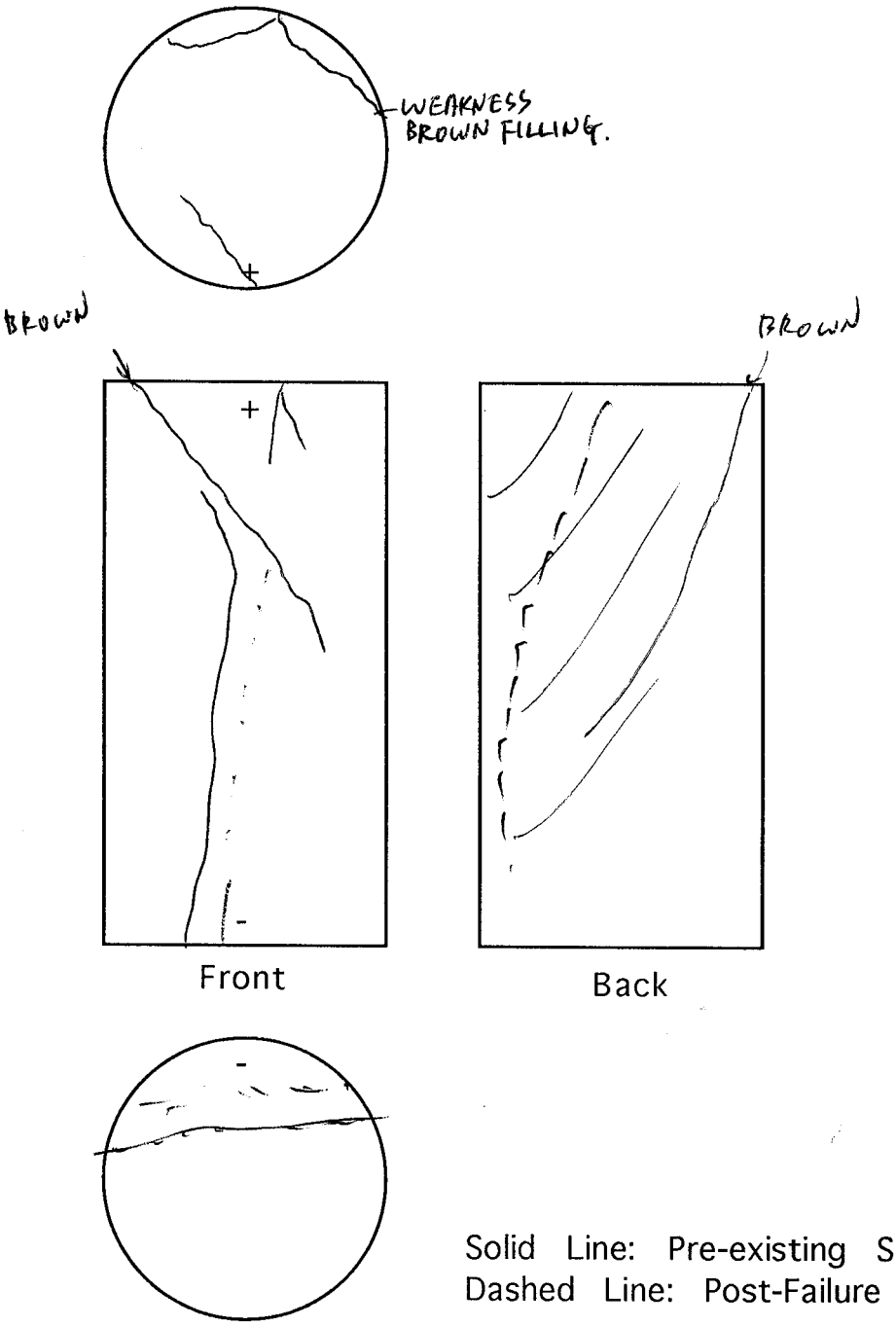
Maximum slope: _____

Avg. Diameter (in):	1.871	Disp. Rate (in/s):	0.000295
Avg. Height (in):	4.049	Gauge Reading (lb):	5.2x10^4
Area (in^2):	2.749	Gauge Correction (lb):	
Volume (in^3):	11.132	Failure Load (lb):	5.2x10^4
Weight (g):	479.92	Failure Stress (psi):	18,915.97
Density (lb/ft^3):	164.09		130.43 MPa

$$\gamma = \frac{W}{V} \times \frac{1728}{454}$$

Comments: _____

Sample Number: U-017



Front

Back

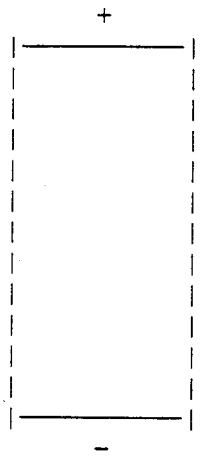
Solid Line: Pre-existing Structure
Dashed Line: Post-Failure

Uniaxial Compression Test Results

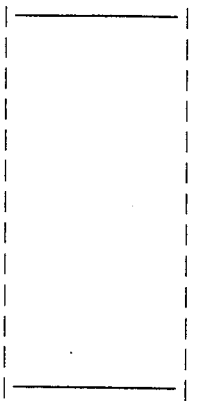
Sample Number: U-028
Hole Number: LFM57-73
Depth:
Rock Type:

Job: CNWRA
Location:
Prepped By/Date: RW 5/13/94
Tested By/Date: RW 5/17/94
Reviewed By/Date: M. Bridges 6/2/94

Equipment Used: Caliper (0.001") SBEL



PREFAILURE SKETCH



POSTFAILURE

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.115 - 0.114 = 0.001 in Δ_{90} = 0.115 - 0.114 = 0.001 in

Δ_{180} = 0.114 - 0.113 = 0.001 in Δ_{270} = 0.116 - 0.114 = 0.002 in

2. Perpendicularity

Δ_1 = 0.066 - 0.065 = 0.001 in Δ_2 = 0.065 - 0.065 = 0 in

Δ'_1 = 0.066 - 0.065 = 0.001 in Δ'_2 = 0.065 - 0.065 = 0 in

3. Diameter

D_1 = 1.375 in D_2 = 1.375 in

D_3 = 1.374 in D_4 = 1.374 in

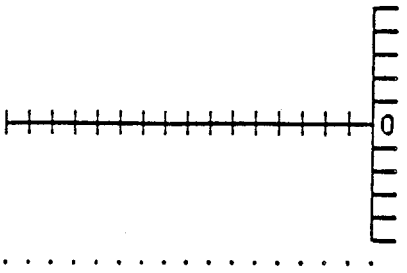
D_5 = 1.374 in D_6 = 1.374 in

4. Height

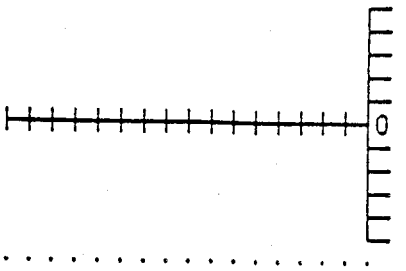
H_1 = 4.069 in H_2 = 4.069 in

H_3 = 4.069 in H_4 = 4.069 in

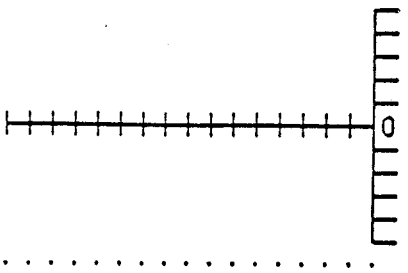
Sample Number: 4-028



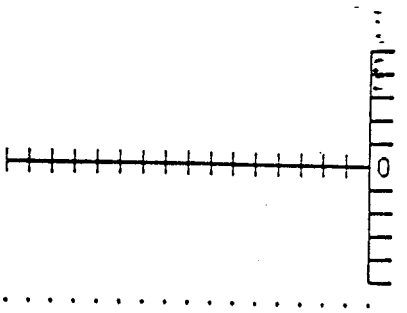
Maximum slope: _____



Maximum slope: _____



Maximum slope: _____



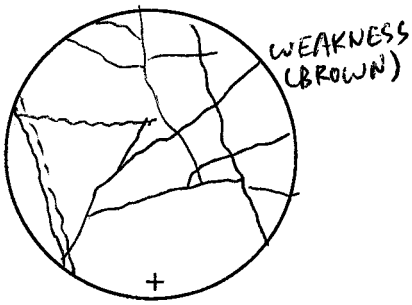
Maximum slope: _____

Avg. Diameter (in):	1.874	Disp. Rate (in/s):	0.00295
Avg. Height (in):	4.069	Gauge Reading (lb):	0.6 X 10⁴
Area (in^2):	2.758	Gauge Correction (lb):	
Volume (in^3):	11.223	Failure Load (lb):	0.6 X 10⁴
Weight (g):	476.61	Failure Stress (psi):	2,175.49 (Invalid)
Density (lb/ft^3):	161.63		15 (MPa)

$$\gamma = \frac{W}{V} \times \frac{1728}{454}$$

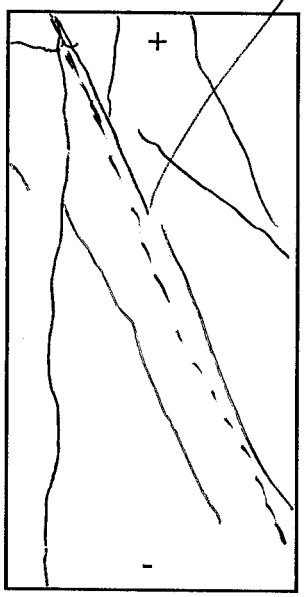
Comments: Along pre-existing ~~fracture~~ weak plane

Sample Number: U-028

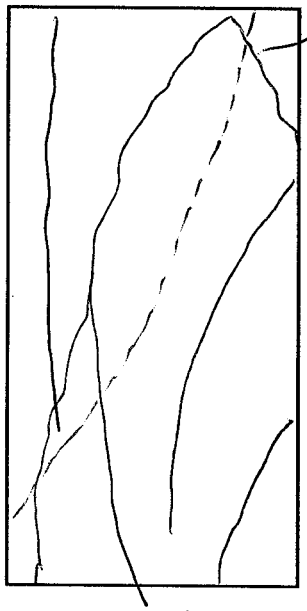


CRYSTALIZATION &
MANY JOINTS (BEDDING)
EXAMINED

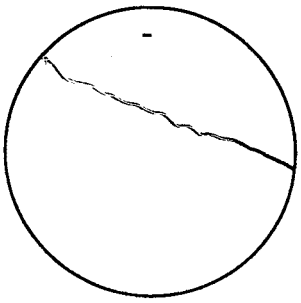
along pre-existing weakness



Front



Back

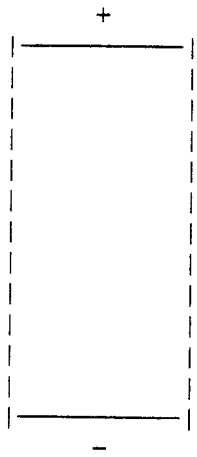


Solid Line: Pre-existing Structure
Dashed Line: Post-Failure

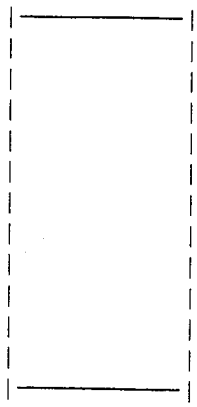
Uniaxial Compression Test Results

Sample Number: U-041
Hole Number: UFM 57-73
Depth:
Rock Type:
Equipment Used: Caliper (0.001")

Job: CNWRA
Location:
Prepped By/Date: RW 5/13/94
Tested By/Date: RW 5/17/94
Reviewed By/Date: M. Bridges 6/2/94
SBFL



PREFAILURE SKETCH



POSTFAILURE

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.100 − 0.093 = 0.007 in Δ_{90} = 0.098 − 0.095 = 0.003 in

Δ_{180} = 0.096 − 0.093 = 0.003 in Δ_{270} = 0.100 − 0.094 = 0.006 in

2. Perpendicularity

Δ_1 = 0.109 − 0.108 = 0.001 in Δ_2 = 0.108 − 0.108 = 0 in

Δ'_1 = 0.109 − 0.108 = 0.001 in Δ'_2 = 0.109 − 0.108 = 0.001 in

3. Diameter

D_1 = 1.858 in D_2 = 1.859 in

D_3 = 1.858 in D_4 = 1.859 in

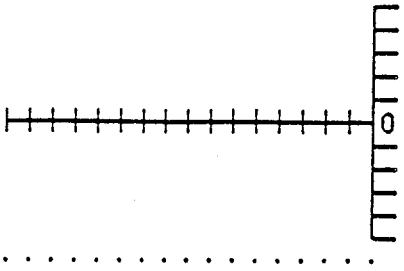
D_5 = 1.858 in D_6 = 1.861 in

4. Height

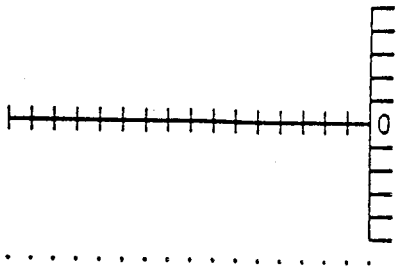
H_1 = 4.012 in H_2 = 4.014 in

H_3 = 4.014 in H_4 = 4.014 in

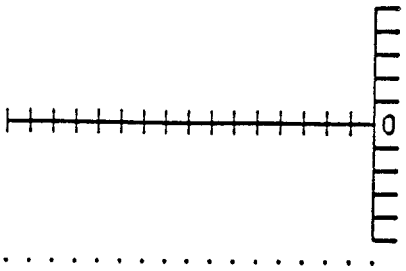
Sample Number: U-041



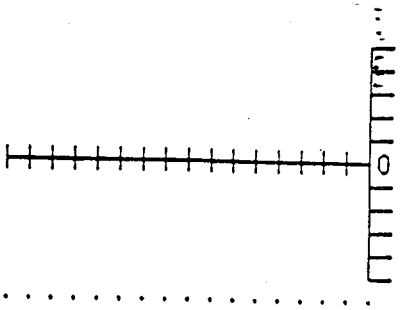
Maximum slope: _____



Maximum slope: _____



Maximum slope: _____



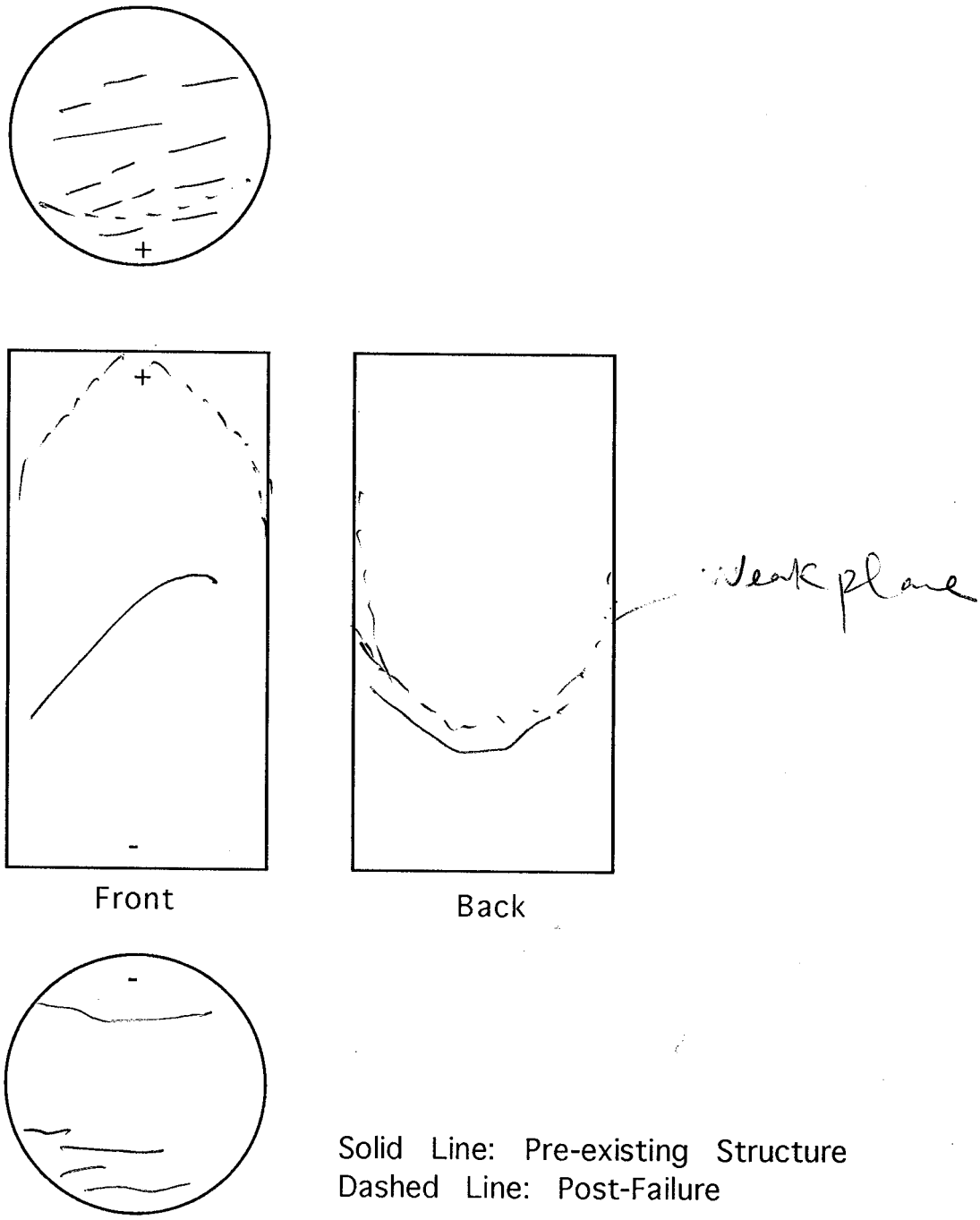
Maximum slope: _____

Avg. Diameter (in):	1.859	Disp. Rate (in/s):	0.000295
Avg. Height (in):	4.014	Gauge Reading (lb):	3.4×10^4
Area (in^2):	2.714	Gauge Correction (lb):	
Volume (in^3):	10.895	Failure Load (lb):	3.4×10^4
Weight (g):	481.46	Failure Stress (psi):	12,527.63
Density (lb/ft^3):	168.20		86.38 MPa

$$\gamma = \frac{W}{V} \times \frac{1728}{454}$$

Comments: _____

Sample Number: U-041



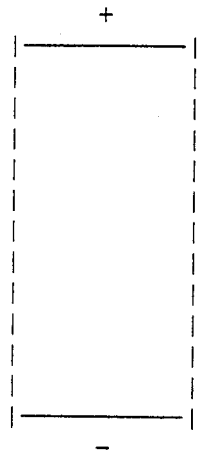
Solid Line: Pre-existing Structure
Dashed Line: Post-Failure

Uniaxial Compression Test Results

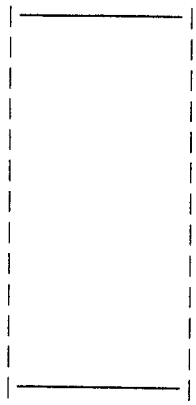
Sample Number: U-025b
Hole Number: LFM57-73
Depth:
Rock Type:

Job: CNWRA
Location:
Prepped By/Date: R W 5/13/94
Tested By/Date: R W 5/17/94
Reviewed By/Date: M. Bridges 6/2/94

Equipment Used: Caliper (0.001") SBEL



PREFAILURE SKETCH



POSTFAILURE

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.092 − 0.089 = 0.003 in Δ_{90} = 0.092 − 0.090 = 0.002 in

Δ_{180} = 0.093 − 0.089 = 0.004 in Δ_{270} = 0.093 − 0.090 = 0.003 in

2. Perpendicularity

Δ_1 = 0.101 − 0.100 = 0.001 in Δ_2 = 0.101 − 0.100 = 0.001 in

Δ'_1 = 0.102 − 0.102 = 0 in Δ'_2 = 0.102 − 0.102 = 0 in

3. Diameter

D_1 = ~~4.008~~ 1.355 in D_2 = 1.354 in

D_3 = ~~4~~ 1.357 in D_4 = 1.354 in

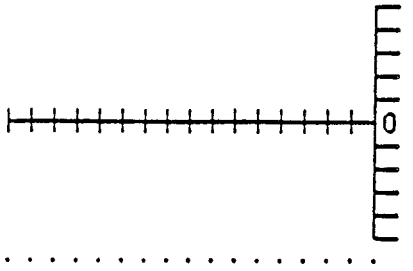
D_5 = 1.355 in D_6 = 1.355 in

4. Height

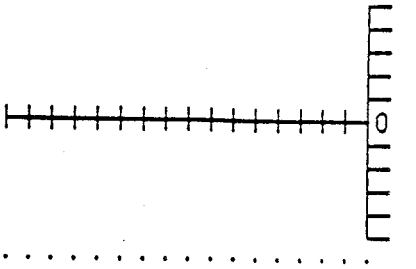
H_1 = 4.008 in H_2 = 4.008 in

H_3 = 4.008 in H_4 = 4.007 in

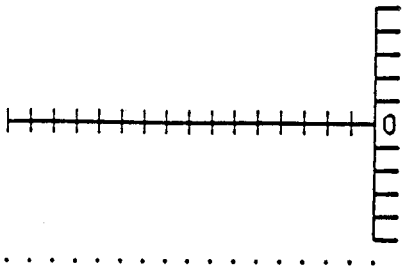
Sample Number: U-0256



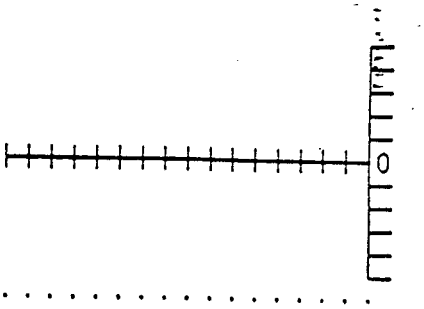
Maximum slope: _____



Maximum slope: _____



Maximum slope: _____



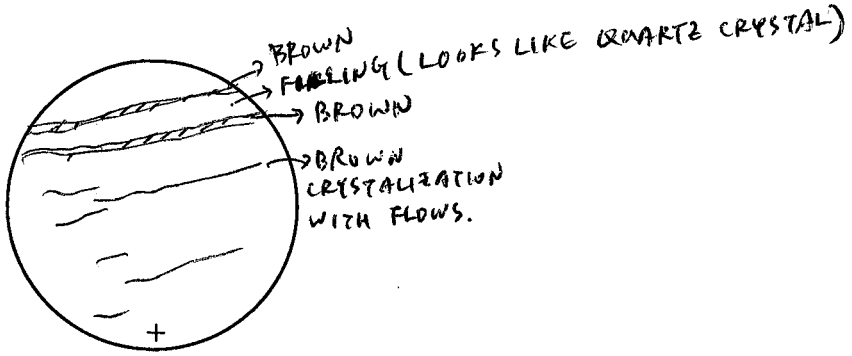
Maximum slope: _____

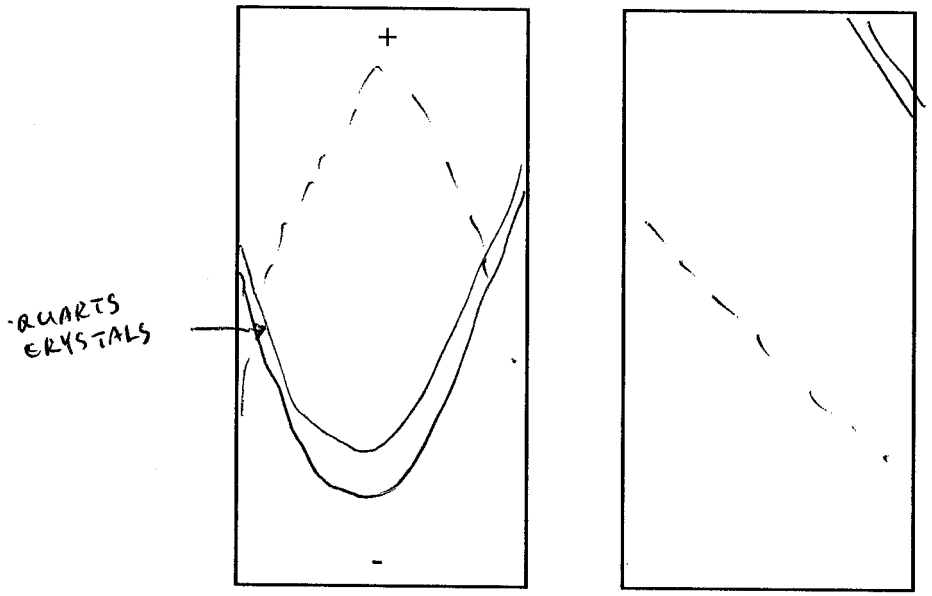
Avg. Diameter (in):	1.855	Disp. Rate (in/s):	0.000295
Avg. Height (in):	4.008	Gauge Reading (lb):	11.4×10^4
Area (in^2):	2.703	Gauge Correction (lb):	
Volume (in^3):	10.832	Failure Load (lb):	11.4×10^4
Weight (g):	487.38	Failure Stress (psi):	42,175.36
Density (lb/ft^3):	171.26		290.80 MPa

$$\gamma = \frac{W}{V} \times \frac{1728}{454}$$

Comments: _____

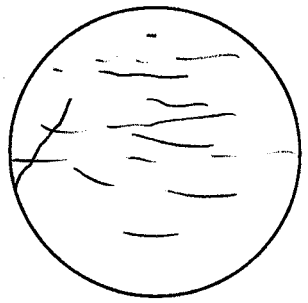
Sample Number: U-025-b





Front

Back

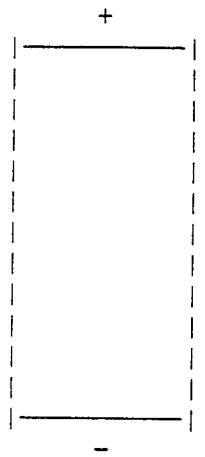


Solid Line: Pre-existing Structure
Dashed Line: Post-Failure

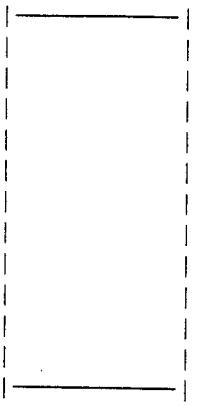
Uniaxial Compression Test Results

Sample Number: U-~~046~~ U-043
Hole Number: UFM 57-73
Depth:
Rock Type:
Equipment Used: caliper (0.001") SBEL

Job: CNWRA
Location:
Prepped By/Date: RW 5/13/94
Tested By/Date: MLB 5/17/94
Reviewed By/Date: M. Bridges 6/2/94



PREFAILURE SKETCH



POSTFAILURE

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.110 - 0.109 = 0.001 in
Δ_{180} = 0.109 - 0.108 = 0.001 in
Δ_{90} = 0.109 - 0.107 = 0.002 in
Δ_{270} = 0.110 - 0.108 = 0.002 in

2. Perpendicularity

Δ_1 = 0.107 - 0.107 = 0 in
Δ'_1 = 0.108 - 0.107 = 0.001 in
Δ_2 = 0.107 - 0.106 = 0.001 in
Δ'_2 = 0.108 - 0.107 = 0.001 in

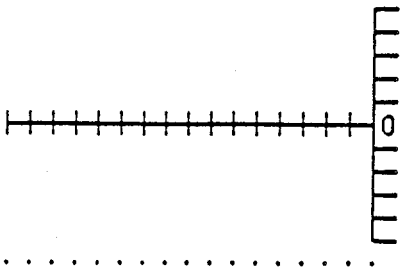
3. Diameter

D_1 = 1.870 in
D_3 = 1.871 in
D_5 = 1.870 in
D_2 = 1.868 in
D_4 = 1.869 in
D_6 = 1.868 in

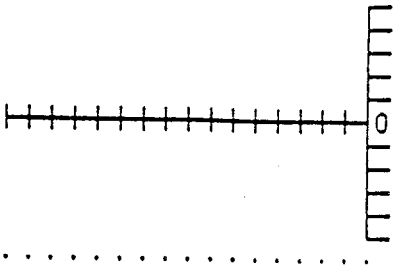
4. Height

H_1 = 4.055 in
H_3 = 4.056 in
H_2 = 4.057 in
H_4 = 4.054 in

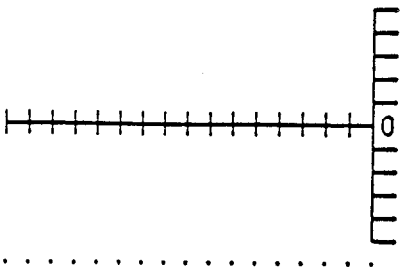
Sample Number: _____



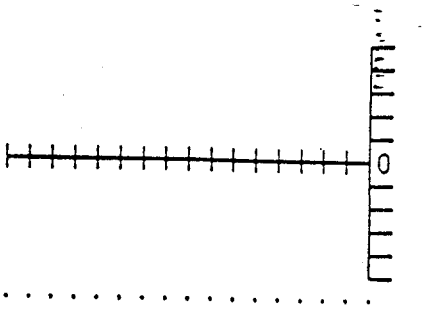
Maximum slope: _____



Maximum slope: _____



Maximum slope: _____



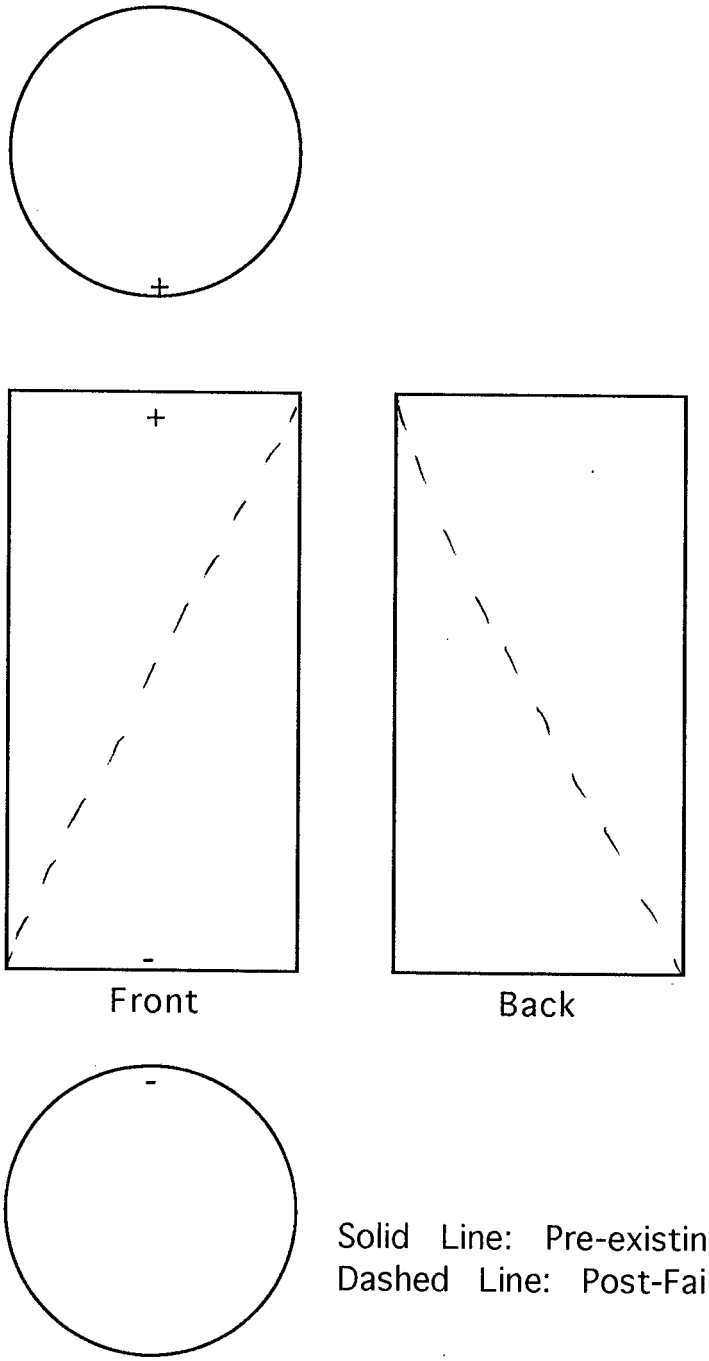
Maximum slope: _____

Avg. Diameter (in):	1.869	Disp. Rate (in/s):	0.000295
Avg. Height (in):	4.056	Gauge Reading (lb):	5.3×10^4
Area (in^2):	2.744	Gauge Correction (lb):	
Volume (in^3):	11.128	Failure Load (lb):	5.3×10^4
Weight (g):	497.29	Failure Stress (psi):	19,314.37
Density (lb/ft^3):	170.09		133.18 MPa

$$\gamma = \frac{W}{V} \times \frac{1728}{454}$$

Comments: _____

Sample Number:_____



Solid Line: Pre-existing Structure
Dashed Line: Post-Failure

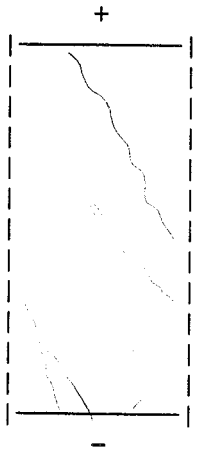
Finish this up!

Uniaxial Compression Test Results

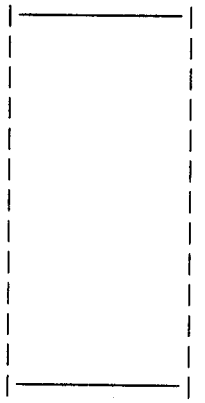
Sample Number: U-001
Hole Number: EM95-C2-6
Depth:
Rock Type:

Job: SRI CNWRA
Location:
Prepped By/Date: 5/3/94 RW
Tested By/Date: 5/3/94 RW
Reviewed By/Date: M. Bridges 6/7/94

Equipment Used: caliper (0.001"), SBEL



PREFAILURE SKETCH



POSTFAILURE

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.099 - 0.081 = 0.018 in
Δ_{180} = 0.120 - 0.100 = 0.02 in
Δ_{90} = 0.105 - 0.098 = 0.007 in
Δ_{270} = 0.103 - 0.095 = 0.008 in

2. Perpendicularity

Δ_1 = 0.115 - 0.100 = 0.015 in
Δ'_1 = 0.108 - 0.099 = 0.009 in
Δ_2 = 0.105 - 0.100 = 0.005 in
Δ'_2 = 0.104 - 0.097 = 0.007 in

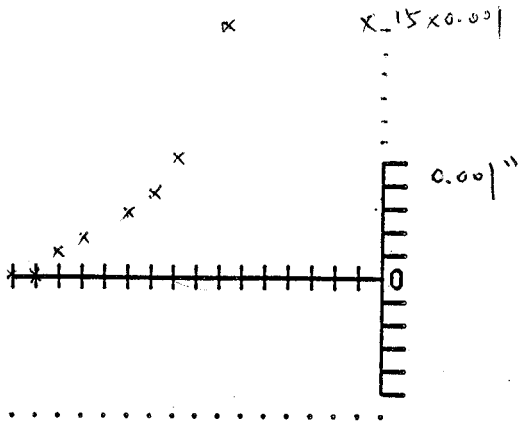
3. Diameter

D_1 = ~~1.8702~~ in 1.870
D_3 = ~~1.8687~~ in 1.869
D_5 = ~~1.8745~~ in 1.875
D_2 = ~~1.8670~~ in 1.867
D_4 = ~~1.8673~~ in 1.867
D_6 = ~~1.8740~~ in 1.874

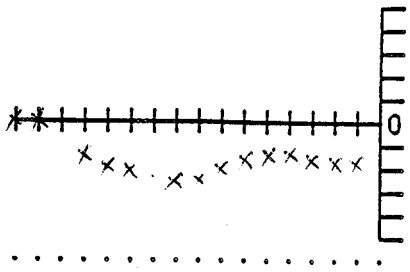
4. Height

H_1 = ~~4.1442~~ in 4.144
H_3 = ~~4.1410~~ in 4.141
H_2 = ~~4.1428~~ in 4.143
H_4 = ~~4.1379~~ in 4.138

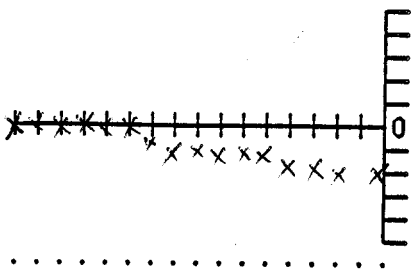
Sample Number: 1A - 001



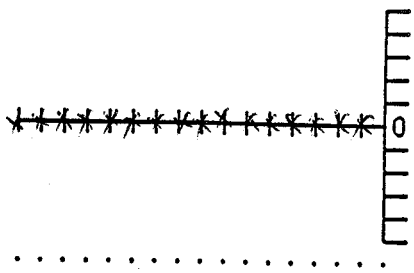
Maximum slope: _____



Maximum slope: _____



Maximum slope: _____



Maximum slope: _____

Avg. Diameter (in):	1.870	Disp. Rate (in/s):	0.000295
Avg. Height (in):	4.142	Gauge Reading (lb):	3.9x10⁴
Area (in^2):	2.746	Gauge Correction (lb):	
Volume (in^3):	11.376	Failure Load (lb):	~~38800~~ 3.9x10⁴
Weight (g):	495.21	Failure Stress (psi):	~~14202.98~~
Density (lb/ft^3):	165.69		97.93 (MPa)

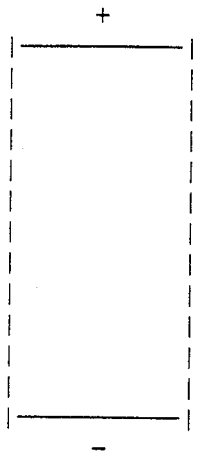
$$\gamma = \frac{W}{V} \times \frac{1728}{454}$$

Comments: _____

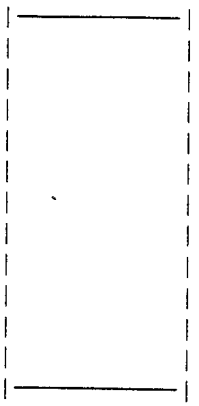
Uniaxial Compression Test Results

Sample Number: U-035
Hole Number: LFM 57-73
Depth:
Rock Type:
Equipment Used: Caliper (0.001")

Job: CNWRA
Location:
Prepped By/Date: RW 5/13/94
Tested By/Date: RW 5/16/94
Reviewed By/Date: M. Bridges 6/7/94



PREFAILURE SKETCH



POSTFAILURE

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.111 - 0.099 = 0.012 in
Δ_{180} = 0.111 - 0.099 = 0.012 in
Δ_{90} = 0.106 - 0.100 = 0.006 in
Δ_{270} = 0.108 - 0.100 = 0.008 in

2. Perpendicularity

Δ_1 = 0.108 - 0.100 = 0.008 in
Δ'_1 = 0.108 - 0.100 = 0.008 in
Δ_2 = 0.105 - 0.103 = 0.002 in
Δ'_2 = 0.104 - 0.103 = 0.001 in

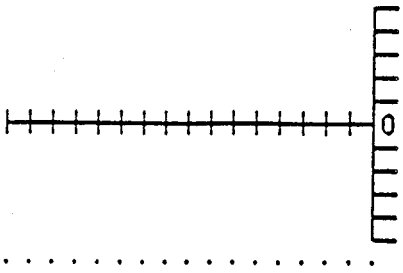
3. Diameter

D_1 = 1.863 in
D_3 = 1.864 in
D_5 = 1.863 in
D_2 = 1.862 in
D_4 = 1.863 in
D_6 = 1.862 in

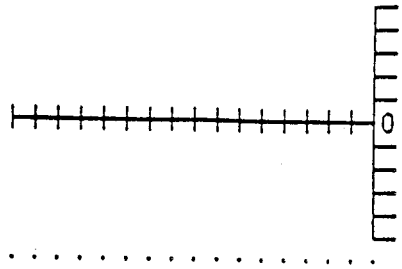
4. Height

H_1 = 4.014 in
H_3 = 4.006 in
H_2 = 4.009 in
H_4 = 4.010 in

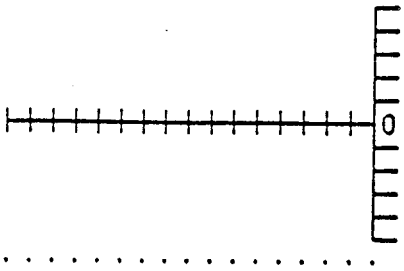
Sample Number: _____



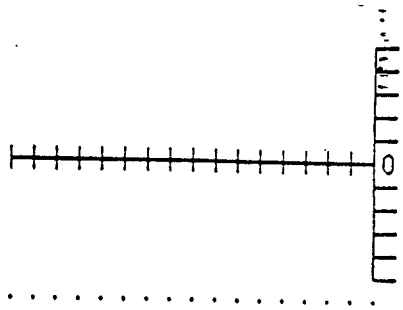
Maximum slope: _____



Maximum slope: _____



Maximum slope: _____



Maximum slope: _____

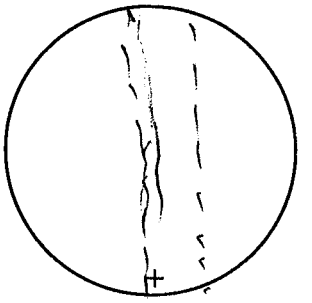
Avg. Diameter (in):	1.863	Disp. Rate (in/s):	0.000295
Avg. Height (in):	~~4.01~~ 4.010	Gauge Reading (lb):	3.3×10^4
Area (in^2):	2.726	Gauge Correction (lb):	
Volume (in^3):	10.931	Failure Load (lb):	3.3×10^4
Weight (g):	490.15	Failure Stress (psi):	12,105.65
Density (lb/ft^3):	170.67		

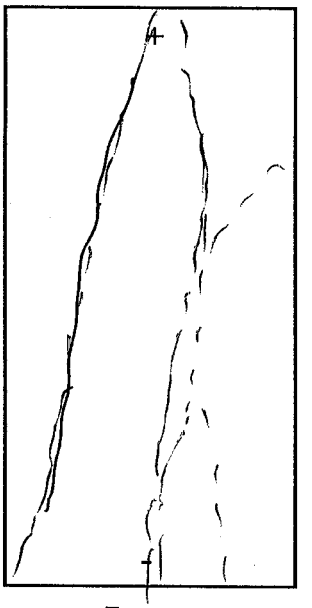
83.47 (MPa)

$$\gamma = \frac{W}{V} \times \frac{1728}{454}$$

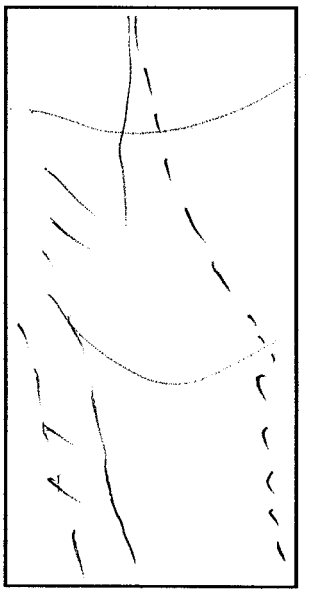
Comments: _____

Sample Number: _____

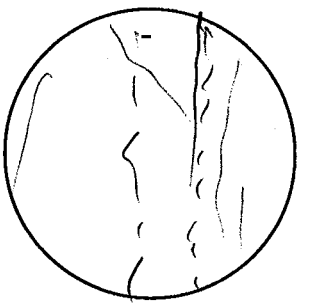




Front



Back

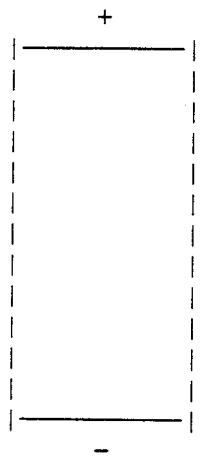


Solid Line: Pre-existing Structure
Dashed Line: Post-Failure

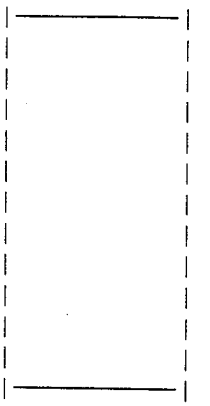
Uniaxial Compression Test Results

Sample Number: U-043 U-046
Hole Number: UFM 57-73
Depth:
Rock Type:
Equipment Used: caliper (0.001")

Job: CNWRA
Location:
Prepped By/Date: R W 5/13/94
Tested By/Date: RW 5/17/94
Reviewed By/Date: M. Bridges 6/2/94



PREFAILURE SKETCH



POSTFAILURE

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.106 - 0.104 = 0.002 in Δ_{90} = 0.103 - 0.101 = 0.002 in

Δ_{180} = 0.108 - 0.106 = 0.002 in Δ_{270} = 0.107 - 0.106 = 0.001 in

2. Perpendicularity

Δ_1 = 0.081 - 0.080 = 0.001 in Δ_2 = 0.080 - 0.080 = 0 in

Δ'_1 = 0.080 - 0.079 = 0.001 in Δ'_2 = 0.080 - 0.080 = 0 in

3. Diameter

D_1 = 1.869 in D_2 = 1.869 in

D_3 = 1.869 in D_4 = 1.868 in

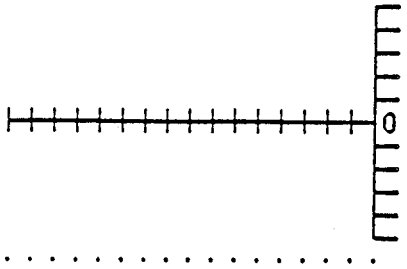
D_5 = 1.869 in D_6 = 1.869 in

4. Height

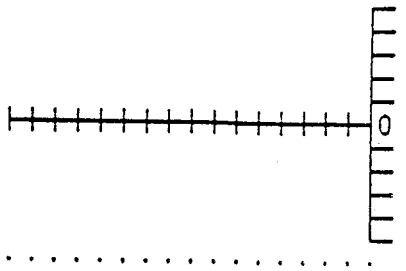
H_1 = 4.012 in H_2 = 4.013 in

H_3 = 4.013 in H_4 = 4.013 in

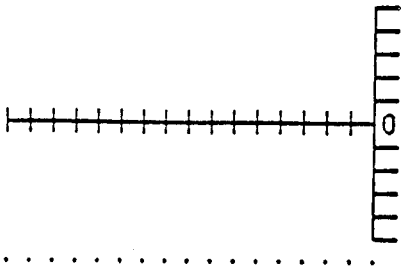
Sample Number: _____



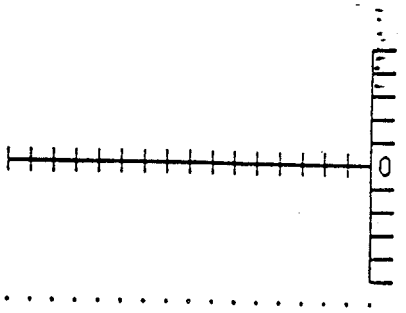
Maximum slope: _____



Maximum slope: _____



Maximum slope: _____



Maximum slope: _____

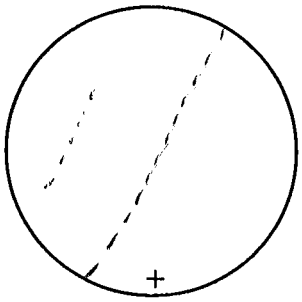
Avg. Diameter (in):	1.869	Disp. Rate (in/s):	0.000295
Avg. Height (in):	4.013	Gauge Reading (lb):	13 x 1.4
Area (in^2):	2.744	Gauge Correction (lb):	
Volume (in^3):	11.010	Failure Load (lb):	13x1.4
Weight (g):	481.89	Failure Stress (psi):	47,376.09
Density (lb/ft^3):	166.59		

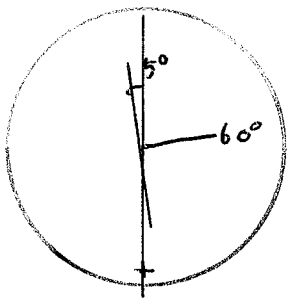
326.66 (MPa)

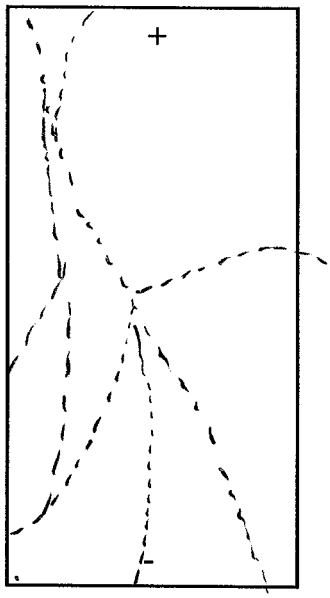
$$\gamma = \frac{W}{V} \times \frac{1728}{454}$$

Comments: _____

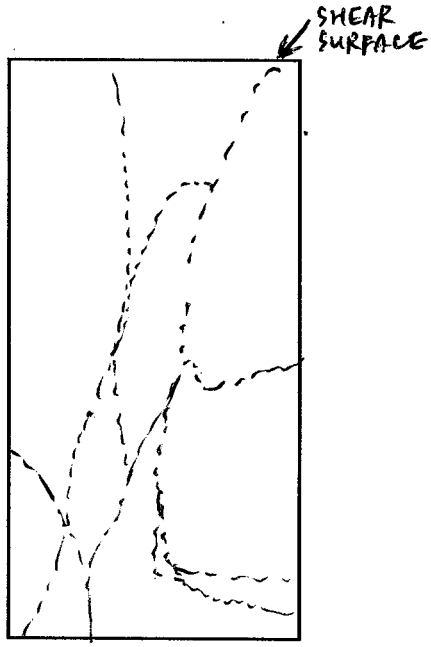
Sample Number: _____



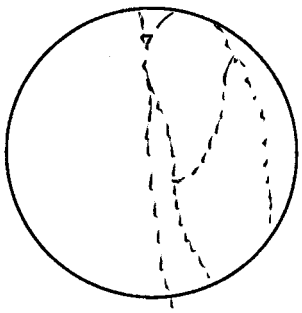




Front



Back



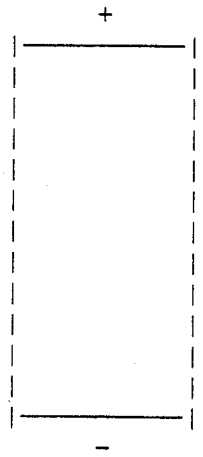
Solid Line: Pre-existing Structure
Dashed Line: Post-Failure

Uniaxial Compression Test Results

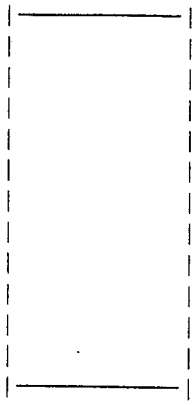
Sample Number: U-049
Hole Number: LFM 57-73
Depth:
Rock Type:

Job: CNWRA
Location:
Prepped By/Date: RW 5/13/94
Tested By/Date: RW 5/16/94
Reviewed By/Date: M. Bridges 6/2/94

Equipment Used: Caliper (0.001")



PREFAILURE SKETCH



POSTFAILURE

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.112 - 0.111 = 0.001 in
Δ_{180} = 0.113 - 0.110 = 0.003 in
Δ_{90} = 0.112 - 0.110 = 0.002 in
Δ_{270} = 0.114 - 0.110 = 0.004 in

2. Perpendicularity

Δ_1 = 0.098 - 0.098 = 0 in
Δ'_1 = 0.098 - 0.098 = 0 in
Δ_2 = 0.098 - 0.097 = 0.001 in
Δ'_2 = 0.098 - 0.098 = 0 in

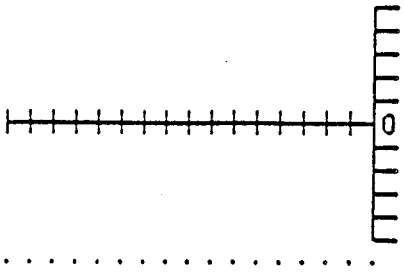
3. Diameter

D_1 = 1.872 in
D_3 = 1.872 in
D_5 = 1.873 in
D_2 = 1.872 in
D_4 = 1.874 in
D_6 = 1.874 in

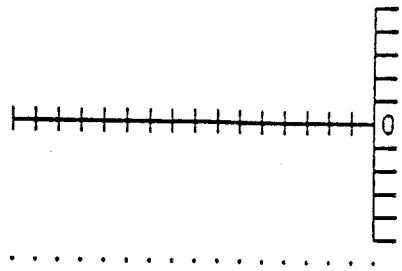
4. Height

H_1 = 4.018 in
H_3 = 4.020 in
H_2 = 4.018 in
H_4 = 4.019 in

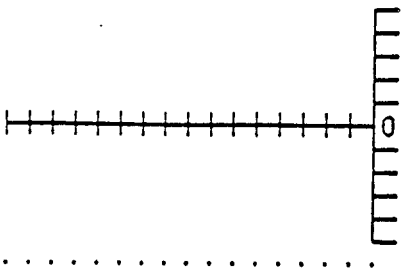
Sample Number: _____



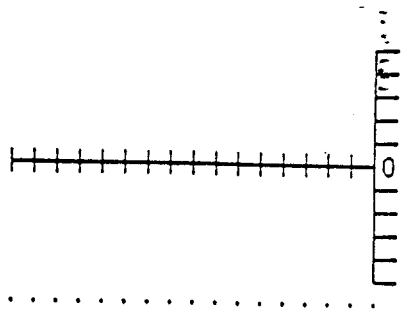
Maximum slope: _____



Maximum slope: _____



Maximum slope: _____



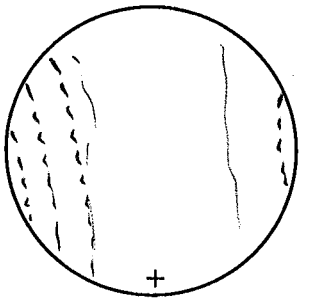
Maximum slope: _____

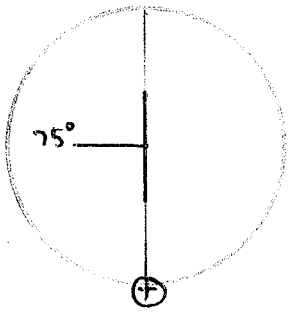
Avg. Diameter (in):	1.873	Disp. Rate (in/s):	0.000295
Avg. Height (in):	4.019	Gauge Reading (lb):	9.3×10^4
Area (in^2):	2.755	Gauge Correction (lb):	
Volume (in^3):	11.073	Failure Load (lb):	9.3×10^4
Weight (g):	428.75	Failure Stress (psi):	~~35,571.69~~
Density (lb/ft^3):	167.99		245.27 (MPa)

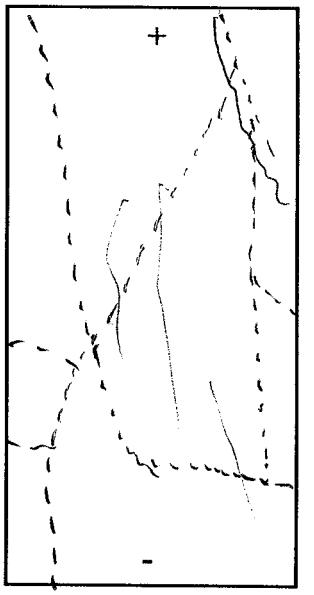
$$\gamma = \frac{W}{V} \times \frac{1728}{454}$$

Comments: _____

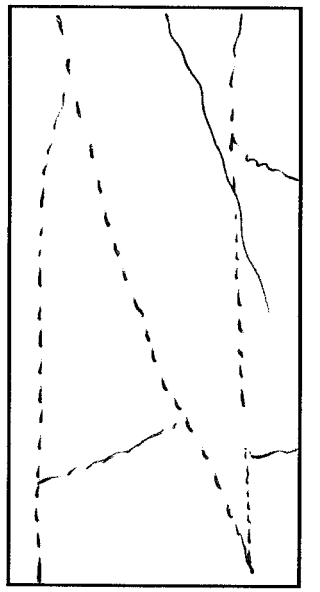
Sample Number: _____





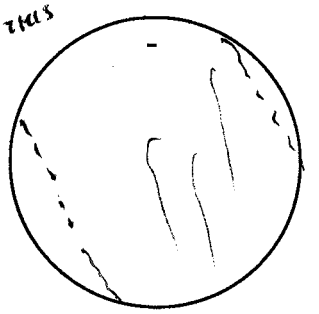


Front



Back

SHEAR FAILURE ALONG THIS PLANE

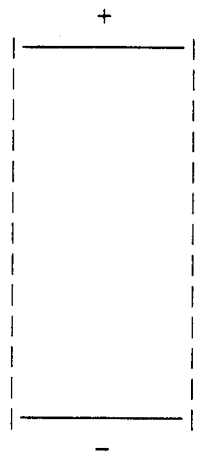


Solid Line: Pre-existing Structure
Dashed Line: Post-Failure

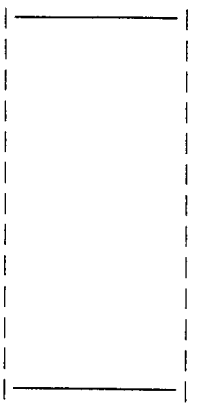
Uniaxial Compression Test Results

Sample Number: U-009
Hole Number: LFM95-C2-2
Depth:
Rock Type:
Equipment Used: Caliper (0.001")

Job: CNWRA
Location:
Prepped By/Date: RW 5/13/94
Tested By/Date: DW 5/16/94
Reviewed By/Date: M. Bridges 6/2/94



PREFAILURE SKETCH



POSTFAILURE

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.097 − 0.077 = 0.02 in Δ_{90} = 0.102 − 0.072 = 0.03 in

Δ_{180} = 0.093 − 0.074 = 0.019 in Δ_{270} = 0.092 − 0.074 = 0.018 in

2. Perpendicularity

Δ_1 = 0.109 − 0.102 = 0.007 in Δ_2 = 0.105 − 0.102 = 0.003 in

Δ'_1 = 0.106 − 0.104 = 0.002 in Δ'_2 = 0.106 − 0.104 = 0.002 in

3. Diameter

D_1 = 1.866 in D_2 = 1.867 in

D_3 = 1.863 in D_4 = 1.861 in

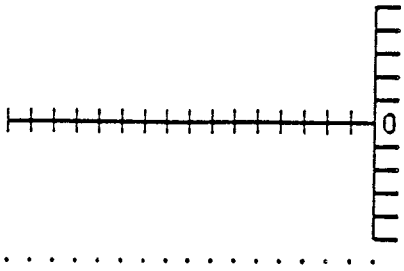
D_5 = 1.862 in D_6 = 1.860 in

4. Height

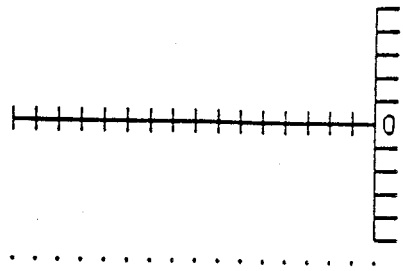
H_1 = 4.126 in H_2 = 4.123 in

H_3 = 4.125 in H_4 = 4.128 in

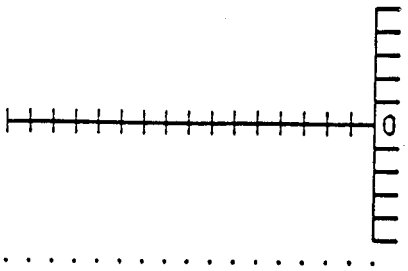
Sample Number: _____



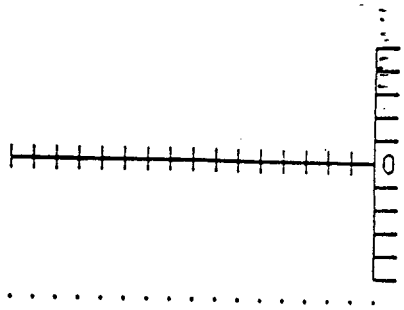
Maximum slope: _____



Maximum slope: _____



Maximum slope: _____



Maximum slope: _____

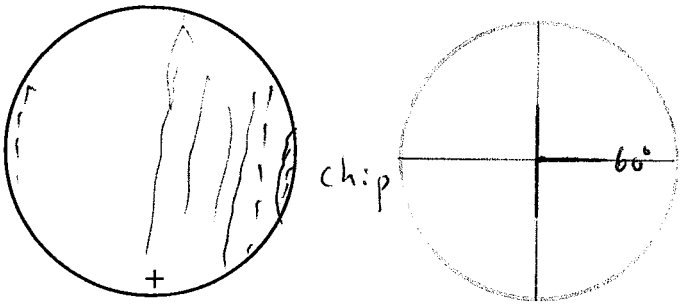
Avg. Diameter (in):	1.863	Disp. Rate (in/s):	~~2.0 x 10^-6~~ 0.000295
Avg. Height (in):	4.126	Gauge Reading (lb):	2.0 x 10^4
Area (in^2):	2.726	Gauge Correction (lb):	
Volume (in^3):	11.247	Failure Load (lb):	2.0 x 10^4
Weight (g):	493.18	Failure Stress (psi):	7,336.76
Density (lb/ft^3):	166.90		

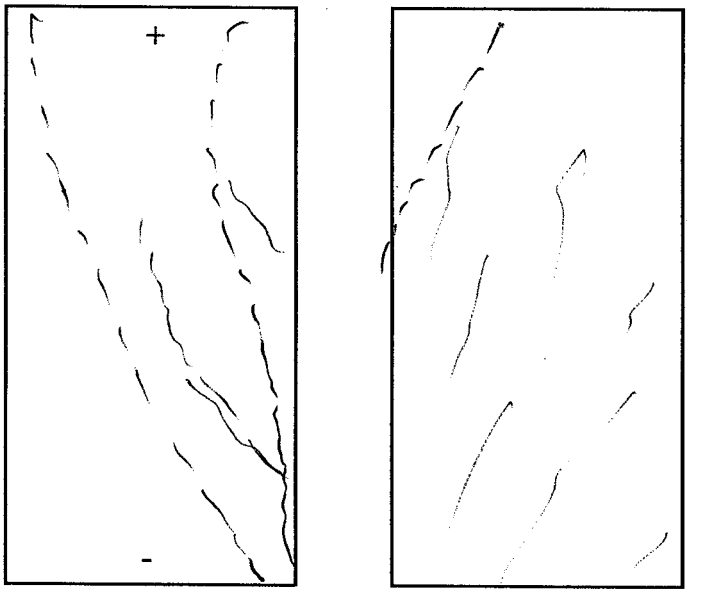
50.59 (MPa)

$$\gamma = \frac{W}{V} \times \frac{1728}{454}$$

Comments: _____

Sample Number: _____

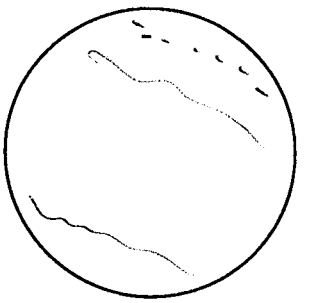




Front

Back

SMEAR FAILURE AMONG THIS PLANE

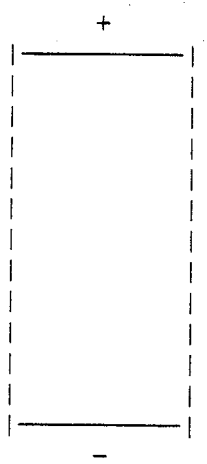


Solid Line: Pre-existing Structure
Dashed Line: Post-Failure

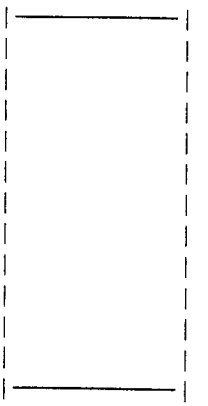
Uniaxial Compression Test Results

Sample Number: U-030
Hole Number: LFM 57-73
Depth:
Rock Type:
Equipment Used: cal: per (0.001")

Job: CNWRA
Location:
Prepped By/Date: R W 5/13/94
Tested By/Date: R W 5/16/94
Reviewed By/Date: M. Bridges 6/2/94



PREFAILURE SKETCH



POSTFAILURE

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.106 − 0.105 = 0.001 in Δ_{90} = 0.106 − 0.106 = 0 in

Δ_{180} = 0.106 − 0.105 = 0.001 in Δ_{270} = 0.106 − 0.106 = 0 in

2. Perpendicularity

Δ_1 = 0.075 − 0.075 = 0 in Δ_2 = 0.075 − 0.075 = 0 in

Δ'_1 = 0.076 − 0.075 = 0.001 in Δ'_2 = 0.076 − 0.076 = 0 in

3. Diameter

D_1 = 1.867 in D_2 = 1.868 in

D_3 = 1.867 in D_4 = 1.867 in

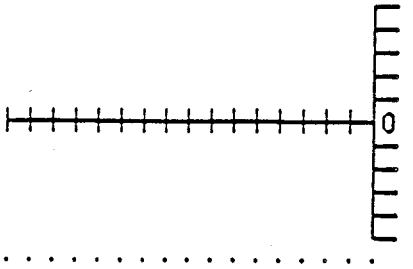
D_5 = 1.868 in D_6 = 1.868 in

4. Height

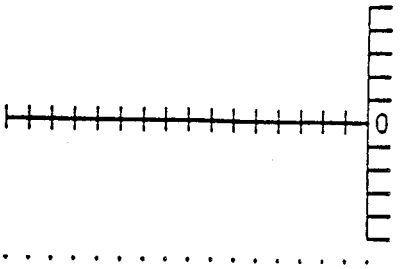
H_1 = 4.014 in H_2 = 4.014 in

H_3 = 4.015 in H_4 = 4.014 in

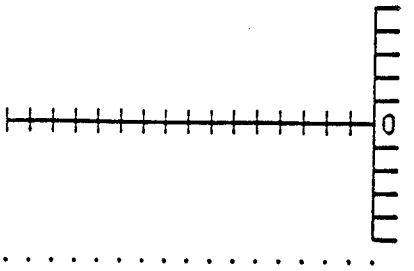
Sample Number: _____



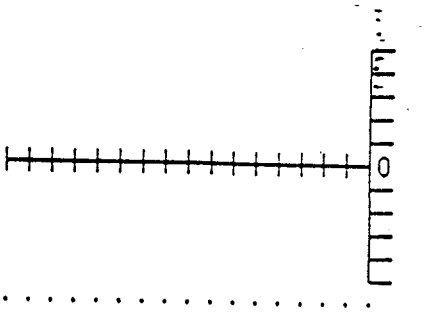
Maximum slope: _____



Maximum slope: _____



Maximum slope: _____



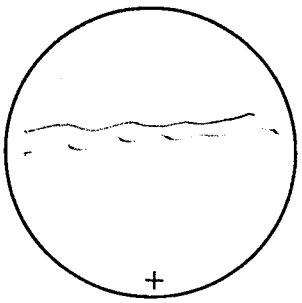
Maximum slope: _____

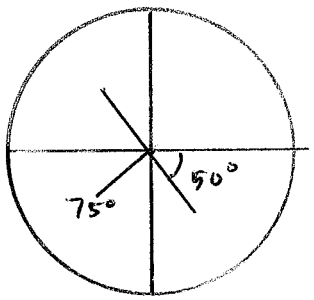
Avg. Diameter (in):	1.868	Disp. Rate (in/s):	0.000295
Avg. Height (in):	4.014	Gauge Reading (lb):	8.5 x 10^4
Area (in^2):	2.741	Gauge Correction (lb):	
Volume (in^3):	11.001	Failure Load (lb):	8.5 x 10^4
Weight (g):	474.97	Failure Stress (psi):	~~31,010.58~~
Density (lb/ft^3):	164.34		213.82 (MPa)

$$\gamma = \frac{W}{V} \times \frac{1728}{454}$$

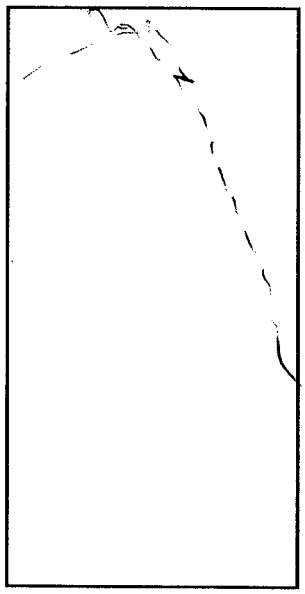
Comments: _____

Sample Number: _____



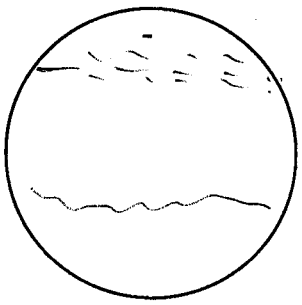


Front



Back

FAILED ALONG A SHEAR PLANE

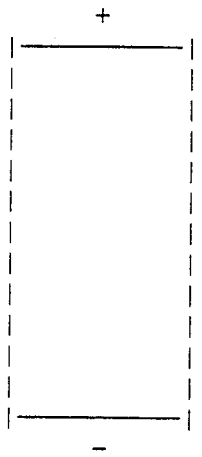


Solid Line: Pre-existing Structure
Dashed Line: Post-Failure

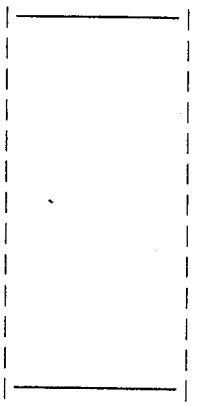
Uniaxial Compression Test Results

Sample Number: U-024a
Hole Number: LFM 57-73
Depth:
Rock Type:
Equipment Used: Caliper (0.001")

Job: CNWRA
Location:
Prepped By/Date: RW 5/13/94
Tested By/Date: RW 5/16/94
Reviewed By/Date: M. Bridges 6/2/94



PREFAILURE SKETCH



POSTFAILURE

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.107 - 0.106 = 0.001 in
Δ_{180} = 0.107 - 0.105 = 0.002 in
Δ_{90} = 0.107 - 0.105 = 0.002 in
Δ_{270} = 0.107 - 0.105 = 0.002 in

2. Perpendicularity

Δ_1 = 0.099 - 0.098 = 0.001 in
Δ'_1 = 0.097 - 0.096 = 0.001 in
Δ_2 = 0.098 - 0.098 = 0 in
Δ'_2 = 0.096 - 0.096 = 0 in

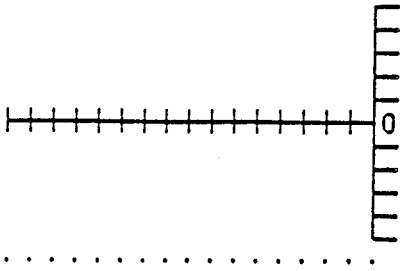
3. Diameter

D_1 = 1.368 in
D_3 = 1.368 in
D_5 = 1.367 in
D_2 = 1.368 in
D_4 = 1.369 in
D_6 = 1.368 in

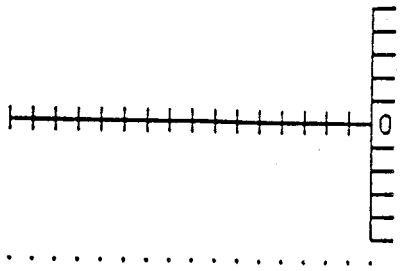
4. Height

H_1 = 4.002 in
H_3 = 4.001 in
H_2 = 4.002 in
H_4 = 4.003 in

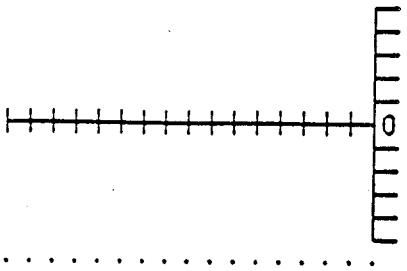
Sample Number: _____



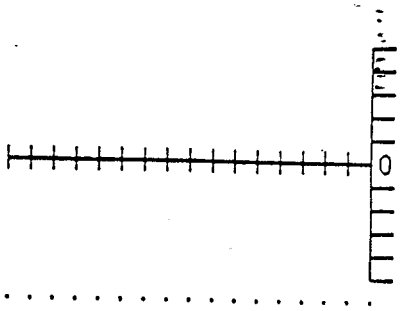
Maximum slope: _____



Maximum slope: _____



Maximum slope: _____



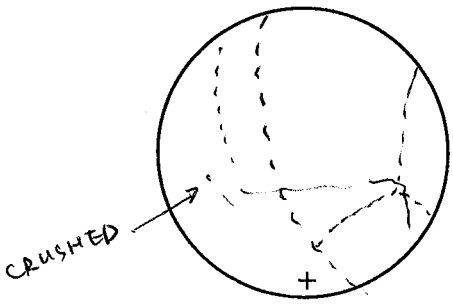
Maximum slope: _____

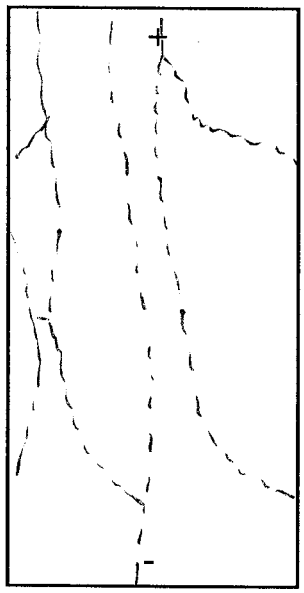
Avg. Diameter (in):	1.868	Disp. Rate (in/s):	0.000295
Avg. Height (in):	4.002	Gauge Reading (lb):	13.5 X10⁴
Area (in^2):	2.741	Gauge Correction (lb):	
Volume (in^3):	10.968	Failure Load (lb):	13.5 X10⁴
Weight (g):	484.91	Failure Stress (psi):	~~49,252.10~~
Density (lb/ft^3):	168.28		339.59 (MPa)

$$\gamma = \frac{W}{V} \times \frac{1728}{454}$$

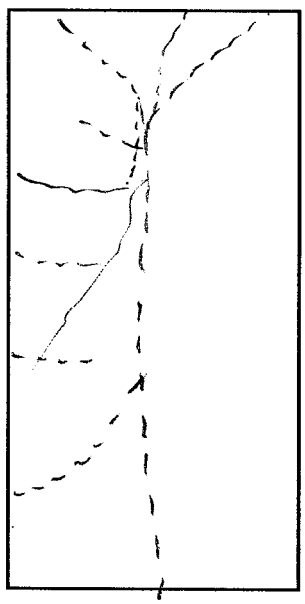
Comments: _____

Sample Number: _____



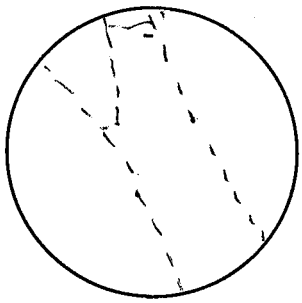


Front



Back

FAILED IN AXIAL CLEAVAGE. PATIALLY CRUSHED ZONES

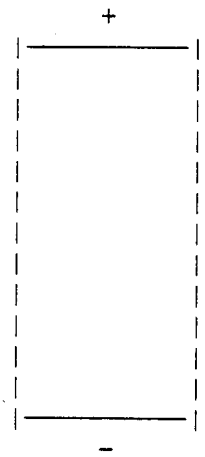


Solid Line: Pre-existing Structure
Dashed Line: Post-Failure

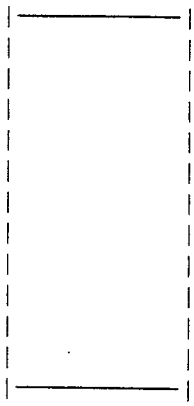
Uniaxial Compression Test Results

Sample Number: U-024b
Hole Number: LFM 57-73
Depth:
Rock Type:
Equipment Used: caliper (0.001")

Job: CNWRA
Location:
Prepped By/Date: R W 5/13/94
Tested By/Date: R W 5/16/94
Reviewed By/Date: M. Bridges 6/2/94



PREFAILURE SKETCH



POSTFAILURE

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.105 - 0.102 = 0.003 in Δ_{90} = 0.104 - 0.101 = 0.003 in

Δ_{180} = 0.105 - 0.101 = 0.004 in Δ_{270} = 0.104 - 0.101 = 0.003 in

2. Perpendicularity

Δ_1 = 0.033 - 0.033 = 0 in Δ_2 = 0.034 - 0.033 = 0.001 in

Δ'_1 = 0.035 - 0.034 = 0.001 in Δ'_2 = 0.034 - 0.033 = 0.001 in

3. Diameter

D_1 = 1.867 in D_2 = 1.867 in

D_3 = 1.867 in D_4 = 1.868 in

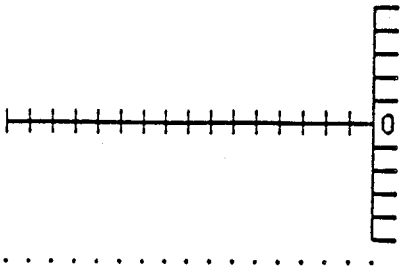
D_5 = 1.867 in D_6 = 1.867 in

4. Height

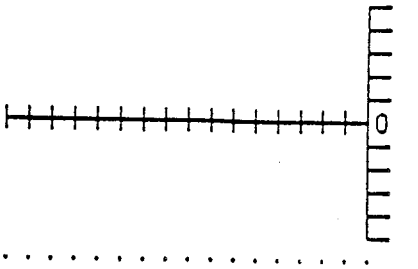
H_1 = 4.069 in H_2 = 4.069 in

H_3 = 4.070 in H_4 = 4.069 in

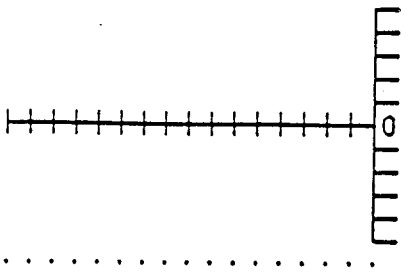
Sample Number: _____



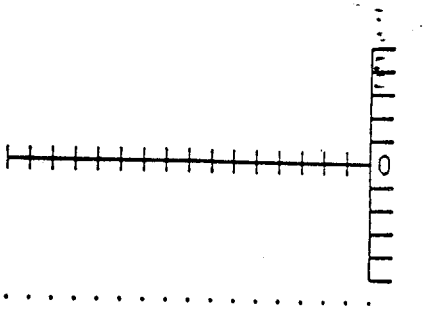
Maximum slope: _____



Maximum slope: _____



Maximum slope: _____



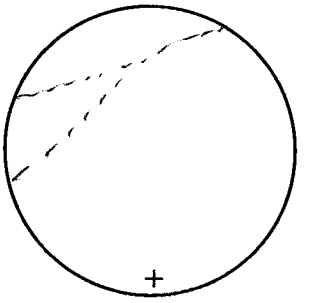
Maximum slope: _____

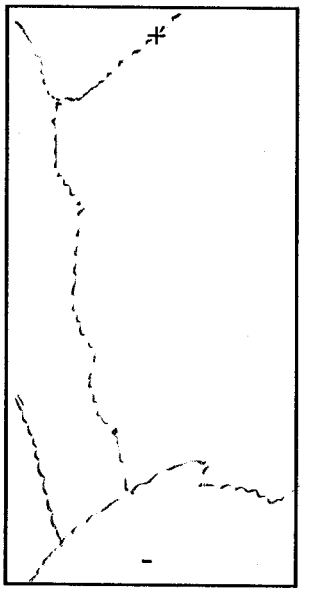
Avg. Diameter (in):	1.867	Disp. Rate (in/s):	0.000295
Avg. Height (in):	4.069	Gauge Reading (lb):	9.8×10^4
Area (in^2):	2.738	Gauge Correction (lb):	
Volume (in^3):	11.140	Failure Load (lb):	9.8×10^4
Weight (g):	493.27	Failure Stress (psi):	35,792.55
Density (lb/ft^3):	168.54		246.79 (MPa)

$$\gamma = \frac{W}{V} \times \frac{1728}{454}$$

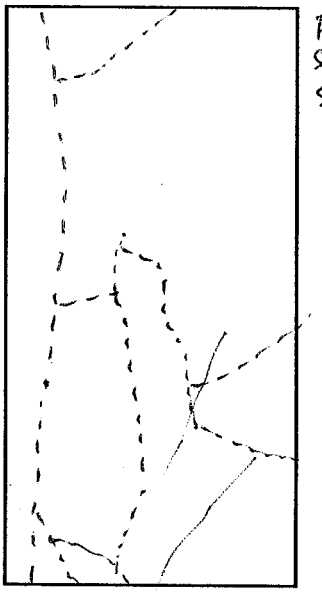
Comments: _____

Sample Number: _____



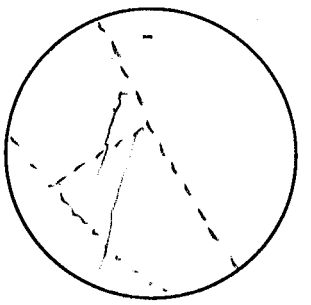


Front



Back

FAILED INTO SEVERAL SPLITTING SLABS.



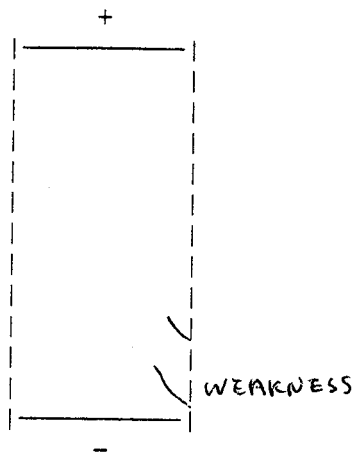
Solid Line: Pre-existing Structure
Dashed Line: Post-Failure

Uniaxial Compression Test Results

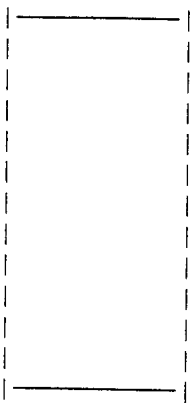
Sample Number: U-057
Hole Number: ~~LTM157-73~~
Depth:
Rock Type:

Job: CNWRA
Location:
Prepped By/Date: RW 5/7/94
Tested By/Date: RW 5/16/94
Reviewed By/Date: M. Bridges 6/2/94

Equipment Used: Caliper (0.001") / SBEL



PREFAILURE SKETCH



POSTFAILURE

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.082 - 0.078 = 0.004 in Δ_{90} = 0.094 - 0.077 = 0.017 in

Δ_{180} = 0.085 - 0.078 = 0.007 in Δ_{270} = 0.089 - 0.078 = 0.011 in

2. Perpendicularity

Δ_1 = 0.105 - 0.104 = 0.001 in Δ_2 = 0.106 - 0.105 = 0.001 in

Δ'_1 = 0.106 - 0.105 = 0.001 in Δ'_2 = 0.109 - 0.099 = 0.01 in

3. Diameter

D_1 = 1.847 in D_2 = 1.848 in

D_3 = 1.847 in D_4 = 1.848 in

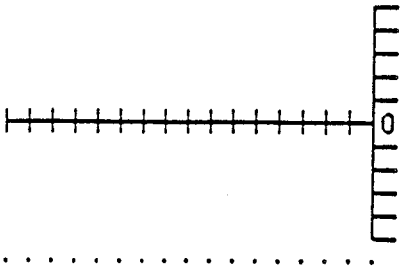
D_5 = 1.847 in D_6 = 1.847 in

4. Height

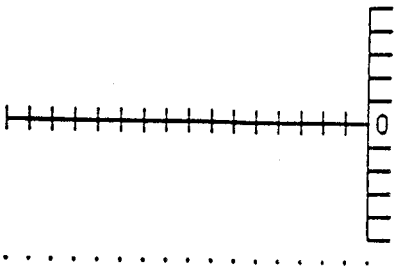
H_1 = 4.012 in H_2 = 4.008 in

H_3 = 4.012 in H_4 = 4.014 in

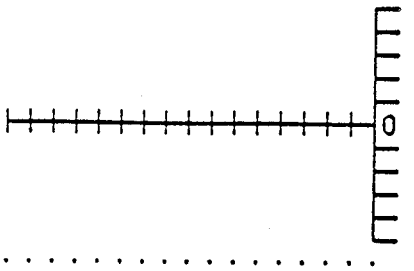
Sample Number: _____



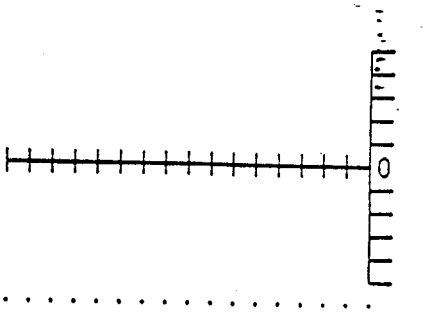
Maximum slope: _____



Maximum slope: _____



Maximum slope: _____



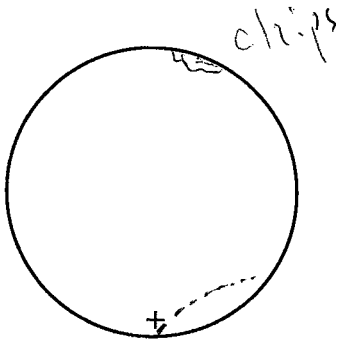
Maximum slope: _____

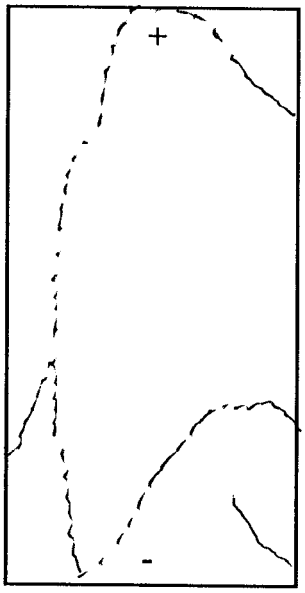
Avg. Diameter (in):	1.847	Disp. Rate (in/s):	~~10.5 x 10^4~~ 0.000295
Avg. Height (in):	4.012	Gauge Reading (lb):	10.5 x 10^4
Area (in^2):	2.679	Gauge Correction (lb):	
Volume (in^3):	10.75	Failure Load (lb):	10.5 x 10^4
Weight (g):	450.78	Failure Stress (psi):	~~39,193.13~~
Density (lb/ft^3):	~~149.61~~ 159.16 MLD		270.24 (MPa)

$$\gamma = \frac{W}{V} \times \frac{1728}{454}$$

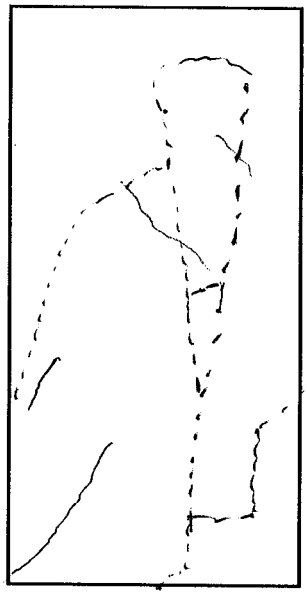
Comments: _____

Sample Number: 4-057



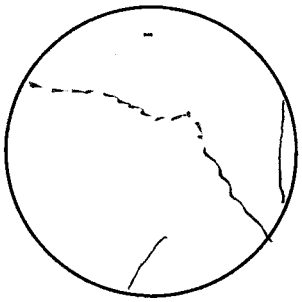


Front



SPLITTING FAILURE INTO SEVERAL SLABS

Back

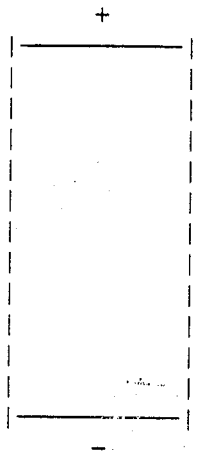


Solid Line: Pre-existing Structure
Dashed Line: Post-Failure

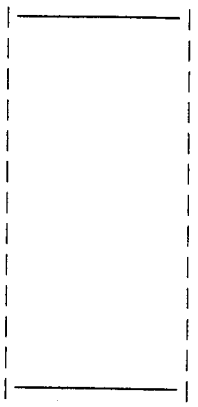
Uniaxial Compression Test Results

Sample Number: U-040
Hole Number: VFM 57-73
Depth:
Rock Type:
Equipment Used: Caliper (0.001") SBEL

Job: CNWRA
Location:
Prepped By/Date: RW 5/11/94
Tested By/Date: RW 5/16/94
Reviewed By/Date: M. Bridges 6/2/94



PREFAILURE SKETCH



POSTFAILURE

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.103 − 0.099 = 0.004 in Δ_{90} = 0.103 − 0.100 = 0.003 in

Δ_{180} = 0.103 − 0.100 = 0.003 in Δ_{270} = 0.101 − 0.100 = 0.001 in

2. Perpendicularity

Δ_1 = 0.101 − 0.101 = 0 in Δ_2 = 0.101 − 0.100 = 0 in

Δ'_1 = 0.100 − 0.100 = 0 in Δ'_2 = 0.100 − 0.099 = 0.001 in

3. Diameter

D_1 = 1.863 in D_2 = 1.862 in

D_3 = 1.863 in D_4 = 1.862 in

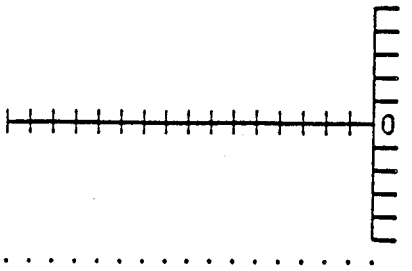
D_5 = 1.864 in D_6 = 1.863 in

4. Height

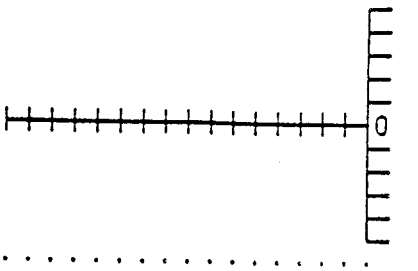
H_1 = 4.018 in H_2 = 4.018 in

H_3 = 4.018 in H_4 = 4.017 in

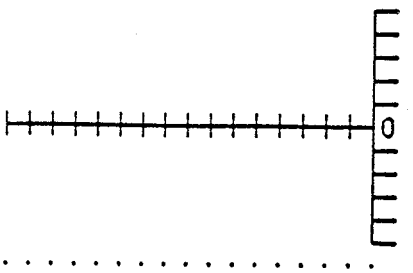
Sample Number: _____



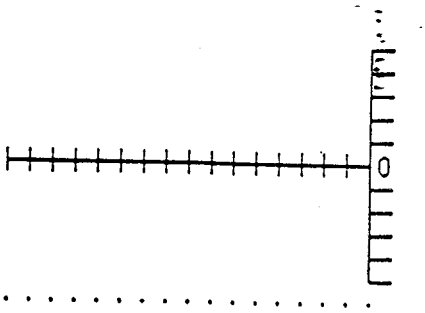
Maximum slope: _____



Maximum slope: _____



Maximum slope: _____



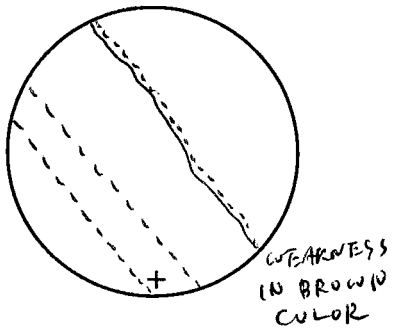
Maximum slope: _____

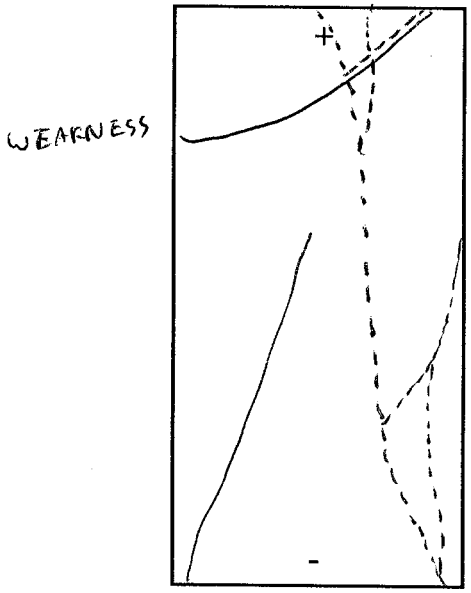
Avg. Diameter (in):	1.863	Disp. Rate (in/s):	~~6.9 x 10^4~~ 0.000295
Avg. Height (in):	4.018	Gauge Reading (lb):	6.9 x 10^4
Area (in^2):	2.726	Gauge Correction (lb):	
Volume (in^3):	10.953	Failure Load (lb):	6.9 x 10^4
Weight (g):	431.41	Failure Stress (psi):	25,311.81
Density (lb/ft^3):	167.29		174.52 (mPa)

$$\gamma = \frac{W}{V} \times \frac{1728}{454}$$

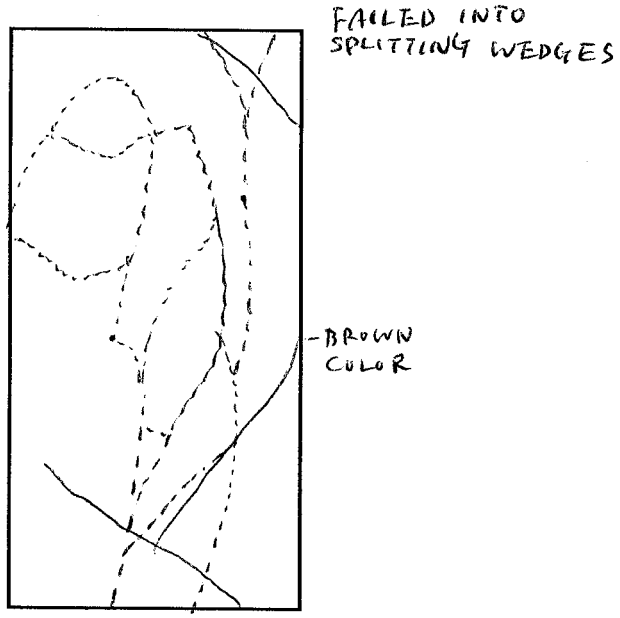
Comments: _____

Sample Number: LFM 57-73 4-040

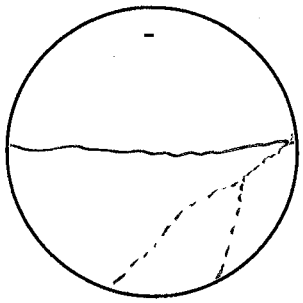




Front



Back



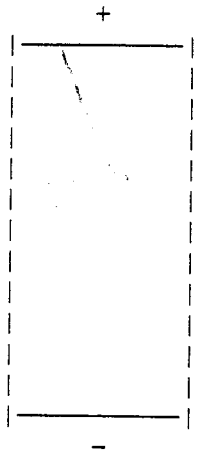
Solid Line: Pre-existing Structure
Dashed Line: Post-Failure

Uniaxial Compression Test Results

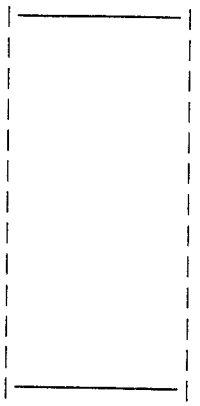
Sample Number: U-047
Hole Number: UTM 57-73
Depth:
Rock Type:

Job: CNWRA
Location:
Prepped By/Date: RW 5/11/94
Tested By/Date: RW 5/16/94
Reviewed By/Date: M. Bridges 6/2/94

Equipment Used: caliper (0.001")



PREFAILURE SKETCH



POSTFAILURE

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.093 − 0.092 = 0.001 in
Δ_{180} = 0.093 − 0.091 = 0.002 in
Δ_{90} = 0.093 − 0.091 = 0.002 in
Δ_{270} = 0.092 − 0.091 = 0.001 in

2. Perpendicularity

Δ_1 = 0.073 − 0.073 = 0 in
Δ'_1 = 0.074 − 0.073 = 0.001 in
Δ_2 = 0.074 − 0.074 = 0 in
Δ'_2 = 0.073 − 0.073 = 0 in

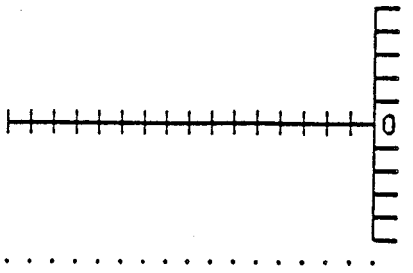
3. Diameter

D_1 = 1.358 in
D_3 = 1.358 in
D_5 = 1.358 in
D_2 = 1.359 in
D_4 = 1.359 in
D_6 = 1.359 in

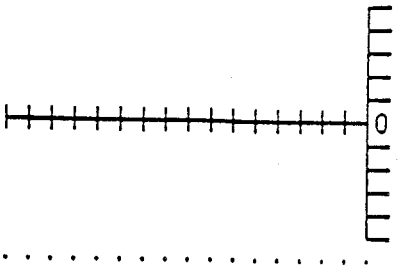
4. Height

H_1 = 4.018 in
H_3 = 4.017 in
H_2 = 4.018 in
H_4 = 4.017 in

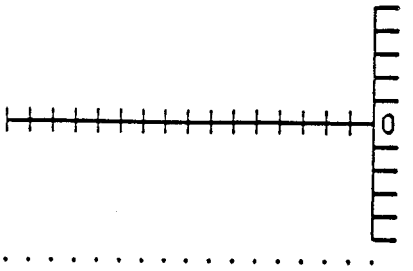
Sample Number: _____



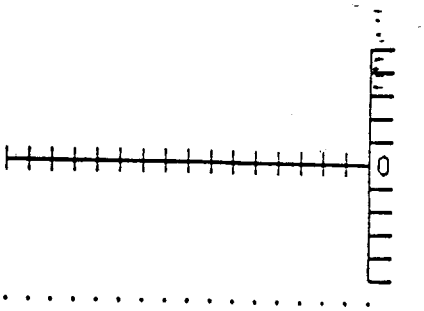
Maximum slope: _____



Maximum slope: _____



Maximum slope: _____



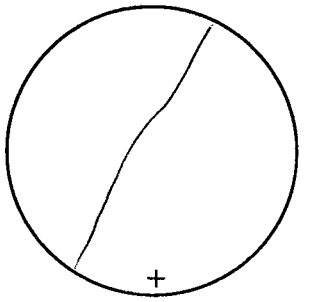
Maximum slope: _____

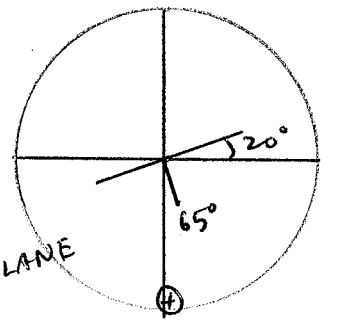
Avg. Diameter (in):	1.989	Disp. Rate (in/s):	~~8.4 x 10^4~~ 0.000295
Avg. Height (in):	4.018	Gauge Reading (lb):	~~8.4 x 10^4~~
Area (in^2):	2.714	Gauge Correction (lb):	
Volume (in^3):	10.906	Failure Load (lb):	8.4 x 10^4
Weight (g):	489.25	Failure Stress (psi):	~~30,950.63~~ 213.40 MPa
Density (lb/ft^3):	170.75		

$$\gamma = \frac{W}{V} \times \frac{1728}{454}$$

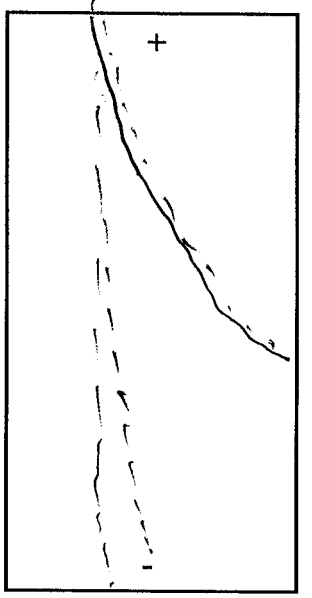
Comments: _____

Sample Number: _____

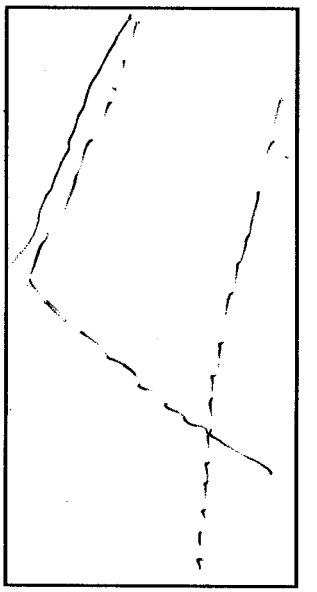




SLIDING (SHEAR) PLANE

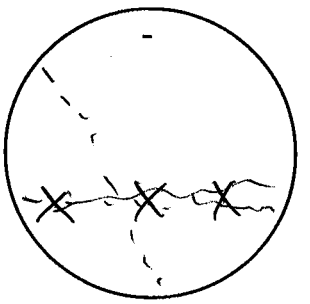


Front



Back

SPLITTING



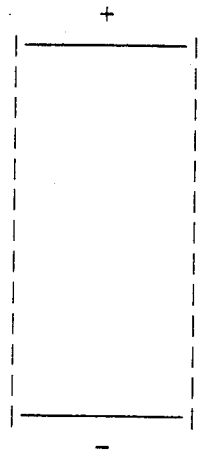
Solid Line: Pre-existing Structure
Dashed Line: Post-Failure

Uniaxial Compression Test Results

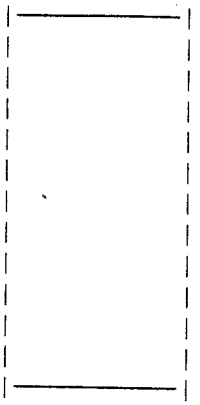
Sample Number: U-048
Hole Number: VFM 57-73
Depth:
Rock Type:

Job: CNWRA
Location:
Prepped By/Date: RW 5/11/94
Tested By/Date: RW 5/16/94
Reviewed By/Date: M. Bridges 6/2/94

Equipment Used: caliper (0.001")



PREFAILURE SKETCH



POSTFAILURE

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.097 - 0.096 = 0.001 in
Δ_{180} = 0.096 - 0.096 = 0 in
Δ_{90} = 0.098 - 0.097 = 0.001 in
Δ_{270} = 0.097 - 0.096 = 0.001 in

2. Perpendicularity

Δ_1 = 0.109 - 0.109 = 0 in
Δ'_1 = 0.109 - 0.108 = 0.001 in
Δ_2 = 0.109 - 0.109 = 0 in
Δ'_2 = 0.109 - 0.109 = 0 in

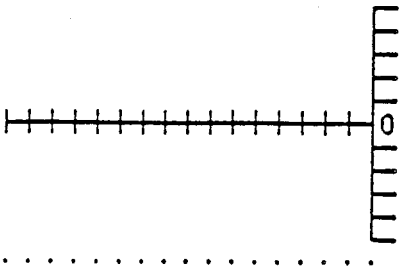
3. Diameter

D_1 = 1.362 in
D_3 = 1.361 in
D_5 = 1.360 in
D_2 = 1.362 in
D_4 = 1.362 in
D_6 = 1.362 in

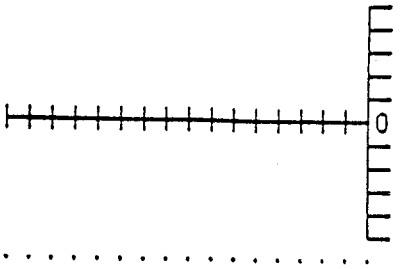
4. Height

H_1 = 4.053 in
H_3 = 4.054 in
H_2 = 4.053 in
H_4 = 4.052 in

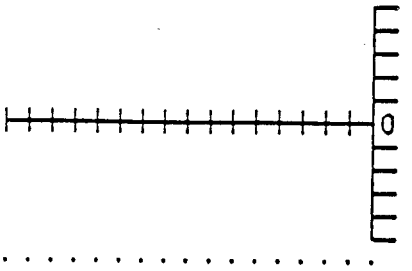
Sample Number: _____



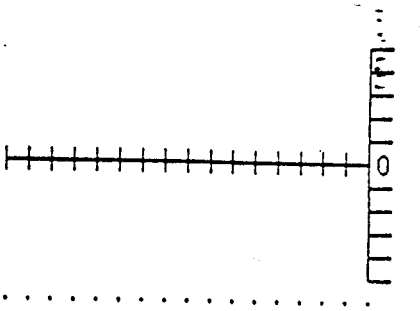
Maximum slope: _____



Maximum slope: _____



Maximum slope: _____



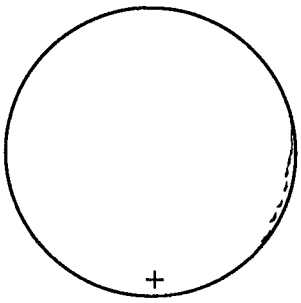
Maximum slope: _____

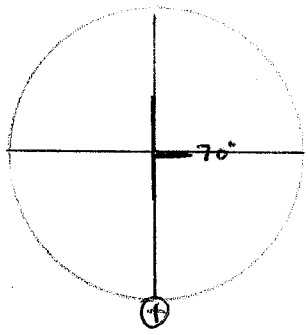
Avg. Diameter (in):	1.862	Disp. Rate (in/s):	0.000295 ~~7.9 x 10^4~~
Avg. Height (in):	4.053	Gauge Reading (lb):	~~7.7 x 10^4~~
Area (in^2):	2.723	Gauge Correction (lb):	
Volume (in^3):	11.036	Failure Load (lb):	7.9 x 10^4
Weight (g):	498.25	Failure Stress (psi):	29,012.12
Density (lb/ft^3):	171.83		200.04 MPa

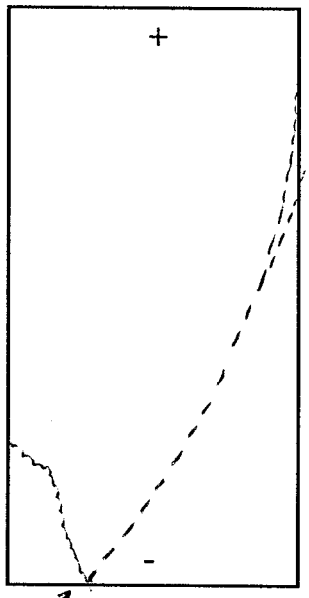
$$\gamma = \frac{W}{V} \times \frac{1728}{454}$$

Comments: _____

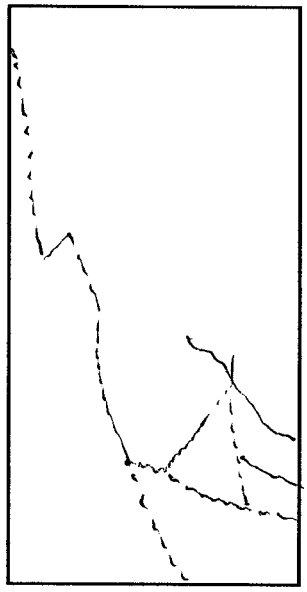
Sample Number: _____





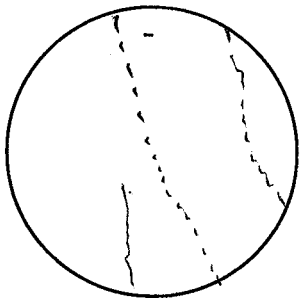


Front



Back

SHEAR FAILURE



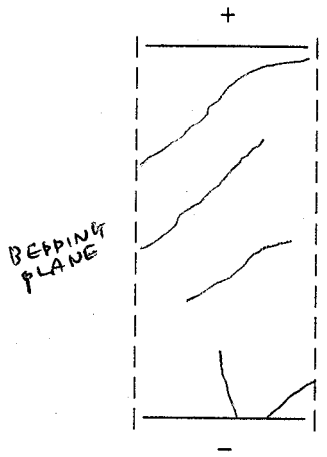
Solid Line: Pre-existing Structure
Dashed Line: Post-Failure

Uniaxial Compression Test Results

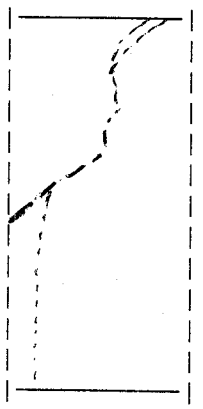
Sample Number: U-020
Hole Number: UFM57-73
Depth:
Rock Type:

Job: CNWRA
Location:
Prepped By/Date: RW 5/7/94
Tested By/Date: S. Jeon / 5-10-94
Reviewed By/Date: M. Bridges 6/7/94

Equipment Used: caliper (0.001") / SBEL

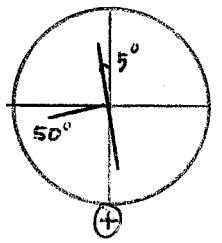


PREFAILURE SKETCH



FAILURE ALONG THE WEAKNESS.

SHEAR PLANE



POSTFAILURE

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.105 − 0.100 = 0.005 in Δ_{90} = 0.102 − 0.100 = 0.002 in

Δ_{180} = 0.103 − 0.098 = 0.005 in Δ_{270} = 0.100 − 0.098 = 0.002 in

2. Perpendicularity

Δ_1 = 0.102 − 0.101 = 0.001 in Δ_2 = 0.103 − 0.101 = 0.002 in

Δ'_1 = 0.092 − 0.091 = 0.001 in Δ'_2 = 0.095 − 0.092 = 0.003 in

3. Diameter

D_1 = 1.368 in D_2 = 1.370 in

D_3 = 1.368 in D_4 = 1.369 in

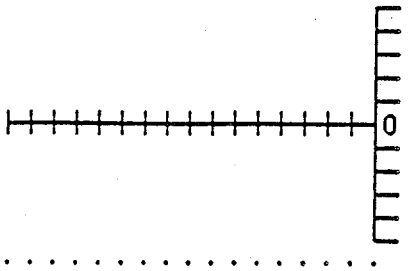
D_5 = 1.367 in D_6 = 1.371 in

4. Height

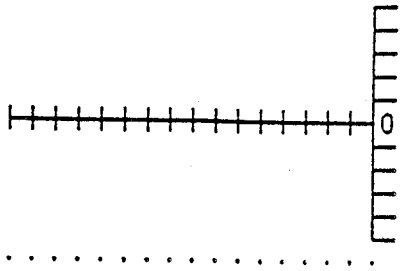
H_1 = 4.012 in H_2 = 4.016 in

H_3 = 4.007 in H_4 = 4.012 in

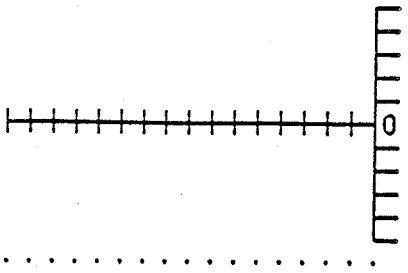
Sample Number: LFM57-73
U-020



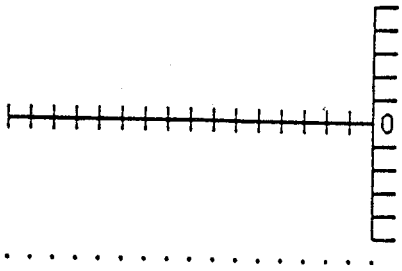
Maximum slope: _____



Maximum slope: _____



Maximum slope: _____



Maximum slope: _____

Avg. Diameter (in):	1.869
Avg. Height (in):	4.012
Area (in^2):	2.744
Volume (in^3):	11.007
Weight (g):	472.07
Density (lb/ft^3):	163.24

TIME ELAPSED : 2:40

Disp. Rate (in/s):	0.000295
Gauge Reading (lb):	29,000
Gauge Correction (lb):	
Failure Load (lb):	29,000 (2.9×10^4)
Failure Stress (psi):	10570 (≈73 MPa)

$$\gamma = \frac{W}{V} \times \frac{1728}{454}$$

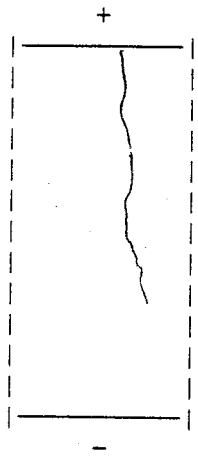
Comments: _____

Uniaxial Compression Test Results

Sample Number: 11 – 025a
Hole Number: LFM57-73
Depth:
Rock Type:

Job: CNWRA
Location:
Prepped By/Date: RW 5/7/94
Tested By/Date: S. Jeon / 5-11-94
Reviewed By/Date: M. Bridges 6/2/94

Equipment Used: Cal. per (0.001")/ SBEL



PREFAILURE SKETCH

POSTFAILURE

AXIAL SPLITTING (CLEAVAGE) FAILURE

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.115 – 0.105 = 0.01 in Δ_{90} = 0.112 – 0.108 = 0.004 in

Δ_{180} = 0.112 – 0.098 = 0.004 in Δ_{270} = 0.115 – 0.106 = 0.009 in

2. Perpendicularity

Δ_1 = 0.110 – 0.104 = 0.006 in Δ_2 = 0.107 – 0.105 = 0.002 in

Δ'_1 = 0.105 – 0.104 = 0.001 in Δ'_2 = 0.105 – 0.104 = 0.001 in

3. Diameter

D_1 = 1.355 in D_2 = 1.354 in

D_3 = 1.355 in D_4 = 1.353 in

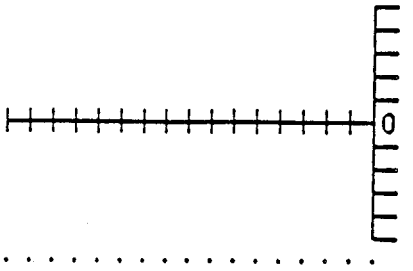
D_5 = 1.354 in D_6 = 1.353 in

4. Height

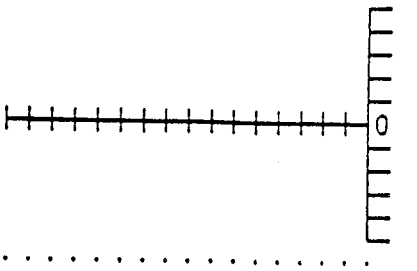
H_1 = 4.003 in H_2 = 4.004 in

H_3 = 4.002 in H_4 = 4.005 in

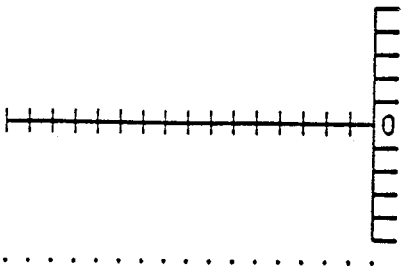
Sample Number: LFM 57-73 U-025a



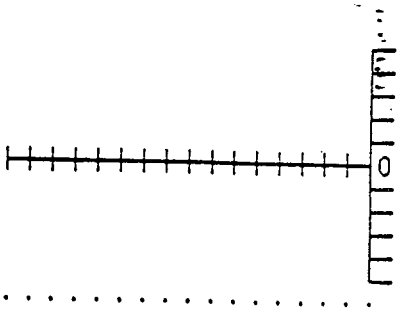
Maximum slope: _____



Maximum slope: _____



Maximum slope: _____



Maximum slope: _____

Avg. Diameter (in):	1.854	Time Elapsed	2:58
Avg. Height (in):	4.005	Disp. Rate (in/s):	0.000295
Area (in^2):	2.700	Gauge Reading (lb):	79,000
Volume (in^3):	10.812	Gauge Correction (lb):	
Weight (g):	482.22	Failure Load (lb):	79,000 (7.9×10^4)
Density (lb/ft^3):	169.75	Failure Stress (psi):	29260
			(≃ 202 MPa)

$$\gamma = \frac{W}{V} \times \frac{1728}{454}$$

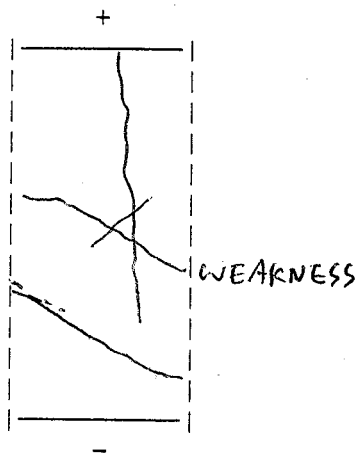
Comments: _____

Uniaxial Compression Test Results

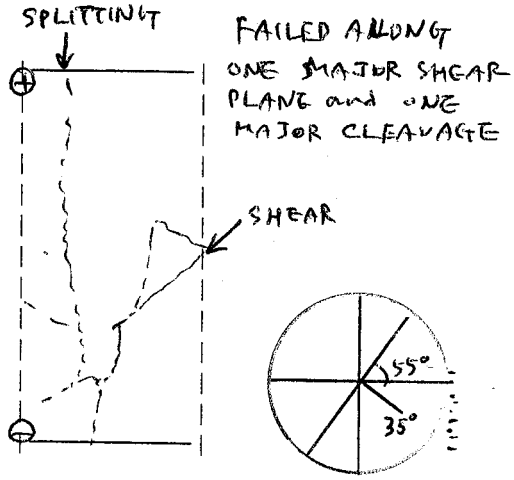
Sample Number: U-037
Hole Number: UFM 57-73
Depth:
Rock Type:

Job: CNWRA
Location:
Prepped By/Date: R W 5/7/94
Tested By/Date: S. Jeon / 5-11-94
Reviewed By/Date: M. Bridges 6/2/94

Equipment Used: Caliper (0.001") / SBEL



PREFAILURE SKETCH



POSTFAILURE

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.096 - 0.094 = 0.002 in Δ_{90} = 0.097 - 0.094 = 0.003 in

Δ_{180} = 0.095 - 0.094 = 0.001 in Δ_{270} = 0.096 - 0.093 = 0.003 in

2. Perpendicularity

Δ_1 = 0.101 - 0.100 = 0.001 in Δ_2 = 0.103 - 0.100 = 0.003 in

Δ'_1 = 0.109 - 0.108 = 0.001 in Δ'_2 = 0.110 - 0.109 = 0.001 in

3. Diameter

D_1 = 1.862 in D_2 = 1.863 in

D_3 = 1.862 in D_4 = 1.862 in

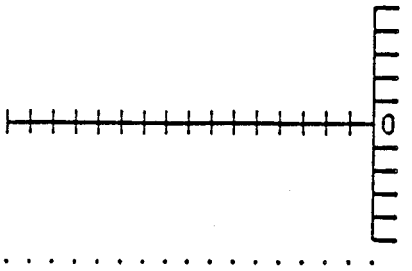
D_5 = 1.863 in D_6 = 1.863 in

4. Height

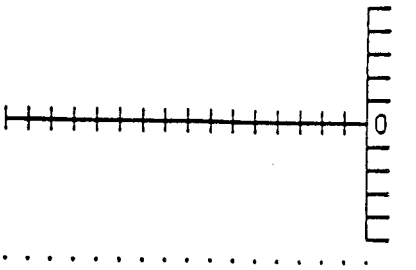
H_1 = 4.014 in H_2 = 4.014 in

H_3 = 4.015 in H_4 = 4.013 in

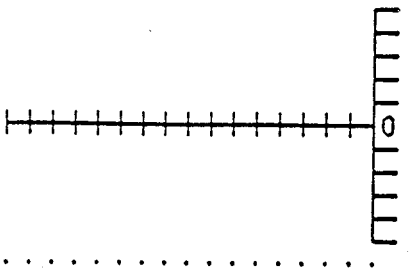
Sample Number: LFM57-73 U-037



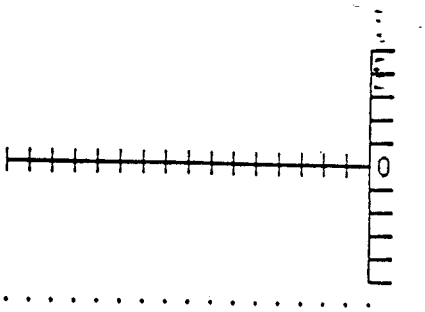
Maximum slope: _____



Maximum slope: _____



Maximum slope: _____



Maximum slope: _____

Time Elapsed: 3:40

Avg. Diameter (in):	1.863	Disp. Rate (in/s):	0.000295
Avg. Height (in):	4.014	Gauge Reading (lb):	65,000
Area (in^2):	2.726	Gauge Correction (lb):	
Volume (in^3):	10.942	Failure Load (lb):	65,000 (6.5×10^4)
Weight (g):	462.07	Failure Stress (psi):	23840
Density (lb/ft^3):	160.73		(≈164 MPa)

$$\gamma = \frac{W}{V} \times \frac{1728}{454}$$

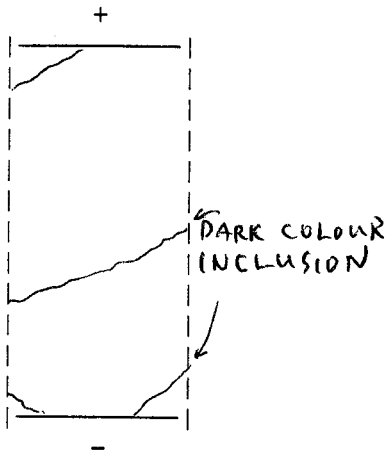
Comments: _____

Uniaxial Compression Test Results

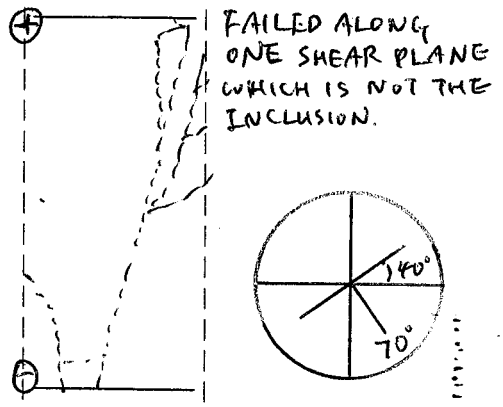
Sample Number: U-036a
Hole Number: LFM 57-73
Depth:
Rock Type:

Job: CNWRA
Location:
Prepped By/Date: RW 5/7/94
Tested By/Date: S. JEON / 5-11-94
Reviewed By/Date: M. Bridges 6/2/94

Equipment Used: caliper (0.001") / SBEL



PREFAILURE SKETCH



POSTFAILURE

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.090 − 0.089 = 0.001 in Δ_{90} = 0.091 − 0.090 = 0.001 in

Δ_{180} = 0.090 − 0.090 = 0 in Δ_{270} = 0.092 − 0.090 = 0.002 in

2. Perpendicularity

Δ_1 = 0.100 − 0.100 = 0 in Δ_2 = 0.101 − 0.100 = 0.001 in

Δ'_1 = 0.103 − 0.102 = 0.001 in Δ'_2 = 0.104 − 0.102 = 0.002 in

3. Diameter

D_1 = 1.363 in D_2 = 1.361 in

D_3 = 1.363 in D_4 = 1.364 in

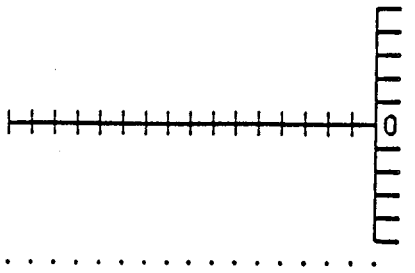
D_5 = 1.367 in D_6 = 1.363 in

4. Height

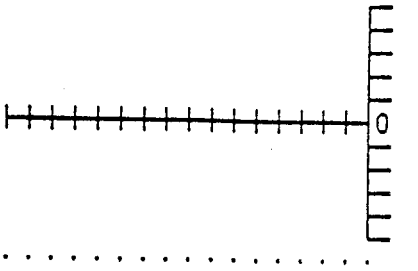
H_1 = 4.052 in H_2 = 4.052 in

H_3 = 4.053 in H_4 = 4.051 in

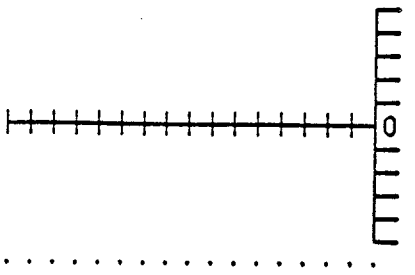
Sample Number: LFM 57-73 4-036a



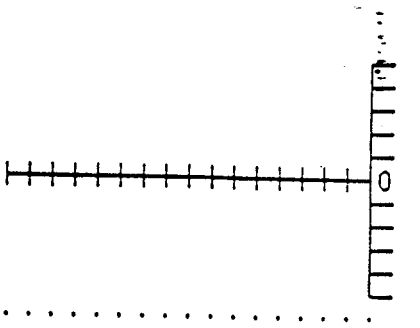
Maximum slope: _____



Maximum slope: _____



Maximum slope: _____



Maximum slope: _____

Avg. Diameter (in): 1.864
Avg. Height (in): 4.052
Area (in^2): 2.729
Volume (in^3): 11.058 5.8 cm
Weight (g): 464.91
Density (lb/ft^3): 160.03 5.8 cm

Time Elapsed: 2:47
Disp. Rate (in/s): 0.000295
Gauge Reading (lb): ~~48,000~~
Gauge Correction (lb): _____
Failure Load (lb): 48,000 (4.8×10^4)
Failure Stress (psi): 17590
($\simeq$ 121 MPa)

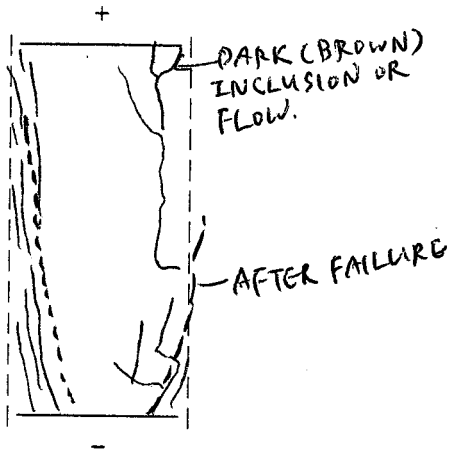
$$\gamma = \frac{W}{V} \times \frac{1728}{454}$$

Comments: _____

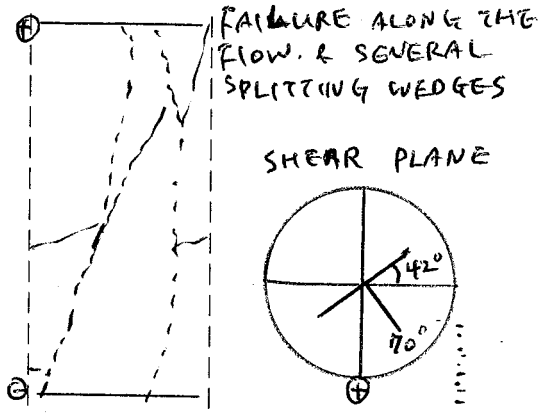
Uniaxial Compression Test Results

Sample Number: U-038
Hole Number: LFM 57-73
Depth:
Rock Type:
Equipment Used: caliper (0.001") / SBEL

Job: CNWRA
Location:
Prepped By/Date: RW 5/7/94
Tested By/Date: S. Jeon / 5-11-94
Reviewed By/Date: M. Bridges 6/2/94



PREFAILURE SKETCH



POSTFAILURE

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.103 − 0.100 = 0.003 in Δ_{90} = 0.109 − 0.105 = 0.004 in

Δ_{180} = 0.108 − 0.105 = 0.003 in Δ_{270} = 0.109 − 0.104 = 0.005 in

2. Perpendicularity

Δ_1 = 0.106 − 0.106 = 0 in Δ_2 = 0.107 − 0.106 = 0.001 in

Δ'_1 = 0.096 − 0.095 = 0.001 in Δ'_2 = 0.096 − 0.095 = 0.001 in

3. Diameter

D_1 = 1.866 in D_2 = 1.866 in

D_3 = 1.867 in D_4 = 1.866 in

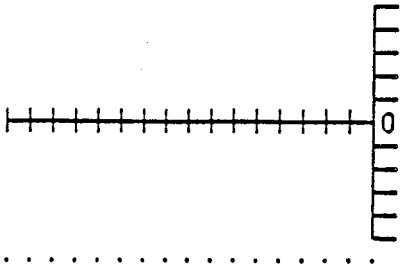
D_5 = 1.866 in D_6 = 1.864 in

4. Height

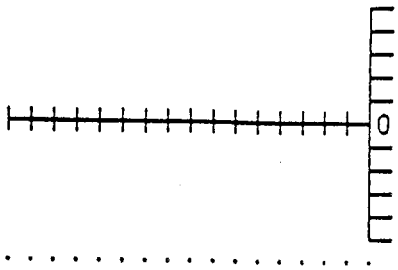
H_1 = 4.017 in H_2 = 4.017 in

H_3 = 4.018 in H_4 = 4.019 in

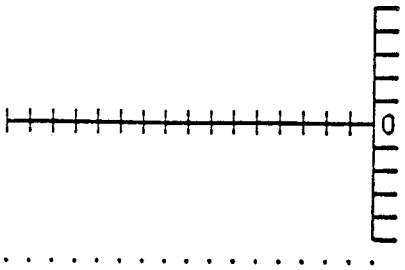
Sample Number: LFM 57-73 4-038



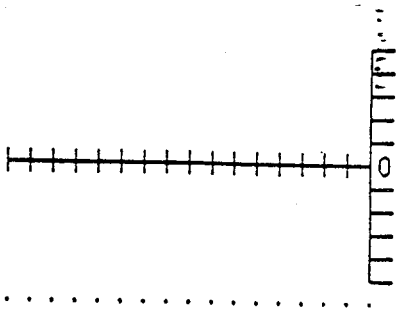
Maximum slope: _____



Maximum slope: _____



Maximum slope: _____



Maximum slope: _____

Avg. Diameter (in): 1.866
Avg. Height (in): 4.018
Area (in^2): 2.735
Volume (in^3): 10.988
Weight (g): 460.86
Density (lb/ft^3): 159.64

Time Elapsed : 2:31
Disp. Rate (in/s): 0.000295
Gauge Reading (lb): 67,000
Gauge Correction (lb):
Failure Load (lb): 67,000 (6.7×10^4)
Failure Stress (psi): 24500
($\simeq$ 169 MPa)

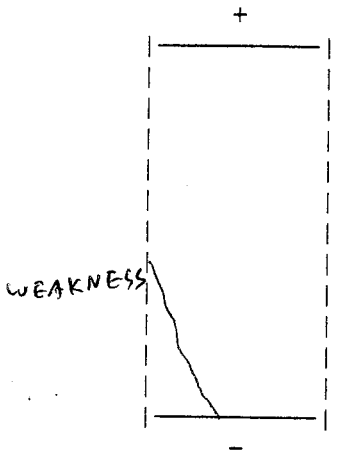
$$\gamma = \frac{W}{V} \times \frac{1728}{454}$$

Comments: _____

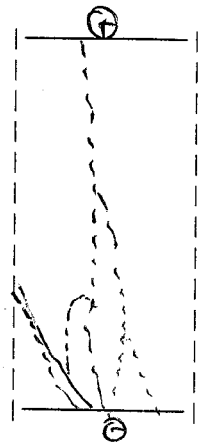
Uniaxial Compression Test Results

Sample Number: U-044
Hole Number: LFM57-73
Depth:
Rock Type:
Equipment Used: caliper (0.001")/SBEL

Job: CNWRA
Location:
Prepped By/Date: RW 5/7/94
Tested By/Date: S. Seon / 5-11-94
Reviewed By/Date: M. Bridges 6/2/94

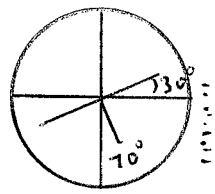


PREFAILURE SKETCH



SHEAR FAILURE ALONG THE WEAKNESS AND SOME SPLITTING WEDGES.

POSTFAILURE



Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.102 - 0.101 = 0.001 in Δ_{90} = 0.104 - 0.101 = 0.003 in

Δ_{180} = 0.103 - 0.102 = ____ in Δ_{270} = 0.103 - 0.101 = 0.002 in

2. Perpendicularity

Δ_1 = 0.106 - 0.105 = 0.001 in Δ_2 = 0.107 - 0.106 = 0.001 in

Δ'_1 = 0.103 - 0.103 = 0.0 in Δ'_2 = 0.103 - 0.103 = 0 in

3. Diameter

D_1 = 1.369 in D_2 = 1.369 in

D_3 = 1.368 in D_4 = 1.369 in

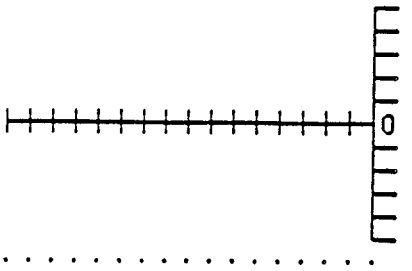
D_5 = 1.369 in D_6 = 1.370 in

4. Height

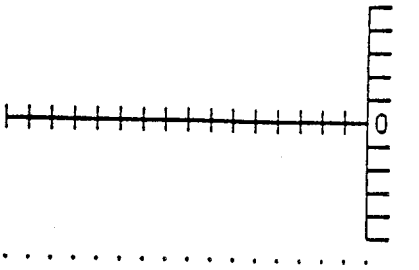
H_1 = 4.022 in H_2 = 4.022 in

H_3 = 4.019 in H_4 = 4.021 in

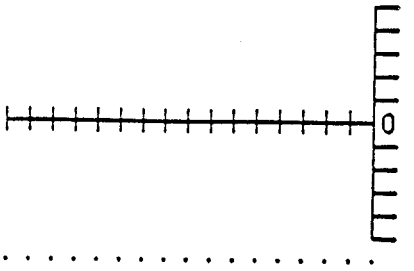
Sample Number: _____



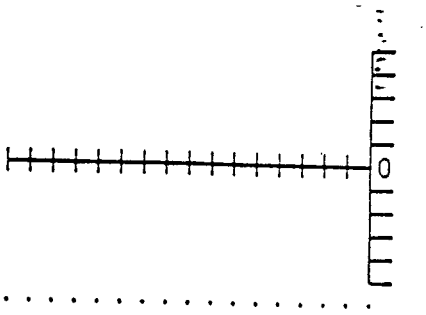
Maximum slope: _____



Maximum slope: _____



Maximum slope: _____



Maximum slope: _____

Avg. Diameter (in):	1.869
Avg. Height (in):	4.021
Area (in^2):	2.744
Volume (in^3):	11.032
Weight (g):	471.76
Density (lb/ft^3):	162.77

TIME ELAPSED :	2:09
Disp. Rate (in/s):	0.000295
Gauge Reading (lb):	61,000
Gauge Correction (lb):	
Failure Load (lb):	61,000 (6.1×10^4)
Failure Stress (psi):	22230 (≈153 MPa)

$$\gamma = \frac{W}{V} \times \frac{1728}{454}$$

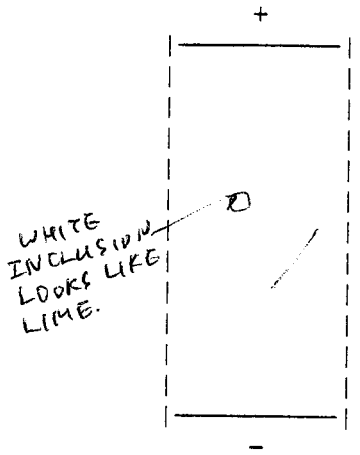
Comments: _____

Uniaxial Compression Test Results

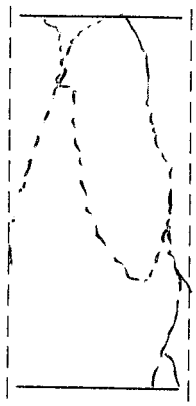
Sample Number: U-052
Hole Number: LFM57-73
Depth:
Rock Type:

Job: CNWRA
Location:
Prepped By/Date: RW 5/7/94
Tested By/Date: S. Jeon / 5-11-94
Reviewed By/Date: M. Bridges 6/2/94

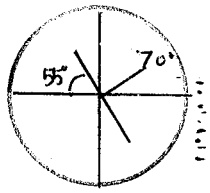
Equipment Used: Caliper (0.001") / SBEL



PREFAILURE SKETCH



FAILED ALONG AN UNEXPECTED SHEAR PLANE, PROVIDING LOTS OF POWDER



POSTFAILURE

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.100 - 0.070 = 0.03 in Δ_{90} = 0.110 - 0.065 = 0.045 in

Δ_{180} = 0.085 - 0.066 = 0.019 in Δ_{270} = 0.098 - 0.068 = 0.03 in

2. Perpendicularity

Δ_1 = 0.100 - 0.096 = 0.004 in Δ_2 = 0.102 - 0.098 = 0.004 in

Δ'_1 = 0.106 - 0.104 = 0.002 in Δ'_2 = 0.102 - 0.093 = 0.009 in

3. Diameter

D_1 = 1.354 in D_2 = 1.354 in

D_3 = 1.353 in D_4 = 1.352 in

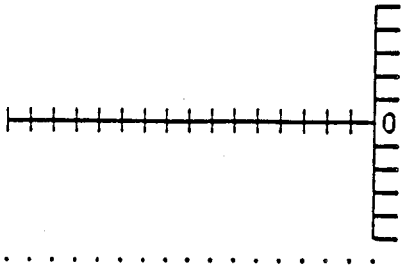
D_5 = 1.353 in D_6 = 1.352 in

4. Height

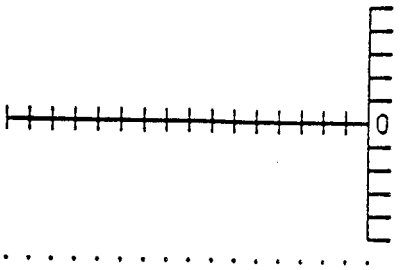
H_1 = 4.015 in H_2 = 4.018 in

H_3 = 4.019 in H_4 = 4.012 in

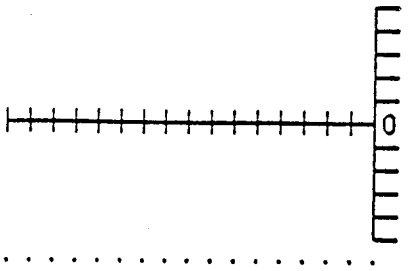
Sample Number: _____



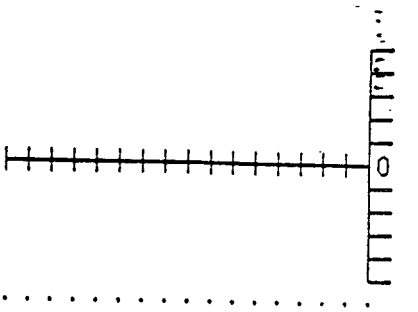
Maximum slope: _____



Maximum slope: _____



Maximum slope: _____



Maximum slope: _____

Avg. Diameter (in):	1.853	TIME ELAPSED:	2:25
Avg. Height (in):	4.016	Disp. Rate (in/s):	0.000295
Area (in^2):	2.697	Gauge Reading (lb):	36,000
Volume (in^3):	10.83	Gauge Correction (lb):	
Weight (g):	404.78	Failure Load (lb):	36,000 (3.6×10^4)
Density (lb/ft^3):	142.26	Failure Stress (psi):	13350 (≈92 MPa)

$$\gamma = \frac{W}{V} \times \frac{1728}{454}$$

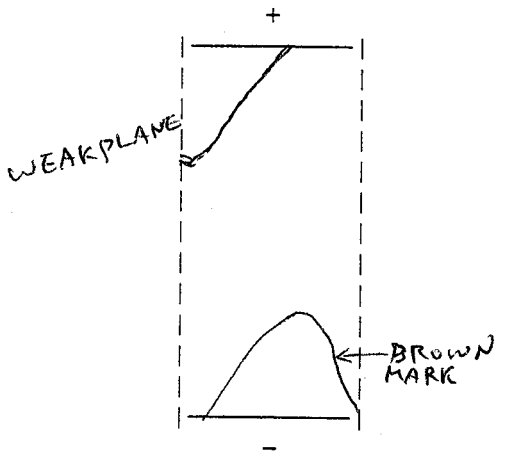
Comments: _____

Uniaxial Compression Test Results

Sample Number: U-054
Hole Number: LFM 57-73
Depth:
Rock Type:

Job: CNW 12A
Location:
Prepped By/Date: RW 5/7/94
Tested By/Date: S. Jeon / 5-11-94
Reviewed By/Date: M. Bridges 6/2/94

Equipment Used: caliper (0.001")



PREFAILURE SKETCH

DID NOT BREAK ALONG THE WEAKNESS FAILED IN GENERAL SPLITTING MODE

POSTFAILURE

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.101 − 0.097 = 0.004 in Δ_{90} = 0.100 − 0.097 = 0.003 in

Δ_{180} = 0.100 − 0.097 = 0.003 in Δ_{270} = 0.100 − 0.097 = 0.003 in

2. Perpendicularity

Δ_1 = 0.105 − 0.102 = 0.003 in Δ_2 = 0.104 − 0.103 = 0.001 in

Δ'_1 = 0.100 − 0.099 = 0.001 in Δ'_2 = 0.100 − 0.100 = 0 in

3. Diameter

D_1 = 1.865 in D_2 = 1.865 in

D_3 = ~~1.866~~ in D_4 = 1.865 in

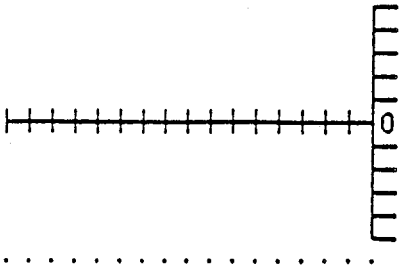
D_5 = ~~1.865~~ in D_6 = 1.865 in

4. Height

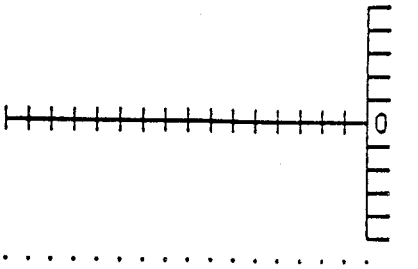
H_1 = 4.047 in H_2 = 4.048 in

H_3 = 4.049 in H_4 = 4.049 in

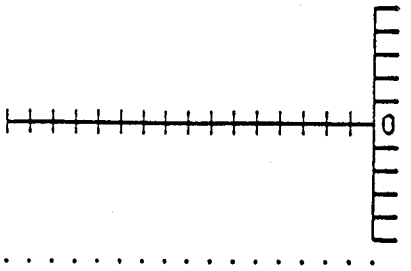
Sample Number: _____



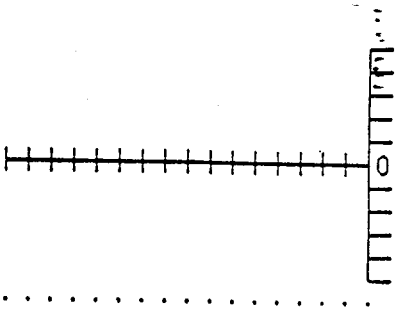
Maximum slope: _____



Maximum slope: _____



Maximum slope: _____



Maximum slope: _____

Avg. Diameter (in):	1.865	ELAPSED TIME:	3:21
Avg. Height (in):	4.048	Disp. Rate (in/s):	0.000295
Area (in^2):	2.732	Gauge Reading (lb):	31,000
Volume (in^3):	11.058	Gauge Correction (lb):	
Weight (g):	468.08	Failure Load (lb):	31,000 (3.1×10^4)
Density (lb/ft^3):	161.11	Failure Stress (psi):	11,350
			(C=78 MPa)

$$\gamma = \frac{W}{V} \times \frac{1728}{454}$$

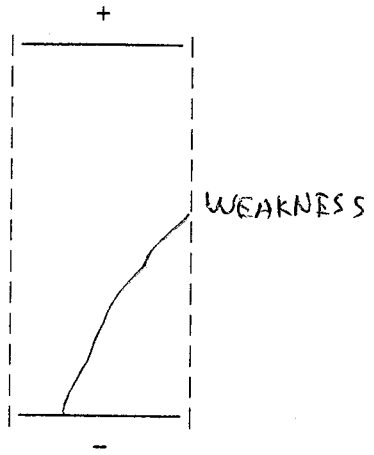
Comments: _____

Uniaxial Compression Test Results

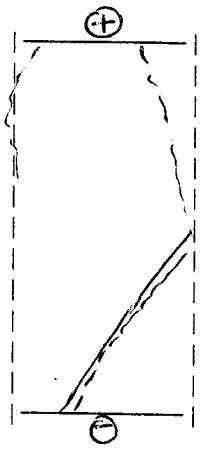
Sample Number: U-056a
Hole Number: UFM 57-73
Depth:
Rock Type:

Job: CNWRA
Location:
Prepped By/Date: RW 5/4/94
Tested By/Date: S. Jeon / 5-11-94
Reviewed By/Date: M. Bridges 6/2/94

Equipment Used: caliper (0.001") / SBEL

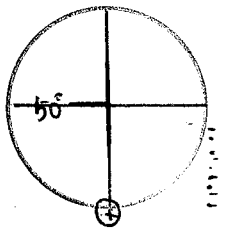


PREFAILURE SKETCH



POSTFAILURE

ONE MAJOR SHEAR SURFACE & ONE MAJOR SPLITTING FAILURE SURFACE EXAMINED



Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.102 - 0.100 = 0.002 in Δ_{90} = 0.100 - 0.099 = 0.001 in

Δ_{180} = 0.101 - 0.099 = 0.002 in Δ_{270} = 0.100 - 0.098 = 0.002 in

2. Perpendicularity

Δ_1 = 0.104 - 0.104 = 0 in Δ_2 = 0.106 - 0.104 = 0.002 in

Δ'_1 = 0.102 - 0.102 = 0 in Δ'_2 = 0.104 - 0.103 = 0.001 in

3. Diameter

D_1 = 1.367 in D_2 = 1.367 in

D_3 = 1.367 in D_4 = 1.367 in

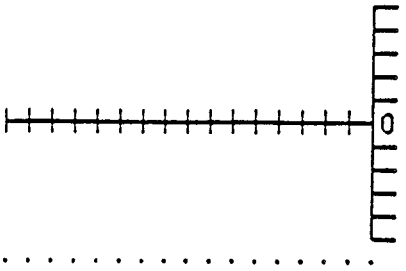
D_5 = 1.368 in D_6 = 1.367 in

4. Height

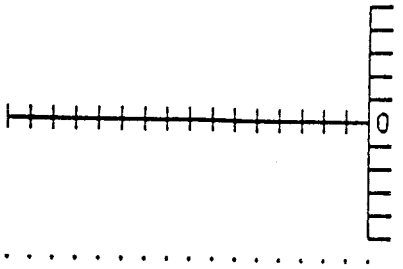
H_1 = 4.017 in H_2 = 4.018 in

H_3 = 4.019 in H_4 = 4.017 in

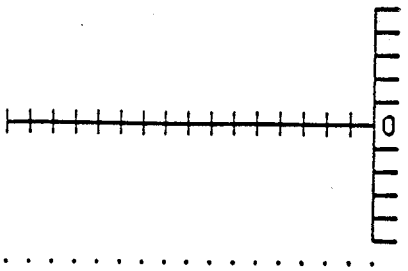
Sample Number: LFM 57-73 U-056a



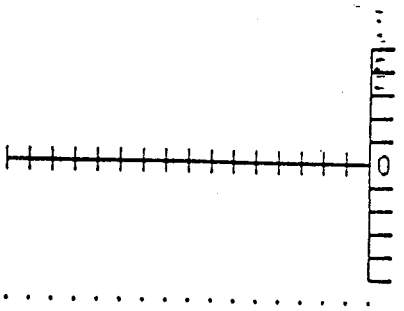
Maximum slope: _____



Maximum slope: _____



Maximum slope: _____



Maximum slope: _____

Time Elapsed = 3:08

Avg. Diameter (in):	1.867	Disp. Rate (in/s):	0.000295
Avg. Height (in):	4.018	Gauge Reading (lb):	55,000
Area (in^2):	2.738	Gauge Correction (lb):	
Volume (in^3):	11.000	Failure Load (lb):	65,000 (5.5×10^4)
Weight (g):	468.49	Failure Stress (psi):	20,090
Density (lb/ft^3):	162.11		(≃139 MPa)

$$\gamma = \frac{W}{V} \times \frac{1728}{454}$$

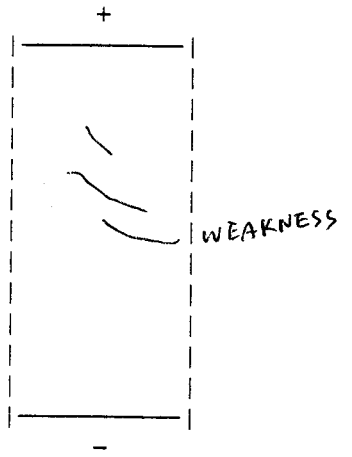
Comments: _____

Uniaxial Compression Test Results

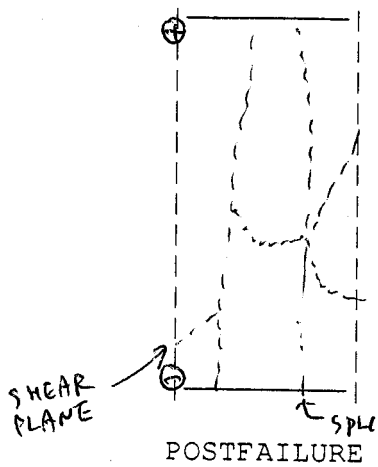
Sample Number: U-056b
Hole Number: LFM 57-73
Depth:
Rock Type:

Job: CNWRA
Location:
Prepped By/Date: RW 5/7/94
Tested By/Date: S. Jean / 5-16-94
Reviewed By/Date: M. Bridges 6/2/94

Equipment Used: caliper (0.001") / SBEL



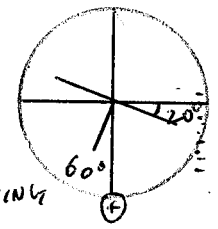
PREFAILURE SKETCH



POSTFAILURE

DID NOT FAIL ALONG THE PRE-EXISTING WEAKNESS.

FAILED ALONG A CERTAIN SHEAR PLANE.



Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.100 - 0.097 = 0.003 in Δ_{90} = 0.101 - 0.097 = 0.004 in

Δ_{180} = 0.100 - 0.098 = 0.002 in Δ_{270} = 0.100 - 0.098 = 0.002 in

2. Perpendicularity

Δ_1 = 0.103 - 0.102 = 0.001 in Δ_2 = 0.105 - 0.104 = 0.001 in

Δ'_1 = 0.106 - 0.105 = 0.001 in Δ'_2 = 0.107 - 0.106 = 0.001 in

3. Diameter

D_1 = 1.866 in D_2 = 1.866 in

D_3 = 1.865 in D_4 = 1.866 in

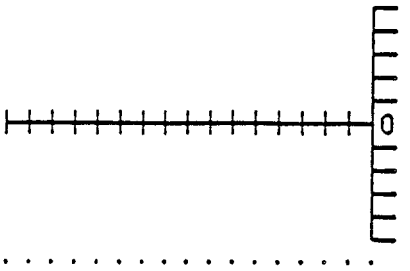
D_5 = 1.865 in D_6 = 1.865 in

4. Height

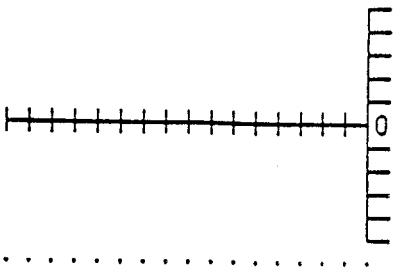
H_1 = 4.017 in H_2 = 4.017 in

H_3 = 4.018 in H_4 = 4.019 in

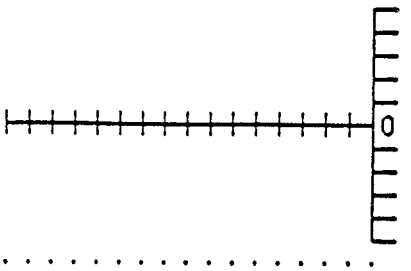
Sample Number: LFM 57-73 U-0566



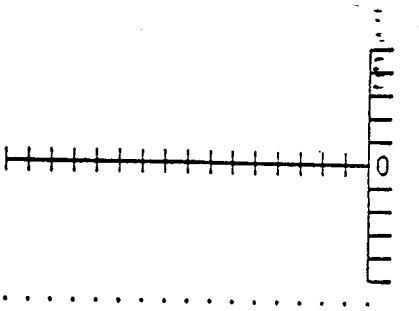
Maximum slope: _____



Maximum slope: _____



Maximum slope: _____



Maximum slope: _____

Time Elapsed : 3:10

Avg. Diameter (in):	1.866	Disp. Rate (in/s):	0.000295
Avg. Height (in):	4.018	Gauge Reading (lb):	67.000
Area (in^2):	2.735	Gauge Correction (lb):	
Volume (in^3):	10.988	Failure Load (lb):	6.7×10^4
Weight (g):	467.39	Failure Stress (psi):	24,497.26
Density (lb/ft^3):	161.90		168.91 MPa

$$\gamma = \frac{W}{V} \times \frac{1728}{454}$$

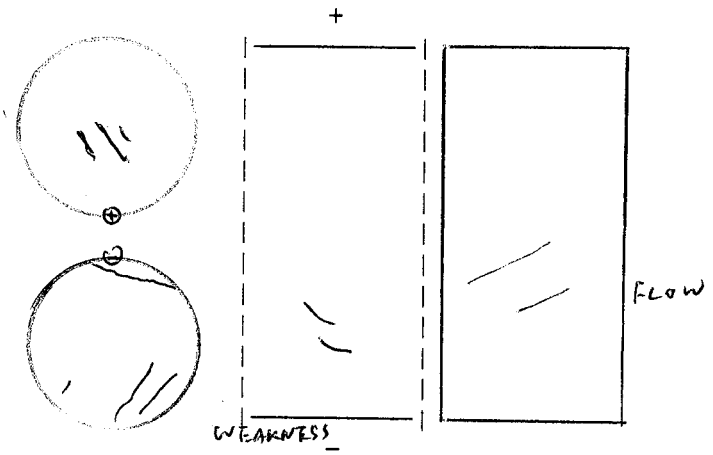
Comments: _____

Uniaxial Compression Test Results

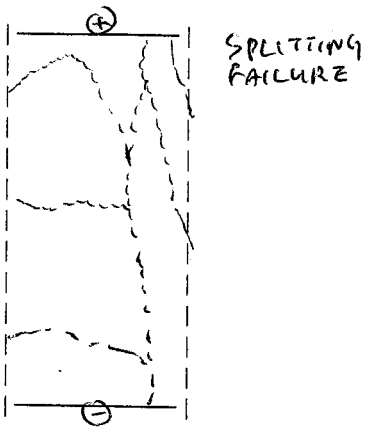
Sample Number: U-039
Hole Number: UFM 57-73
Depth:
Rock Type:

Job: CNWRA
Location:
Prepped By/Date: RW 5/11/94
Tested By/Date: S. Jean 5-16-94
Reviewed By/Date: M. Bridges 6/2/94

Equipment Used: caliper (0.001") / SBEL



PREFAILURE SKETCH



POSTFAILURE

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.100 − 0.097 = 0.003 in Δ_{90} = 0.100 − 0.098 = 0.002 in

Δ_{180} = 0.098 − 0.097 = 0.001 in Δ_{270} = 0.099 − 0.097 = 0.002 in

2. Perpendicularity

Δ_1 = 0.100 − 0.099 = 0.001 in Δ_2 = 0.101 − 0.099 = 0.002 in

Δ'_1 = 0.101 − 0.100 = 0.001 in Δ'_2 = 0.101 − 0.100 = 0.001 in

3. Diameter

D_1 = 1.360 in D_2 = 1.359 in

D_3 = 1.360 in D_4 = 1.359 in

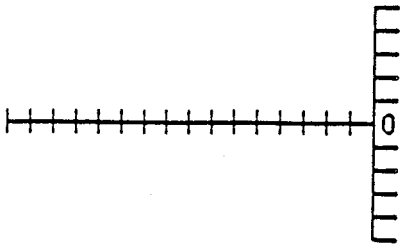
D_5 = 1.360 in D_6 = 1.358 in

4. Height

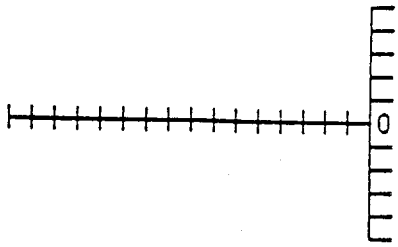
H_1 = 4.006 in H_2 = 4.009 in

H_3 = 4.010 in H_4 = 4.006 in

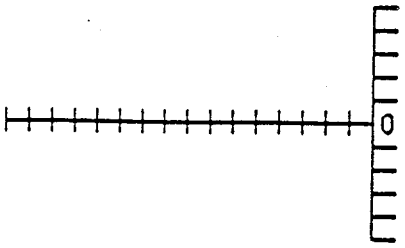
Sample Number: _____



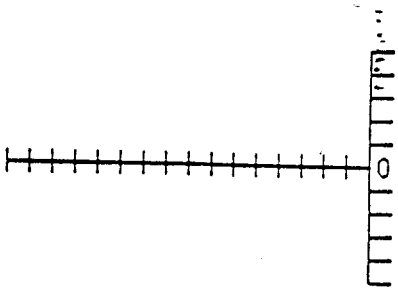
Maximum slope: _____



Maximum slope: _____



Maximum slope: _____



Maximum slope: _____

Avg. Diameter (in): 1.859
Avg. Height (in): 4.008
Area (in^2): 2.714
Volume (in^3): 10.879
Weight (g): 499.85
Density (lb/ft^3): 174.38

Time Elapsed: 2:35
Disp. Rate (in/s): 0.000295
Gauge Reading (lb): 67.000
Gauge Correction (lb): _____
Failure Load (lb): 6.7×10^4
Failure Stress (psi): 24,686.81
170.22 MPa

$$\gamma = \frac{W}{V} \times \frac{1728}{454}$$

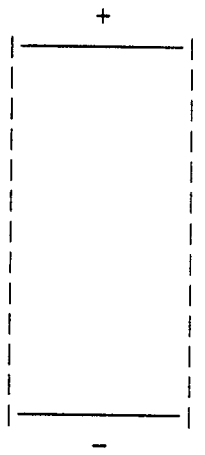
Comments: _____

Triaxial Compression Test Results

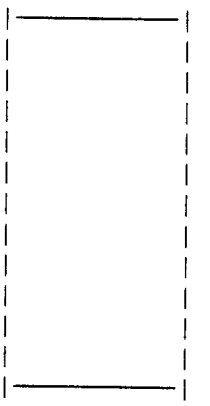
Sample Number: U-050
Hole Number: LFM 57-73
Depth:
Rock Type:

Job: CNW RA
Location:
Prepped By/Date: RW 5/7/94
Tested By/Date: RW 5/13/94
Reviewed By/Date: M. Bridges 6/2/94

Equipment Used: caliper (0.001")



PREFAILURE SKETCH



POSTFAILURE

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.105 - 0.098 = 0.007 in Δ_{90} = 0.105 - 0.097 = 0.008 in

Δ_{180} = 0.097 - 0.091 = 0.006 in Δ_{270} = 0.103 - 0.096 = 0.007 in

2. Perpendicularity

Δ_1 = 0.103 - 0.102 = 0.001 in Δ_2 = 0.104 - 0.103 = 0.001 in

Δ'_1 = 0.104 - 0.103 = 0.001 in Δ'_2 = 0.105 - 0.104 = 0.001 in

3. Diameter

D_1 = 1.354 in D_2 = 1.354 in

D_3 = 1.356 in D_4 = 1.355 in

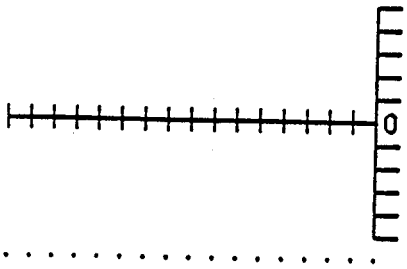
D_5 = 1.355 in D_6 = 1.355 in

4. Height

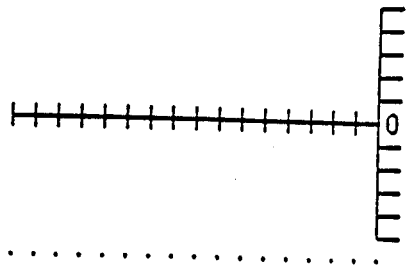
H_1 = 4.107 in H_2 = 4.103 in

H_3 = 4.009 in H_4 = 4.104 in

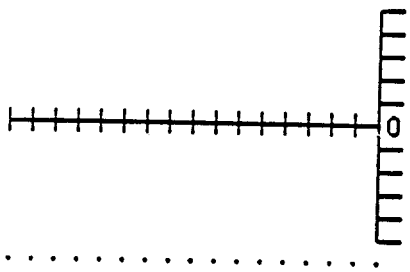
Sample Number: _____



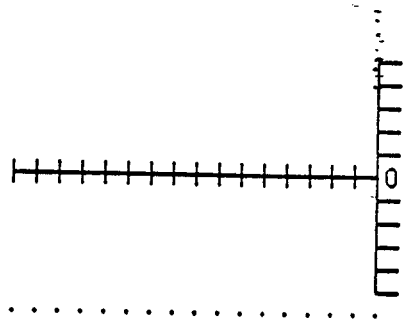
Maximum slope: _____



Maximum slope: _____



Maximum slope: _____



Maximum slope: _____

Avg. Diameter (in): 1.855

Avg. Height (in): ~~4.103~~ 4.081 MLB

Area (in^2): 2.703

Volume (in^3): ~~11.089~~ 11.029 MLB

Weight (g): 463.02

Density (lb/ft^3): ~~158.92~~ 159.78 MLB

Disp. Rate (in/s): 0.000295

Gauge Reading (lb): 9.3×10^4

Gauge Correction (lb): _____

Failure Load (lb): 9.3×10^4

Failure Stress (psi): ~~36,256.01~~

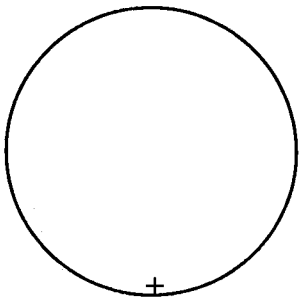
249.99 MPa

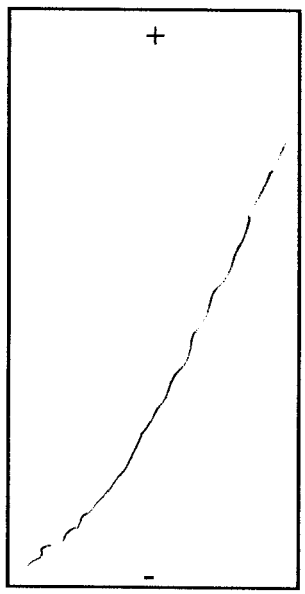
$$\gamma = \frac{W}{V} \times \frac{1728}{454}$$

$\sigma_3 = 1500$ psi

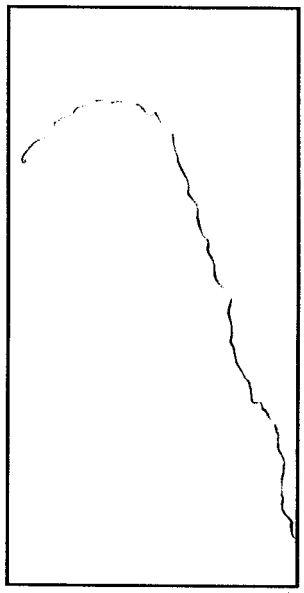
Comments: _____

Sample Number:_____

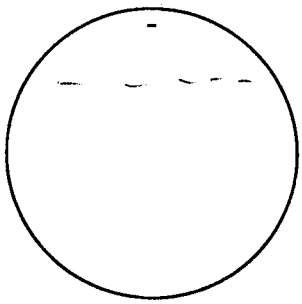




Front



Back



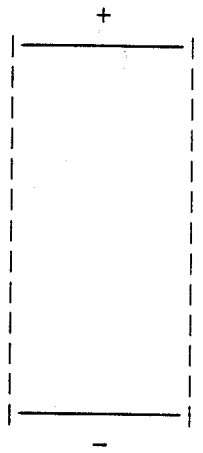
Solid Line: Pre-existing Structure
Dashed Line: Post-Failure

Triaxial Compression Test Results

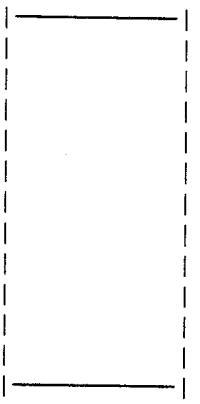
Sample Number: U-005
Hole Number: UFM95-C2-6
Depth:
Rock Type:

Job: CNWRA
Location:
Prepped By/Date: RW 5/11/94
Tested By/Date: RW 5/12/94
Reviewed By/Date: M. Bridges 6/2/94

Equipment Used: Caliper (0.001") SBEL



PREFAILURE SKETCH



POSTFAILURE

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.109 − 0.101 = 0.008 in Δ_{90} = 0.110 − 0.100 = 0.01 in

Δ_{180} = 0.112 − 0.100 = 0.012 in Δ_{270} = 0.110 − 0.101 = 0.009 in

2. Perpendicularity

Δ_1 = 0.108 − 0.105 = 0.003 in Δ_2 = 0.108 − 0.107 = 0.001 in

Δ'_1 = 0.107 − 0.106 = 0.001 in Δ'_2 = 0.109 − 0.105 = 0.004 in

3. Diameter

D_1 = 1.367 in D_2 = 1.367 in

D_3 = 1.366 in D_4 = 1.368 in

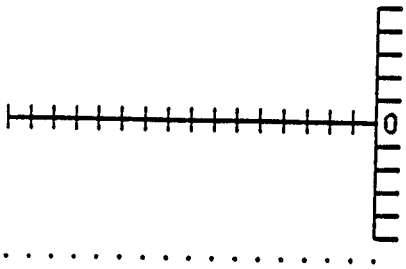
D_5 = 1.368 in D_6 = 1.368 in

4. Height

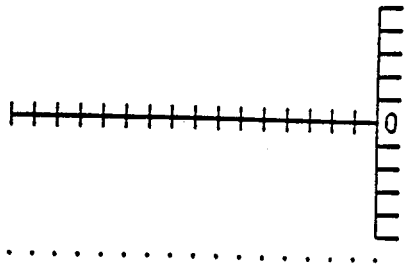
H_1 = 4.155 in H_2 = 4.153 in

H_3 = 4.151 in H_4 = 4.153 in

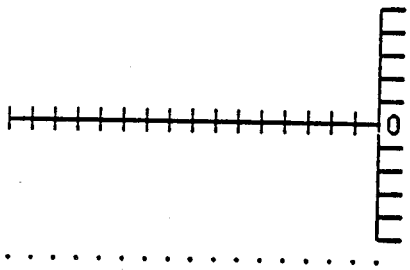
Sample Number: _____



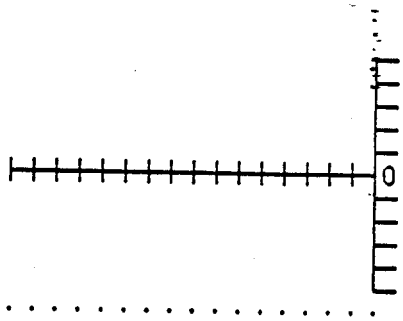
Maximum slope: _____



Maximum slope: _____



Maximum slope: _____



Maximum slope: _____

Avg. Diameter (in):	1.867	Disp. Rate (in/s):	0.000295
Avg. Height (in):	4.153	Gauge Reading (lb):	11.8×10^4
Area (in^2):	2.738	Gauge Correction (lb):	
Volume (in^3):	11.369	Failure Load (lb):	11.8×10^4
Weight (g):	499.72	Failure Stress (psi):	43,097.15
Density (lb/ft^3):	167.29		

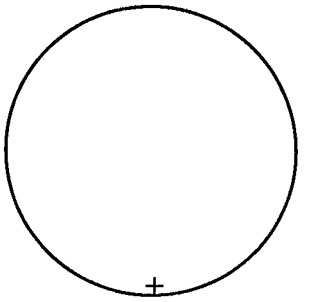
~~297.15~~ (MPa)
297.22 MPa

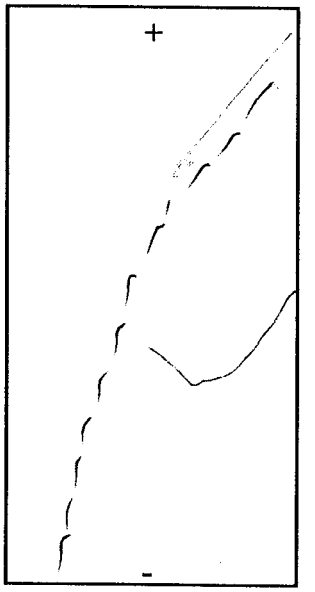
$$\gamma = \frac{W}{V} \times \frac{1728}{454}$$

confining pressure 500 psi

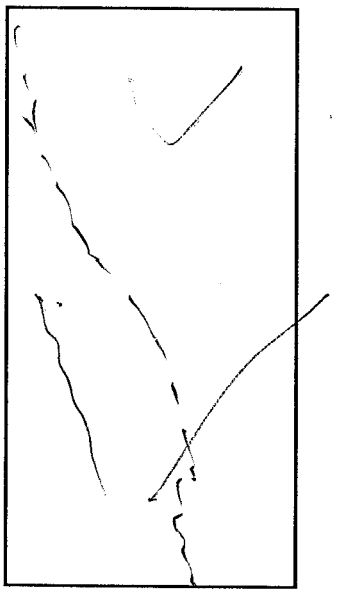
Comments: _____

Sample Number:_____

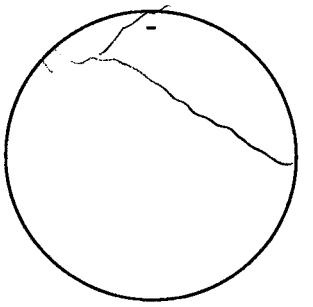




Front



Back



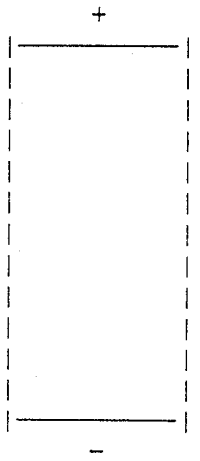
Solid Line: Pre-existing Structure
Dashed Line: Post-Failure

Triaxial Compression Test Results

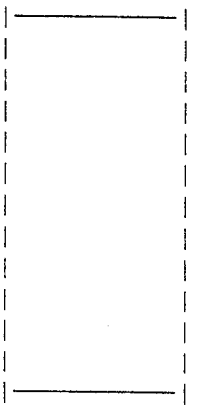
Sample Number: U-016
Hole Number: LFM 57-73
Depth:
Rock Type:

Job: CNWRA
Location:
Prepped By/Date: RW 5/5/94
Tested By/Date: RW 5/18/94
Reviewed By/Date: M. Bridges 6/7/94

Equipment Used: Caliper (0.001")



PREFAILURE SKETCH



POSTFAILURE

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.105 - 0.102 = 0.003 in
Δ_{180} = 0.103 - 0.102 = 0.001 in
Δ_{90} = 0.105 - 0.100 = 0.005 in
Δ_{270} = 0.105 - 0.103 = 0.002 in

2. Perpendicularity

Δ_1 = 0.101 - 0.101 = 0 in
Δ'_1 = 0.101 - 0.100 = 0.001 in
Δ_2 = 0.103 - 0.102 = 0.001 in
Δ'_2 = 0.104 - 0.102 = 0.002 in

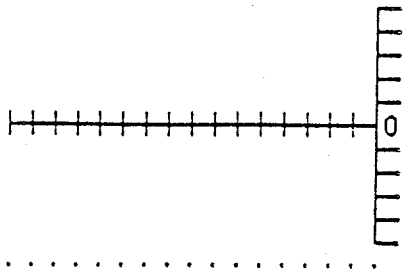
3. Diameter

D_1 = 1.371 in
D_3 = 1.373 in
D_5 = 1.371 in
D_2 = 1.372 in
D_4 = 1.372 in
D_6 = 1.373 in

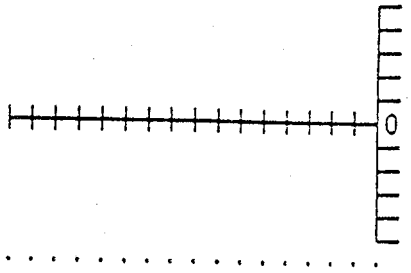
4. Height

H_1 = 4.167 in
H_3 = 4.167 in
H_2 = 4.168 in
H_4 = 4.169 in

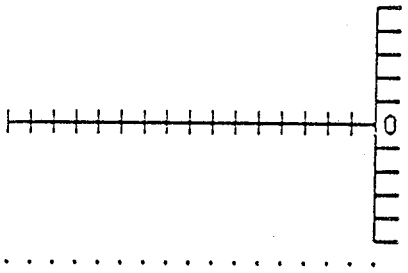
Sample Number: _____



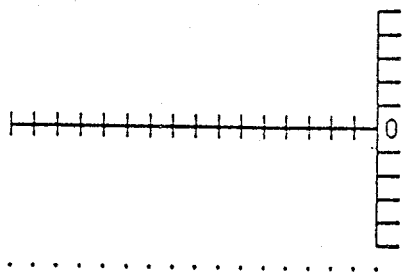
Maximum slope: _____



Maximum slope: _____



Maximum slope: _____



Maximum slope: _____

Avg. Diameter (in):	1.872	Disp. Rate (in/s):	0.000295
Avg. Height (in):	4.168	Gauge Reading (lb):	6.1 x 10⁴
Area (in^2):	2.752	Gauge Correction (lb):	
Volume (in^3):	11.472	Failure Load (lb):	6.1 x 10⁴
Weight (g):	496.87	Failure Stress (psi):	~~22,165.60~~ 22165.70 MLB
Density (lb/ft^3):	164.35		

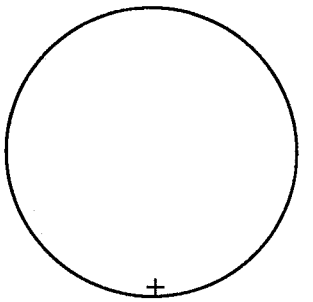
152.83 MPa

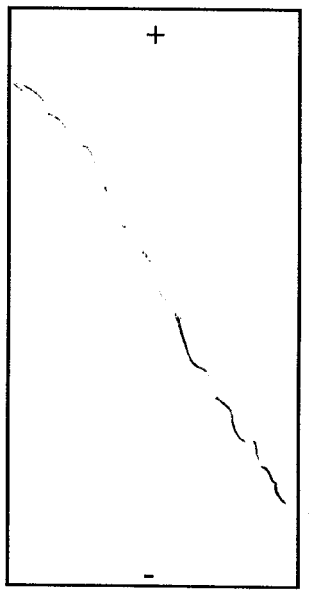
$$\gamma = \frac{W}{V} \times \frac{1728}{454}$$

$\sigma_3 = 1500$ psi

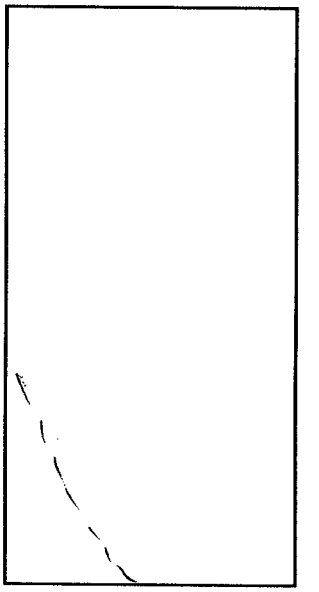
Comments: _____

Sample Number:_____

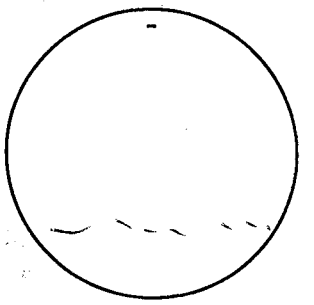




Front



Back



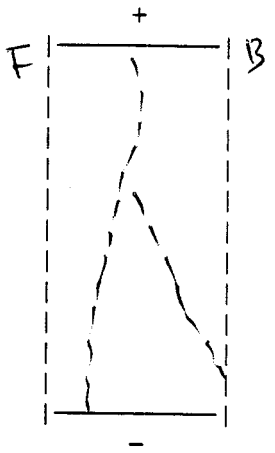
Solid Line: Pre-existing Structure
Dashed Line: Post-Failure

Triaxial Compression Test Results

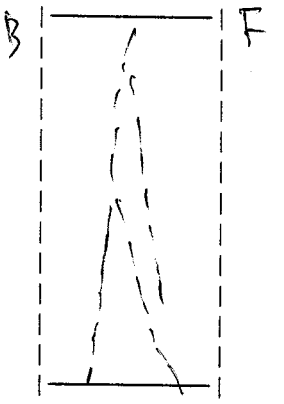
Sample Number: U-007d
Hole Number: LFM95-C2-2
Depth: _____
Rock Type: _____

Job: CNWRA
Location: _____
Prepped By/Date: RW 5/2/94
Tested By/Date: RW 5/19/94
Reviewed By/Date: M. Bridges 6/2/94

Equipment Used: Caliper (0.001")



PREFAILURE SKETCH



POSTFAILURE

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.101 - 0.098 = 0.003 in Δ_{90} = 0.101 - 0.097 = 0.004 in

Δ_{180} = 0.098 - 0.097 = 0.001 in Δ_{270} = 0.100 - 0.098 = 0.002 in

2. Perpendicularity

Δ_1 = 0.100 - 0.100 = 0 in Δ_2 = 0.100 - 0.100 = 0 in

Δ'_1 = 0.101 - 0.100 = 0.001 in Δ'_2 = 0.101 - 0.101 = 0 in

3. Diameter

D_1 = 1.851 in D_2 = 1.850 in

D_3 = 1.853 in D_4 = 1.851 in

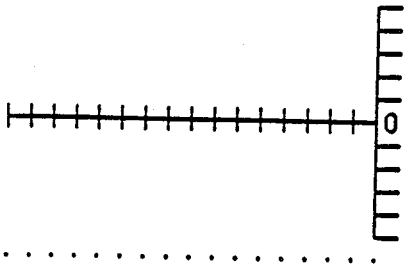
D_5 = 1.854 in D_6 = 1.863 in

4. Height

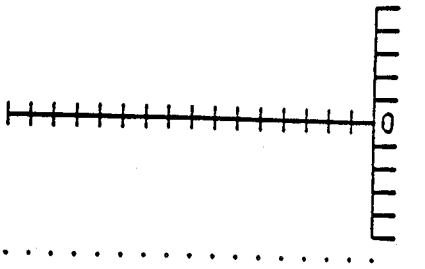
H_1 = 4.056 in H_2 = 4.056 in

H_3 = 4.058 in H_4 = 4.061 in

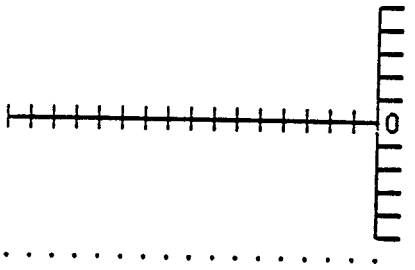
Sample Number: _____



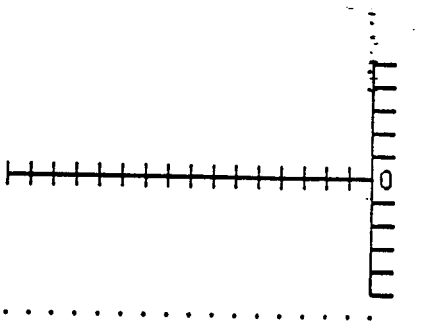
Maximum slope: _____



Maximum slope: _____



Maximum slope: _____



Maximum slope: _____

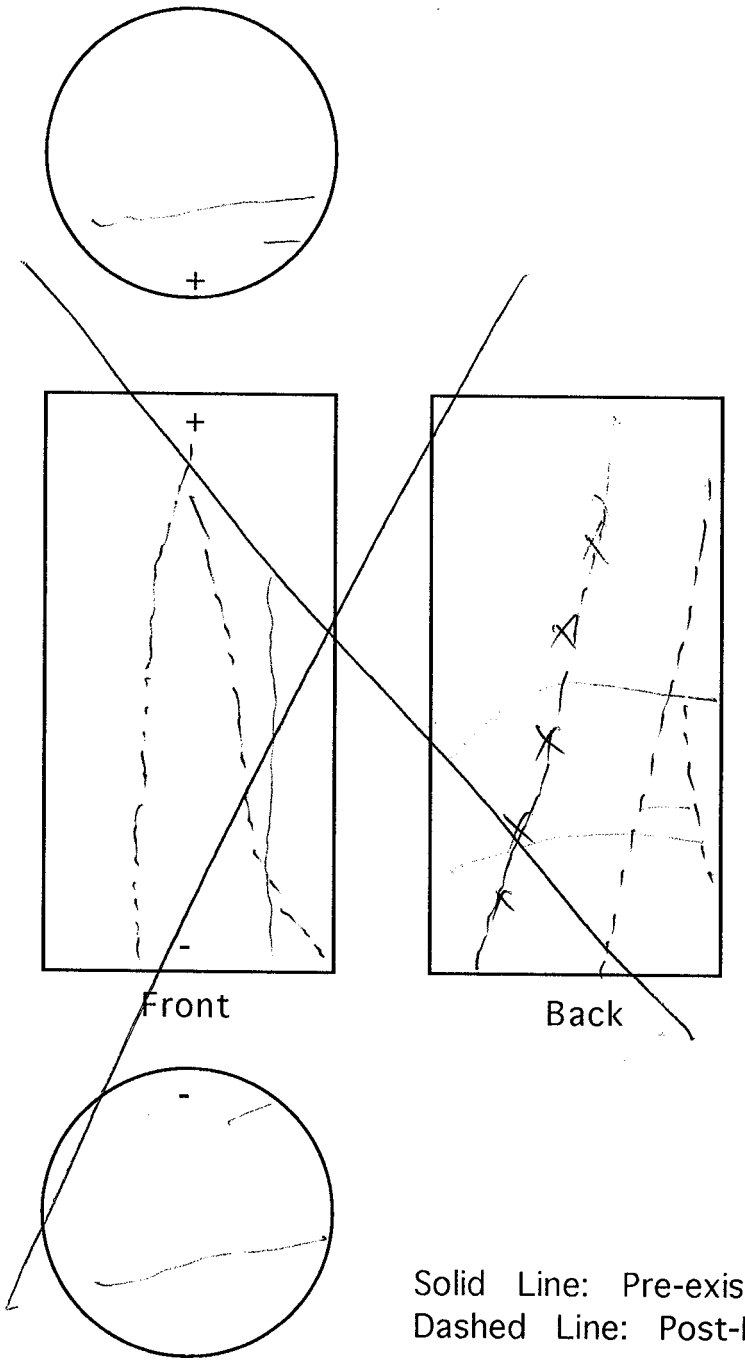
Avg. Diameter (in):	1.854	Disp. Rate (in/s):	0.000295
Avg. Height (in):	4.058	Gauge Reading (lb):	10.5 x 10⁴
Area (in^2):	2.800	Gauge Correction (lb):	
Volume (in^3):	10.96	Failure Load (lb):	10.5 x 10⁴
Weight (g):	474.62	Failure Stress (psi):	38,888.89
Density (lb/ft^3):	~~164.90~~ 164.83 MLP		268.14 MPa

$$\gamma = \frac{W}{V} \times \frac{1728}{454}$$

$\sigma_3 = 1000$ psi

Comments: _____

Sample Number: _____



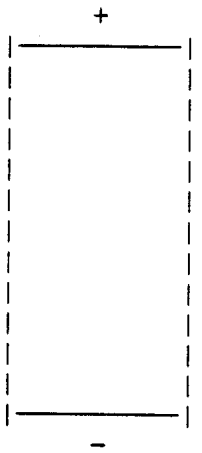
Solid Line: Pre-existing Structure
Dashed Line: Post-Failure

Triaxial Compression Test Results

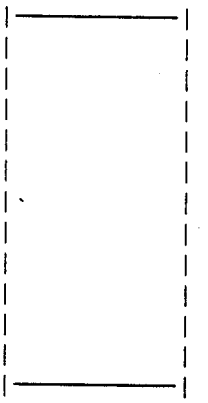
Sample Number: U-055
Hole Number: ITM 57-73
Depth:
Rock Type:

Job: CNWRA
Location:
Prepped By/Date: RW 5/7/94
Tested By/Date: RW 5/19/94
Reviewed By/Date: M. Bridges 6/2/94

Equipment Used: Caliper (0.001")



PREFAILURE SKETCH



POSTFAILURE

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.103 - 0.095 = 0.008 in
Δ_{180} = 0.103 - 0.094 = 0.009 in
Δ_{90} = 0.103 - 0.097 = 0.006 in
Δ_{270} = 0.099 - 0.094 = 0.005 in

2. Perpendicularity

Δ_1 = 0.103 - 0.097 = 0.003 in
Δ'_1 = 0.101 - 0.100 = 0.001 in
Δ_2 = 0.098 - 0.097 = 0.001 in
Δ'_2 = 0.098 - 0.095 = 0.003 in

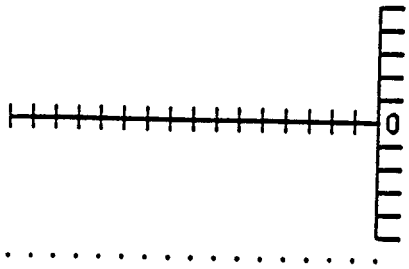
3. Diameter

D_1 = 1.367 in
D_3 = 1.367 in
D_5 = 1.366 in
D_2 = 1.366 in
D_4 = 1.366 in
D_6 = 1.367 in

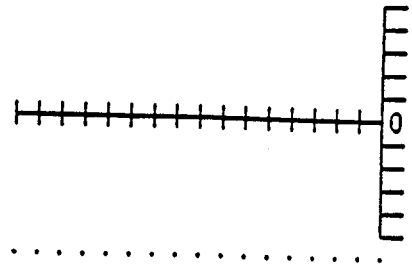
4. Height

H_1 = 4.112 in
H_3 = 4.112 in
H_2 = 4.111 in
H_4 = 4.113 in

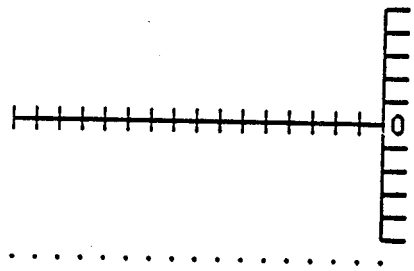
Sample Number: _____



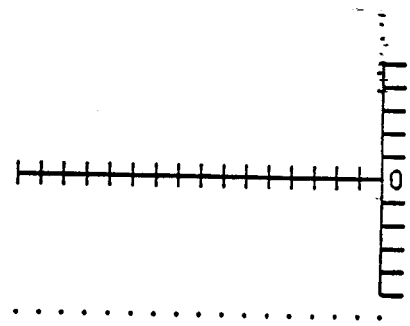
Maximum slope: _____



Maximum slope: _____



Maximum slope: _____



Maximum slope: _____

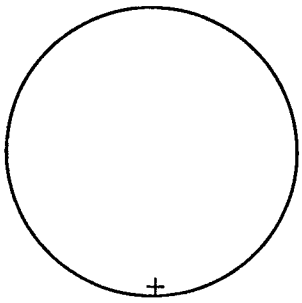
Avg. Diameter (in):	1.867	Disp. Rate (in/s):	0.000295
Avg. Height (in):	4.112	Gauge Reading (lb):	3.0 x10⁴
Area (in^2):	2.738	Gauge Correction (lb):	
Volume (in^3):	11.257	Failure Load (lb):	3.0 x10⁴
Weight (g):	467.58	Failure Stress (psi):	~~3~~ 10,956.90
Density (lb/ft^3):	158.09		75.55 MPa

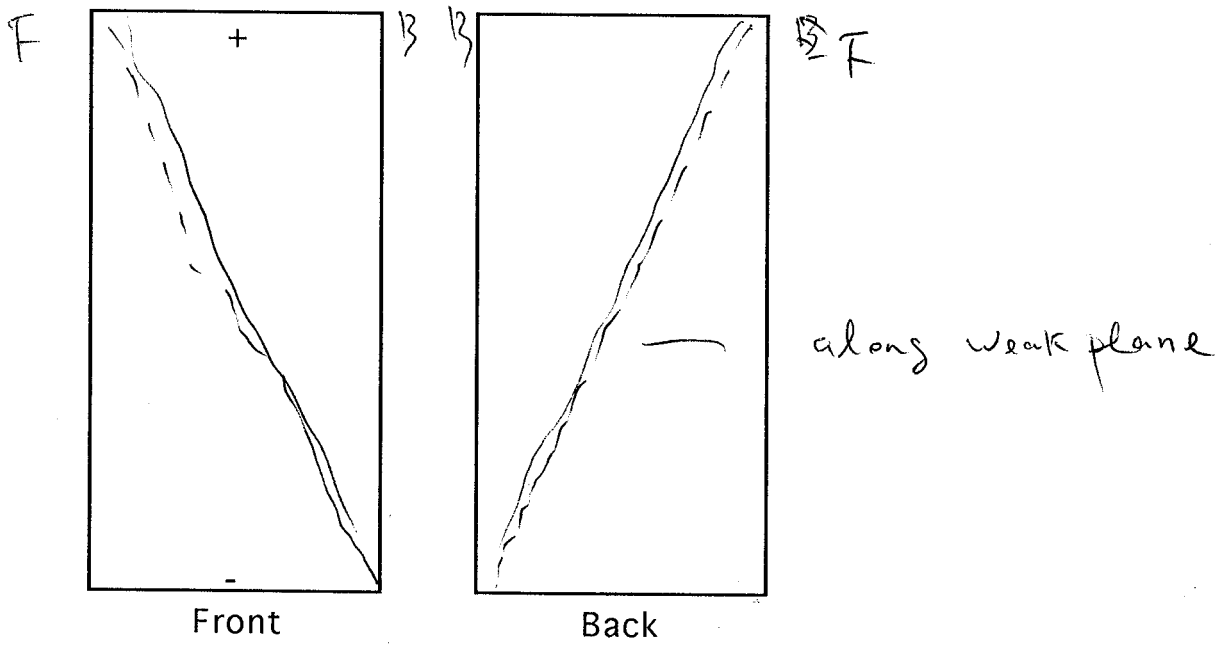
$$\gamma = \frac{W}{V} \times \frac{1728}{454}$$

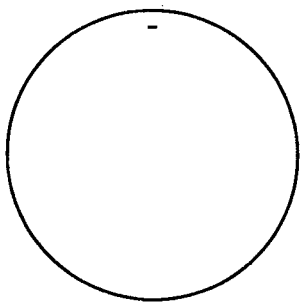
$\sigma_3 = 1000$ psi

Comments: _____

Sample Number:_____







Solid Line: Pre-existing Structure
Dashed Line: Post-Failure

Department MGE, UNIV. OF ARIZONA

Subject SAMPLE LOG BOOK

Name

Address

National Brand

43-649

Laboratory Research Notebook

Dennison Stationery Products Co., Framingham, MA 01701

0 73333 43649 5

11" x 8½" 4 x 4 Quad.
ts - 100 Sets

ASUA BOOKSTORE

$10.70

Sample Tracking Log

On initiation of the project, all boxes and samples are located in Room 17. The samples are; (as of 5-6-94)

LFM 95-C2-6	B-001
LFM 95-C1-4	B-002
LFM 95-C2-6	B-005
LFM 95-C2-6	B-006a
LFM 95-C2-6	B-007
LFM 95-C2-6	B-009
LFM 95-C2-6	B-010
LFM 95-C2-6	B-011
LFM 95-C2-2	B-014C
LFM95-C1-5	B-021a
LFM 95-C1-5	B-022
LFM 95-C2-7	B-024
LFM 95-C2-2	B-028
LFM95-C2-2	B-029
LFM 95-C-4	B-031
LFM 57-73	B-032
LFM57-73	B-035
LFM 57-73	B-037
LFM 57-73	B-040a
LFM 57-73	B-042
LFM 57-73	B-045
LFM 57-73	B-046a
LFM 57-73	B-047
LFM57-73	B-048
LFM57-73	B-050
LFM 57-73	B-051
LFM57-73	B-054
LFM57-73	B-055
LFM57-73	B-056
LFM57-73	B-057
LFM57-73	B-059a
LFM57-73	B-060b
LFM57-73	B-062
LFM57-73	B-063a
LFM 57-73	B-064b
LFM57-73	B-065
LFM 57-73	B-066
LFM 57-73	B-067a
LFM95-C1-4	B-003b

Total 39 specimens for Brazilian Tests (From Box 3)

+ LFM 57-73 B-052

Total 40 specimens for Brazilian Tests.

From Box 2.

LFM95 - C2-2	U-006	×
LFM95 - C2-3A	U-010	×
LFM95 - C1-5	U-013	—
LFM57 - 73	U-016	—
LFM57 - 73	U-017	×
LFM57 - 73	U-024a	×
LFM57 - 73	U-025a	×
LFM57 - 73	U-025b	×
LFM57 - 73	U-028	×
LFM57 - 73	U-030	×
LFM57 - 73	U-034	
LFM57 - 73	U-036a	×
LFM57 - 73	U-039	×
LFM57 - 73	U-040	×
LFM57 - 73	U-041	×
LFM57 - 73	U-043	×
LFM57 - 73	U-044	×
LFM57 - 73	U-045	—
LFM57 - 73	U-046	×
LFM57 - 73	U-047	×
LFM57 - 73	U-049	×
LFM57 - 73	U-050	—
LFM57 - 73	U-052	×
LFM57 - 73	U-053	—
LFM57 - 73	U-054	×
LFM57 - 73	U-048	×
LFM57 - 73	U-055	—
LFM57 - 73	U-056a	×
LFM57 - 73	U-056b	×
LFM57 - 73	U-057	×

Total 30 specimens

From Box 1

LFM95 - C2-6	U-001	×
LFM95 - C2-6	U-002	×
LFM95 - C2-6	U-004	×
LFM95 - C2-6	U-005	—
LFM95 - C2-2	U-007b	—
LFM95 - C2-2	U-007c	—
LFM95 - C2-2	U-007d	—
LFM95 - C2-2	U-008a	—
LFM95 - C2-2	U-008b	—
LFM95 - C2-2	U-009	×
LFM95 - C2-3A	U-011	—
LFM95 - C1-5	U-012	—
LFM95 - C2-7	U-014	×
LFM95 - C2-2	U-015	—
LFM57 - 73	U-018	—
LFM57 - 73	U-019b	×
LFM57 - 73	U-020	×
LFM57 - 73	U-022	—
LFM57 - 73	U-023	×
LFM57 - 73	U-024b	×
LFM57 - 73	U-026	×
LFM57 - 73	U-027	—
LFM57 - 73	U-031	×
LFM57 - 73	U-033	—
LFM57 - 73	U-035	×
LFM57 - 73	U-036b	—
LFM57 - 73	U-037	×
LFM57 - 73	U-038	×

Total 28 specimens

Date	Sample I.D.	Check-out time	check-in time	New Place	Purpose	
5/3	U-001	12:30am	1:00 pm	Room 31	Test	
5/3	B-001	12:15am	12:30am	Room 31	Test	
5/6	U-002					
	U-004					
	U-006					
	U-010					
	U-013					
	U-016					
		3:00 pm		Room 119	Preparation	
	B-002			Room 30		
	B-003b					
	B-005					
	B-014C					
5/8	U-012					
	U-050					
	U-055			Room 119	Smoothness	
	U-007d				Weight	
	U-057			Room 30		
	U-054					
	U-037					
	U-027					
	U-044	11 am	3 pm			
	U-052					
	U-056b					
	U-045					
	U-056a					
	U-053					
	U-025a					
	U-038					
	U-020					
	U-036a					
5/9	B-002	12:40pm	1:35pm	Room 29	Brazilian Test (Versa Tester)	S. Jeon
	B-003b	12:40	1:35			
	B-005	12:40	1:35			
	B-014C	12:40	1:35			

DATE	SAMPLE I.D.	CHECK-OUT	CHECK-IN	PLACE	PURPOSE
5/8	B-024 B-009 B-022 B-021a B-007 B-006a B-029 B-010 B-011 B-028	2:50pm	4:50pm	119	Smoothness Perpendicularity (RW)
5/10	U-002 U-004 U-006 U-010	12:50pm	2:10pm	Room 29	Uniaxial Compression Test S. Geon
5/10	B-054 B-055 B-063a B-062	1:50pm	2:10pm	Room 119	Smoothness Perpendicularity (RW)
5/10	U-020 U-025a U-036a U-038	3:30pm	4:30pm	Room 29	Uniaxial Compression Test S. Geon
5/10	B-055 B-054 B-063a B-062	4:00pm	~~4:30pm~~ S. Geon 4:54pm	Room 29	Brazilian Test S. Geon
5/11	B-024 B-021a B-009 B-028	9:30 am	10:20 am	Room 29	Brazilian Test M. Bridges

5/11	U-025a U-036a U-038	9:47AM	10:46AM	Room 29	Uniaxial Compression Test.	S. Deon
5/11	B-022 B-007 B-010 B-006a	10:33am	11:16am	Room 29	Brazilian Test	M. Bridges
5/11	U-037 U-044 U-052 U-054	11:43AM	12:35pm	Room 29	Uniaxial Compression Test	S. Deon
5/11	B-035 B-032 B-042 B-037 B-040a B-31 B-045 B-67a B-64b B-059a B-048 B-060b B-047 B-065 B-050 B-066 B-051 B-057 B-046a B-056	10:30	12:20	Room 119	Smoothness Perpendicularity	RW

5/11	U-56a U-56b U-57	3:40 PM	4:05 PM	Room 29	uniaxial compression test	S Deon
5/11	U-040 U-039 U-048 U-047 U-033 U-022 U-005 U-015 U-008 U-036b U-007c U-018 U-007b U-008b U-011	3:30 pm	4:15	Room 30	Weight	RW
5/12	U-056b U-057	2:06 PM	2:10 pm	Room 29	uniaxial Compression test Due to lab conflict	S Deon
5/12	U-040 U-039 U-048 U-047 U-033 U-022 U-005 U-015 U-008 U-036b U-007c U-018 U-007b U-008b U-011	3:00 pm	4:30 pm	Room 119	Smoothness and perpendicularity	(RW)

5/13	U-019b U-014 U-023 U-009 U-031 U-026	11:18 am	1:30 pm	Room 29 119	RW
5/16	U-049 U-035 U-046 U-025b U-041 U-028 U-024a U-017 U-030 U-024b U-043	9:20 am	10:50 am	Rm 29 119	Smoothness, perpendicularity weight & RW
5/16	U-056b	12:06 pm	12:54 pm	Room 29	Uniaxial Comp. test. S Dean
5/16	U-039 U-040 U-047 U-048 U-057	1:20 pm	2:30 pm	Room 29	Uniaxial comp. test. RW.
5/16	U-035 U-24b U-043	2:30 pm	3:10 pm	Room 29	RW uniaxial RW
	U-024a U-030 U-009 U-049	3:15 pm	4:00 pm	Room 29	RW Uniaxial

5/17	U-031 U-026 U-023 U-014 U-019b U-017 U-028 U-041 U-025b U-043	12:30am	2:30pm	Rm 29	Uniaxial RW
5/17	U-027	3:00pm	3:25pm	Room 29	Uniaxial Young's Modulus S. Dean
5/18	U-005 U-015 } 500psi U-012 U-013 } 1000psi	1:00pm	4:10pm	Room 29	Triaxial RW 3
5/18	U-007b U-007c U-008a U-018	4:07pm	5:19pm	Room 29	Uniaxial w/ strain Gauge S Dean
5/19	U-050 U-055 U-007d U-016	12:30	2:30	Rm 29	Triaxial RW
5/19	U-008b U-011	2:27pm	3:05pm	Room 29	Uniaxial w/ strain gauge S. Dean

5/19	U-011 U-053	4:06pm	5:35pm	Room 29	uniaxial test w/ strain gauge S. Jeon
5/19	U-022 U-033	3:30pm	4:10pm	Room 29	RW. Triaxial
5/19	U-36b U-018 U-045	4:50pm	5:35pm	Rm 29	RW Youngs's Poison ratio
7/20	B-029 B-011 B-035 B-032 B-042 B-037 B-40a B-031 B-045 B-067a B-064b B-059a B-048 B-060b B-047 B-065 B-050 B-066 B-051 B-057 B-046a B-056	12:30	12:40pm	Room 29	12W Brazilian
6/1	B-052	1:00pm	1:05pm	Room 119	smoothness check S. Jeon

11/14010

6/1	B-52 B-29 B-35 B-32 B-42 B-37 B-40a B-31 B-45 B-67a B-64b B-59a B-048 B-60b B-47 B-65 B-50 B-66 B-51 B-57 B-46a B-56	1:10pm	3:40pm	Room 29	Brazilian Tests S. Oen

12/14 011

6-2-94
SEOKWON

Packing Information

Box #1 : 20 uniaxial test samples (without strain gauge)

U-017	U-040	U-028	U-031
U-046	U-019b	U-026	U-025a
U-009	U-014	U-025b	U-036a
U-024a	U-041	U-038	U-023
U-057	U-043	U-020	U-030

Box #2 : 18 uniaxial test samples (without strain gauge)

U-047	U-054	U-056b	U-002
U-049	U-052	U-044	U-001
U-037	U-024b	U-010	U-034
U-035	U-048	U-006	
U-056a	U-039	U-004	

Box #3 : 10 uniaxial test samples with strain gauge
10 triaxial test samples

U-053	U-007c	U-005	U-055
U-011	U-007b	U-012	U-016
U-045	U-008a	U-015	U-022
U-018	U-008b	U-007d	U-033
U-036b	U-027	U-013	U-050

uniaxial samples — triaxial samples

13/14 012

Box #4: 40 Brizilian test samples

B-001	B-022	B-032	B-051
B-002	B-024	B-035	B-052
B-003b	B-028	B-037	B-056
B-005	B-054	B-040a	B-057
B-006a	B-055	B-042	B-059a
B-007	B-062	B-045	B-060a
B-009	B-063a	B-046a	B-064b
B-010	B-011	B-047	B-065
B-014C	B-029	B-048	B-066
B-021a	B-031	B-050	B-067a

Friday, June 4, 1994

This is just a note about the qualifications of the 3 students that conducted the tests. The two primary technicians are Rungi Wang & Seokwan Jeon, both graduate students in rock mechanics at the University of Arizona, Dept. of Mining & Geological Engineering. Rungi Wang has over 3 yrs. experience in the geomechanics lab and Seokwan Jeon has over 1 year experience in the geomechanics lab at the University of Arizona. Also, both students have TA'ed the rock mechanics lab taught to undergraduate & graduate students in mining & geological engineering, which involved conducting uniaxial, triaxial, and brazilian tests. Matt Bridges also assisted in some of the tests. Matt Bridges is an undergraduate student at the University of Arizona and has about 6 months experience at the geomechanics lab. Matt was trained to conduct the tests by either Seokwan or Rungi.

John Kemeny

Department MGE

Subject

Name RUNQI WANG

Address Room 17

National Brand 43-649

Laboratory Research Notebook

Dennison Stationery Products Co., Framingham, MA 01701

11" x 9¼" 4 x 4 Quad.
200 Sheets 100 Sets

0 73333 43649 5

5/2/94, Monday 3:00 pm – 4:00 pm

Specimens handling

All 3 boxes have been opened up.

Box 1. 28 specimens for uniaxial tests

Box 2. 30 specimens for either uniaxial or triaxial

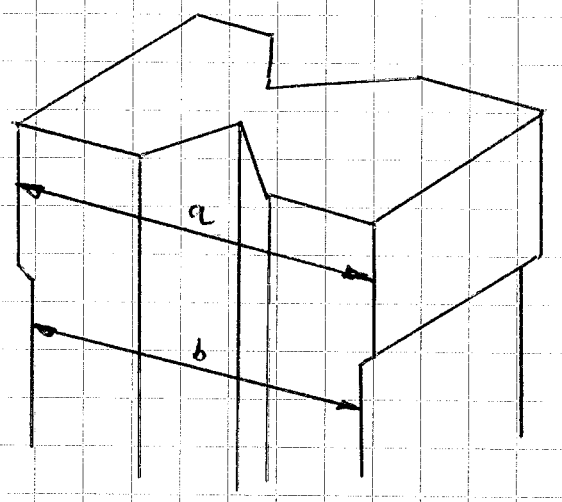
* specimen U-034 been broken during transportation failure plane along weak plane

Box 3 39 specimens for Brazilian tests

photos were taken when specimens were organized on table.

5/4/94
Seokwon Jeon

"V-Block Smoothness check"



By Dial guage attached on the V-Block $\frac{1}{2}(a-b) = 0.065''$ & $0.070''$ (measured 2 times)

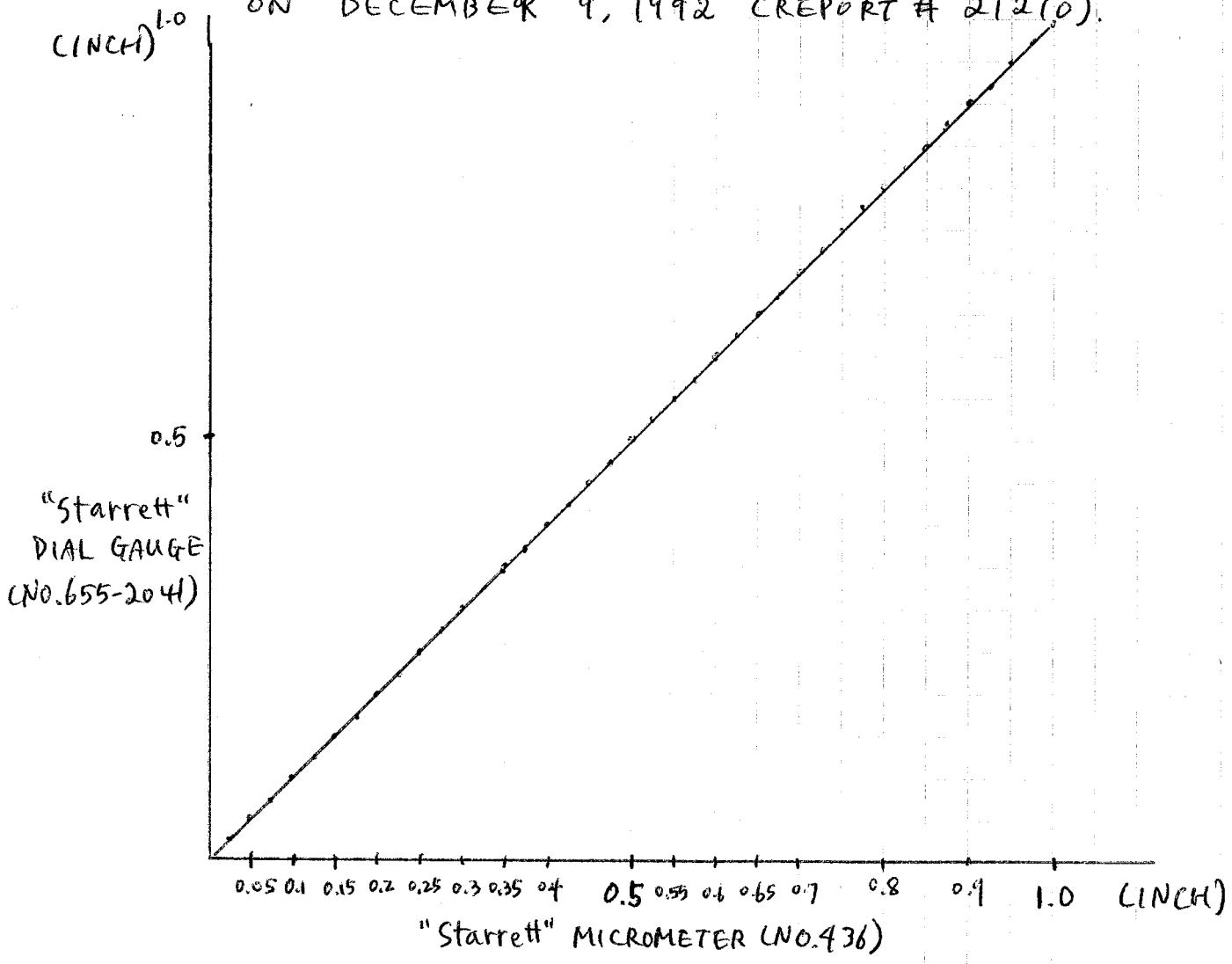
By micrometer $a = 3.536''$
$b = 3.400''$

By caliper $a = 3.536''$
$b = 3.400''$

5-9-94
SEOKWON JEON.

- Loading Rate Measurement.

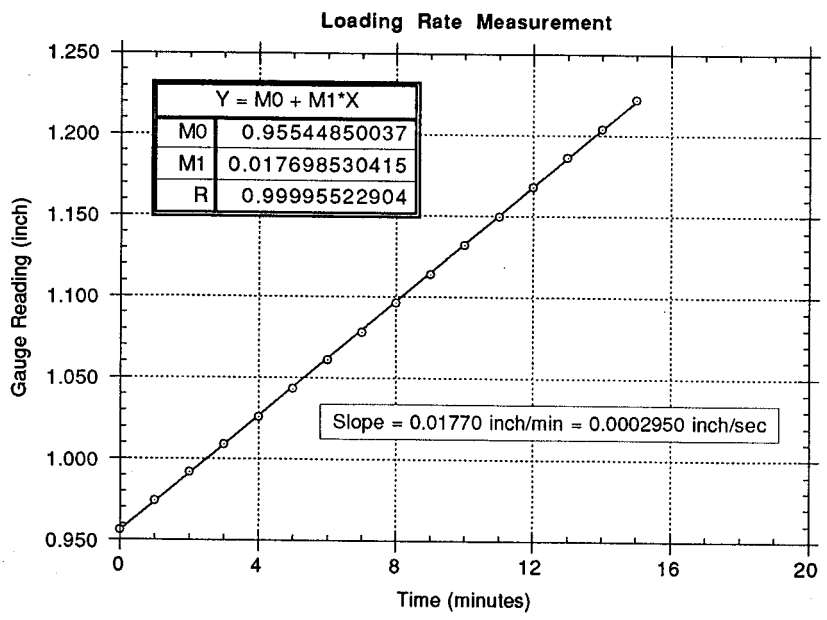
① "Starrett" DIAL GAUGE
(No. 655-2041, 2.000" RANGE, 0.001"/DIVISION)
WAS CALIBRATED AGAINST.
"Starrett" MICROMETER
(No. 436, 5"~6" RANGE, ATHOL, MASS.)
WHICH WAS CALIBRATED BY
"NATIONAL CALIBRATION SERVICE"
ON DECEMBER 9, 1992 (REPORT # 212(0).



5-9-94

② Setting the period @ 1700 seconds of Model 340A Materials Testing Generator (Controlling Signal Part), the loading rate is as follows:

Time (min)	Gauge Reading (Starrett No. 655-2041)
0	0.956"
1	0.974"
2	0.992"
3	1.009"
4	1.026"
5	1.043"
6	1.061"
7	1.078"
8	1.096"
9	1.114"
10	1.132"
11	1.150"
12	1.168"
13	1.186"
14	1.204"
15	1.222"



caliper calibration 5/11/94

Ri Wang

" V-Block Smoothness check"

calibration of caliper by micrometer

The same block as page 002

by micrometer a= 3.536"
3.537"

b = 3.400
3.400

by caliper a= 3.536"
3.537"

b= 3.400
3.400

Sample LFM 57-73 U-034
been broken during transportation along pre-existing weakplane.
See photography.
So this sample didn't been used for any test.

RW
5/18/94

Specimen LFM 57-73 U-022
been broken when SBEL was out of order.
this specimen was failed without result.
It's a invalid test.

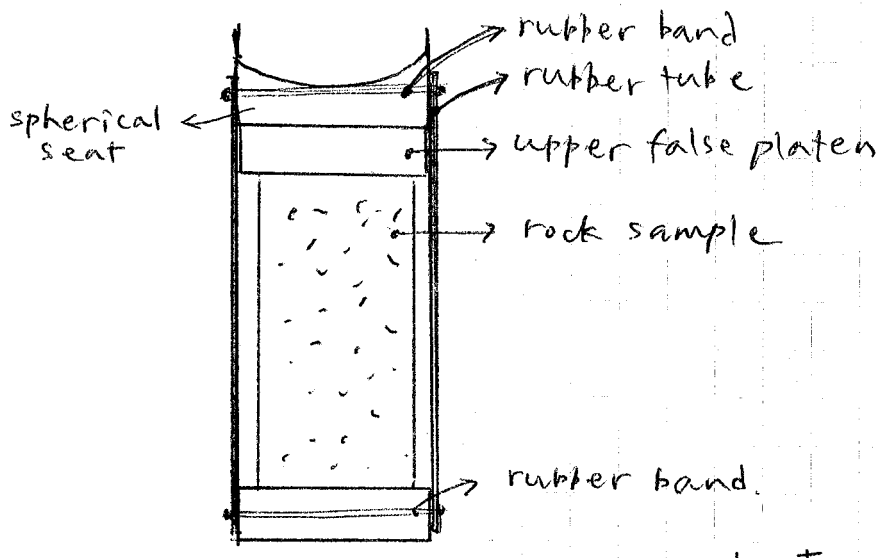
5-19-94
Seokwon Jeon

- Most uniaxial samples broke violently, which are normal in brittle material.

Brittle, violent failure made it difficult to collect all the broken pieces and sketch the post-failure structure.

For the first 5 samples (U-002, U-004, U-006, U-010, U-020), no device was used to collect broken rock chips.

From the test of U-025a (5-10-94), a rubber tube was placed through the lower false platen, the sample, ~~and~~ upper platen, and spherical seat.

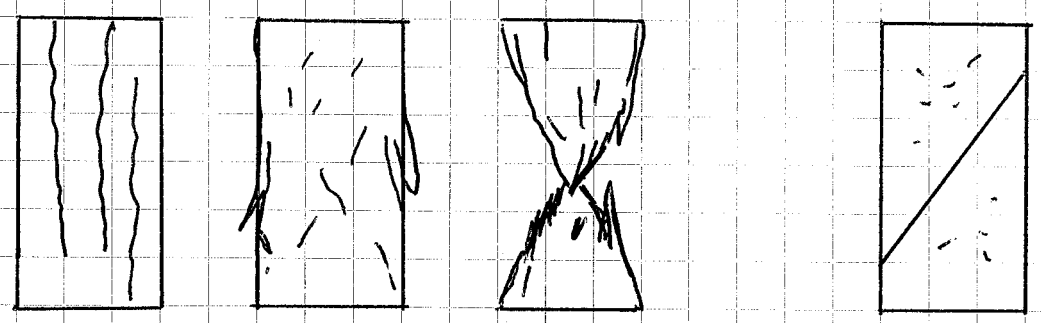


From the test of U-024a (5-16-94), a heat shrinkage tube was placed instead of rubber tube.

5-19-94
Seokwon Seon

- From the first 2-day's test (5-10-94, 5-11-94), it was examined that 95-C2-2 group (There are two groups of 95-C2-2 and 57-13) showed ~~stronger~~ higher strength than the other group. And the samples in 95-C2-2 group broke in splitting mode unless they have a pre-existing weakness plane.

- On failure, the specimens failed by axial brittle splitting or shear, forming one or two shear planes



Axial Brittle Splitting Shear

In "Axial Brittle Splitting" failure, most samples had a shear plane which has 65°~75° from the horizon.

5-20-94
S. Jeon

Young's Modulus Measurements

1. Apparatus Used

① CT-500 loading ram.

② SBEL 442 Servo controller

- 340A Materials Testing Generator
- Schaevitz LVDT
- Pegasus Servo System Module (SSM)
- Servo Valve

③ "Heise" Dial Load Gauge
(Solid Front - C-67240, Newtown, Conn.)
- Calibrated by National Calibration Inc. on 5-3-94 (Report # 40422).
- Has minimum scale of 1000 lbs
- maximum capacity 500,000 lbs.

④ SBEL NX-H-500 Load Cell (500,000 lbs capacity)
Calibrated by National Calibration Inc. on 5-3-94 (Report # 40422).

⑤ Micro-Measurements 2100 system signal conditioning unit.

2. Load Calibration.

① Load in a plot was calibrated against the dial load gauge (Heise). A proper gain was selected to give 2000 lbs / 5 cm, which was 4.20 in Micro-measurements 2100 system signal conditioning unit.

② Load cell has 500,000 lbs capacity, and it has non-linear relationship with Heise Dial Load Gauge at lower range. But over 30,000 lbs, it has a fairly good linear relationship with Heise Load gauge.

3. Strain Calibration

① The following type strain gauges were used.

HBM Strain Gauges
Type 10/120XY91
Resistance = 120 Ω ± 0.50 %
Gauge factor k = 2.03 ± 1 (%)

② Bonding procedure followed the manual.

③ 2 axial and 2 lateral gauges were bonded in serial connection to a sample.

④ For calibration, an aluminum stand specimen was used.

⑤ The aluminum standard specimen is Al6061T6. This has a Young's Modulus of

$$E = 69\ GPa = 10.1 \times 10^6\ psi$$

(The Materials Information Society, Metals Handbook, 10th Ed., Vol. 2, 1990. P103 / ASM International, ASM specialty Handbook, Aluminum and aluminum alloys, 1993, P72)

⑥ By loading the standard specimen, strain was back calculated from the known load, area, and Young's Modulus. On a plot, the strain scale was set to be

157 microstrain / 0.6 cm
≈ 262 microstrain / 1 cm.

4. Young's Modulus Calculation

① Black Ink plots load vs. axial strain. (U-027 --- Red ink)

② Load is divided with area, which gives stress.

③ 50% tangential method was used.

5. Poisson's Ratio Calculation.

① Red ink plots axial strain vs. lateral strain. (Exception. U-027 -- Black ink).

② The two strains have the same gain and the same plotting scale. Therefore, the slope of the red plot simply gives Poisson's Ratio.

Department MGE, UNIV. OF ARIZONA

Subject BRAZILIAN TEST

Name

Address

National Brand 43-649

Laboratory Research Notebook

Dennison Stationery Products Co., F 01701

0 73333 43649 5

9¾" 4 x 4 Quad.
200 Sheets - 100 Sets

S. Jeon

5-4-94
S. JEON

- ~~39~~ 40 samples for Brazilian Test.
- All the Brazilian Tests are performed by Versa Tester (by Soiltest, Inc., Evanston, Il) (Model # AP-1015, Serial # 42479)
- The "Versa Tester" was calibrated by National Calibration SERVICE Inc. (Report # 40422) on May 3, 1994.
- Versa Tester has 20 lbs/division scale, which causes measuring error of ±20 lbs. Maximum capacity is 60,000 pounds.
- Loading rate is controlled by "CT-5000 ConComp" (by Soiltest, Inc., Evanston, IL) (Model # CT-5000, Serial # 81007)
- Sample dimension determination and testing procedure follow the manual prepared to meet ASTM and/or ISRM standards.

5/11/94

- 12 samples to perform brazilian test:

B-009, B-024, B-021a, B-028, B-063a, B-054, B-055, B-062, B-006a, B-010, B-022, B-007

6-1-94
SEOKWON

- Versa Test was broken after 17 tests, which are

LFM	95-C2-6	B-001
LFM	95-C1-4	B-002
LFM	95-C1-4	B-003b
LFM	95-C2-6	B-005
LFM	95-C2-6	B-006a
LFM	95-C2-6	B-007
LFM	95-C2-6	B-009
LFM	95-C2-6	B-010
LFM	95-C2-2	B-014C
LFM	95-C1-5	B-021a
LFM	95-C1-5	B-022
LFM	95-C2-7	B-024
LFM	95-C2-2	B-028
LFM	57-73	B-054
LFM	57-73	B-055
LFM	57-73	B-062
LFM	57-73	B-063a

- SBEL CT-500 Loading Frame was used for the rest of the tests.

"Heise" Dial Load Gauge has minimum scale of 1000 lbs with the maximum capacity of 500,000 lbs, which is not appropriate to the Brazilian (Indirect Disc Tension) Tests.

Therefore, 60,000 lbs capacity load cell was used to read down to 40 lbs with a certain gain control.

The load cell used was

Terrametrics Inc. (Golden, colorado 80401)
Model #: PC-60
Serial #: 4579
Maximum capacity: 60,000 lbs.

, which was calibrated

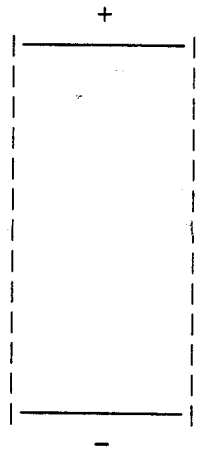
by National calibration Inc.,
on May 4, 94 (Report #: 40422).

- Loading rate was set @ 0.000217 in/sec, which corresponds to ASTM standard.

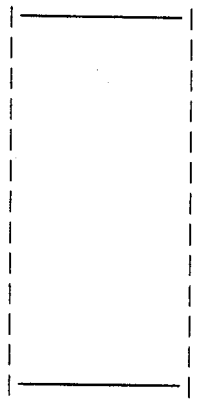
Triaxial Compression Test Results

Sample Number: U-015
Hole Number: LFM95-C2-2
Depth:
Rock Type:
Equipment Used: caliper (0.001")

Job: CNWRA
Location:
Prepped By/Date: RW 5/11/94
Tested By/Date: RW 5/13/94
Reviewed By/Date: M. Bridges 6/2/94
SBEL



PREFAILURE SKETCH



POSTFAILURE

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.098 - 0.086 = 0.012 in
Δ_{180} = 0.099 - 0.089 = 0.01 in
Δ_{90} = 0.102 - 0.088 = 0.014 in
Δ_{270} = 0.098 - 0.087 = 0.011 in

2. Perpendicularity

Δ_1 = 0.038 - 0.033 = 0.005 in
Δ'_1 = 0.040 - 0.034 = 0.006 in
Δ_2 = 0.037 - 0.035 = 0.002 in
Δ'_2 = 0.036 - 0.034 = 0.002 in

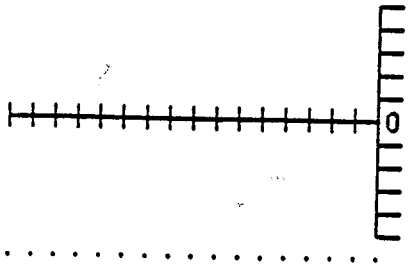
3. Diameter

D_1 = 1.360 in
D_3 = 1.360 in
D_5 = 1.359 in
D_2 = 1.362 in
D_4 = 1.362 in
D_6 = 1.358 in

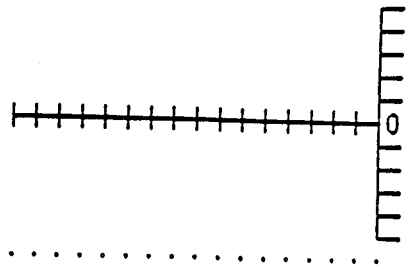
4. Height

H_1 = 4.077 in
H_3 = 4.084 in
H_2 = 4.080 in
H_4 = 4.080 in

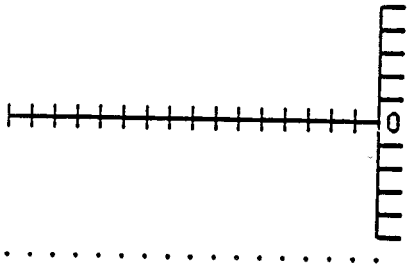
Sample Number: _____



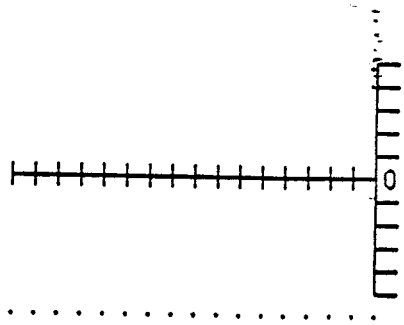
Maximum slope: _____



Maximum slope: _____



Maximum slope: _____



Maximum slope: _____

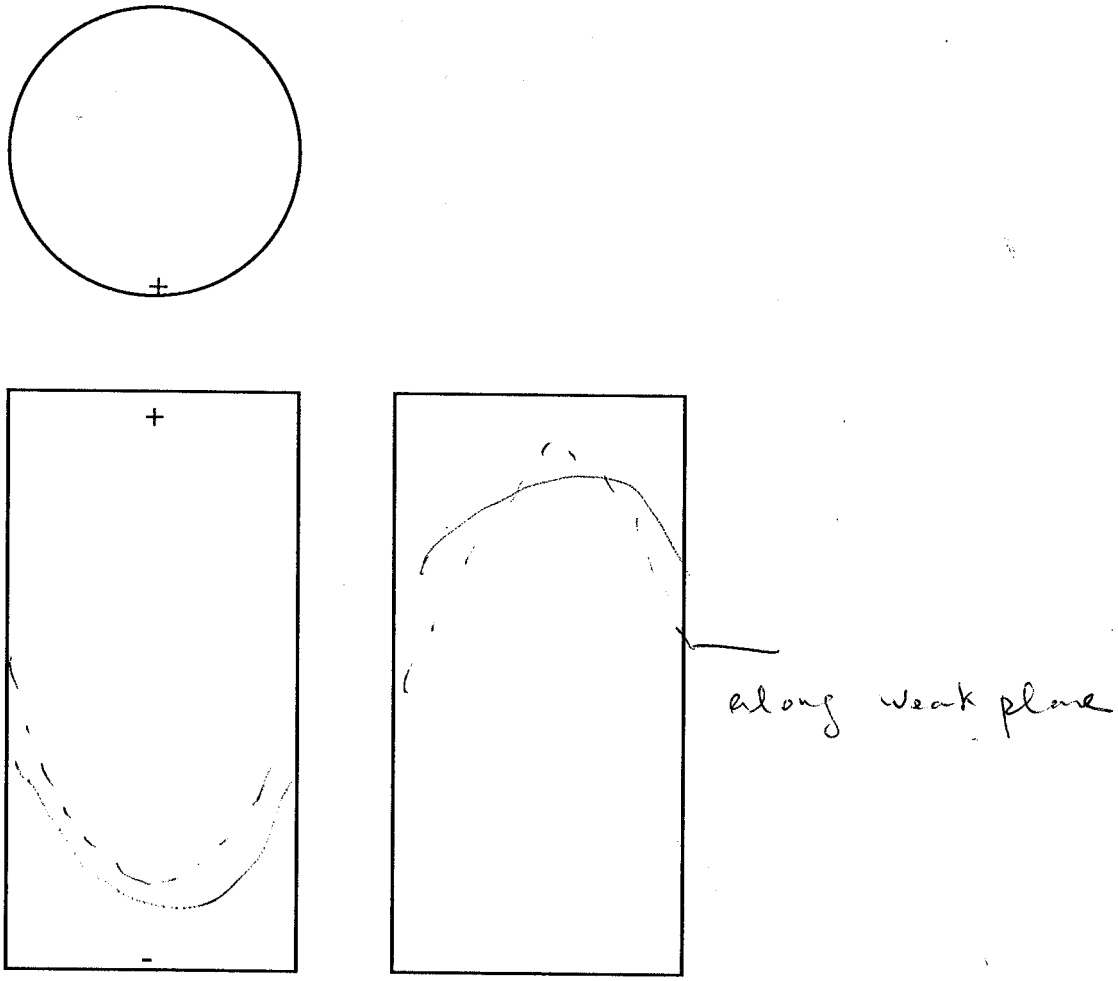
Avg. Diameter (in):	1.860	Disp. Rate (in/s):	0.000095
Avg. Height (in):	4.080	Gauge Reading (lb):	4.2x10⁴
Area (in^2):	2.717	Gauge Correction (lb):	
Volume (in^3):	11.086	Failure Load (lb):	4.2x10⁴
Weight (g):	490.28	Failure Stress (psi):	15,458.23
Density (lb/ft^3):	168.33		106.58 (MPa)

$$\gamma = \frac{W}{V} \times \frac{1728}{454}$$

$\sigma_3 = 500$ psi

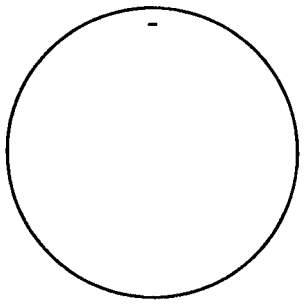
Comments: Failure along pre-existing weak plane

Sample Number:_____



Front

Back



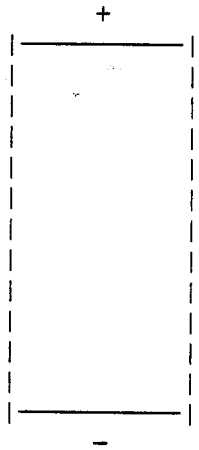
Solid Line: Pre-existing Structure
Dashed Line: Post-Failure

Triaxial Compression Test Results

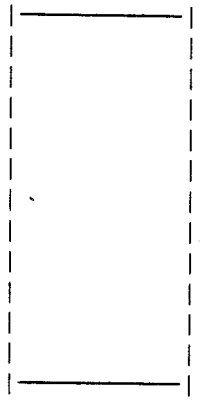
Sample Number: U-033
Hole Number: VFM 57-73
Depth:
Rock Type:

Job: CNWRA
Location:
Prepped By/Date: RW 5/11/94
Tested By/Date: RW 5/19/94
Reviewed By/Date: M. Bridges 6/2/94

Equipment Used: caliper (.001") SIBEL



PREFAILURE SKETCH



POSTFAILURE

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.106 - 0.109 = 0.003 in
Δ_{180} = 0.108 - 0.106 = 0.002 in
Δ_{90} = 0.111 - 0.107 = 0.004 in
Δ_{270} = 0.108 - 0.106 = 0.002 in

2. Perpendicularity

Δ_1 = 0.072 - 0.070 = 0.002 in
Δ'_1 = 0.072 - 0.071 = 0.001 in
Δ_2 = 0.071 - 0.069 = 0.002 in
Δ'_2 = 0.072 - 0.070 = 0.002 in

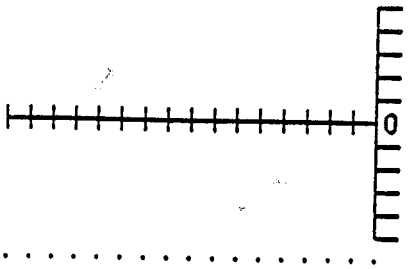
3. Diameter

D_1 = 1.871 in
D_3 = 1.870 in
D_5 = 1.872 in
D_2 = 1.872 in
D_4 = 1.874 in
D_6 = 1.874 in

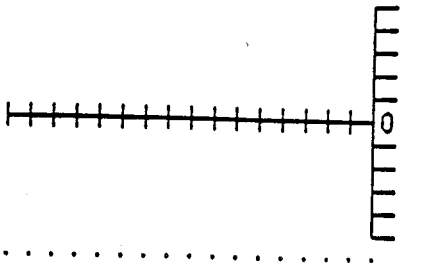
4. Height

H_1 = 4.016 in
H_3 = 4.018 in
H_2 = 4.015 in
H_4 = 4.018 in

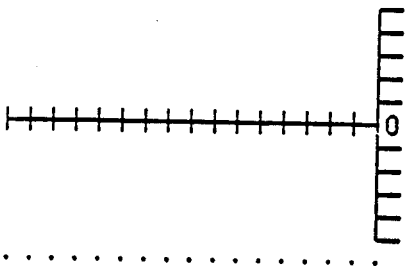
Sample Number: _____



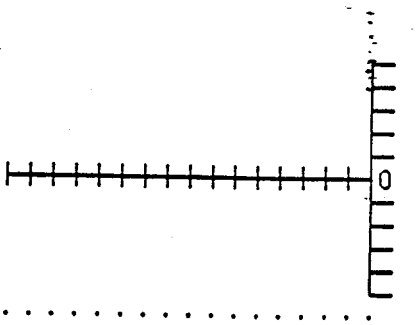
Maximum slope: _____



Maximum slope: _____



Maximum slope: _____



Maximum slope: _____

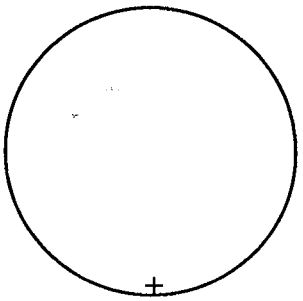
Avg. Diameter (in): 1.872
Avg. Height (in): 4.017
Area (in^2): 2.752
Volume (in^3): 11.056
Weight (g): 434.52
Density (lb/ft^3): 166.30

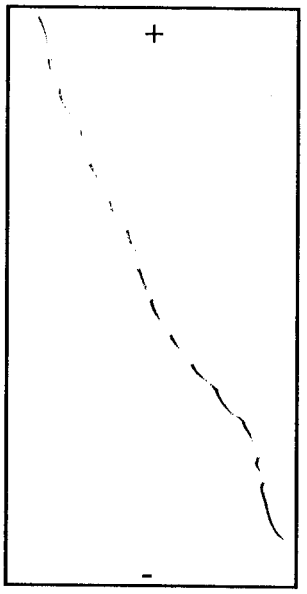
Disp. Rate (in/s): 0.000295
Gauge Reading (lb): 10.9×10^4
Gauge Correction (lb): _____
Failure Load (lb): 10.9×10^4
Failure Stress (psi): 39,607.56
273.09 MPa
$\sigma_3 = 1500$ psi

$$\gamma = \frac{W}{V} \times \frac{1728}{454}$$

Comments: _____

Sample Number:_____





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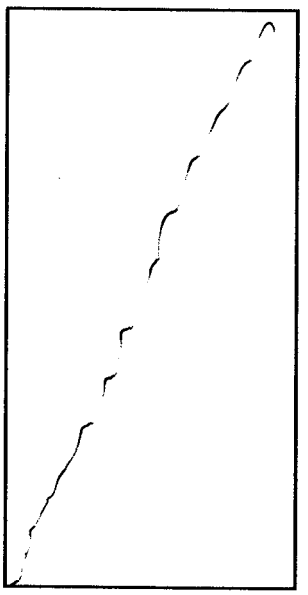
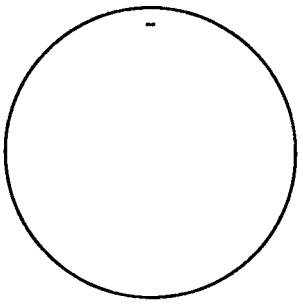


Back



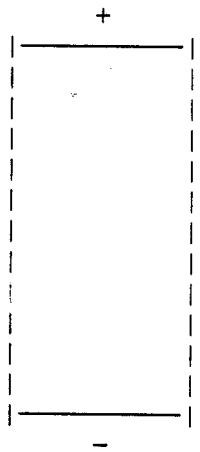
Solid Line: Pre-existing Structure
Dashed Line: Post-Failure

Triaxial Compression Test Results

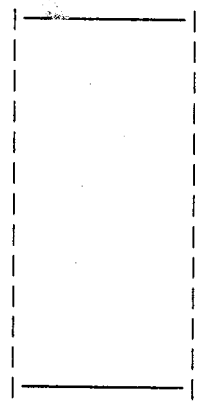
Sample Number: U-022
Hole Number: VFM 57-73
Depth:
Rock Type:

Job: CNWRA
Location:
Prepped By/Date: RW 5/11/94
Tested By/Date: RW 5/19/94
Reviewed By/Date: M. Bridges 6/2/94

Equipment Used: caliper (.001") SBEL



PREFAILURE SKETCH



POSTFAILURE

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.108 - 0.105 = 0.003 in
Δ_{180} = 0.106 - 0.104 = 0.002 in
Δ_{90} = 0.106 - 0.104 = 0.002 in
Δ_{270} = 0.107 - 0.105 = 0.002 in

2. Perpendicularity

Δ_1 = 0.052 - 0.051 = 0.001 in
Δ'_1 = 0.053 - 0.051 = 0.002 in
Δ_2 = 0.052 - 0.051 = 0.001 in
Δ'_2 = 0.051 - 0.051 = 0 in

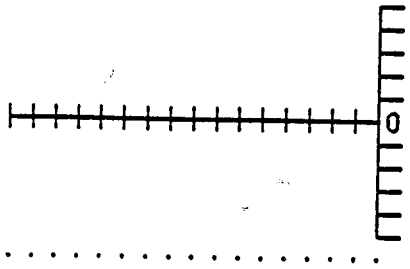
3. Diameter

D_1 = 1.371 in
D_3 = 1.370 in
D_5 = 1.371 in
D_2 = 1.370 in
D_4 = 1.370 in
D_6 = 1.371 in

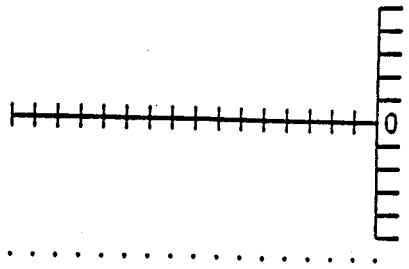
4. Height

H_1 = 3.997 in
H_3 = 3.996 in
H_2 = 3.995 in
H_4 = 3.996 in

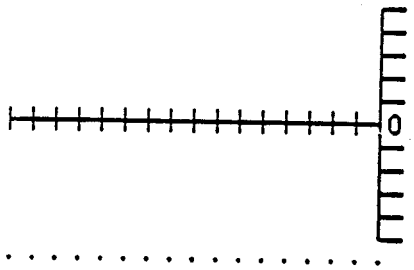
Sample Number: _____



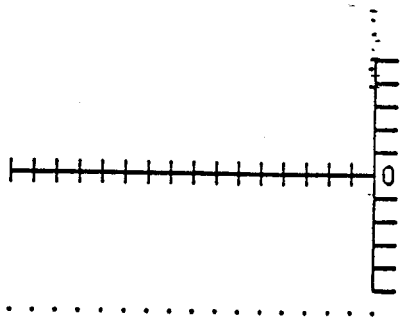
Maximum slope: _____



Maximum slope: _____



Maximum slope: _____



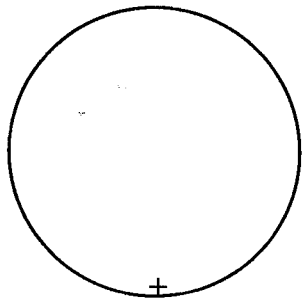
Maximum slope: _____

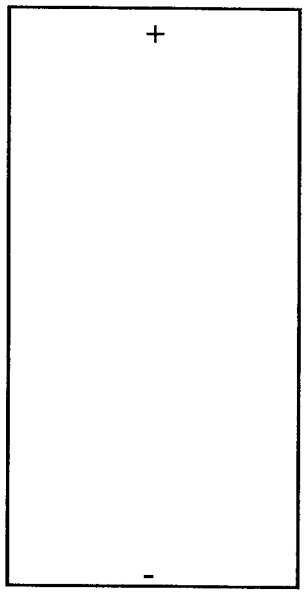
Avg. Diameter (in):	1.871	Disp. Rate (in/s):	
Avg. Height (in):	3.996	Gauge Reading (lb):	
Area (in^2):	2.749	Gauge Correction (lb):	
Volume (in^3):	10.987	Failure Load (lb):	
Weight (g):	492.42	Failure Stress (psi):	
Density (lb/ft^3):	170.59		

$$\gamma = \frac{W}{V} \times \frac{1728}{454}$$

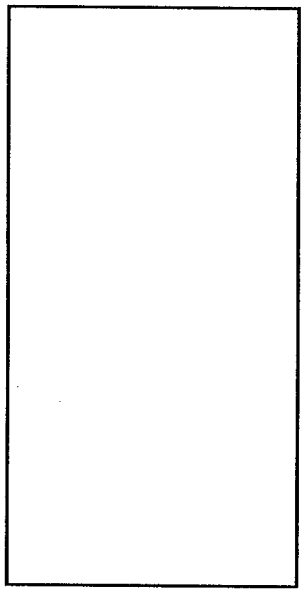
Comments: The SBEL was out of order, the specimen is broken.

Sample Number:_____

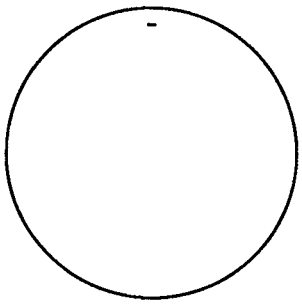




Front



Back



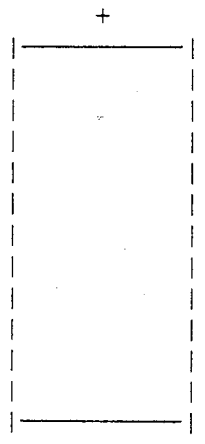
Solid Line: Pre-existing Structure
Dashed Line: Post-Failure

Triaxial Compression Test Results

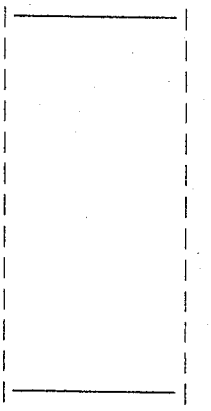
Sample Number: U-013
Hole Number: LEM95-01-5
Depth:
Rock Type:

Job: CNWRA
Location:
Prepped By/Date: RW 5/5/94
Tested By/Date: RW 5/13/94
Reviewed By/Date: MBRIDGES 6/2/94

Equipment Used: caliper (0.001")



PREFAILURE SKETCH



POSTFAILURE

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.113 - 0.80 = 0.033 in Δ_{90} = 0.099 - 0.081 = 0.018 in

Δ_{180} = 0.103 - 0.82 = 0.027 in Δ_{270} = 0.111 - 0.091 = 0.02 in

2. Perpendicularity

Δ_1 = 0.109 - 0.095 = 0.014 in Δ_2 = 0.103 - 0.091 = 0.012 in

Δ'_1 = 0.106 - 0.092 = 0.014 in Δ'_2 = 0.102 - 0.096 = 0.006 in

3. Diameter

D_1 = ~~1.371~~ 1.355 in D_2 = 1.356 in

D_3 = ~~1.377~~ 1.365 in D_4 = 1.353 in

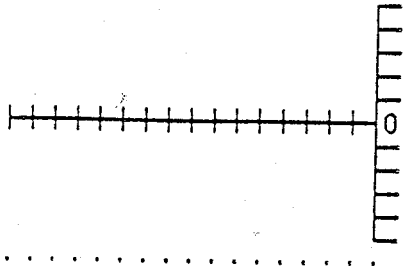
D_5 = ~~1.371~~ 1.365 in D_6 = 1.354 in

4. Height

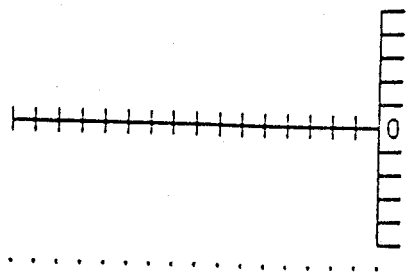
H_1 = 4.144 in H_2 = 4.137 in

H_3 = 4.136 in H_4 = 4.143 in

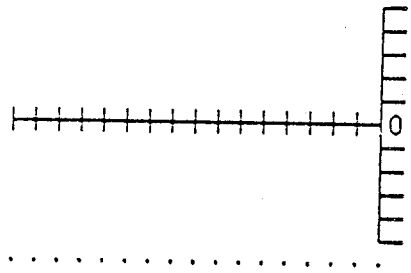
Sample Number: _____



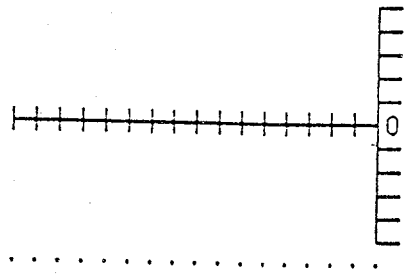
Maximum slope: _____



Maximum slope: _____



Maximum slope: _____



Maximum slope: _____

Avg. Diameter (in):	1.858	Disp. Rate (in/s):	0.00295
Avg. Height (in):	4.14	Gauge Reading (lb):	9.2×10^4
Area (in^2):	2.711	Gauge Correction (lb):	
Volume (in^3):	11.225	Failure Load (lb):	9.2×10^4
Weight (g):	490.06	Failure Stress (psi):	~~33,935.32~~
Density (lb/ft^3):	166.17		

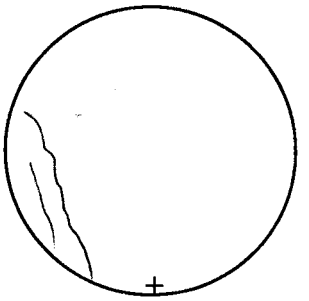
$\sigma_1 = 233.99$ (MPa)

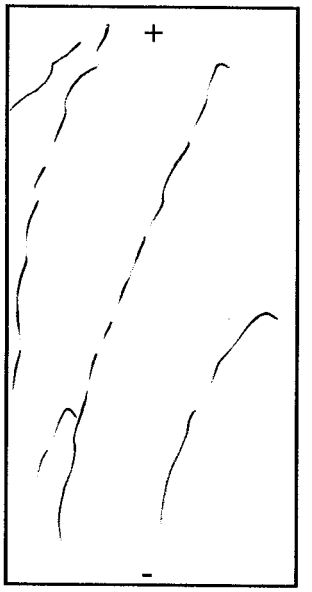
$\sigma_3 = 1000$ psi

$$\gamma = \frac{W}{V} \times \frac{1728}{454}$$

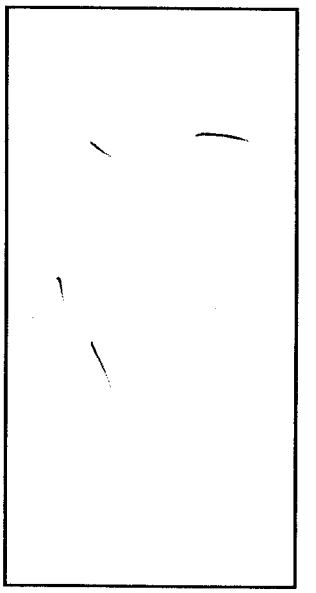
Comments: _____

Sample Number:_____

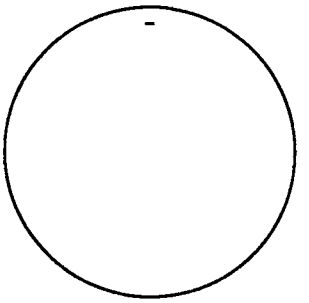




Front



Back

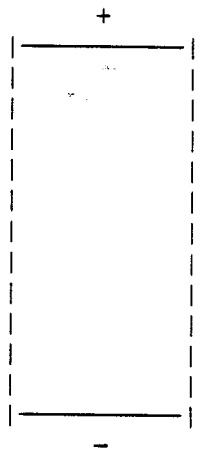


Solid Line: Pre-existing Structure
Dashed Line: Post-Failure

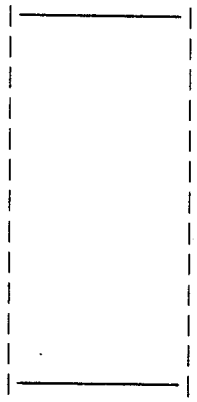
Triaxial Compression Test Results

Sample Number: U-012
Hole Number: IFM95-C1-5
Depth:
Rock Type:
Equipment Used: Caliper (0.001") SBEL

Job: CNWRA
Location:
Prepped By/Date: RW 5/7/94
Tested By/Date: RW 5/13/94
Reviewed By/Date: M. Bridges 6/2/94



PREFAILURE SKETCH



POSTFAILURE

Sample Dimension Checks:

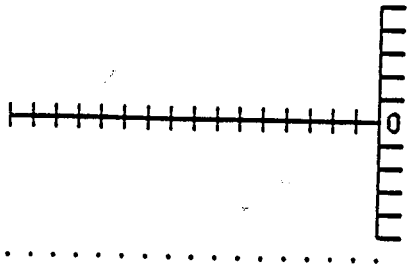
1. Smoothness
   Δ_0 = 0.120 − 0.098 = 0.022 in Δ_{90} = 0.119 − 0.098 = 0.021 in
   Δ_{180} = 0.105 − 0.080 = 0.025 in Δ_{270} = 0.097 − 0.081 = 0.016 in

2. Perpendicularity
   Δ_1 = 0.099 − 0.092 = 0.007 in Δ_2 = 0.097 − 0.094 = 0.003 in
   Δ'_1 = 0.101 − 0.101 = 0 in Δ'_2 = 0.103 − 0.097 = 0.006 in

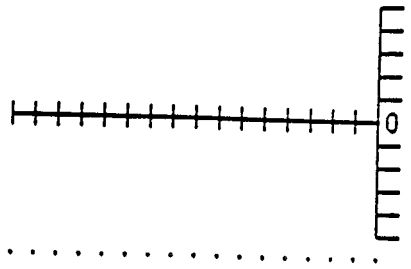
3. Diameter
   D_1 = 1.852 in D_2 = 1.852 in
   D_3 = 1.855 in D_4 = 1.856 in
   D_5 = 1.854 in D_6 = 1.857 in

4. Height
   H_1 = 4.055 in H_2 = 4.055 in
   H_3 = 4.056 in H_4 = 4.056 in

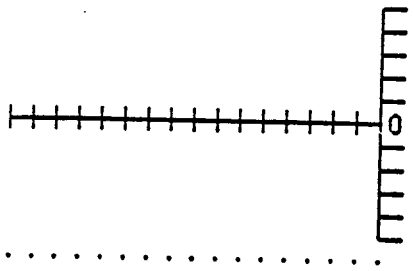
Sample Number: _____



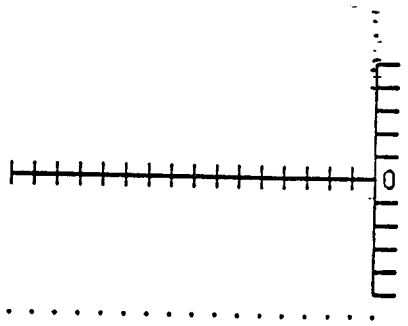
Maximum slope: _____



Maximum slope: _____



Maximum slope: _____



Maximum slope: _____

Avg. Diameter (in): 1.354
Avg. Height (in): 4.056
Area (in^2): 2.700
Volume (in^3): 10.95
Weight (g): 411.62
Density (lb/ft^3): 163.94

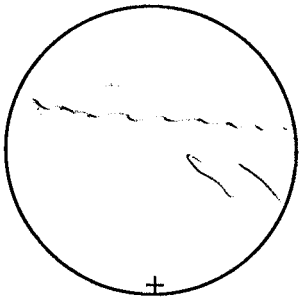
Disp. Rate (in/s): 0.000295
Gauge Reading (lb): 7.0×10^4
Gauge Correction (lb): _____
Failure Load (lb): 7.0×10^4
Failure Stress (psi): 25,925.93
178.76

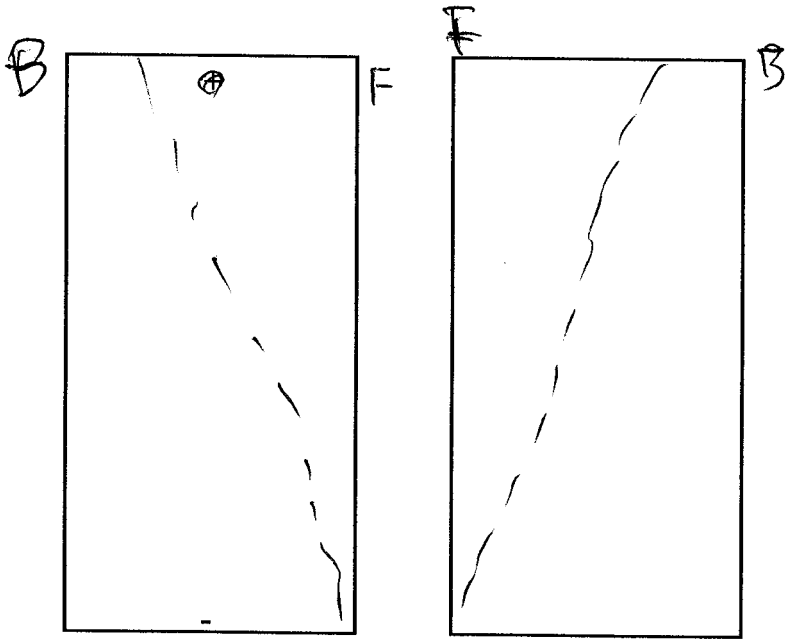
$$\gamma = \frac{W}{V} \times \frac{1728}{454}$$

$\sigma_3 = 500$ psi

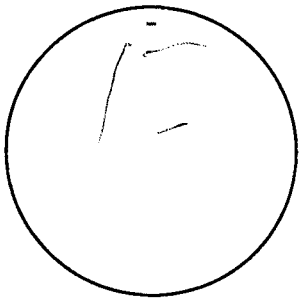
Comments: _____

Sample Number:_____





Front Back



Solid Line: Pre-existing Structure
Dashed Line: Post-Failure

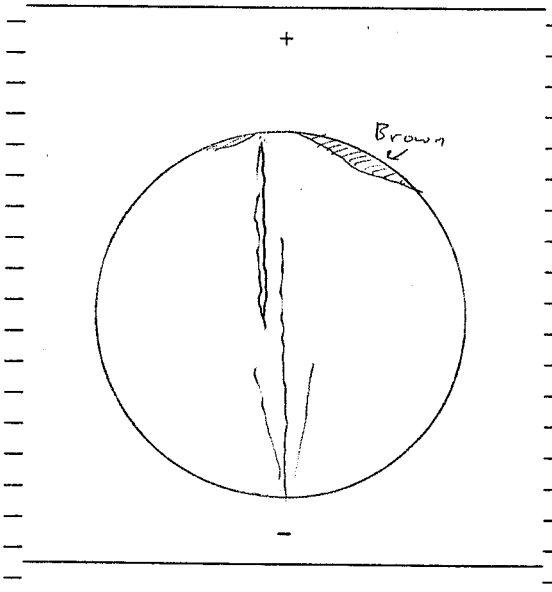
Brazilian Disk Tension Test Data

Job: CNWRA
Location: LFM95-C2-6
Sample Number: B-011
Load Rate (~~lb/s~~): 0.0002 in/s
Equipment Used: Caliper (0.001") SBEL

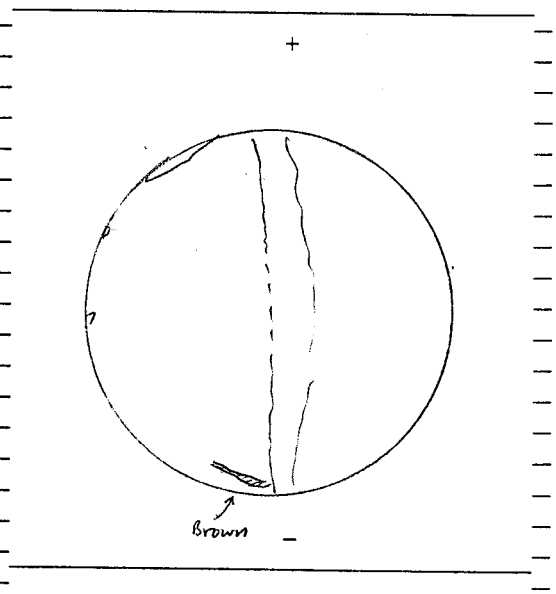
Prepped By/Date: RW 5/2/94
Tested By/Date: M. Bridges 5/20/94
Reviewed By/Date: S. Jean 6-2-94

D_0	1.865	in	L_+	1.017	in
D_{60}	1.857	in	L_{MID}	1.010	in
D_{120}	1.861	in	L_-	1.011	in
D_{AVG}	1.861	in	L_{AVG}	1.013	in
P	6000	lb	P_C	6000	lb
T	2026.2 (2030)	psi			

Front View



Rear View



SYMBOLS

D = Diameter
L = Thickness
P = Failure Load
P_C = Corrected Load
T = Tensile Strength

——— Pre-existing Weakness plane
----- Postfailure Fracture
----- Failure along Pre-existing Weakness plane

$$T = \frac{2P_c}{\pi DL}$$

Sample B-011

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.105 − 0.095 = 0.010 in

Δ_{180} = 0.104 − 0.095 = 0.009 in

Δ_{90} = 0.110 − 0.095 = 0.015 in

Δ_{270} = 0.100 − 0.091 = 0.009 in

2. Perpendicularity

Δ_1 = 0.124 − 0.095 = 0.029 in

Δ'_1 = 0.119 − 0.101 = 0.018 in

Δ_2 = 0.118 − 0.105 = 0.013 in

Δ'_2 = 0.125 − 0.095 = 0.03 in

Maximum deviation from perpendicularity _____ °

Maximum deviation from parallelism _____ °

Comments: _____

Brazilian Disk Tension Test Data

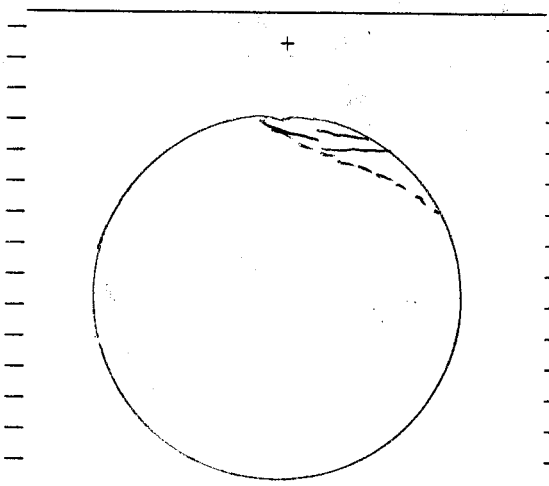
Job: CNWRA
Location: LFM 95-02-2
Sample Number: B-029
Load Rate (lb/s): 0.000217 in/sec
Equipment Used: caliper (0.001")

Prepped By/Date: RW 5/8/94
Tested By/Date: M. Bridges / S. Jeon 6/1/94
Reviewed By/Date: S. Jeon / 6-2-94

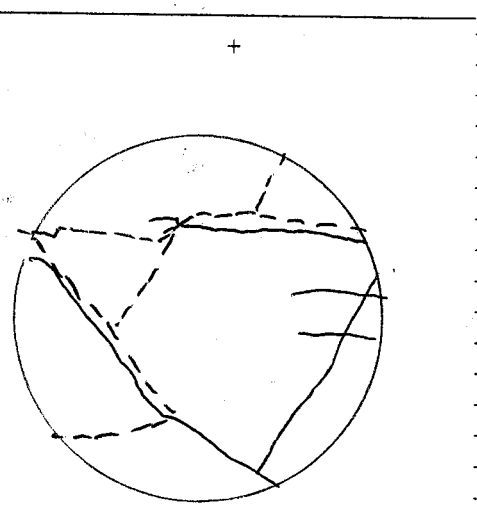
SBEL

D_0	1.357	in	L_+	1.163	in
D_{60}	1.365	in	L_{MID}	1.161	in
D_{120}	1.360	in	L_-	1.160	in
D_{AVG}	1.861	in	L_{AVG}	1.161	in
P	7480	lb	P_C	7480	lb
T	2204.0 (2200)	psi			

Front View



Rear View



SYMBOLS

D = Diameter
L = Thickness
P = Failure Load
P_C = Corrected Load
T = Tensile Strength

——— Pre-existing Weakness plane
----- Postfailure Fracture
═══ Failure along Pre-existing Weakness plane

$$T = \frac{2P_c}{\pi DL}$$

Sample B-029

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.100 - 0.097 = 0.003 in Δ_{90} = 0.102 - 0.099 = 0.003 in

Δ_{180} = 0.100 - 0.098 = 0.002 in Δ_{270} = 0.102 - 0.099 = 0.003 in

2. Perpendicularity

Δ_1 = 0.129 - 0.116 = 0.013 in Δ_2 = 0.129 - 0.114 = 0.015 in

Δ'_1 = 0.129 - 0.114 = 0.015 in Δ'_2 = 0.106 - 0.100 = 0.006 in

Maximum deviation from perpendicularity _____ °

Maximum deviation from parallelism _____ °

Comments: _____

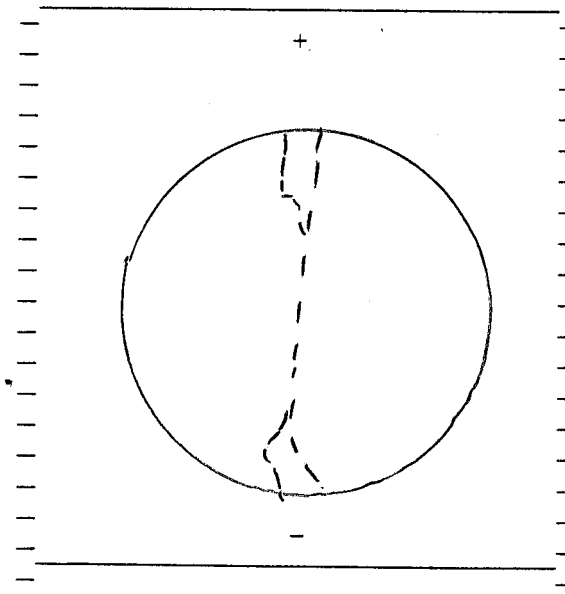
Brazilian Disk Tension Test Data

Job: CNWRA
Location: LFM95 C-4
Sample Number: B-031
Load Rate (lb/s): 0.000217 in/sec
Equipment Used: cal: per (0.001")

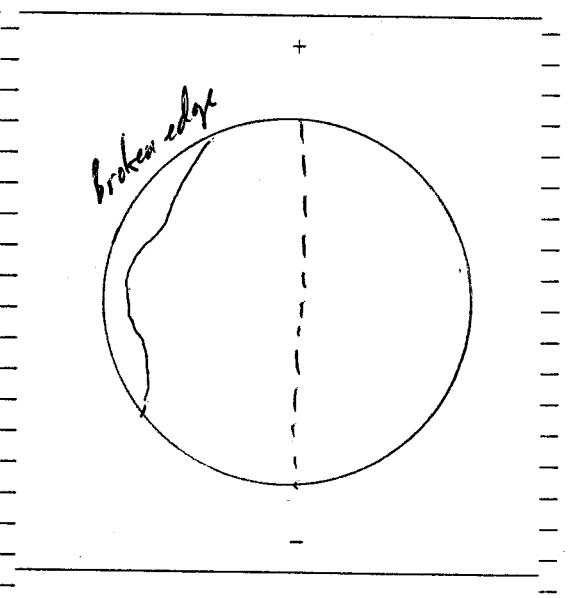
Prepped By/Date: RW 5/10/94
Tested By/Date: M. Bridges/S. Sean 6/1/94
Reviewed By/Date: S. Sean/6-2-94
SBEL

D_0	1.862	in	L_+	1.164	in
D_{60}	1.861	in	L_{MID}	1.220	in
D_{120}	1.861	in	L_-	1.265	in
D_{AVG}	1.861	in	L_{AVG}	1.216	in
P	5040	lb	P_C	5040	lb
T	1417.9 (1420)	psi			

Front View



Rear View



SYMBOLS

D = Diameter
L = Thickness
P = Failure Load
P_C = Corrected Load
T = Tensile Strength

——— Pre-existing Weakness plane
----- Postfailure Fracture
----- Failure along Pre-existing Weakness plane

$$T = \frac{2P_c}{\pi DL}$$

Sample B-031

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.092 − 0.091 = 0.001 in Δ_{90} = 0.091 − 0.090 = 0.001 in

Δ_{180} = 0.092 − 0.090 = 0.002 in Δ_{270} = 0.091 − 0.089 = 0.002 in

2. Perpendicularity

Δ_1 = 0.106 − 0.102 = 0.004 in Δ_2 = 0.165 − 0.065 = 0.1 in

Δ'_1 = 0.107 − 0.102 = 0.005 in Δ'_2 = 0.163 − 0.068 = 0.095 in

Maximum deviation from perpendicularity _____ °

Maximum deviation from parallelism _____ °

Comments: _____

Brazilian Disk Tension Test Data

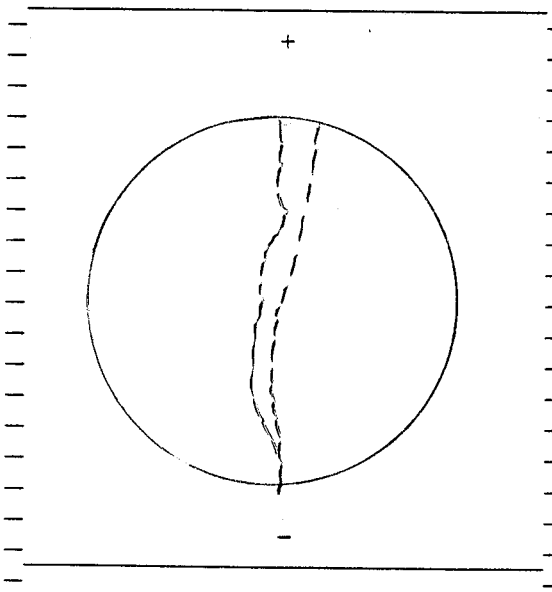
Job: CNWRA
Location: LFM 57-73
Sample Number: B-032
Load Rate (lb/s): 0.00021 in/sec
Equipment Used: caliper (0.001")

Prepped By/Date: RW 5/9/94
Tested By/Date: M. Bridges/S. Jeon 6/1/94
Reviewed By/Date: S. Jeon/6-2-94

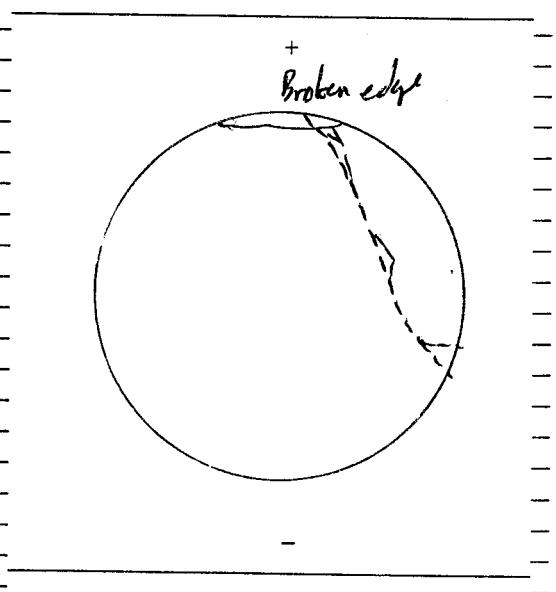
SBEL

D_0	1.878	in	L_+	1.461	in
D_{60}	1.872	in	L_{MID}	1.471	in
D_{120}	1.871	in	L_-	1.498	in
D_{AVG}	1.874	in	L_{AVG}	1.482	in
P	8840	lb	P_C	8840	lb
T	2026.4 (2030)	psi			

Front View



Rear View



SYMBOLS

D = Diameter
L = Thickness
P = Failure Load
P_C = Corrected Load
T = Tensile Strength

——— Pre-existing Weakness plane
----- Postfailure Fracture
----- Failure along Pre-existing Weakness plane

$$T = \frac{2P_c}{\pi DL}$$

Sample B-032

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.109 - 0.108 = 0.001 in Δ_{90} = 0.108 - 0.108 = 0 in

Δ_{180} = 0.107 - 0.108 = 0.001 in Δ_{270} = 0.108 - 0.107 = 0 in

2. Perpendicularity

Δ_1 = 0.108 - 0.078 = 0.03 in Δ_2 = 0.110 - 0.069 = 0.041 in

Δ'_1 = 0.110 - 0.079 = 0.031 in Δ'_2 = 0.109 - 0.075 = 0.034 in

Maximum deviation from perpendicularity _____ °

Maximum deviation from parallelism _____ °

Comments: _____

Brazilian Disk Tension Test Data

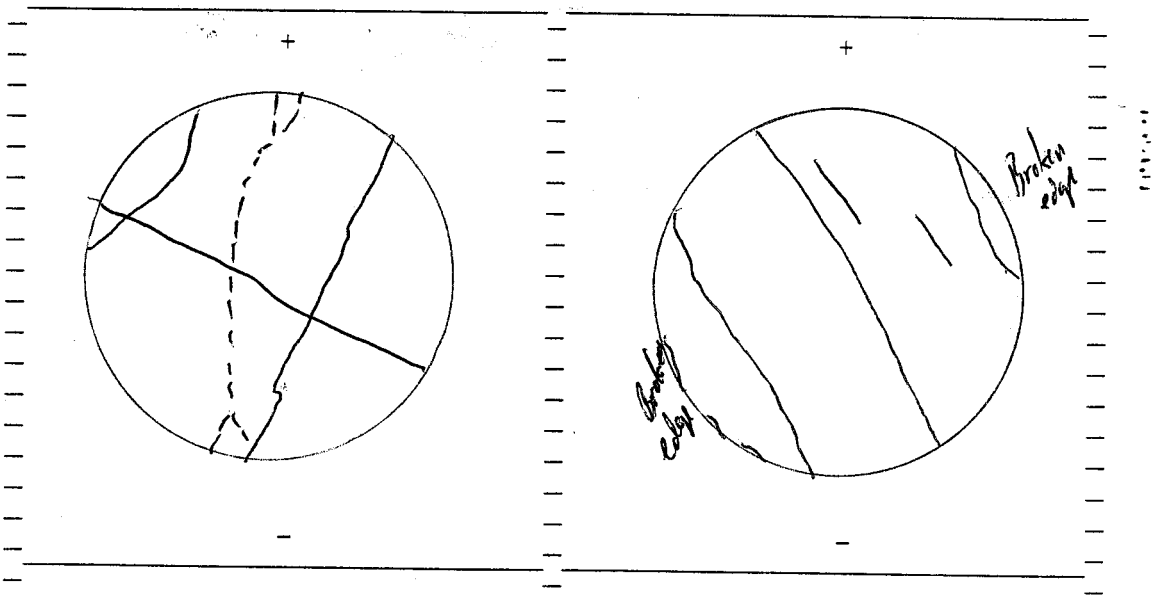
Job: CNWRA
Location: LFM 57-73
Sample Number: B-035
Load Rate (lb/s): 0.000219 in/sec
Equipment Used: caliper (0.001")

Prepped By/Date: RW 5/9/94
Tested By/Date: S. Jeon / M. Bridges 6/1/94
Reviewed By/Date: S. Jeon / 6-2-94

SBEL

D_0	1.868	in	L_+	1.422	in
D_{60}	1.871	in	L_{MID}	1.440	in
D_{120}	1.872	in	L_-	1.449	in
D_{AVG}	1.870	in	L_{AVG}	1.437	in
P	4320	lb	P_C	4320	lb
T	1023.4 (1020)	psi			

Front View



Rear View

SYMBOLS

D = Diameter
L = Thickness
P = Failure Load
P_C = Corrected Load
T = Tensile Strength

——— Pre-existing Weakness plane
----- Postfailure Fracture
----- Failure along Pre-existing Weakness plane

$$T = \frac{2P_c}{\pi DL}$$

Sample B-035

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.104 − 0.102 = 0.002 in Δ_{90} = 0.104 − 0.103 = 0.001 in

Δ_{180} = 0.105 − 0.102 = 0.003 in Δ_{270} = 0.105 − 0.103 = 0.002 in

2. Perpendicularity

Δ_1 = 0.161 − 0.121 = 0.04 in Δ_2 = 0.158 − 0.130 = 0.028 in

Δ'_1 = 0.165 − 0.122 = 0.043 in Δ'_2 = 0.165 − 0.138 = 0.027 in

Maximum deviation from perpendicularity _____ °

Maximum deviation from parallelism _____ °

Comments: _____

Brazilian Disk Tension Test Data

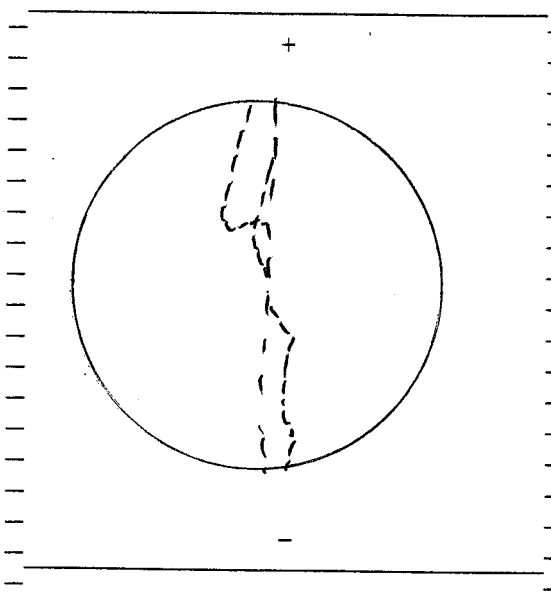
Job: CNWRA
Location: 1EM 57-73
Sample Number: B-037
Load Rate (lb/s): 0.000217 in/sec
Equipment Used: caliper (0.001")

Prepped By/Date: RW 5/9/94
Tested By/Date: M. Bridges/S. Jean 6/1/94
Reviewed By/Date: S. Jean/6-2-94

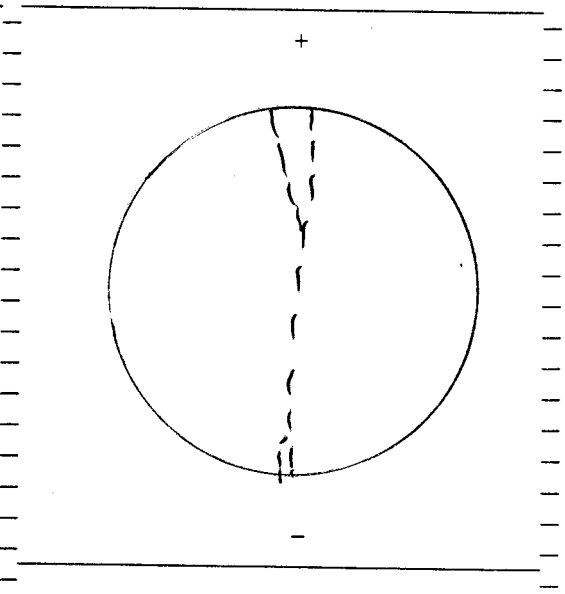
SBEL

D_0	1.873	in	L_+	1.478	in
D_{60}	1.870	in	L_{MID}	1.483	in
D_{120}	1.871	in	L_-	1.453	in
D_{AVG}	1.871	in	L_{AVG}	1.471	in
P	4000	lb	P_C	4000	lb
T	925.2 (930)	psi			

Front View



Rear View



SYMBOLS

D = Diameter
L = Thickness
P = Failure Load
P_C = Corrected Load
T = Tensile Strength

——— Pre-existing Weakness plane
----- Postfailure Fracture
===== Failure along Pre-existing Weakness plane

$$T = \frac{2P_c}{\pi DL}$$

Sample 8-037

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.103 - 0.103 = 0 in Δ_{90} = 0.105 - 0.103 = 0.002 in

Δ_{180} = 0.103 - 0.102 = 0.001 in Δ_{270} = 0.103 - 0.102 = 0.001 in

2. Perpendicularity

Δ_1 = 0.081 - 0.077 = 0.004 in Δ_2 = 0.086 - 0.061 = 0.025 in

Δ'_1 = 0.015 - 0.081 = 0.006 in Δ'_2 = 0.095 - 0.064 = 0.031 in

Maximum deviation from perpendicularity _____ °

Maximum deviation from parallelism _____ °

Comments: _____

Brazilian Disk Tension Test Data

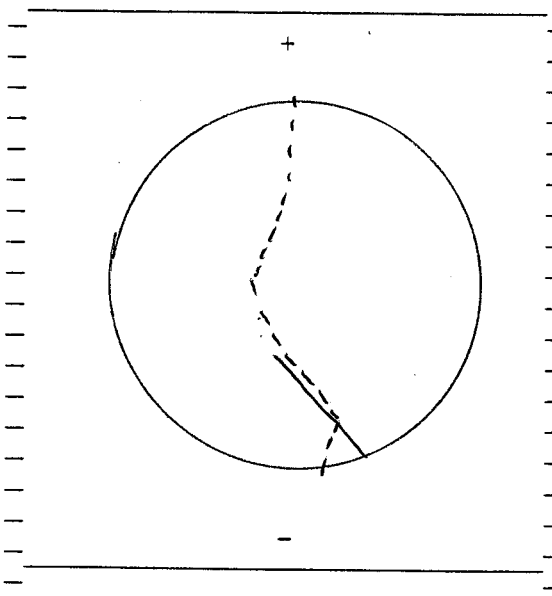
Job: CNWRA
Location: LFM 57-73
Sample Number: B-040a
Load Rate (lb/s): 0.000217 in/sec
Equipment Used: Caliper (0.001")

Prepped By/Date: RW 5/10/94
Tested By/Date: M. Bridges / S. Jean 6/1/94
Reviewed By/Date: S. Jean / 6-2-94

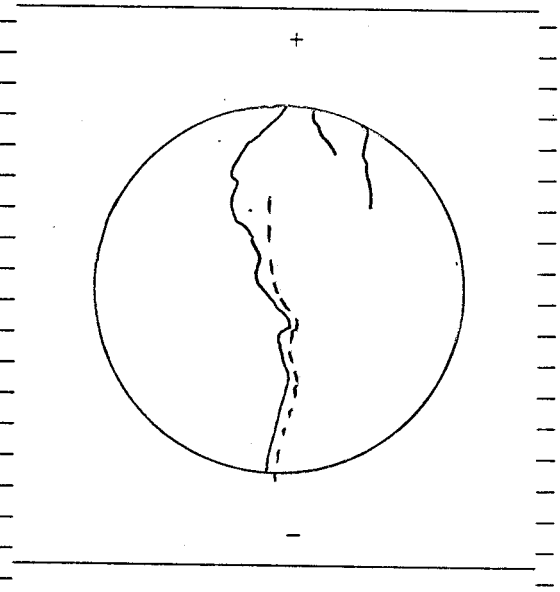
SBEL

D_0	1.868	in	L_+	1.508	in
D_{60}	1.870	in	L_{MID}	1.492	in
D_{120}	1.870	in	L_-	1.468	in
D_{AVG}	1.869	in	L_{AVG}	1.489	in
P	7280	lb	P_C	7280	lb
T	1665.4 (1670)	psi			

Front View



Rear View



SYMBOLS

D = Diameter
L = Thickness
P = Failure Load
P_C = Corrected Load
T = Tensile Strength

——— Pre-existing Weakness plane
----- Postfailure Fracture
----- Failure along Pre-existing Weakness plane

$$T = \frac{2P_c}{\pi DL}$$

Sample B-040a

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.103 - 0.100 = 0.003 in

Δ_{180} = 0.103 - 0.100 = 0.003 in

Δ_{90} = 0.103 - 0.098 = 0.005 in

Δ_{270} = 0.105 - 0.099 = 0.006 in

2. Perpendicularity

Δ_1 = 0.097 - 0.092 = 0.005 in

Δ'_1 = 0.110 - 0.099 = 0.011 in

Δ_2 = 0.118 - 0.072 = 0.05 in

Δ'_2 = 0.129 - 0.075 = 0.054 in

Maximum deviation from perpendicularity _____ °

Maximum deviation from parallelism _____ °

Comments: _____

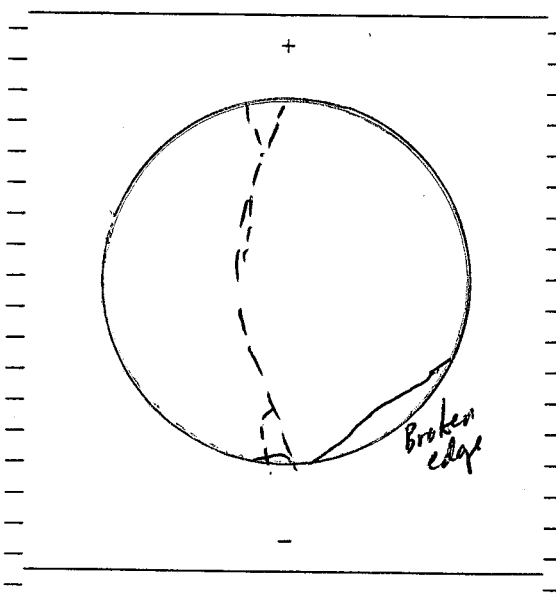
Brazilian Disk Tension Test Data

Job: CNWRA
Location: LFM 51-73
Sample Number: B-042
Load Rate (lb/s): 0.000217 in/sec
Equipment Used: caliper (0.001") SBEL

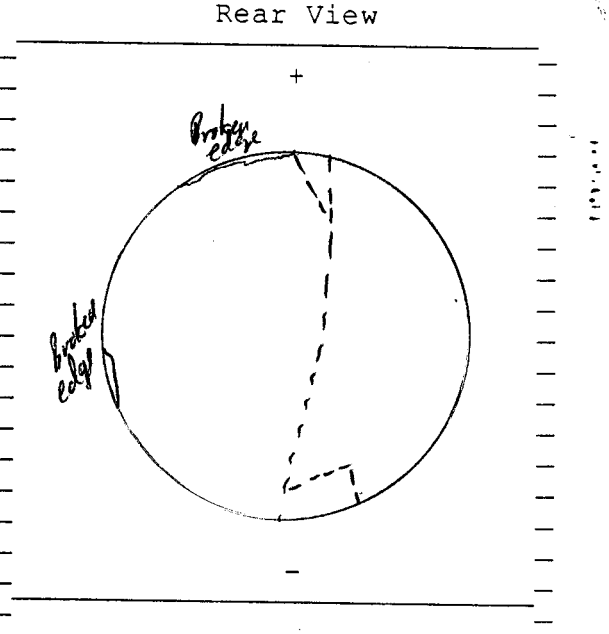
Prepped By/Date: RW 5/9/94
Tested By/Date: A. Bridges / S. Jeon 6/1/94
Reviewed By/Date: S. Jeon / 6-2-94

D_0	1.862	in	L_+	1.471	in
D_{60}	1.862	in	L_{MID}	1.462	in
D_{120}	1.862	in	L_-	1.442	in
D_{AVG}	1.862	in	L_{AVG}	1.458	in
P	6280	lb	P_C	6280	lb
T	1472.7 (1470)	psi			

Front View



Rear View



SYMBOLS

D = Diameter
L = Thickness
P = Failure Load
P_C = Corrected Load
T = Tensile Strength

——— Pre-existing Weakness plane
----- Postfailure Fracture
----- Failure along Pre-existing Weakness plane

$$T = \frac{2P_c}{\pi DL}$$

Sample B-042

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.100 - 0.094 = 0.006 in

Δ_{180} = 0.098 - 0.094 = 0.004 in

Δ_{90} = 0.099 - 0.093 = 0.006 in

Δ_{270} = 0.099 - 0.094 = 0.005 in

2. Perpendicularity

Δ_1 = 0.087 - 0.045 = 0.042 in

Δ'_1 = 0.085 - 0.038 = 0.047 in

Δ_2 = 0.078 - 0.053 = 0.025 in

Δ'_2 = 0.080 - 0.054 = 0.026 in

Maximum deviation from perpendicularity _____ °

Maximum deviation from parallelism _____ °

Comments: _____

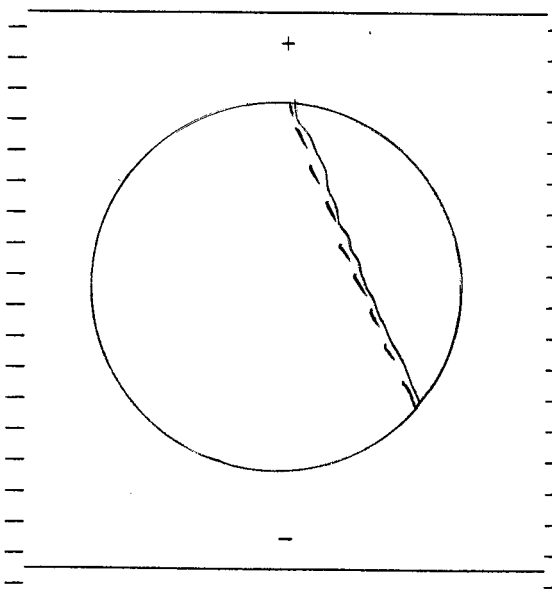
Brazilian Disk Tension Test Data

Job: CNW RA
Location: LFM57-73
Sample Number: B-045
Load Rate (lb/s): 0.000217 in/sec
Equipment Used: caliper (0.001") SBEL

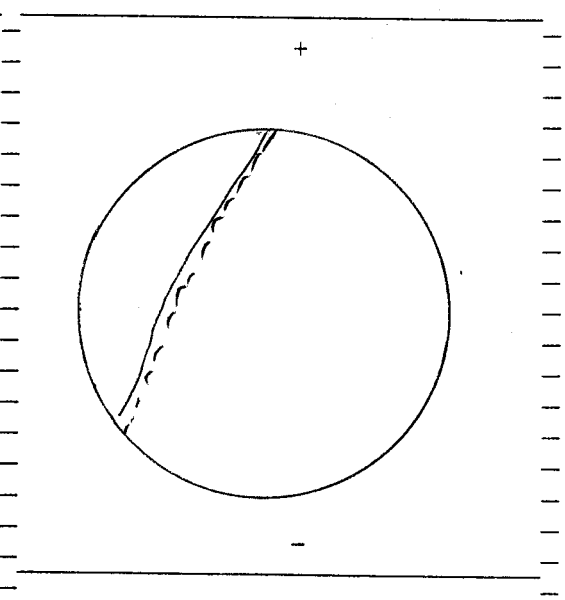
Prepped By/Date: RW 5/10/94
Tested By/Date: M. Bridges/S. Jeon 6/1/94
Reviewed By/Date: S. Jeon/6-2-94

D_0	1.873	in	L_+	1.516	in
D_{60}	1.877	in	L_{MID}	1.527	in
D_{120}	1.878	in	L_-	1.528	in
D_{AVG}	1.876	in	L_{AVG}	1.524	in
P	7400	lb	P_C	7400	lb
T	1647.8 (1650)	psi			

Front View



Rear View



SYMBOLS

D = Diameter
L = Thickness
P = Failure Load
P_C = Corrected Load
T = Tensile Strength

——— Pre-existing Weakness plane
----- Postfailure Fracture
===== Failure along Pre-existing Weakness plane

$$T = \frac{2P_c}{\pi DL}$$

Sample 8-045

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.107 - 0.107 = 0 in

Δ_{180} = 0.101 - 0.100 = 0.001 in

Δ_{90} = 0.102 - 0.102 = 0 in

Δ_{270} = 0.103 - 0.102 = 0.001 in

2. Perpendicularity

Δ_1 = 0.121 - 0.110 = 0.011 in

Δ'_1 = 0.119 - 0.114 = 0.005 in

Δ_2 = 0.121 - 0.112 = 0.009 in

Δ'_2 = 0.126 - 0.112 = 0.014 in

Maximum deviation from perpendicularity _____ °

Maximum deviation from parallelism _____ °

Comments: _____

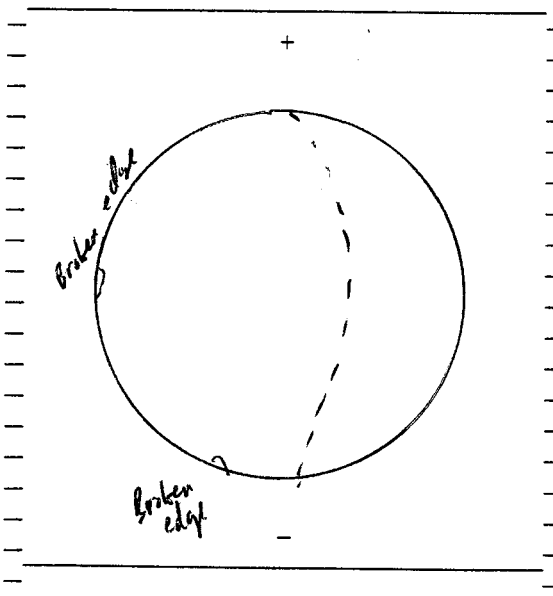
Brazilian Disk Tension Test Data

Job: CNWRA
Location: LFM 57-73
Sample Number: B-046a
Load Rate (lb/s): 0.000217 in/sec
Equipment Used: caliper (0.001") / SBEL

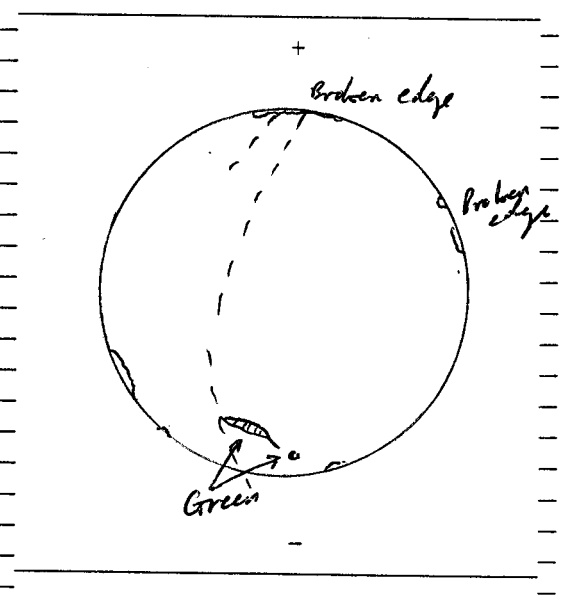
Prepped By/Date: RW 5/10/94
Tested By/Date: M. Bridges / S. Jeon 6/1/94
Reviewed By/Date: S. Jeon 6-2-94

D_0	1.868	in	L_+	1.482	in
D_{60}	1.872	in	L_{MID}	1.481	in
D_{120}	1.867	in	L_-	1.455	in
D_{AVG}	1.869	in	L_{AVG}	1.473	in
P	11,000	lb	P_C	11000	lb
T	2543.7 (2540)	psi			

Front View



Rear View



SYMBOLS

D = Diameter
L = Thickness
P = Failure Load
P_C = Corrected Load
T = Tensile Strength

——— Pre-existing Weakness plane
----- Postfailure Fracture
----- Failure along Pre-existing Weakness plane

$$T = \frac{2P_c}{\pi DL}$$

Sample B-046a

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.119 - 0.118 = 0.001 in

Δ_{180} = 0.118 - 0.117 = 0.001 in

Δ_{90} = 0.118 - 0.118 = 0 in

Δ_{270} = 0.118 - 0.117 = 0.001 in

2. Perpendicularity

Δ_1 = 0.100 - 0.052 = 0.048 in

Δ'_1 = 0.097 - 0.057 = 0.04 in

Δ_2 = 0.091 - 0.059 = 0.032 in

Δ'_2 = 0.097 - 0.059 = 0.038 in

Maximum deviation from perpendicularity _____ °

Maximum deviation from parallelism _____ °

Comments: _____

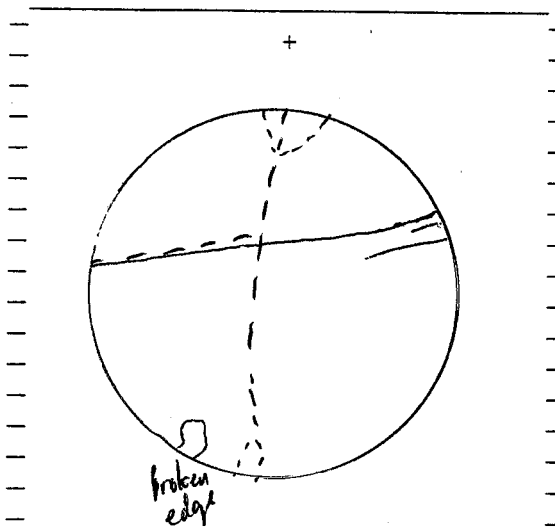
Brazilian Disk Tension Test Data

Job: CNWRA
Location: LFM 51-73
Sample Number: B-047
Load Rate (lb/s): 0.000217 in/sec
Equipment Used: Caliper (0.001") SBEL

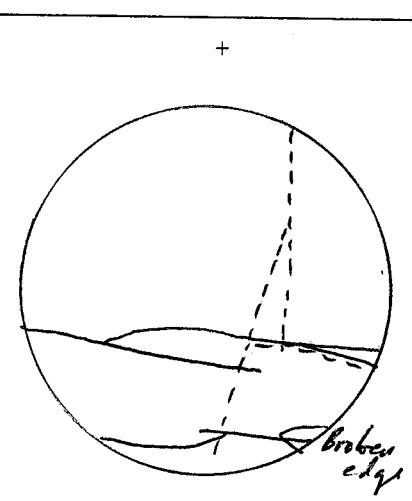
Prepped By/Date: RW 5/10/94
Tested By/Date: M. Bridges / S. Jean 6/1/94
Reviewed By/Date: S. Jean / 6-2-94

D_0	1.873	in	L_+	1.489	in
D_{60}	1.875	in	L_{MID}	1.498	in
D_{120}	1.874	in	L_-	1.499	in
D_{AVG}	1.874	in	L_{AVG}	1.495	in
P	5680	lb	P_C	5680	lb
T	1290.7 (1290)	psi			

Front View



Rear View



SYMBOLS

D = Diameter
L = Thickness
P = Failure Load
P_C = Corrected Load
T = Tensile Strength

——— Pre-existing Weakness plane
----- Postfailure Fracture
----- Failure along Pre-existing Weakness plane

$$T = \frac{2P_c}{\pi DL}$$

Sample B-047

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.129 - 0.128 = 0.001 in

Δ_{180} = 0.129 - 0.129 = 0 in

Δ_{90} = 0.130 - 0.130 = 0 in

Δ_{270} = 0.130 - 0.129 = 0.001 in

2. Perpendicularity

Δ_1 = 0.105 - 0.092 = 0.013 in

Δ'_1 = 0.111 - 0.092 = 0.009 in

Δ_2 = 0.104 - 0.094 = 0.01 in

Δ'_2 = 0.106 - 0.095 = 0.011 in

Maximum deviation from perpendicularity _____ °

Maximum deviation from parallelism _____ °

Comments: _____

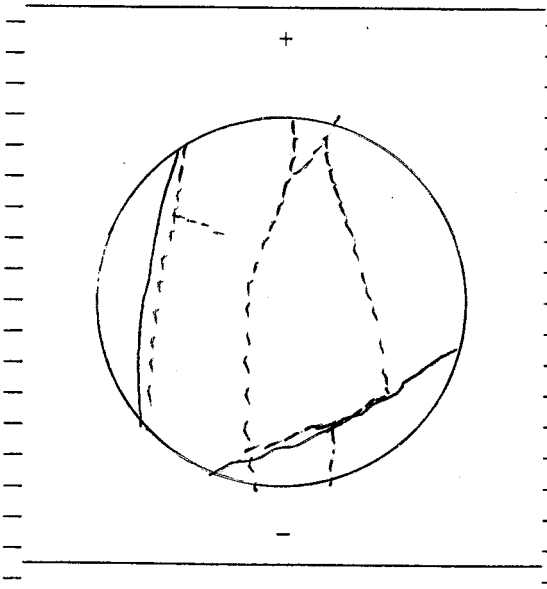
Brazilian Disk Tension Test Data

Job: CNWRA
Location: LFM 57-73
Sample Number: B-048
Load Rate (lb/s): 0.000217 in/sec
Equipment Used: Caliper (0.001") SBEL

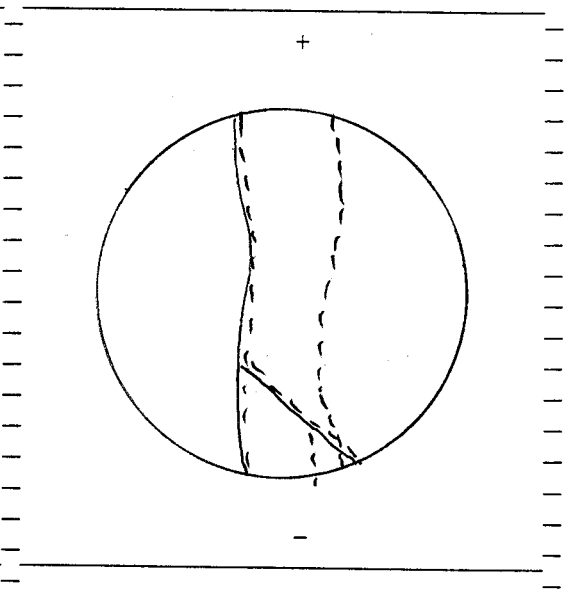
Prepped By/Date: RW 5/10/94
Tested By/Date: M. Bridges/S. Jeon 6/1/94
Reviewed By/Date: S. Jeon/6-2-94

D_0	1.870	in	L_+	1.420	in
D_{60}	1.872	in	L_{MID}	1.416	in
D_{120}	1.872	in	L_-	1.390	in
D_{AVG}	1.871	in	L_{AVG}	1.409	in
P	6320	lb	P_C	6320	lb
T	1526.2 (1530)	psi			

Front View



Rear View



SYMBOLS

D = Diameter
L = Thickness
P = Failure Load
P_C = Corrected Load
T = Tensile Strength

——— Pre-existing Weakness plane
----- Postfailure Fracture
----- Failure along Pre-existing Weakness plane

$$T = \frac{2P_c}{\pi DL}$$

Sample B-048

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.105 - 0.105 = 0 in

Δ_{180} = 0.105 - 0.104 = 0.001 in

Δ_{90} = 0.105 - 0.105 = 0 in

Δ_{270} = 0.106 - 0.105 = 0.001 in

2. Perpendicularity

Δ_1 = 0.116 - 0.103 = 0.013 in

Δ'_1 = 0.113 - 0.109 = 0.004 in

Δ_2 = 0.125 - 0.088 = 0.037 in

Δ'_2 = 0.122 - 0.089 = 0.033 in

Maximum deviation from perpendicularity _____ °

Maximum deviation from parallelism _____ °

Comments: _____

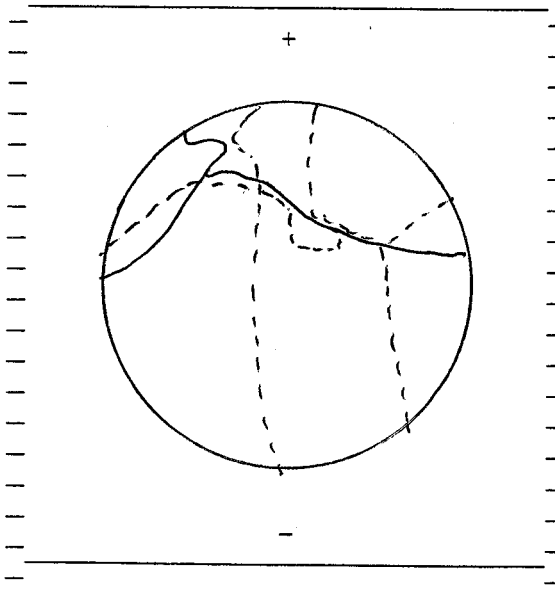
Brazilian Disk Tension Test Data

Job: CNRWA
Location: LFM 57-73
Sample Number: B-050
Load Rate (lb/s): 0.000217 in/sec
Equipment Used: caliper (0.001") SBEL

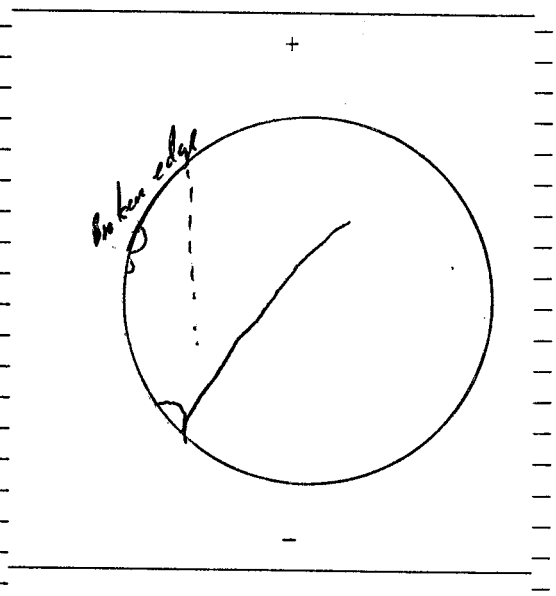
Prepped By/Date: RW 5/10/94
Tested By/Date: M. Bridges/S. Jeon 6/1/94
Reviewed By/Date: S Jeon/ 6-2-94

D_0	1.863	in	L_+	1.843	in
D_{60}	1.866	in	L_{MID}	1.849	in
D_{120}	1.864	in	L_-	1.842	in
D_{AVG}	1.864	in	L_{AVG}	1.845	in
P	6160	lb	P_c	6160	lb
T	1140.3 (1140)	psi			

Front View



Rear View



SYMBOLS

D = Diameter
L = Thickness
P = Failure Load
P_c = Corrected Load
T = Tensile Strength

_____ Pre-existing Weakness plane
----- Postfailure Fracture
----- Failure along Pre-existing Weakness plane

$$T = \frac{2P_c}{\pi DL}$$

Sample B-050

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.108 − 0.108 = 0 in

Δ_{180} = 0.108 − 0.107 = 0.001 in

Δ_{90} = 0.108 − 0.106 = 0.002 in

Δ_{270} = 0.108 − 0.107 = 0.001 in

2. Perpendicularity

Δ_1 = 0.060 − 0.035 = 0.025 in

Δ'_1 = 0.055 − 0.035 = 0.02 in

Δ_2 = 0.055 − 0.049 = 0.006 in

Δ'_2 = 0.052 − 0.049 = 0.003 in

Maximum deviation from perpendicularity _____ °

Maximum deviation from parallelism _____ °

Comments: _____

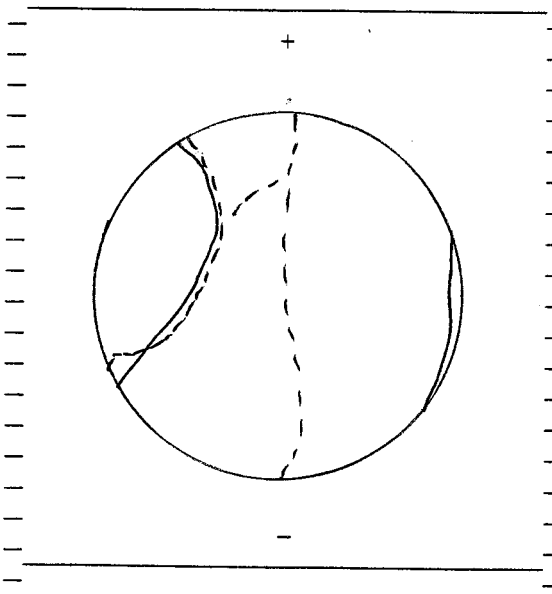
Brazilian Disk Tension Test Data

Job: CNWRA
Location: LFM 57-73
Sample Number: B-051
Load Rate (lb/s): 0.000217 in/sec
Equipment Used: caliper (0.001")/SBEL

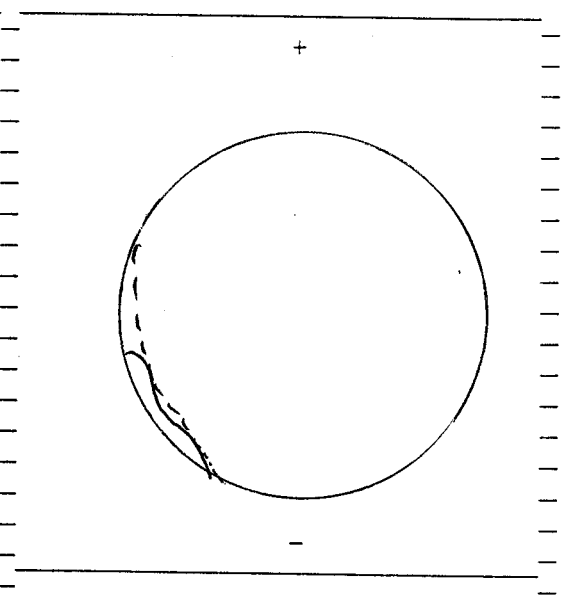
Prepped By/Date: RW 5/10/94
Tested By/Date: M. Bridges/S. Jeon 6-1-94
Reviewed By/Date: S. Jeon/6-2-94

D_0	1.866	in	L_+	1.491	in
D_{60}	1.866	in	L_{MID}	1.516	in
D_{120}	1.863	in	L_-	1.520	in
D_{AVG}	1.865	in	L_{AVG}	1.509	in
P	2400	lb	P_C	2400	lb
T	542.9 (540)	psi			

Front View



Rear View



SYMBOLS

D = Diameter
L = Thickness
P = Failure Load
P_C = Corrected Load
T = Tensile Strength

——— Pre-existing Weakness plane
----- Postfailure Fracture
----- Failure along Pre-existing Weakness plane

$$T = \frac{2P_c}{\pi DL}$$

Sample B-051

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.110 - 0.110 = 0 in Δ_{90} = 0.110 - 0.110 = 0 in

Δ_{180} = 0.110 - 0.109 = 0.001 in Δ_{270} = 0.109 - 0.108 = 0.001 in

2. Perpendicularity

Δ_1 = 0.115 - 0.110 = 0.005 in Δ_2 = 0.127 - 0.098 = 0.029 in

Δ'_1 = 0.120 - 0.108 = 0.012 in Δ'_2 = 0.126 - 0.098 = 0.028 in

Maximum deviation from perpendicularity _____ °

Maximum deviation from parallelism _____ °

Comments: _____

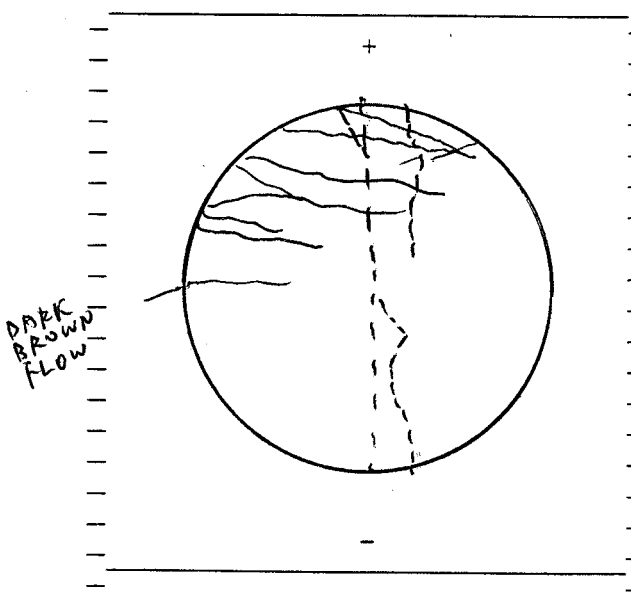
Brazilian Disk Tension Test Data

Job: CNWRA
Location: LFM57-73
Sample Number: B-052
Load Rate (lb/s): 0.000217 in/sec
Equipment Used: Caliper (0.001") SBEL

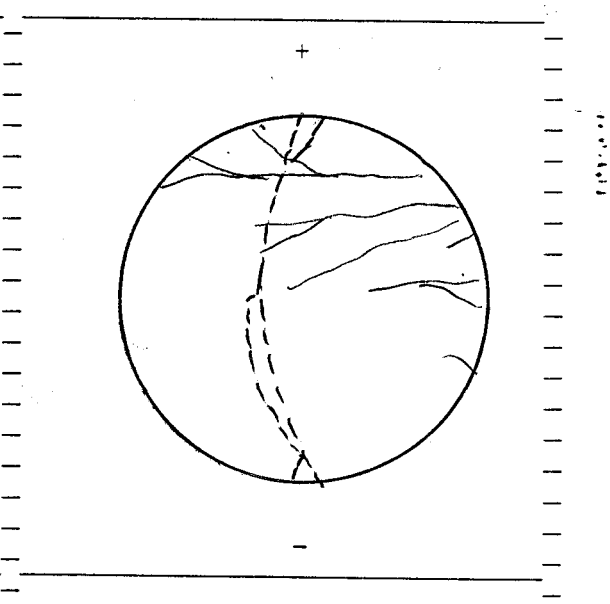
Prepped By/Date: S. Jeon / 5-27-94
Tested By/Date: M. Bridges / S. Jeon 6/1/94
Reviewed By/Date: S. Jeon / 6-2-94

D_0	1.865	in	L_+	1.491	in
D_{60}	1.867	in	L_{MID}	1.491	in
D_{120}	1.867	in	L_-	1.501	in
D_{AVG}	1.866	in	L_{AVG}	1.494	in
P	11000	lb	P_C	11000	lb
T	2511.9 (2510)	psi			

Front View



Rear View



SYMBOLS

D = Diameter
L = Thickness
P = Failure Load
P_C = Corrected Load
T = Tensile Strength

——— Pre-existing Weakness plane
----- Postfailure Fracture
===== Failure along Pre-existing Weakness plane

$$T = \frac{2P_c}{\pi DL}$$

Sample B-052

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.001 − 0.000 = 0.001 in

Δ_{180} = 0.001 − 0.000 = 0.001 in

Δ_{90} = 0.001 − 0.000 = 0.001 in

Δ_{270} = 0.000 − 0.010 = 0.000 in

2. Perpendicularity

Δ_1 = ~~0.002~~ 1.002 − 0.982 = 0.020 in

Δ'_1 = 1.000 − 0.989 = 0.011 in

Δ_2 = 1.002 − 0.993 = 0.009 in

Δ'_2 = 1.000 − 0.987 = 0.013 in

Maximum deviation from perpendicularity _____ °

Maximum deviation from parallelism _____ °

Comments: _____

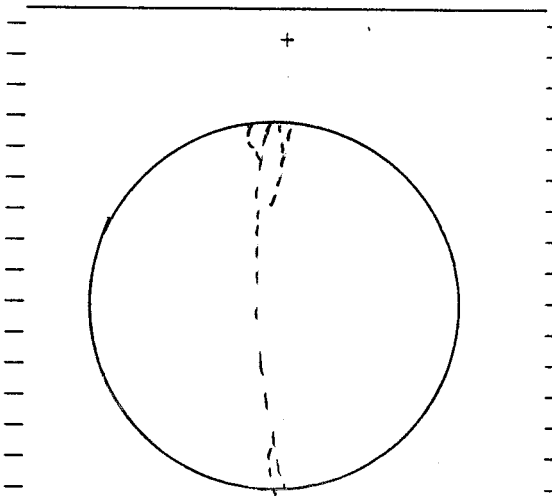
Brazilian Disk Tension Test Data

Job: CNWRA
Location: LFM 57-73
Sample Number: B-056
Load Rate (lb/s): 0.000217 in/sec
Equipment Used: caliper (0.001") / SBEL

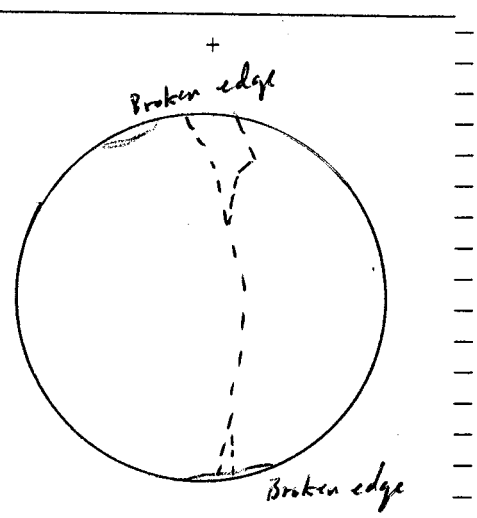
Prepped By/Date: RW 5/10/94
Tested By/Date: M. Bridges / S. Jeon 6/1/94
Reviewed By/Date: S. Jeon 6-2-94

D_0	1.872	in	L_+	1.469	in
D_{60}	1.872	in	L_{MID}	1.482	in
D_{120}	1.872	in	L_-	1.488	in
D_{AVG}	1.872	in	L_{AVG}	1.480	in
P	8840	lb	P_C	8840	lb
T	2031.3 (2030)	psi			

Front View



Rear View



SYMBOLS

D = Diameter
L = Thickness
P = Failure Load
P_C = Corrected Load
T = Tensile Strength

——— Pre-existing Weakness plane
----- Postfailure Fracture
----- Failure along Pre-existing Weakness plane

$$T = \frac{2P_c}{\pi DL}$$

Sample B-056

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.124 − 0.122 = 0.002 in Δ_{90} = 0.124 − 0.123 = 0.001 in

Δ_{180} = 0.124 − 0.122 = 0.002 in Δ_{270} = 0.123 − 0.121 = 0.002 in

2. Perpendicularity

Δ_1 = 0.114 − 0.051 = 0.063 in Δ_2 = 0.079 − 0.069 = 0.02 in

Δ'_1 = 0.106 − 0.055 = 0.051 in Δ'_2 = 0.091 − 0.067 = 0.024 in

Maximum deviation from perpendicularity _____ °

Maximum deviation from parallelism _____ °

Comments: _____

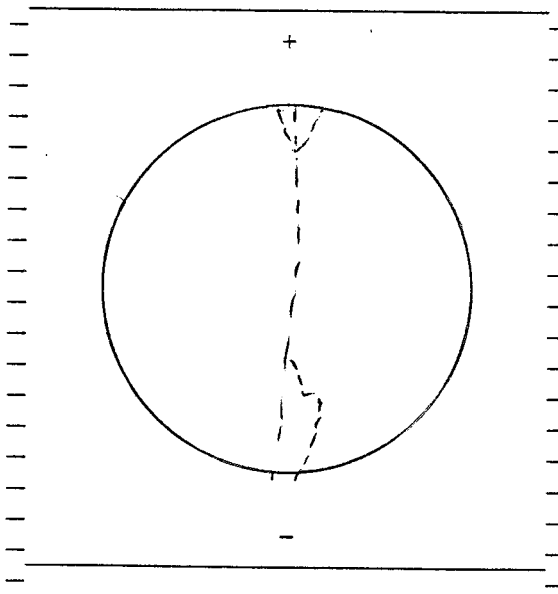
Brazilian Disk Tension Test Data

Job: CNWRA
Location: LEM 57-73
Sample Number: B-057
Load Rate (lb/s): 0.000217 in/sec
Equipment Used: caliper (0.001") / SBEC

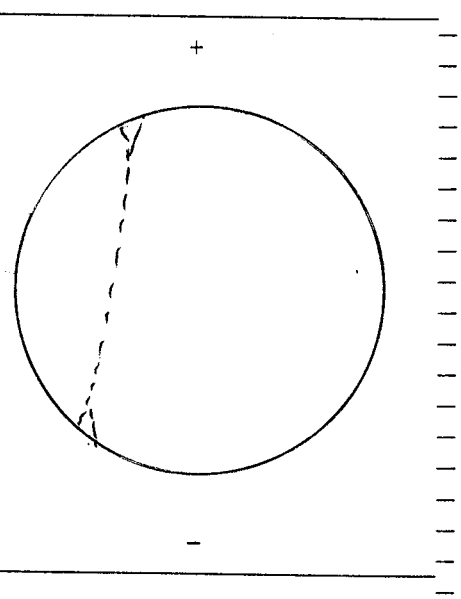
Prepped By/Date: RW 5/10/94
Tested By/Date: M. Bridges / S. Teorn 6/1/94
Reviewed By/Date: S. Teorn / 6-2-94

D_0	1.869	in	L_+	1.465	in
D_{60}	1.871	in	L_{MID}	1.480	in
D_{120}	1.871	in	L_-	1.475	in
D_{AVG}	1.870	in	L_{AVG}	1.473	in
P	5320	lb	P_C	5320	lb
T	1229.6 (1230)	psi			

Front View



Rear View



SYMBOLS

D = Diameter
L = Thickness
P = Failure Load
P_C = Corrected Load
T = Tensile Strength

——— Pre-existing Weakness plane
----- Postfailure Fracture
----- Failure along Pre-existing Weakness plane

$$T = \frac{2P_c}{\pi DL}$$

Sample B-057

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.120 - 0.119 = 0.001 in

Δ_{180} = 0.120 - 0.119 = 0.001 in

Δ_{90} = 0.121 - 0.120 = 0.001 in

Δ_{270} = 0.121 - 0.119 = 0.002 in

2. Perpendicularity

Δ_1 = 0.082 - 0.078 = 0.004 in

Δ'_1 = 0.081 - 0.078 = 0.003 in

Δ_2 = 0.081 - 0.074 = 0.007 in

Δ'_2 = 0.083 - 0.071 = 0.012 in

Maximum deviation from perpendicularity _____ °

Maximum deviation from parallelism _____ °

Comments: _____

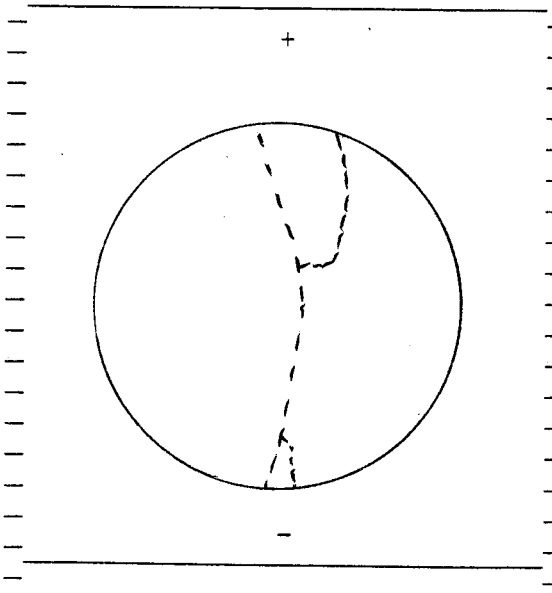
Brazilian Disk Tension Test Data

Job: CNWRA
Location: LFM 51-73
Sample Number: B-059a
Load Rate (lb/s): 0.000217 in/sec
Equipment Used: caliper (.001") SBEL

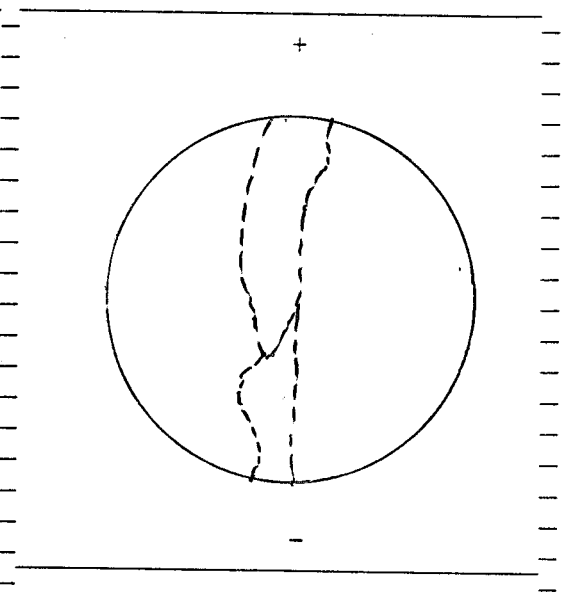
Prepped By/Date: RW 5/10/94
Tested By/Date: M. Bridges / S. Jeon 6/1/94
Reviewed By/Date: S. Jeon / 6-2-94

D_0	1.863	in	L_+	1.467	in
D_{60}	1.868	in	L_{MID}	1.494	in
D_{120}	1.864	in	L_-	1.497	in
D_{AVG}	1.865	in	L_{AVG}	1.486	in
P	13000	lb	P_C	13000	lb
T	2986.2 (2990)	psi			

Front View



Rear View



SYMBOLS

D = Diameter
L = Thickness
P = Failure Load
P_C = Corrected Load
T = Tensile Strength

——— Pre-existing Weakness plane
----- Postfailure Fracture
----- Failure along Pre-existing Weakness plane

$$T = \frac{2P_c}{\pi DL}$$

Sample B-059a

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.092 - 0.091 = 0.001 in

Δ_{180} = 0.092 - 0.091 = 0.001 in

Δ_{90} = 0.093 - 0.092 = 0.001 in

Δ_{270} = 0.092 - 0.092 = 0 in

2. Perpendicularity

Δ_1 = 0.086 - 0.078 = 0.008 in

Δ'_1 = 0.086 - 0.072 = 0.014 in

Δ_2 = 0.097 - 0.088 = 0.009 in

Δ'_2 = 0.096 - 0.066 = 0.03 in

Maximum deviation from perpendicularity _____ °

Maximum deviation from parallelism _____ °

Comments: _____

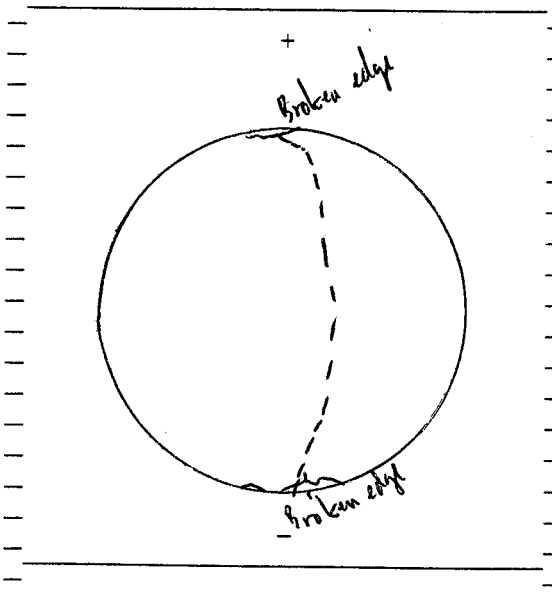
Brazilian Disk Tension Test Data

Job: CNWRA
Location: LFM 51-73
Sample Number: B-060b
Load Rate (lb/s): 0.000217 in/sec
Equipment Used: caliper (0.001") SBEL

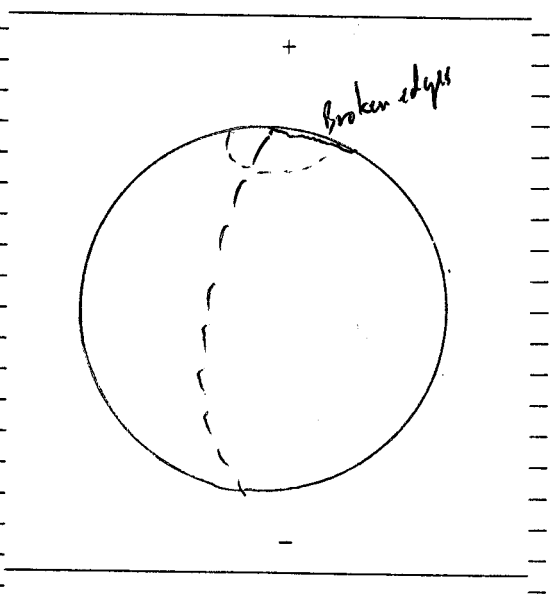
Prepped By/Date: RW 5/10/94
Tested By/Date: M. Bridges/S. Jeon 6/1/94
Reviewed By/Date: S. Jeon/6-2-94

D_0	1.849	in	L_+	1.444	in
D_{60}	1.852	in	L_{MID}	1.446	in
D_{120}	1.860	in	L_-	1.428	in
D_{AVG}	1.854	in	L_{AVG}	1.439	in
P	10280	lb	P_C	10280	lb
T	2453.0 (2450)	psi			

Front View



Rear View



SYMBOLS

D = Diameter
L = Thickness
P = Failure Load
P_C = Corrected Load
T = Tensile Strength

——— Pre-existing Weakness plane
----- Postfailure Fracture
----- Failure along Pre-existing Weakness plane

$$T = \frac{2P_c}{\pi DL}$$

Sample B-060b

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.101 - 0.100 = 0.001 in

Δ_{180} = 0.103 - 0.100 = 0.003 in

Δ_{90} = 0.105 - 0.103 = 0.002 in

Δ_{270} = 0.104 - 0.102 = 0.002 in

2. Perpendicularity

Δ_1 = 0.046 - 0.037 = 0.009 in

Δ'_1 = 0.050 - 0.038 = 0.012 in

Δ_2 = 0.044 - 0.030 = 0.014 in

Δ'_2 = 0.047 - 0.042 = 0.005 in

Maximum deviation from perpendicularity _____ °

Maximum deviation from parallelism _____ °

Comments: _____

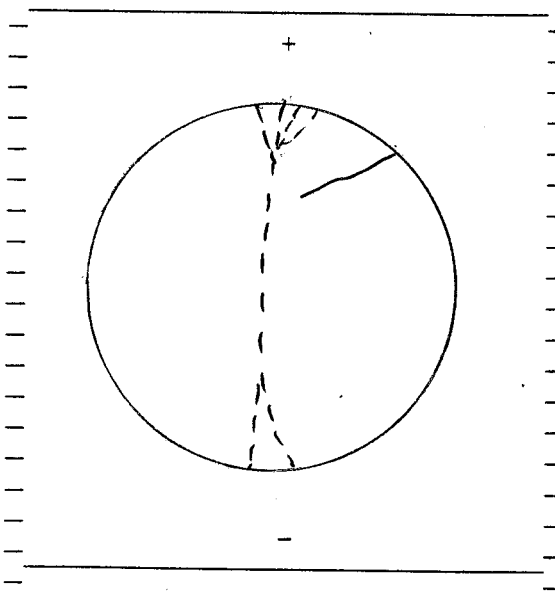
Brazilian Disk Tension Test Data

Job: CNWRA
Location: LFM 57-73
Sample Number: B-0646
Load Rate (lb/s): 0.00021 in/sec
Equipment Used: cal: per (0.001") / SBEL

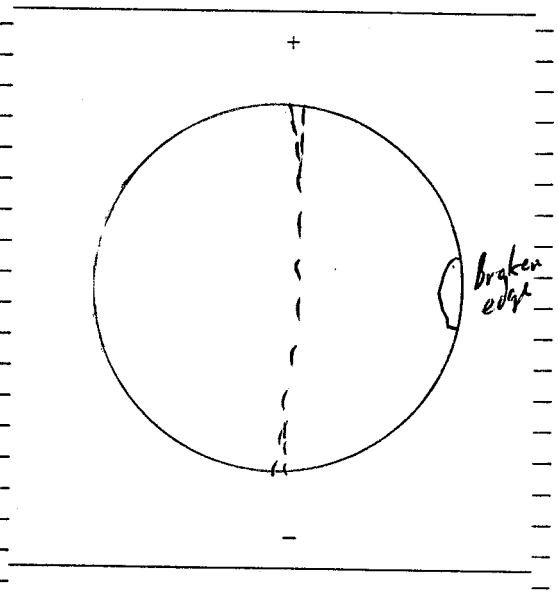
Prepped By/Date: RW 5/10/94
Tested By/Date: M. Bridges / S. Jeon 6/1/94
Reviewed By/Date: S. Jeon / 6-2-94

D_0	1.866	in	L_+	1.413	in
D_{60}	1.875	in	L_{MID}	1.404	in
D_{120}	1.865	in	L_-	1.405	in
D_{AVG}	1.869	in	L_{AVG}	1.407	in
P	3480	lb	P_C	3480	lb
T	842.5 (840)	psi			

Front View



Rear View



SYMBOLS

D = Diameter
L = Thickness
P = Failure Load
P_C = Corrected Load
T = Tensile Strength

——— Pre-existing Weakness plane
----- Postfailure Fracture
----- Failure along Pre-existing Weakness plane

$$T = \frac{2P_c}{\pi DL}$$

Sample 3-064b

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.091 - 0.090 = 0.001 in

Δ_{180} = 0.091 - 0.089 = 0.002 in

Δ_{90} = 0.090 - 0.090 = 0 in

Δ_{270} = 0.090 - 0.089 = 0.001 in

2. Perpendicularity

Δ_1 = 0.113 - 0.099 = 0.014 in

Δ'_1 = 0.108 - 0.099 = 0.009 in

Δ_2 = 0.112 - 0.108 = 0.004 in

Δ'_2 = 0.117 - 0.106 = 0.011 in

Maximum deviation from perpendicularity _____ °

Maximum deviation from parallelism _____ °

Comments: _____

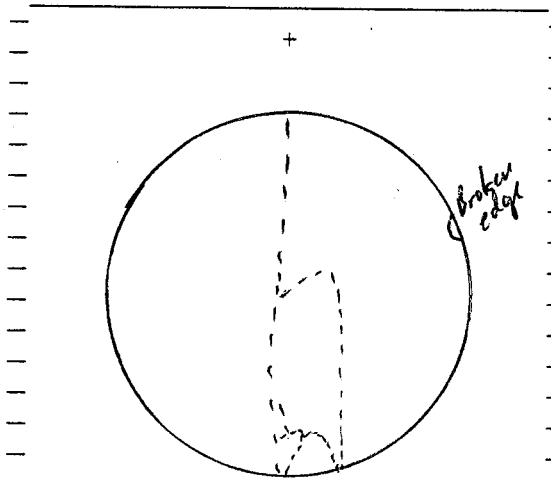
Brazilian Disk Tension Test Data

Job: CNWRA
Location: LFM 57-73
Sample Number: B-065
Load Rate (lb/s): 0.000217 in/sec
Equipment Used: caliper (0.001") SIBEL

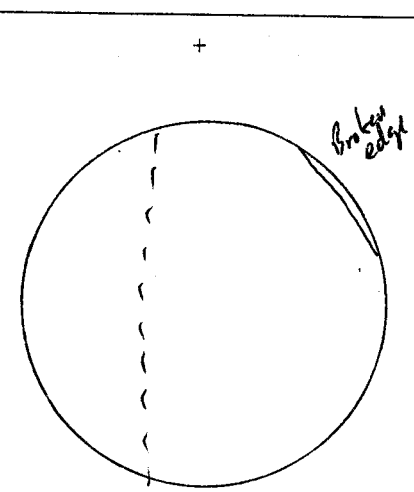
Prepped By/Date: RW 5/10/94
Tested By/Date: M. Bridges/S. Jeon 6/1/94
Reviewed By/Date: S. Jeon/6-2-94

D_0	1.347	in	L_+	1.452	in
D_{60}	1.348	in	L_{MID}	1.465	in
D_{120}	1.349	in	L_-	1.467	in
D_{AVG}	1.348	in	L_{AVG}	1.461	in
P	3800	lb	P_C	3800	lb
T	896.0 (900)	psi			

Front View



Rear View



SYMBOLS

D = Diameter
L = Thickness
P = Failure Load
P_C = Corrected Load
T = Tensile Strength

——— Pre-existing Weakness plane
----- Postfailure Fracture
=====- Failure along Pre-existing Weakness plane

$$T = \frac{2P_c}{\pi DL}$$

Sample B-065

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.108 − 0.102 = 0.006 in

Δ_{180} = 0.107 − 0.101 = 0.006 in

Δ_{90} = 0.111 − 0.101 = 0.01 in

Δ_{270} = 0.109 − 0.103 = 0.006 in

2. Perpendicularity

Δ_1 = 0.072 − 0.076 = 0.004 in

Δ'_1 = 0.072 − 0.068 = 0.004 in

Δ_2 = 0.074 − 0.067 = 0.007 in

Δ'_2 = 0.072 − 0.065 = 0.007 in

Maximum deviation from perpendicularity _____ °

Maximum deviation from parallelism _____ °

Comments: _____

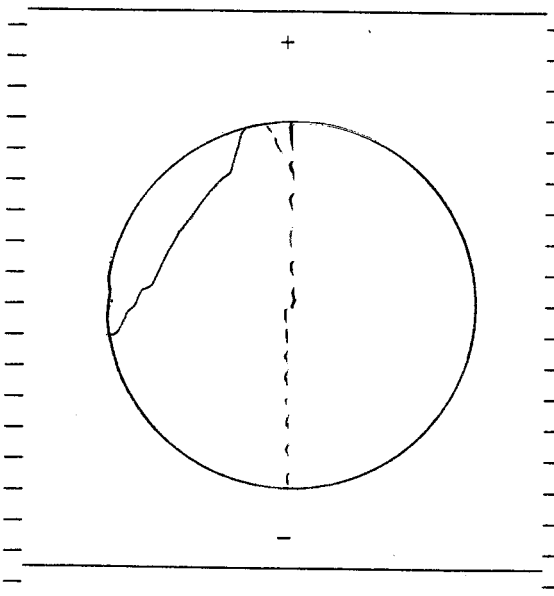
Brazilian Disk Tension Test Data

Job: CNWRA
Location: LFM 57-73
Sample Number: B-066
Load Rate (lb/s): 0.000217 in/sec
Equipment Used: caliper (0.001") SBEL

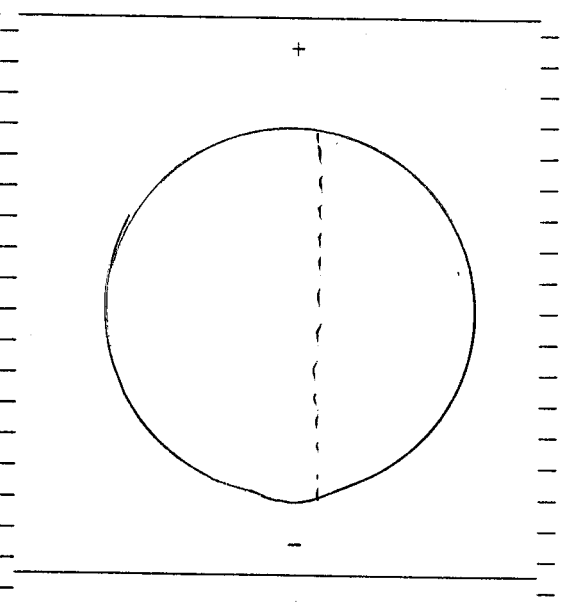
Prepped By/Date: RW 5/10/94
Tested By/Date: M. Bridges / S. Jeon 6/1/94
Reviewed By/Date: S. Jeon / 6-2-94

D_0	1.870	in	L_+	1.460	in
D_{60}	1.871	in	L_{MID}	1.468	in
D_{120}	1.867	in	L_-	1.442	in
D_{AVG}	1.869	in	L_{AVG}	1.457	in
P	3760	lb	P_C	3760	lb
T	879.0 (880)	psi			

Front View



Rear View



SYMBOLS

D = Diameter
L = Thickness
P = Failure Load
P_C = Corrected Load
T = Tensile Strength

——— Pre-existing Weakness plane
----- Postfailure Fracture
===== Failure along Pre-existing Weakness plane

$$T = \frac{2P_c}{\pi DL}$$

Sample B-066

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.113 - 0.113 = 0 in

Δ_{180} = 0.112 - 0.103 = 0.009 in

Δ_{90} = 0.112 - 0.112 = 0 in

Δ_{270} = 0.112 - 0.110 = 0.002 in

2. Perpendicularity

Δ_1 = 0.061 - 0.051 = 0.01 in

Δ'_1 = 0.066 - 0.053 = 0.013 in

Δ_2 = 0.069 - 0.051 = 0.018 in

Δ'_2 = 0.068 - 0.047 = 0.021 in

Maximum deviation from perpendicularity _____ °

Maximum deviation from parallelism _____ °

Comments: _____

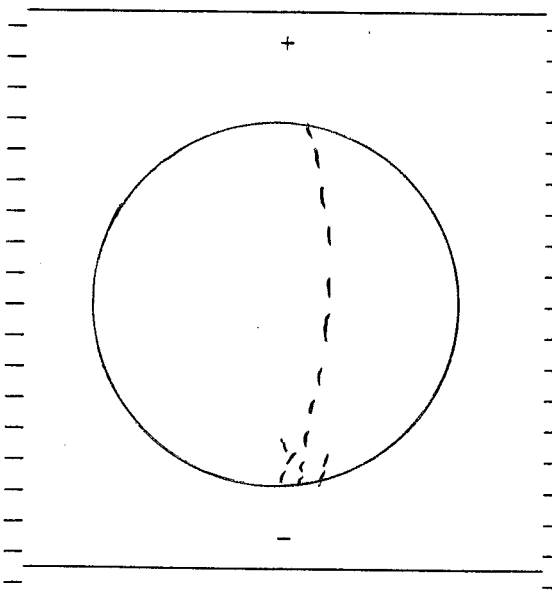
Brazilian Disk Tension Test Data

Job: CNWRA
Location: LFM 57-73
Sample Number: B-067a
Load Rate (lb/s): 0.000217 in/sec
Equipment Used: caliper (0.001") / SBEL

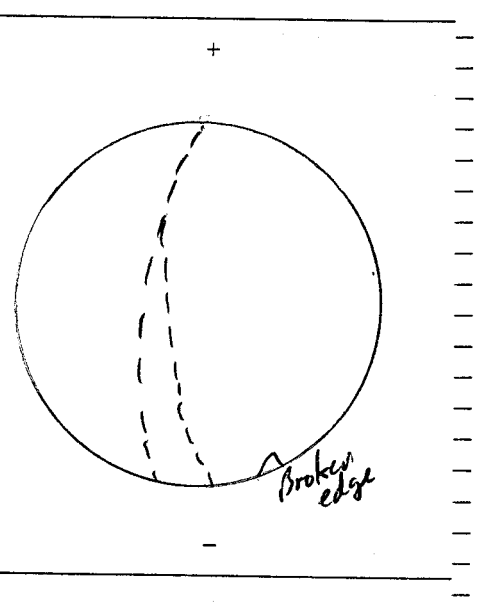
Prepped By/Date: RW 5/10/94
Tested By/Date: M Bridges / S. Jeon 6/1/94
Reviewed By/Date: S. Jeon / 6-2-94

D_0	1.847	in	L_+	1.473	in
D_{60}	1.847	in	L_{MID}	1.469	in
D_{120}	1.849	in	L_-	1.427	in
D_{AVG}	1.848	in	L_{AVG}	1.456	in
P	9280	lb	P_C	9280	lb
T	2195.7 (2200)	psi			

Front View



Rear View



SYMBOLS

D = Diameter
L = Thickness
P = Failure Load
P_C = Corrected Load
T = Tensile Strength

——— Pre-existing Weakness plane
----- Postfailure Fracture
═══ Failure along Pre-existing Weakness plane

$$T = \frac{2P_c}{\pi DL}$$

Sample B-067a

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.072 - 0.071 = 0.001 in Δ_{90} = 0.073 - 0.071 = 0.002 in

Δ_{180} = 0.073 - 0.071 = 0.002 in Δ_{270} = 0.074 - 0.071 = 0.003 in

2. Perpendicularity

Δ_1 = 0.075 - 0.047 = 0.028 in Δ_2 = 0.068 - 0.028 = 0.04 in

Δ'_1 = 0.075 - 0.042 = 0.033 in Δ'_2 = 0.071 - 0.044 = 0.027 in

Maximum deviation from perpendicularity _____ °

Maximum deviation from parallelism _____ °

Comments: _____

Brazilian Disk Tension Test Data

Job: SRI
Location: LFM 95-C2-6
Sample Number: B-001
Load Rate (lb/s): 56.6
Equipment Used: caliper / VERSA-TESTER

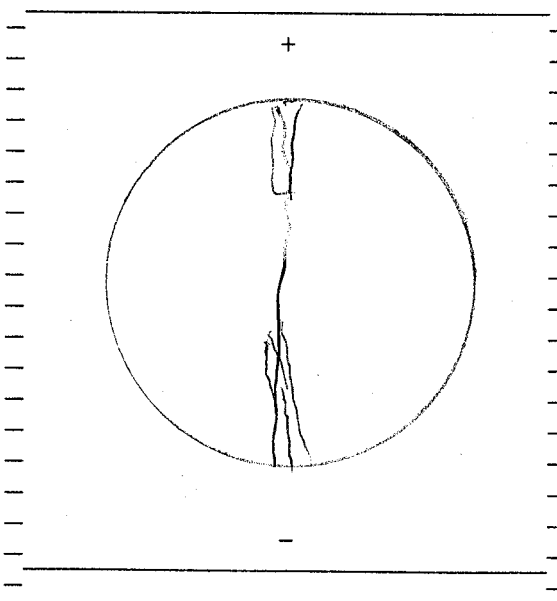
Prepped By/Date: RW 5/4/94
Tested By/Date: S. Jeon / 5-4-94
Reviewed By/Date: S. Jeon 6-2-94

D_0	1.870 ~~1.8699~~	in	L_+	1.220 ~~1.2195~~	in
D_{60}	1.872 ~~1.8715~~	in	L_{MID}	1.220 ~~1.2119~~	in
D_{120}	1.870 ~~1.8695~~	in	L_-	1.206 ~~1.2055~~	in
D_{AVG}	1.871 ~~1.8703~~	in	L_{AVG}	1.215 ~~1.2125~~	in
P	~~62.62~~	lb	P_C	6263	lb
T	1754.0 psi S Jeon				

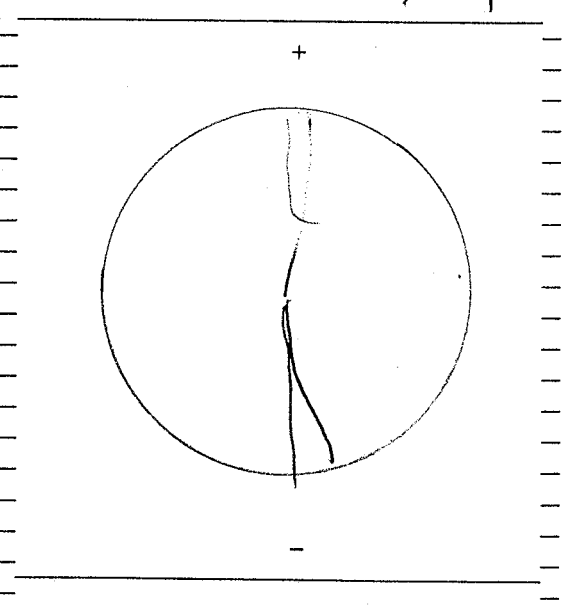
≈ 1750 psi

Picture taken as LFM-95-C1-4 B-001 should be corrected to LFM-95-C2-6 B-001

Front View



Rear



SYMBOLS

D = Diameter
L = Thickness
P = Failure Load
P_C = Corrected Load
T = Tensile Strength

——— Pre-existing Weakness plane
----- Postfailure Fracture
----- Failure along Pre-existing Weakness plane

$$T = \frac{2P_c}{\pi DL}$$

Sample ~~A~~ B-001

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.102 - 0.099 = 0.003 in

Δ_{180} = 0.101 - 0.100 = 0.001 in

Δ_{90} = 0.100 - 0.099 = 0.001 in

Δ_{270} = 0.101 - 0.100 = 0.001 in

2. Perpendicularity

Δ_1 = 0.105 - 0.094 = 0.011 in

Δ'_1 = 0.101 - 0.095 = 0.006 in

Δ_2 = 0.100 - 0.082 = 0.018 in

Δ'_2 = 0.100 - 0.084 = 0.016 in

Maximum deviation from perpendicularity _____ °

Maximum deviation from parallelism _____ °

Comments: _____

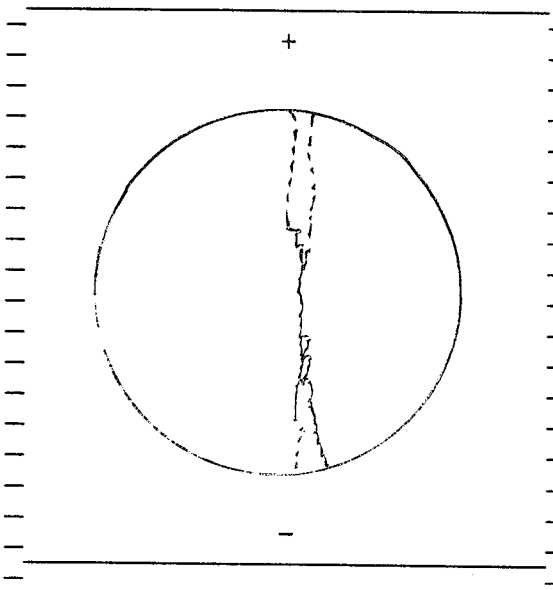
Brazilian Disk Tension Test Data

Job: SR1 (CNWRA)
Location: LFM95-C1-4
Sample Number: B-002
Load Rate (lb/s): 56.6 (Rate 2)
Equipment Used: caliper / VERSA-TESTER

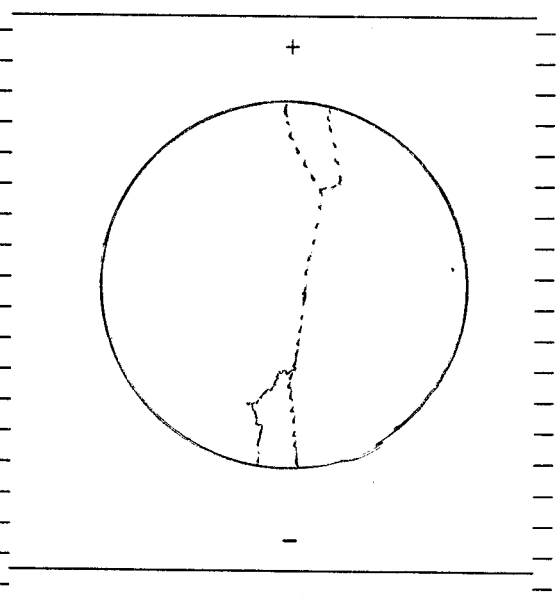
Prepped By/Date: RW 5/4/94
Tested By/Date: S. JEON / 5-9-94
Reviewed By/Date: S. Jeon / 6-2-94

D_0	1.2520	in	L_+	1.1125	in
D_{60}	1.8545	in	L_{MID}	1.1162	in
D_{120}	1.8532	in	L_-	1.1165	in
D_{AVG}	1.8532	in	L_{AVG}	1.115	in
P	1940	lb	P_C	1940	lb
T	597.8	psi			
	= 600 psi				

Front View



Rear View



SYMBOLS

D = Diameter
L = Thickness
P = Failure Load
P_C = Corrected Load
T = Tensile Strength

——— Pre-existing Weakness plane
----- Postfailure Fracture
----- Failure along Pre-existing Weakness plane

$$T = \frac{2P_c}{\pi DL}$$

Sample B-002

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.103 - 0.098 = 0.005 in

Δ_{180} = 0.103 - 0.099 = 0.004 in

Δ_{90} = 0.102 - 0.100 = 0.002 in

Δ_{270} = 0.103 - 0.100 = 0.003 in

2. Perpendicularity

Δ_1 = 0.103 - 0.098 = 0.01 in

Δ'_1 = 0.103 - 0.095 = 0.008 in

Δ_2 = 0.092 - 0.085 = 0.007 in

Δ'_2 = 0.101 - 0.093 = 0.008 in

Maximum deviation from perpendicularity _____ °

Maximum deviation from parallelism _____ °

Comments: _____

Brazilian Disk Tension Test Data

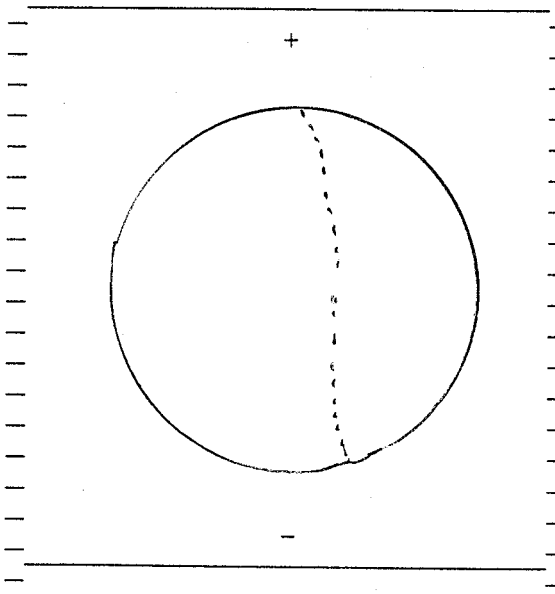
Job: CNWRA
Location: IFM-95-C1-4
Sample Number: B-003b
Load Rate (lb/s): 56.6 (Rate 2)
Equipment Used: Caliper (0.001") / Versa Tester

Prepped By/Date: RW / 5/4/94
Tested By/Date: S. Jeon / 5-9-94
Reviewed By/Date: S. Jeon / 6-2-94

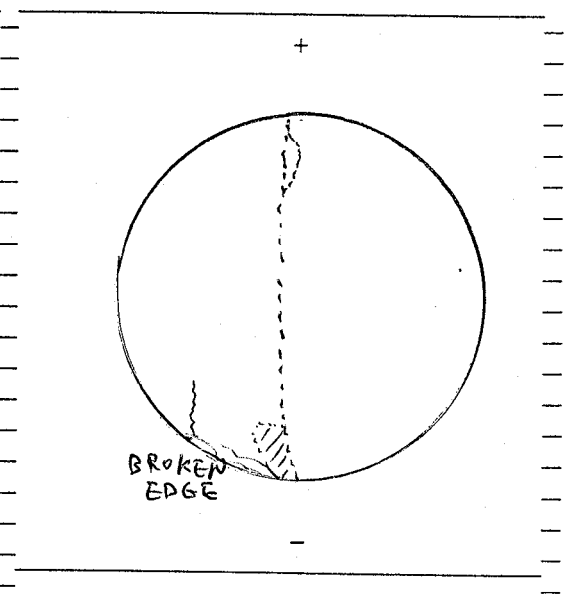
D_0	1.854	in	L_+	1.252	in
D_{60}	1.855	in	L_{MID}	1.271	in
D_{120}	1.853	in	L_-	1.273	in
D_{AVG}	1.854	in	L_{AVG}	1.265	in
P	3600	lb	P_C	3600	lb
T	977.2	psi			

≈ 980 psi

Front View



Rear View



SYMBOLS

D = Diameter
L = Thickness
P = Failure Load
P_C = Corrected Load
T = Tensile Strength

——— Pre-existing Weakness plane
----- Postfailure Fracture
----- Failure along Pre-existing Weakness plane

$$T = \frac{2P_c}{\pi DL}$$

Sample B-003b

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.104 - 0.099 = 0.005 in

Δ_{180} = 0.102 - 0.097 = 0.005 in

Δ_{90} = 0.103 - 0.099 = 0.005 in

Δ_{270} = 0.105 - 0.101 = 0.004 in

2. Perpendicularity

Δ_1 = 0.104 - 0.075 = 0.029 in

Δ'_1 = 0.094 - 0.091 = 0.003 in

Δ_2 = 0.106 - 0.098 = 0.008 in

Δ'_2 = 0.112 - 0.082 = 0.03 in

Maximum deviation from perpendicularity _____ °

Maximum deviation from parallelism _____ °

Comments: _____

Brazilian Disk Tension Test Data

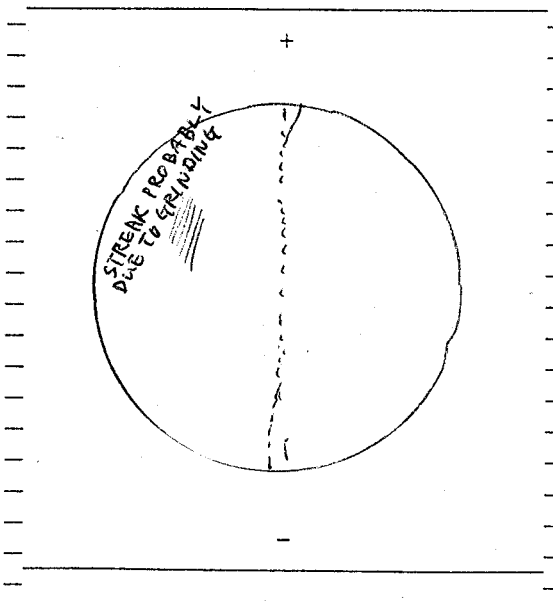
Job: LNWRA
Location: LFM95.02-6
Sample Number: B-005
Load Rate (lb/s): 56.6 (Rate 2)
Equipment Used: caliper (0.001") / VERSATESTER

Prepped By/Date: RW 5/5/94
Tested By/Date: S. Jeon / 5-9-94
Reviewed By/Date: S. Jeon / 5-2-94

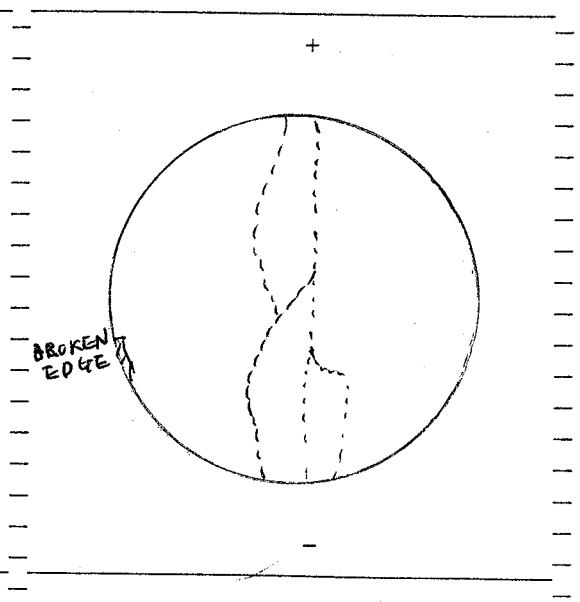
D_0	1.860	in	L_+	1.233	in
D_{60}	1.864	in	L_{MID}	1.261	in
D_{120}	1.861	in	L_-	1.299	in
D_{AVG}	1.862	in	L_{AVG}	1.264	in
P	3540	lb	P_C	3540	lb
T	957.4	psi			

≈ 960 psi

Front View



Rear View



SYMBOLS

D = Diameter
L = Thickness
P = Failure Load
P_C = Corrected Load
T = Tensile Strength

——— Pre-existing Weakness plane
----- Postfailure Fracture
----- Failure along Pre-existing Weakness plane

$$T = \frac{2P_c}{\pi DL}$$

Sample B-005

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.107 - 0.102 = 0.005 in

Δ_{180} = 0.109 - 0.104 = 0.005 in

Δ_{90} = 0.108 - 0.105 = 0.003 in

Δ_{270} = 0.109 - 0.104 = 0.005 in

2. Perpendicularity

Δ_1 = 0.168 - 0.098 = 0.01 in

Δ'_1 = 0.135 - 0.102 = 0.017 in

Δ_2 = 0.140 - 0.071 = 0.069 in

Δ'_2 = 0.094 - 0.090 = 0.004 in

Maximum deviation from perpendicularity _____°

Maximum deviation from parallelism _____°

Comments: _____

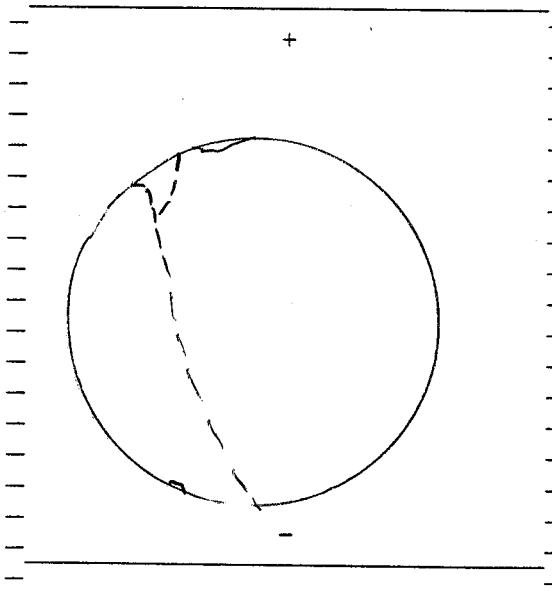
Brazilian Disk Tension Test Data

Job: CNWRA
Location: LFM 95-C2-6
Sample Number: B-006a
Load Rate (lb/s): 56.6
Equipment Used: caliper (0.001") Versa tester

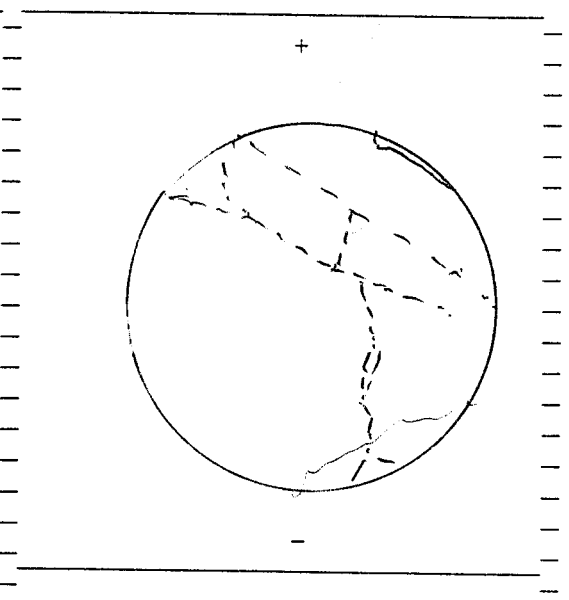
Prepped By/Date: RW 5/8/94
Tested By/Date: M. Bridges 5/11/94
Reviewed By/Date: S. Sean / 6-2-94

D_0	1.867	in	L_+	1.163	in
D_{60}	1.867	in	L_{MID}	1.145	in
D_{120}	1.865	in	L_-	1.136	in
D_{AVG}	1.866	in	L_{AVG}	1.148	in
P	800	lb	P_C	800	lb
T	237.7	psi			
	~~237~~ 240				

Front View



Rear View



SYMBOLS

D = Diameter
L = Thickness
P = Failure Load
P_C = Corrected Load
T = Tensile Strength

——— Pre-existing Weakness plane
----- Postfailure Fracture
----- Failure along Pre-existing Weakness plane

$$T = \frac{2P_c}{\pi DL}$$

Sample B-006a

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.107 - 0.105 = 0.002 in

Δ_{180} = 0.107 - 0.105 = 0.002 in

Δ_{90} = 0.107 - 0.106 = 0.001 in

Δ_{270} = 0.106 - 0.104 = 0.002 in

2. Perpendicularity

Δ_1 = 0.107 - 0.098 = 0.009 in

Δ'_1 = 0.106 - 0.099 = 0.007 in

Δ_2 = 0.119 - 0.091 = 0.028 in

Δ'_2 = 0.124 - 0.084 = 0.04 in

Maximum deviation from perpendicularity _____ °

Maximum deviation from parallelism _____ °

Comments: _____

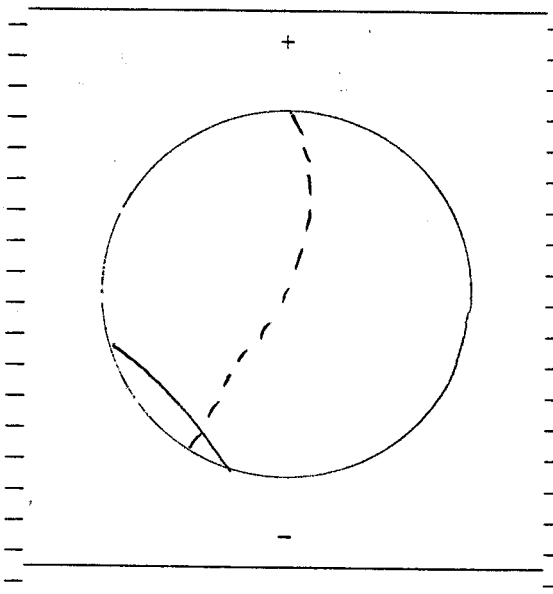
Brazilian Disk Tension Test Data

Job: CNWRA
Location: LFM 95-C2-6
Sample Number: B-~~006~~ 007
Load Rate (lb/s): 560b
Equipment Used: cal: per (0.001") Versatester

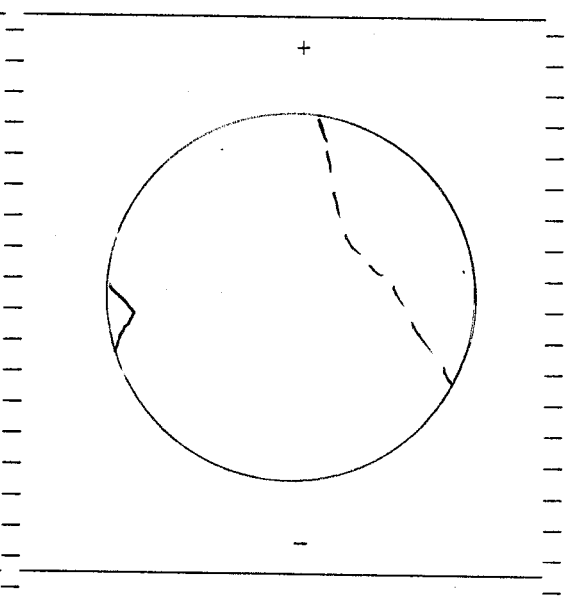
Prepped By/Date: RW 5/8/94
Tested By/Date: M. Bridges 5/11/94
Reviewed By/Date: S. Swan 6-8-94

D_0	1.866	in	L_+	1.170	in
D_{60}	1.870	in	L_{MID}	1.168	in
D_{120}	1.870	in	L_-	1.140	in
D_{AVG}	1.869	in	L_{AVG}	1.159	in
P	760	lb	P_C	760	lb
T	223.4 / 220	psi			

Front View



Rear View



SYMBOLS

D = Diameter
L = Thickness
P = Failure Load
P_C = Corrected Load
T = Tensile Strength

——— Pre-existing Weakness plane
----- Postfailure Fracture
═══ Failure along Pre-existing Weakness plane

$$T = \frac{2P_c}{\pi DL}$$

Sample B-007

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.111 - 0.104 = 0.007 in

Δ_{180} = 0.106 - 0.104 = 0.002 in

Δ_{90} = 0.108 - 0.105 = 0.003 in

Δ_{270} = 0.107 - 0.104 = 0.003 in

2. Perpendicularity

Δ_1 = 0.104 - 0.082 = 0.022 in

Δ'_1 = 0.115 - 0.091 = 0.024 in

Δ_2 = 0.117 - 0.088 = 0.029 in

Δ'_2 = 0.113 - 0.091 = 0.022 in

Maximum deviation from perpendicularity _____ °

Maximum deviation from parallelism _____ °

Comments: _____

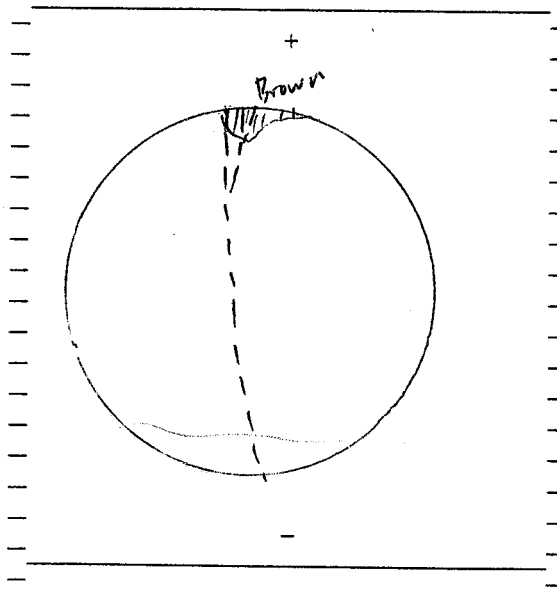
Brazilian Disk Tension Test Data

Job: CNWRA
Location: LFM95-C2-6
Sample Number: B[illegible]-009
Load Rate (lb/s): 56.6
Equipment Used: caliper (0.001") Versatester

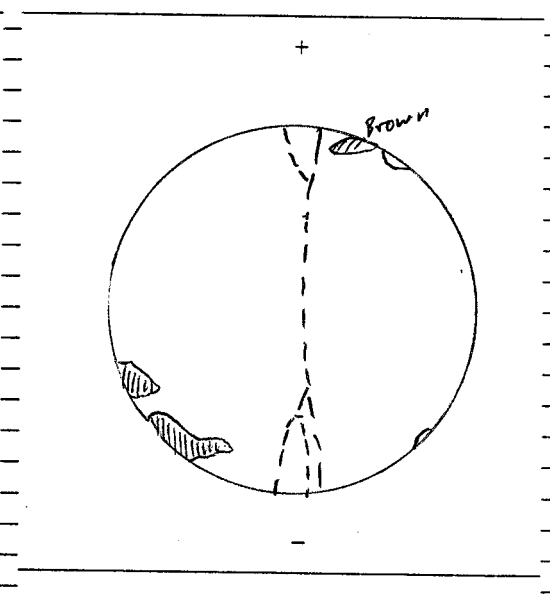
Prepped By/Date: RW 5/8/94
Tested By/Date: M. Bridges 5/11/94
Reviewed By/Date: S. Jeon/6-2-94

D_0	1.857	in	L_+	1.188	in
D_{60}	1.853	in	L_{MID}	1.188	in
D_{120}	1.872	in	L_-	1.189	in
D_{AVG}	1.861	in	L_{AVG}	1.188	in
P	780	lb	P_C	780	lb
T	224.6 / 220	psi			

Front View



Rear View



SYMBOLS

D = Diameter
L = Thickness
P = Failure Load
P_C = Corrected Load
T = Tensile Strength

——— Pre-existing Weakness plane
----- Postfailure Fracture
----- Failure along Pre-existing Weakness plane

$$T = \frac{2P_c}{\pi DL}$$

Sample B-009

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.105 - 0.097 = 0.008 in Δ_{90} = 0.105 - 0.099 = 0.006 in

Δ_{180} = 0.106 - 0.098 = 0.008 in Δ_{270} = 0.107 - 0.102 = 0.007 in

2. Perpendicularity

Δ_1 = 0.101 - 0.080 = 0.021 in Δ_2 = 0.107 - 0.078 = 0.029 in

Δ'_1 = 0.100 - 0.078 = 0.022 in Δ'_2 = 0.105 - 0.080 = 0.025 in

Maximum deviation from perpendicularity _____ °

Maximum deviation from parallelism _____ °

Comments: _____

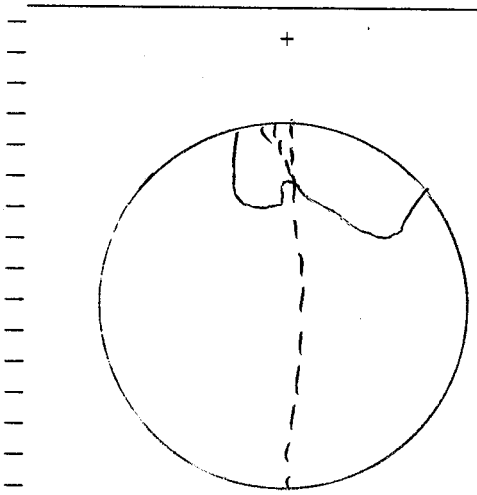
Brazilian Disk Tension Test Data

Job: CNWRA
Location: LFM 95-02-6
Sample Number: B-010
Load Rate (lb/s): 56.6
Equipment Used: cal: Per (0.001") Versatester

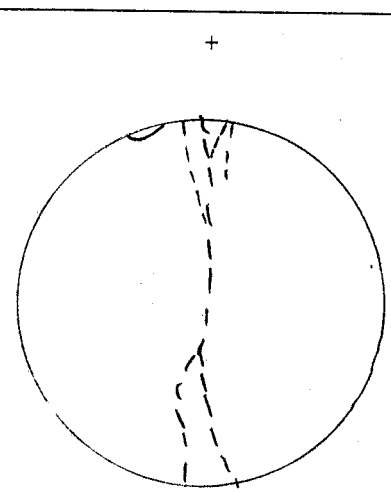
Prepped By/Date: RW 5/8/94
Tested By/Date: M. Bridges 5/11/94
Reviewed By/Date: S. Sran 6-2-94

D_0	1.870	in	L_+	1.034	in
D_{60}	1.862	in	L_{MID}	1.024	in
D_{120}	1.863	in	L_-	1.014	in
D_{AVG}	1.865	in	L_{AVG}	1.024	in
P	600	lb	P_C	600	lb
T	200.0	psi			
	200				

Front View



Rear View



SYMBOLS

D = Diameter
L = Thickness
P = Failure Load
P_C = Corrected Load
T = Tensile Strength

——— Pre-existing Weakness plane
----- Postfailure Fracture
----- Failure along Pre-existing Weakness plane

$$T = \frac{2P_c}{\pi DL}$$

Sample B-010

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.103 − 0.095 = 0.008 in

Δ_{180} = 0.107 − 0.098 = 0.009 in

Δ_{90} = 0.105 − 0.098 = 0.007 in

Δ_{270} = 0.105 − 0.096 = 0.009 in

2. Perpendicularity

Δ_1 = 0.093 − 0.073 = 0.02 in

Δ'_1 = 0.094 − 0.073 = 0.021 in

Δ_2 = 0.106 − 0.058 = 0.048 in

Δ'_2 = 0.107 − 0.060 = 0.047 in

Maximum deviation from perpendicularity _____ °

Maximum deviation from parallelism _____ °

Comments: _____

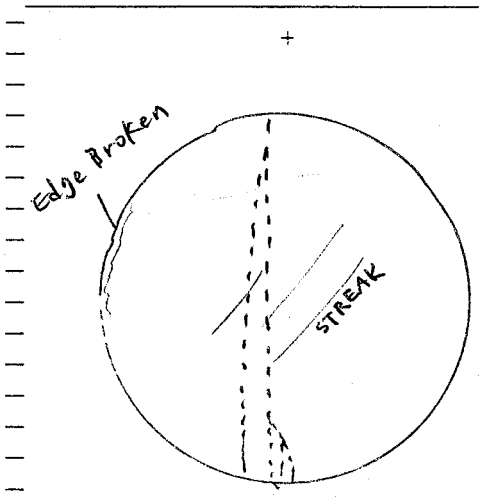
Brazilian Disk Tension Test Data

Job: CNWRA
Location: LFM95C2-3
Sample Number: B-01WC
Load Rate (lb/s): 56.6 lb/s (Rate 2)
Equipment Used: Caliper (0.001") / Versa Tester

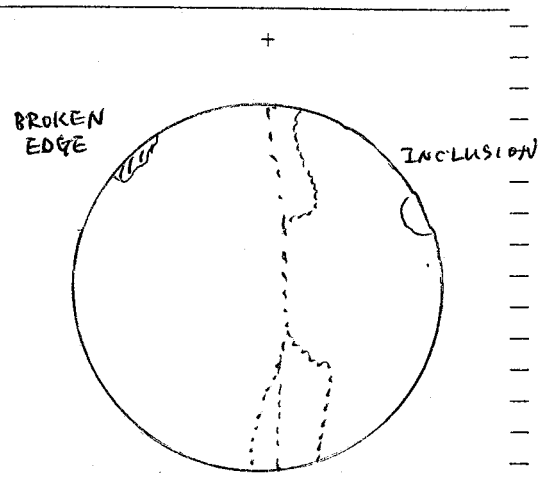
Prepped By/Date: RW 5/5/94
Tested By/Date: S. Jeon 5/9/94
Reviewed By/Date: S. Jeon 6-2-94

D_0	1.867	in	L_+	1.179	in
D_{60}	1.869	in	L_{MID}	1.173	in
D_{120}	1.864	in	L_-	1.170	in
D_{AVG}	1.867	in	L_{AVG}	1.176	in
P	3560	lb	P_C	3560	lb (±20, 20lb/division)
T	1032.1	psi			
	≈1030	psi			

Front View



Rear View



SYMBOLS

D = Diameter
L = Thickness
P = Failure Load
P_C = Corrected Load
T = Tensile Strength

_____ Pre-existing Weakness plane
----- Postfailure Fracture
-----/----- Failure along Pre-existing Weakness plane

$$T = \frac{2P_c}{\pi DL}$$

Sample LFM95-C2-2 B-014C

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.110 - 0.108 = 0.002 in Δ_{90} = 0.110 - 0.108 = 0.002 in

Δ_{180} = 0.109 - 0.108 = 0.001 in Δ_{270} = 0.108 - 0.107 = 0.001 in

2. Perpendicularity

Δ_1 = 0.085 - 0.080 = 0.005 in Δ_2 = 0.091 - 0.085 = 0.006 in

Δ'_1 = 0.079 - 0.076 = 0.003 in Δ'_2 = 0.078 - 0.074 = 0.004 in

Maximum deviation from perpendicularity _____ °

Maximum deviation from parallelism _____ °

Comments: _____

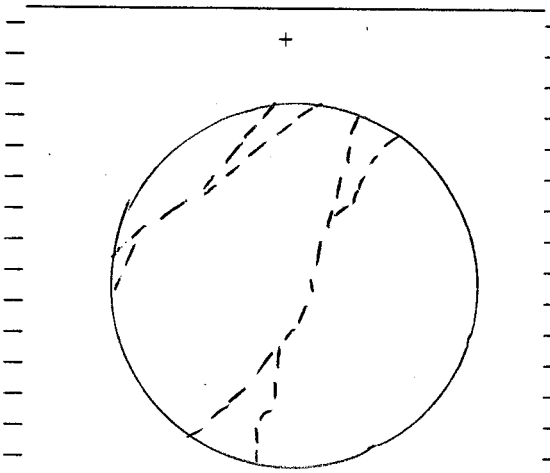
Brazilian Disk Tension Test Data

Job: CNWRA
Location: LFM 95-C1-5
Sample Number: B-021a
Load Rate (lb/s): 56.6
Equipment Used: caliper (0.001") Versatester

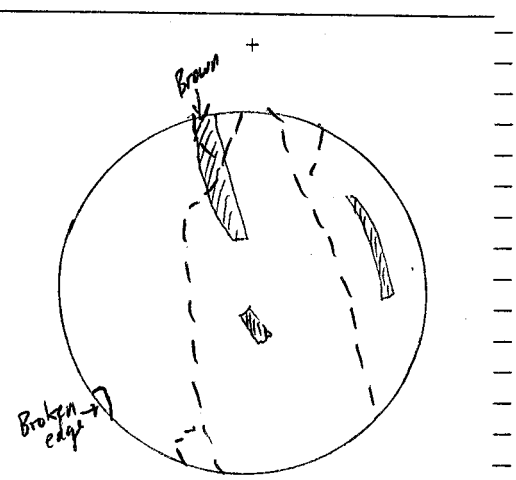
Prepped By/Date: RW 5/8/94
Tested By/Date: M. Bridges 5/11/94
Reviewed By/Date: S. Jeon 6-2-94

D_0	1.845	in	L_+	~~1.8~~ 1.165	in
D_{60}	1.856	in	L_{MID}	1.168	in
D_{120}	1.840	in	L_-	1.157	in
D_{AVG}	1.847	in	L_{AVG}	1.163	in
P	820	lb	P_C	820	lb
T	243.0 240	psi			

Front View



Rear View



SYMBOLS

D = Diameter
L = Thickness
P = Failure Load
P_C = Corrected Load
T = Tensile Strength

——— Pre-existing Weakness plane
----- Postfailure Fracture
===== Failure along Pre-existing Weakness plane

$$T = \frac{2P_c}{\pi DL}$$

Sample B-021a

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.083 - 0.082 = 0.001 in

Δ_{180} = 0.085 - 0.082 = 0.003 in

Δ_{90} = 0.083 - 0.079 = 0.004 in

Δ_{270} = 0.084 - 0.082 = 0.002 in

2. Perpendicularity

Δ_1 = 0.105 - 0.095 = 0.01 in

Δ'_1 = 0.109 - 0.099 = 0.01 in

Δ_2 = 0.106 - 0.097 = 0.009 in

Δ'_2 = 0.104 - 0.098 = 0.006 in

Maximum deviation from perpendicularity _____ °

Maximum deviation from parallelism _____ °

Comments: _____

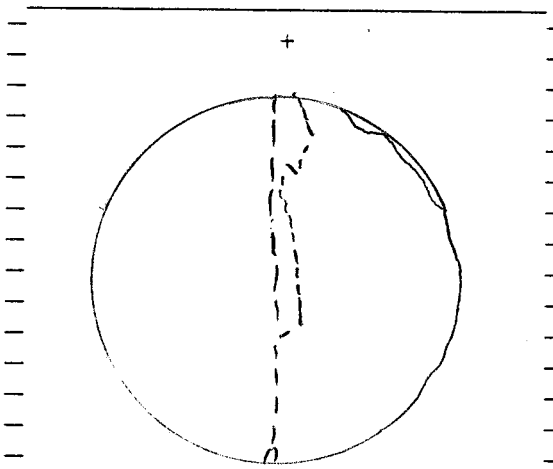
Brazilian Disk Tension Test Data

Job: CNWRA
Location: LFM 95-C1-5
Sample Number: B-022
Load Rate (lb/s): 56.6
Equipment Used: caliper (0.001")

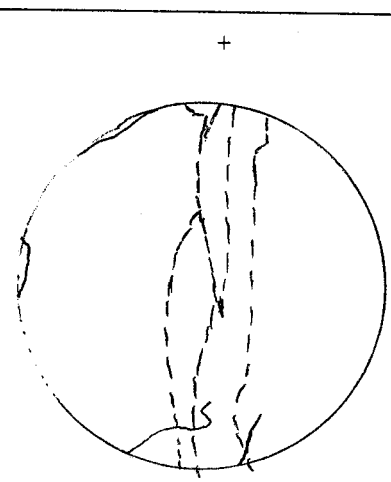
Prepped By/Date: RW 5/8/94
Tested By/Date: M. Bridges 5/11/94
Reviewed By/Date: S. Jeon/6-2-94

D_0	1.864	in	L_+	1.119	in
D_{60}	1.868	in	L_{MID}	1.113	in
D_{120}	1.869	in	L_-	1.110	in
D_{AVG}	1.867	in	L_{AVG}	1.114	in
P	800	lb	P_C	800	lb
T	~~244.6~~ ~~240~~	psi	250.0 psi (250)		

Front View



Rear View



SYMBOLS

D = Diameter
L = Thickness
P = Failure Load
P_C = Corrected Load
T = Tensile Strength

——— Pre-existing Weakness plane
----- Postfailure Fracture
----- Failure along Pre-existing Weakness plane

$$T = \frac{2P_c}{\pi DL}$$

Sample B-022

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.111 - 0.102 = 0.009 in

Δ_{180} = 0.107 - 0.094 = 0.013 in

Δ_{90} = 0.105 - 0.094 = 0.011 in

Δ_{270} = 0.107 - 0.096 = 0.011 in

2. Perpendicularity

Δ_1 = 0.090 - 0.085 = 0.005 in

Δ'_1 = 0.095 - 0.078 = 0.017 in

Δ_2 = 0.096 - 0.076 = 0.02 in

Δ'_2 = 0.104 - 0.096 = 0.008 in

Maximum deviation from perpendicularity _____ °

Maximum deviation from parallelism _____ °

Comments: _____

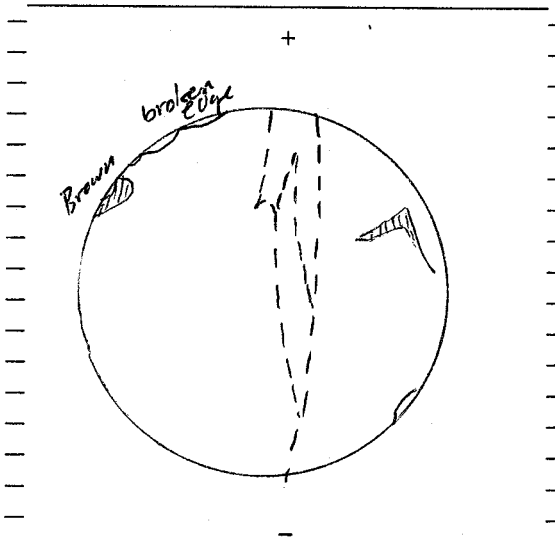
Brazilian Disk Tension Test Data

Job: CNWRA
Location: LFM95-C2-7
Sample Number: B-024
Load Rate (lb/s): 56.6
Equipment Used: caliper (0.001") Versatester

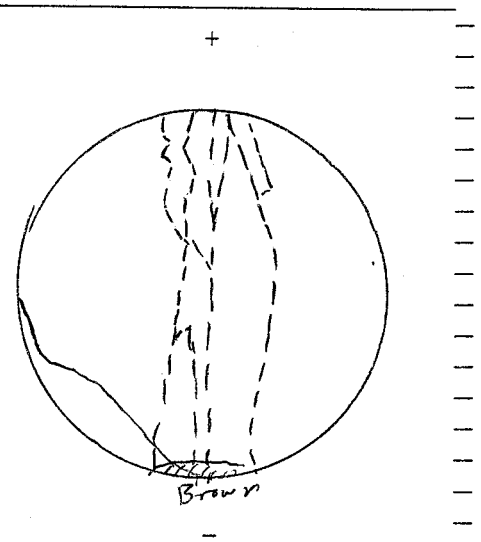
Prepped By/Date: RW 5/8/94
Tested By/Date: M. Bridges, 5/11/94
Reviewed By/Date: S. Jeon 6-2-94

D_0	1.865	in	L_+	1.106	in
D_{60}	1.868	in	L_{MID}	1.133	in
D_{120}	1.867	in	L_-	1.162	in
D_{AVG}	1.867	in	L_{AVG}	1.134	in
P	800	lb	P_C	800	lb
T	240.6 / 240	psi			

Front View



Rear View



SYMBOLS

D = Diameter
L = Thickness
P = Failure Load
P_C = Corrected Load
T = Tensile Strength

——— Pre-existing Weakness plane
----- Postfailure Fracture
----- Failure along Pre-existing Weakness plane

$$T = \frac{2P_c}{\pi DL}$$

Sample B-024

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.109 − 0.107 = 0.006 in

Δ_{180} = 0.108 − 0.104 = 0.004 in

Δ_{90} = 0.106 − 0.103 = 0.003 in

Δ_{270} = 0.107 − 0.104 = 0.003 in

2. Perpendicularity

Δ_1 = ~~0.101~~ 0.114 − ~~0.080~~ 0.086 = ~~0.021~~ 0.028 in

Δ'_1 = ~~0.100~~ 0.114 − ~~0.078~~ 0.085 = ~~0.022~~ 0.029 in

Δ_2 = ~~0.107~~ 0.110 − ~~0.078~~ 0.079 = ~~0.029~~ 0.031 in

Δ'_2 = 0.105 0.110 − 0.080 0.087 = ~~0.025~~ 0.023 in

Maximum deviation from perpendicularity _____ °

Maximum deviation from parallelism _____ °

Comments: _____

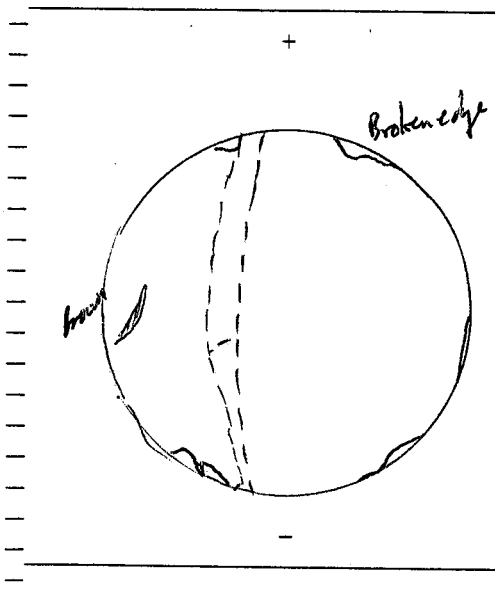
Brazilian Disk Tension Test Data

Job: CNWRA
Location: LFM95-C2-2
Sample Number: B-028
Load Rate (lb/s): 56.6
Equipment Used: caliper (0.001") Versatester

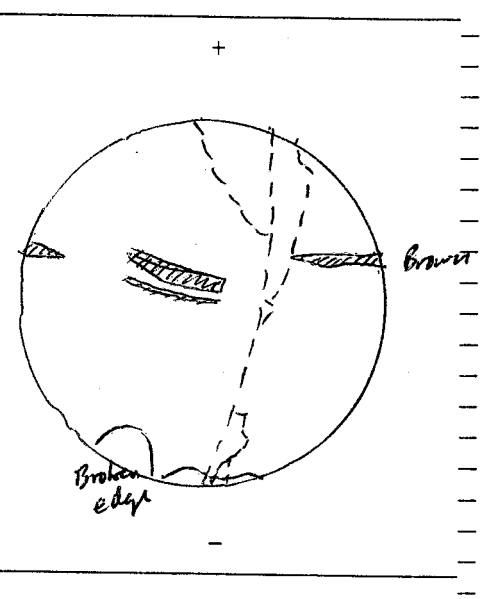
Prepped By/Date: RW 5/3/94
Tested By/Date: M. Bridges 5/11/94
Reviewed By/Date: S. Sevon 6-2-94

D_0	1.860	in	L_+	1.151	in
D_{60}	1.860	in	L_{MID}	1.181	in
D_{120}	1.861	in	L_-	1.188	in
D_{AVG}	1.860	in	L_{AVG}	1.173	in
P	800	lb	P_C	800	lb
T	233.4 (230)	psi			

Front View



Rear View



SYMBOLS

D = Diameter
L = Thickness
P = Failure Load
P_C = Corrected Load
T = Tensile Strength

——— Pre-existing Weakness plane
----- Postfailure Fracture
----- Failure along Pre-existing Weakness plane

$$T = \frac{2P_c}{\pi DL}$$

Sample B-028

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.104 − 0.100 = 0.004 in

Δ_{180} = 0.103 − 0.100 = 0.003 in

Δ_{90} = 0.109 − 0.102 = 0.007 in

Δ_{270} = 0.105 − 0.101 = 0.004 in

2. Perpendicularity

Δ_1 = 0.105 − 0.098 = 0.007 in

Δ'_1 = 0.141 − 0.085 = 0.054 in

Δ_2 = 0.143 − 0.100 = 0.043 in

Δ'_2 = 0.128 − 0.119 = 0.009 in

Maximum deviation from perpendicularity _____ °

Maximum deviation from parallelism _____ °

Comments: _____

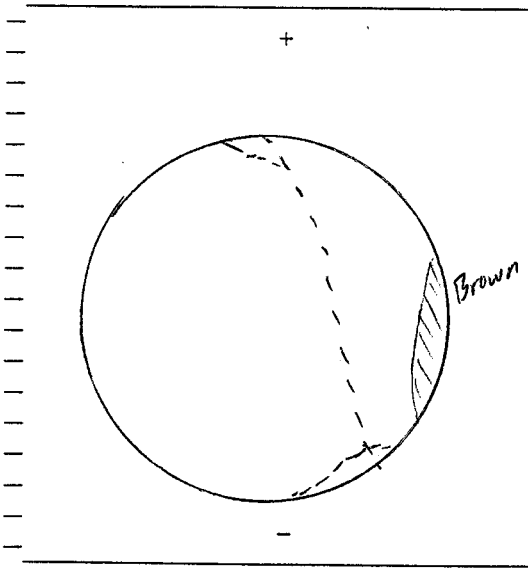
Brazilian Disk Tension Test Data

Job: CNWRA
Location: LFM 57-73
Sample Number: B-054
Load Rate (lb/s): 56.6 lb/s
Equipment Used: caliper (0.001") Versa tester

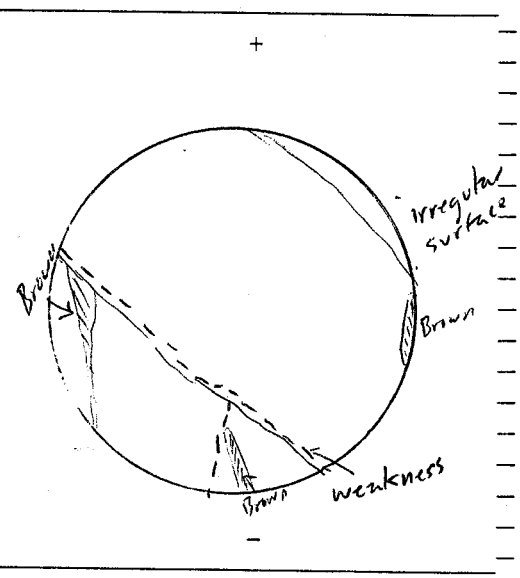
Prepped By/Date: RW 5/10/94
Tested By/Date: M. Bridges 5/10/94
Reviewed By/Date: S. Seon 6-2-94

D_0	1.859	in	L_+	1.448	in
D_{60}	1.860	in	L_{MID}	1.466	in
D_{120}	1.871	in	L_-	1.471	in
D_{AVG}	1.863	in	L_{AVG}	1.462	in
P	1380	lb	P_C	1380	lb
T	322.6	psi			
	320				

Front View



Rear View



SYMBOLS

D = Diameter
L = Thickness
P = Failure Load
P_C = Corrected Load
T = Tensile Strength

——— Pre-existing Weakness plane
----- Postfailure Fracture
----- Failure along Pre-existing Weakness plane

$$T = \frac{2P_c}{\pi DL}$$

Sample B-054

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.101 - 0.100 = 0.001 in

Δ_{180} = 0.102 - 0.101 = 0.001 in

Δ_{90} = 0.101 - 0.100 = 0.001 in

Δ_{270} = 0.102 - 0.099 = 0.003 in

2. Perpendicularity

Δ_1 = 0.126 - 0.113 = 0.013 in

Δ'_1 = 0.125 - 0.112 = 0.013 in

Δ_2 = 0.123 - 0.101 = 0.022 in

Δ'_2 = 0.123 - 0.103 = 0.02 in

Maximum deviation from perpendicularity _____ °

Maximum deviation from parallelism _____ °

Comments: _____

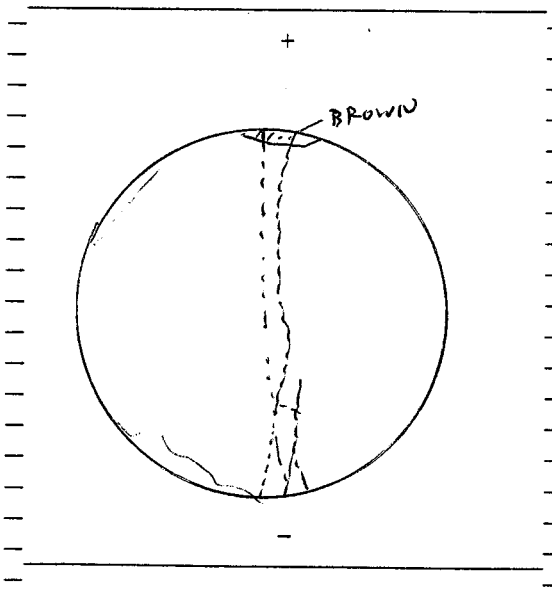
Brazilian Disk Tension Test Data

Job: CNWRA
Location: IFM57-73
Sample Number: B-055
Load Rate (lb/s): 56.6
Equipment Used: caliper (0.001") / VERSA-TESTER

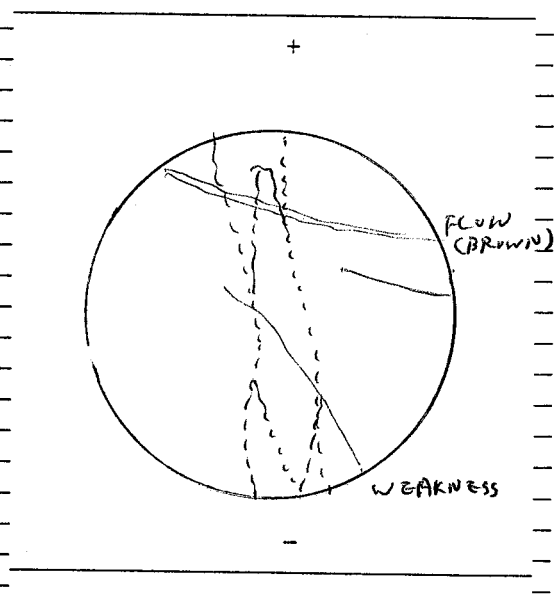
Prepped By/Date: RW 5/10/94
Tested By/Date: S. Jeon (5-10-94
Reviewed By/Date: S. Jeon/6-2-94

D_0	1.870	in	L_+	1.470	in
D_{60}	1.870	in	L_{MID}	1.467	in
D_{120}	1.874	in	L_-	1.448	in
D_{AVG}	1.871	in	L_{AVG}	1.462	in
P	1420	lb	P_C	1420	lb
T	330.5	psi			
	330				

Front View



Rear View



SYMBOLS

D = Diameter
L = Thickness
P = Failure Load
P_C = Corrected Load
T = Tensile Strength

_____ Pre-existing Weakness plane
----- Postfailure Fracture
----- Failure along Pre-existing Weakness plane

$$T = \frac{2P_c}{\pi DL}$$

Sample 3055

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.100 - 0.100 = 0 in

Δ_{180} = 0.099 - 0.098 = 0.001 in

Δ_{90} = 0.100 - 0.099 = 0.001 in

Δ_{270} = 0.097 - 0.096 = 0.001 in

2. Perpendicularity

Δ_1 = 0.120 - 0.108 = 0.012 in

Δ'_1 = 0.129 - 0.112 = 0.017 in

Δ_2 = 0.130 - 0.107 = 0.023 in

Δ'_2 = 0.118 - 0.106 = 0.012 in

Maximum deviation from perpendicularity _____ °

Maximum deviation from parallelism _____ °

Comments: _____

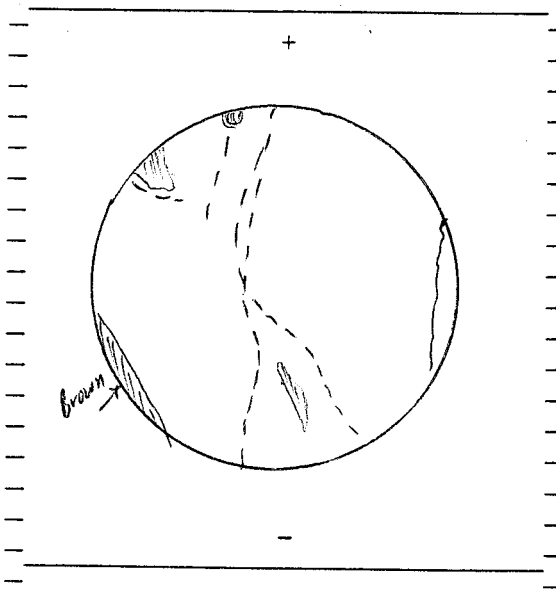
Brazilian Disk Tension Test Data

Job: CNWRA
Location: LEM 57-73
Sample Number: B-062
Load Rate (lb/s): 56.6 lb/s
Equipment Used: caliper (0.001") Versatester

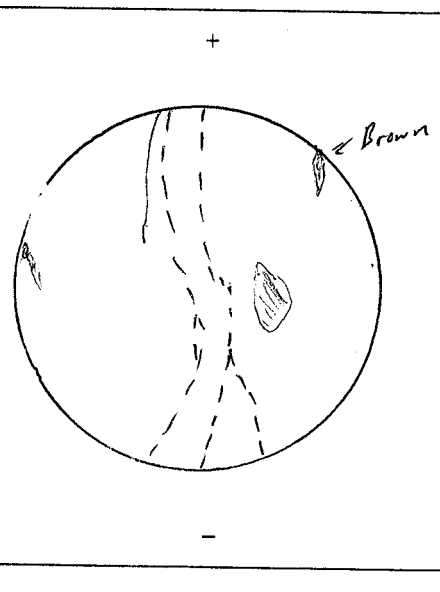
Prepped By/Date: RW 5/10/94
Tested By/Date: M. Bridges 5/10/94
Reviewed By/Date: S. Jeon 6-2-94

D_0	1.856	in	L_+	1.482	in
D_{60}	1.863	in	L_{MID}	1.485	in
D_{120}	1.860	in	L_-	1.473	in
D_{AVG}	1.860	in	L_{AVG}	1.480	in
P	1180	lb	P_C	1180	lb
T	~~272.9~~ MCA 0.1K 270	psi			

Front View



Rear View



SYMBOLS

D = Diameter
L = Thickness
P = Failure Load
P_C = Corrected Load
T = Tensile Strength

——— Pre-existing Weakness plane
----- Postfailure Fracture
═══ Failure along Pre-existing Weakness plane

$$T = \frac{2P_c}{\pi DL}$$

Sample B-062

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.104 - 0.099 = 0.005 in

Δ_{180} = 0.110 - 0.099 = 0.011 in

Δ_{90} = 0.110 - 0.099 = 0.011 in

Δ_{270} = 0.104 - 0.100 = 0.004 in

2. Perpendicularity

Δ_1 = 0.113 - 0.100 = 0.013 in

Δ'_1 = 0.114 - 0.103 = 0.011 in

Δ_2 = 0.111 - 0.104 = 0.007 in

Δ'_2 = 0.105 - 0.093 = 0.012 in

Maximum deviation from perpendicularity _____ °

Maximum deviation from parallelism _____ °

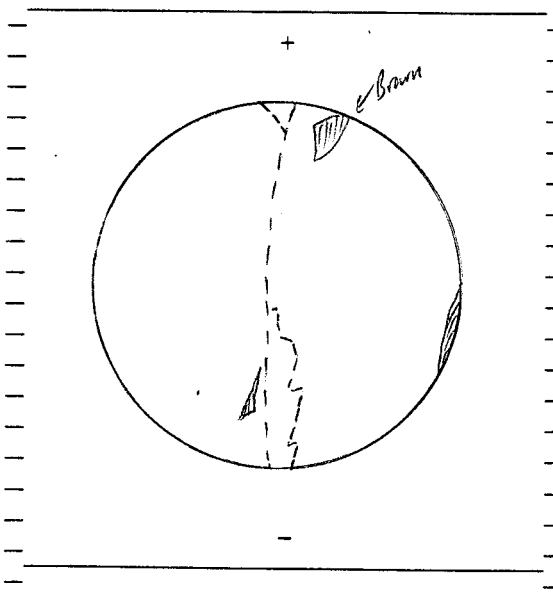
Comments: _____

Brazilian Disk Tension Test Data

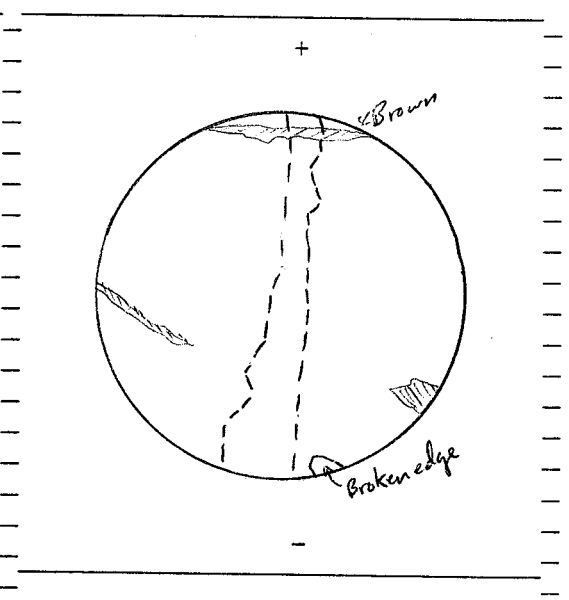
Job:	CNWRA	Prepped By/Date:	RW 5/10/94
Location:	UTM 57-73	Tested By/Date:	M. Bridges 5/10/94
Sample Number:	B-063a	Reviewed By/Date:	S. Jean 6-2-94
Load Rate (lb/s):	56.6 lb/s		
Equipment Used:	calipers (0.001") Versatester		

D_0	1.868	in	L_+	1.449	in
D_{60}	1.873	in	L_{MID}	1.445	in
D_{120}	1.868	in	L_-	1.448	in
D_{AVG}	1.870	in	L_{AVG}	1.447	in
P	1520	lb	P_C	1520	lb
T	357.6	psi			
	360				

Front View



Rear View



SYMBOLS

D = Diameter
L = Thickness
P = Failure Load
P_C = Corrected Load
T = Tensile Strength

_____ Pre-existing Weakness plane
----- Postfailure Fracture
-----= Failure along Pre-existing Weakness plane

$$T = \frac{2P_c}{\pi DL}$$

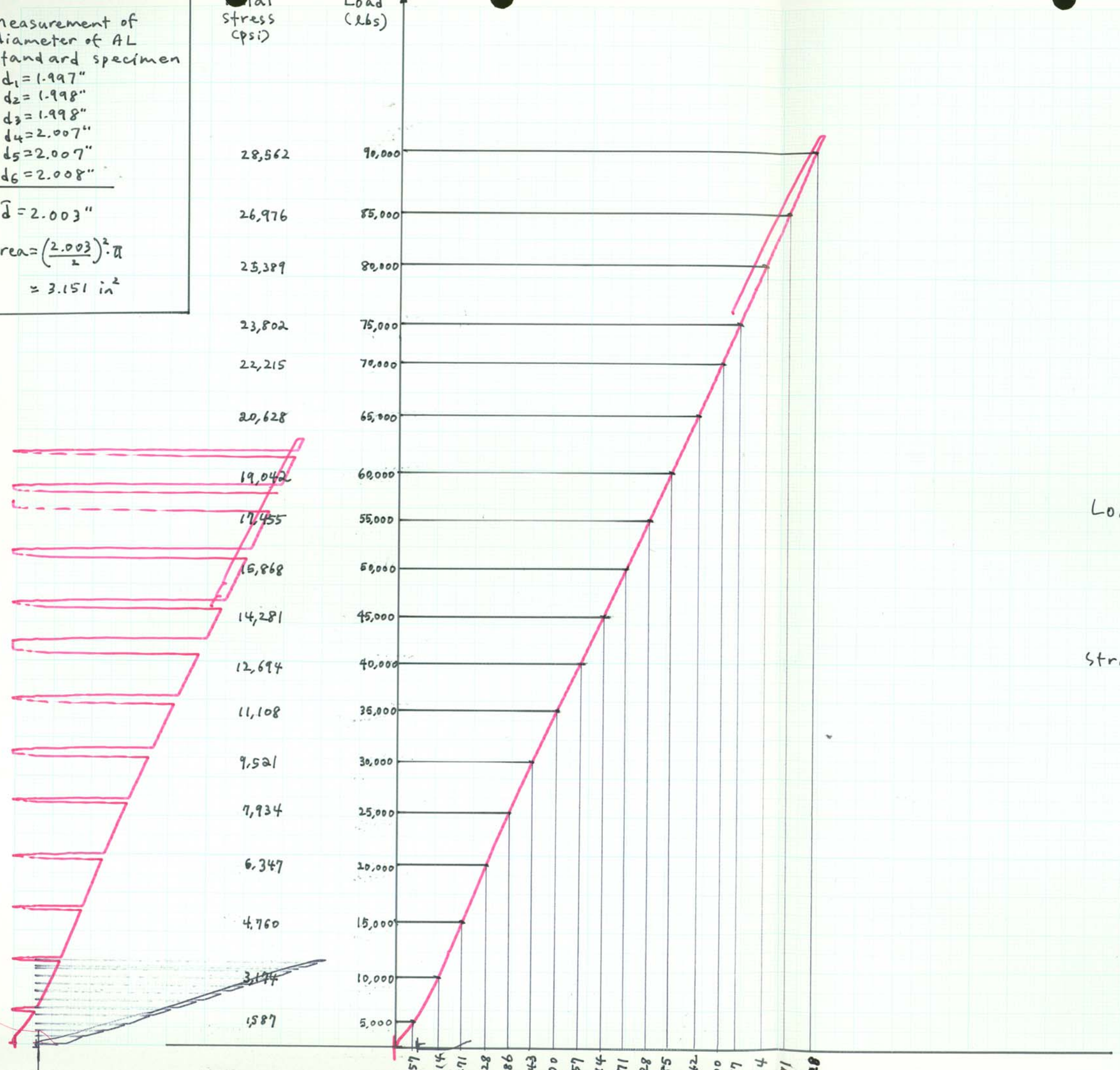
Measurement of diameter of AL standard specimen

$d_1 = 1.997''$
$d_2 = 1.998''$
$d_3 = 1.998''$
$d_4 = 2.007''$
$d_5 = 2.007''$
$d_6 = 2.008''$

$\bar{d} = 2.003''$

$\text{Area} = \left(\frac{2.003}{2}\right)^2 \cdot \pi$

$= 3.151 \text{ in}^2$



Seokwon

- Al 6061T6
  $E = 69 \text{ GPa}$
  $= 10.1 \times 10^6 \text{ psi}$
- HBM 60mm Strain Gauge
- Gain
  Load : 4.20
  Ax. St : 2.00
  Lat. St : 2.00
- Plotting Scale
  Load : 200 mV/cm
  Ax. St : 500 mV/cm
  Lat. St : 500 mV/cm

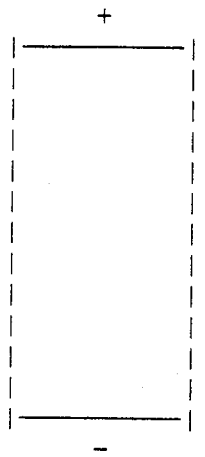
Load : 20,000 lbs / 5cm
= 10,000 lbs / 2.5cm
= 5,000 lbs / 1.25 cm
= 1,000 lbs / 0.25 cm

Strain : 157 microstrain / 0.6 cm

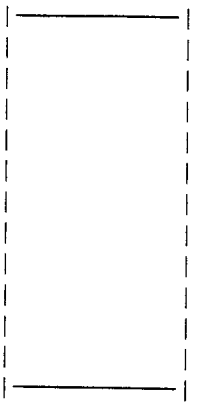
Uniaxial Compression Test Results

Sample Number: U-007b
Hole Number: LFM 95-C2-2
Depth:
Rock Type:
Equipment Used: Caliper (0.001")/SBEL

Job: CNWRA
Location:
Prepped By/Date: RW 5/11/94
Tested By/Date: S. Deon/5-18-94
Reviewed By/Date: M. Bridges 6/2/94



PREFAILURE SKETCH



POSTFAILURE

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.093 - 0.090 = 0.003 in
Δ_{180} = 0.093 - 0.090 = 0.003 in
Δ_{90} = 0.094 - 0.090 = 0.004 in
Δ_{270} = 0.092 - 0.090 = 0.002 in

2. Perpendicularity

Δ_1 = 0.067 - 0.065 = 0.002 in
Δ'_1 = 0.066 - 0.065 = 0.001 in
Δ_2 = 0.066 - 0.065 = 0.001 in
Δ'_2 = 0.066 - 0.065 = 0.001 in

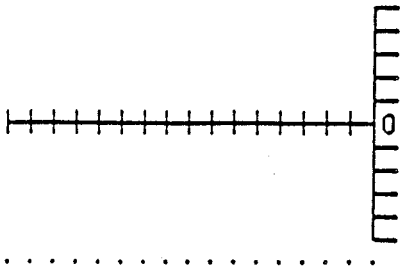
3. Diameter

D_1 = 1.365 in
D_3 = 1.366 in
D_5 = 1.366 in
D_2 = 1.365 in
D_4 = 1.367 in
D_6 = 1.366 in

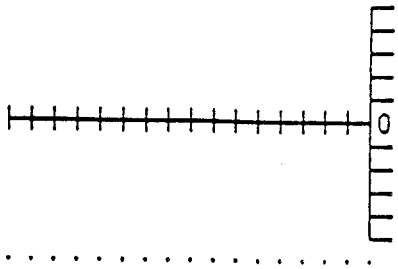
4. Height

H_1 = 4.112 in
H_3 = 4.108 in
H_2 = 4.109 in
H_4 = 4.110 in

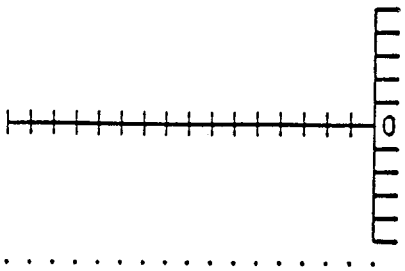
Sample Number: 4r0076



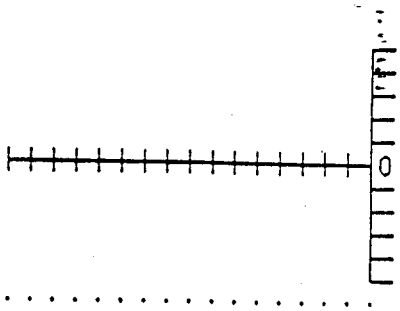
Maximum slope: _____



Maximum slope: _____



Maximum slope: _____



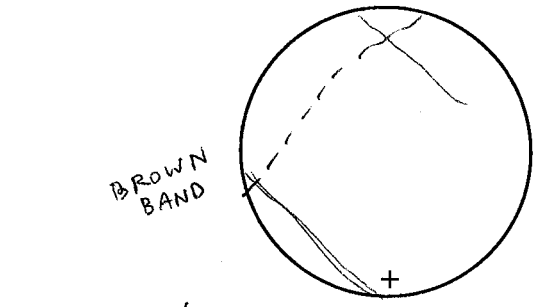
Maximum slope: _____

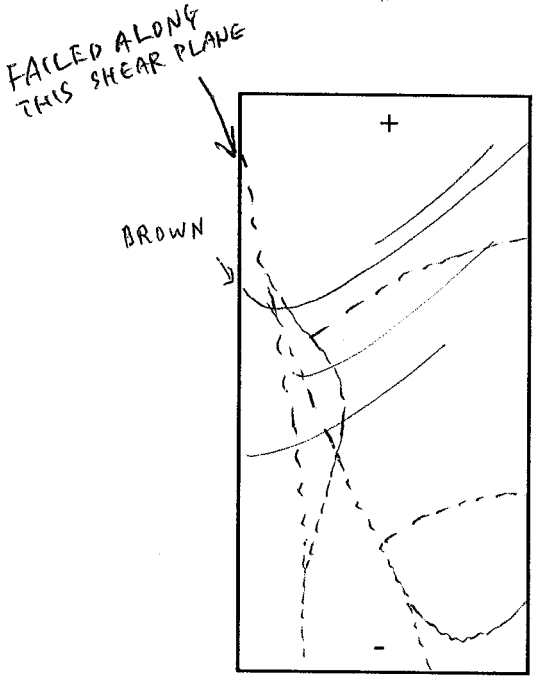
Avg. Diameter (in):	1.866	Disp. Rate (in/s):	0.000295
Avg. Height (in):	4.110	Gauge Reading (lb):	85,000
Area (in^2):	2.735	Gauge Correction (lb):	
Volume (in^3):	11.240	Failure Load (lb):	8.5x10⁴
Weight (g):	496.60	Failure Stress (psi):	31,080
Density (lb/ft^3):	168.17		(≃ 214 MPa)

$$\gamma = \frac{W}{V} \times \frac{1728}{454}$$

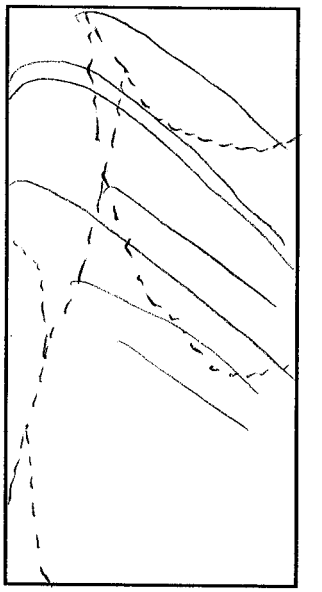
Comments: _____

Sample Number: U-007b

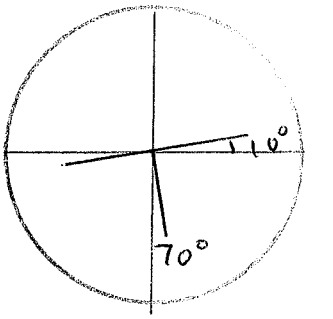


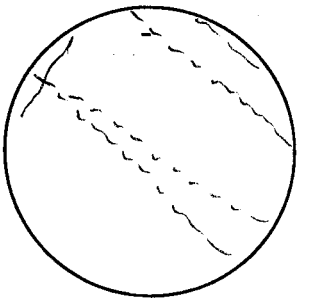


Front



Back

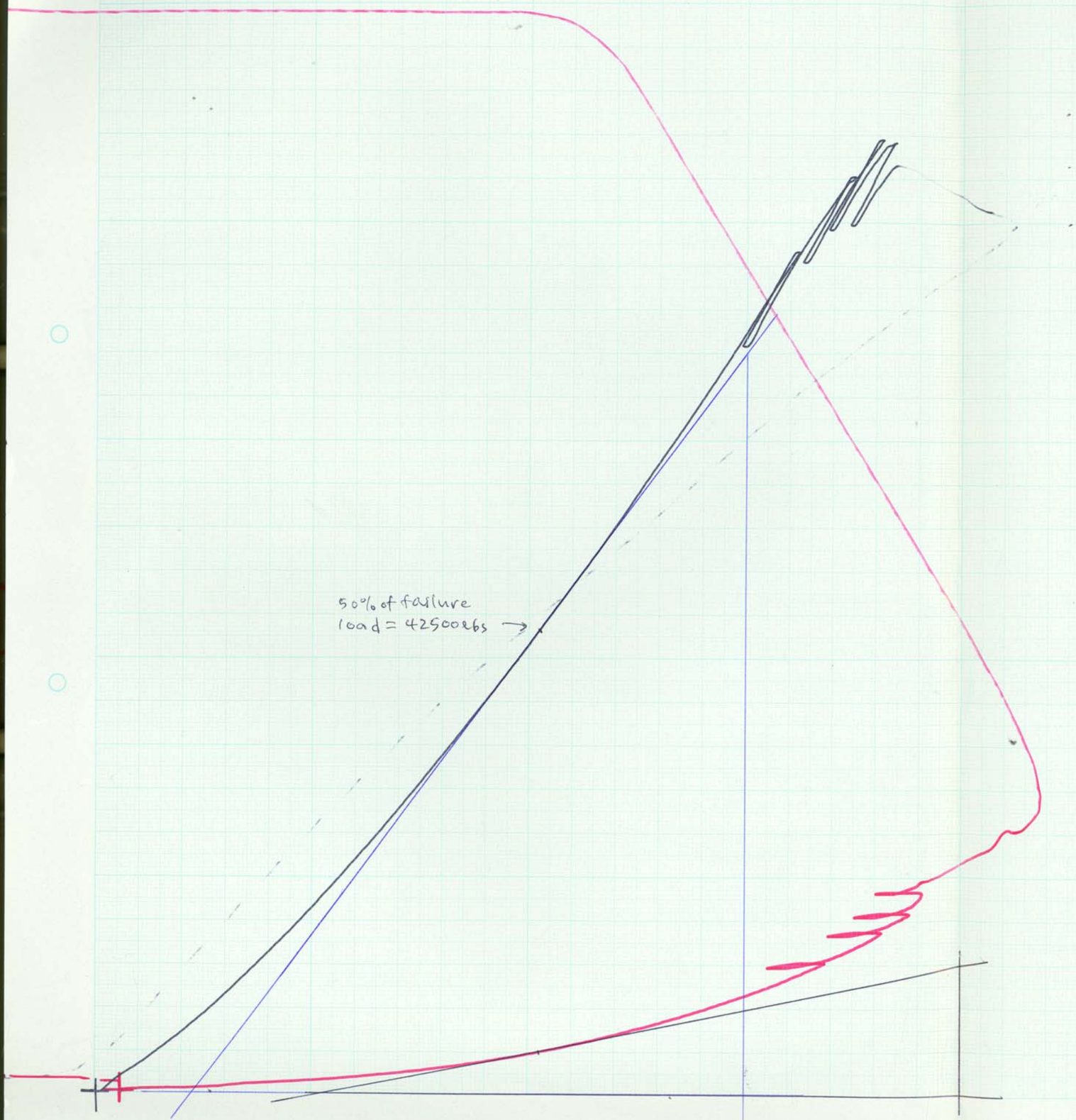




Solid Line: Pre-existing Structure
Dashed Line: Post-Failure

Seokwon Jeon
U-007b

Failure load 85,000 lbs



① Young's Modulus (Blue Triangle)

Load = 17.0 cm = 68000 lbs
Area = 2.735 in^2
stress = 68000/2.735 = 24863 psi
strain = 12.8 cm = 3349 microstrain

$$E = \frac{24863 \text{ psi}}{3349 \times 10^{-6}} = 7.42 \times 10^6 \text{ psi}$$
$$\simeq 51 \text{ GPa}$$

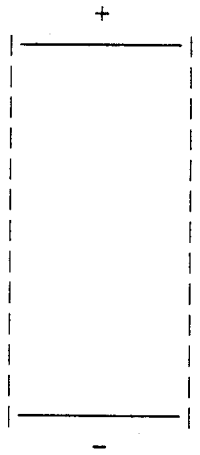
② Poisson's Ratio (Black triangle)

$$\text{Slope} = \frac{2.9 \text{ cm}}{14.7 \text{ cm}} = 0.20$$

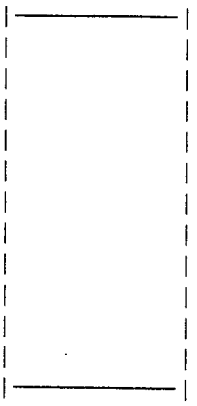
Uniaxial Compression Test Results

Sample Number: U-007C
Hole Number: ~~LFMF95-C-2-2~~ LMF95-C2-2
Depth:
Rock Type:
Equipment Used: caliper (0.001") / SBEL

Job: CNWRA
Location:
Prepped By/Date: RW 5/11/94
Tested By/Date: S. Jeun / 5-18-94
Reviewed By/Date: M. Bridges 6/2/94



PREFAILURE SKETCH



POSTFAILURE

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.099 - 0.097 = 0.002 in Δ_{90} = 0.098 - 0.095 = 0.003 in

Δ_{180} = 0.099 - 0.097 = 0.002 in Δ_{270} = 0.097 - 0.095 = 0.002 in

2. Perpendicularity

Δ_1 = 0.064 - 0.064 = 0 in Δ_2 = 0.069 - 0.068 = 0.001 in

Δ'_1 = 0.069 - 0.068 = 0.001 in Δ'_2 = 0.069 - 0.068 = 0.001 in

3. Diameter

D_1 = 1.866 in D_2 = 1.865 in

D_3 = 1.867 in D_4 = 1.865 in

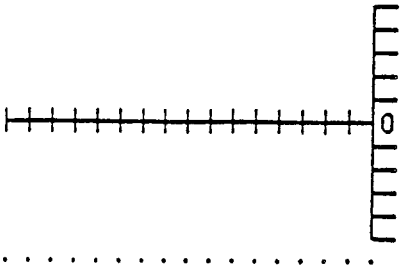
D_5 = 1.867 in D_6 = 1.865 in

4. Height

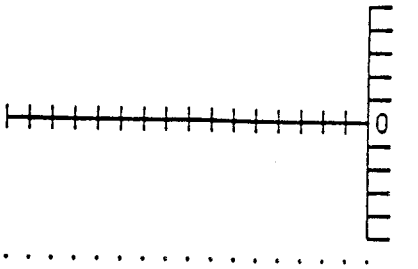
H_1 = 4.103 in H_2 = 4.103 in

H_3 = 4.104 in H_4 = 4.104 in

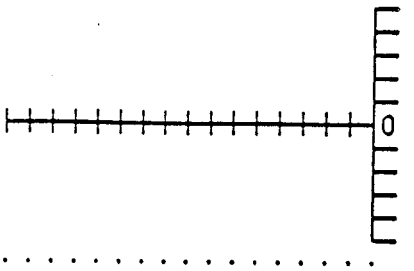
Sample Number: 4-007C



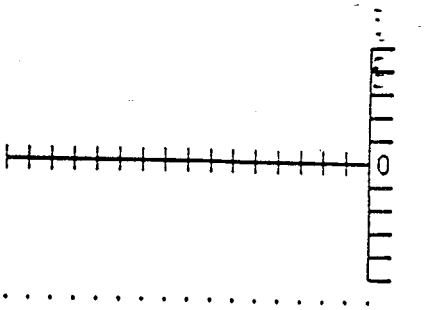
Maximum slope: _____



Maximum slope: _____



Maximum slope: _____



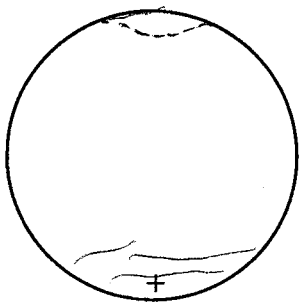
Maximum slope: _____

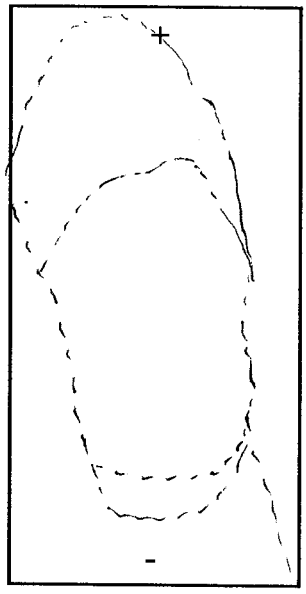
Avg. Diameter (in):	1.866	Disp. Rate (in/s):	0.000295
Avg. Height (in):	4.104	Gauge Reading (lb):	103,000
Area (in^2):	2.735	Gauge Correction (lb):	
Volume (in^3):	11.223	Failure Load (lb):	10.3×10^4
Weight (g):	492.43	Failure Stress (psi):	37,660
Density (lb/ft^3):	167.00		(≃ 260 MPa)

$$\gamma = \frac{W}{V} \times \frac{1728}{454}$$

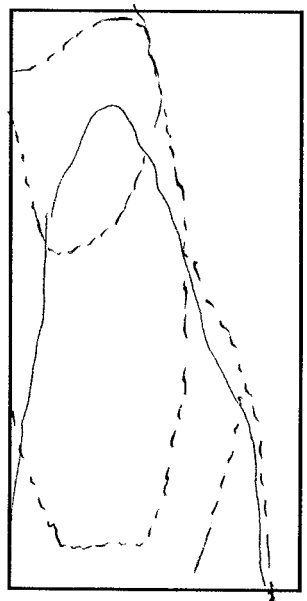
Comments: _____

Sample Number: U-007C



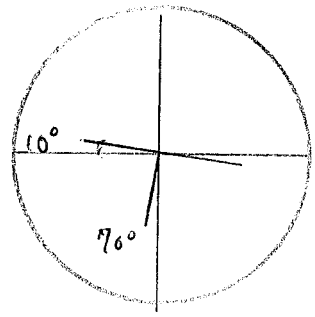


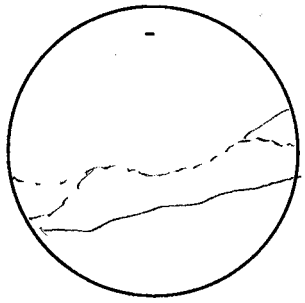
Front



Back

FAILED ALONG THIS SHEAR PLANE

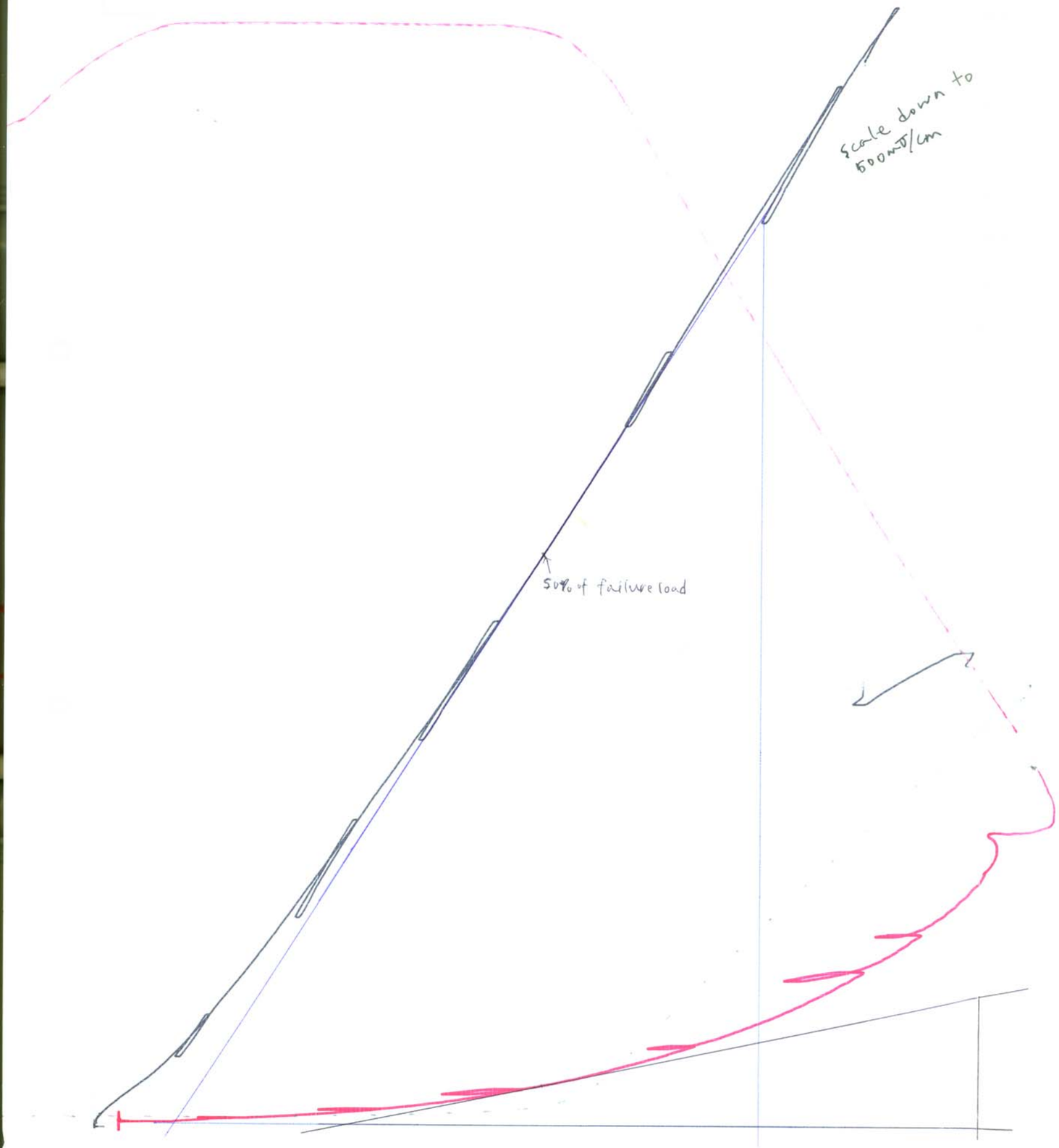




Solid Line: Pre-existing Structure
Dashed Line: Post-Failure

Seokwon
U-0076 S.Jeon

Failure Load 103,000 lbs



① Young's Modulus (Blue Triangle)

Load = 20.5cm = 82000 lbs
Area = 2.735 in^2
Stress = 82000/2.735 = 29982 psi
Strain = 13.2 cm = 3454 microstrain

$$E = \frac{29982\ psi}{3454 \times 10^{-6}} \simeq 8.68 \times 10^{6}\ psi$$
$$\simeq 60\ GPa$$

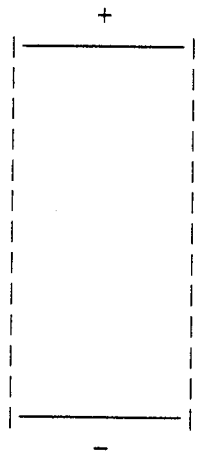
② Poisson's Ratio (Black Triangle)

$$Slope = \frac{2.9\ cm}{14.3\ cm} \simeq 0.20$$

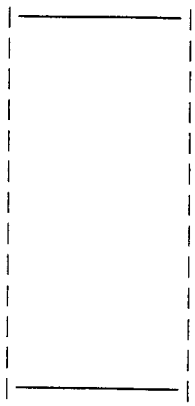
Uniaxial Compression Test Results

Sample Number: U-008a
Hole Number: LFM 95-C2-2
Depth:
Rock Type:
Equipment Used: caliper (0.001") / SBEL

Job: CNWRA
Location:
Prepped By/Date: RW 5/11/94
Tested By/Date: S. Jeon / 5-18-94
Reviewed By/Date: M. Bridges 6/2/94



PREFAILURE SKETCH



POSTFAILURE

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.103 − 0.095 = 0.008 in
Δ_{180} = 0.104 − 0.096 = 0.008 in
Δ_{90} = 0.101 − 0.098 = 0.003 in
Δ_{270} = 0.102 − 0.096 = 0.006 in

2. Perpendicularity

Δ_1 = 0.065 − 0.062 = 0.003 in
Δ'_1 = 0.065 − 0.065 = 0 in
Δ_2 = 0.064 − 0.064 = 0 in
Δ'_2 = 0.066 − 0.064 = 0.002 in

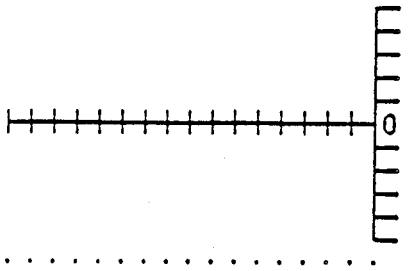
3. Diameter

D_1 = 1.866 in
D_3 = 1.867 in
D_5 = 1.867 in
D_2 = 1.865 in
D_4 = 1.866 in
D_6 = 1.867 in

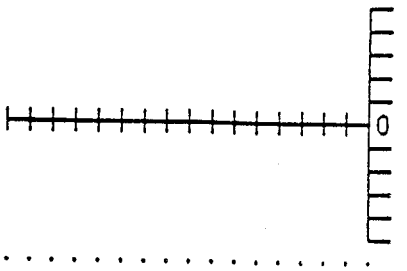
4. Height

H_1 = 4.107 in
H_3 = 4.107 in
H_2 = 4.108 in
H_4 = 4.107 in

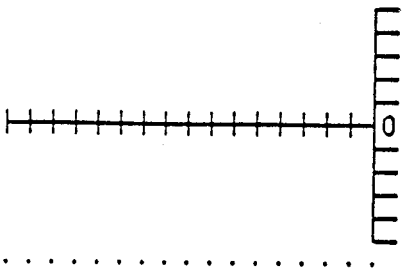
Sample Number: 4-008a



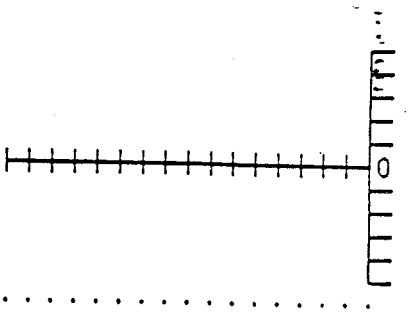
Maximum slope: _____



Maximum slope: _____



Maximum slope: _____



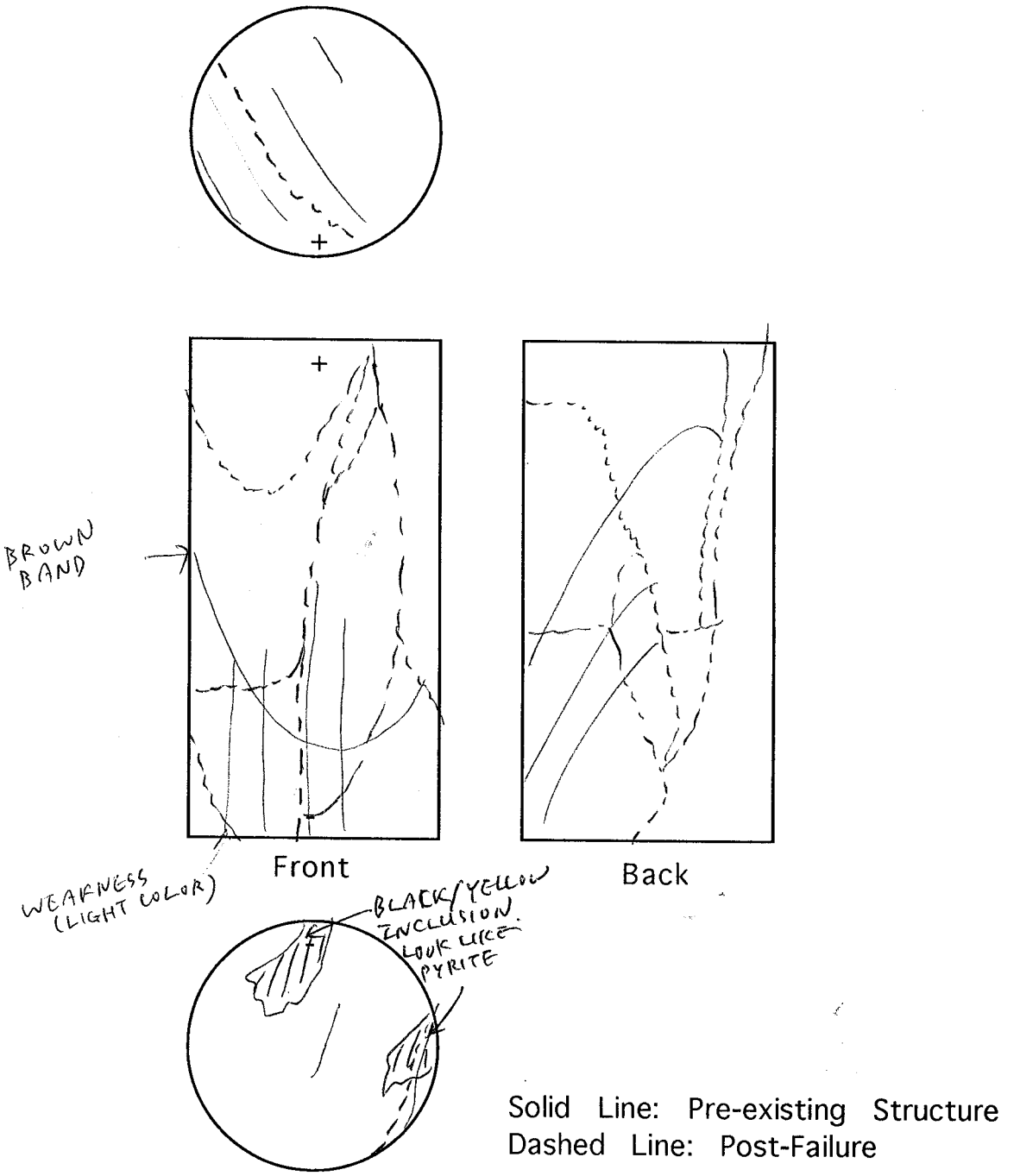
Maximum slope: _____

Avg. Diameter (in):	1.867	Disp. Rate (in/s):	0.000295
Avg. Height (in):	4.107	Gauge Reading (lb):	60,000
Area (in^2):	2.738	Gauge Correction (lb):	
Volume (in^3):	11.244	Failure Load (lb):	6.0×10^4
Weight (g):	495.58	Failure Stress (psi):	21910
Density (lb/ft^3):	167.76		(≈151 MPa)

$$\gamma = \frac{W}{V} \times \frac{1728}{454}$$

Comments: _____

Sample Number: U-008a

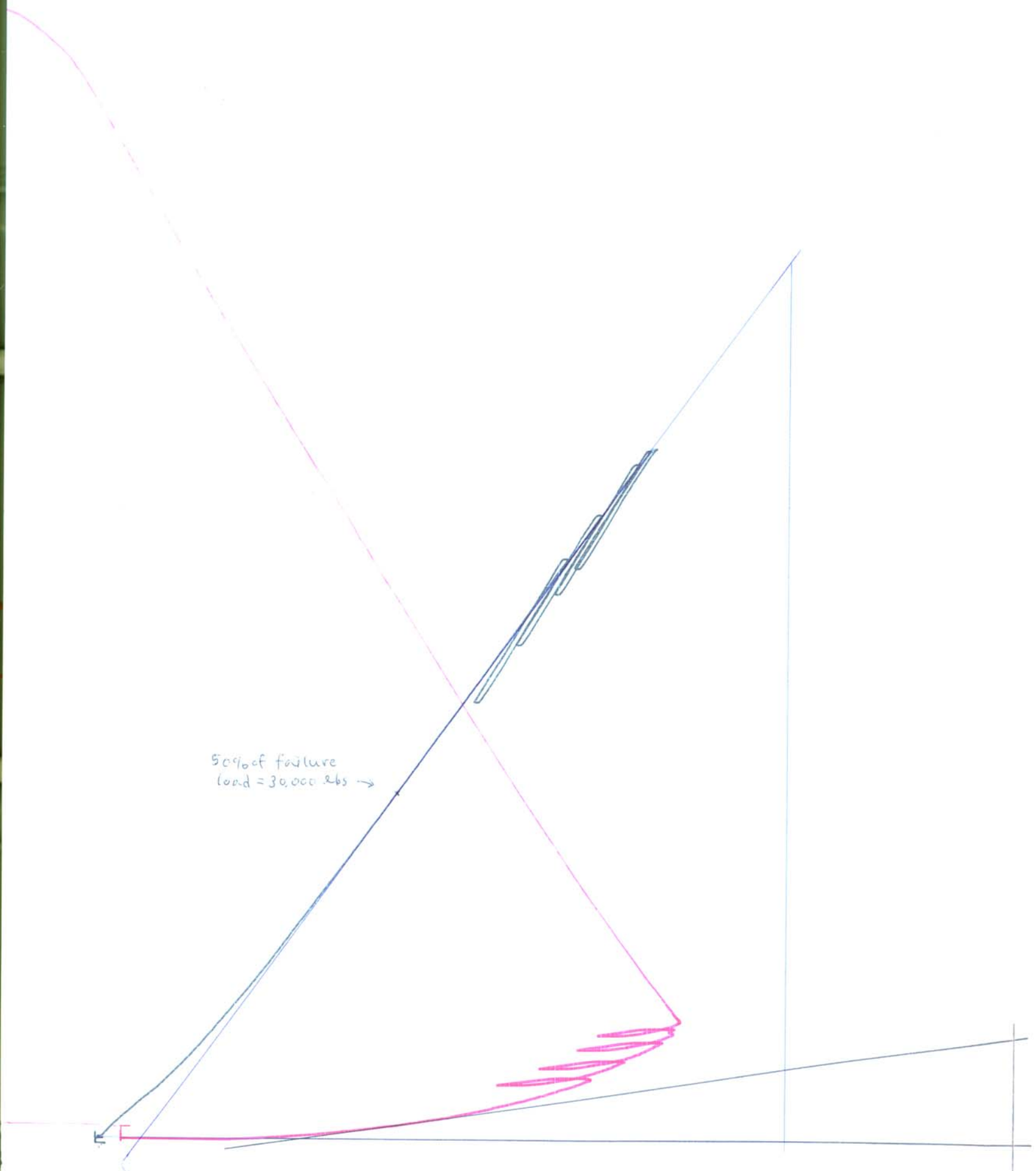


Solid Line: Pre-existing Structure
Dashed Line: Post-Failure

Seokwon Jeon

U-008a

Failure Load
60,000 lbs



① Young's Modulus (Blue Triangle)

Load = 19.0 cm = 76000 lbs.
Area = 2.738
Stress = 76000/2.738 ≃ 27757 psi
Strain = 14.0 cm ≃ 3663 microstrains

$$E = \frac{27757 \text{ psi}}{3663 \times 10^{-6}} = 7.58 \times 10^{6} \text{ psi}$$
$$\simeq 52 \text{ GPa}$$

② Poisson's Ratio

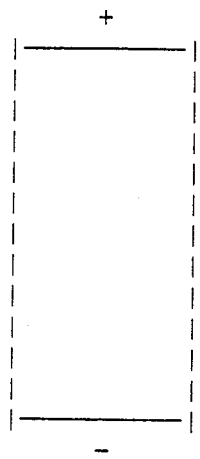
$$\text{Slope} = \frac{2.3 \text{ cm}}{15.5 \text{ cm}} \simeq 0.15$$

Uniaxial Compression Test Results

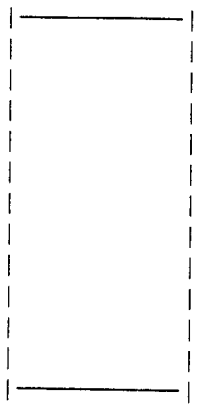
Sample Number: U-0086
Hole Number: LFM 95 C2-2
Depth:
Rock Type:

Job: CNWRA
Location:
Prepped By/Date: R W 5/11/94
Tested By/Date: S. Jeon / 5-19-94
Reviewed By/Date: M. Bridges 6/2/94

Equipment Used: Caliper (0.001") / SBEL



PREFAILURE SKETCH



POSTFAILURE

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.097 − 0.089 = 0.008 in Δ_{90} = 0.094 − 0.088 = 0.006 in

Δ_{180} = 0.095 − 0.088 = 0.007 in Δ_{270} = 0.093 − 0.087 = 0.006 in

2. Perpendicularity

Δ_1 = 0.067 − 0.066 = 0.001 in Δ_2 = 0.068 − 0.064 = 0.004 in

Δ'_1 = 0.070 − 0.066 = 0.004 in Δ'_2 = 0.070 − 0.067 = 0.003 in

3. Diameter

D_1 = 1.365 in D_2 = 1.365 in

D_3 = 1.368 in D_4 = 1.366 in

D_5 = 1.367 in D_6 = 1.363 in

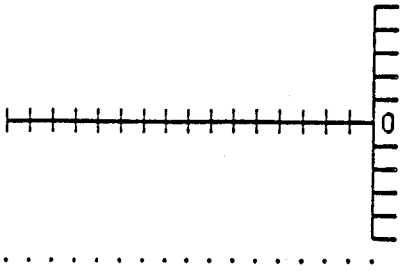
4. Height

H_1 = 4.111 in H_2 = 4.106 in

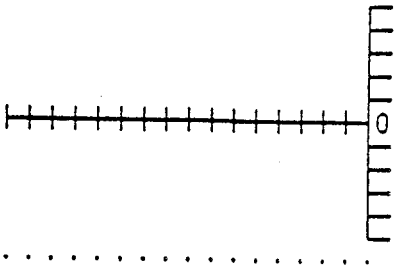
H_3 = 4.108 in H_4 = ~~4.112~~ in

• One strain gauge was bonded on a irregular surface, which seems to be occurred during coring the specimen.

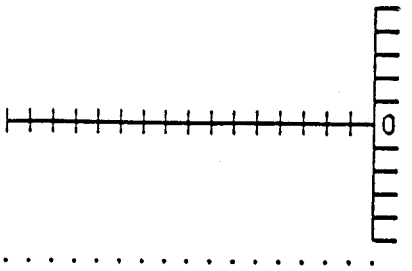
Sample Number: U-008b



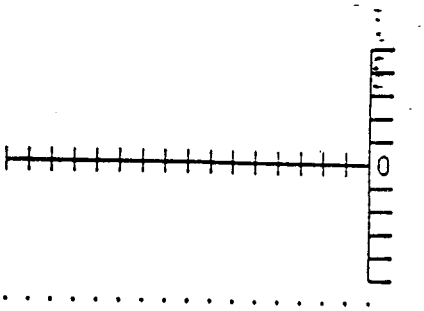
Maximum slope: _____



Maximum slope: _____



Maximum slope: _____



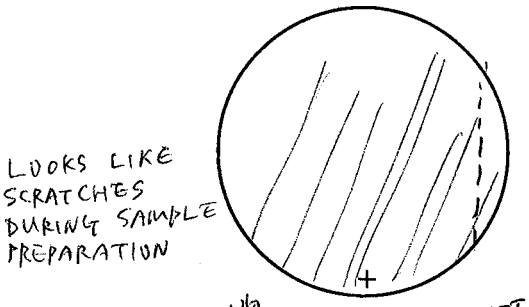
Maximum slope: _____

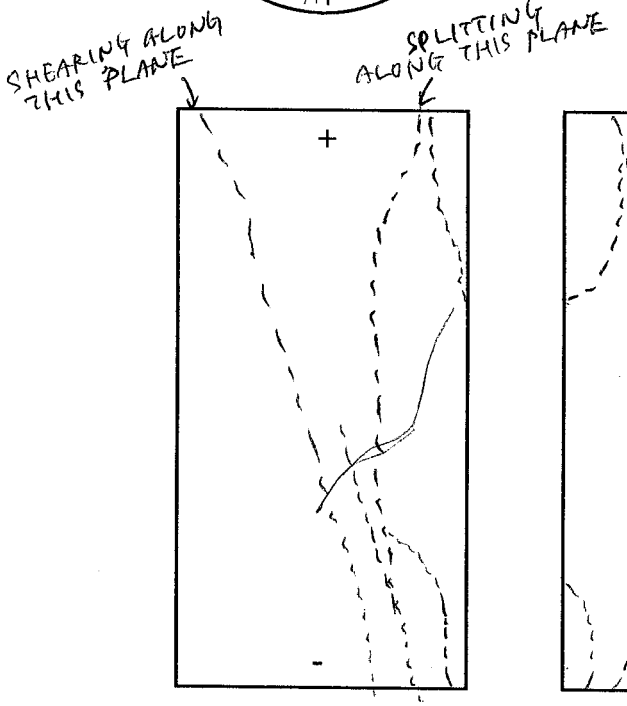
Avg. Diameter (in):	1.866	Disp. Rate (in/s):	0.000295
Avg. Height (in):	4.109	Gauge Reading (lb):	50,000
Area (in^2):	2.735	Gauge Correction (lb):	
Volume (in^3):	11.237	Failure Load (lb):	5.0X10⁴
Weight (g):	493.26	Failure Stress (psi):	18,280
Density (lb/ft^3):	167.08		(≃ 126 MPa)

$$\gamma = \frac{W}{V} \times \frac{1728}{454}$$

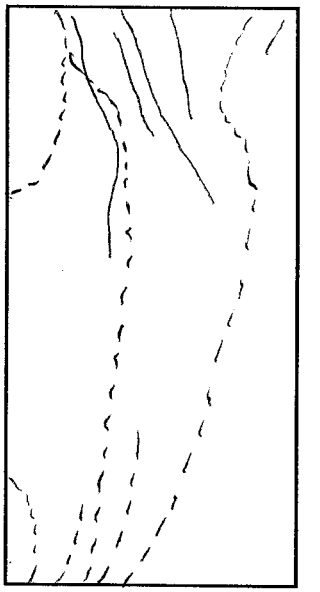
Comments: _____

Sample Number: U-008b

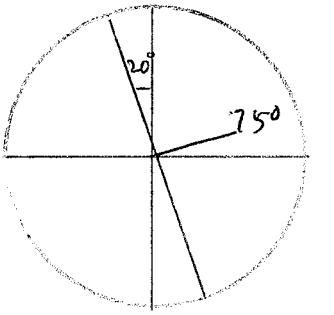


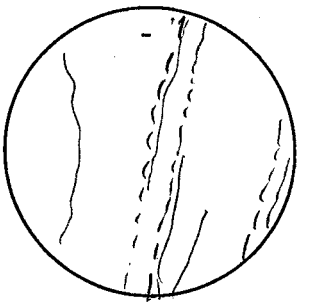


Front



Back

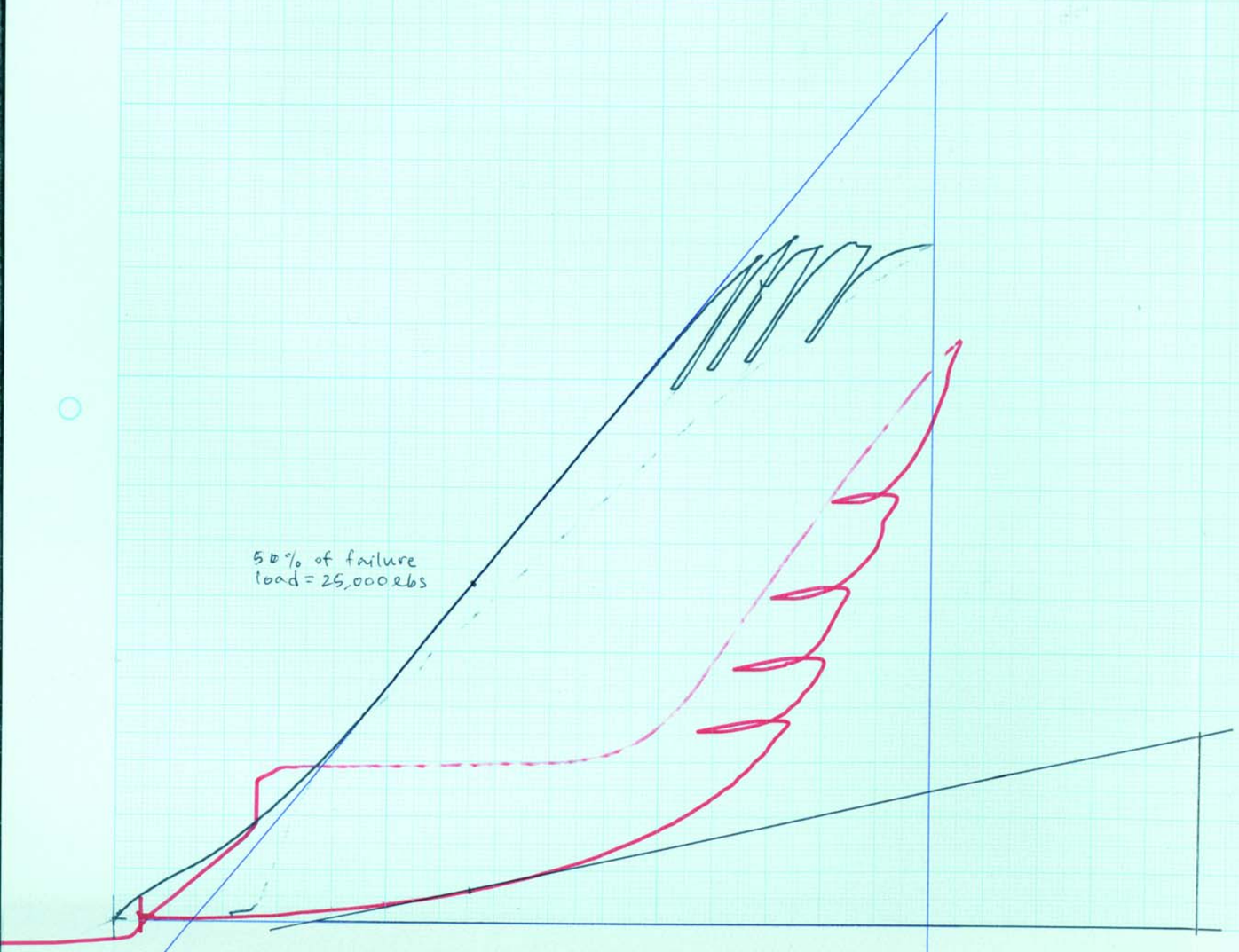




Solid Line: Pre-existing Structure
Dashed Line: Post-Failure

5-10-14
Seokwon Jeon
U-0086

Failure load:
50,000 lbs



① Young's Modulus (Blue Triangle)

Load = 16.5 cm = 66,000 lbs.
Area = 2.735 in^2
Stress = 66,000/2.735 ≃ 24132 psi

Strain = 13.6 cm ≃ 3559 microstrain

$$E = \frac{24132\ psi}{3559 \times 10^{-6}} = 6.78 \times 10^{6}\ psi$$
$$\simeq 47\ GPa$$

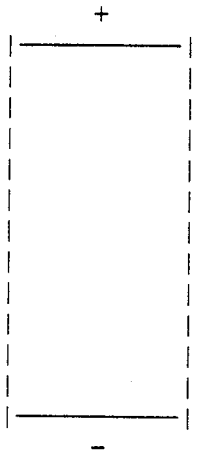
② Poisson's Ratio (Black Triangle)

$$Slope = \frac{3.5\ cm}{16.3\ cm} \simeq 0.21$$

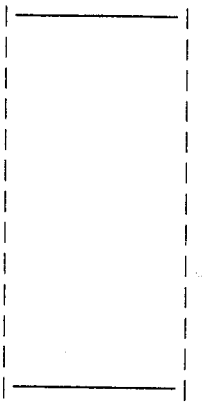
Uniaxial Compression Test Results

Sample Number: U-011
Hole Number: LFM95-C2-3A
Depth:
Rock Type:
Equipment Used: caliper (0.001") / SBEL

Job: CNWRA
Location:
Prepped By/Date: RW 5/11/94
Tested By/Date: S. Jeon / 5-19-94
Reviewed By/Date: M. Bridges 6/2/94



PREFAILURE SKETCH



POSTFAILURE

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.152 - 0.100 = 0.052 in
Δ_{180} = 0.152 - 0.098 = 0.054 in
Δ_{90} = 0.150 - 0.100 = 0.05 in
Δ_{270} = 0.153 - 0.101 = 0.052 in

2. Perpendicularity

Δ_1 = 0.067 - 0.057 = 0.001 in
Δ'_1 = 0.076 - 0.055 = 0.021 in
Δ_2 = 0.074 - 0.050 = 0.014 in
Δ'_2 = 0.068 - 0.057 = 0.011 in

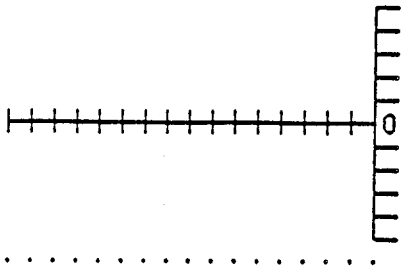
3. Diameter

D_1 = 1.863 in
D_3 = 1.835 in
D_5 = 1.821 in
D_2 = 1.862 in
D_4 = 1.829 in
D_6 = 1.821 in

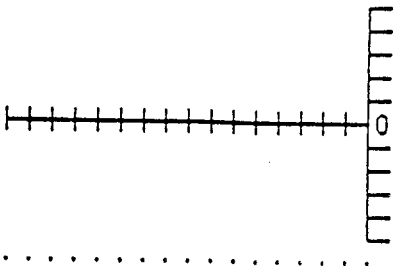
4. Height

H_1 = 4.094 in
H_3 = 4.106 in
H_2 = 4.090 in
H_4 = 4.112 in

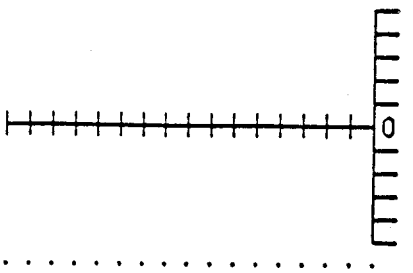
Sample Number: 4-011



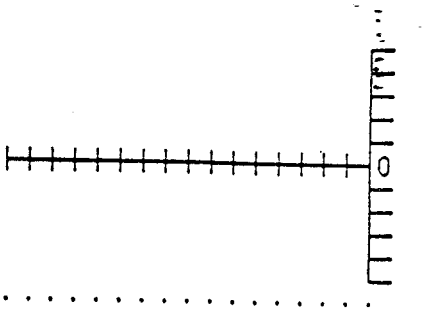
Maximum slope: _____



Maximum slope: _____



Maximum slope: _____



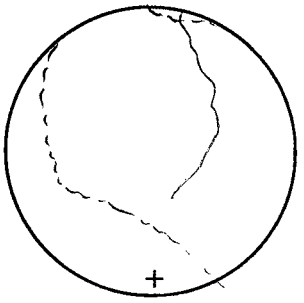
Maximum slope: _____

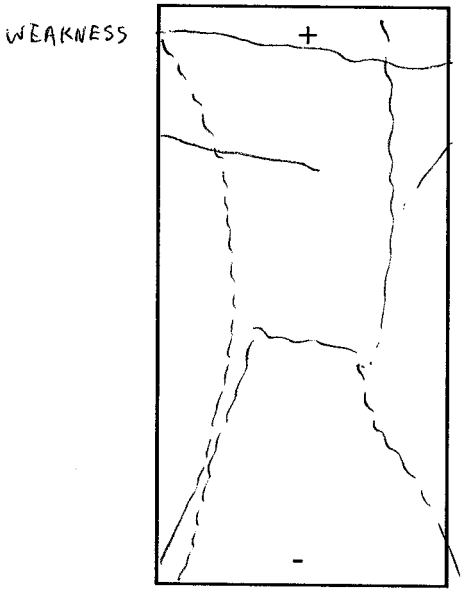
Avg. Diameter (in):	1.739	Disp. Rate (in/s):	0.000295
Avg. Height (in):	4.101	Gauge Reading (lb):	11.7×10^4
Area (in^2):	2.656	Gauge Correction (lb):	
Volume (in^3):	10.893	Failure Load (lb):	11.7×10^4
Weight (g):	478.84	Failure Stress (psi):	44,050
Density (lb/ft^3):	167.32		(≃ 304 MPa)

$$\gamma = \frac{W}{V} \times \frac{1728}{454}$$

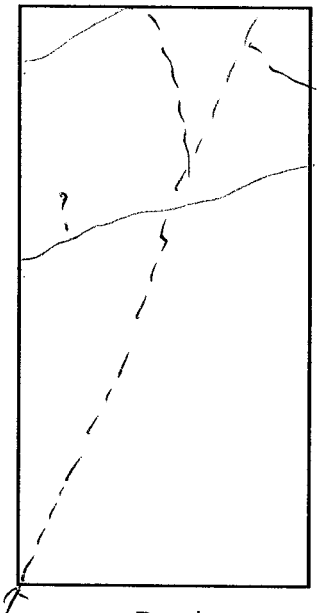
Comments: THE SAMPLE WAS STRONG. IT FAILED VIOLENTLY

Sample Number: U-011



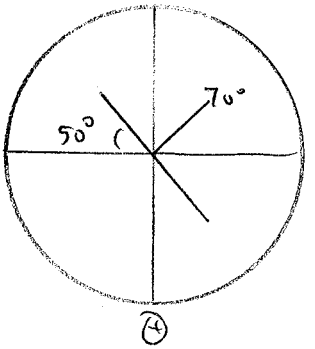


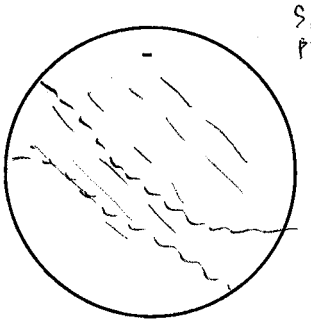
Front



Back

MAJOR SHEAR PLANE

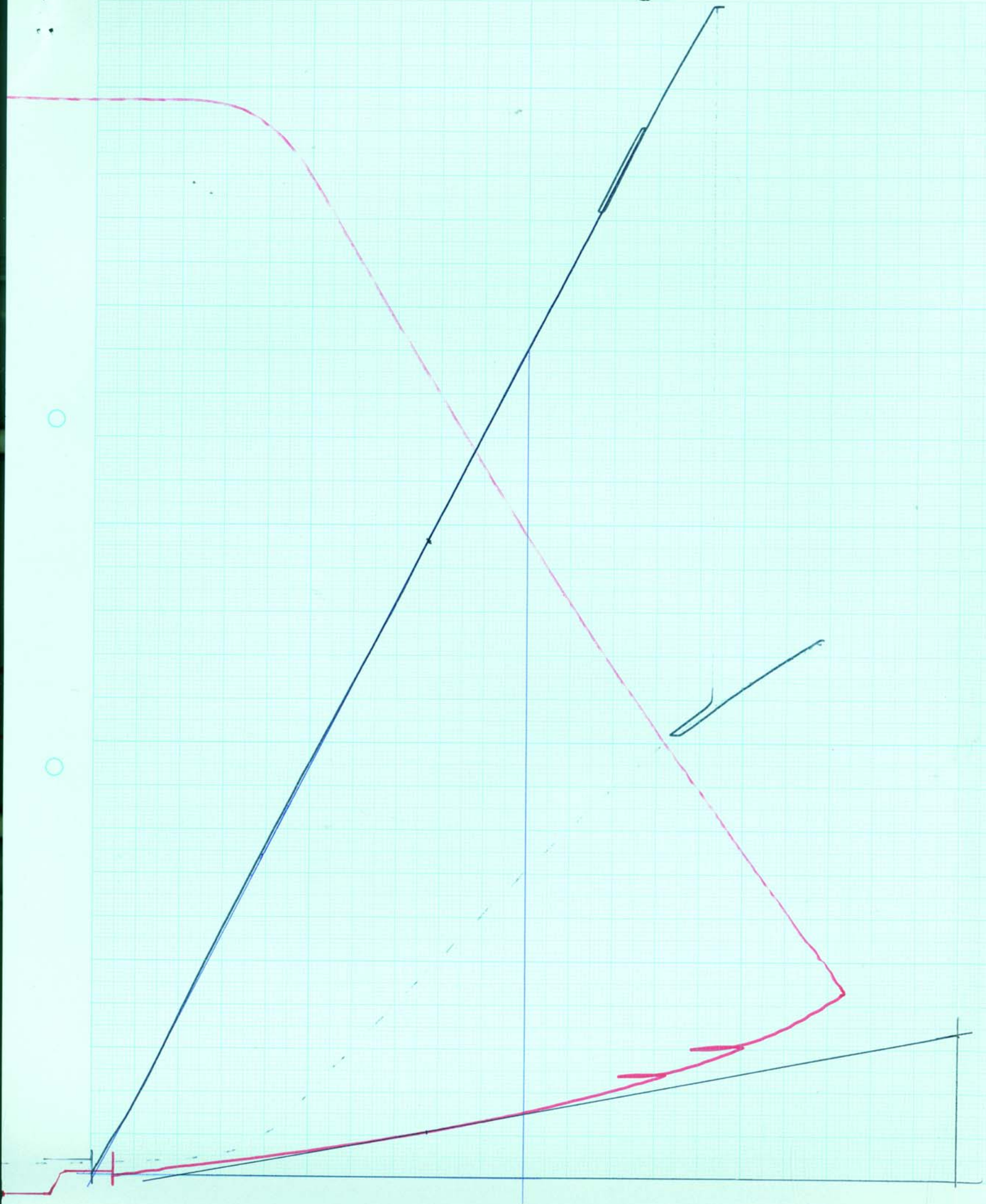




Solid Line: Pre-existing Structure
Dashed Line: Post-Failure

5-14-14
Seokwon Jeon
U-011

Failure Load
117,000 lbs



① Young's Modulus (Blue Triangle)

Load = 19 cm = 76000 lbs.
Area = 2.656 in^2
Stress = 76000/2.656 ≃ 28614 psi
Strain = 9.9 cm = 2591 microstrain.

$$E = \frac{28614\,psi}{2591\times10^{-6}} \simeq 11.04\times10^{6}\ psi$$
$$\simeq 76\ GPa$$

② Poisson's Ratio (Black Triangle)

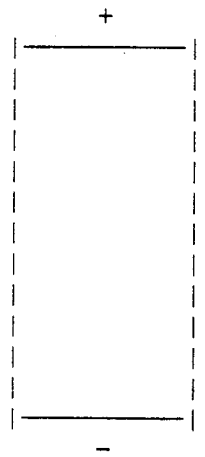
$$Slope = \frac{3.3\,cm}{17.9\,cm} \simeq 0.18$$

Uniaxial Compression Test Results

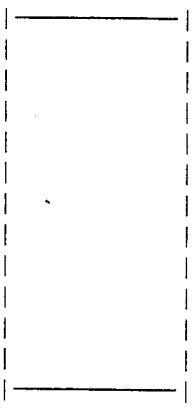
Sample Number: U-018
Hole Number: VFM 57-73
Depth:
Rock Type:

Job: CNWRA
Location:
Prepped By/Date: RW 5/11/94
Tested By/Date: S. Seon ~~5-18-94~~ S. Seon
Reviewed By/Date: M. Bridges 6/2/94 5-19-94

Equipment Used: Caliper (0.001")/SBEL



PREFAILURE SKETCH



POSTFAILURE

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.110 − 0.102 = 0.008 in Δ_{90} = 0.111 − 0.104 = 0.007 in

Δ_{180} = 0.112 − 0.104 = 0.008 in Δ_{270} = 0.105 − 0.102 = 0.003 in

2. Perpendicularity

Δ_1 = 0.064 − 0.062 = 0.002 in Δ_2 = 0.063 − 0.063 = 0 in

Δ'_1 = 0.064 − 0.063 = 0.001 in Δ'_2 = 0.065 − 0.064 = 0.001 in

3. Diameter 1.873

D_1 = ~~4.006~~ in D_2 = 1.870 in

D_3 = 1.874 in D_4 = 1.874 in

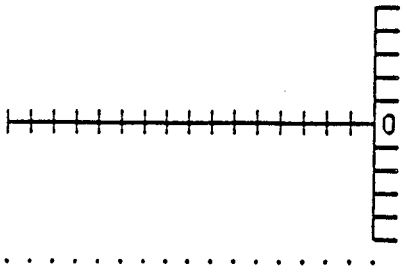
D_5 = 1.874 in D_6 = 1.873 in

4. Height

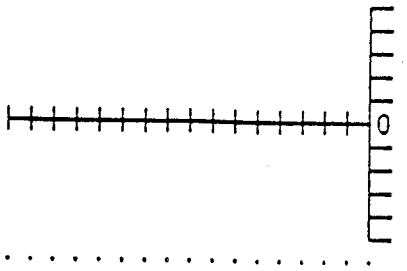
H_1 = 4.006 in H_2 = 4.007 in

H_3 = 4.007 in H_4 = 4.007 in

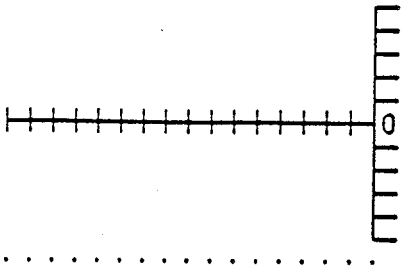
Sample Number: U-018



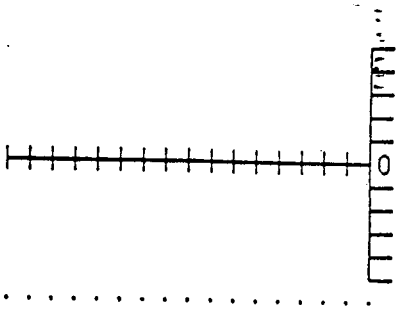
Maximum slope: _____



Maximum slope: _____



Maximum slope: _____



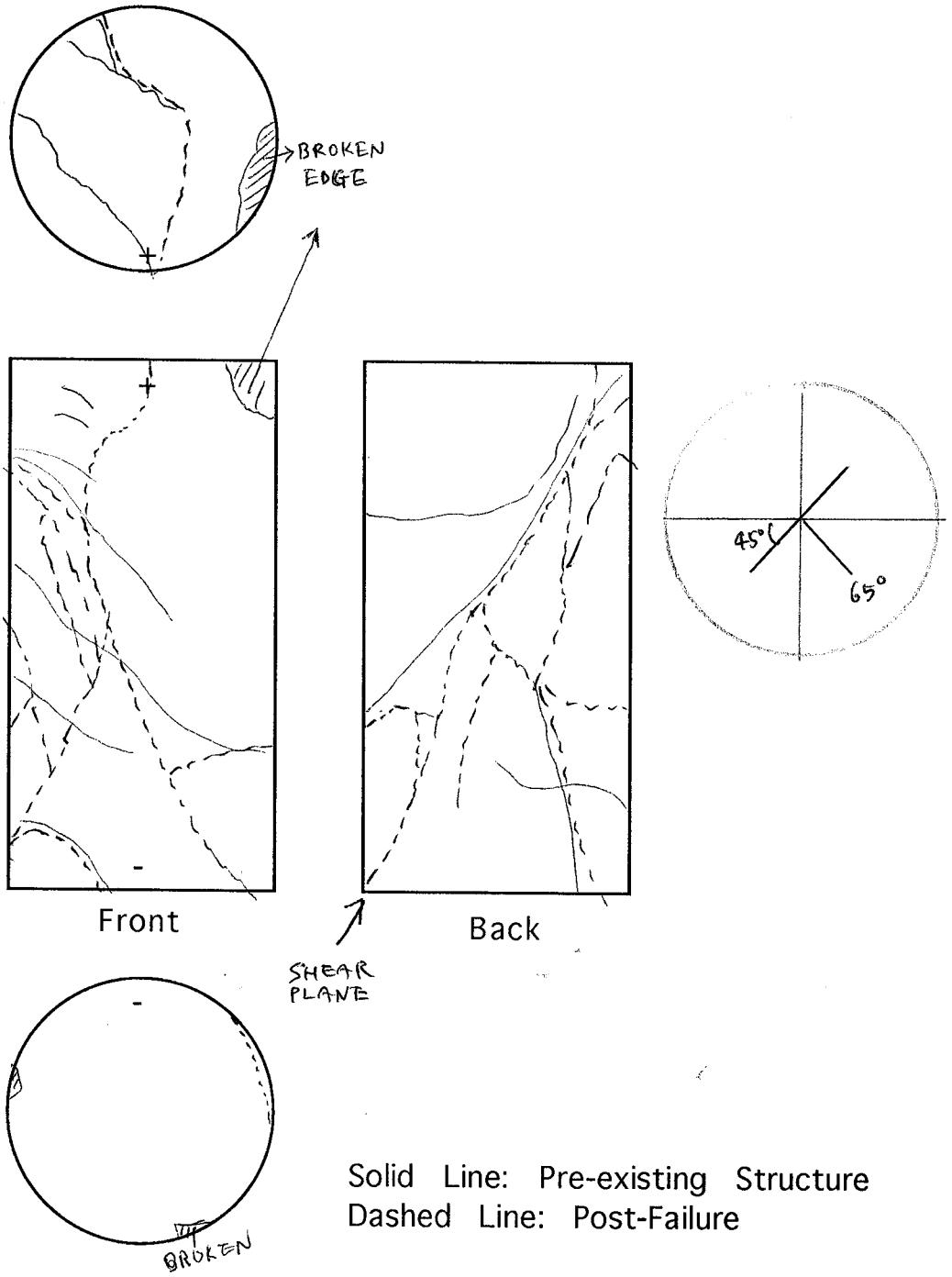
Maximum slope: _____

Avg. Diameter (in):	1.873	Disp. Rate (in/s):	0.000295
Avg. Height (in):	4.007	Gauge Reading (lb):	4.2 x 10⁴
Area (in^2):	2.755	Gauge Correction (lb):	
Volume (in^3):	11.040	Failure Load (lb):	4.2x10⁴
Weight (g):	426.70	Failure Stress (psi):	15,250
Density (lb/ft^3):	167.79		(≃105 MPa)

$$\gamma = \frac{W}{V} \times \frac{1728}{454}$$

Comments: THIS SAMPLE LOOKS DIFFERENT WITH OTHER SAMPLES. COLOR WAS BRIGHTER THAN THE OTHERS. TEXTURE LOOKS COARSER THAN OTHERS.

Sample Number: U-018



Solid Line: Pre-existing Structure
Dashed Line: Post-Failure

Seokwon Jeon

U-018

- Strain gauges were broken during the test. (Probably, bondage was broken)
- The sample showed an excessive strain.

- Failure load = 42000 lbs

Due to the breakage of strain gauges, Young's modulus was calculated at 38% of the failure load (16000 lbs).

① Young's Modulus. (Refer to the blue triangle)

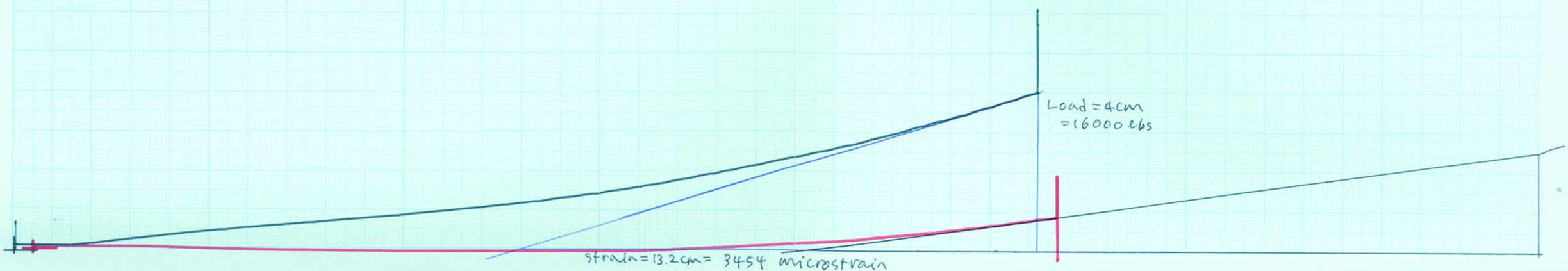
Load = 16000 lbs
Area = 2.755 in^2

stress = 5810 psi

$$\therefore E = \frac{5810\ psi}{3454 \times 10^{-6}} \simeq 1.68 \times 10^{6}\ psi$$
$$\simeq 11.6\ GPa$$

② Poisson's Ratio (Refer to the black triangle)

$$slope = \frac{2.5}{18.7} \simeq 0.13$$

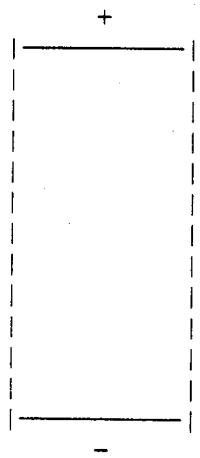


Uniaxial Compression Test Results

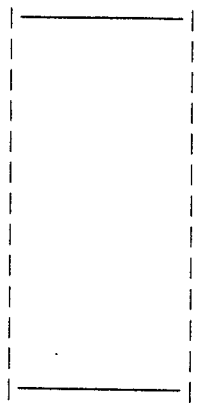
Sample Number: U-027
Hole Number: LFM 57-73
Depth:
Rock Type:

Job: CNWRA
Location:
Prepped By/Date: RW 5/7/94
Tested By/Date: S. Jeon / 5-17-94
Reviewed By/Date: M. Bridges 6/2/94

Equipment Used: caliper (0.001") / SBEL



PREFAILURE SKETCH



POSTFAILURE

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.105 - 0.0914 = 0.009 in Δ_{90} = 0.100 - 0.097 = 0.003 in

Δ_{180} = 0.106 - 0.095 = 0.011 in Δ_{270} = 0.103 - 0.098 = 0.005 in

2. Perpendicularity

Δ_1 = 0.102 - 0.100 = 0.002 in Δ_2 = 0.103 - 0.101 = 0.002 in

Δ'_1 = 0.106 - 0.108 = 0 in Δ'_2 = 0.110 - 0.108 = 0.002 in

3. Diameter

D_1 = 1.871 in D_2 = 1.869 in

D_3 = 1.870 in D_4 = 1.870 in

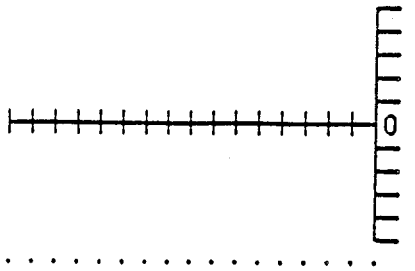
D_5 = 1.870 in D_6 = 1.870 in

4. Height

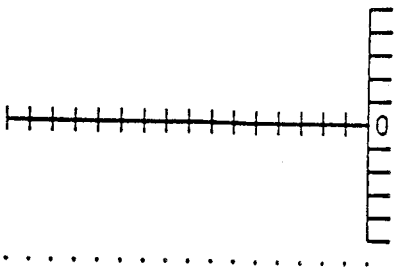
H_1 = 4.003 in H_2 = 4.005 in

H_3 = 4.004 in H_4 = 4.006 in

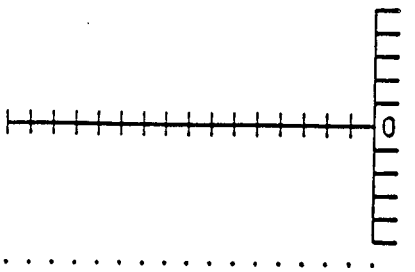
Sample Number: 4-027



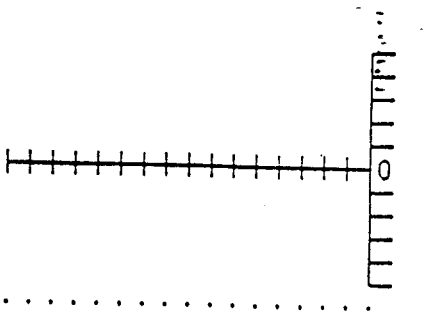
Maximum slope: _____



Maximum slope: _____



Maximum slope: _____



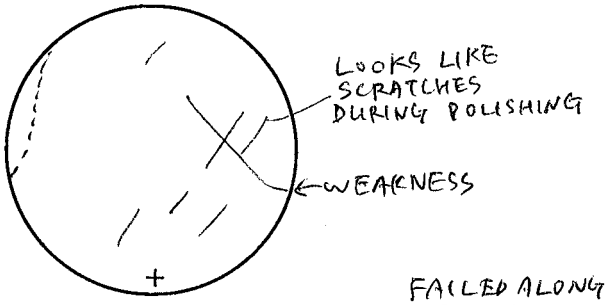
Maximum slope: _____

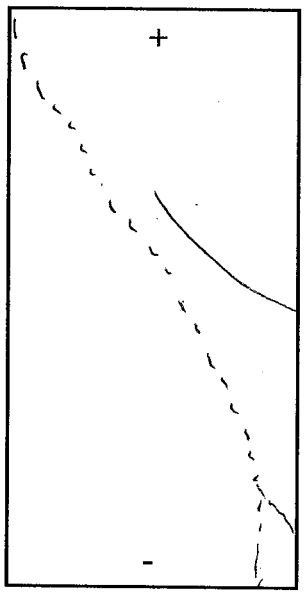
Avg. Diameter (in):	1.870	Disp. Rate (in/s):	0.000295
Avg. Height (in):	4.006	Gauge Reading (lb):	35,000
Area (in^2):	2.746	Gauge Correction (lb):	
Volume (in^3):	11.002	Failure Load (lb):	3.5×10^4
Weight (g):	481.37	Failure Stress (psi):	12,750
Density (lb/ft^3):	166.53		(≃ 88 MPa)

$$\gamma = \frac{W}{V} \times \frac{1728}{454}$$

Comments: _____

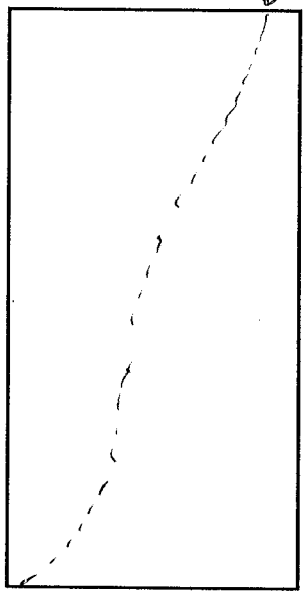
Sample Number: U-027





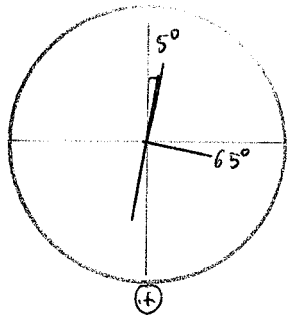
Front

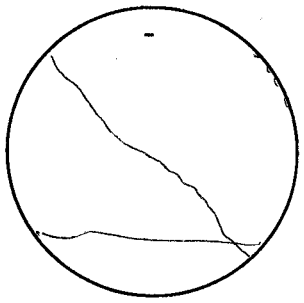
FAILED ALONG
A SHEAR SURFACE



Back

SHEAR PLANE





WEAKNESS

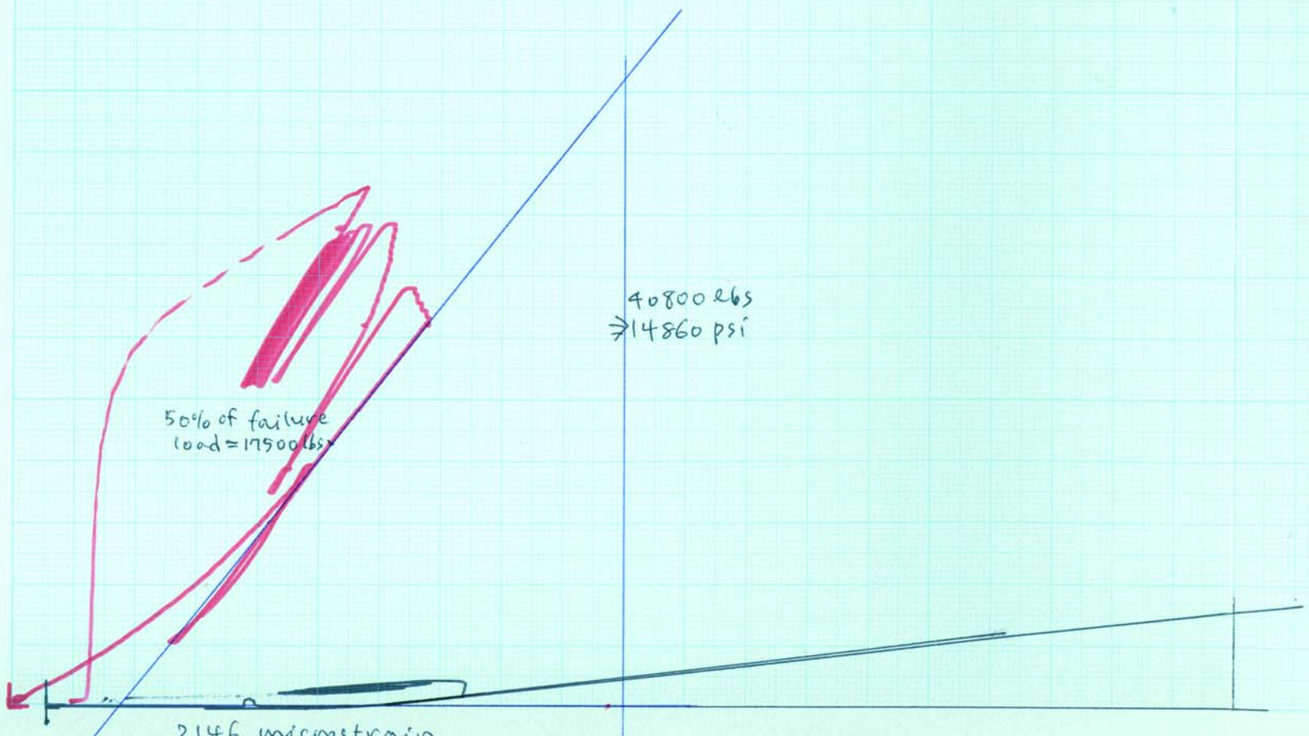
Solid Line: Pre-existing Structure
Dashed Line: Post-Failure

5-17-94.
U-027

Gain: load: 4.20
Axi. St: 2.00
Lat. St: 2.00
plotting scale
load: 200 mV/cm
Axi. St. 500 mV/cm
Lat. St. 500 mV/cm

Failure load: 35,000 lbs
Time Elapsed: 3:05

- Sample failed along a shear plane, which did not allow a complete stress-strain curve.
- Before it failed, several loading-unloading cycles were applied



① Young's Modulus (Blue triangle)

Load = 10.2 cm = 40800 lbs
Area = 2.746 in²

stress = 40800/2.746 ≈ 14860 psi

strain = 8.2 cm = 2146 microstrain

$$E = \frac{14860 \text{ psi}}{2146 \times 10^{-6}} \simeq 6.92 \times 10^{6} \text{ psi}$$
$$\simeq 48 \text{ GPa}$$

② Poisson's Ratio (Black triangle)

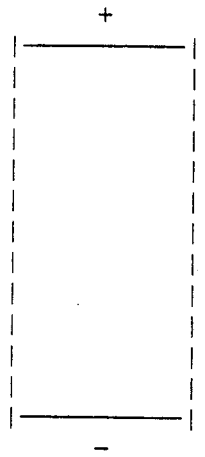
$$\text{Slope} = \frac{1.6 \text{ cm}}{14.0 \text{ cm}} \simeq 0.11$$

Uniaxial Compression Test Results

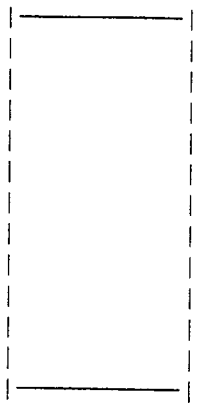
Sample Number: U-036b
Hole Number: VFM 57-73
Depth:
Rock Type:

Job: CNWRA
Location:
Prepped By/Date: R W 5/11/94
Tested By/Date: S. Jeon / 5-19-94
Reviewed By/Date: McBridge 6/2/94

Equipment Used: Caliper (0.001") / SBEL



PREFAILURE SKETCH



POSTFAILURE

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.096 − 0.094 = 0.002 in Δ_{90} = 0.094 − 0.093 = 0.001 in

Δ_{180} = 0.096 − 0.093 = 0.003 in Δ_{270} = 0.095 − 0.092 = 0.003 in

2. Perpendicularity

Δ_1 = 0.081 − 0.079 = 0.002 in Δ_2 = 0.081 − 0.079 = 0.002 in

Δ'_1 = 0.079 − 0.078 = 0.001 in Δ'_2 = 0.080 − 0.079 = 0.001 in

3. Diameter 1.863

D_1 = ~~4.063~~ 1.863 in D_2 = ~~4.063~~ 1.863 in

D_3 = ~~4.063~~ 1.863 in D_4 = ~~4.063~~ 1.863 in

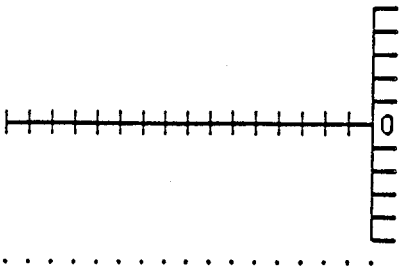
D_5 = ~~4.064~~ 1.864 in D_6 = ~~4.064~~ 1.863 in

4. Height

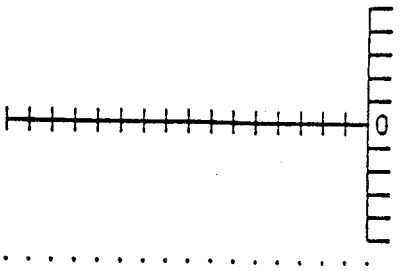
H_1 = 4.020 in H_2 = 4.019 in

H_3 = 4.020 in H_4 = 4.018 in

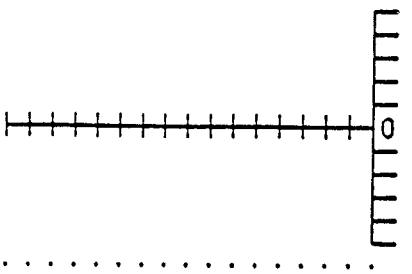
Sample Number: U-036b



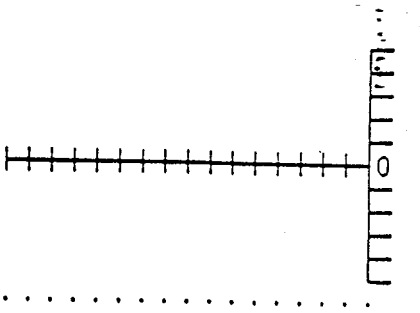
Maximum slope: _____



Maximum slope: _____



Maximum slope: _____



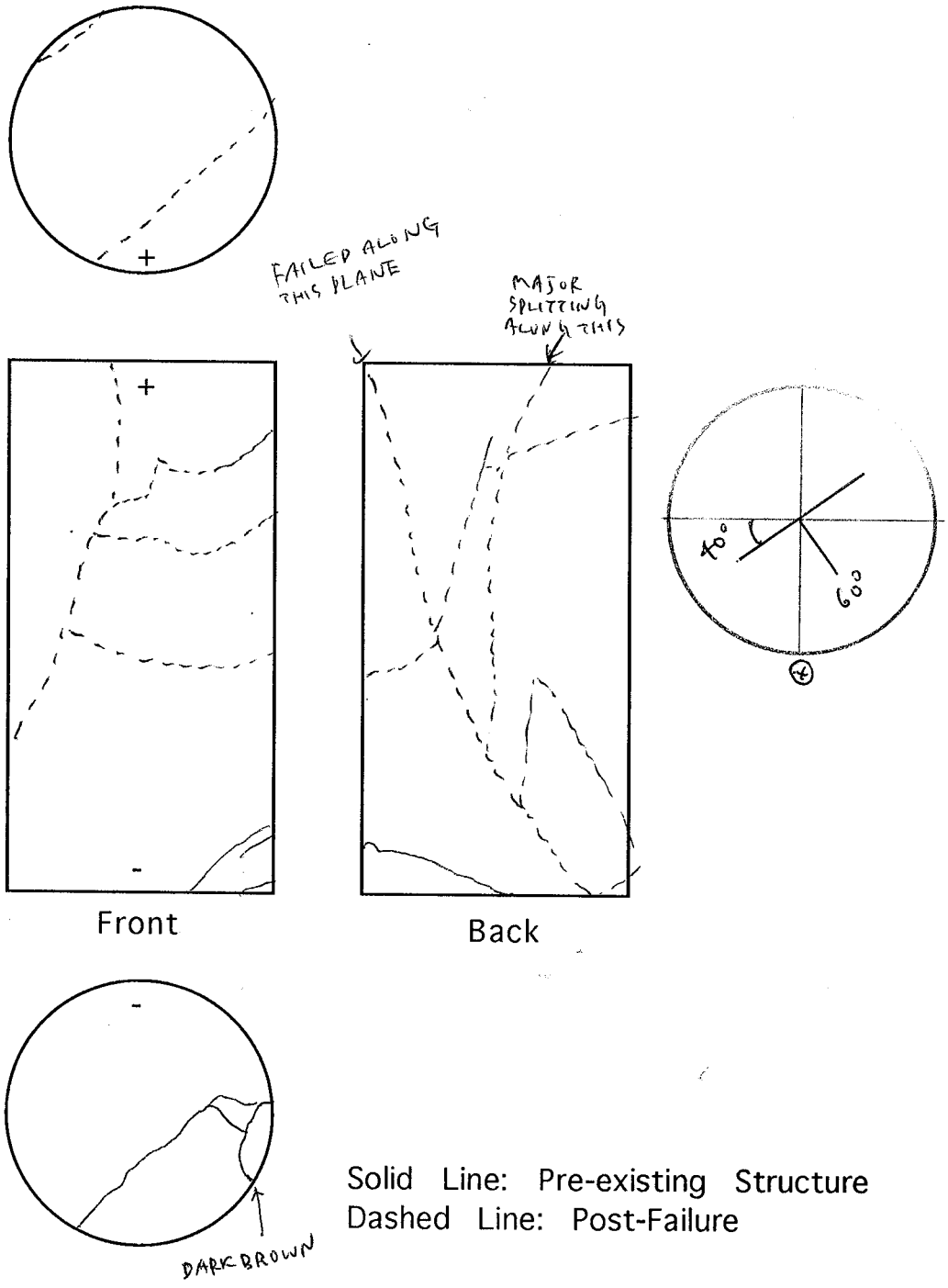
Maximum slope: _____

Avg. Diameter (in):	1.863	Disp. Rate (in/s):	
Avg. Height (in):	4.019	Gauge Reading (lb):	8.5 x10⁴
Area (in^2):	2.726	Gauge Correction (lb):	
Volume (in^3):	10.96	Failure Load (lb):	8.5x10⁴
Weight (g):	482.08	Failure Stress (psi):	31,180
Density (lb/ft^3):	~~167.48~~ 167.42 MLB		(≃ 215 MPa)

$$\gamma = \frac{W}{V} \times \frac{1728}{454}$$

Comments: _____

Sample Number: U-036 b



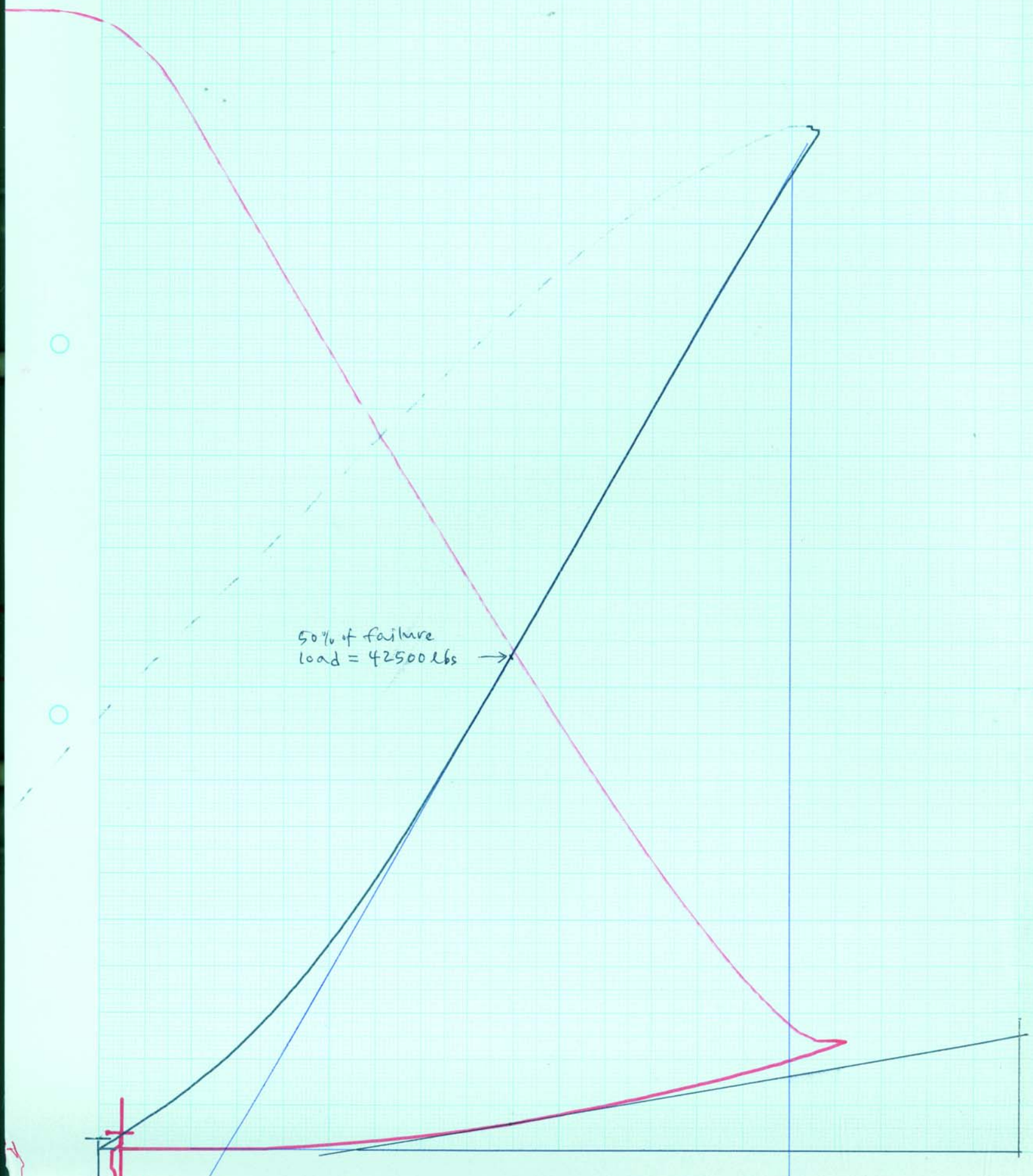
Solid Line: Pre-existing Structure
Dashed Line: Post-Failure

5-14-14

Seokwon Jeon

U-036 b

Failure Load = 85000 lbs



① Young's Modulus (Blue Triangle)

Load = 21.2 cm = 84800 lbs
Area = 2.726 in^2
Stress = 84800 / 2.726 ≈ 31108 psi
Strain = 12.2 cm = 3192 microstrain

$$E = \frac{31108}{3192 \times 10^{-6}} \simeq 9.74 \times 10^{6} \text{ psi}$$
$$\simeq 67 \text{ GPa}$$

② Poisson's Ratio (Black Triangle)

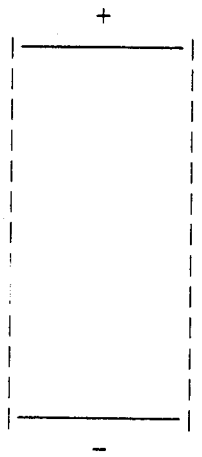
$$\text{Slope} = \frac{2.5 \text{ cm}}{14.4 \text{ cm}} \simeq 0.17$$

Uniaxial Compression Test Results

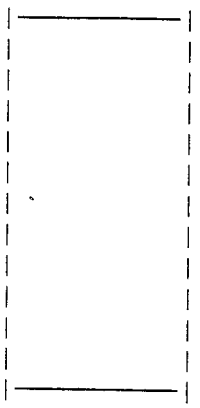
Sample Number: U-045
Hole Number: LEM87-73
Depth:
Rock Type:

Job: CNWRA
Location:
Prepped By/Date: RW 5/7/94
Tested By/Date: S. Seon / 5-19-94
Reviewed By/Date: M. Bridges 6/2/94

Equipment Used: caliper (0.001") / SBEL



PREFAILURE SKETCH



POSTFAILURE

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.105 - 0.103 = 0.002 in Δ_{90} = 0.107 - 0.103 = 0.004 in

Δ_{180} = 0.104 - 0.102 = 0.002 in Δ_{270} = 0.107 - 0.103 = 0.004 in

2. Perpendicularity

Δ_1 = 0.100 - 0.100 = 0 in Δ_2 = 0.101 - 0.101 = 0 in

Δ'_1 = 0.101 - 0.101 = 0 in Δ'_2 = 0.103 - 0.101 = 0.002 in

3. Diameter

D_1 = 1.870 in D_2 = 1.870 in

D_3 = 1.870 in D_4 = 1.871 in

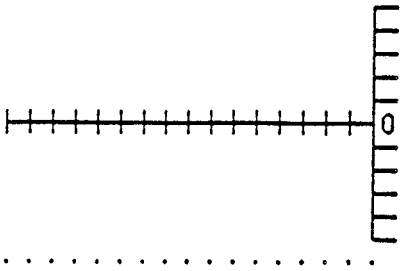
D_5 = 1.869 in D_6 = 1.870 in

4. Height

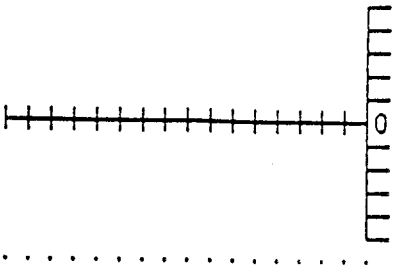
H_1 = 4.052 in H_2 = 4.052 in

H_3 = 4.053 in H_4 = 4.052 in

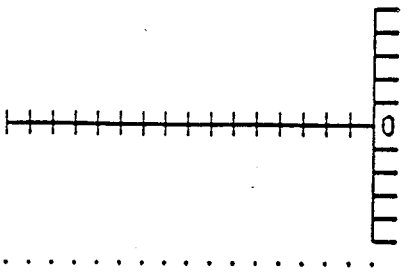
Sample Number: U-045



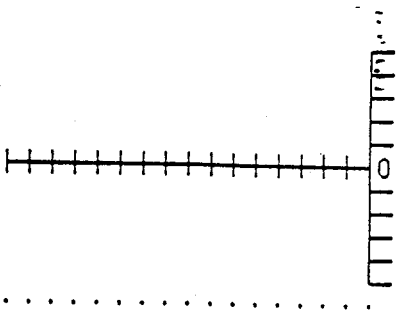
Maximum slope: _____



Maximum slope: _____



Maximum slope: _____



Maximum slope: _____

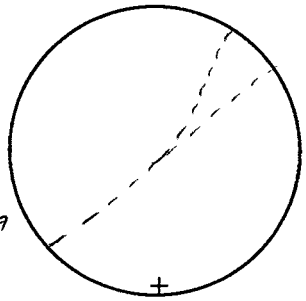
Avg. Diameter (in):	1.870	Disp. Rate (in/s):	0.000295
Avg. Height (in):	4.052	Gauge Reading (lb):	11.9 x 10^4
Area (in^2):	2.746	Gauge Correction (lb):	
Volume (in^3):	11.129	Failure Load (lb):	14.9 x 10^4
Weight (g):	494.68	Failure Stress (psi):	54,260
Density (lb/ft^3):	169.19		(≃ 374 MPa)

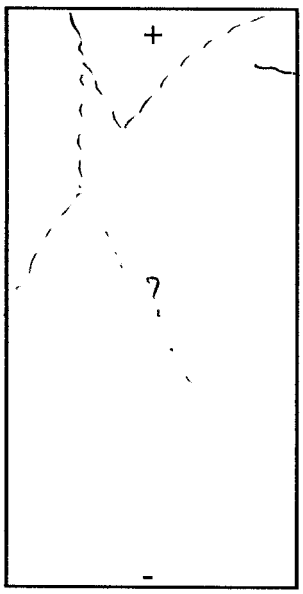
$$\gamma = \frac{W}{V} \times \frac{1728}{454}$$

Comments: It was very strong. It failed violently due to the stored strain energy. ~~Collecting the broken sample was not~~ Broken sample (pieces) was not (could not) collected enough to sketch post-failure.

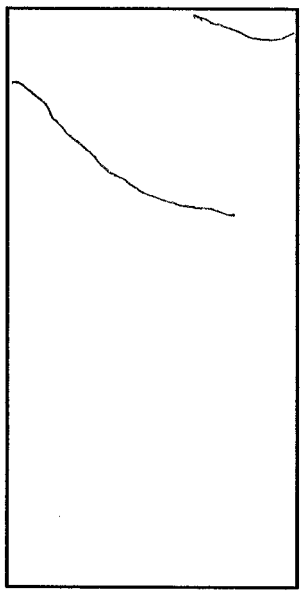
Sample Number: 01-045

CRYSTALIZATION WITH BROWN COLOR.



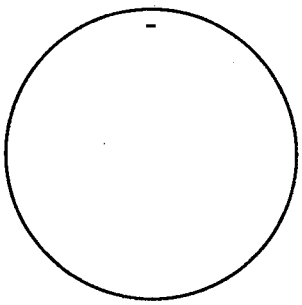


Front



Back

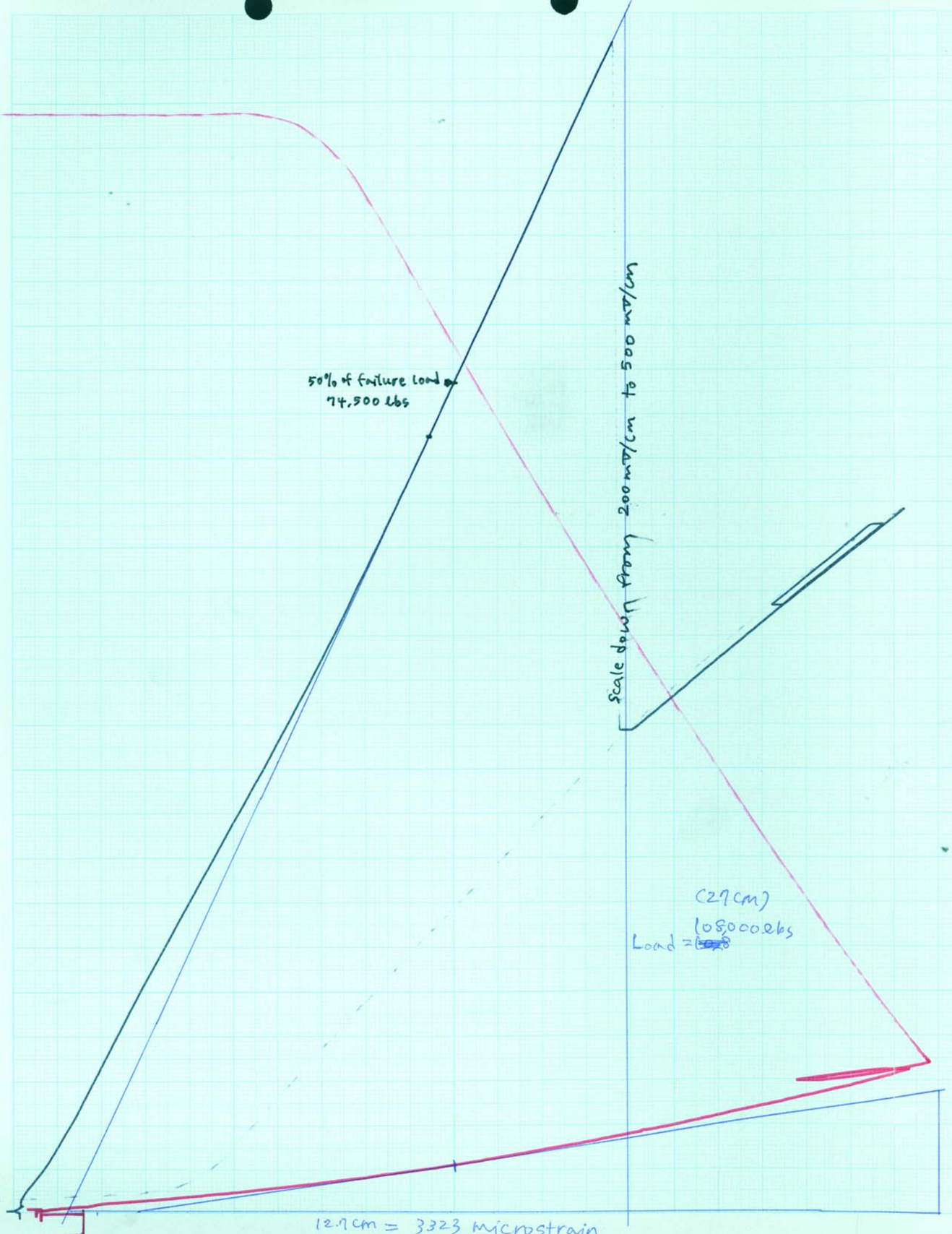
THE SAME AS THE TOP SURFACE



Solid Line: Pre-existing Structure
Dashed Line: Post-Failure

Seokwon Jeon
U-045 s.jeon

Failure Load = 149,000 lbs



① Young's modulus calculation.

$$\text{stress} = 108{,}000\ \text{lbs}/2.746\ \text{in}^2 = 39{,}330\ \text{psi}$$

$$E = \frac{\sigma}{\varepsilon} = \frac{39{,}330\ \text{psi}}{3323\times10^{-6}} \simeq 1.18\times10^{7}\ \text{psi} \simeq 81\ \text{GPa}$$

s.jeon

② Poisson's Ratio

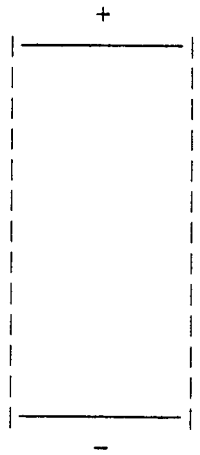
$$\text{Slope of the triangle} = \frac{2.8\ \text{cm}}{18.2\ \text{cm}} \simeq 0.15$$

Uniaxial Compression Test Results

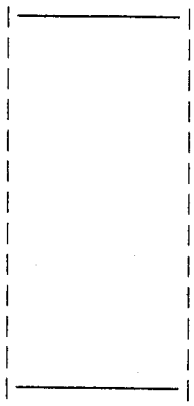
Sample Number: U-053
Hole Number: LEM 57-73
Depth:
Rock Type:

Job: CNWRA
Location:
Prepped By/Date: RW 5/7/94
Tested By/Date: S. Deal 5-19-94
Reviewed By/Date: Mr Bridges 6/7/94

Equipment Used: caliper (0.001")/SBEL



PREFAILURE SKETCH



POSTFAILURE

Sample Dimension Checks:

1. Smoothness

Δ_0 = 0.097 - 0.096 = 0.001 in Δ_{90} = 0.100 - 0.098 = 0.002 in

Δ_{180} = 0.100 - 0.098 = 0.002 in Δ_{270} = 0.100 - 0.098 = 0.002 in

2. Perpendicularity

Δ_1 = 0.108 - 0.107 = 0.001 in Δ_2 = 0.108 - 0.107 = 0.001 in

Δ'_1 = 0.101 - 0.100 = 0.001 in Δ'_2 = 0.103 - 0.101 = 0.002 in

3. Diameter 1.866

D_1 = ~~1.852~~ in D_2 = 1.867 in

D_3 = 1.865 in D_4 = 1.868 in

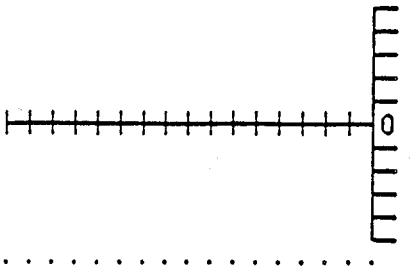
D_5 = 1.866 in D_6 = 1.867 in

4. Height

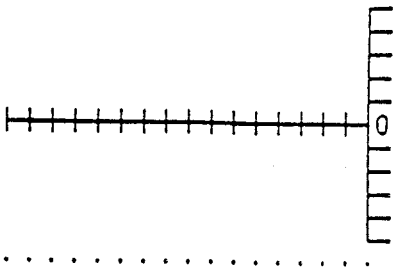
H_1 = 4.052 in H_2 = 4.053 in

H_3 = 4.054 in H_4 = 4.053 in

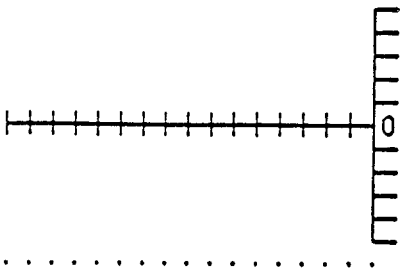
Sample Number: U-053



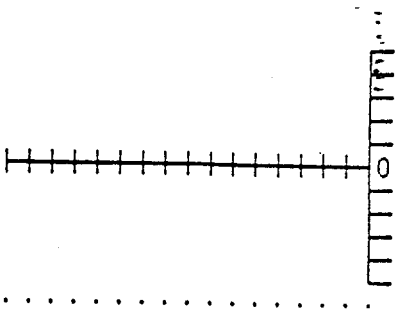
Maximum slope: _____



Maximum slope: _____



Maximum slope: _____



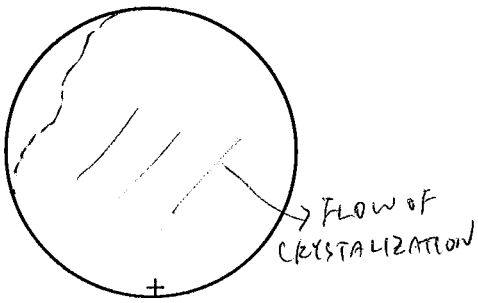
Maximum slope: _____

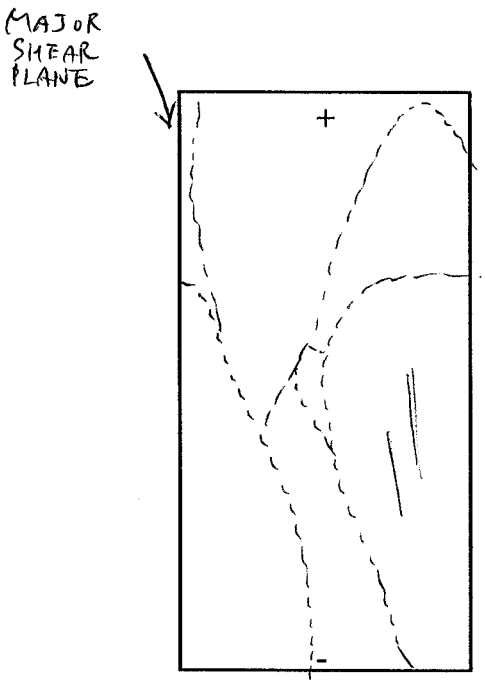
Avg. Diameter (in):	1.867	Disp. Rate (in/s):	0.000295
Avg. Height (in):	4.053	Gauge Reading (lb):	8.6×10^4
Area (in^2):	2.738	Gauge Correction (lb):	
Volume (in^3):	11.096	Failure Load (lb):	8.6×10^4
Weight (g):	469.91	Failure Stress (psi):	31,410
Density (lb/ft^3):	161.19		(≃ 217 MPa)

$$\gamma = \frac{W}{V} \times \frac{1728}{454}$$

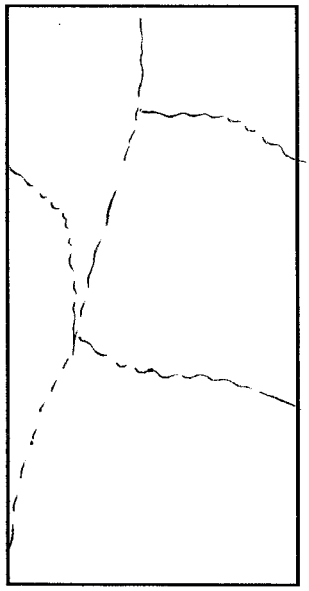
Comments: _____

Sample Number: U-053

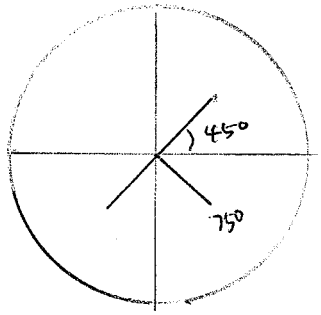


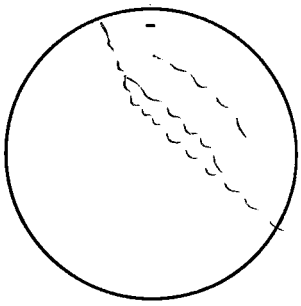


Front



Back

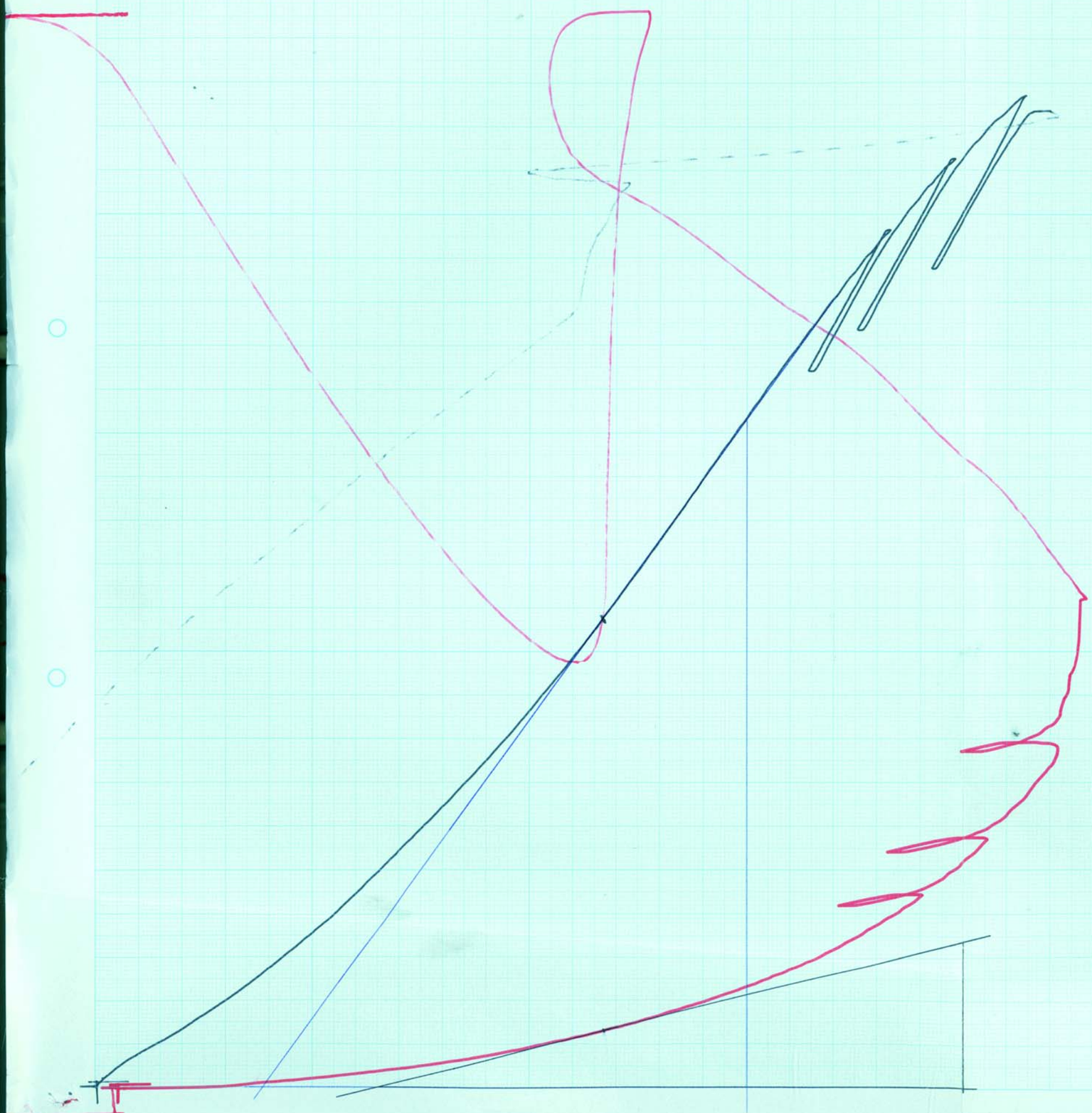




Solid Line: Pre-existing Structure
Dashed Line: Post-Failure

Seokwon
U-053

Failure Load
86,000 lbs



① Young's Modulus (Blue Triangle)

Load = 15.4 cm = 61600 lbs
Area = 2.738 in^2
Stress = 61600/2.738 = 22498 psi
Strain = 11.1 cm = 2905 microstrain

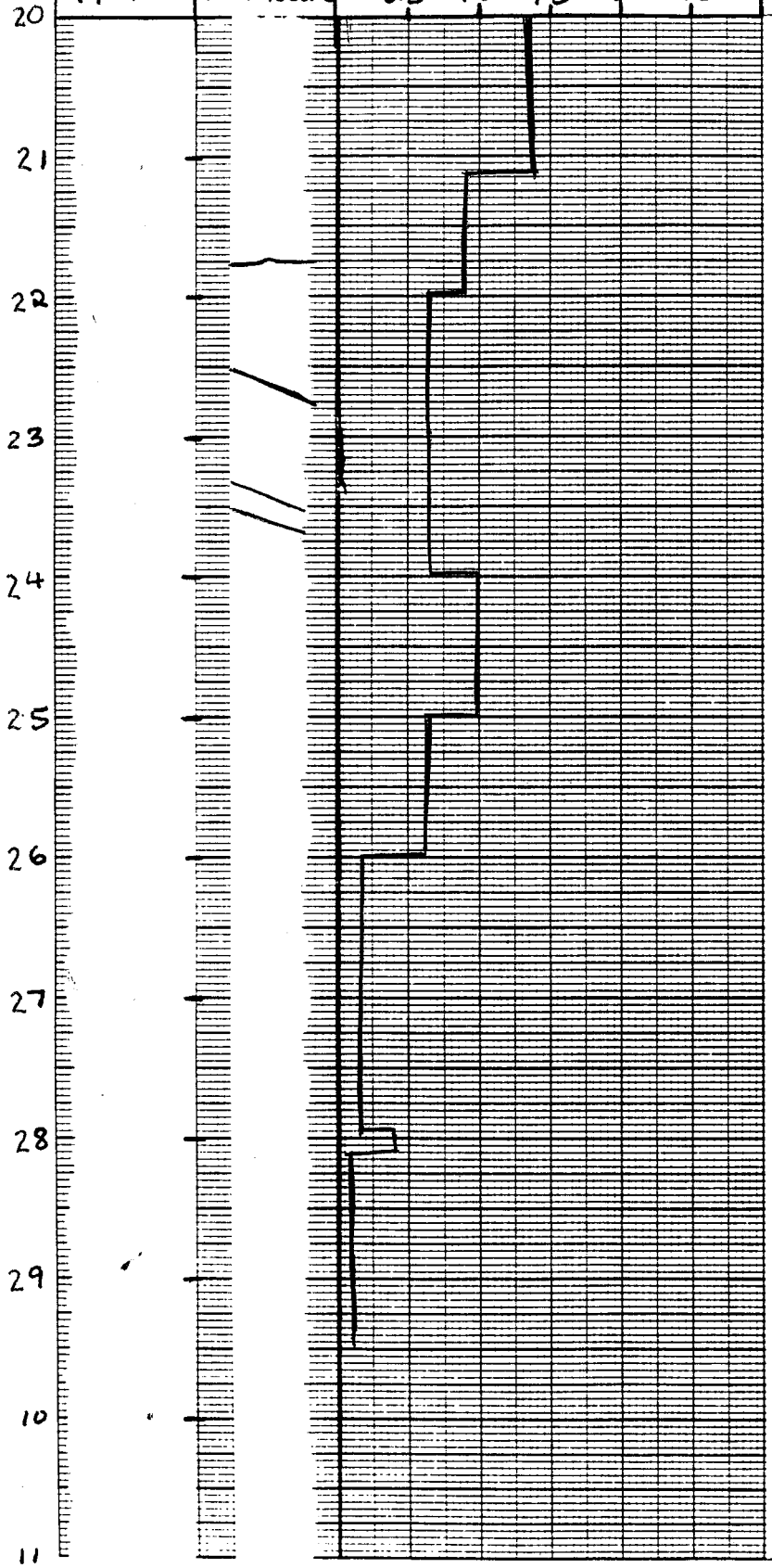
$$E = \frac{22498}{2905 \times 10^{-6}} \simeq 7.74 \times 10^{6} \text{ psi}$$
$$\simeq 53 \text{ GPa}$$

② Poisson's Ratio

$$\text{Slope} = \frac{3.4\text{ cm}}{13.5\text{ cm}} \simeq 0.25$$

Box Number: 3 Start Depth: 20 End Depth: 29.5

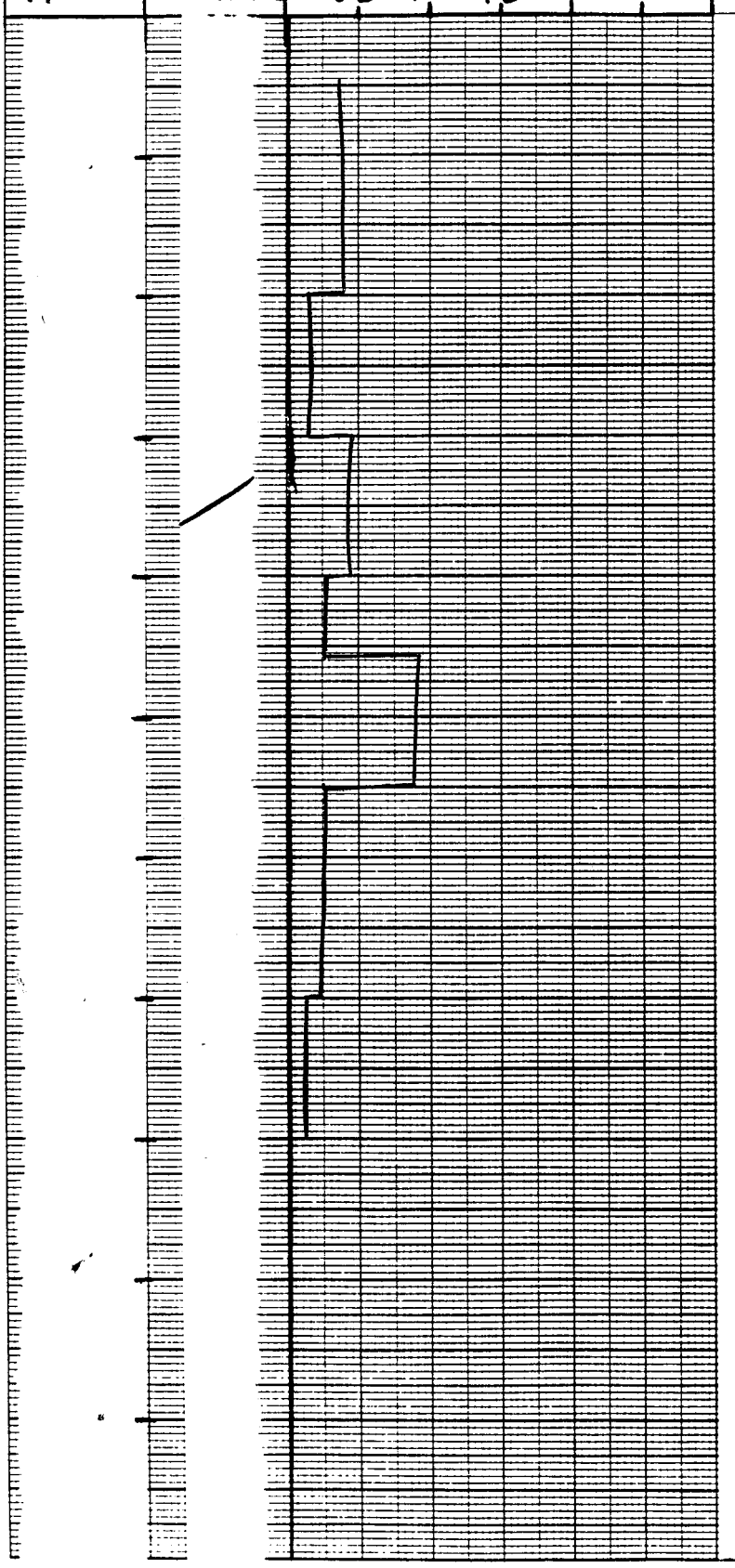
Depth (ft)	Major Fracture	Core Continuity (ft)	Remarks



K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM
KEUFFEL & ESSER CO. MADE IN U.S.A.
461510

Box Number: 4 Start Depth: 29.5 End Depth: 38

Depth (ft)	Major Fracture	Core Continuity (ft)	Remarks



K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM
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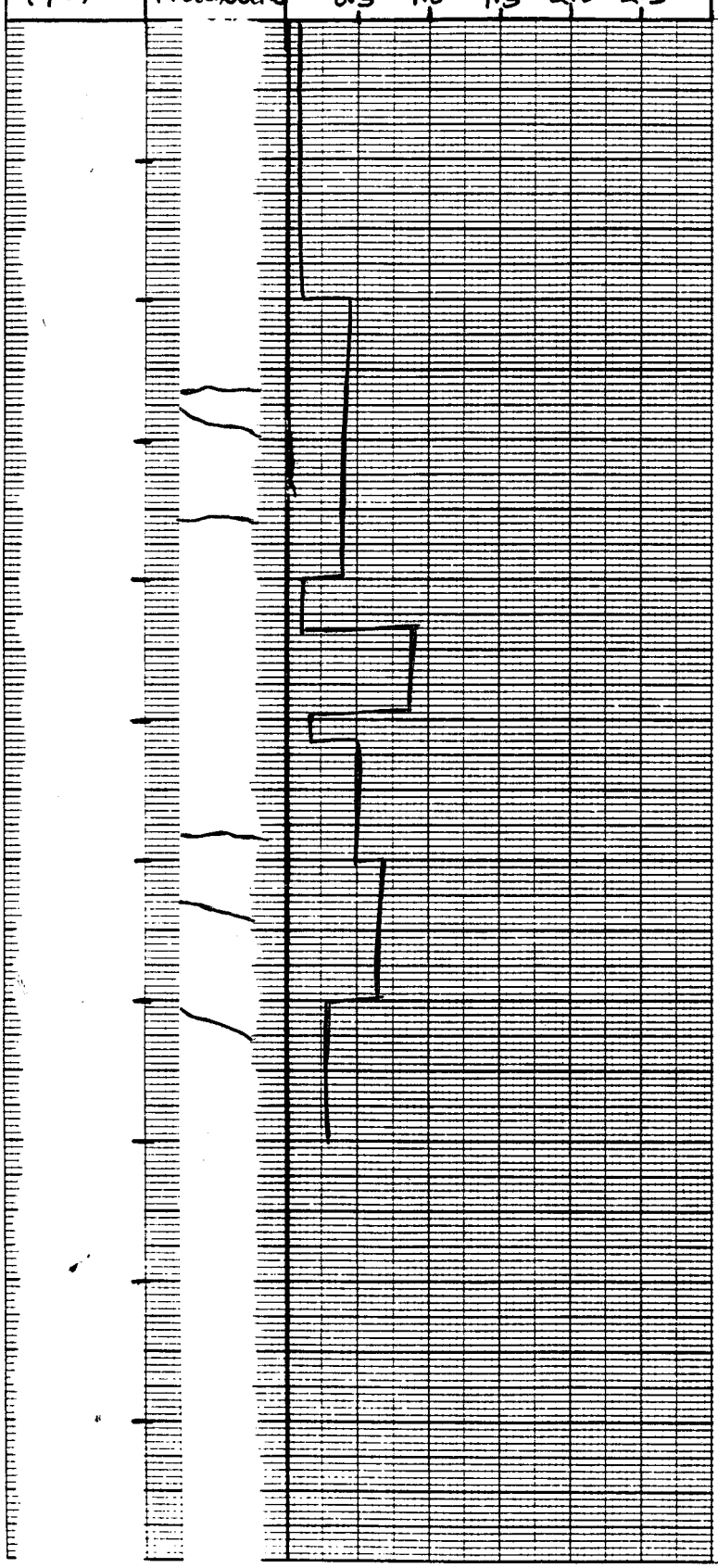
Box Number: 5 Start Depth: 38 End Depth: 46

Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks



K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM
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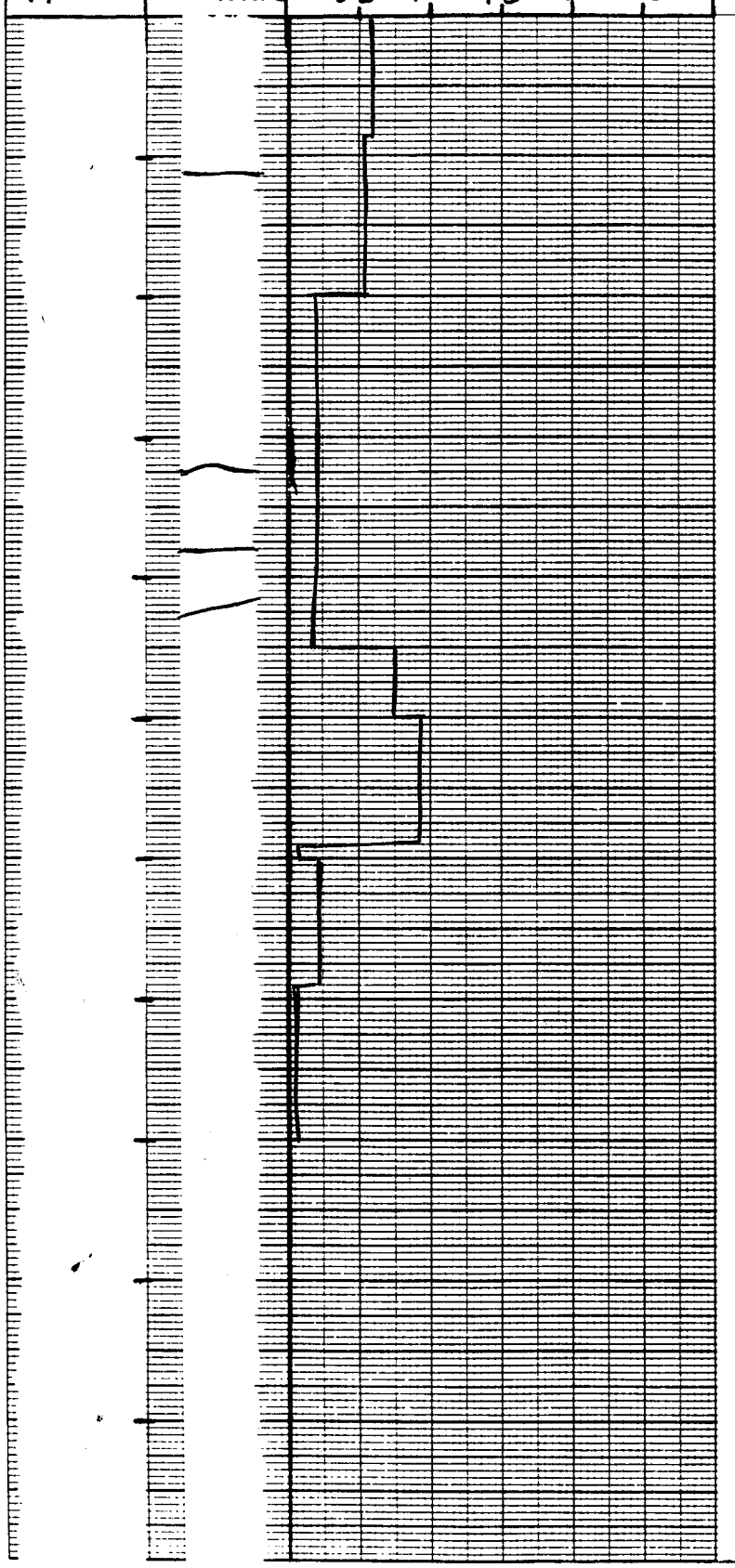
Box Number: 6 Start Depth: 46 End Depth: 55

Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks



K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM
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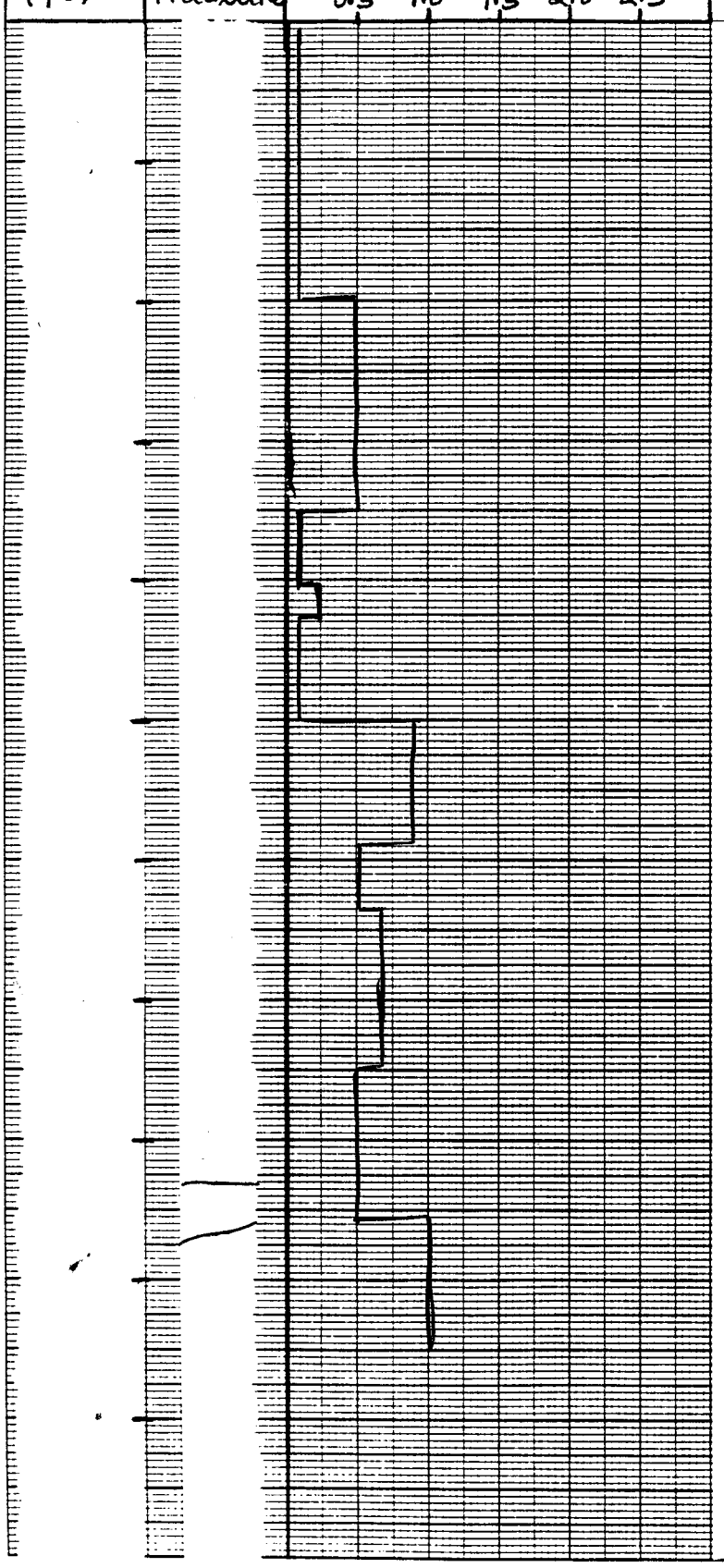
Box Number: 7 Start Depth: 55 End Depth: 64.5

Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks



K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM
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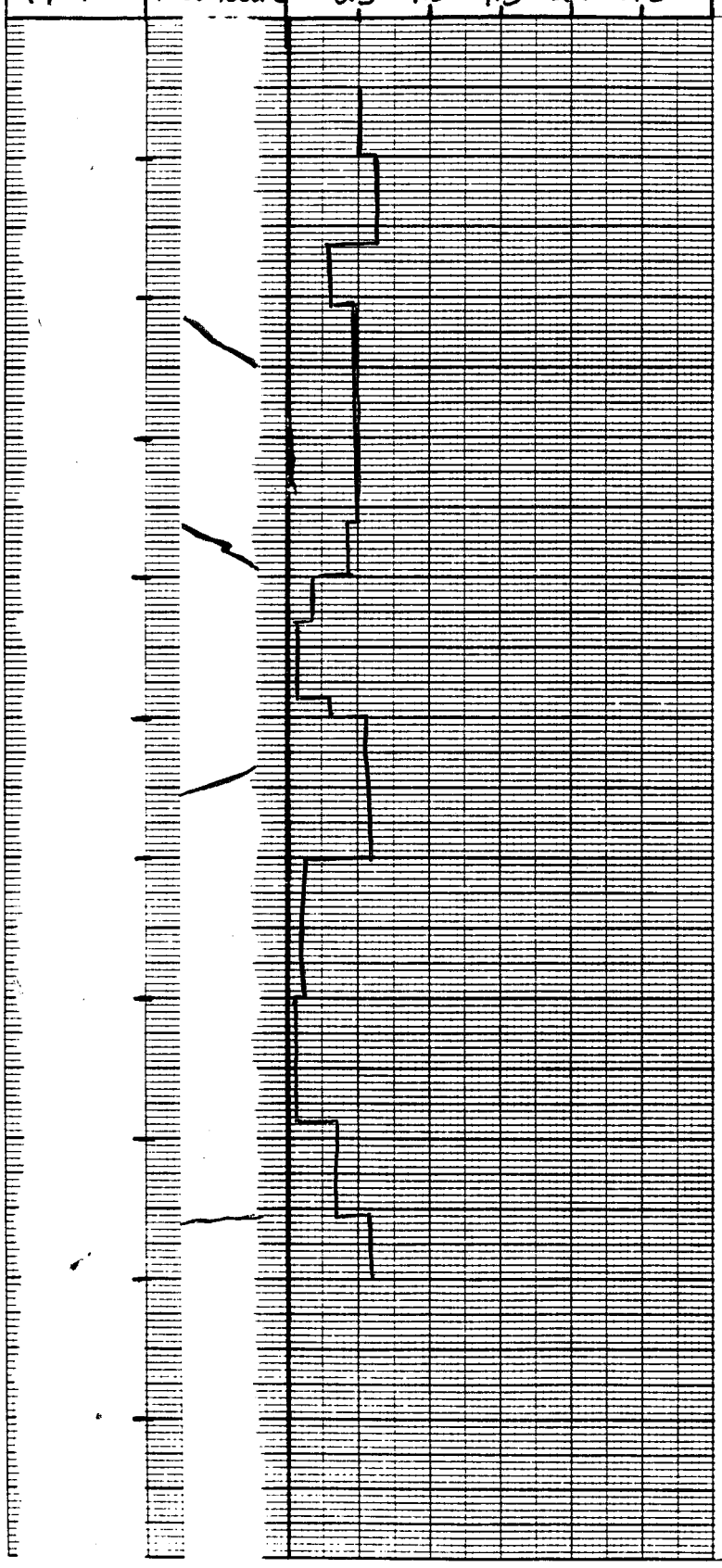
Box Number: 8 Start Depth: 64.5 End Depth: 73

Depth (ft)	Major Fracture	Core Continuity (ft)	Remarks



K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM
KEUFFEL & ESSER CO. MADE IN U.S.A.
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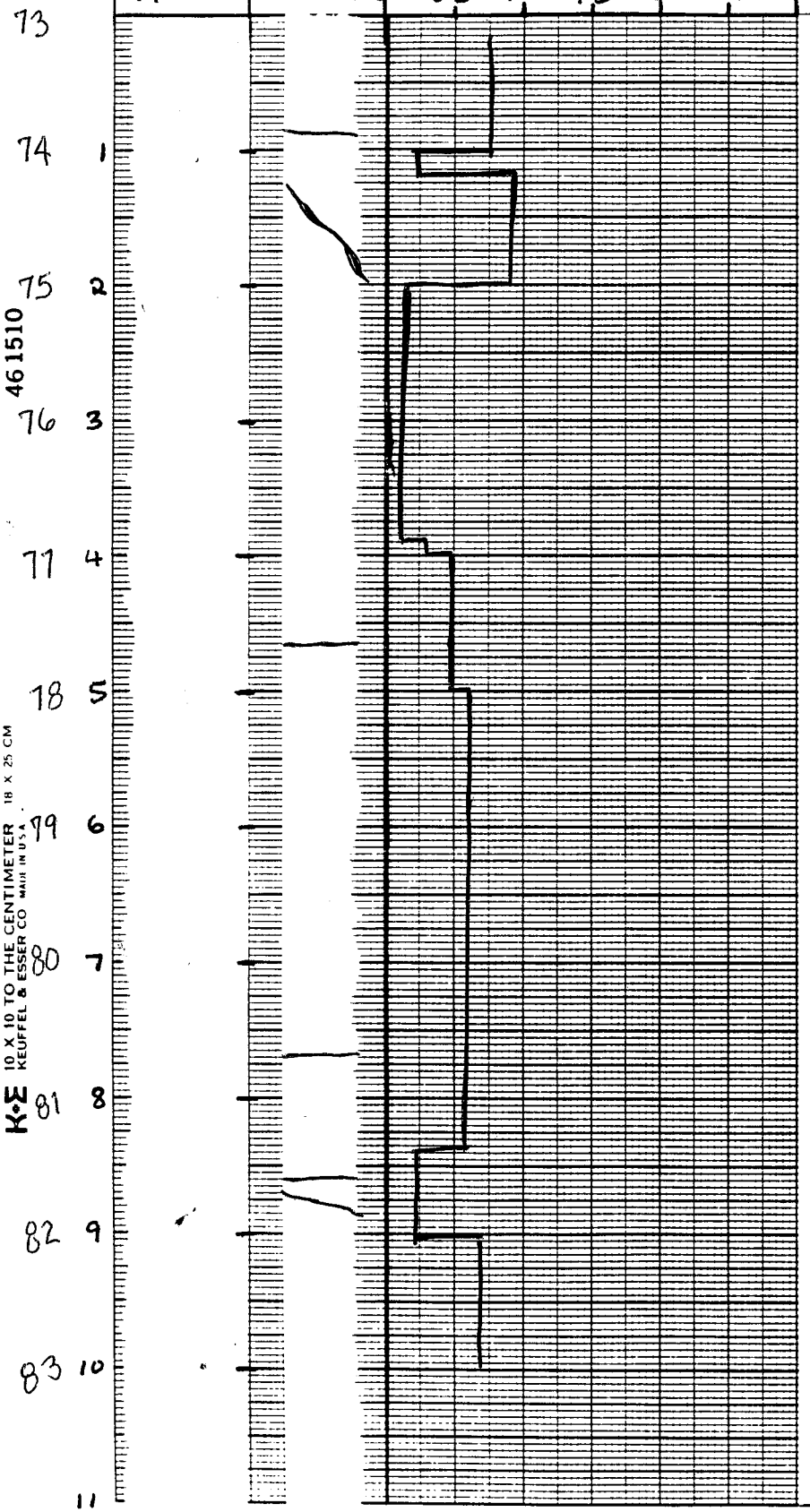
Box Number: 9 Start Depth: 73 End Depth: 83

Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks



K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM
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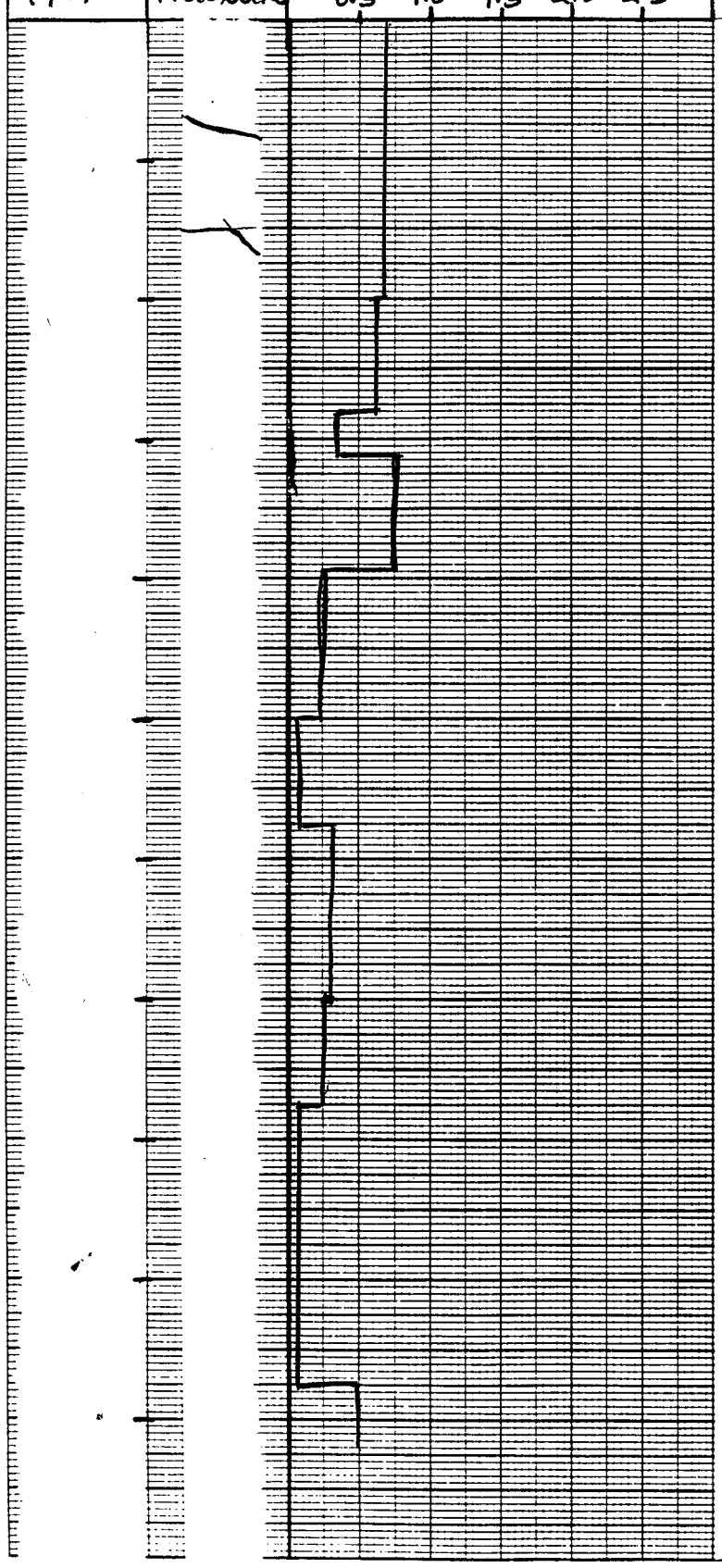
Box Number: 10 Start Depth: 83 End Depth: 93

Depth (ft)	Major Fracture	Core Continuity (ft)	Remarks



K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM
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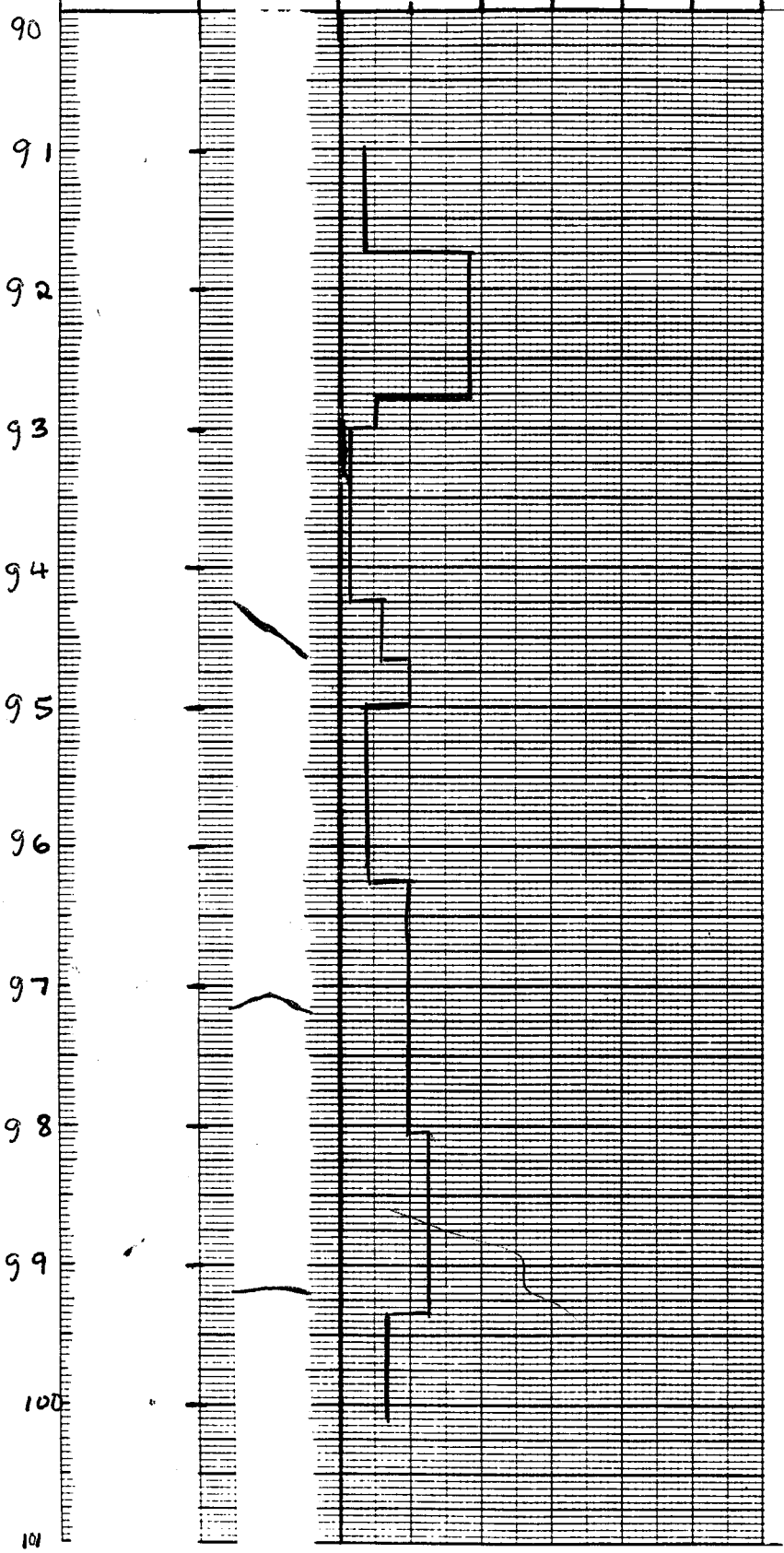
Box Number: 11 Start Depth: 91 End Depth: 100

Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks



K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM
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Box Number: 12 Start Depth: 100 End Depth: 109

Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks
100			
101			rock particles very shattered and broken up.
102			
103			
104			
105			
106			
107			
108			
109			
110			
111			

K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM KEUFFEL & ESSER CO. MADE IN U.S.A. 461510

Box Number: 13 Start Depth: 109 End Depth: 119

Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks
109			
110			very fragmented but sliced core rock.
111 2			
112 3			
113 4			
114 5			
115 6			
116 7			
117 8			
118 9			
119 10			
11			

K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM KEUFFEL & ESSER CO. MADE IN U.S.A. 46 1510

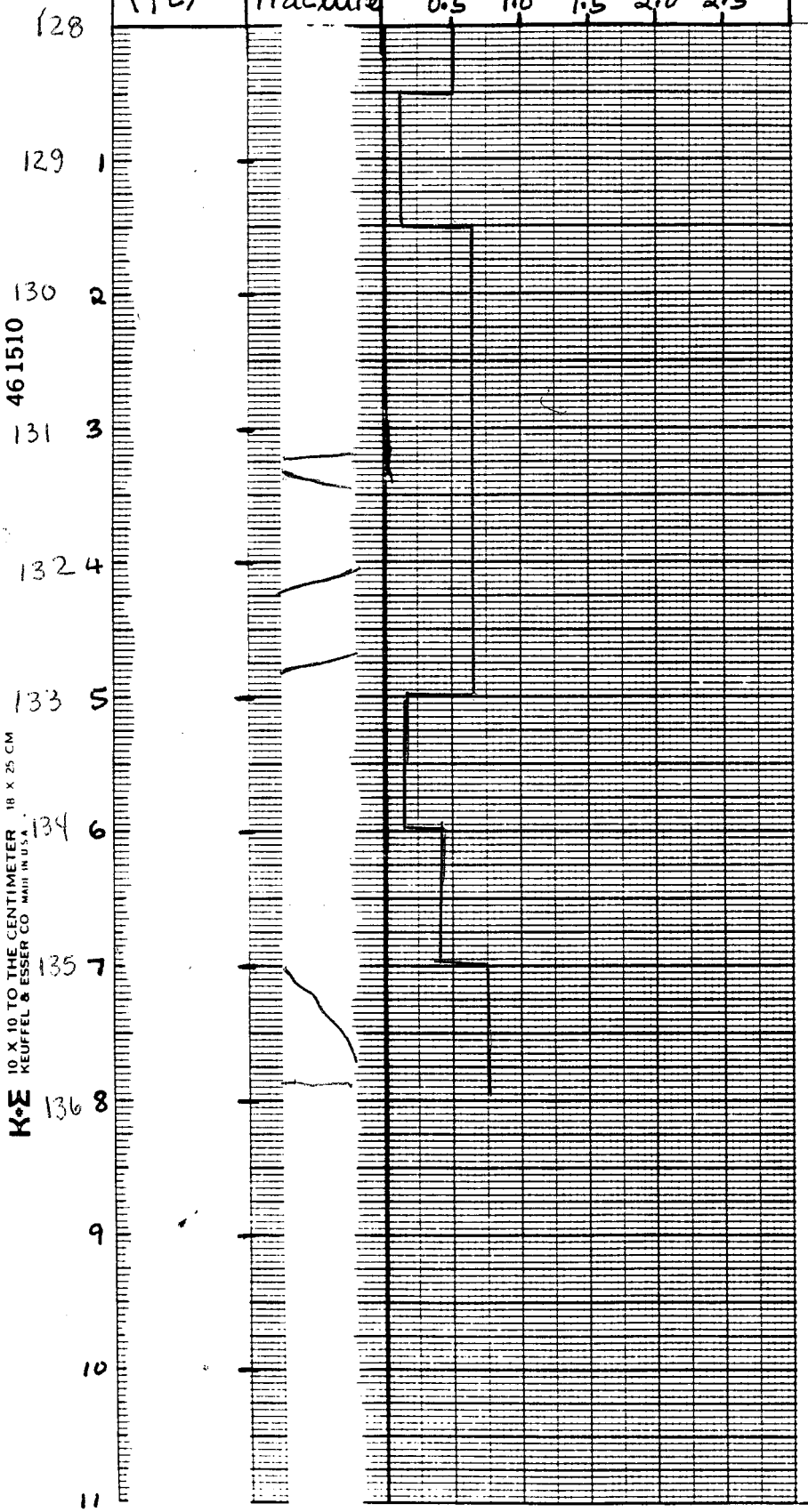
Box Number: 14 Start Depth: 119 End Depth: 128

Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks
119			
120			
121 3			
122 4			
123 5			
124 6			
125 7			
126 8			
127 9			
128 10			
11			

K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM KEUFFEL & ESSER CO. MADE IN U.S.A. 46 1510

Box Number: 15 Start Depth: 128 End Depth: 136

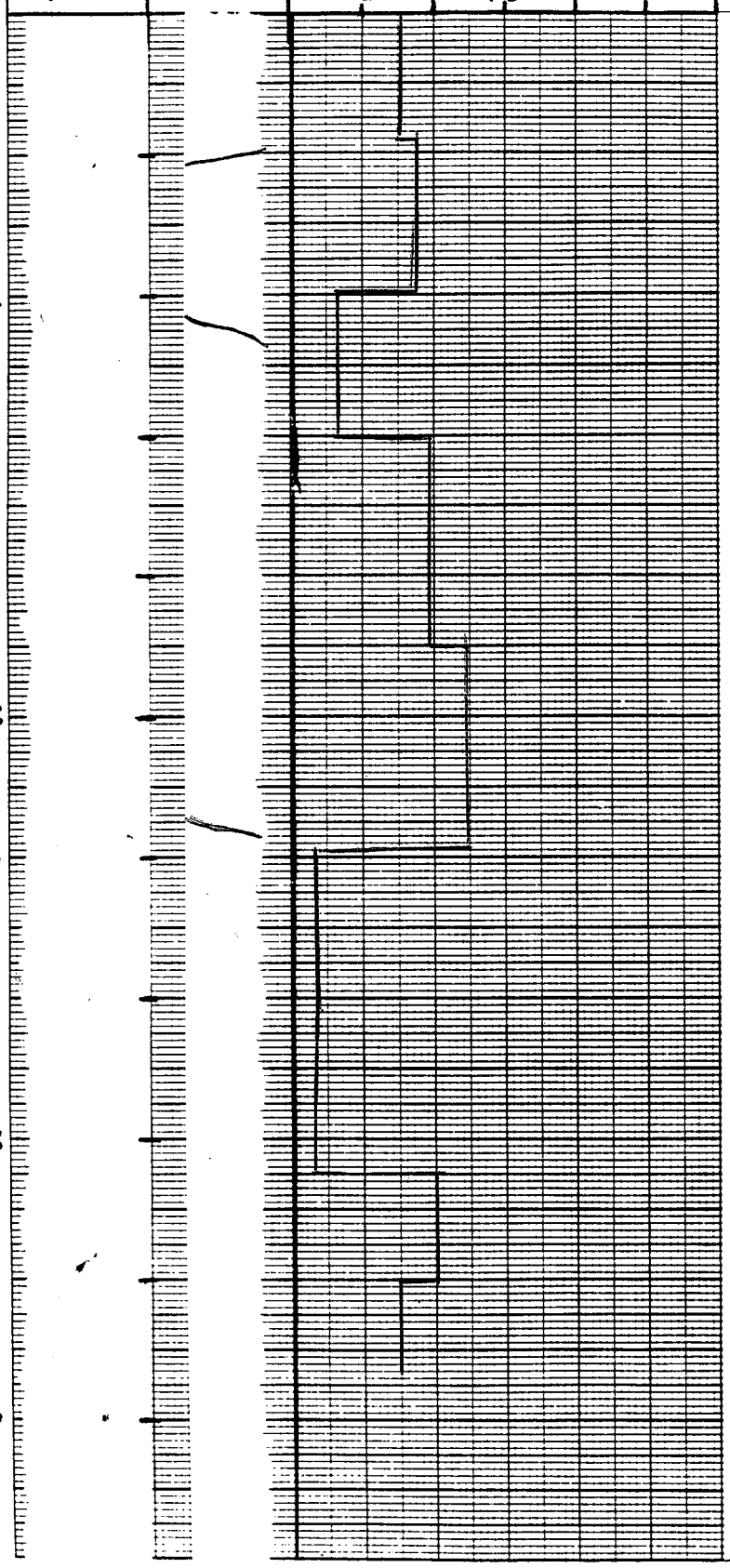
Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks



K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM KEUFFEL & ESSER CO. MADE IN U.S.A. 46 1510

Box Number: 16 Start Depth: 136 End Depth: 145

Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks



K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM
KEUFFEL & ESSER CO. MADE IN U.S.A.
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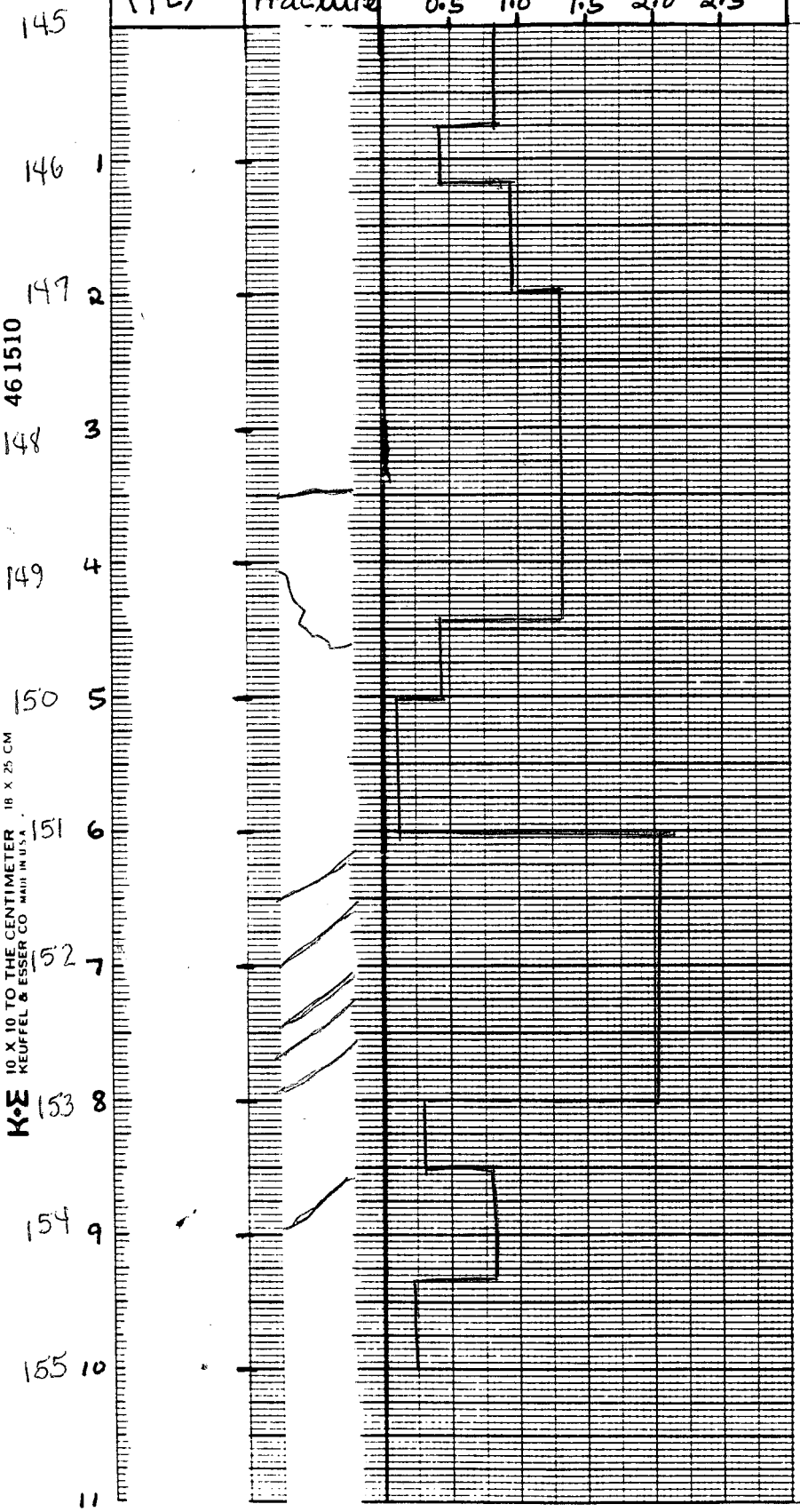
Box Number: 17 Start Depth: 145 End Depth: 154.5

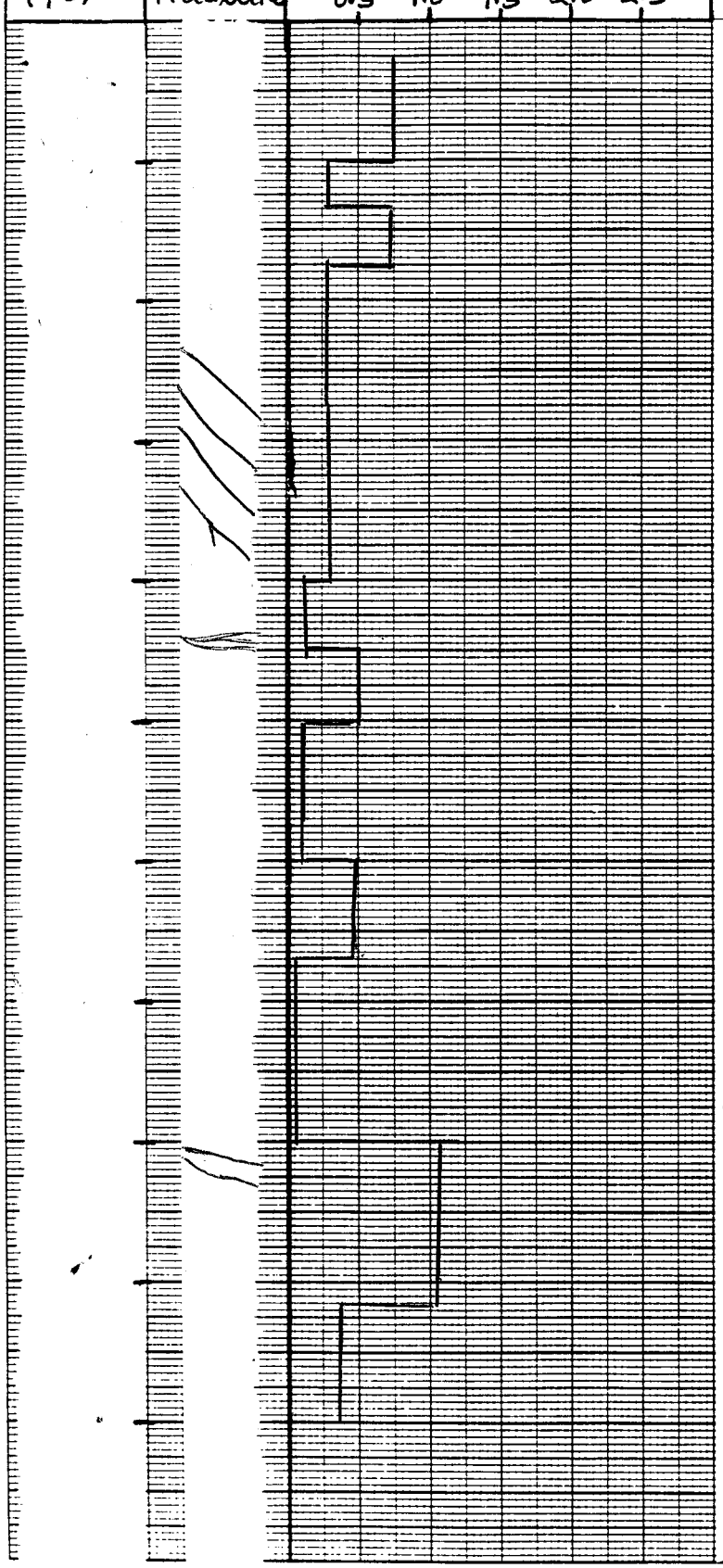
Depth (ft)	Major Fracture	Core Continuity (ft)	Remarks



K·E 10 X 10 TO THE CENTIMETER 18 X 25 CM KEUFFEL & ESSER CO. MADE IN U.S.A. 461510

Box Number: 18 Start Depth: 154.5 End Depth: 164

Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks

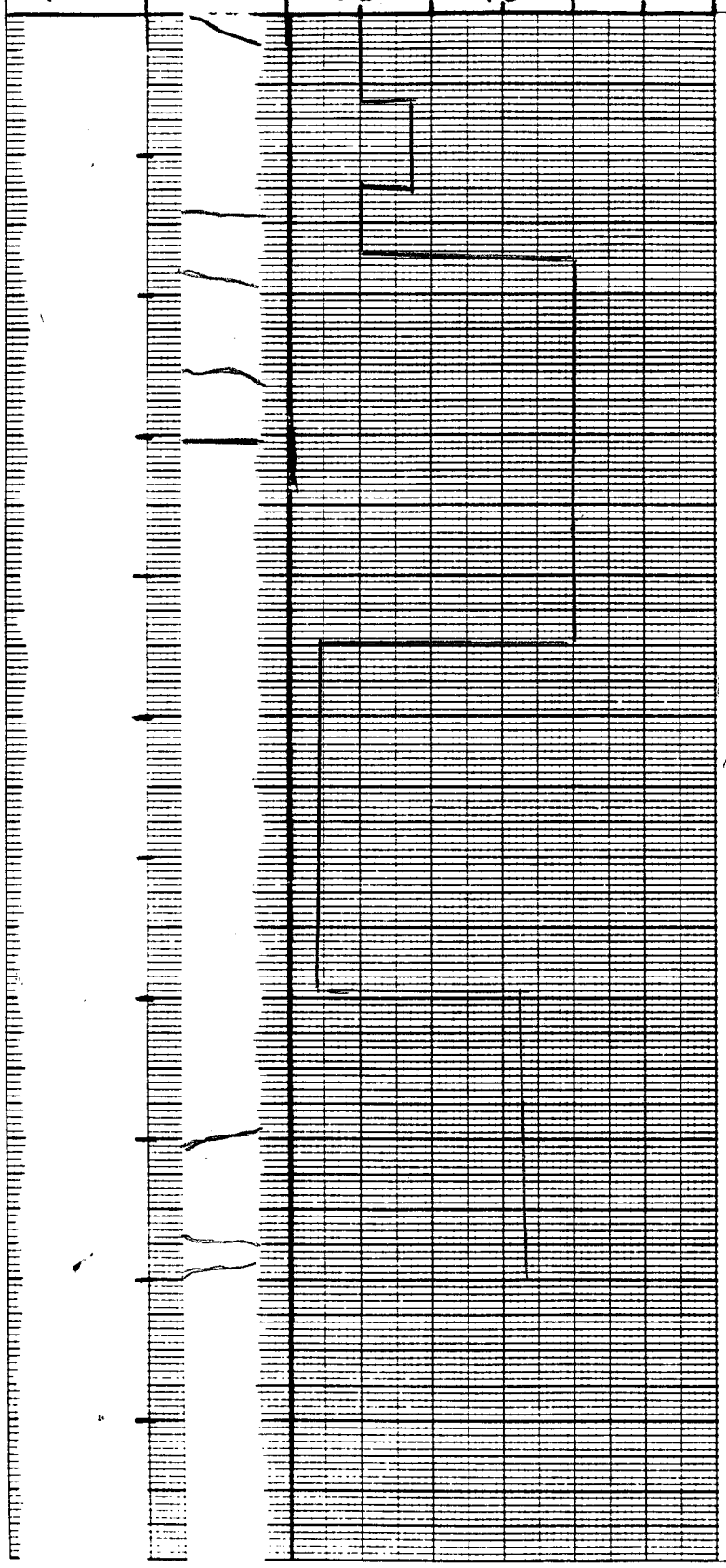


split piece

K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM
KEUFFEL & ESSER CO. MADE IN U.S.A.
46 1510

Box Number: 19 Start Depth: 164 End Depth: 173

Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks

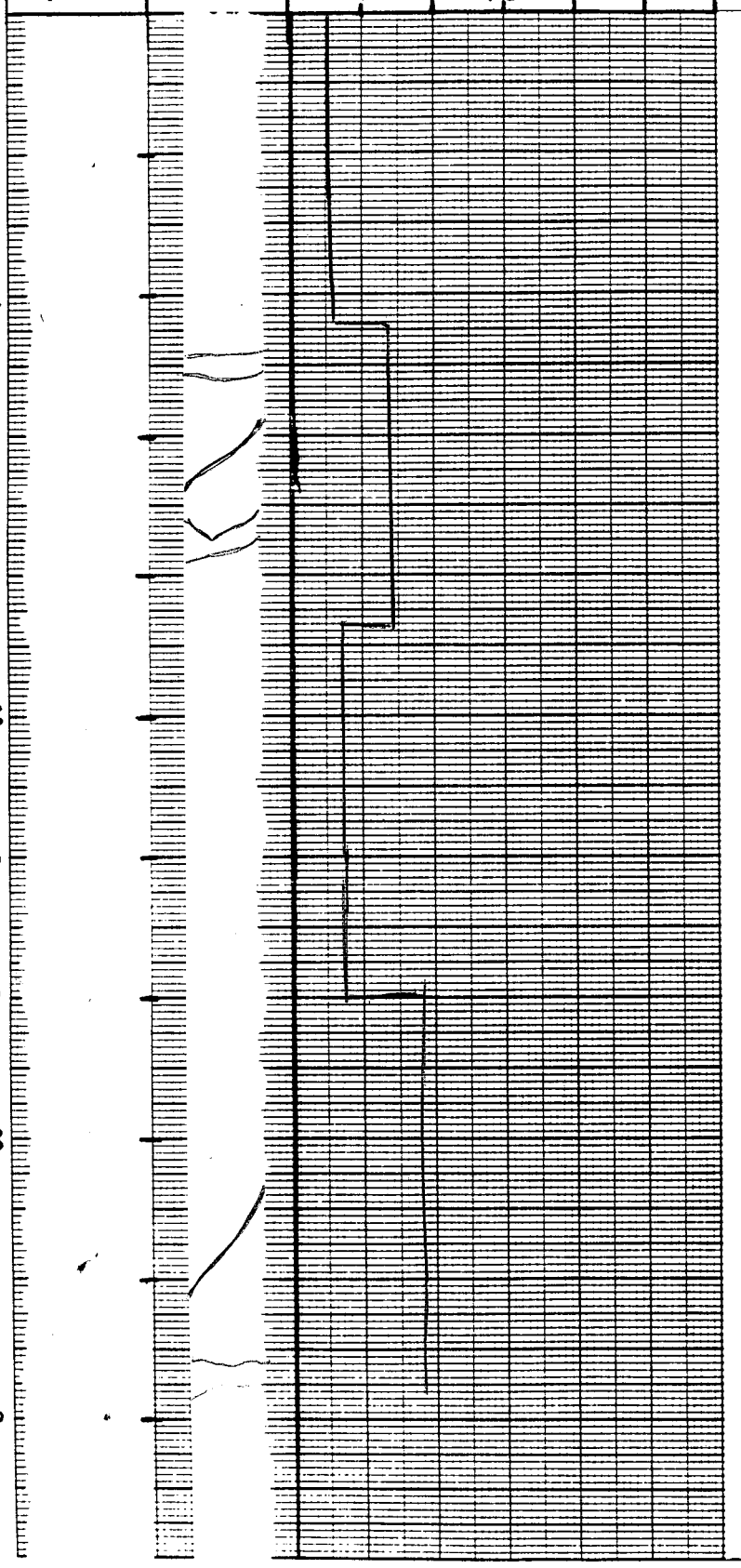


split core

K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM KEUFFEL & ESSER CO. MADE IN U.S.A. 461510

Box Number: 20 Start Depth: 173 ~~20~~ OCJ 6/21/94 End Depth: 182.8

Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks



K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM
KEUFFEL & ESSER CO. MADE IN U.S.A.
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Box Number: 21 Start Depth: End Depth:

Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks
1			NO BOX 21 FOUND.
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			

K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM
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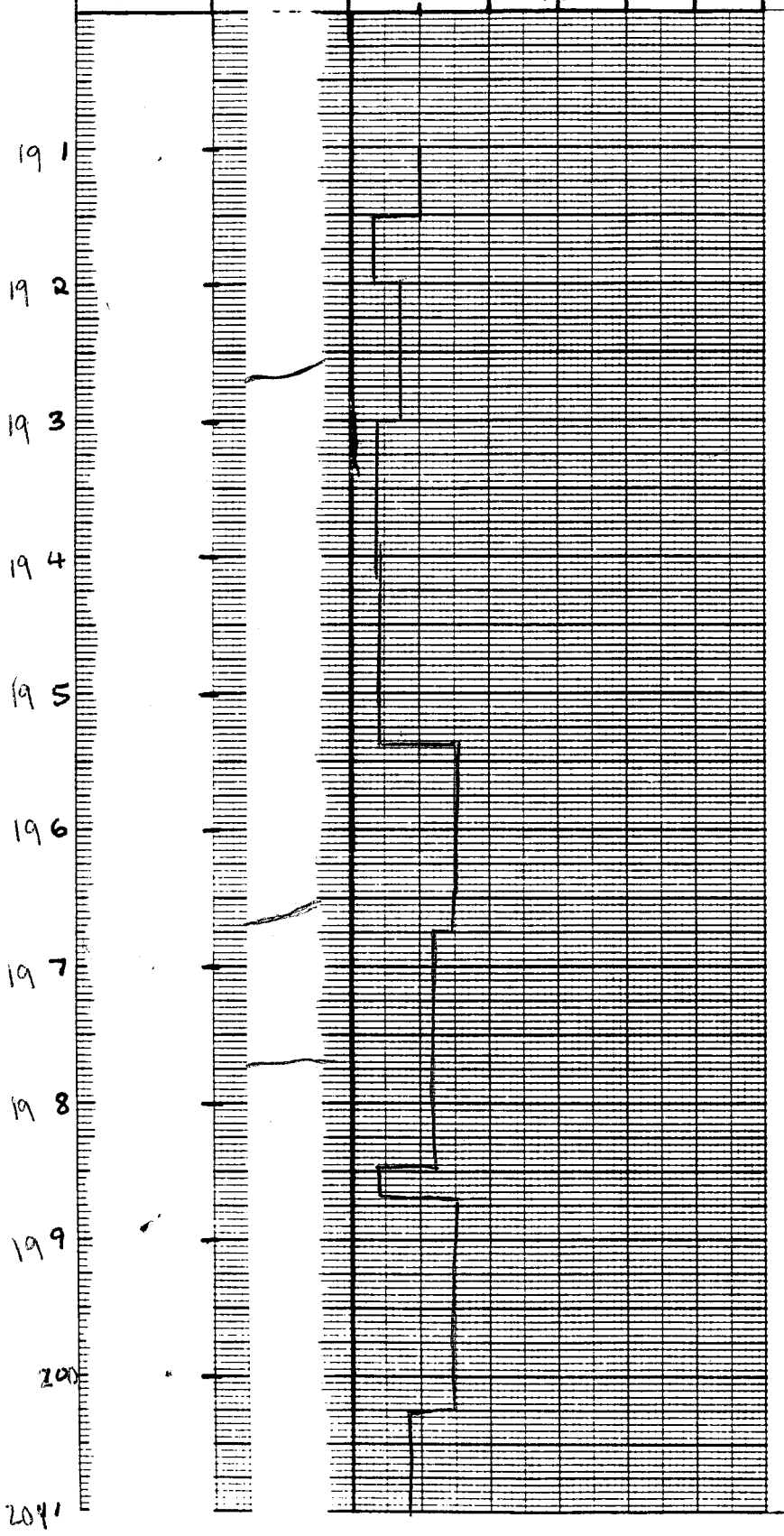
Box Number: 22 Start Depth: 191 End Depth: 201

Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks



K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM
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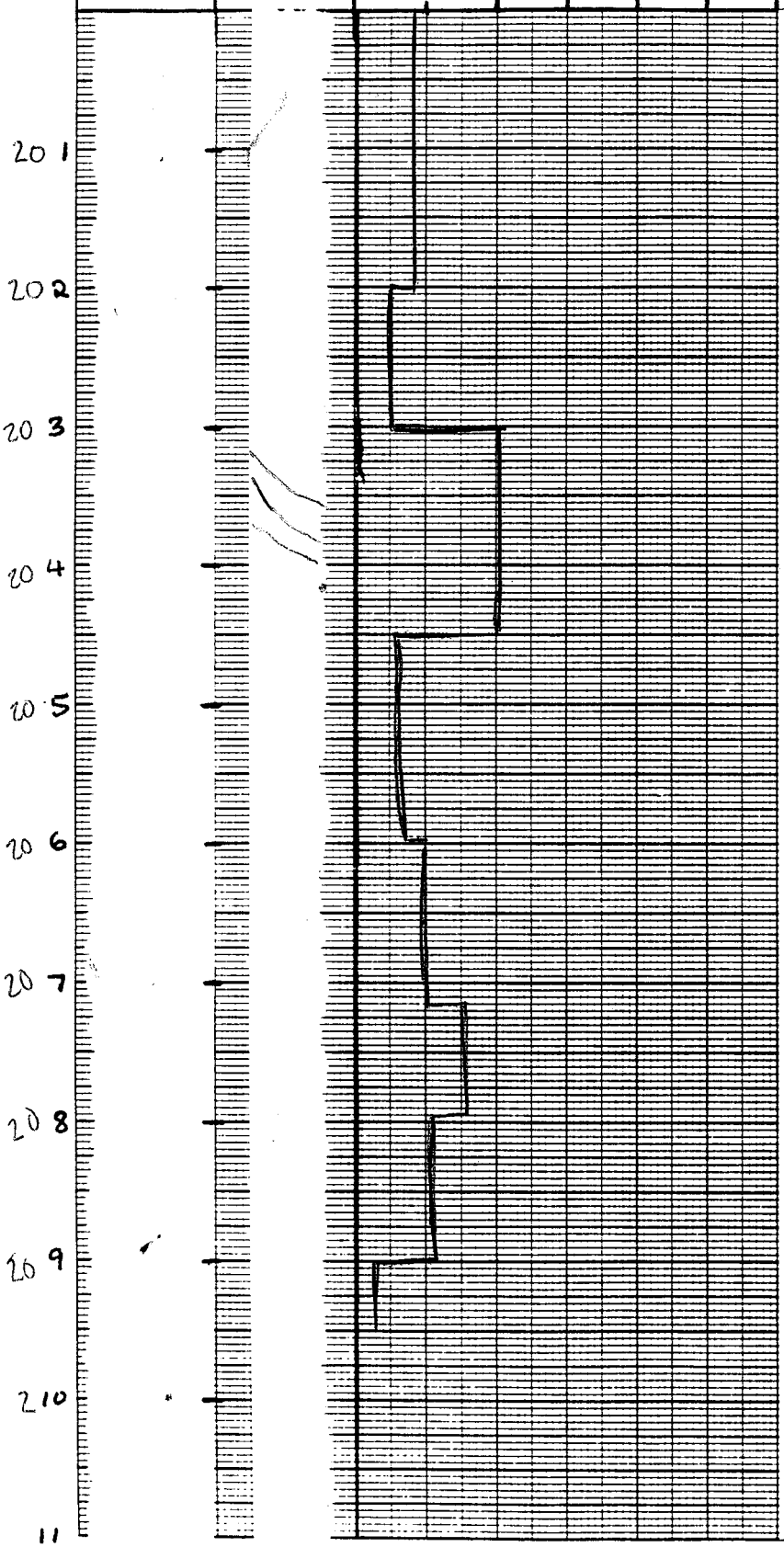
Box Number: 23 Start Depth: 201 End Depth: 209.5

Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks



K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM
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Box Number: 24 Start Depth: 220 End Depth: 228

Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks
220			
221			
222			
223			
224			
225			
226			
227			
228			
229			
10			
11			

K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM
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Box Number: 26 Start Depth: 228 End Depth: 236

Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks
228			
229 1			
230 2			
231 3			
232 4			FRAGMENTED CORE
233 5			
234 6			
235 7			
236 8			
236 9			
10			
11			

K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM
KEUFFEL & ESSER CO. MADE IN U.S.A.
46 1510

OCD 6/21/94

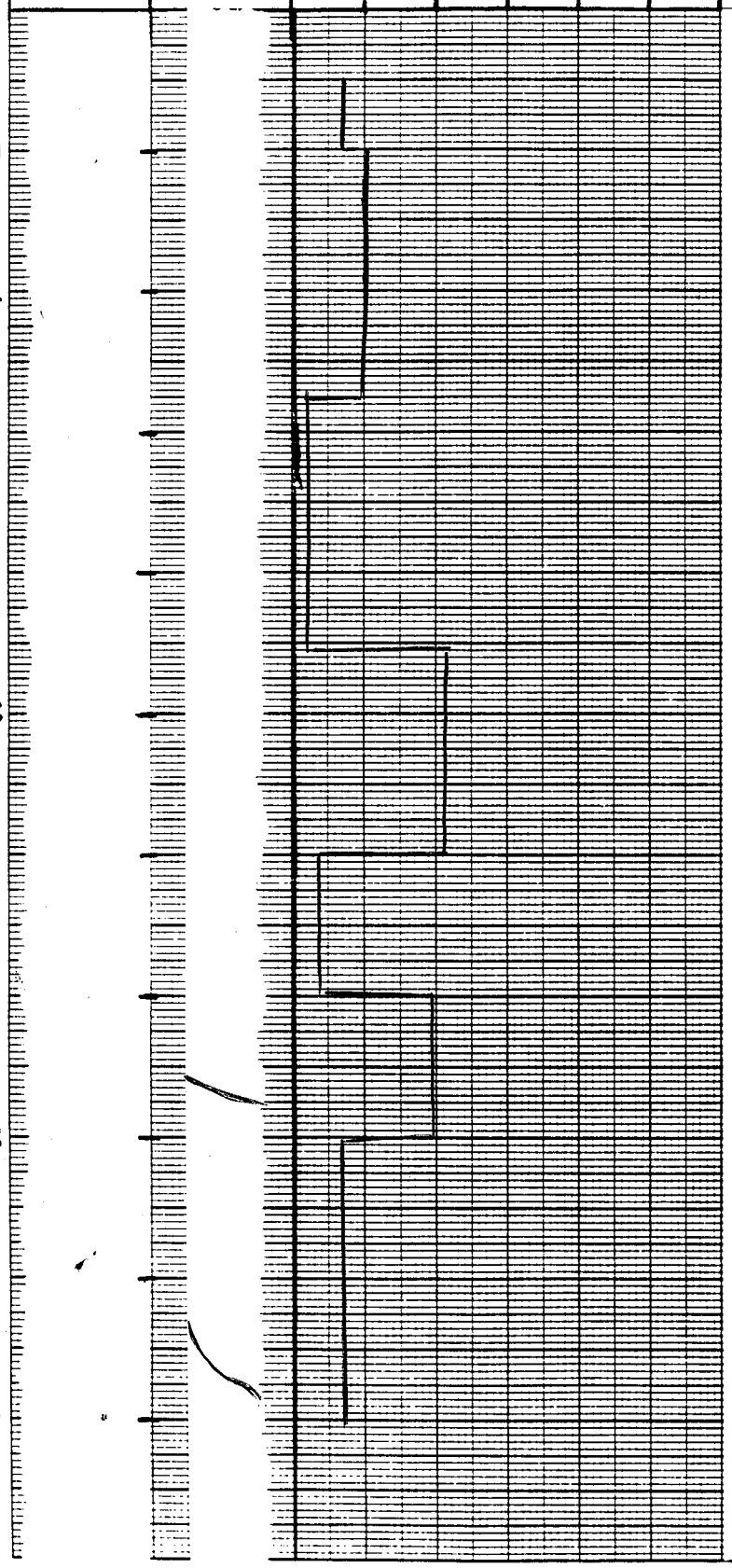
Box Number: 27 Start Depth: 236 End Depth: 248

Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks
236			
237 1			
238 2			
239 3			
240 4			
241 5			
242 6			
243 7			
244 8			empty sample
245 9			
246 10			
247 11			
248			

K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM
KEUFFEL & ESSER CO. MADE IN U.S.A.
46 1510

Box Number: 28 Start Depth: 248 End Depth: 257

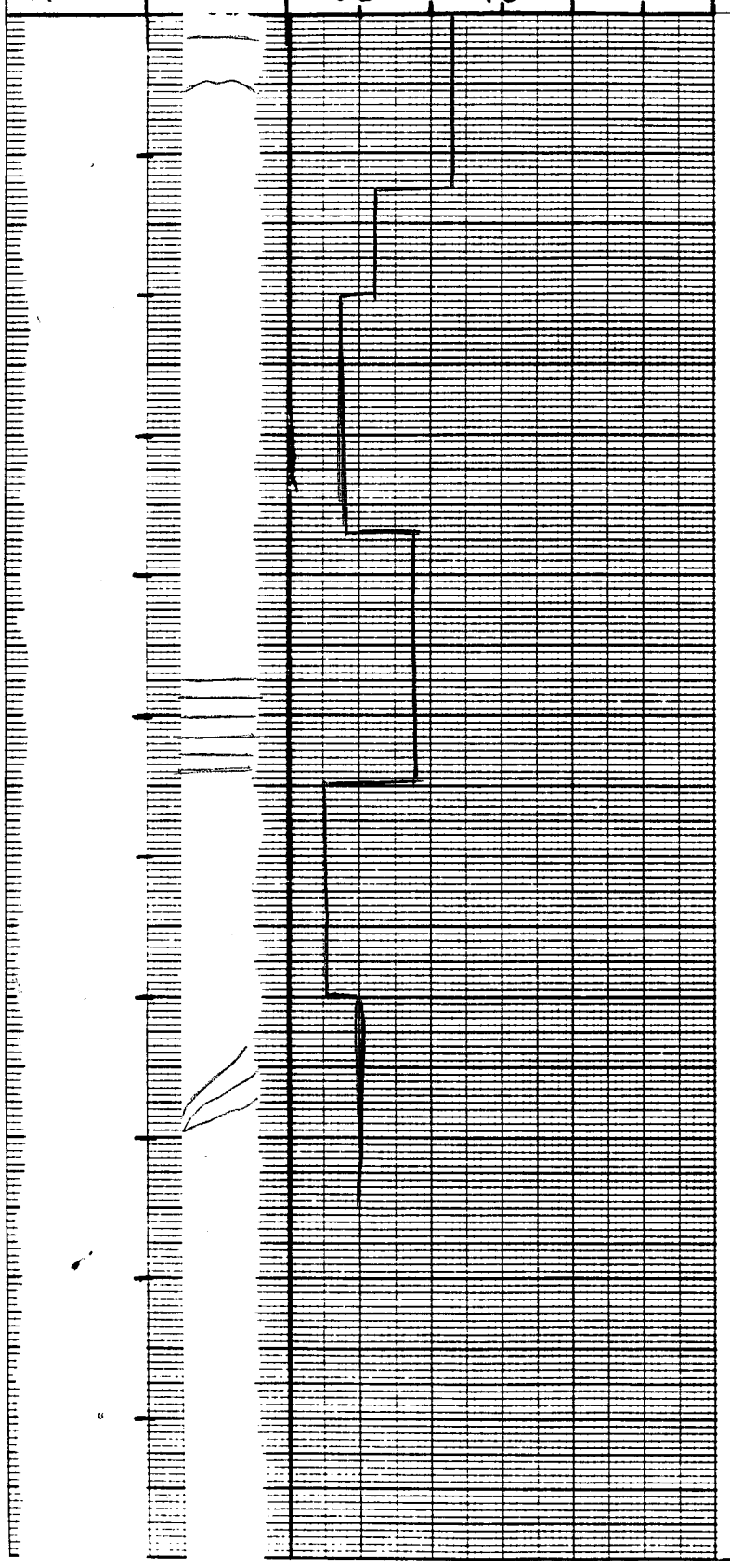
Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks



K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM KEUFFEL & ESSER CO. MADE IN U.S.A. 46 1510

Box Number: 29 Start Depth: 257 End Depth: 265.5

Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks



K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM
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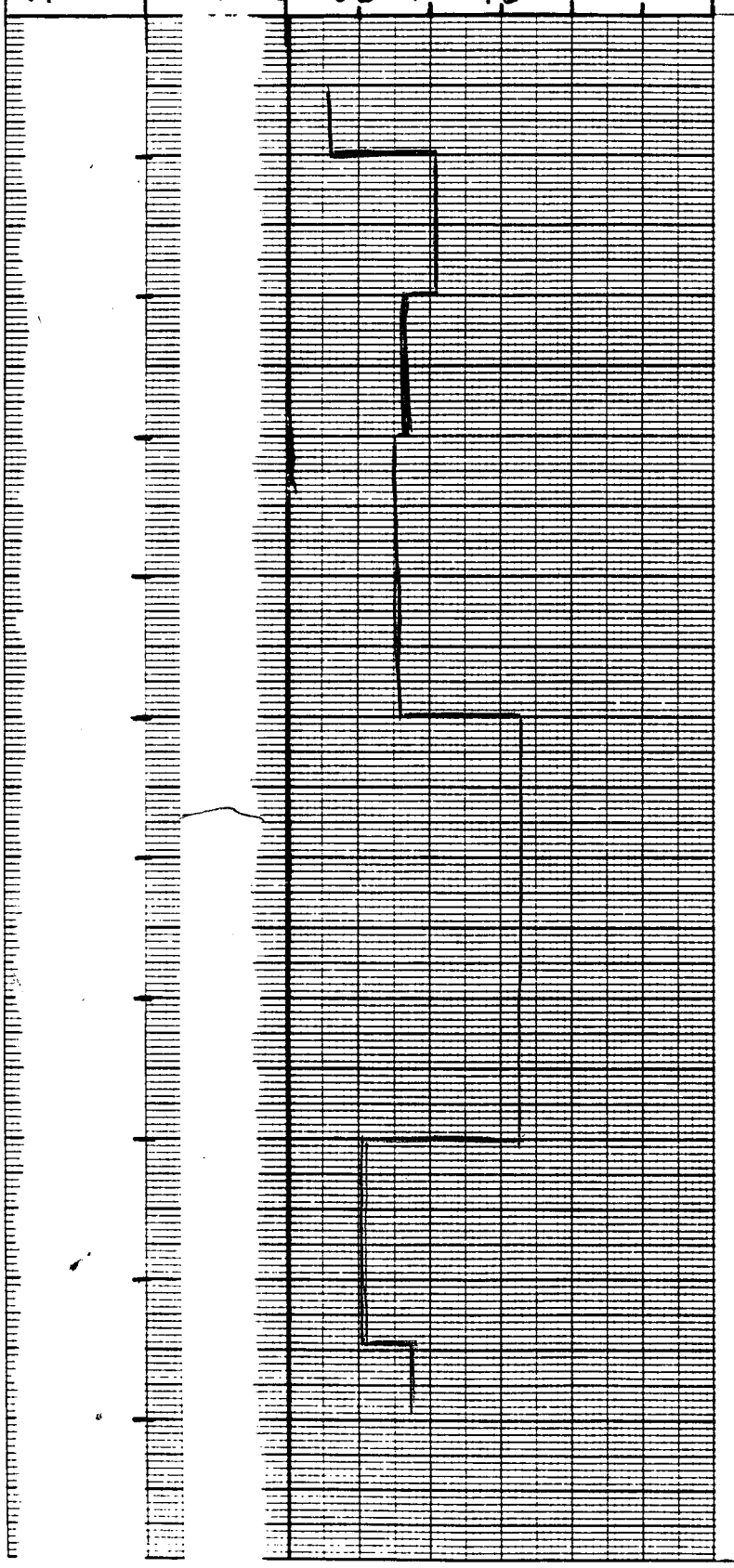
Box Number: 3D Start Depth: 265.5 End Depth: 275

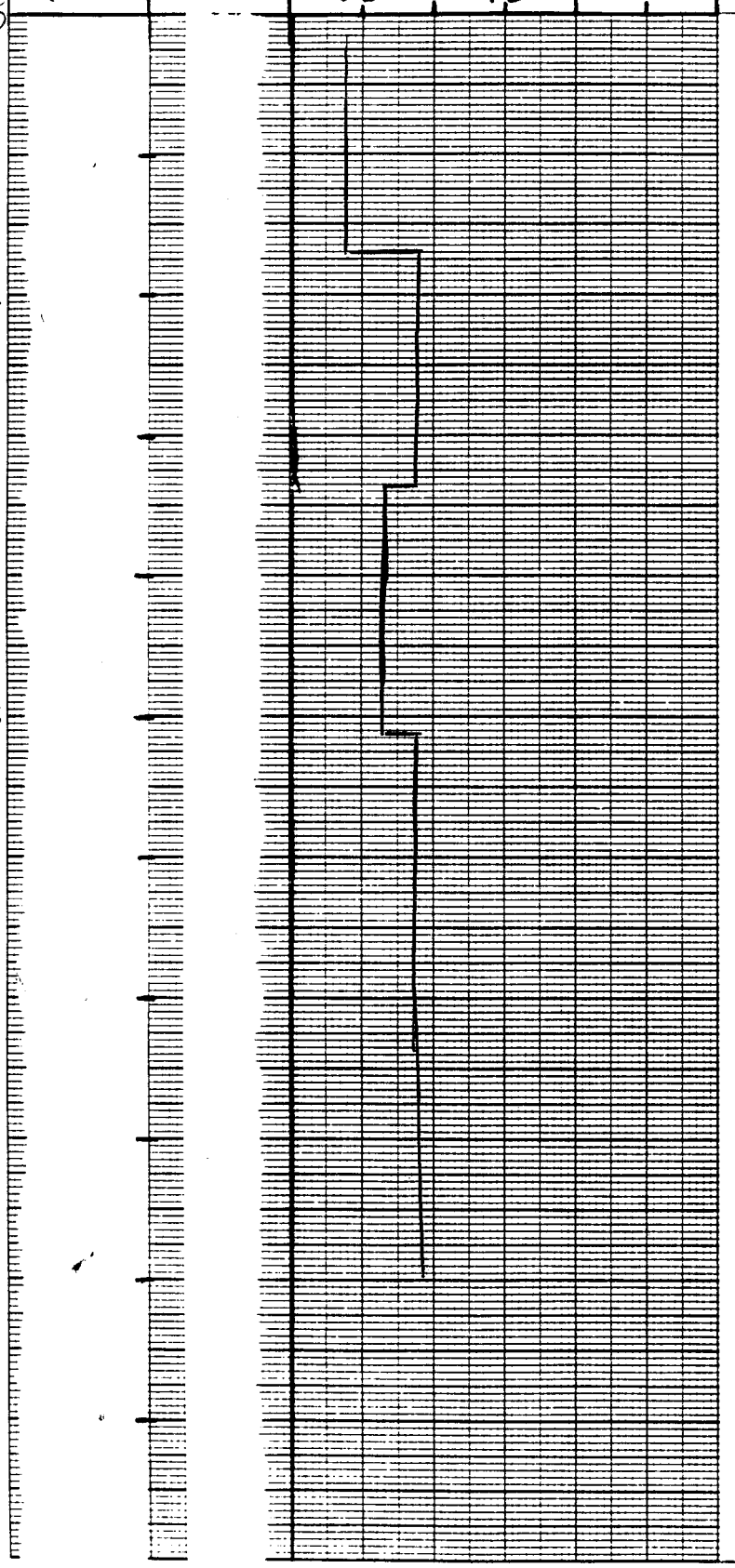
Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks



K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM
KEUFFEL & ESSER CO. MADE IN U.S.A.
46 1510

Box Number: 31 Start Depth: 275 End Depth: 284

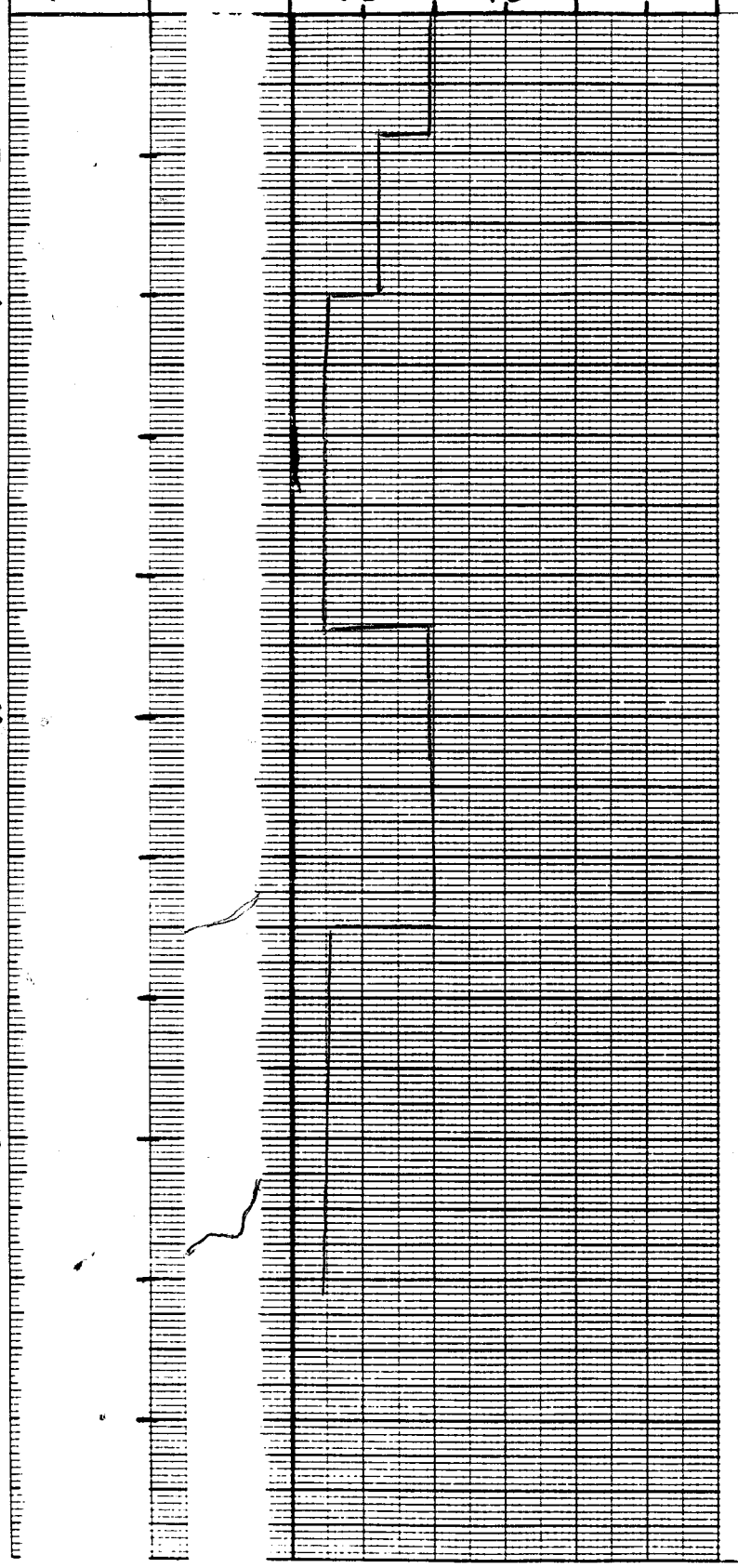
Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks



K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM
KEUFFEL & ESSER CO. MADE IN U.S.A.
46 1510

Box Number: 32 Start Depth: 284 End Depth: 293

Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks



K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM
KEUFFEL & ESSER CO. MADE IN U.S.A.
46 1510

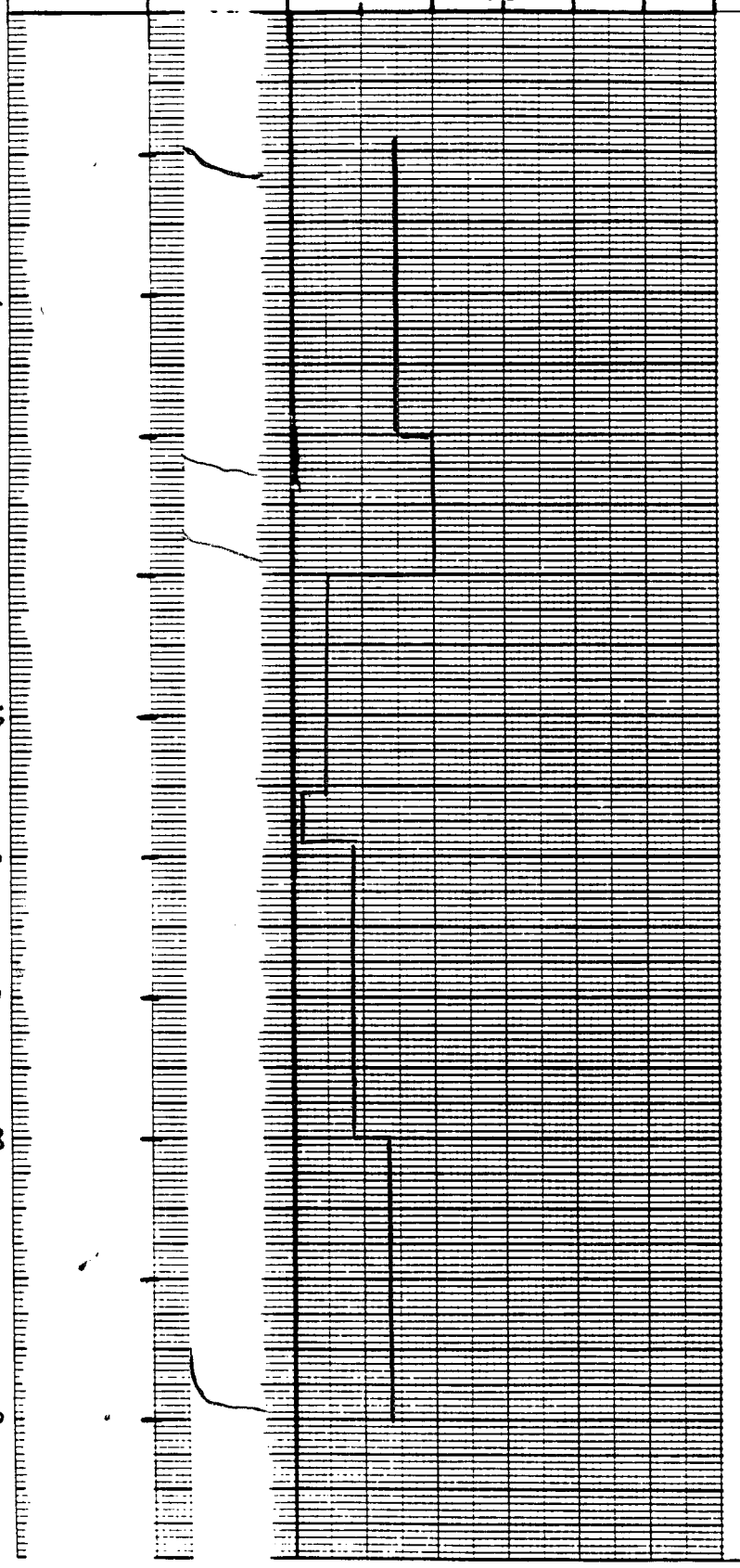
Box Number: 33 Start Depth: 293 End Depth: 302

Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks
293			
294 1			
295 2			numerous [illegible] core
296 3			
297 4			
298 5			
299 6			
300 7			
301 8			
302 9			
10			
11			

K·E 10 X 10 TO THE CENTIMETER 18 X 25 CM KEUFFEL & ESSER CO. MADE IN U.S.A. 46 1510

Box Number: 34 Start Depth: 302 End Depth: 312

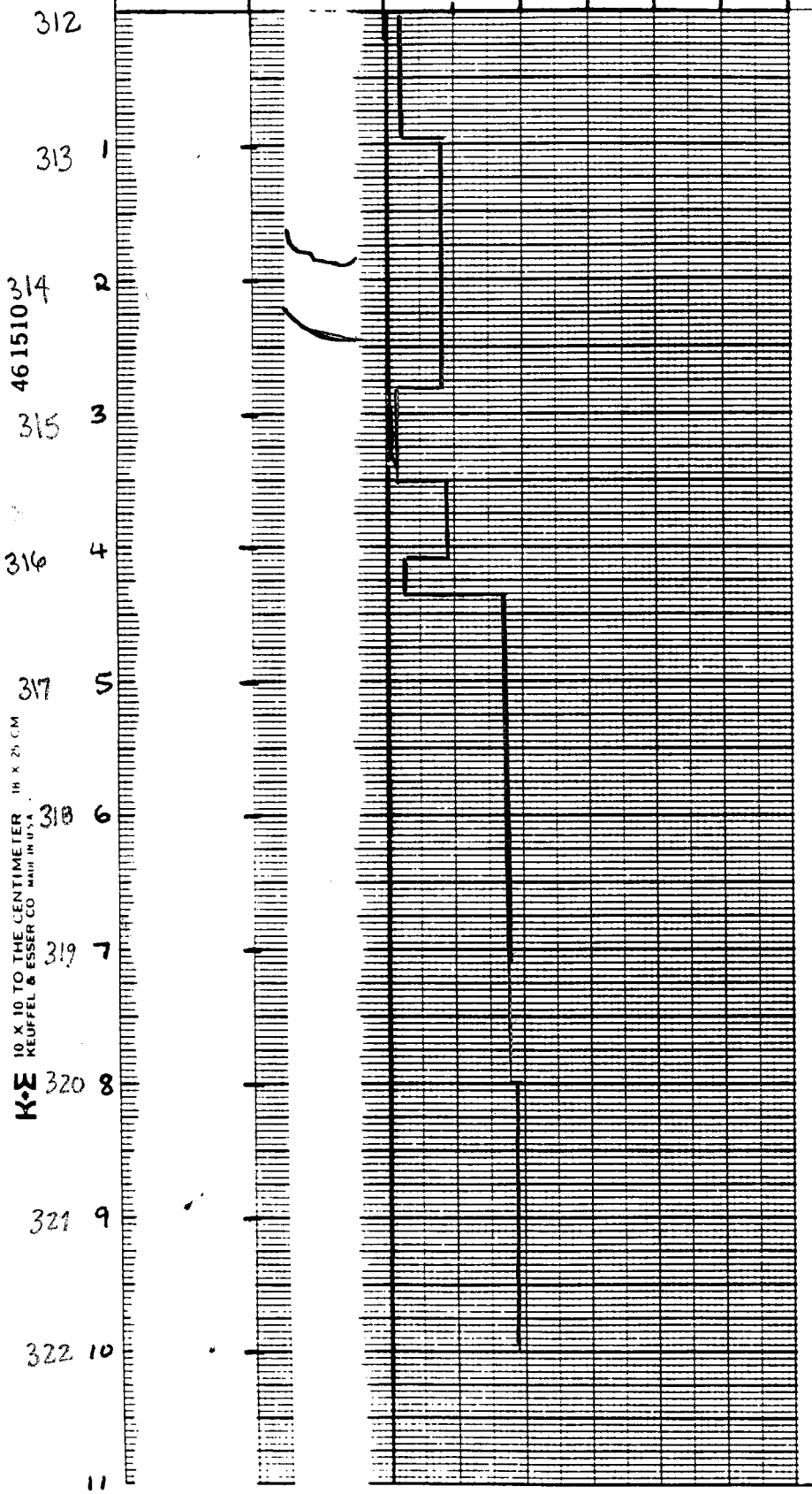
Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks



K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM
KEUFFEL & ESSER CO. MADE IN U.S.A.
46 1510

Box Number: 35 Start Depth: 312 End Depth: 322

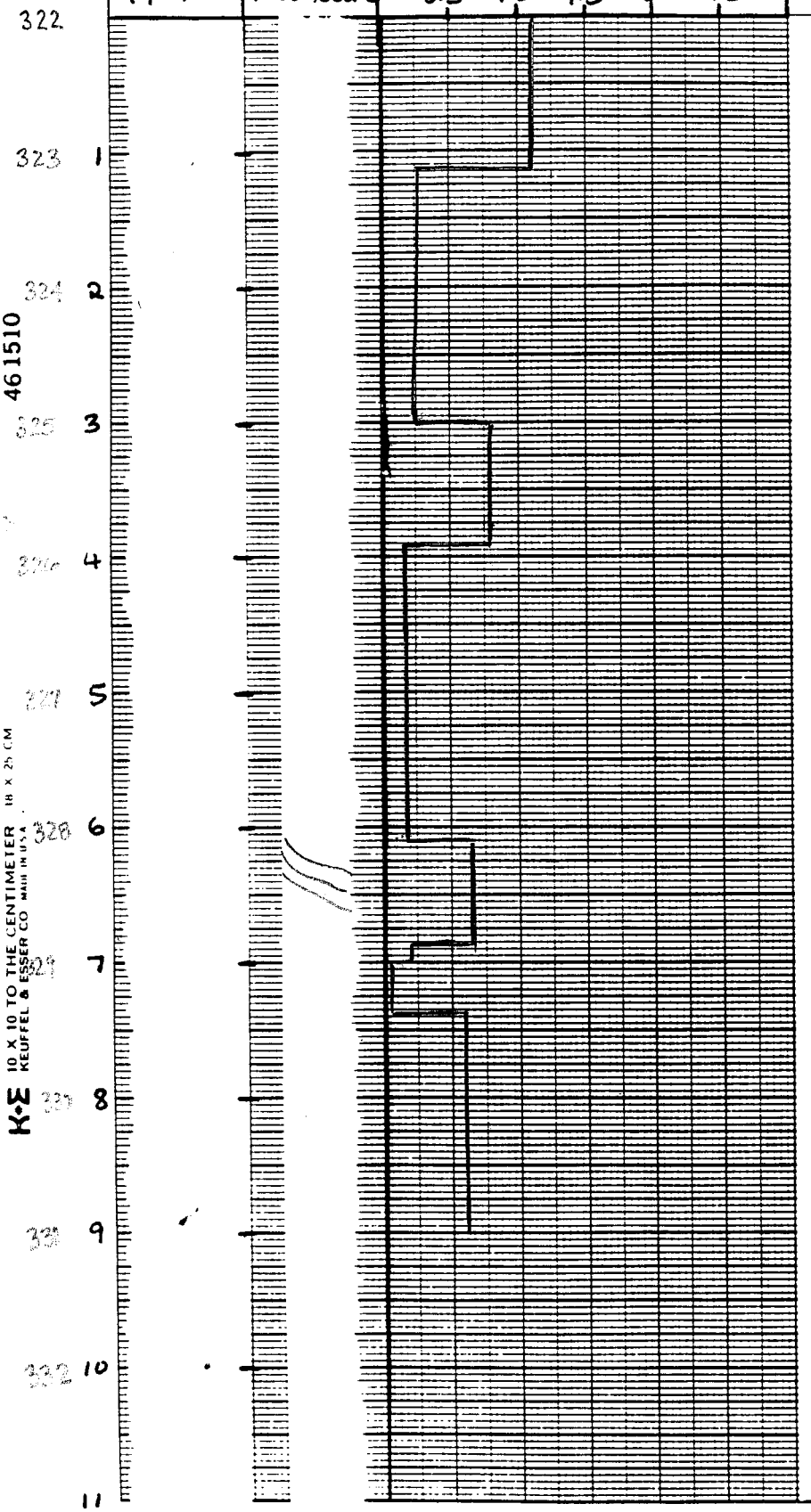
Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks



K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM
KEUFFEL & ESSER CO. MADE IN U.S.A.
46 1510

Box Number: 36 Start Depth: 322 End Depth: 331

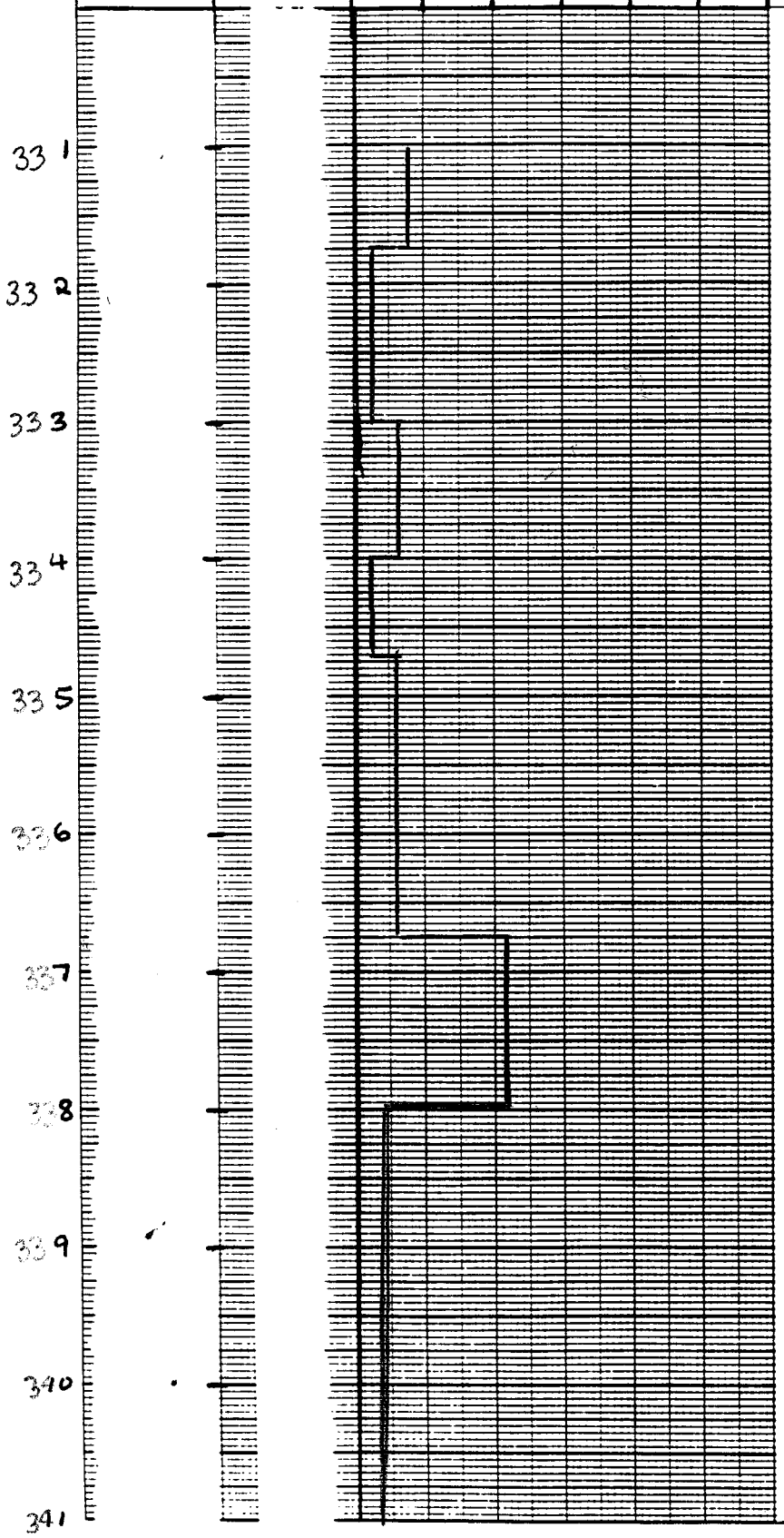
Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks



K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM
KEUFFEL & ESSER CO. MADE IN U.S.A.
46 1510

Box Number: 37 Start Depth: 331 End Depth: 340

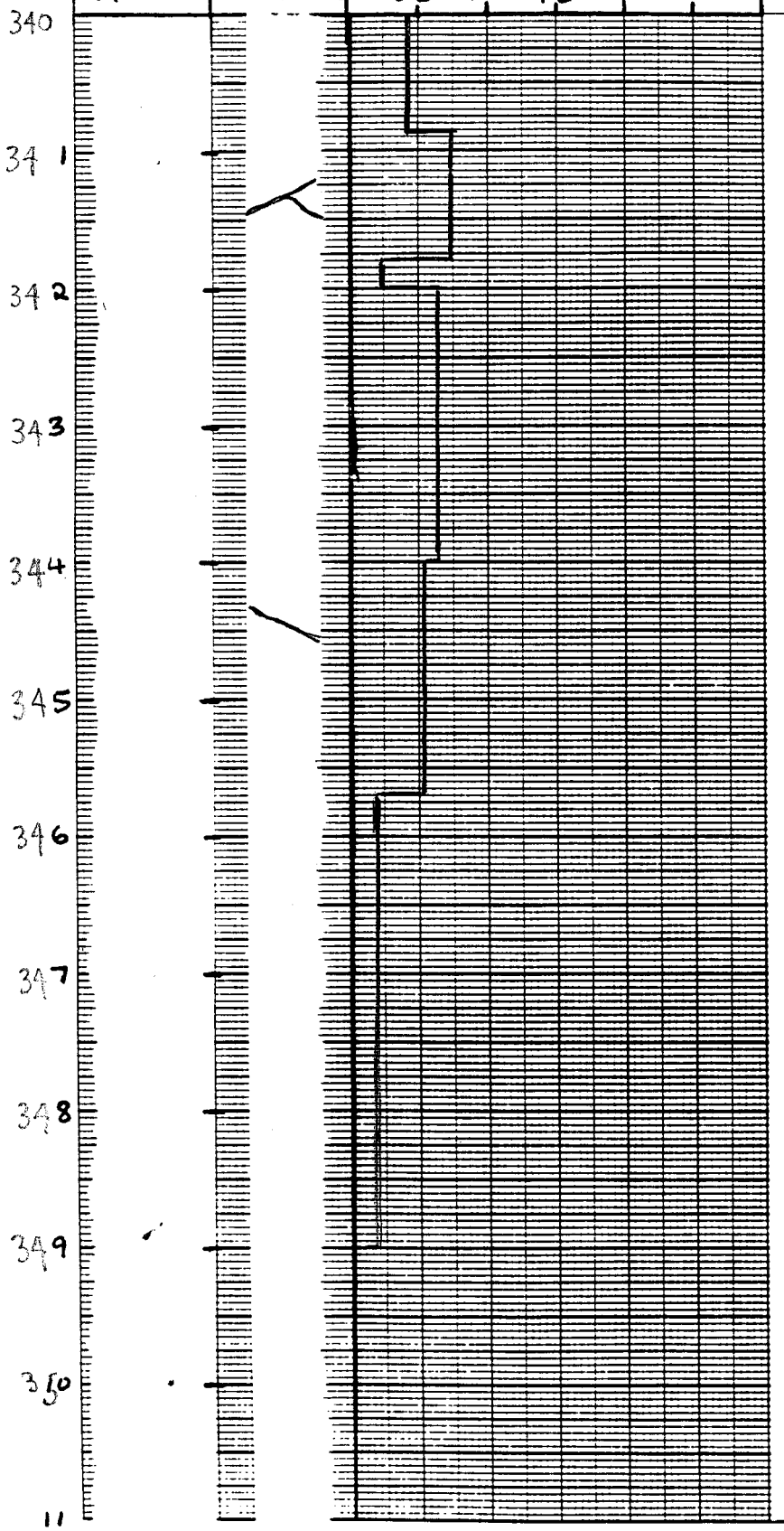
Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks



K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM
KEUFFEL & ESSER CO. MADE IN U.S.A.
46 1510

Box Number: 38 Start Depth: 340 End Depth: 349.5

Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks



BOX LABEL INCORRECT... SHOULD BE 340 - 349.5 instead of 347.5

K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM KEUFFEL & ESSER CO. MADE IN U.S.A. 46 1510

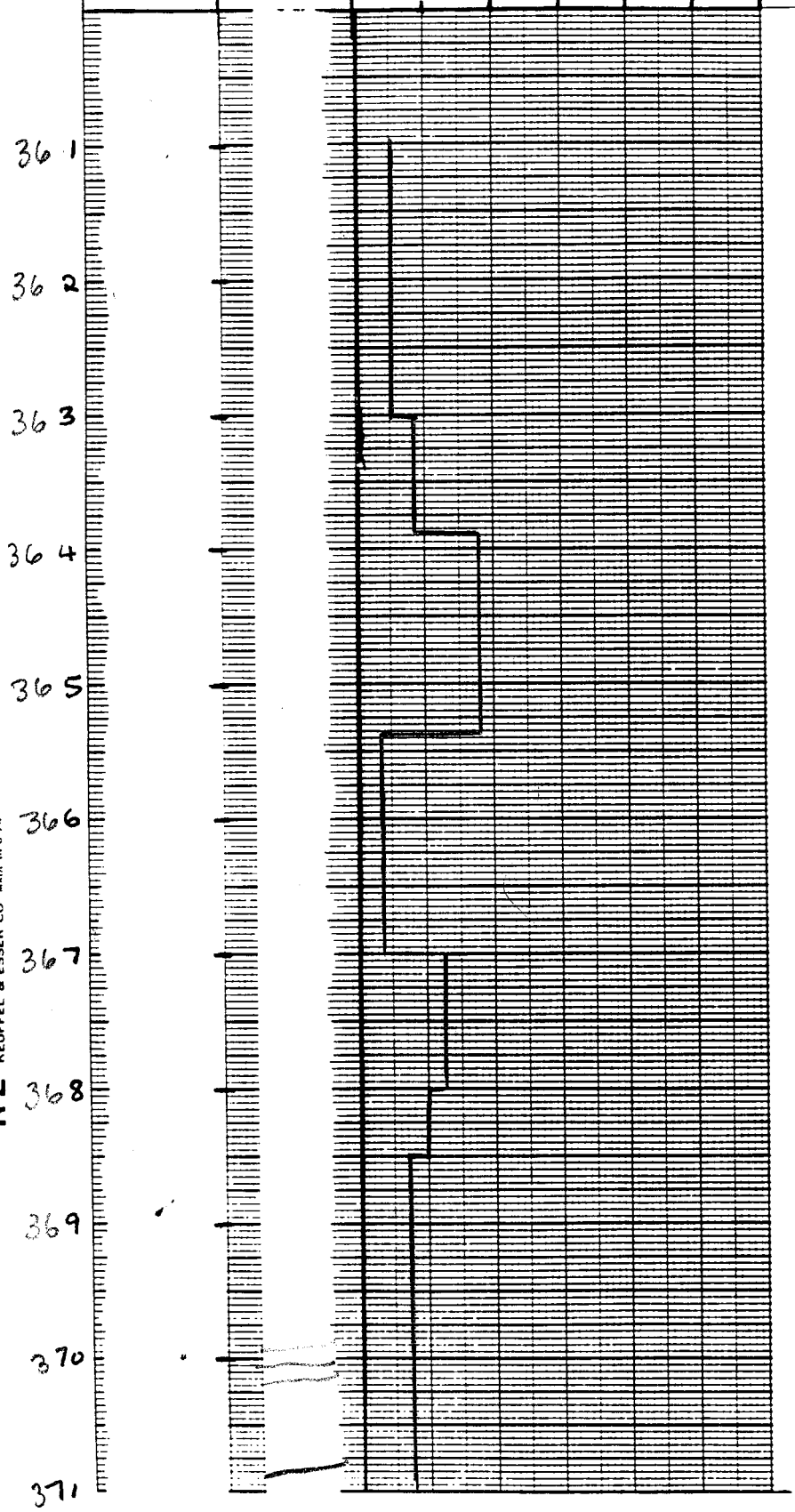
Box Number: 39 Start Depth: 349.5 End Depth: 361

Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks
349			
350 1			
351 2			
352 3			
353 4			
354 5			
355 6			
356 7			
357 8			
358 9			
359 10			
360 11			
361			

K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM KEUFFEL & ESSER CO. MADE IN U.S.A. 461510

Box Number: 40 Start Depth: 361 End Depth: 371

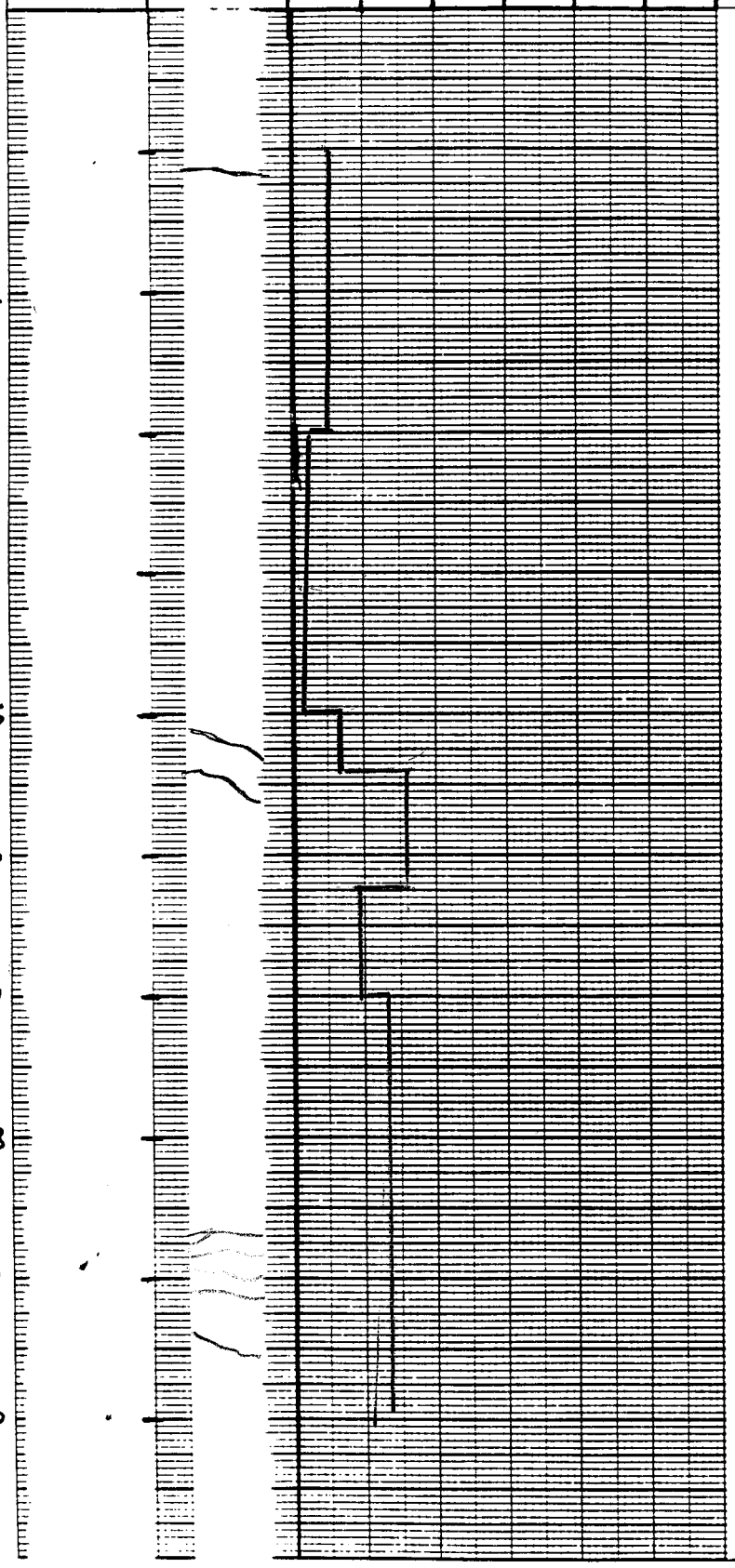
Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks



K·E 10 X 10 TO THE CENTIMETER 18 X 25 CM KEUFFEL & ESSER CO. MADE IN U.S.A. 461510

Box Number: 41 Start Depth: 371 End Depth: 380

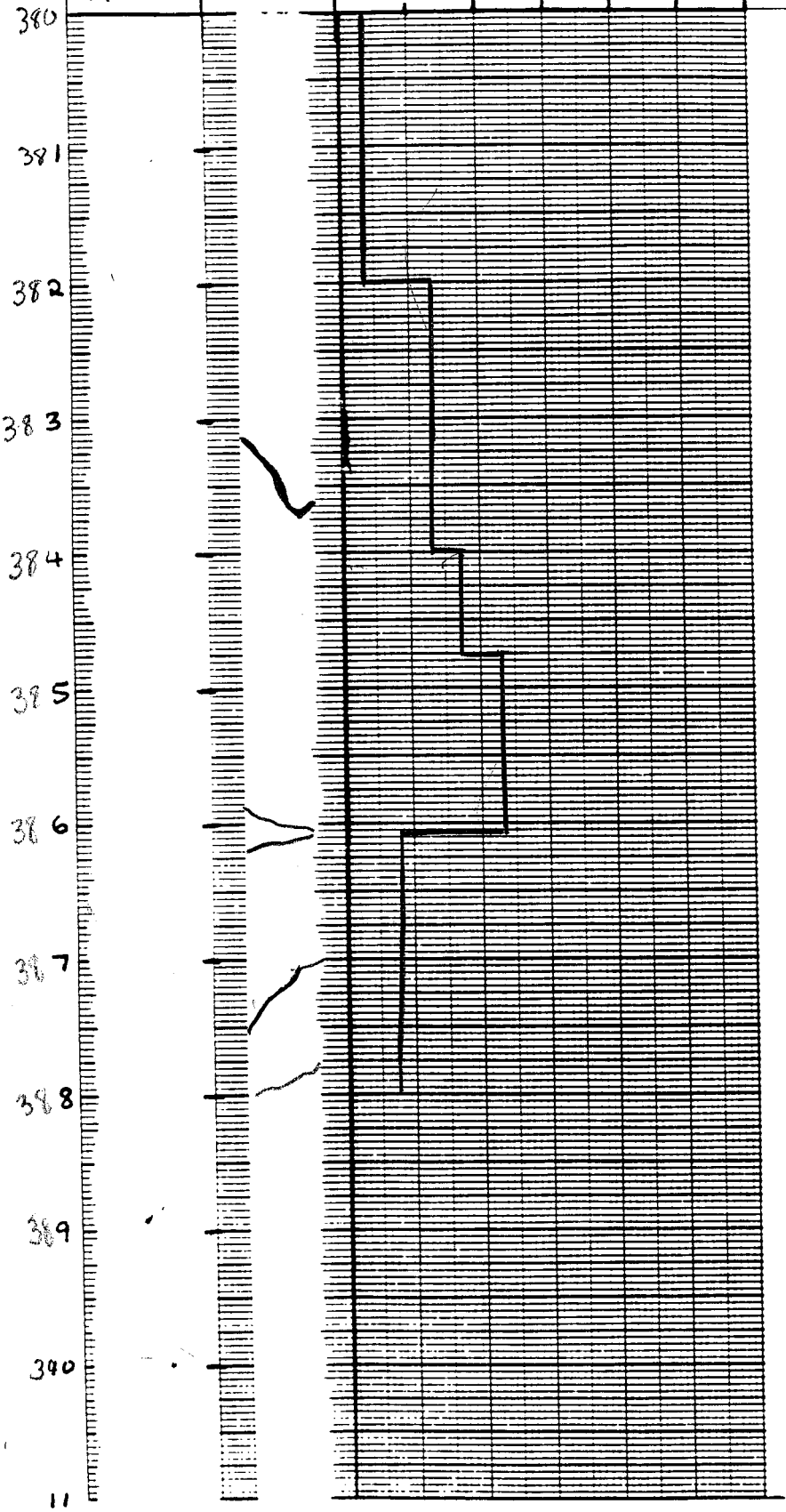
Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks



K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM
KEUFFEL & ESSER CO. MADE IN U.S.A.
46 1510

Box Number: 42 Start Depth: 380 End Depth: 388

Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks



K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM
KEUFFEL & ESSER CO. MADE IN U.S.A.
46 1510

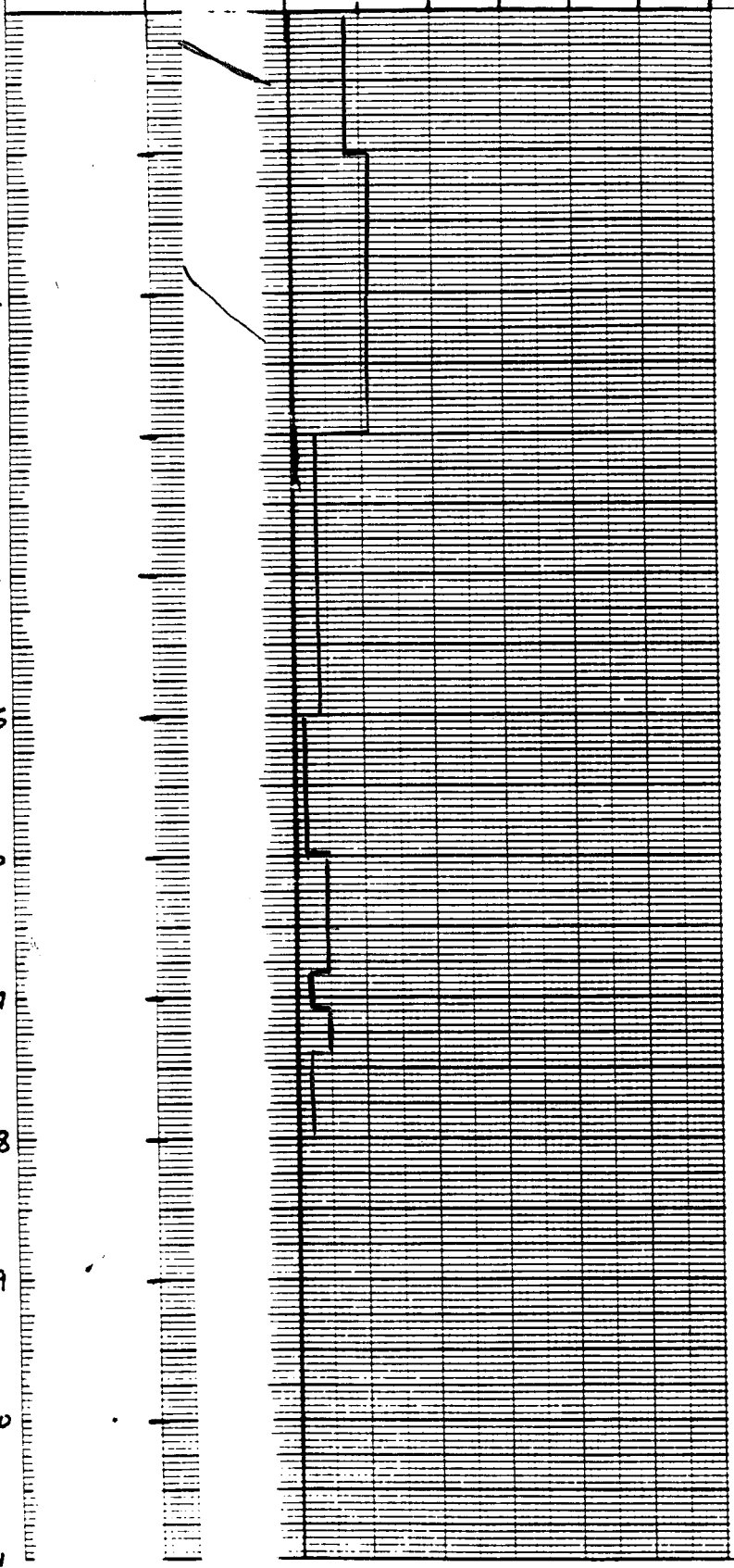
Box Number: 43 Start Depth: 388 End Depth: 396

Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks
388			very broken up core with diagonal fractures.
389 1			
390 2			
391 3			
392 4			
393 5			
394 6			
395 7			
396 8			
397 9			
10			
11			

K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM KEUFFEL & ESSER CO. MADE IN U.S.A. 46 1510

Box Number: 44 Start Depth: 396 End Depth: 404

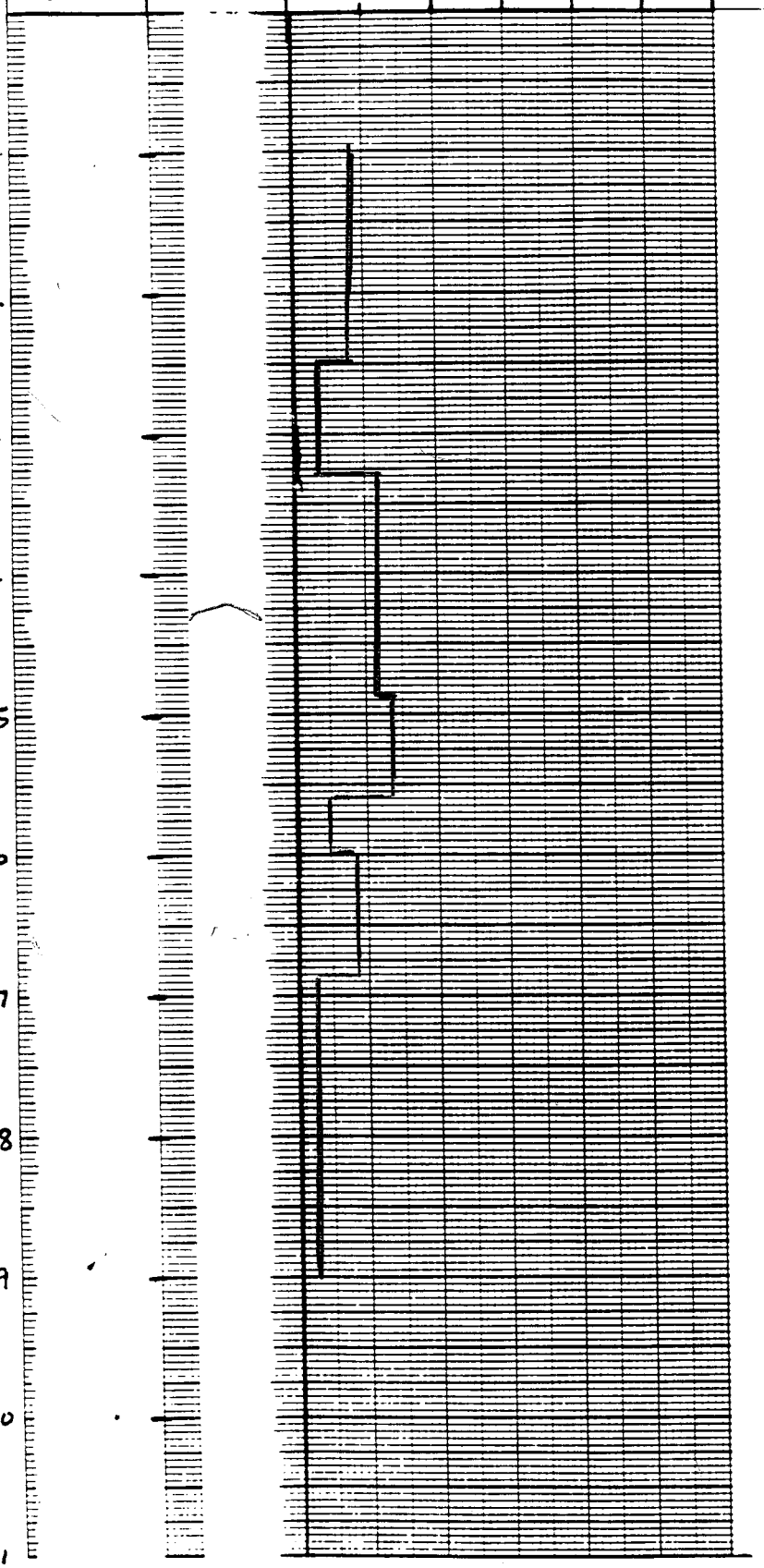
Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks



K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM
KEUFFEL & ESSER CO. MADE IN U.S.A.
46 1510

Box Number: 45 Start Depth: 404 End Depth: 412

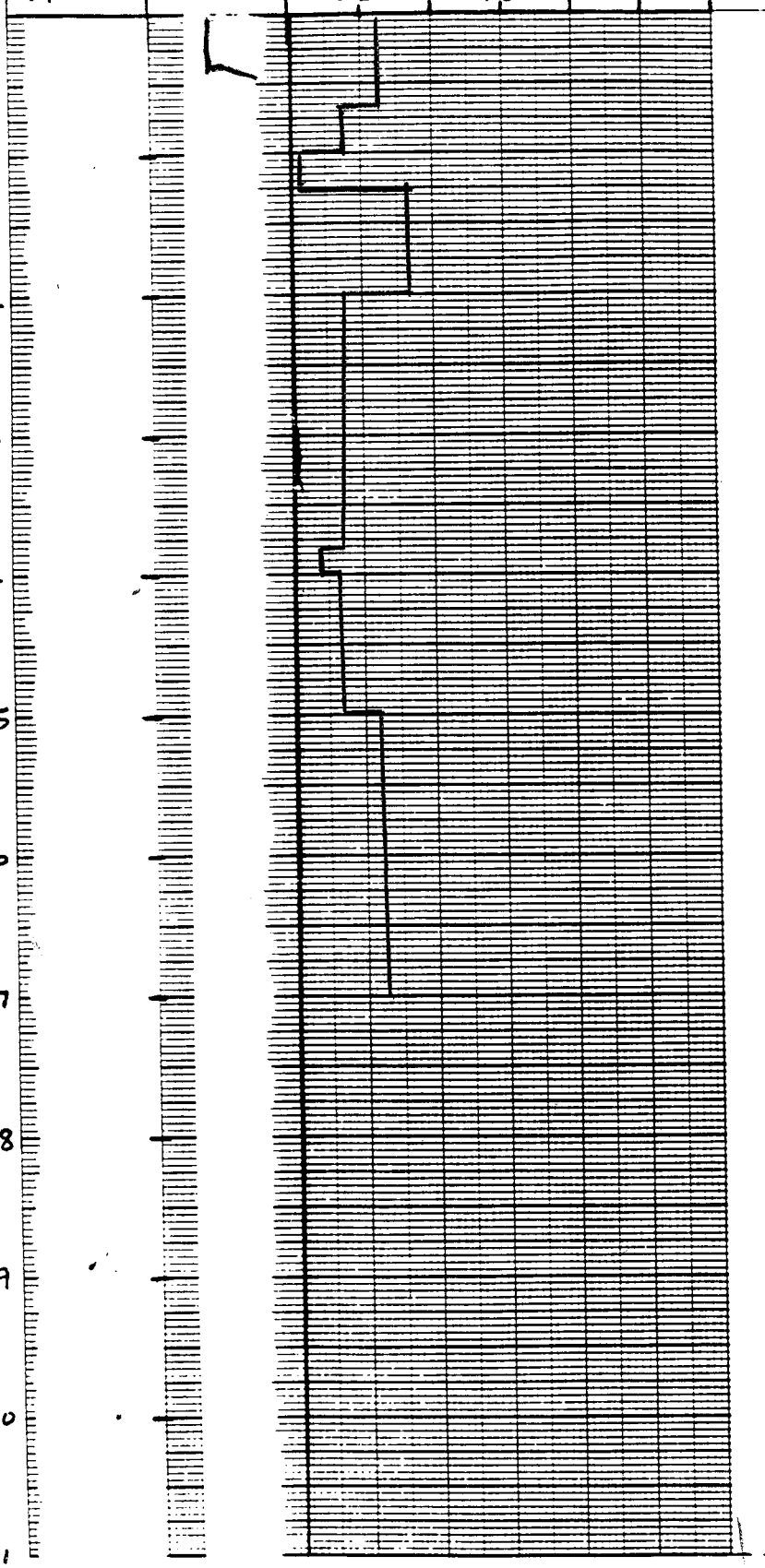
Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks



K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM
KEUFFEL & ESSER CO. MADE IN U.S.A.
461510

Box Number: 46 Start Depth: 412 End Depth: 419

Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks



K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM KEUFFEL & ESSER CO. MADE IN U.S.A. 461510

Box Number: 47 Start Depth: 419 End Depth: 431

Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks
419			
420 1			
421 2			
422 3			
423 4			
424 5			
425 6			
426 7			
427 8			
428 9			
429 10			
430 11			
431			

K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM
KEUFFEL & ESSER CO. MADE IN U.S.A.
46 1510

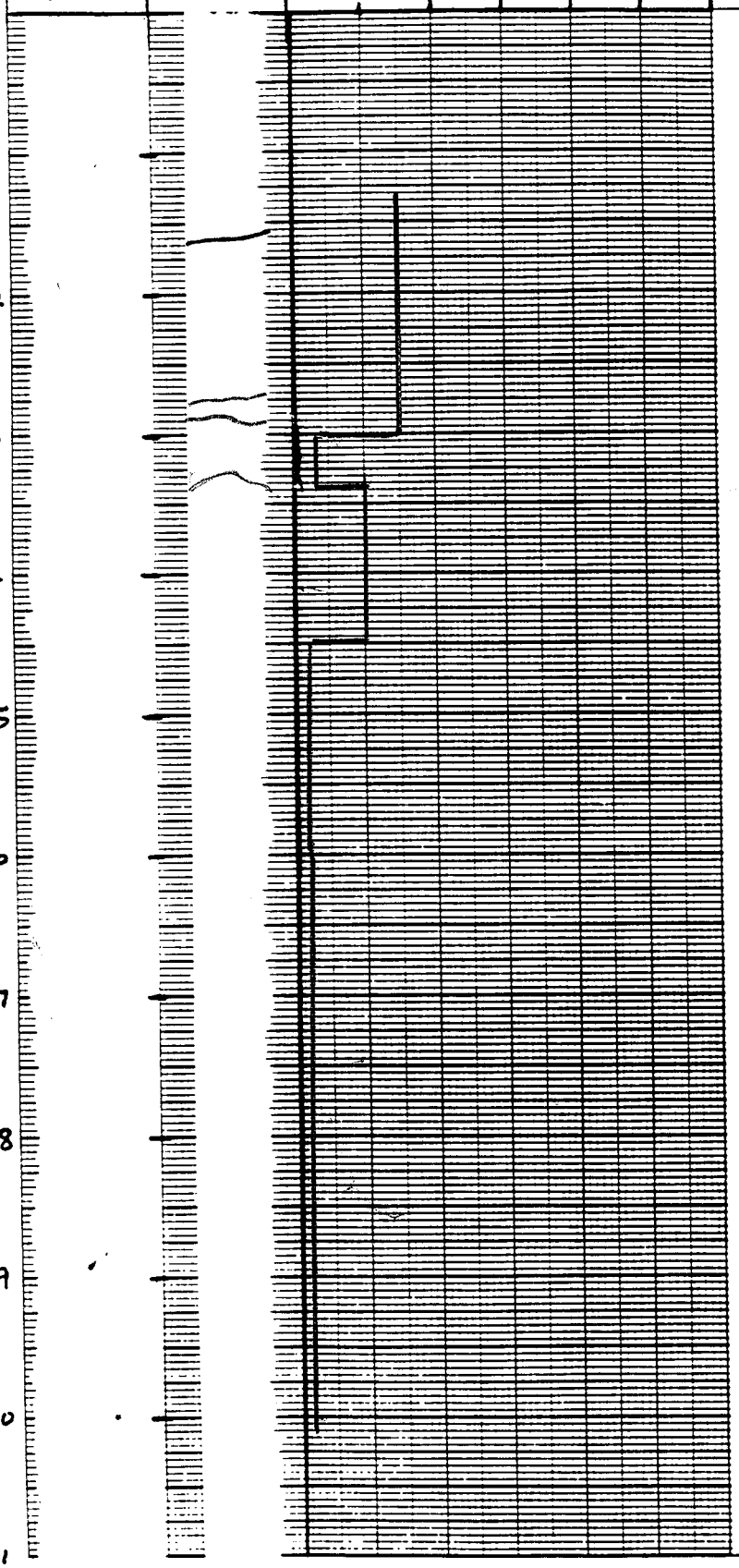
Box Number: 48 Start Depth: 431 End Depth: 441

Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks
430			
431			
432			
433			
434			
435			
436			
437			
438			
439			
440			
441			

K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM
KEUFFEL & ESSER CO. MADE IN U.S.A.
46 1510

Box Number: 49 Start Depth: 441.5 End Depth: 450

Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks



461510
K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM
KEUFFEL & ESSER CO. MADE IN U.S.A.

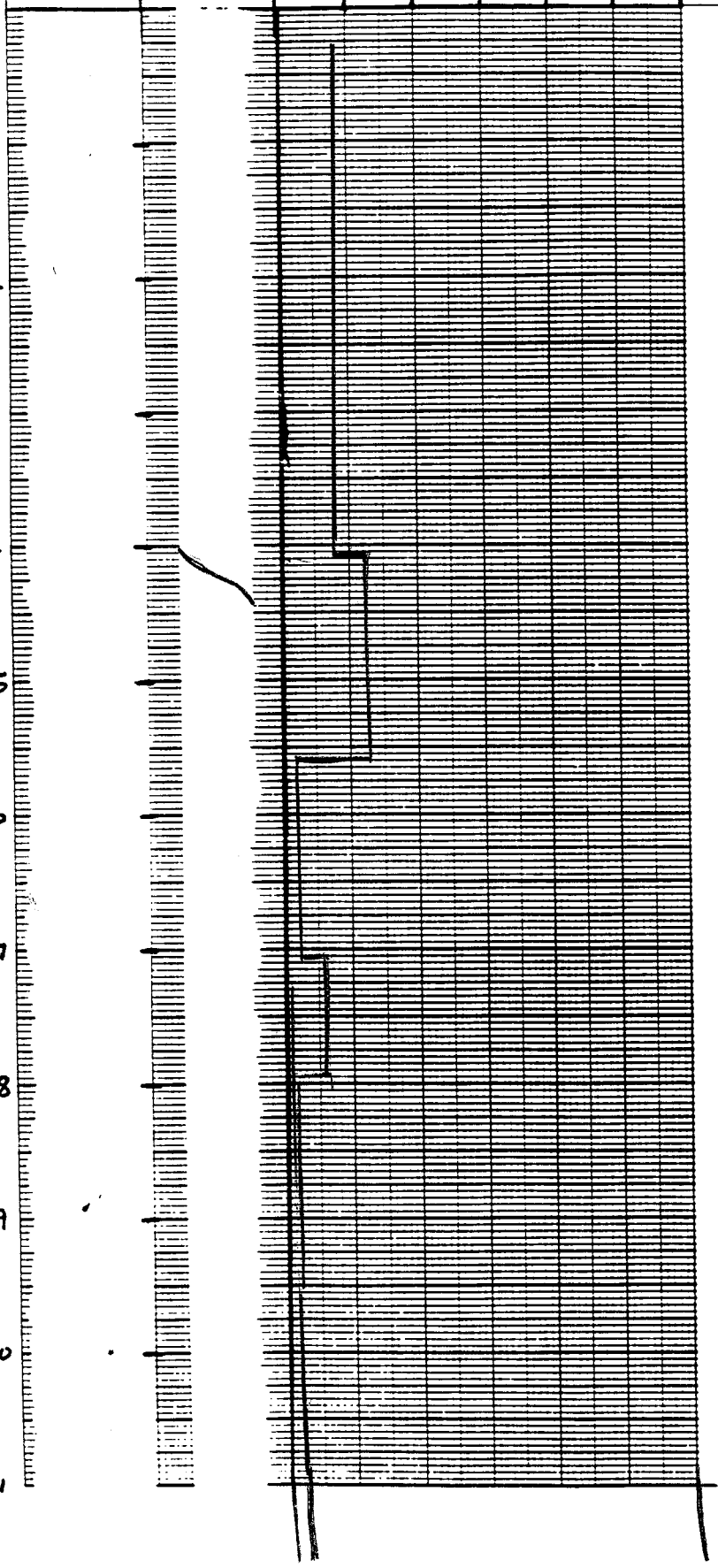
Box Number: 50 Start Depth: 450 End Depth: 459

Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks
450			
451			
452			
453			
454			
455			
456			
457			
458			
459			
10			
11			

K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM
KEUFFEL & ESSER CO. MADE IN U.S.A.
46 1510

Box Number: 51 Start Depth: 459 End Depth: 471.5

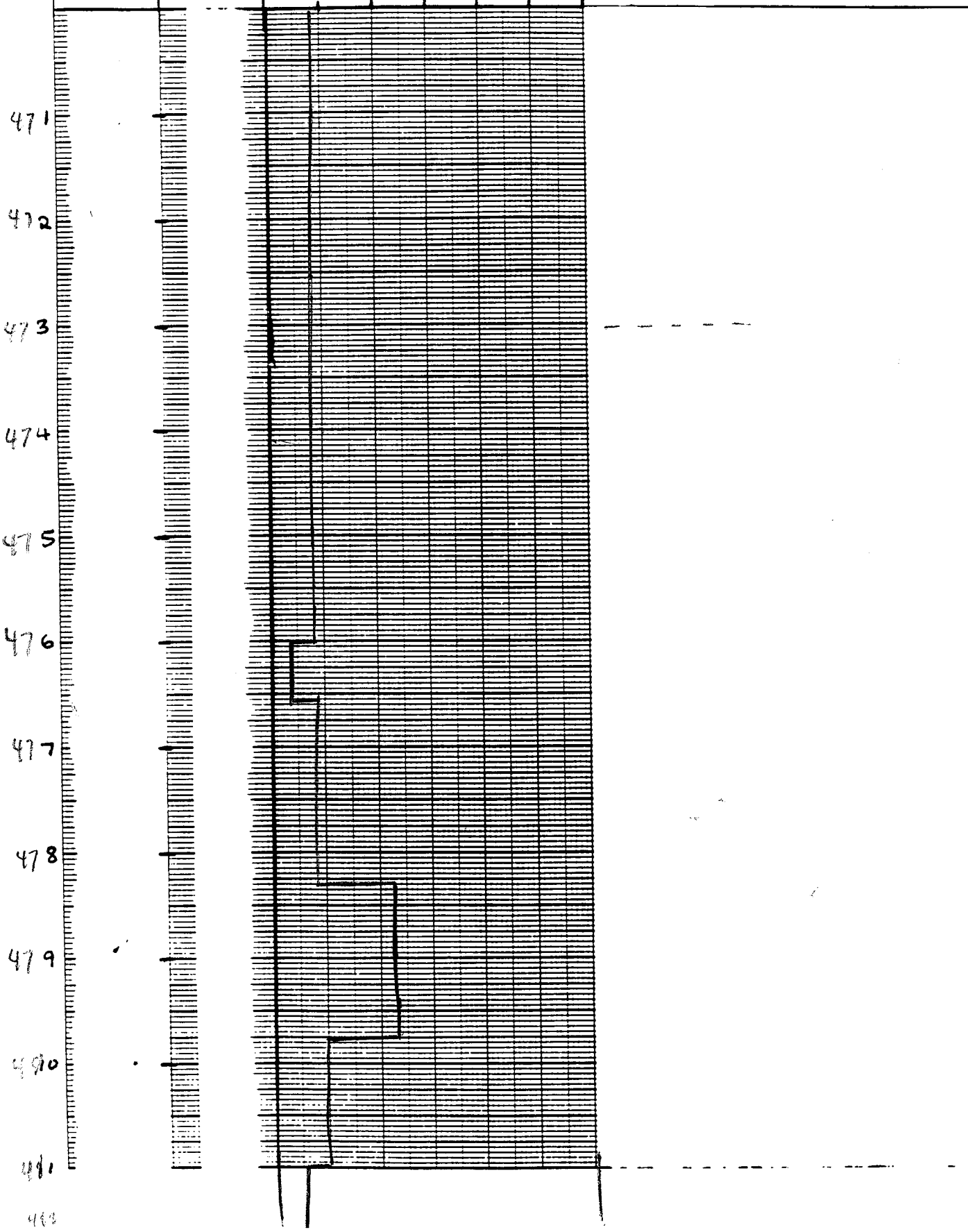
Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks
460 1			NOT 450 AS INDICATED ON BOX CASE
461 2			
462 3			
463 4			
464 5			
465 6			
466 7			
467 8			
468 9			
469 10			
470 11			
471			



K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM KEUFFEL & ESSER CO. MADE IN U.S.A.

Box Number: 52 Start Depth: 471.5 End Depth: 482

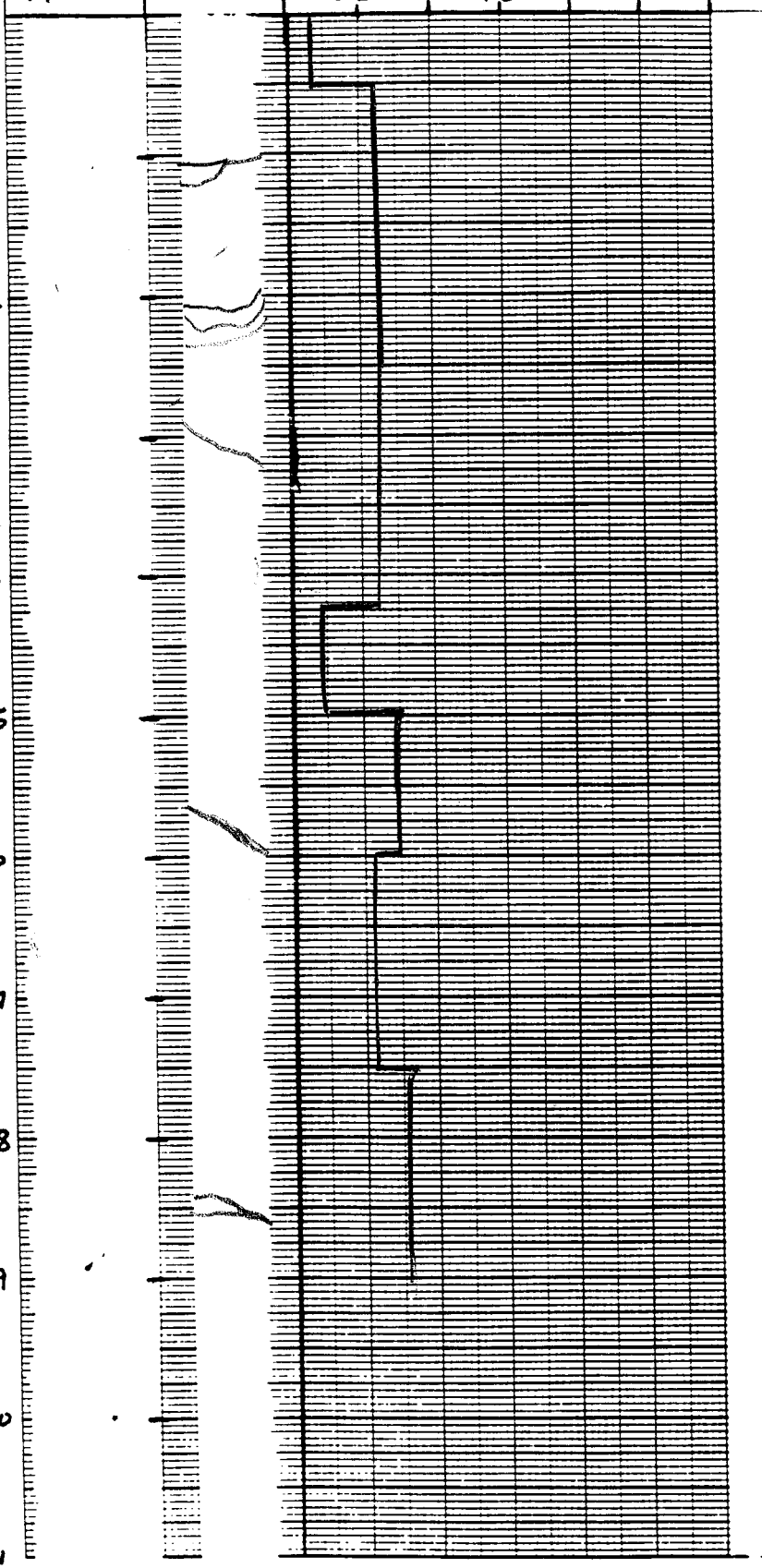
Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks



461510
K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM
KEUFFEL & ESSER CO. MADE IN U.S.A.

Box Number: 53 Start Depth: 482 End Depth: 490.5

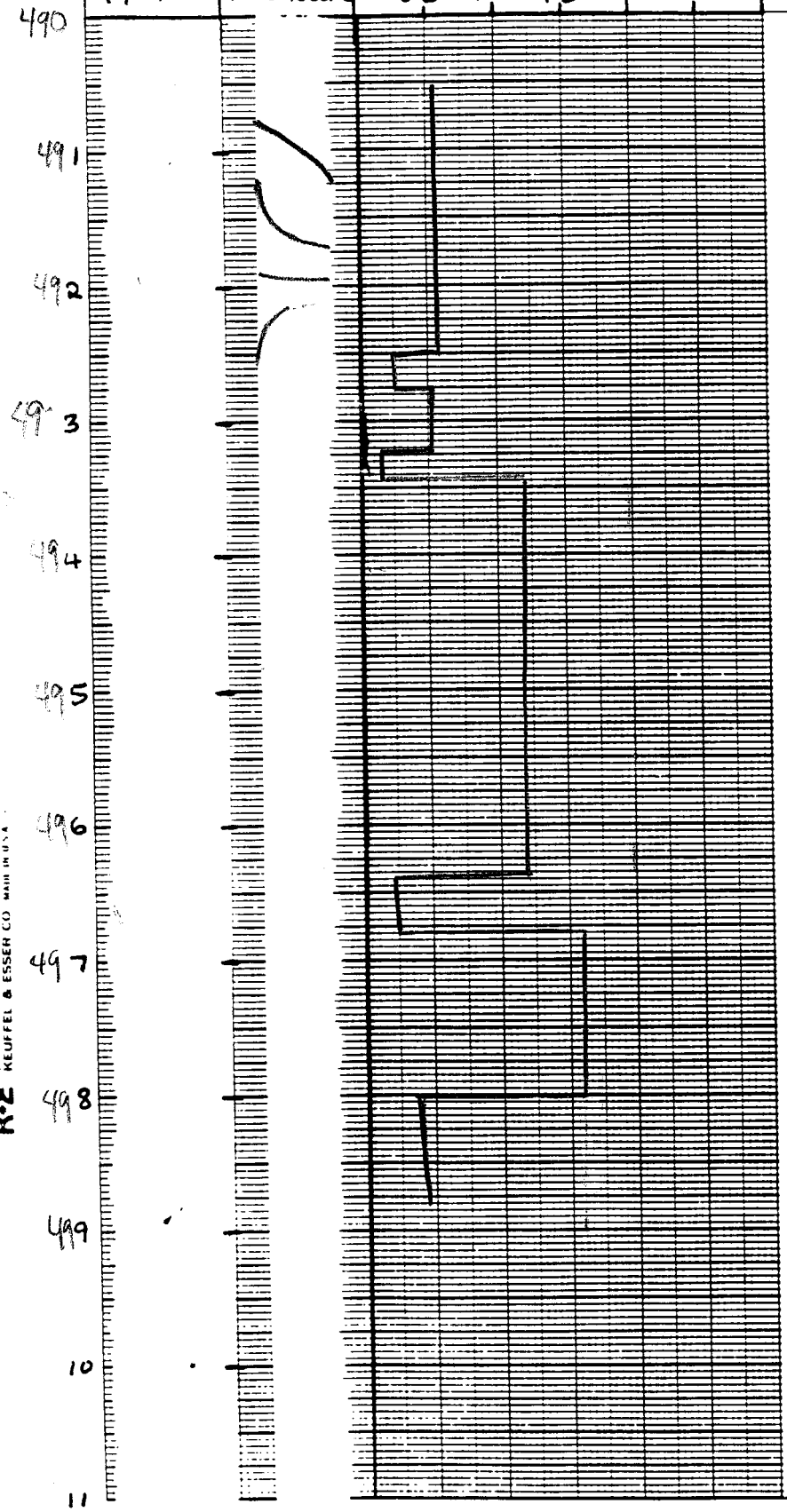
Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks



461510
K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM
KEUFFEL & ESSER CO. MADE IN U.S.A.

Box Number: 54 Start Depth: 490.5 End Depth: 498.5

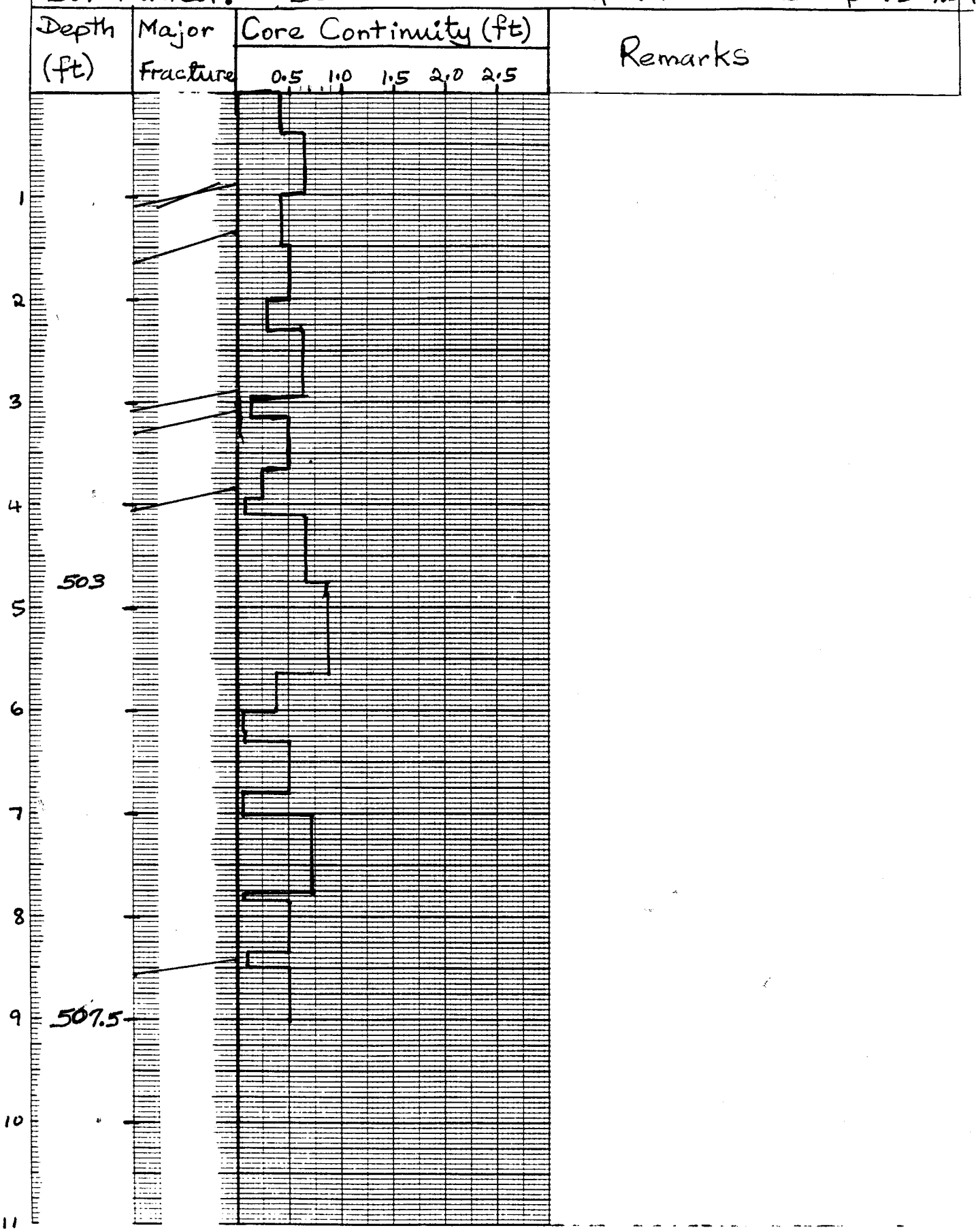
Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks



K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM
KEUFFEL & ESSER CO. MADE IN U.S.A.
46 1510

Fig B-1

Box Number: 55 Start Depth: 498.5 ft End Depth: 507.5 ft



K·E 10 X 10 TO THE CENTIMETER 18 X 25 CM KEUFFEL & ESSER CO. MADE IN U.S.A. 461510

Box Number: 56 Start Depth: 507.5 End Depth: 518

Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks
508			
1			Missing
2			
3			
4			
5			
513			
6			
7			
8			
9			Missing
10			
518			
11			

K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM KEUFFEL & ESSER CO. MADE IN U.S.A. 46 1510

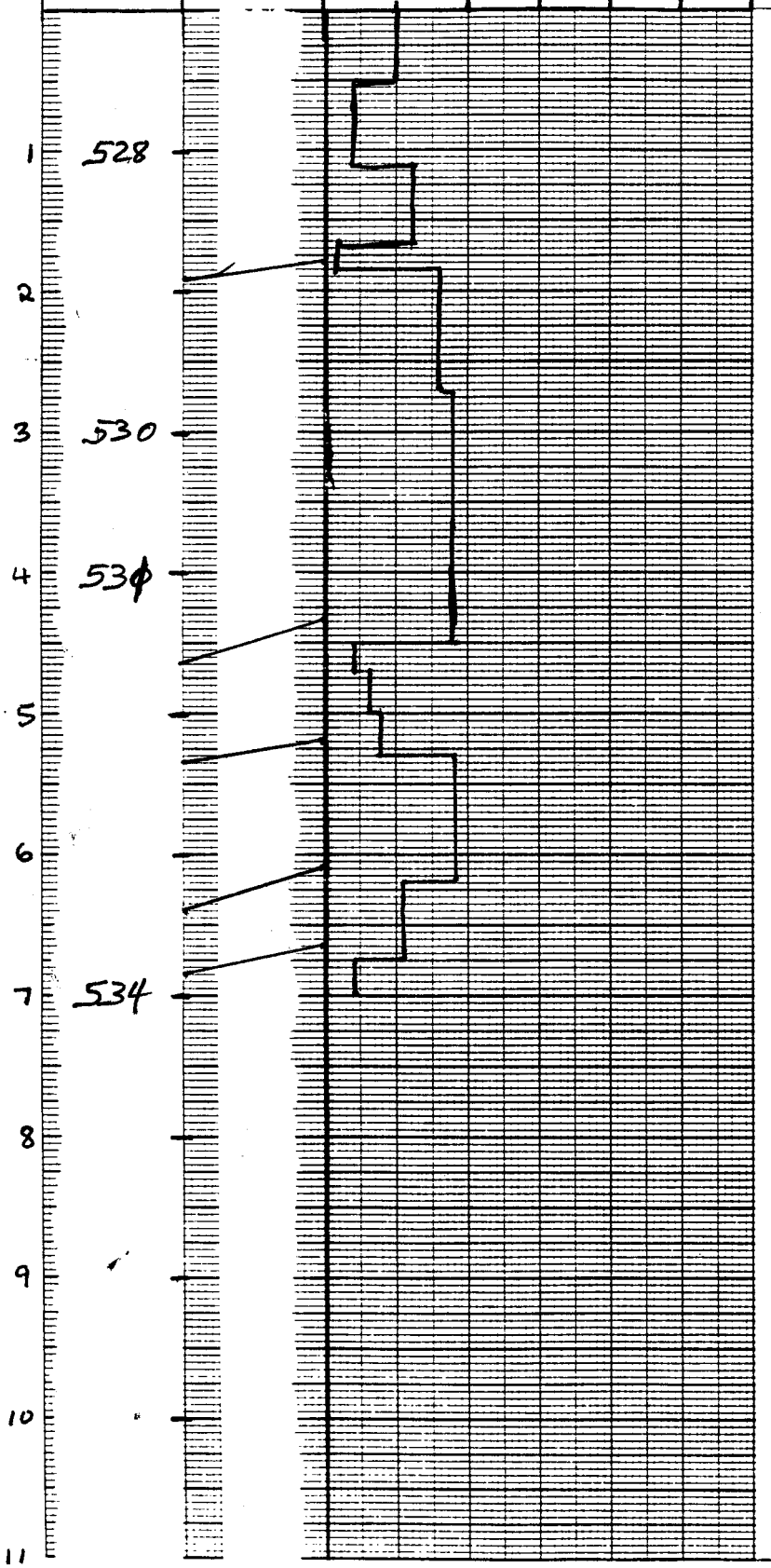
Box Number: 57 Start Depth: 518 End Depth: 527

Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks
518.5			
519			
			Missing
520			
522			
525			
527			

K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM KEUFFEL & ESSER CO. MADE IN U.S.A. 46 1510

Box Number: 58 Start Depth: 527 End Depth: 534

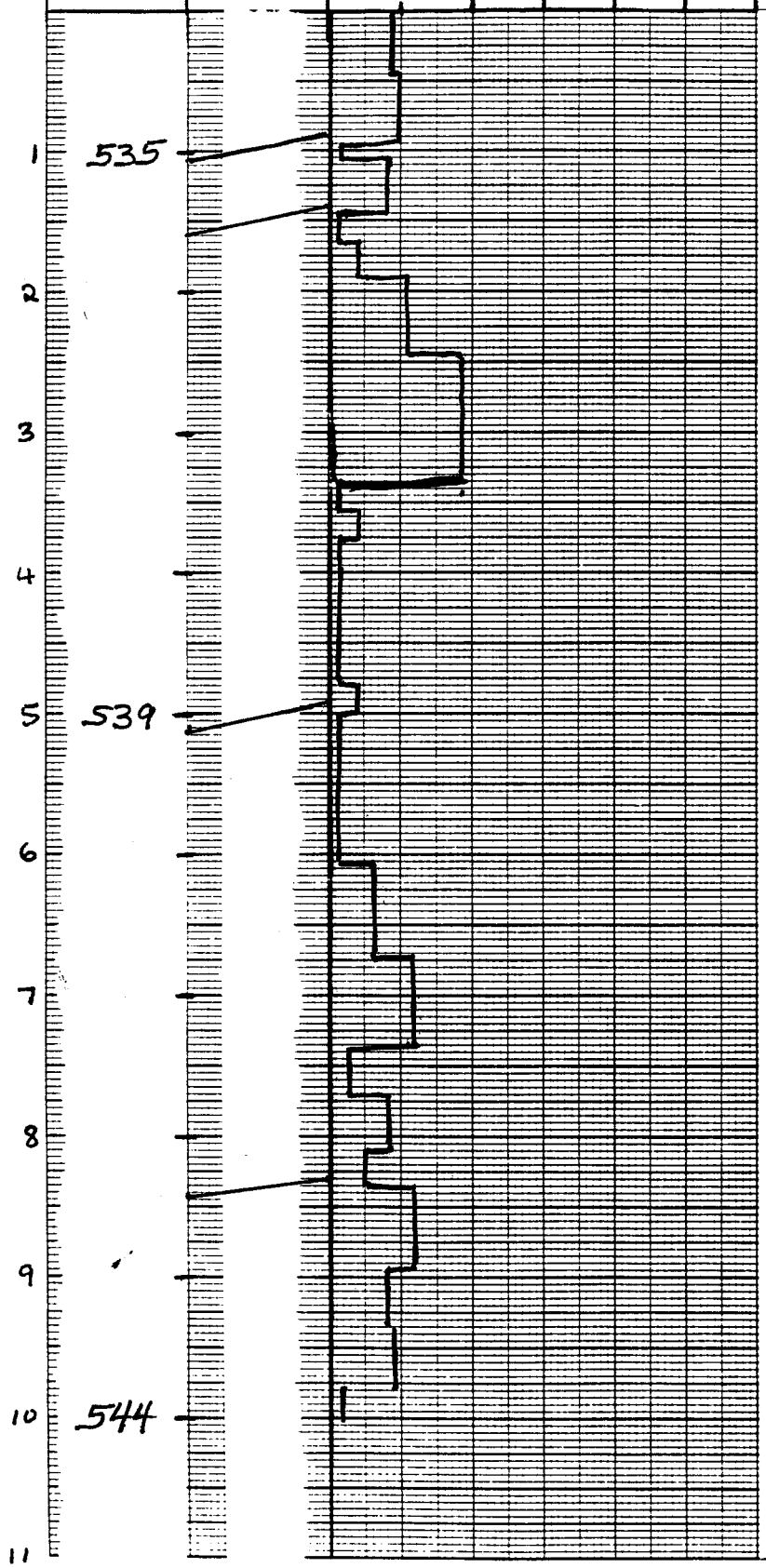
Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks



K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM
KEUFFEL & ESSER CO. MADE IN U.S.A.
46 1510

Box Number: 59 Start Depth: 534 End Depth: 544

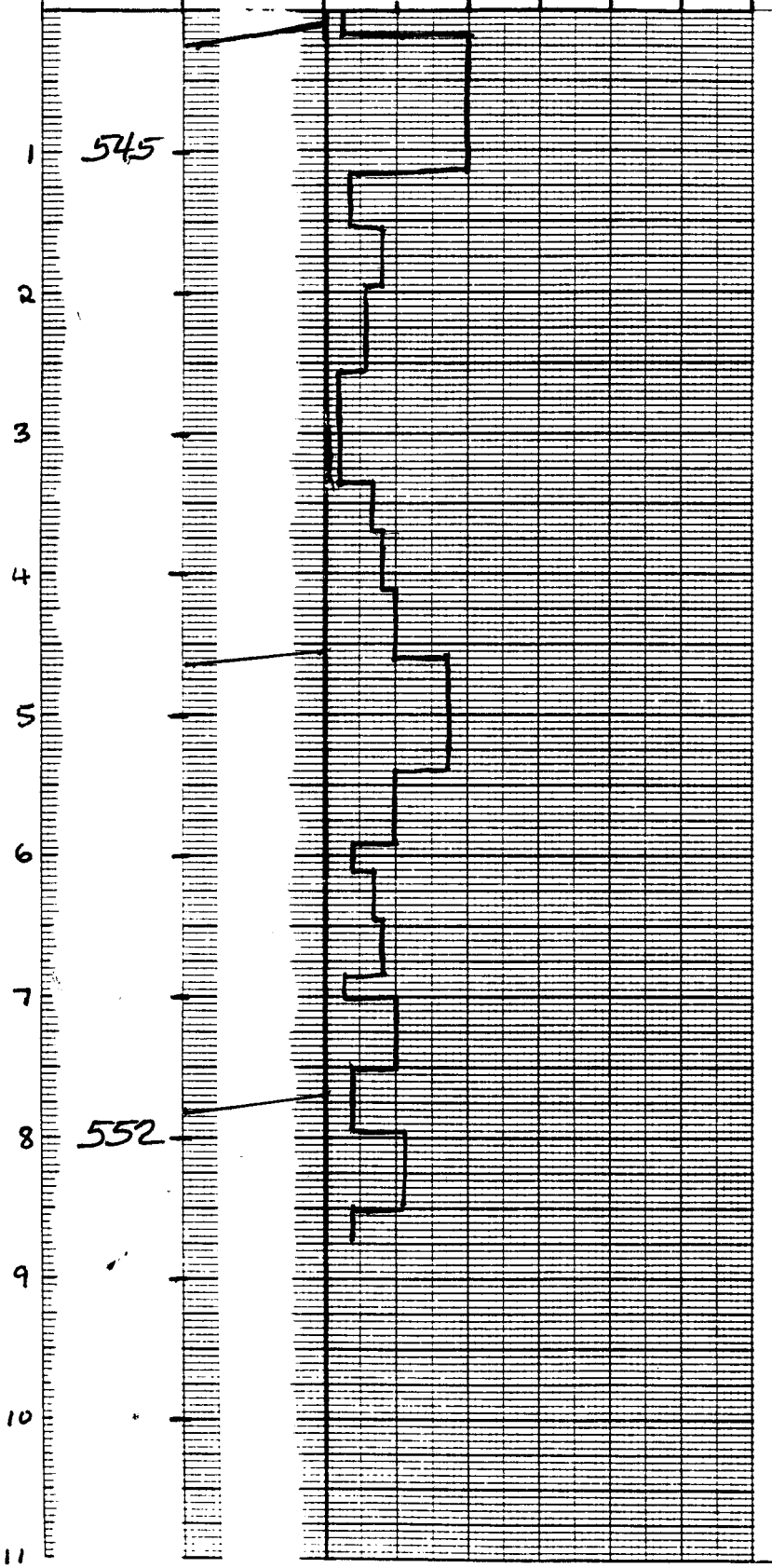
Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks



K•E 10 X 10 TO THE CENTIMETER 18 X 25 CM
KEUFFEL & ESSER CO. MADE IN U.S.A.
46 1510

Box Number: 60 Start Depth: 544 End Depth: 552.7

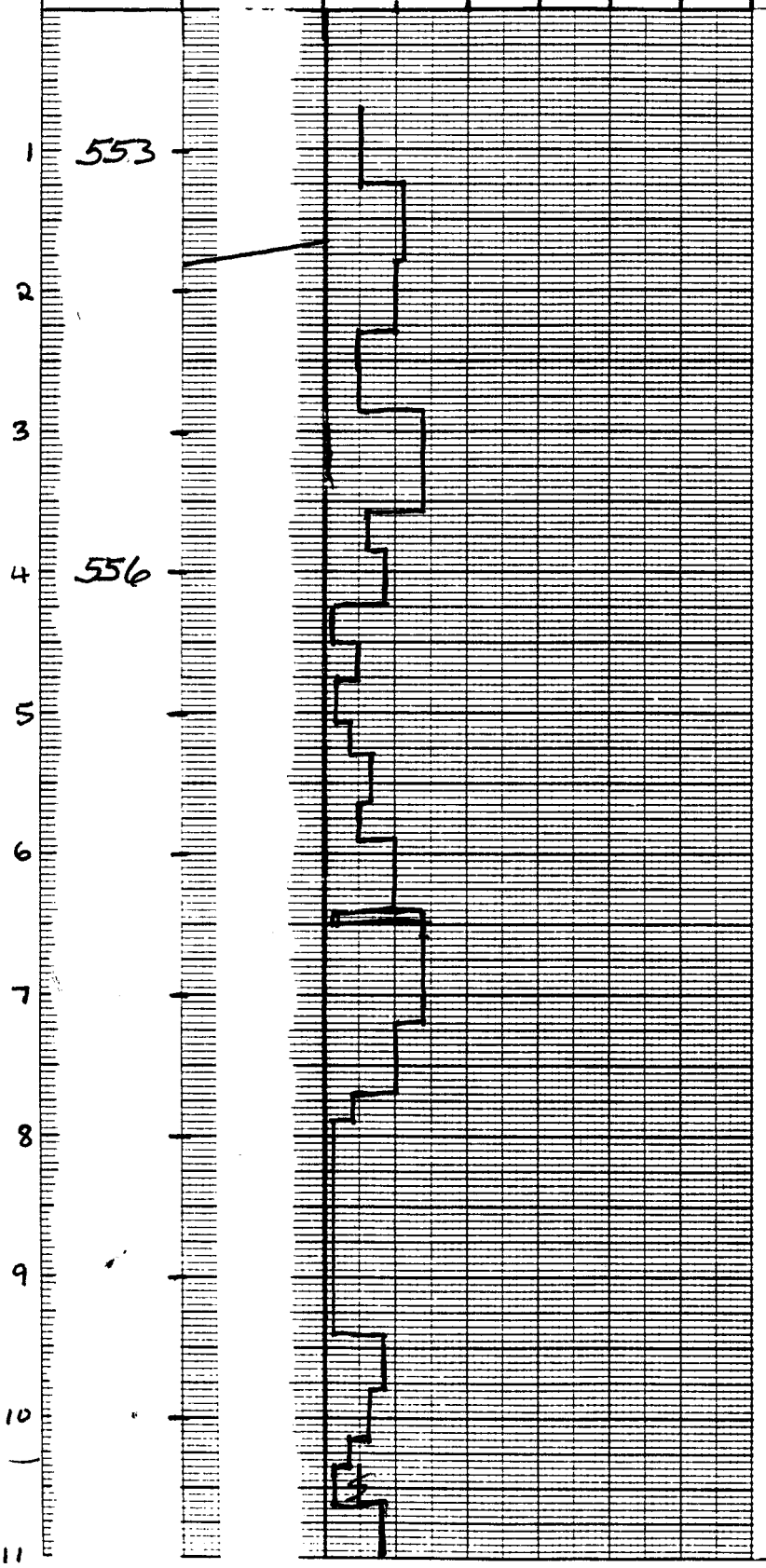
Depth (ft)	Major Fracture	Core Continuity (ft)	Remarks



K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM KEUFFEL & ESSER CO. MADE IN U.S.A.
46 1510

Box Number: 61 Start Depth: 552.7 End Depth: 563

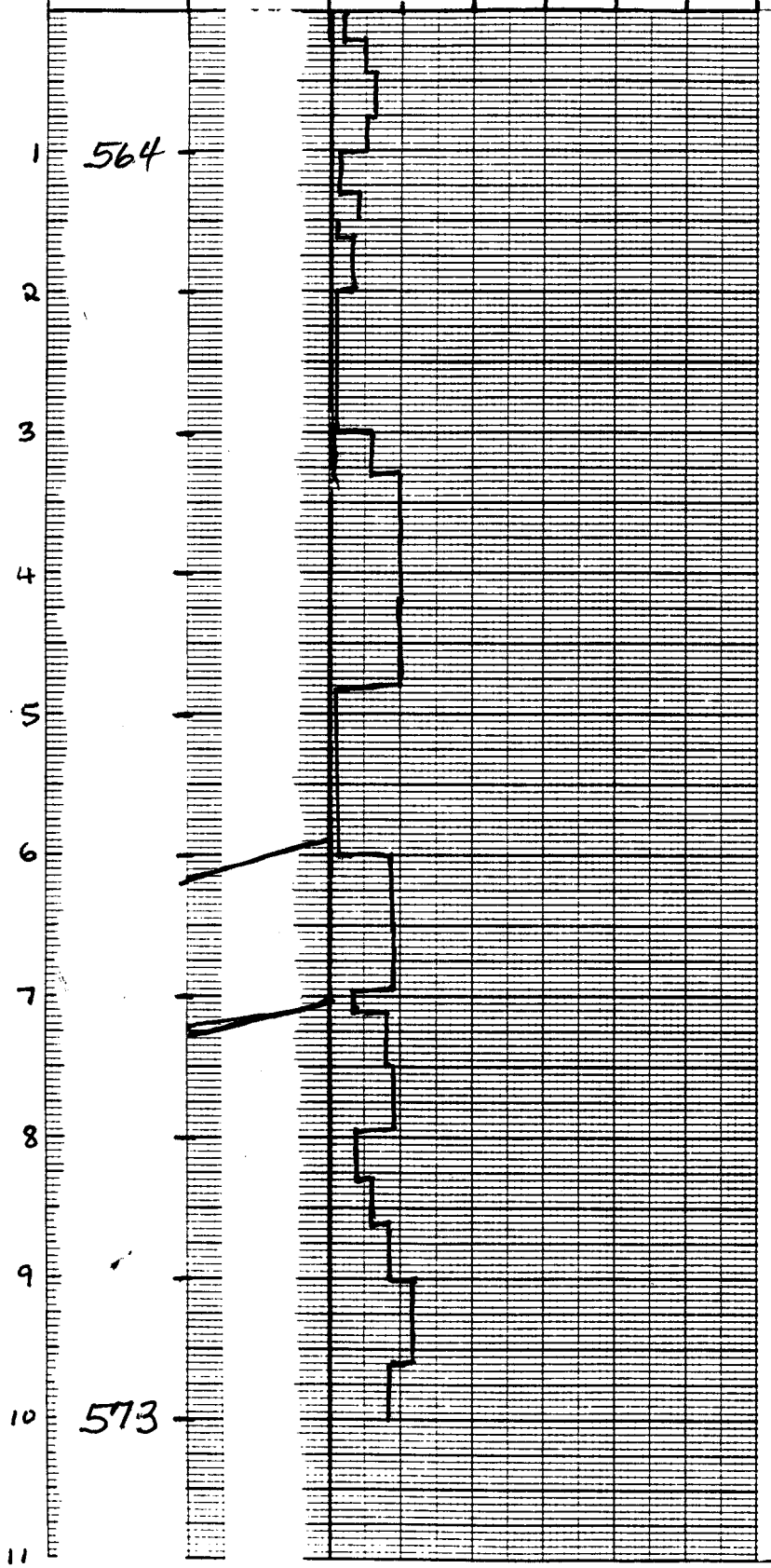
Depth (ft)	Major Fracture	Core Continuity (ft)	Remarks



K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM KEUFFEL & ESSER CO. MADE IN U.S.A. 461510

Box Number: 62 Start Depth: 563 End Depth: 573

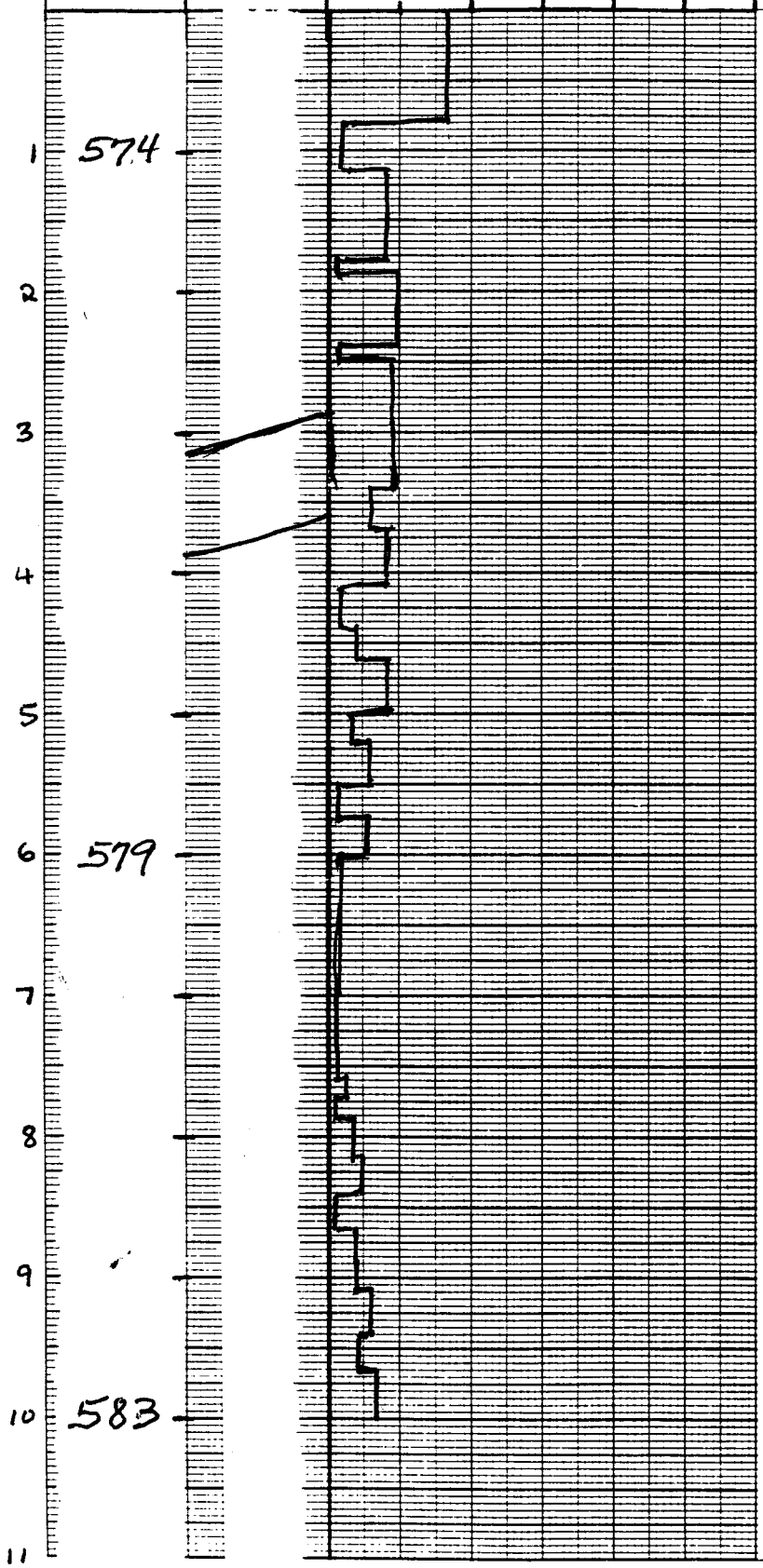
Depth (ft)	Major Fracture	Core Continuity (ft)	Remarks



K·E 10 X 10 TO THE CENTIMETER 18 X 25 CM
KEUFFEL & ESSER CO. MADE IN U.S.A.
46 1510

Box Number: 63 Start Depth: 573 End Depth: 583

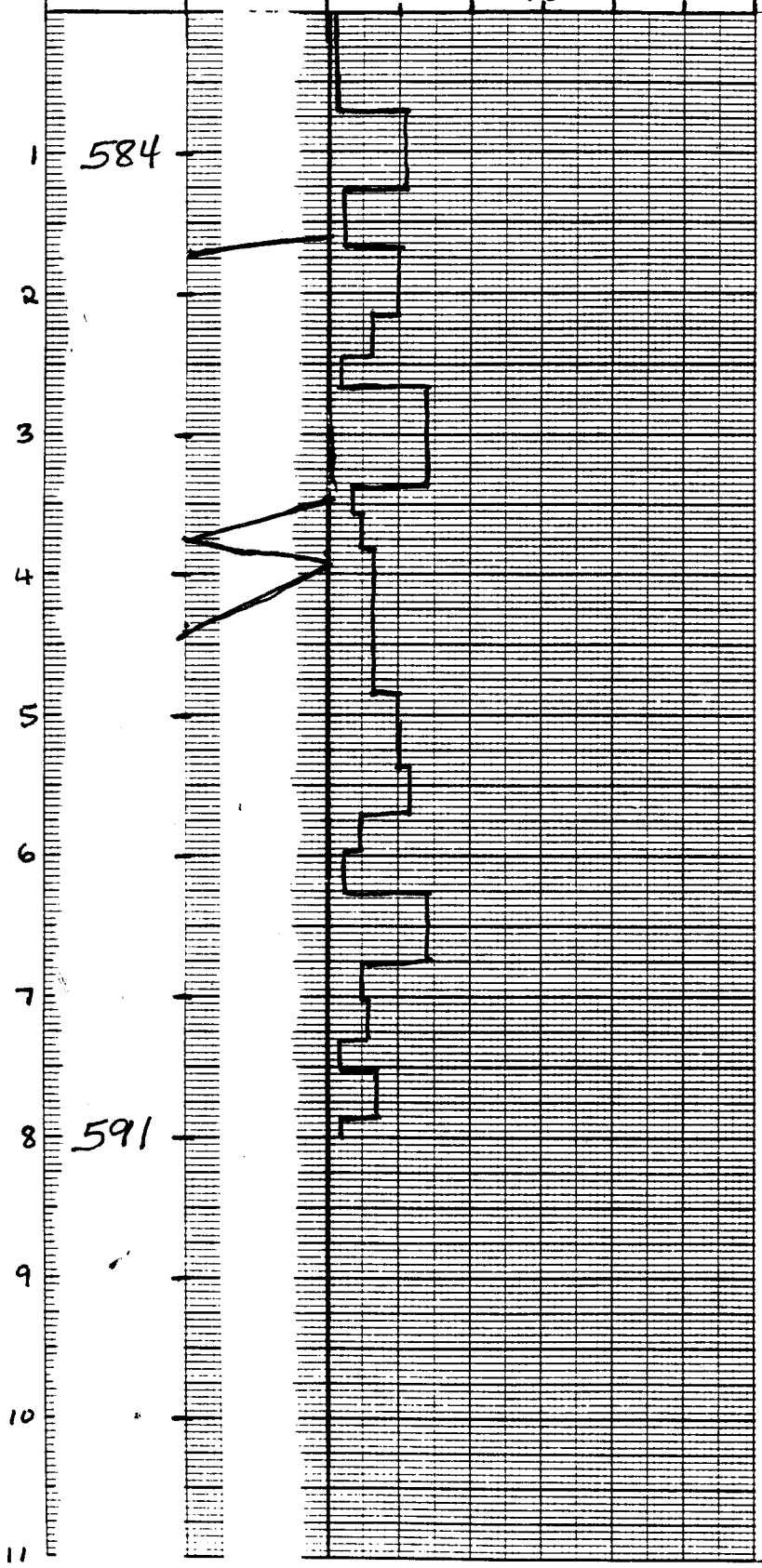
Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks



K·E 10 X 10 TO THE CENTIMETER 18 X 25 CM KEUFFEL & ESSER CO. MADE IN U.S.A. 46 1510

Box Number: 64 Start Depth: 583 End Depth: 591

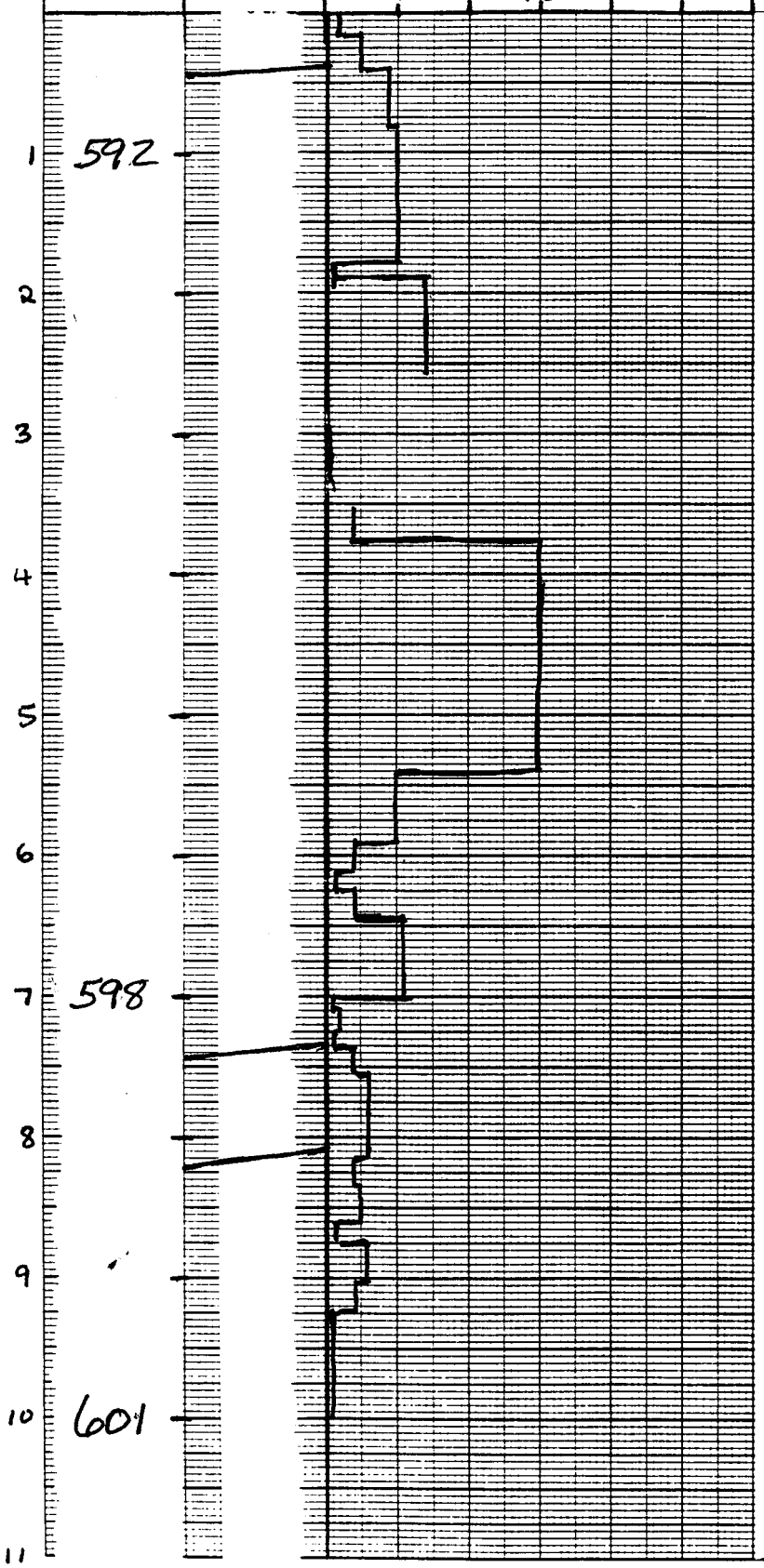
Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks



K·E 10 X 10 TO THE CENTIMETER 18 X 25 CM KEUFFEL & ESSER CO. MADE IN U.S.A. 46 1510

Box Number: 65 Start Depth: 591 End Depth: 601

Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks

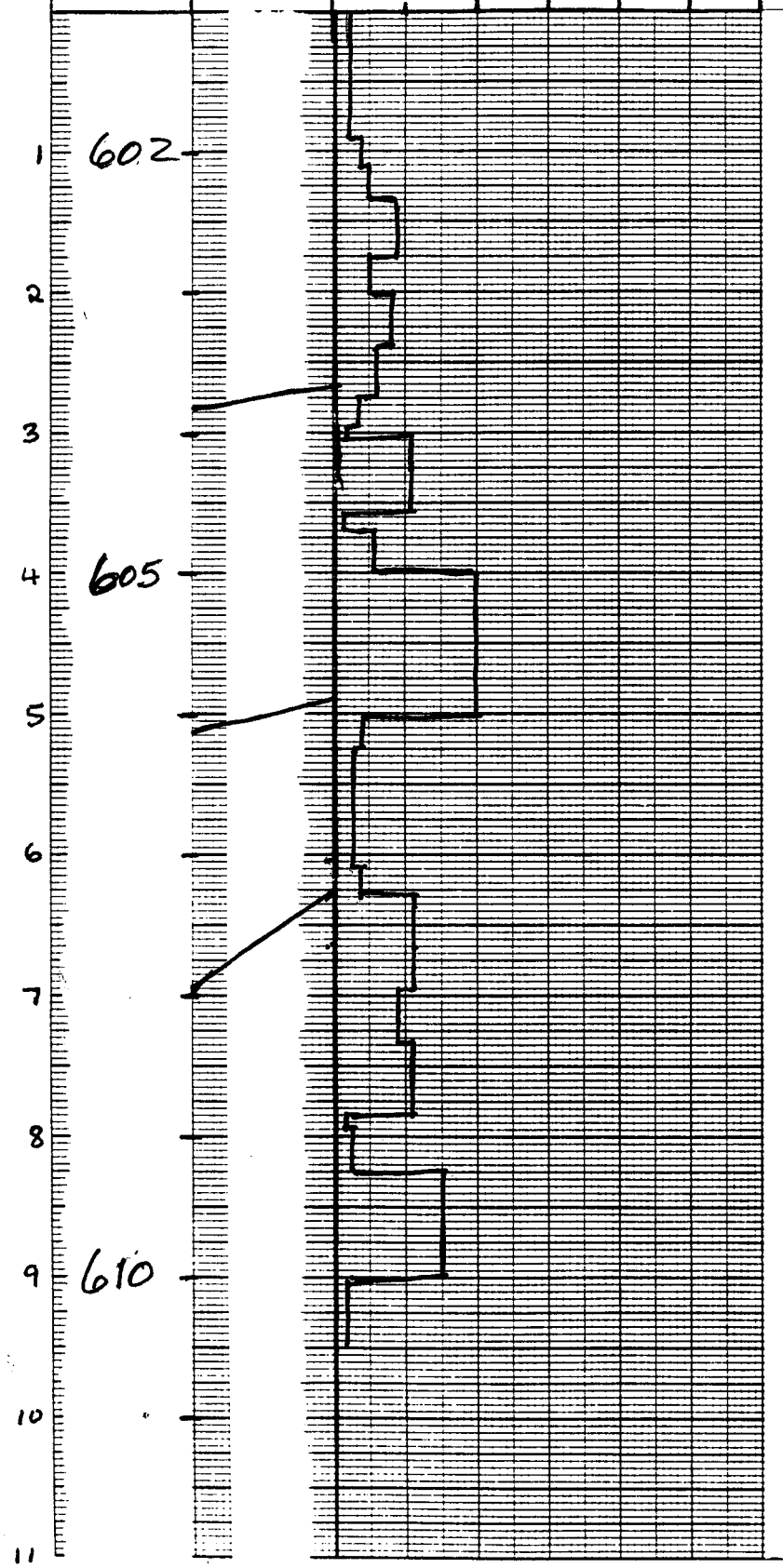


Missing #11

K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM KEUFFEL & ESSER CO. MADE IN U.S.A. 46 1510

Box Number: 66 Start Depth: 601 End Depth: 610.5

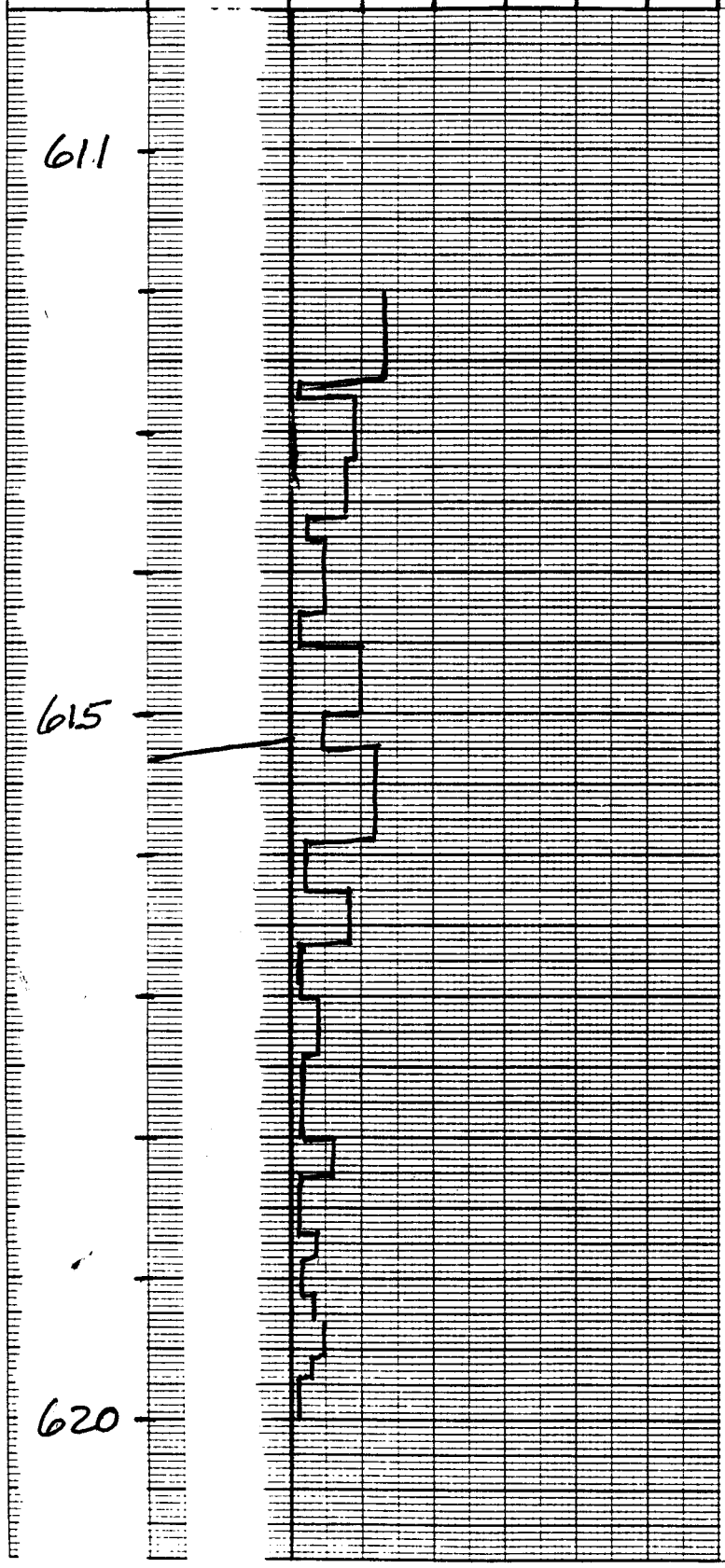
Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks



K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM
KEUFFEL & ESSER CO. MADE IN U.S.A.
46 1510

Box Number: 67 Start Depth: 610.5 End Depth: 620

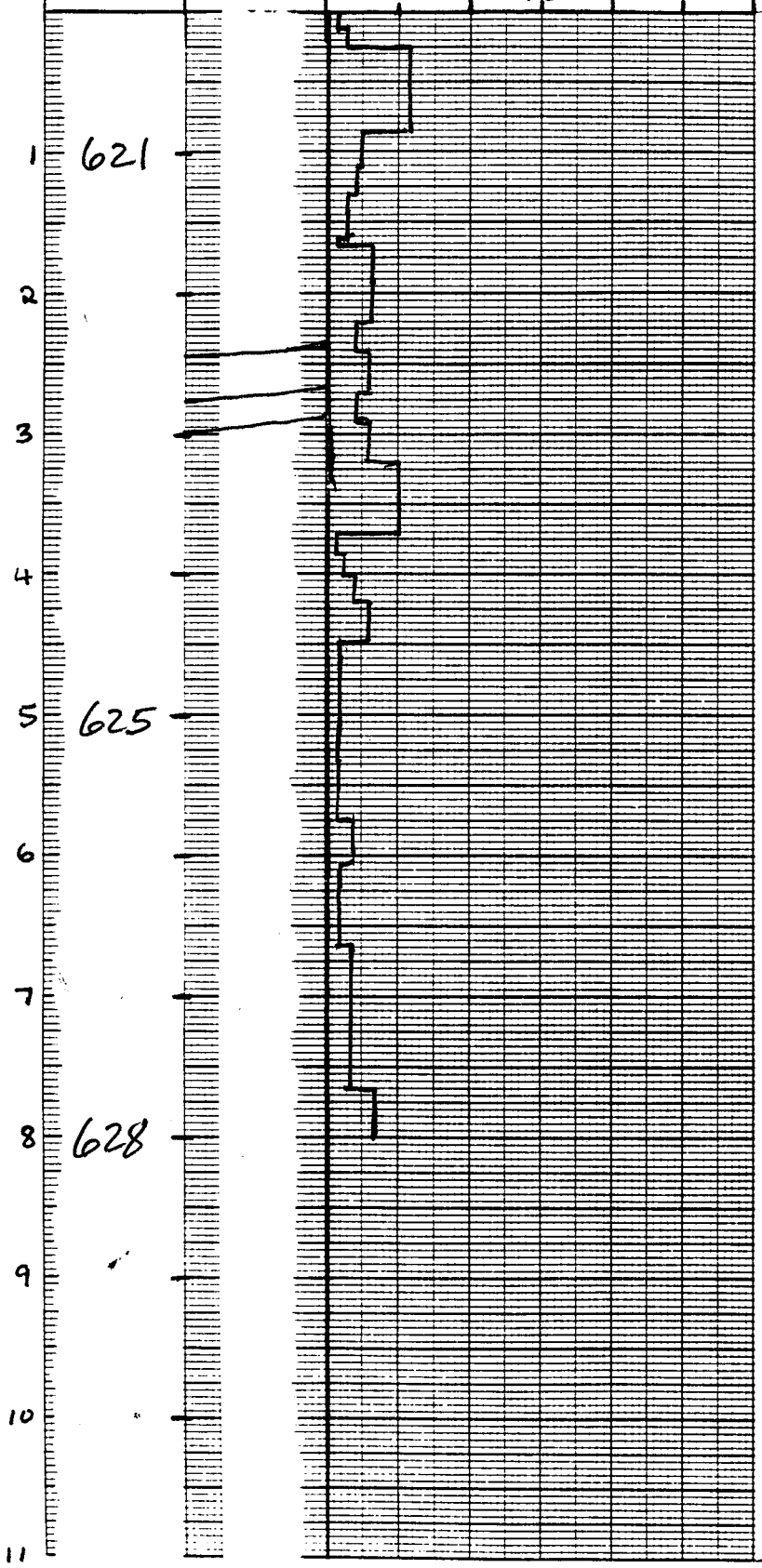
Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks
611			Missing #10
615			
620			



K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM KEUFFEL & ESSER CO. MADE IN U.S.A. 46 1510

Box Number: 68 Start Depth: 620 End Depth: 628

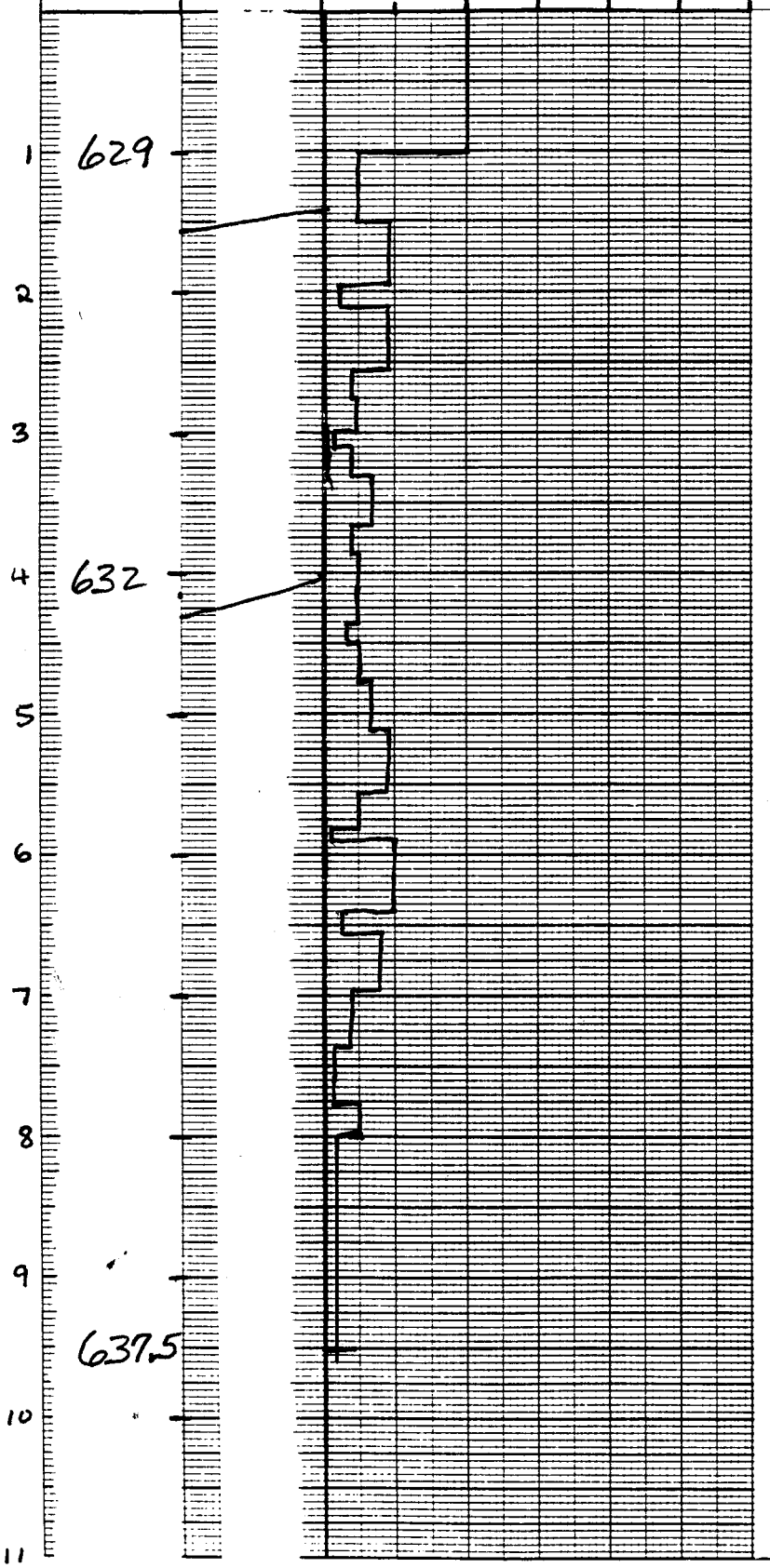
Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks



K·E 10 X 10 TO THE CENTIMETER 18 X 25 CM KEUFFEL & ESSER CO. MADE IN U.S.A. 46 1510

Box Number: 69 Start Depth: 628 End Depth: 637.5

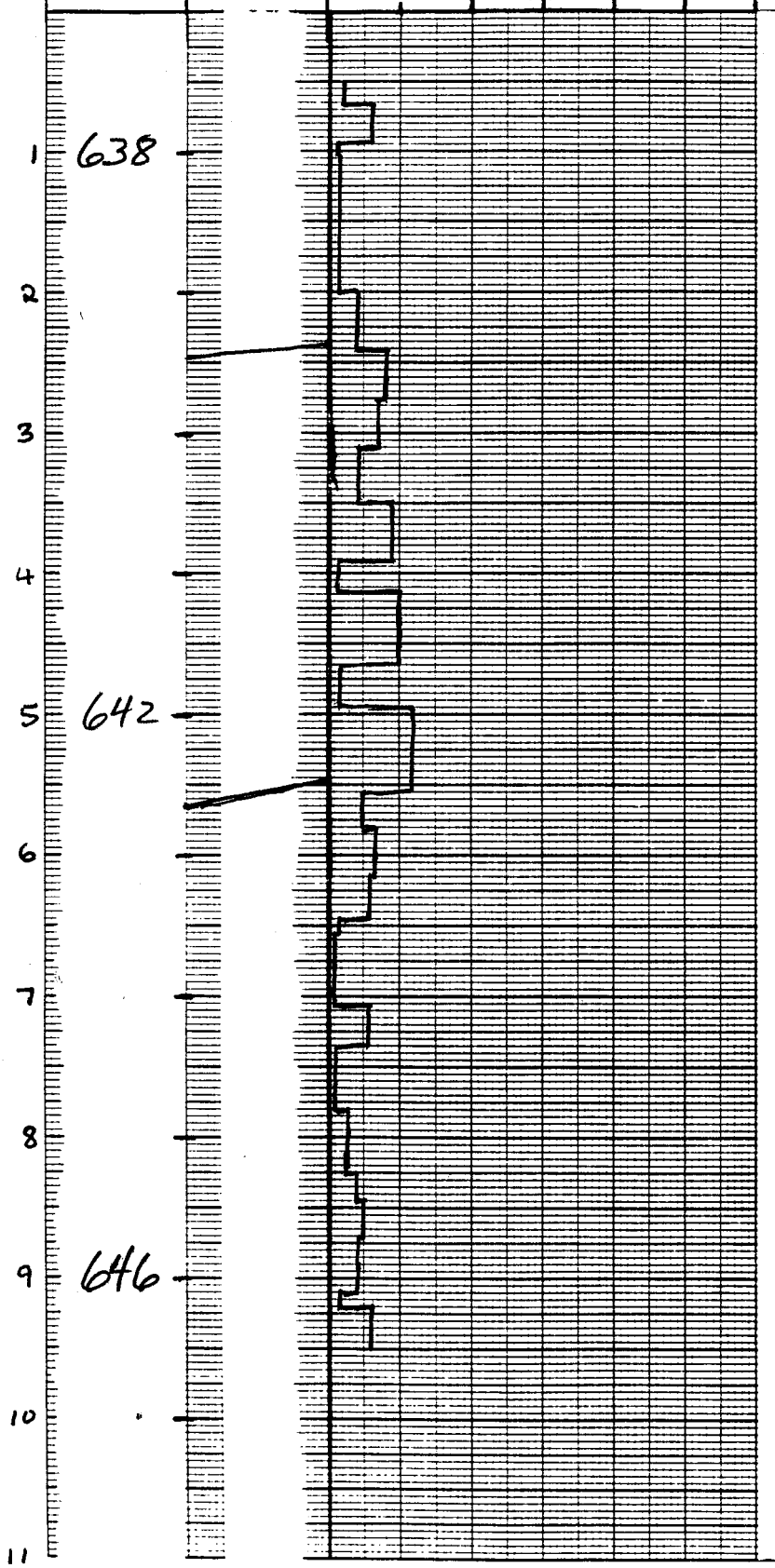
Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks



K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM KEUFFEL & ESSER CO. MADE IN U.S.A. 46 1510

Box Number: 70 Start Depth: 637.5 End Depth: 646.5

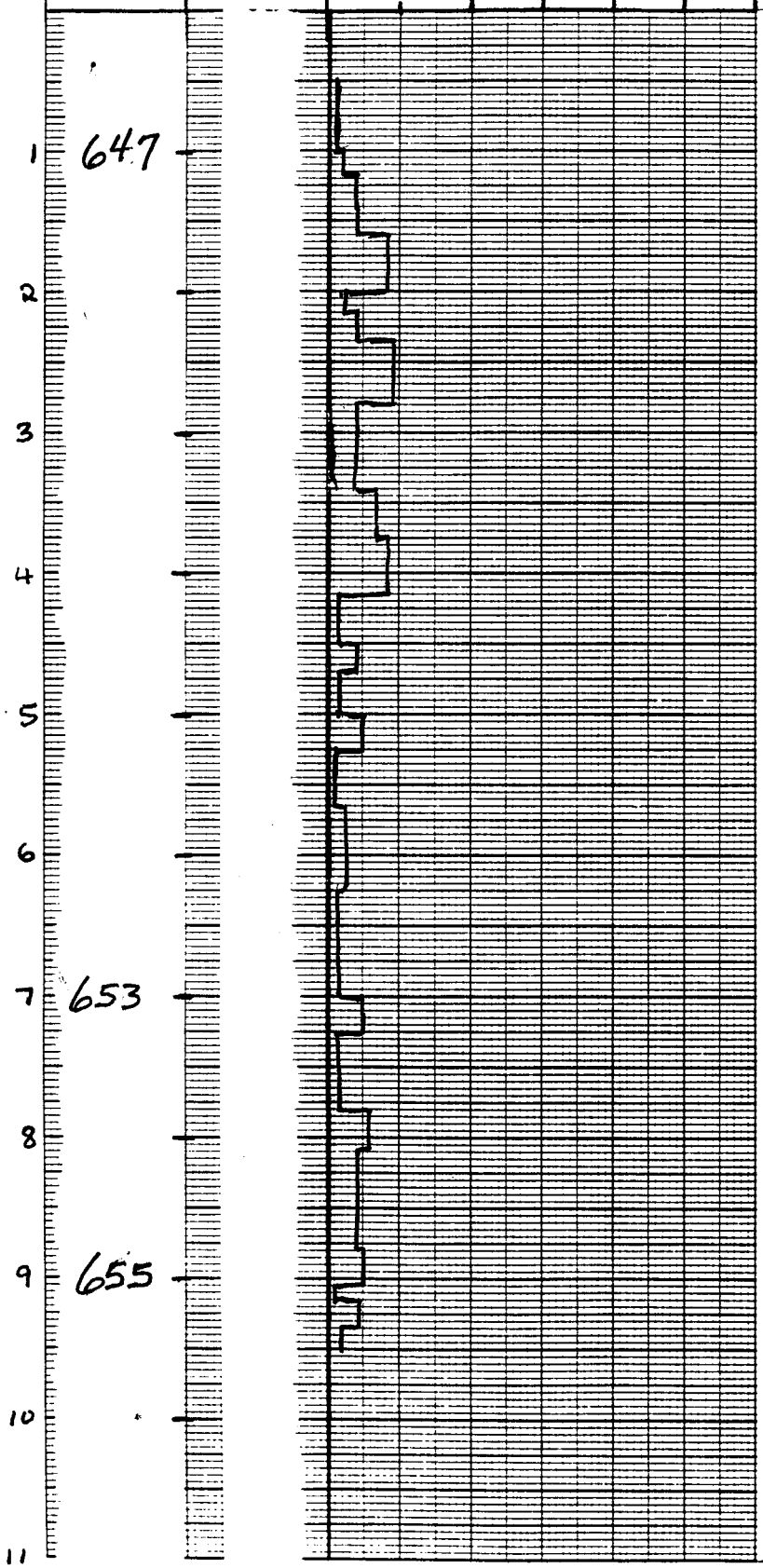
Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks



K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM KEUFFEL & ESSER CO. MADE IN U.S.A.
46 1510

Box Number: 71 Start Depth: 646.5 End Depth: 655.5

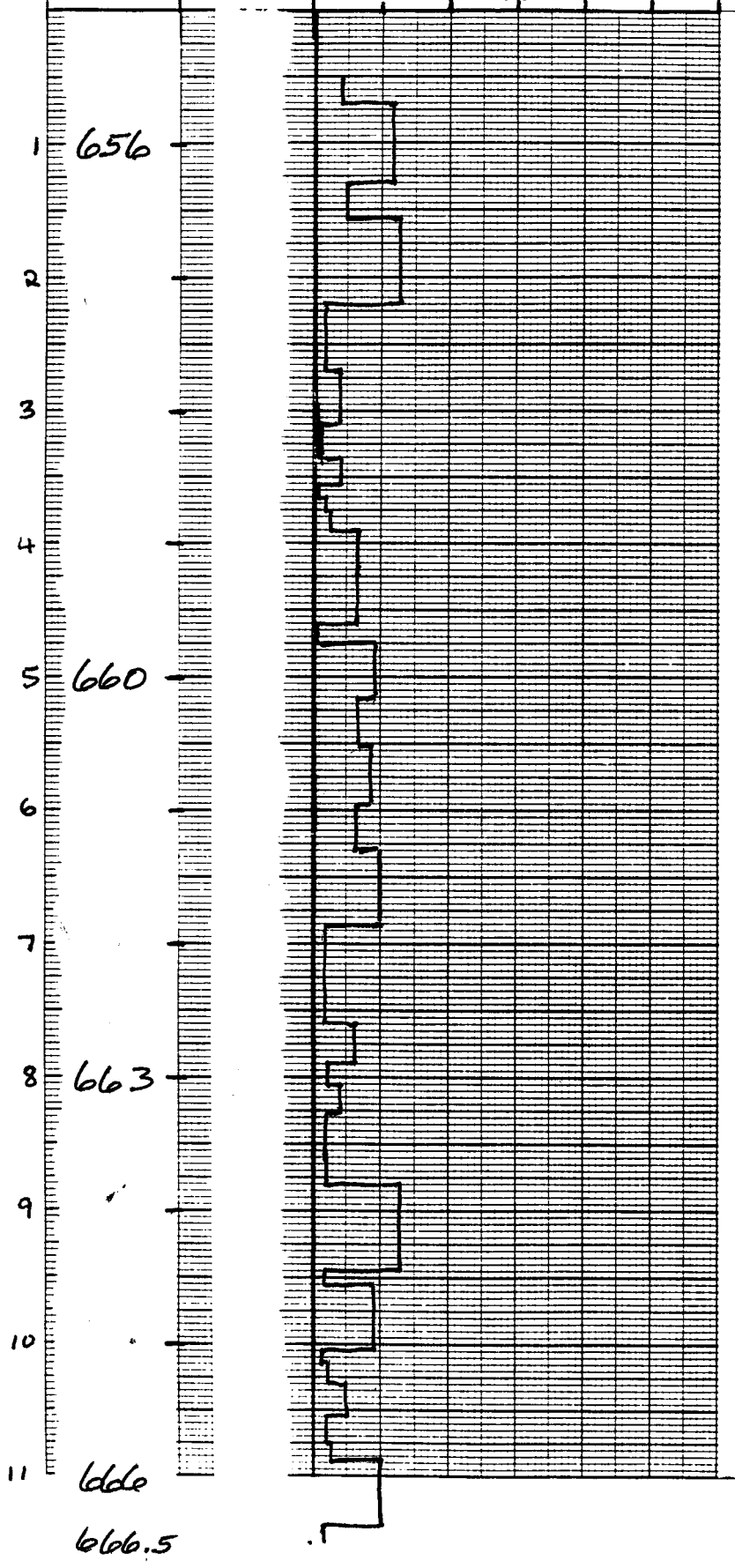
Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks



K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM KEUFFEL & ESSER CO. MADE IN U.S.A. 46 1510

Box Number: 72 Start Depth: 655.5 End Depth: 666.5

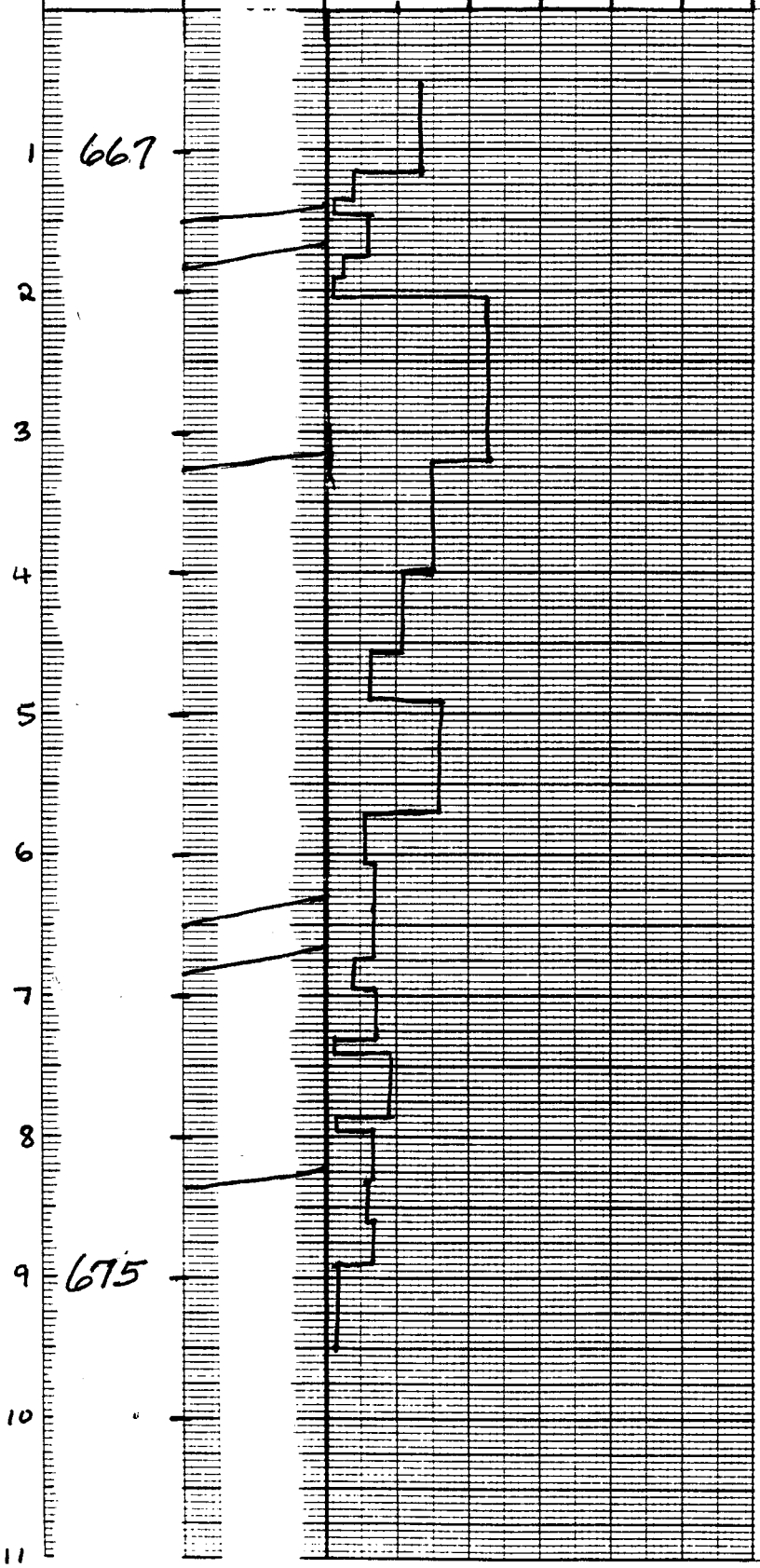
Depth (ft)	Major Fracture	Core Continuity (ft)	Remarks



K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM KEUFFEL & ESSER CO. MADE IN U.S.A. 46 1510

Box Number: 73 Start Depth: 666.5 End Depth: 675.5

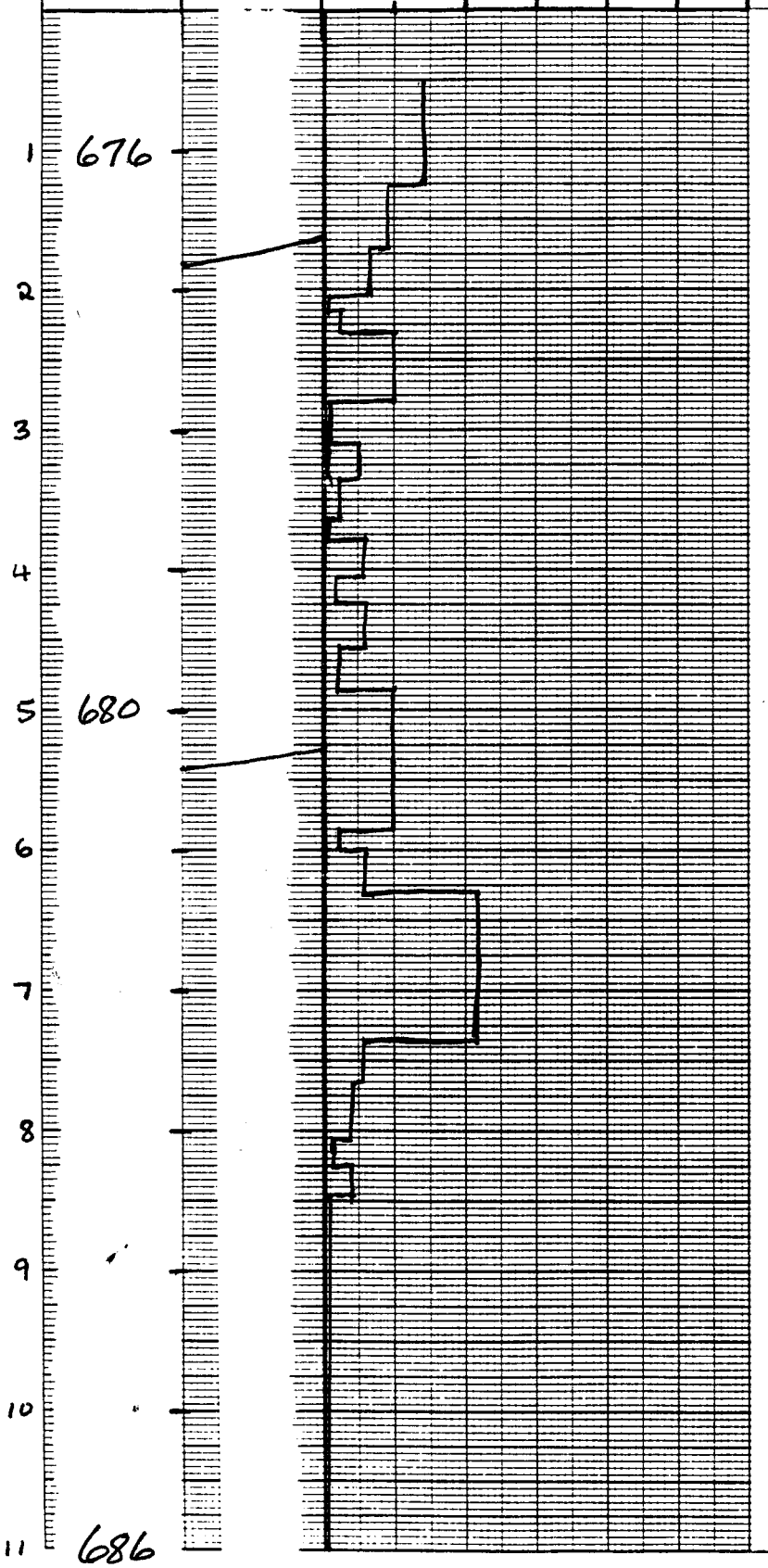
Depth (ft)	Major Fracture	Core Continuity (ft)	Remarks



K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM KEUFFEL & ESSER CO. MADE IN U.S.A.
461510

Box Number: 74 Start Depth: 675.5 End Depth: 686

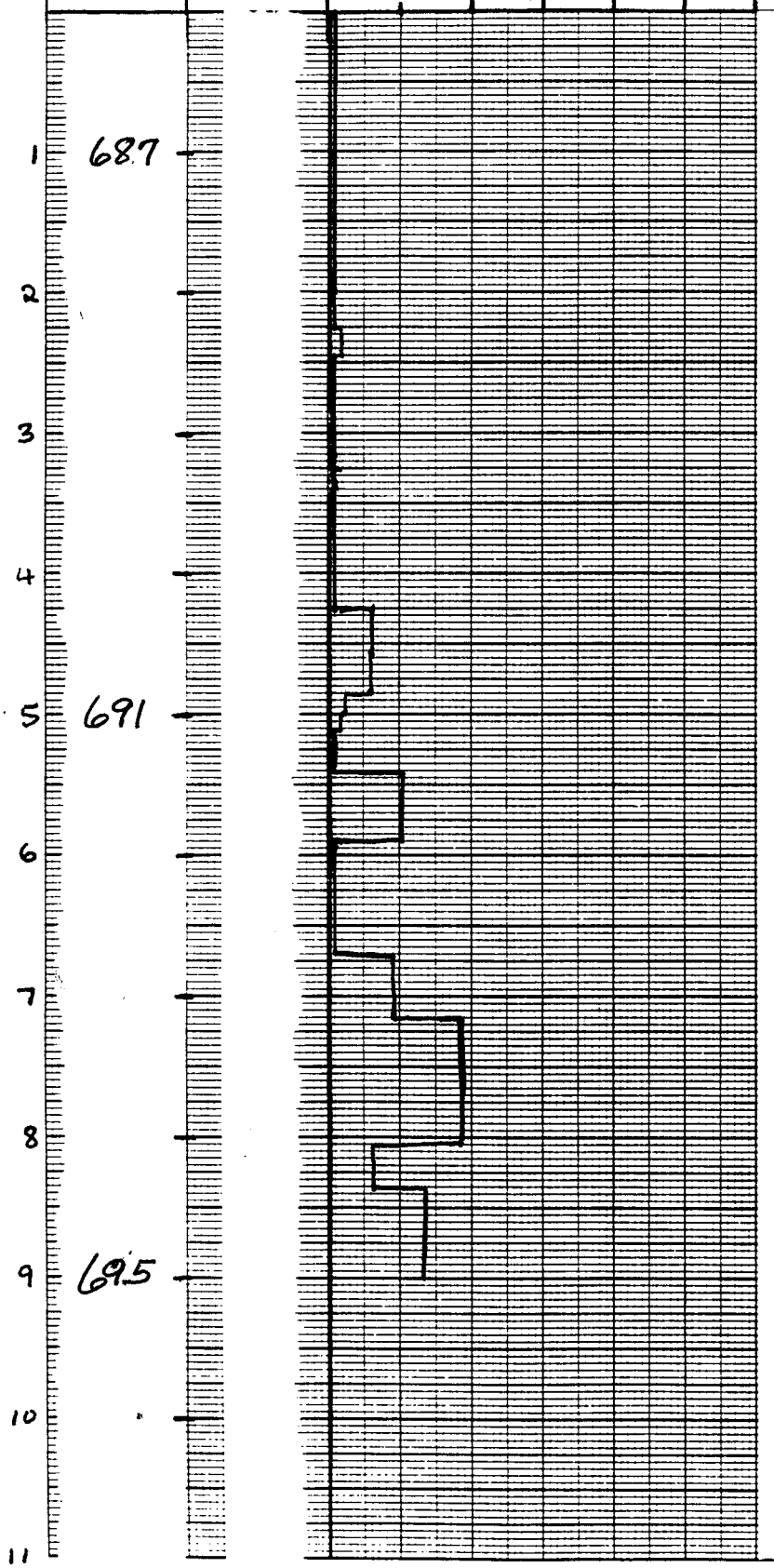
Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks



K•E 10 X 10 TO THE CENTIMETER 18 X 25 CM KEUFFEL & ESSER CO. MADE IN U.S.A. 46 1510

Box Number: 75 Start Depth: 686 End Depth: 695

Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks



K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM KEUFFEL & ESSER CO. MADE IN U.S.A. 46 1510

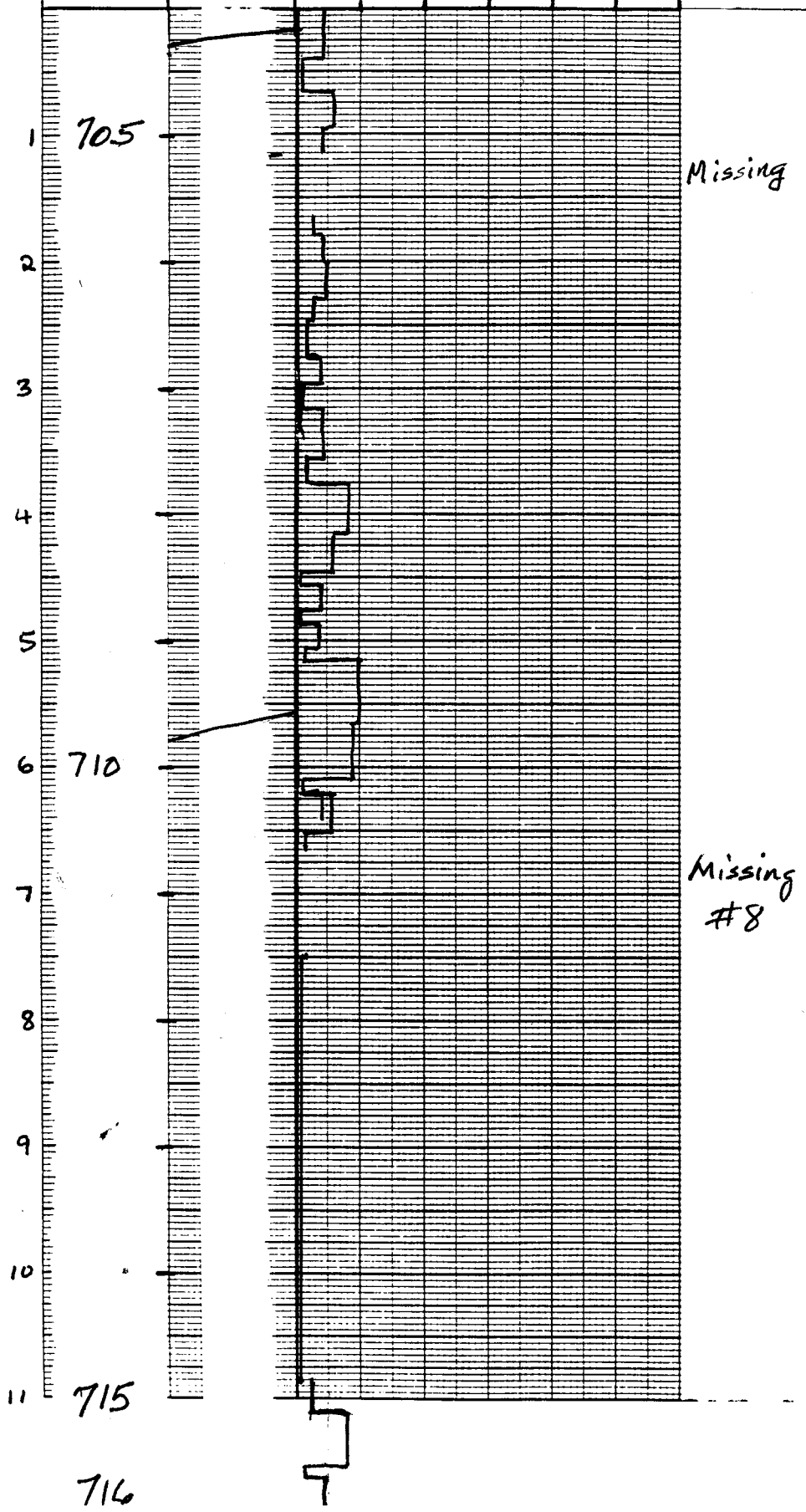
Box Number: 76 Start Depth: 695 End Depth: 704

Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks
696			
			Missing #9
700			
704			

K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM KEUFFEL & ESSER CO. MADE IN U.S.A. 46 1510

Box Number: 77 Start Depth: 704 End Depth: 716

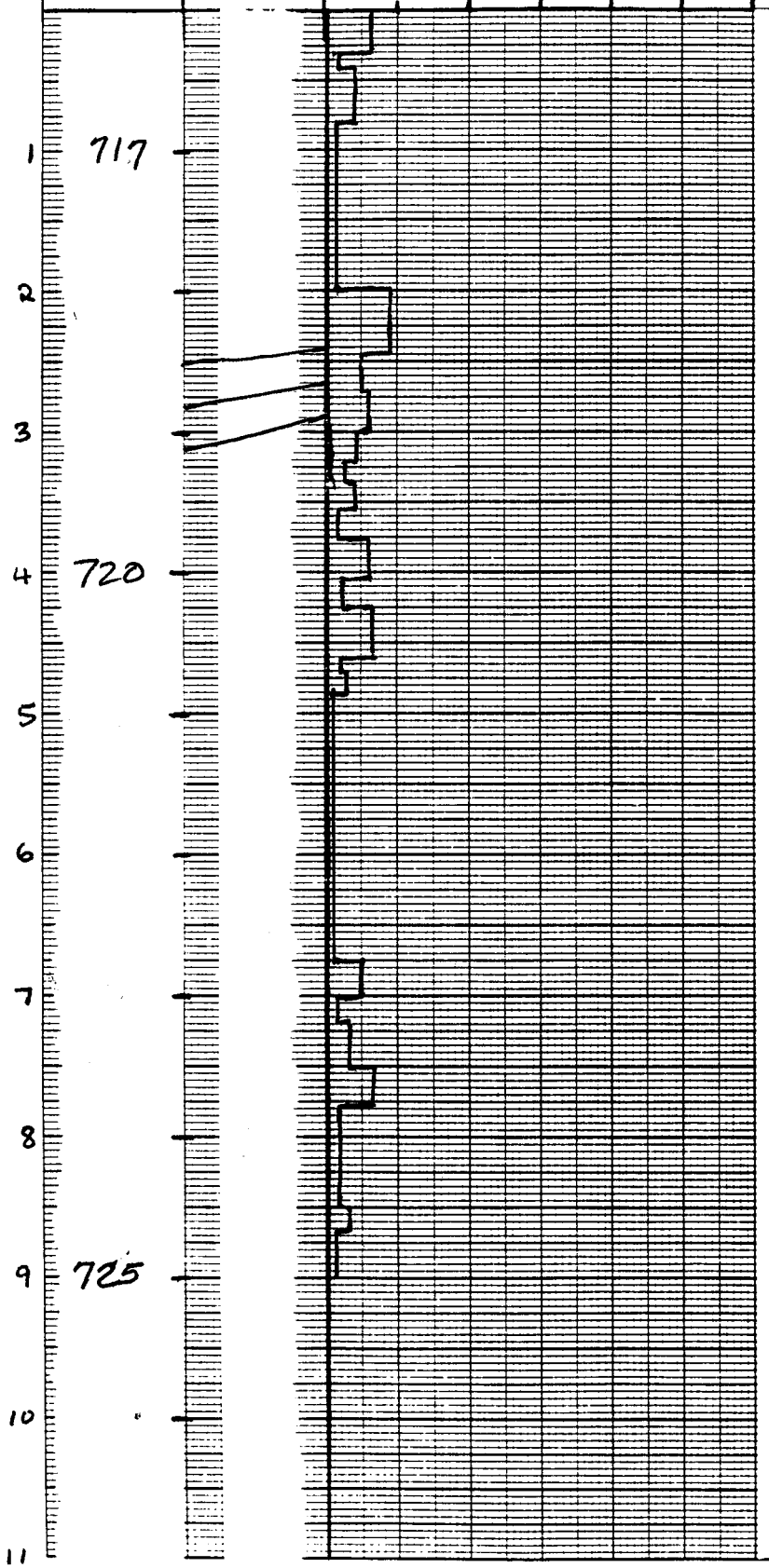
Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks



K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM KEUFFEL & ESSER CO. MADE IN U.S.A. 46 1510

Box Number: 78 Start Depth: 716 End Depth: 725.5

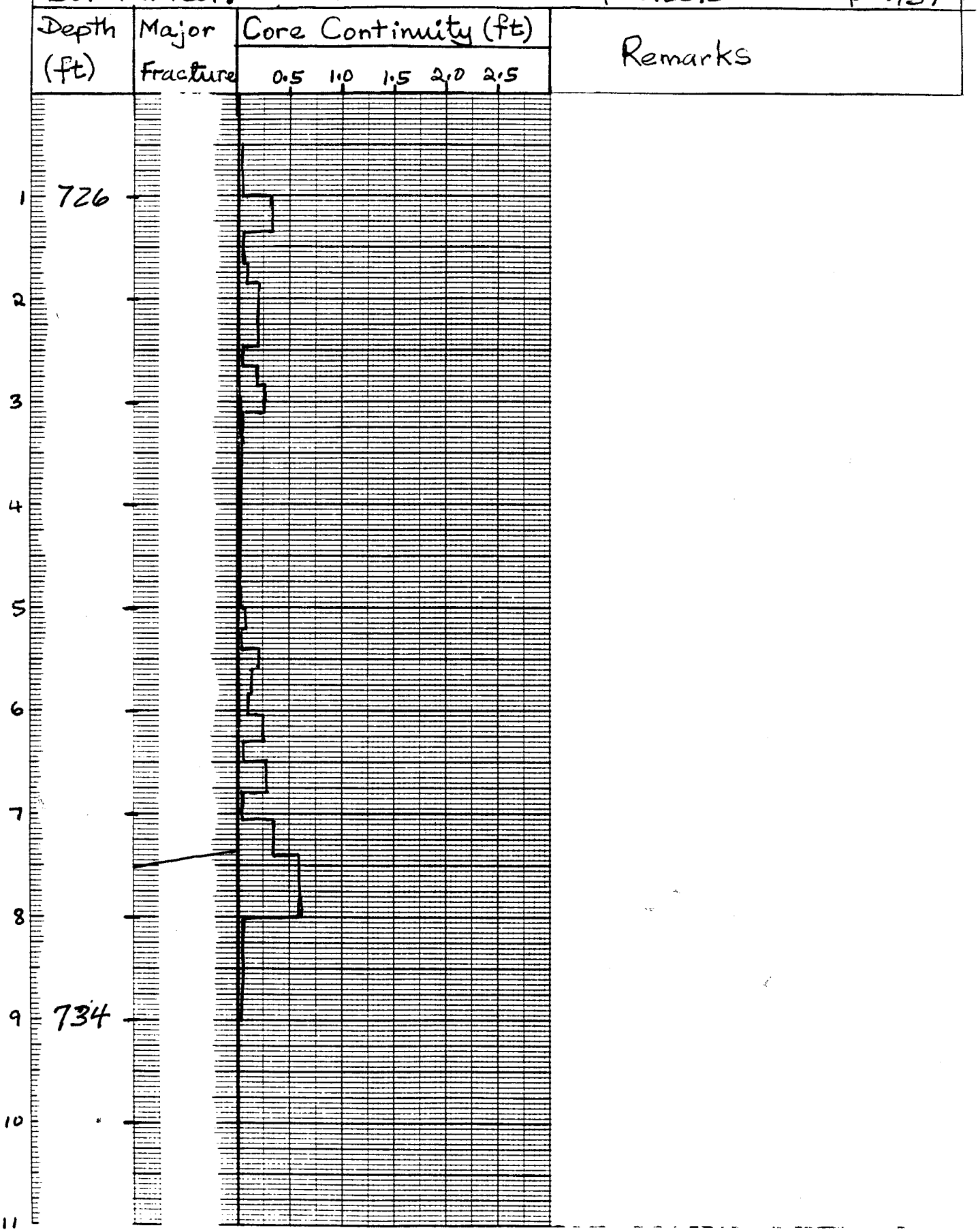
Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks



K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM KEUFFEL & ESSER CO. MADE IN U.S.A.
46 1510

Fig B-2

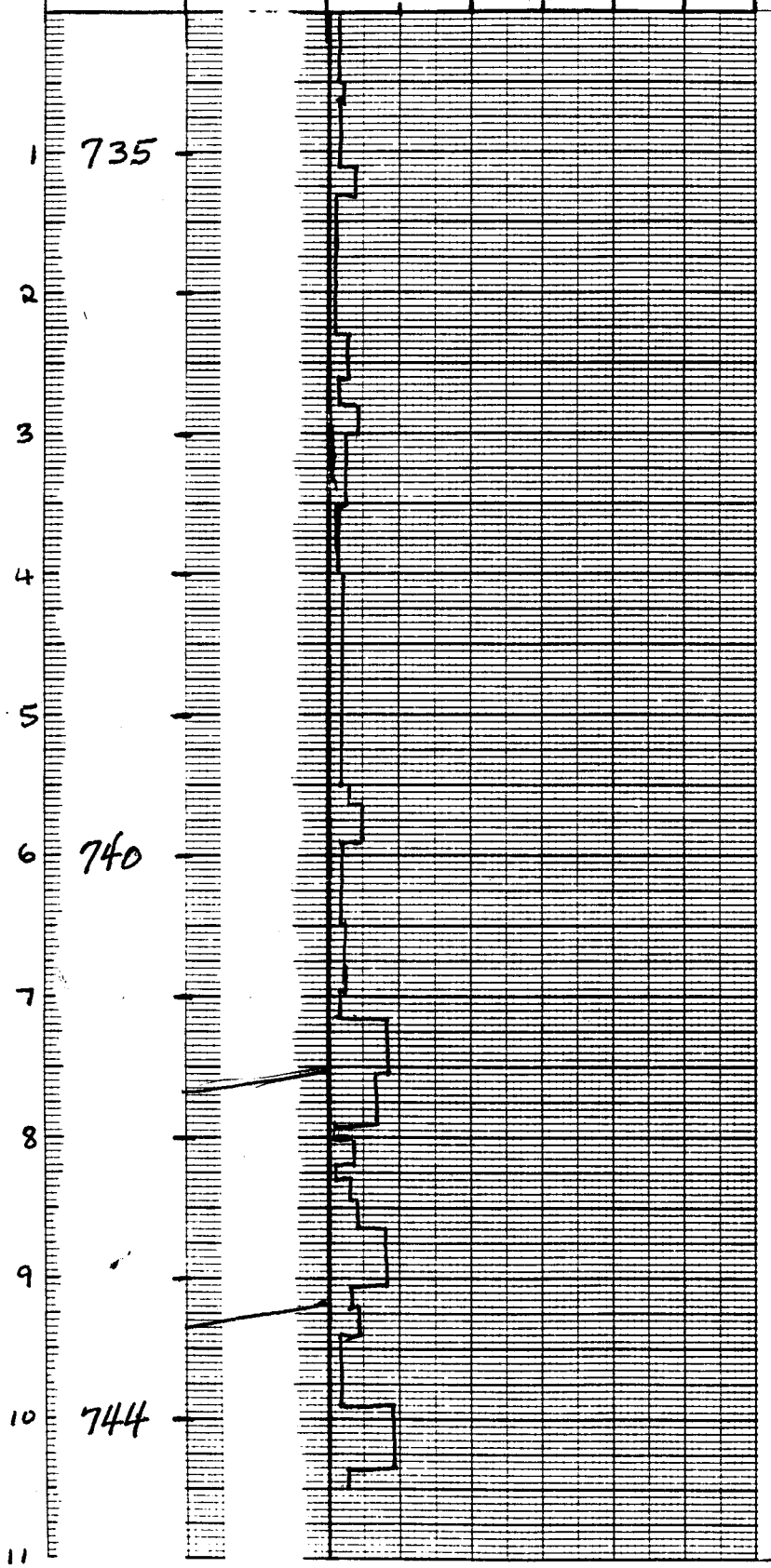
Box Number: 79 Start Depth: 725.5 ft End Depth: 734 ft



K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM KEUFFEL & ESSER CO. MADE IN U.S.A. 46 1510

Box Number: 80 Start Depth: 734 End Depth: 744.5

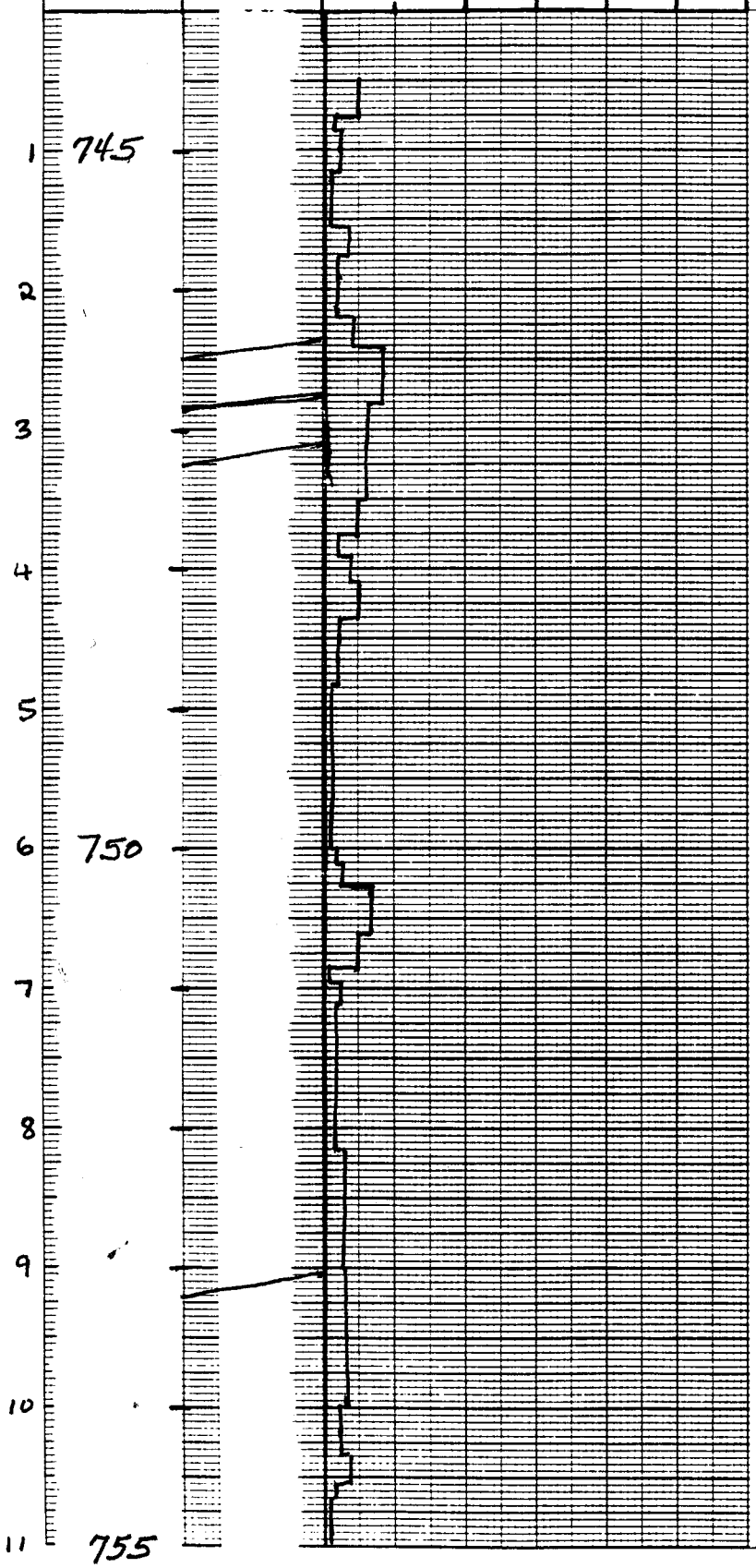
Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks



K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM
KEUFFEL & ESSER CO. MADE IN U.S.A.
46 1510

Box Number: 81 Start Depth: 744.5 End Depth: 755

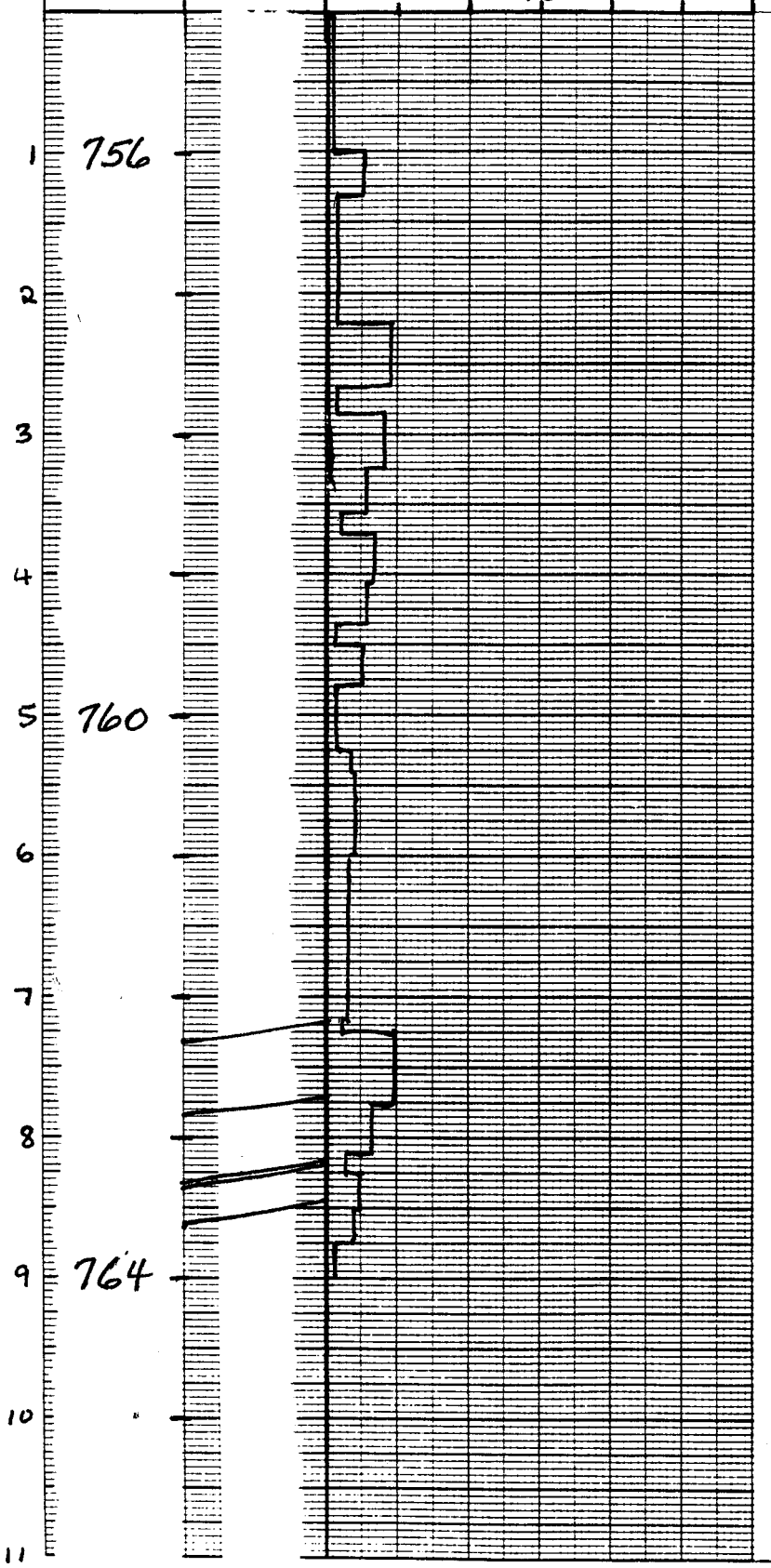
Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks



K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM
KEUFFEL & ESSER CO. MADE IN U.S.A.
46 1510

Box Number: 82 Start Depth: 755 End Depth: 764

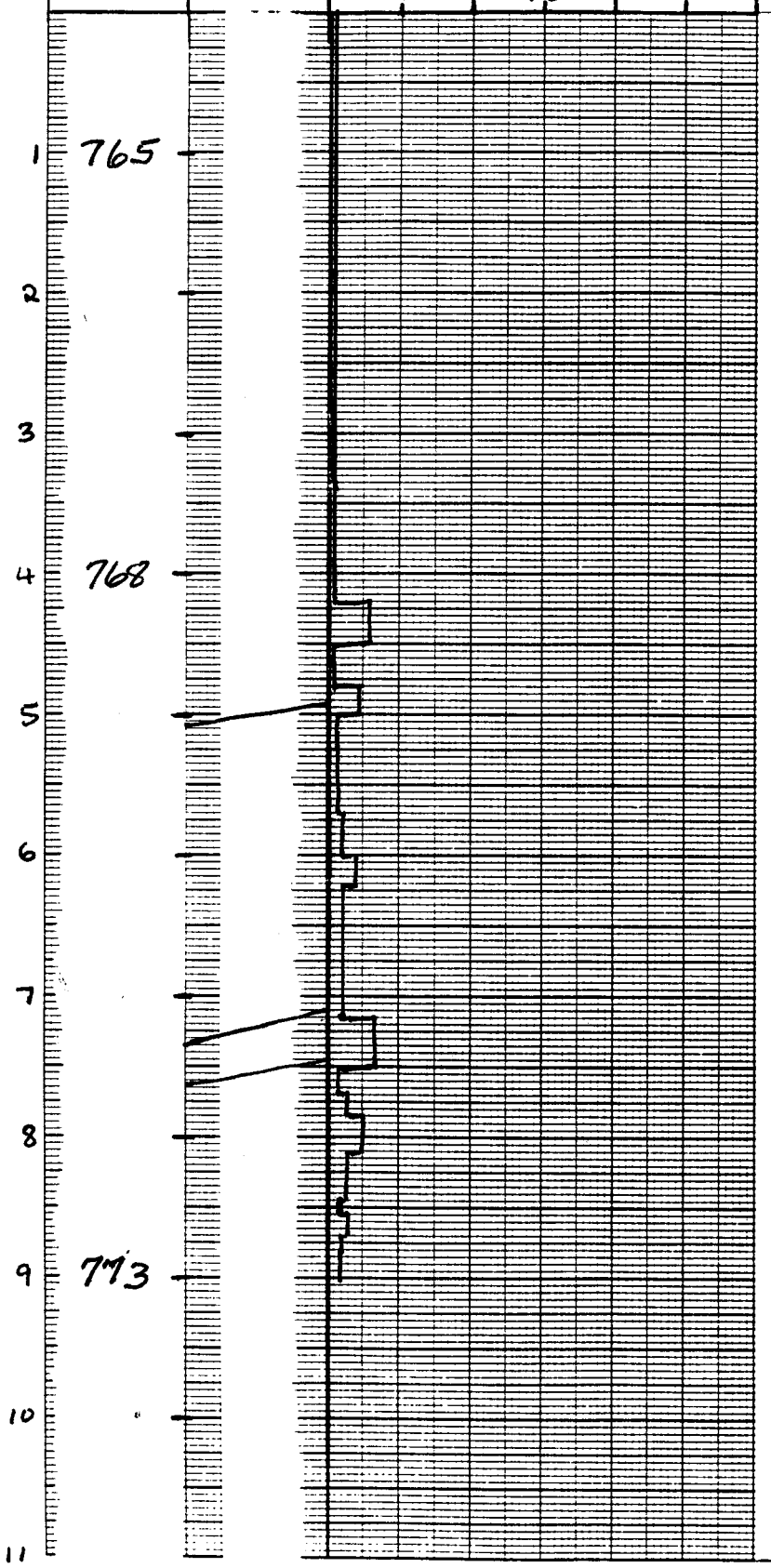
Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks



K•E 10 X 10 TO THE CENTIMETER 18 X 25 CM KEUFFEL & ESSER CO. MADE IN U.S.A. 46 1510

Box Number: 83 Start Depth: 764 End Depth: 773

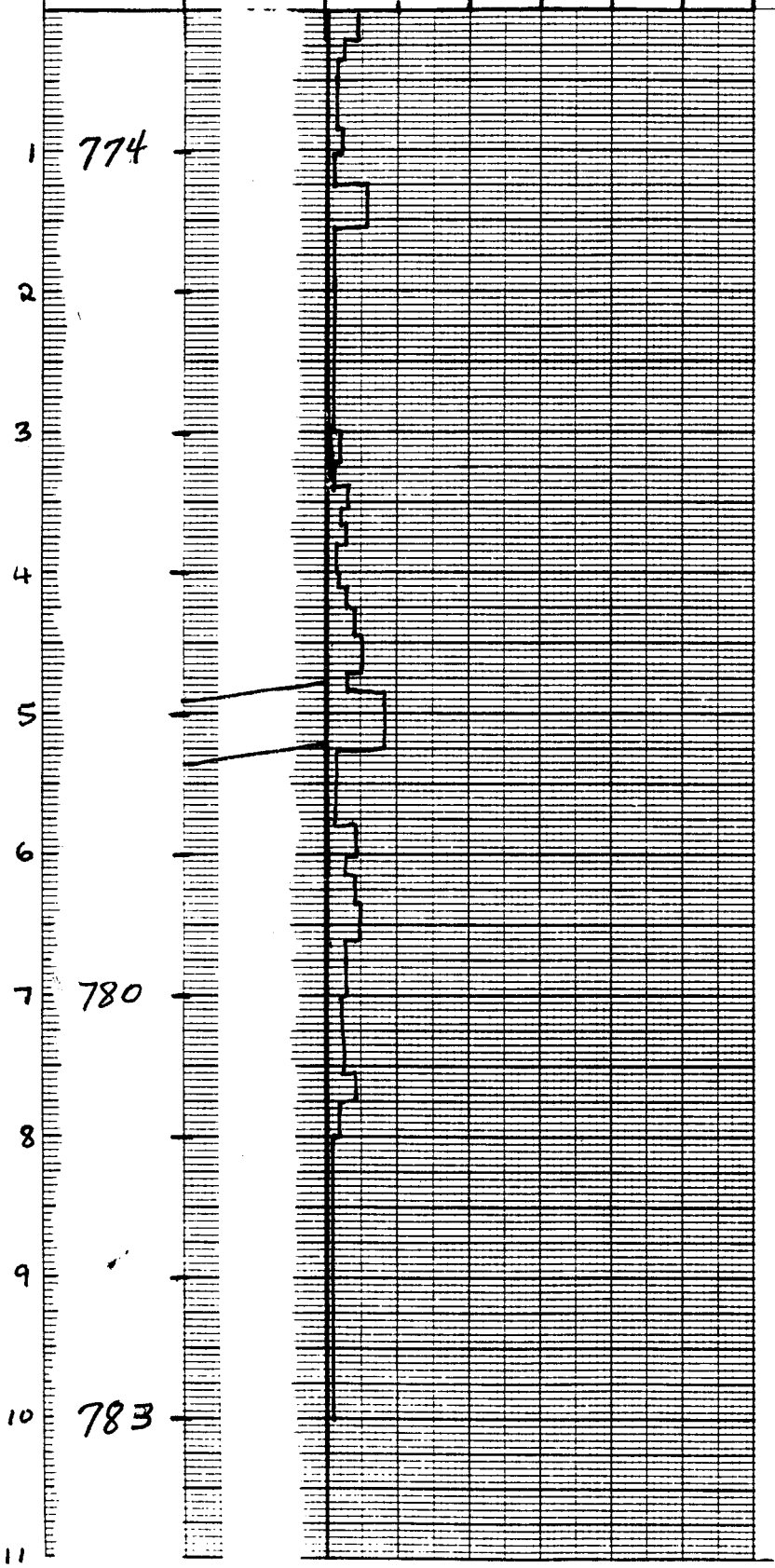
Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks



K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM KEUFFEL & ESSER CO. MADE IN U.S.A. 461510

Box Number: 84 Start Depth: 773 End Depth: 783

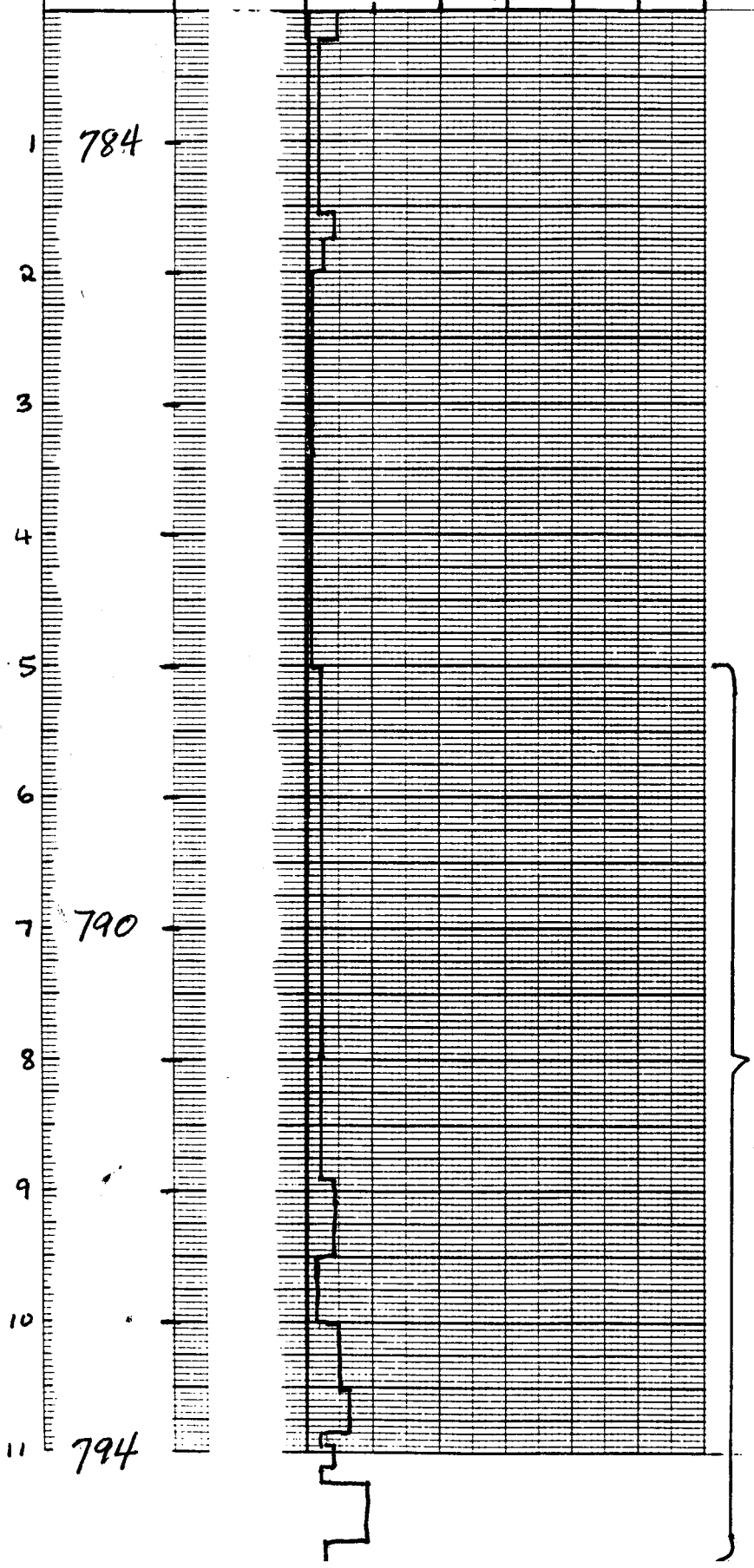
Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks



K·E 10 X 10 TO THE CENTIMETER 18 X 25 CM KEUFFEL & ESSER CO. MADE IN U.S.A.
461510

Box Number: 85 Start Depth: 783 End Depth: 795

Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks

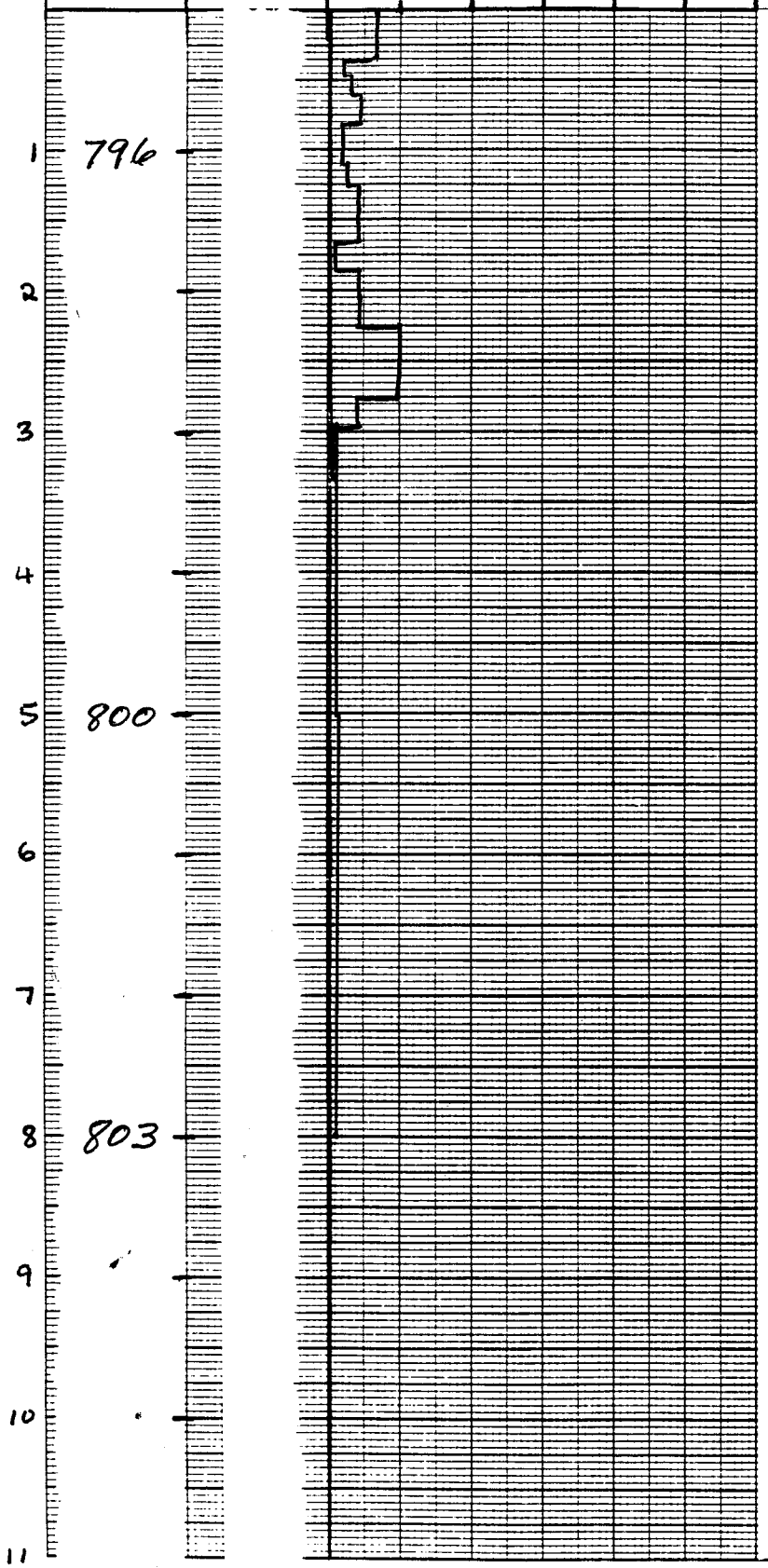


Even cracking between each layer

K·E 10 X 10 TO THE CENTIMETER 18 X 25 CM KEUFFEL & ESSER CO. MADE IN U.S.A. 46 1510

Box Number: 86 Start Depth: 795 End Depth: 803

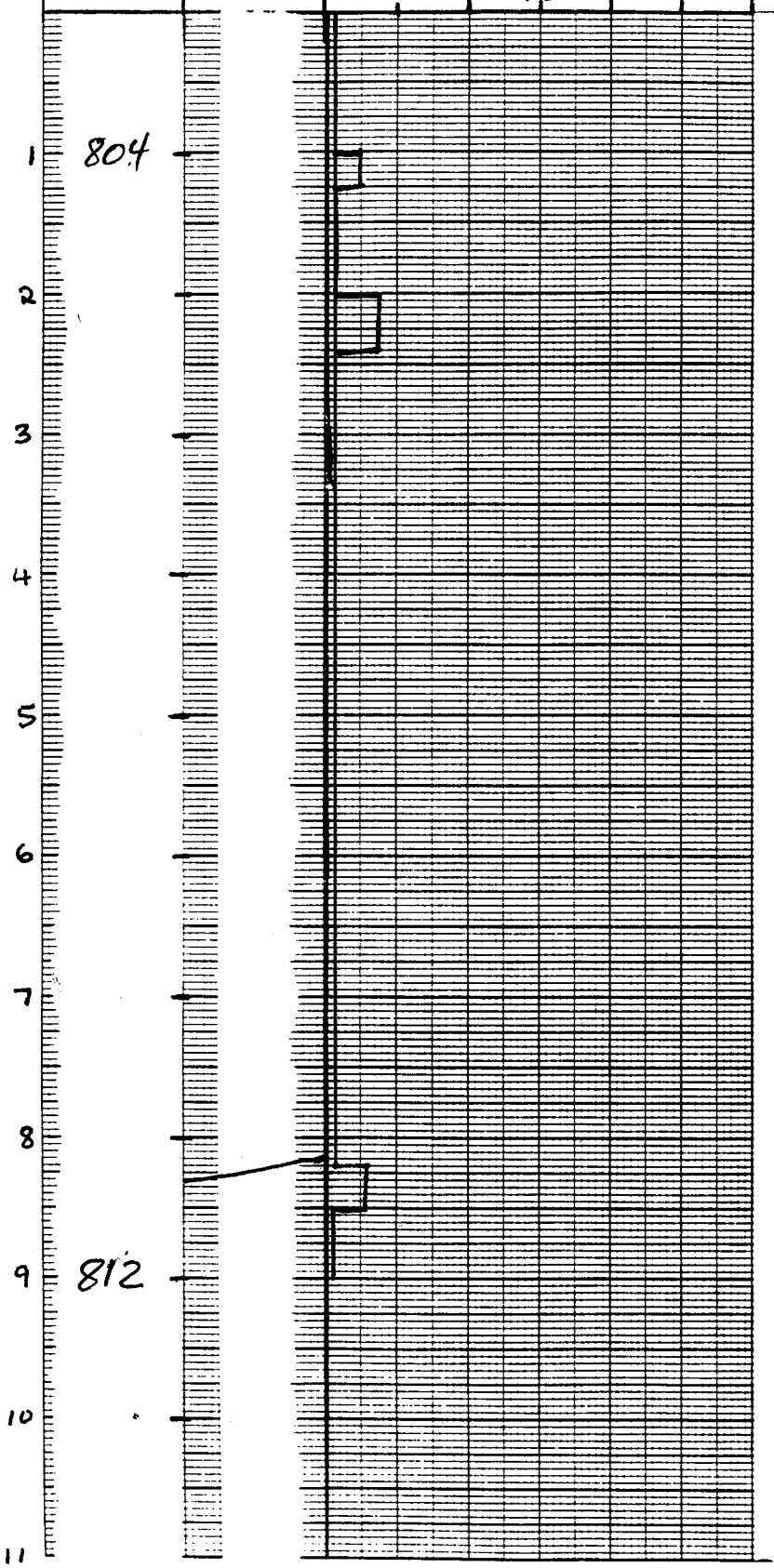
Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks
796			
800			
803			



K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM
KEUFFEL & ESSER CO. MADE IN U.S.A.
46 1510

Box Number: 87 Start Depth: 803 End Depth: 812

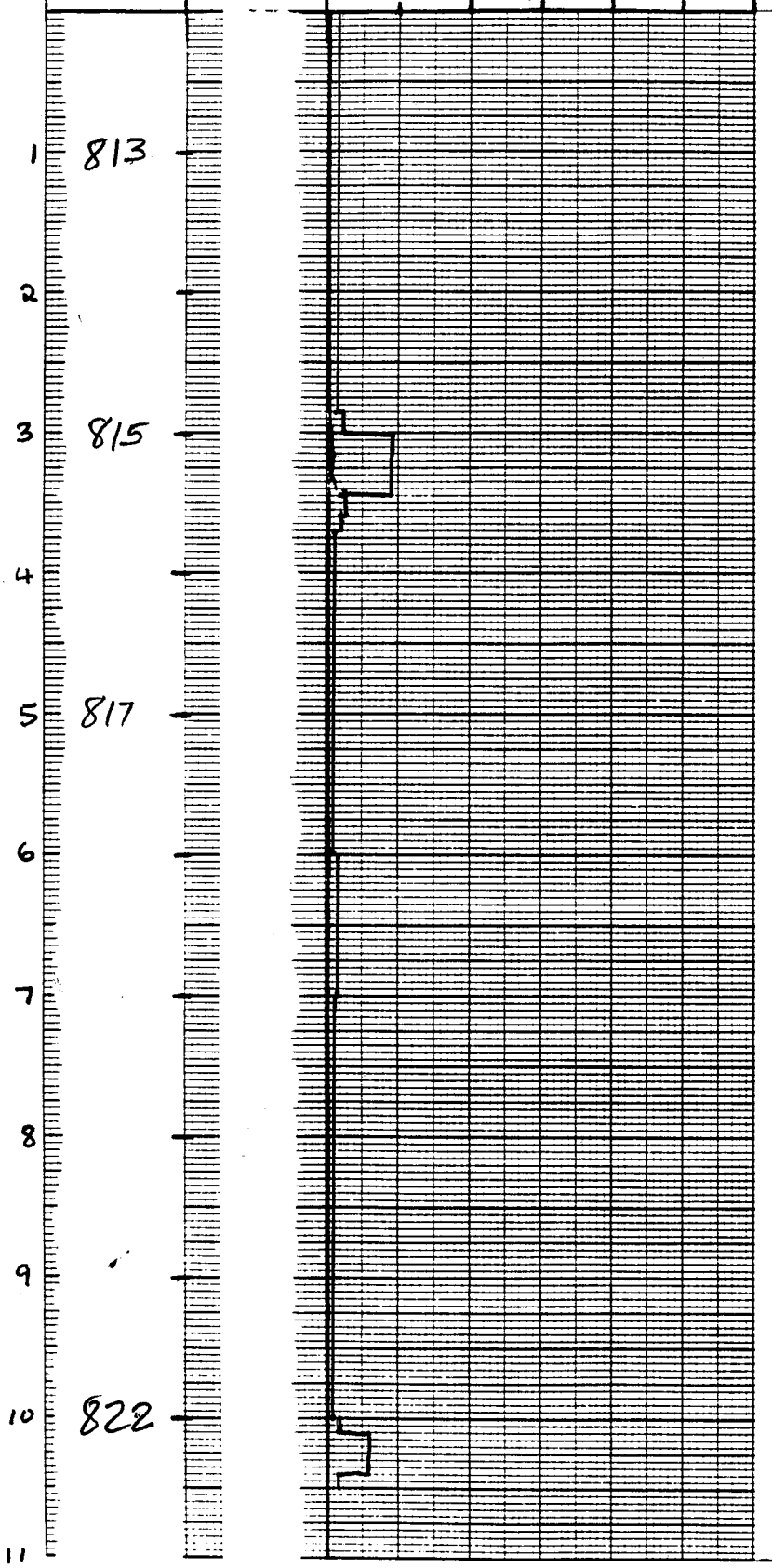
Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks



K•E 10 X 10 TO THE CENTIMETER 18 X 25 CM KEUFFEL & ESSER CO. MADE IN U.S.A. 46 1510

Box Number: 88 Start Depth: 812 End Depth: 822.5

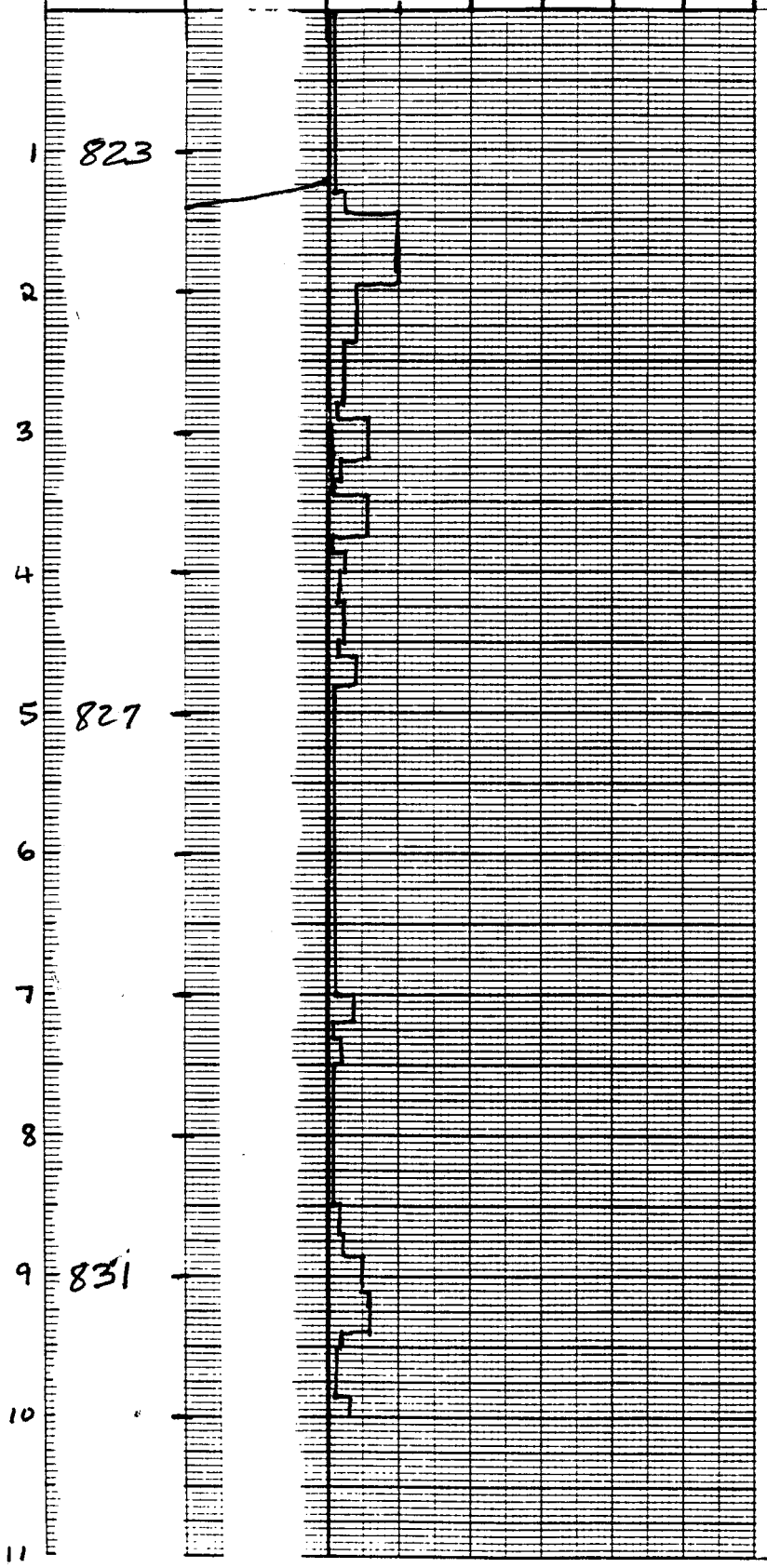
Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks
813			
815			
817			
822			



K·E 10 X 10 TO THE CENTIMETER 18 X 25 CM KEUFFEL & ESSER CO. MADE IN U.S.A. 461510

Box Number: 89 Start Depth: 822.5 End Depth: 831.5

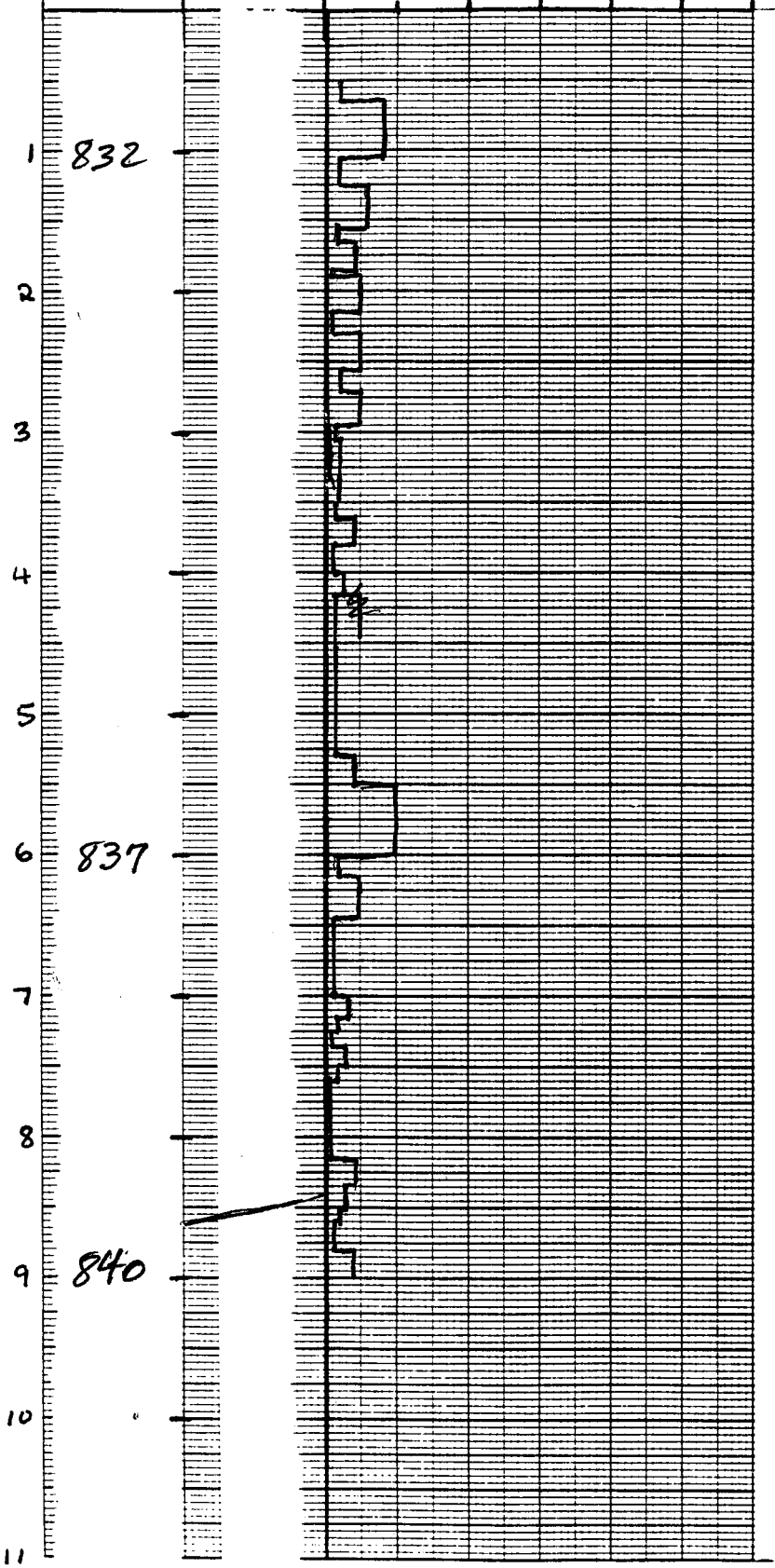
Depth (ft)	Major Fracture	Core Continuity (ft)	Remarks



K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM KEUFFEL & ESSER CO. MADE IN U.S.A. 46 1510

Box Number: 90 Start Depth: 831.5 End Depth: 840

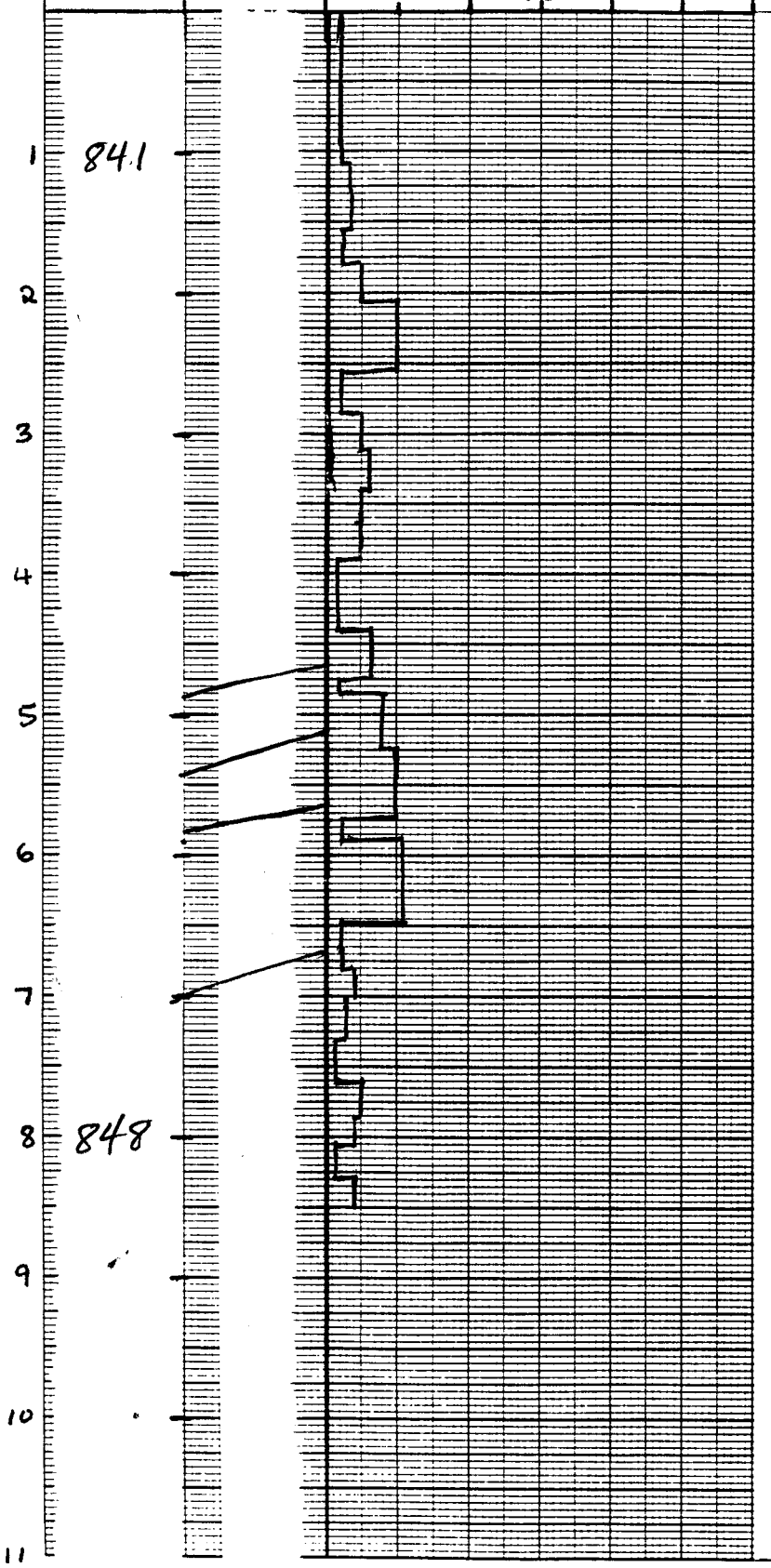
Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks



461510
K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM
KEUFFEL & ESSER CO. MADE IN U.S.A.

Box Number: 91 Start Depth: 840 End Depth: 848.5

Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks



K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM KEUFFEL & ESSER CO. MADE IN U.S.A. 46 1510

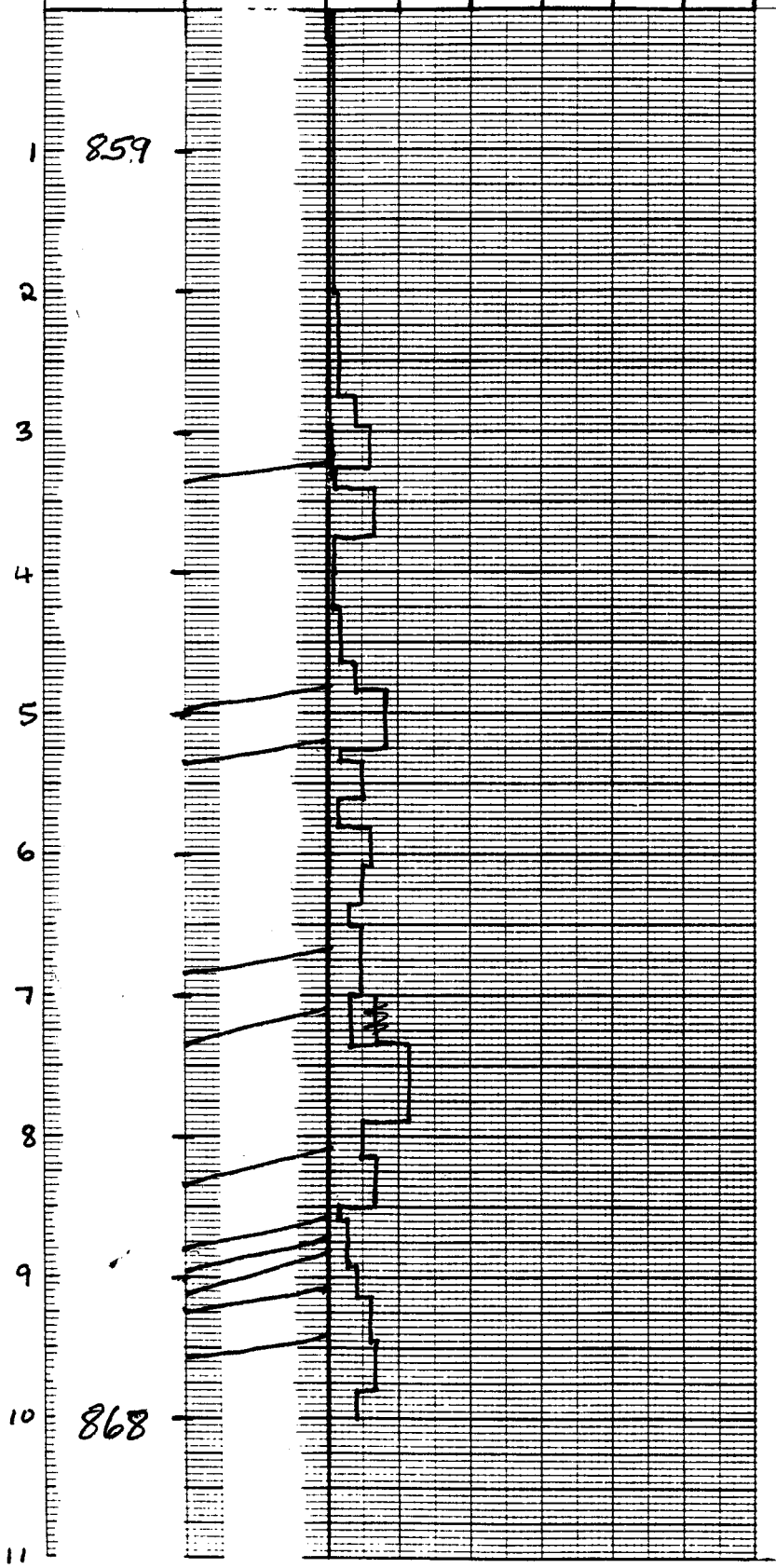
Box Number: 92 Start Depth: 848.5 End Depth: 858

Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks
1			
849			
2			
3			
4			
853			
5			
6			Missing #7
855			
7			
8			
9			
858			
10			
11			

K·E 10 X 10 TO THE CENTIMETER 18 X 25 CM KEUFFEL & ESSER CO. MADE IN U.S.A. 461510

Box Number: 93 Start Depth: 858 End Depth: 868

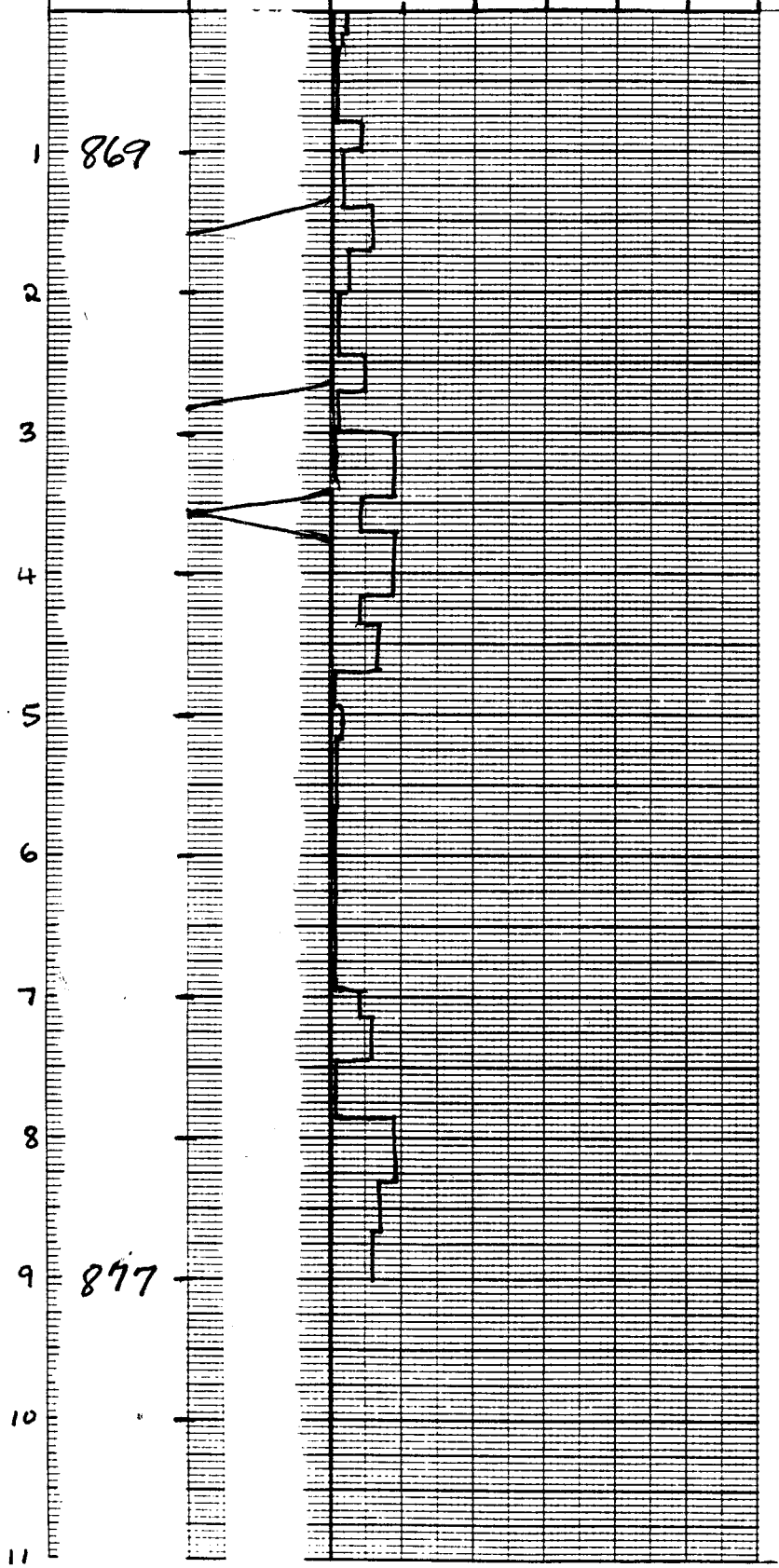
Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks



K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM KEUFFEL & ESSER CO. MADE IN U.S.A. 46 1510

Box Number: 94 Start Depth: 868 End Depth: 877

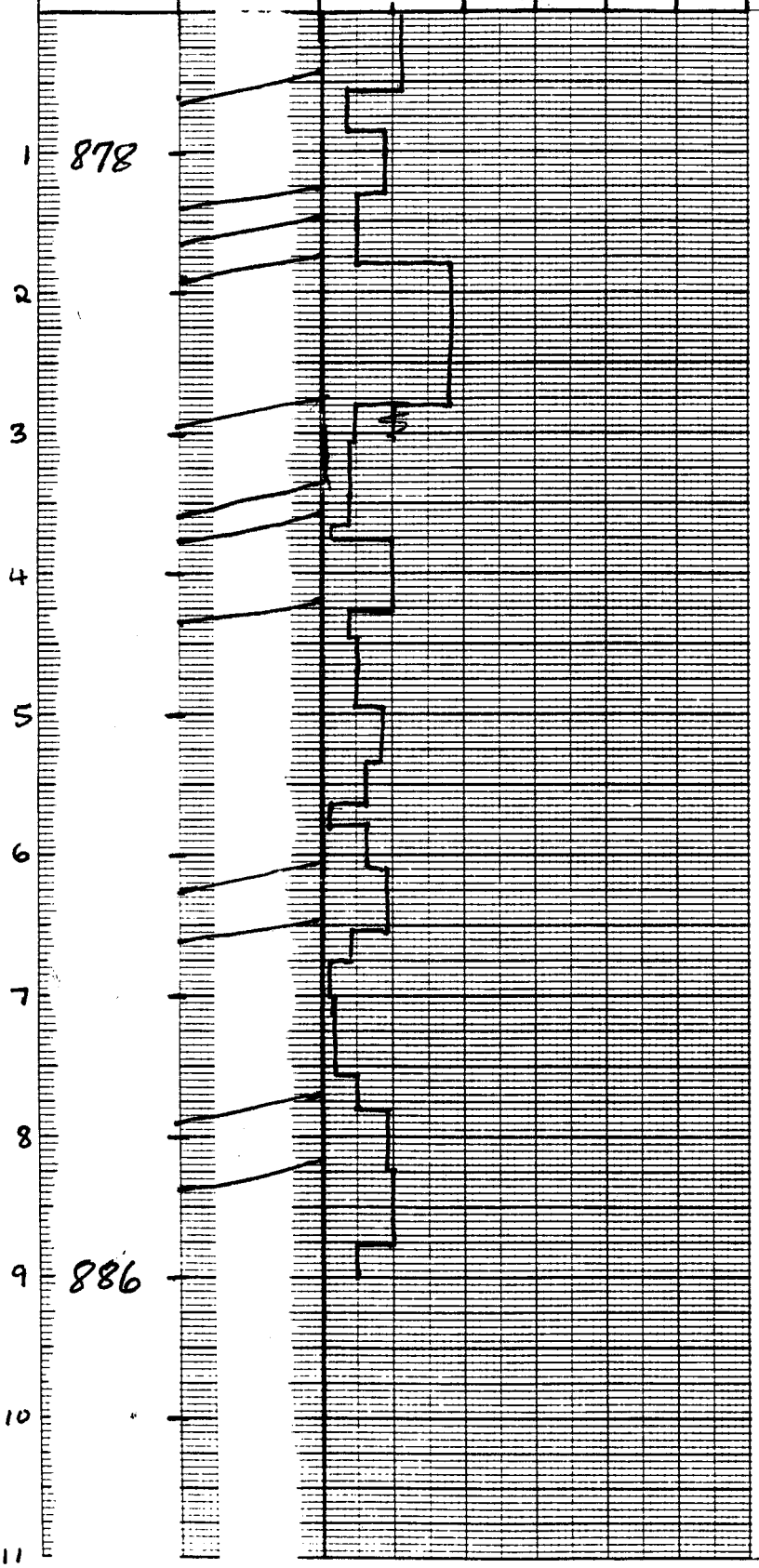
Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks



K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM KEUFFEL & ESSER CO. MADE IN U.S.A.
46 1510

Box Number: 95 Start Depth: 877 End Depth: 886

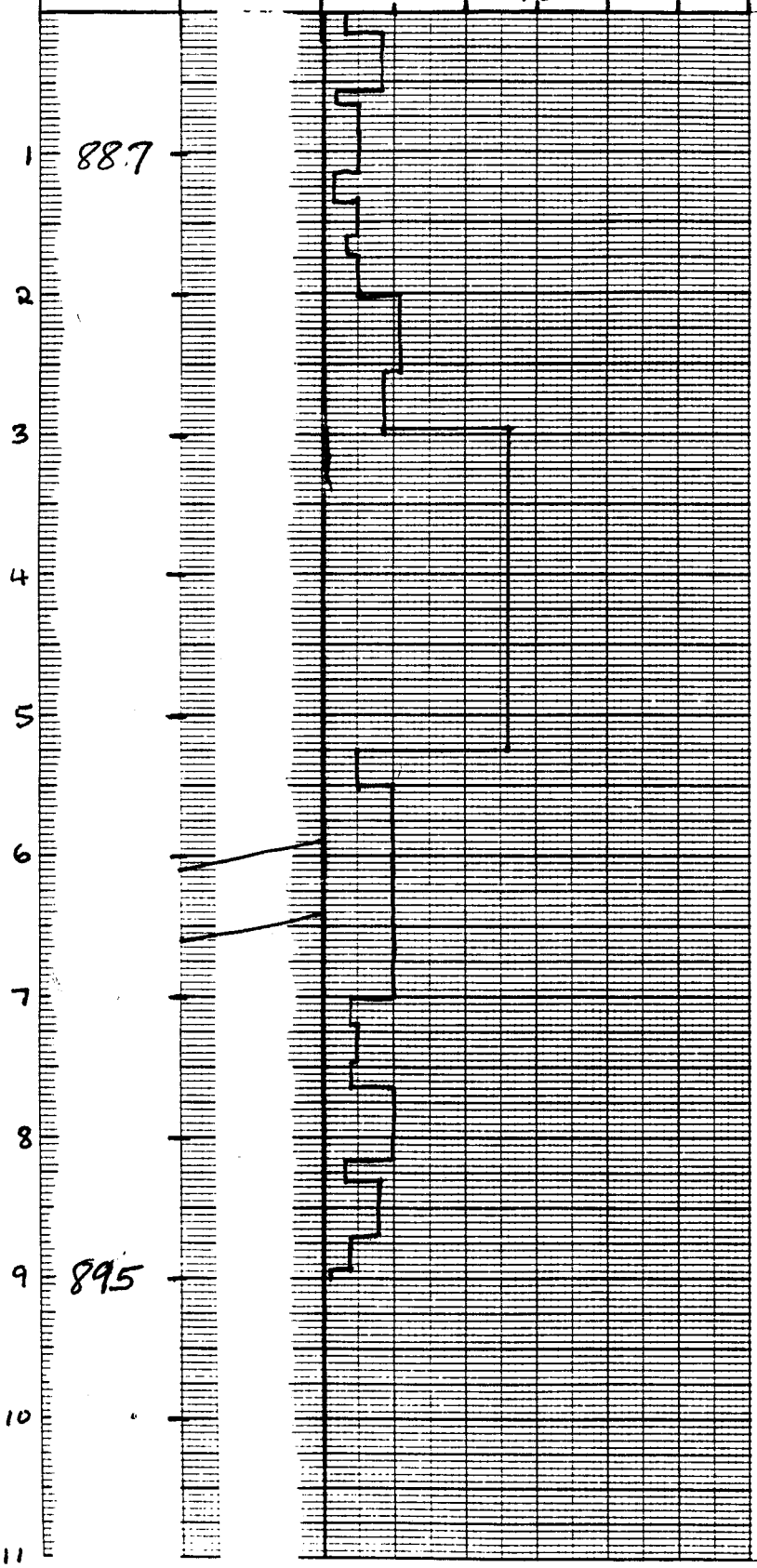
Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks



K•E 10 X 10 TO THE CENTIMETER 18 X 25 CM KEUFFEL & ESSER CO. MADE IN U.S.A. 46 1510

Box Number: 96 Start Depth: 886 End Depth: 895

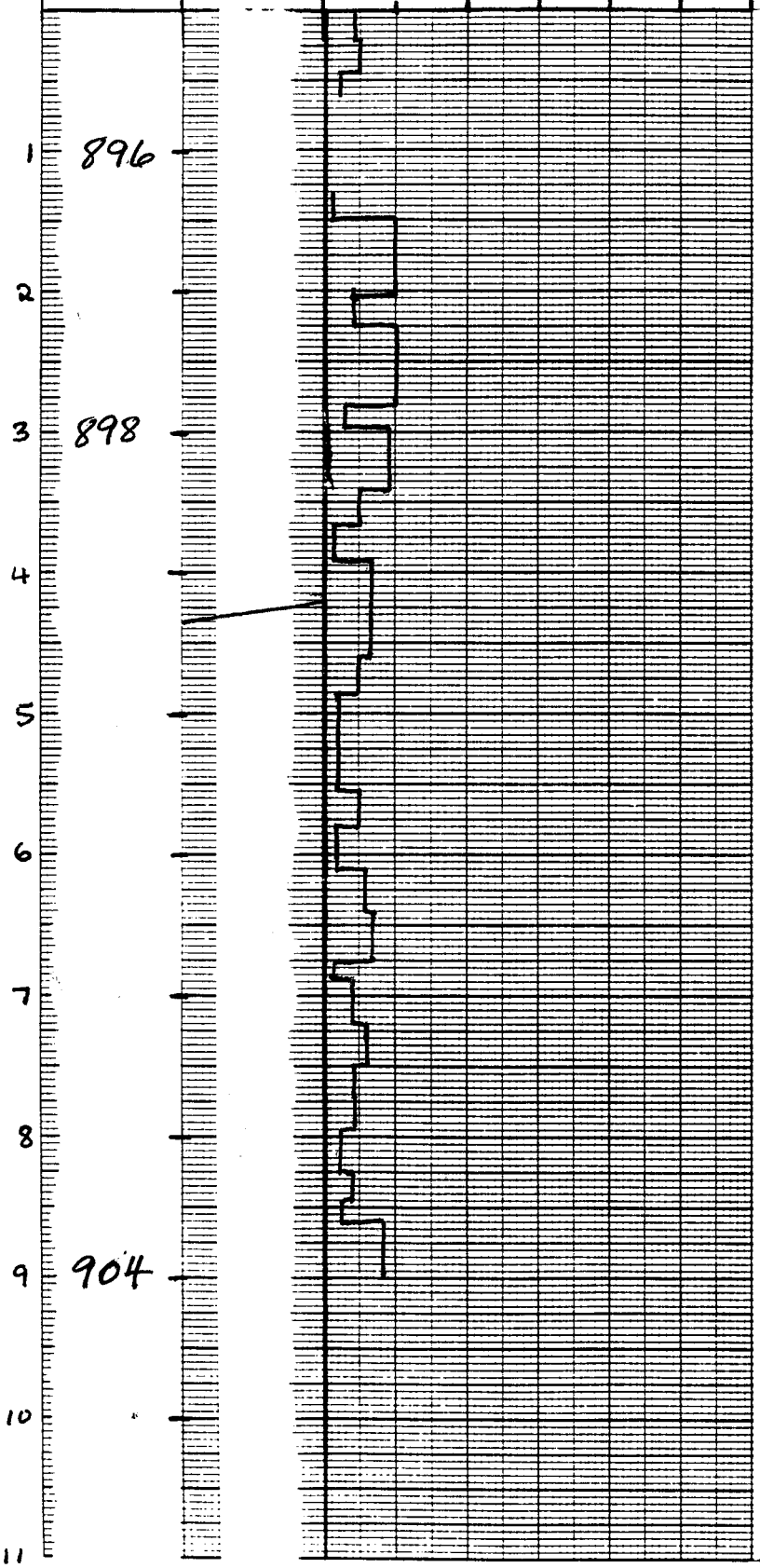
Depth (ft)	Major Fracture	Core Continuity (ft)	Remarks



K·E 10 X 10 TO THE CENTIMETER 18 X 25 CM KEUFFEL & ESSER CO. MADE IN U.S.A. 461510

Box Number: 97 Start Depth: 895 End Depth: 904

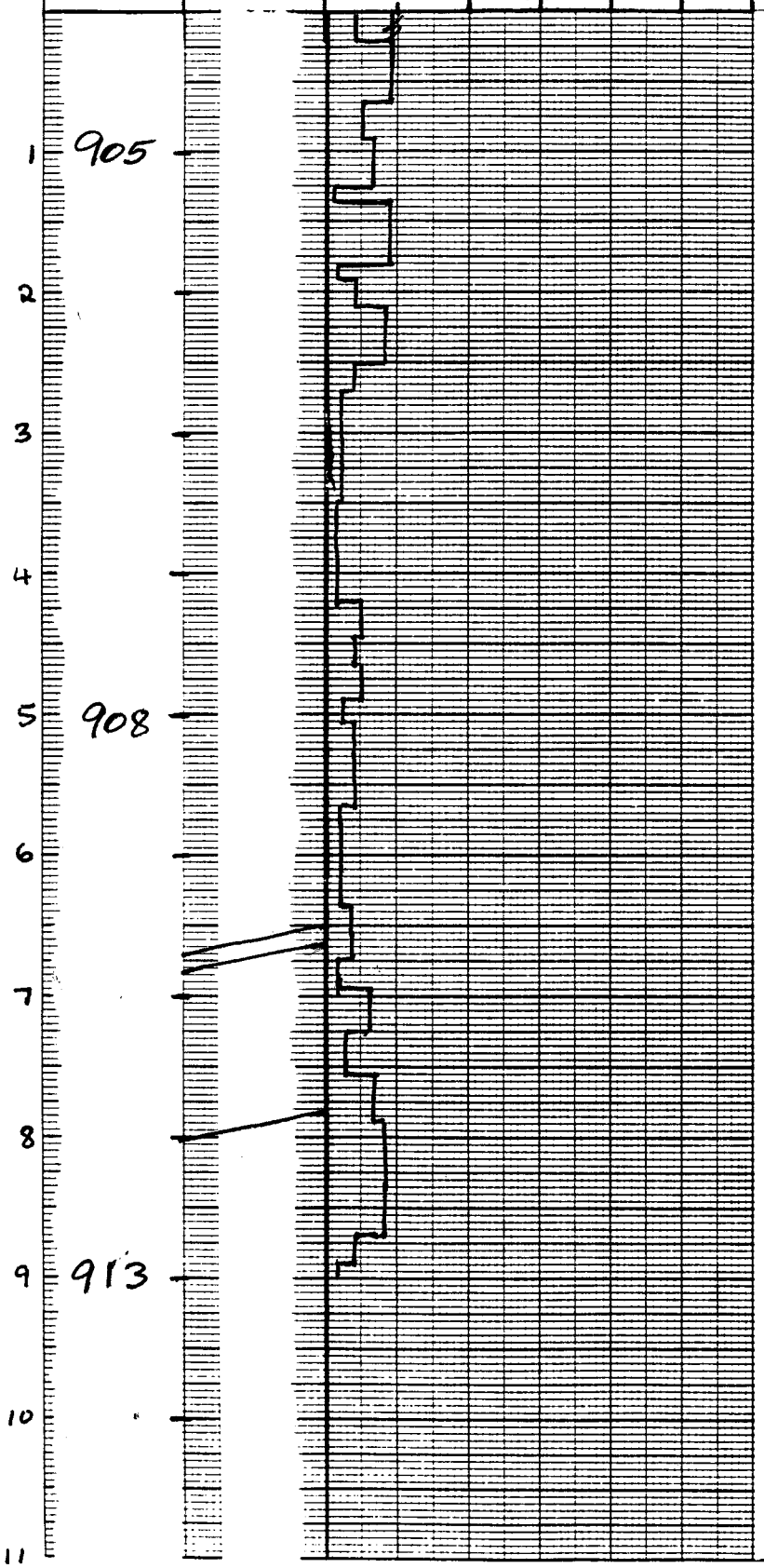
Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks
896			Missing
898			
904			



K·E 10 X 10 TO THE CENTIMETER 18 X 25 CM KEUFFEL & ESSER CO. MADE IN U.S.A. 46 1510

Box Number: 98 Start Depth: 904 End Depth: 913

Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks

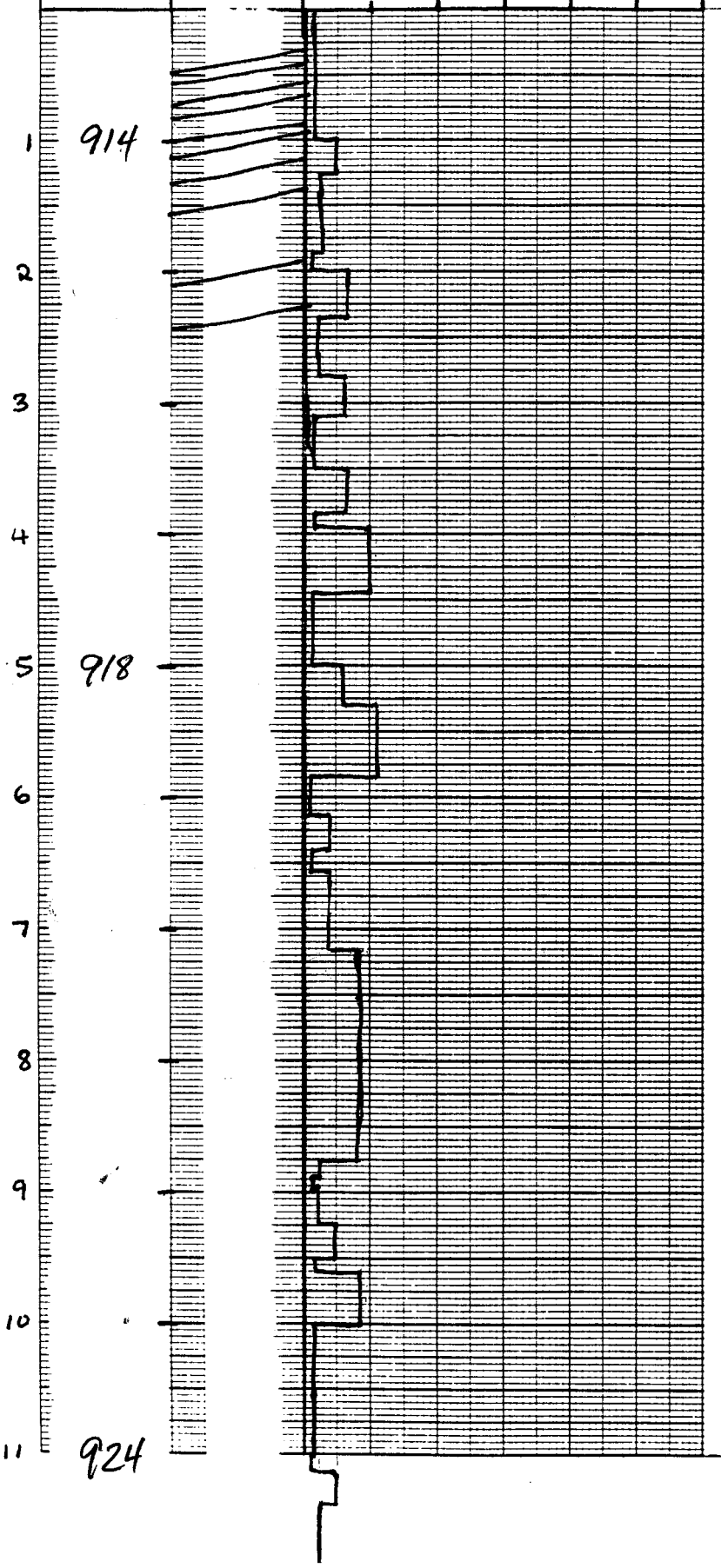


K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM KEUFFEL & ESSER CO. MADE IN U.S.A.
46 1510

Fig B-3

Box Number: 99 Start Depth: 913 ft End Depth: 925 ft

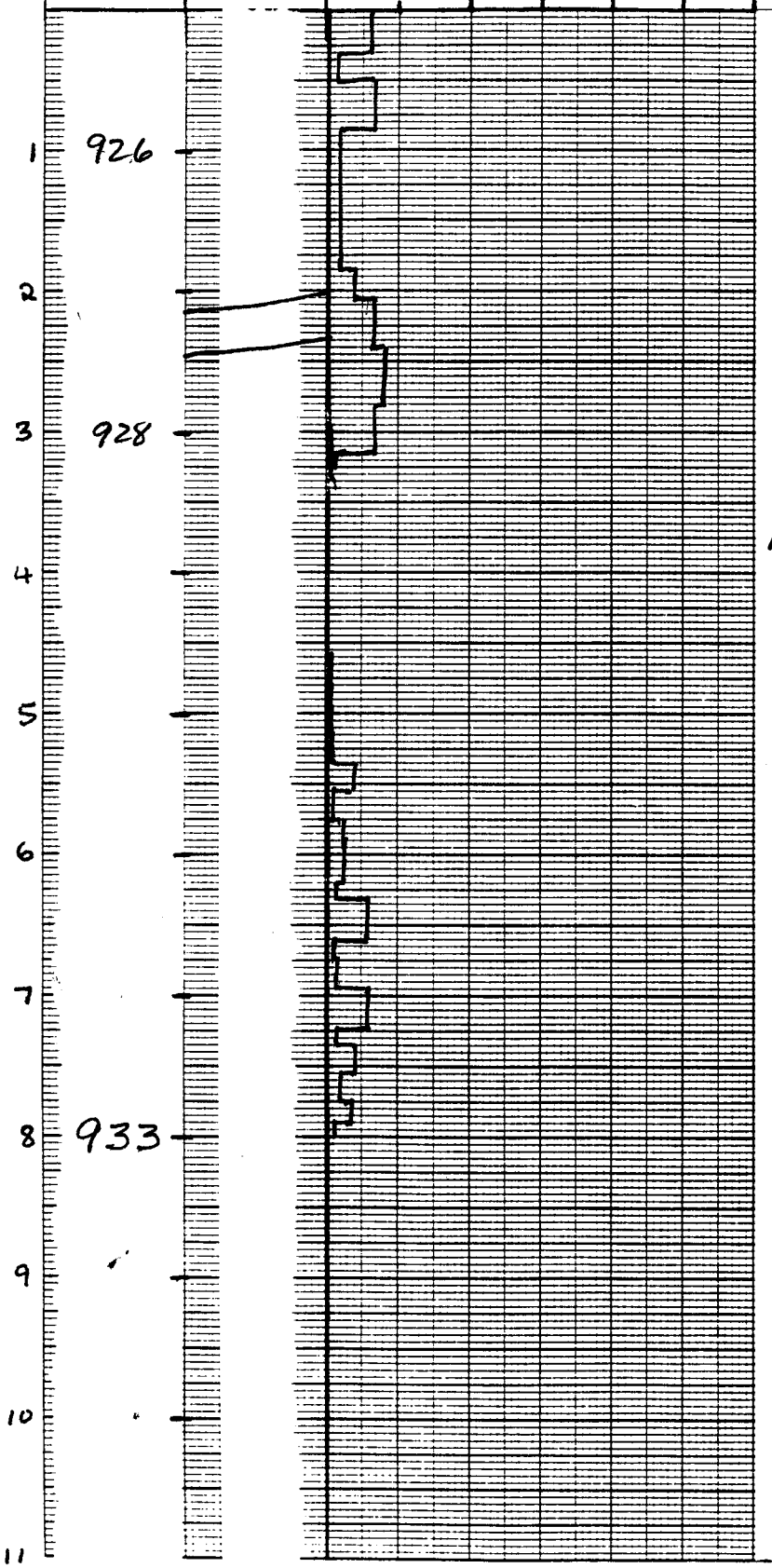
Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks



K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM KEUFFEL & ESSER CO. MADE IN U.S.A. 46 1510

Box Number: 100 Start Depth: 925 End Depth: 933

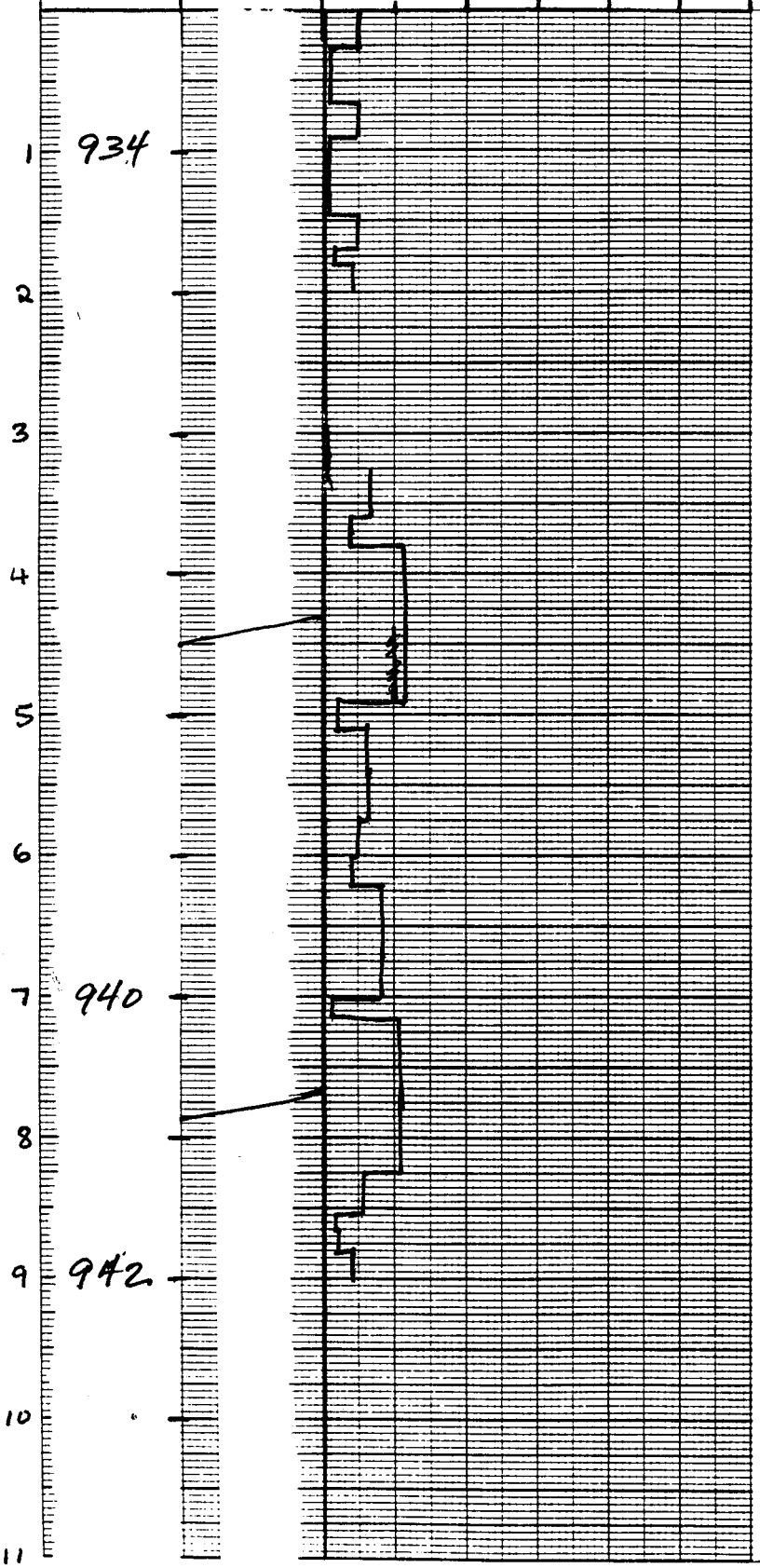
Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks
926			
928			
			Missing
933			



K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM KEUFFEL & ESSER CO. MADE IN U.S.A. 46 1510

Box Number: 101 Start Depth: 933 End Depth: 942

Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks

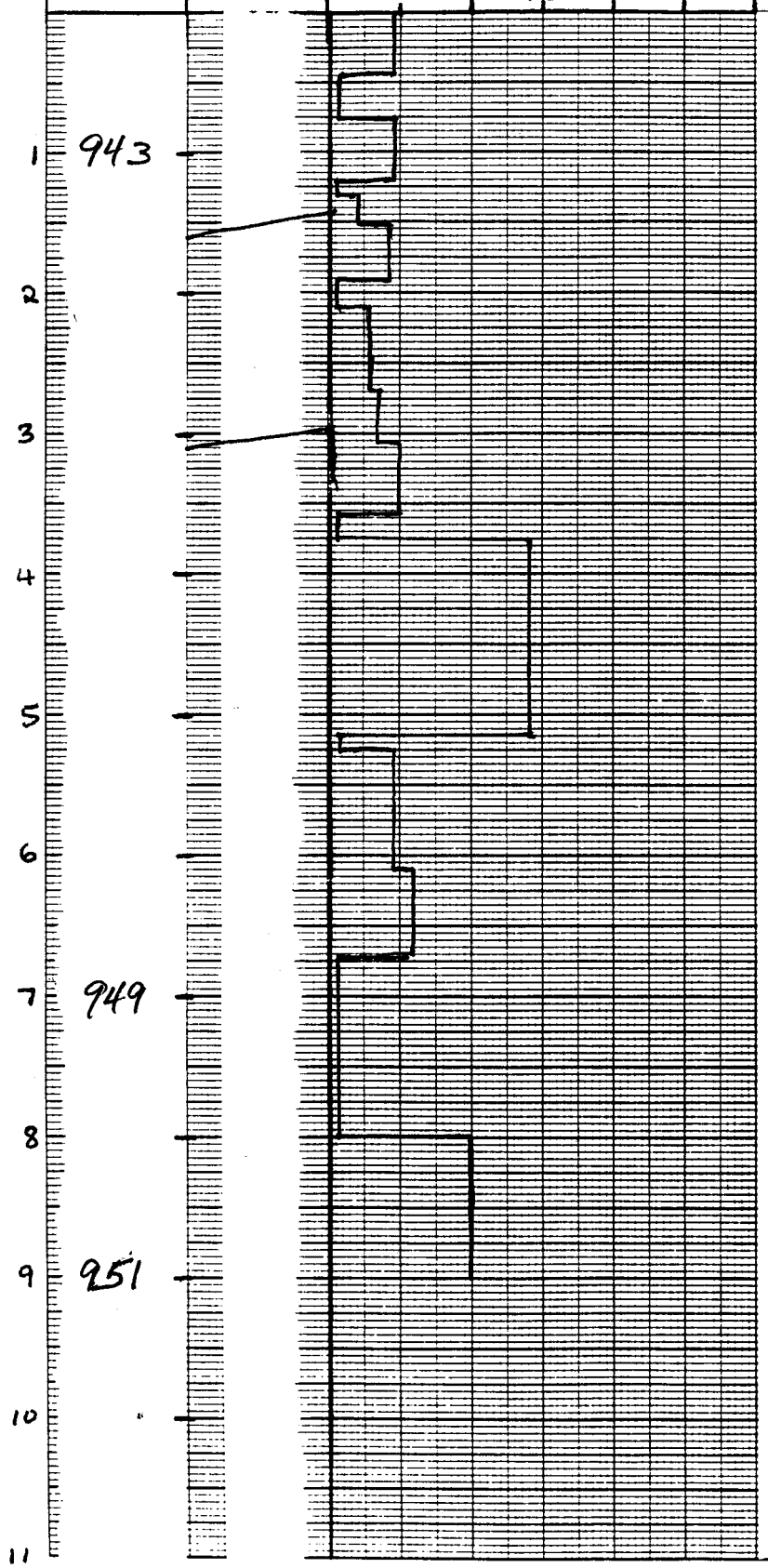


Missing #4

K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM KEUFFEL & ESSER CO. MADE IN U.S.A. 46 1510

Box Number: 102 Start Depth: 942 End Depth: 951

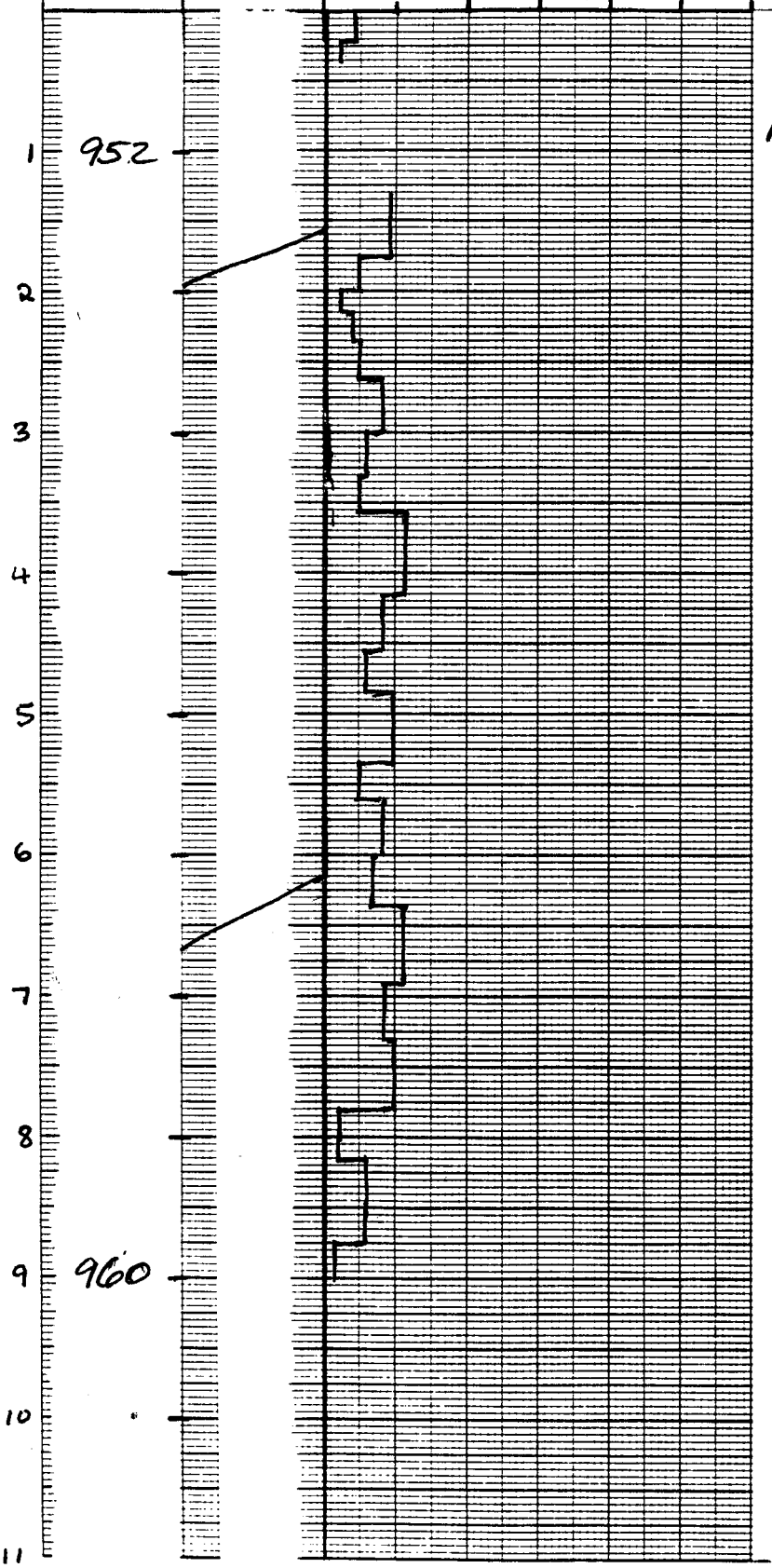
Depth (ft)	Major Fracture	Core Continuity (ft)	Remarks



K·E 10 X 10 TO THE CENTIMETER 18 X 25 CM KEUFFEL & ESSER CO. MADE IN U.S.A. 46 1510

Box Number: 103 Start Depth: 951 End Depth: 960

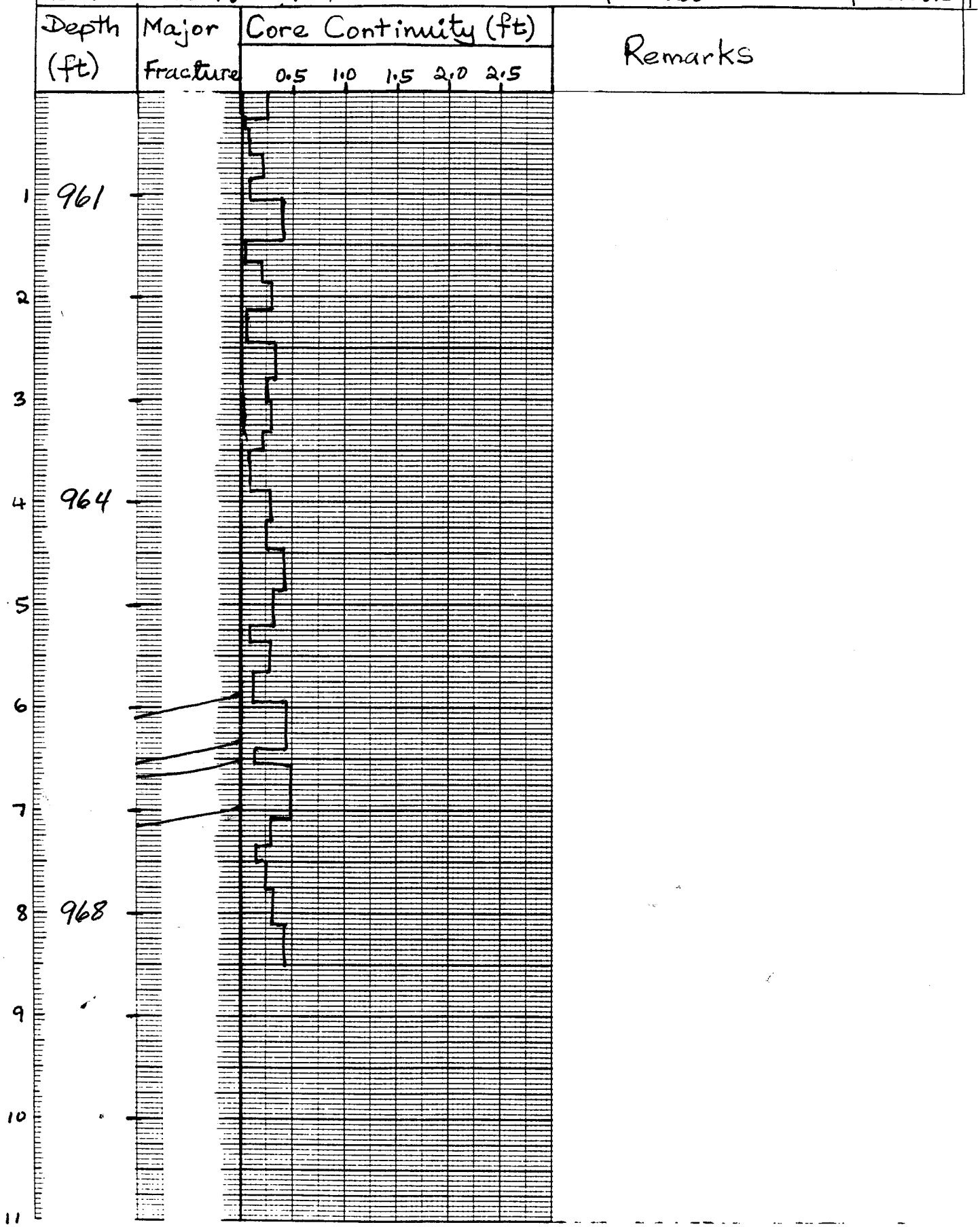
Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks
952			Missing
960			



K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM KEUFFEL & ESSER CO. MADE IN U.S.A. 461510

Fig B-4

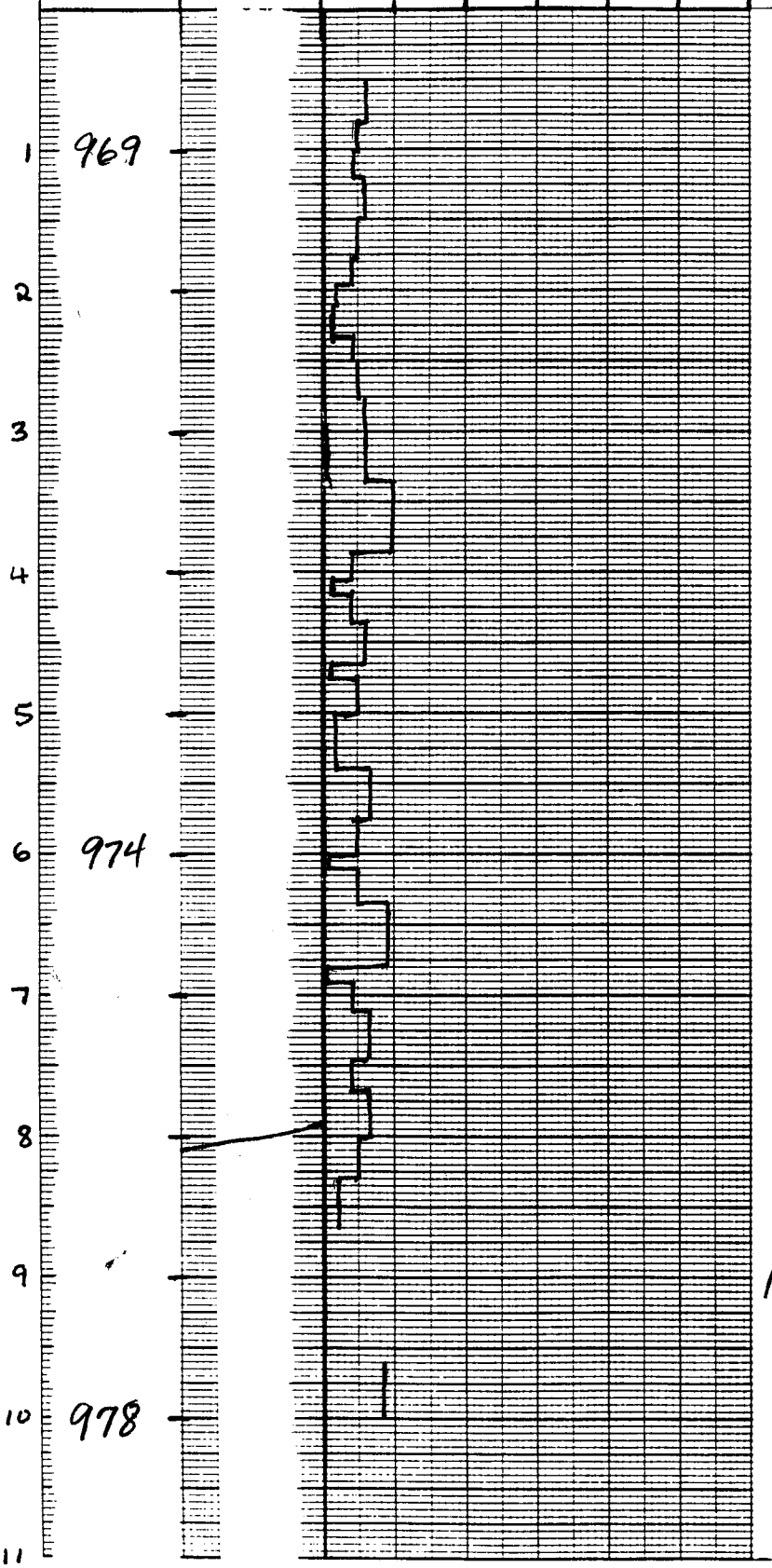
Box Number: 104 Start Depth: 960 ft End Depth: 968.5 ft



K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM KEUFFEL & ESSER CO. MADE IN U.S.A. 46 1510

Box Number: 105 Start Depth: 968.5 End Depth: 978

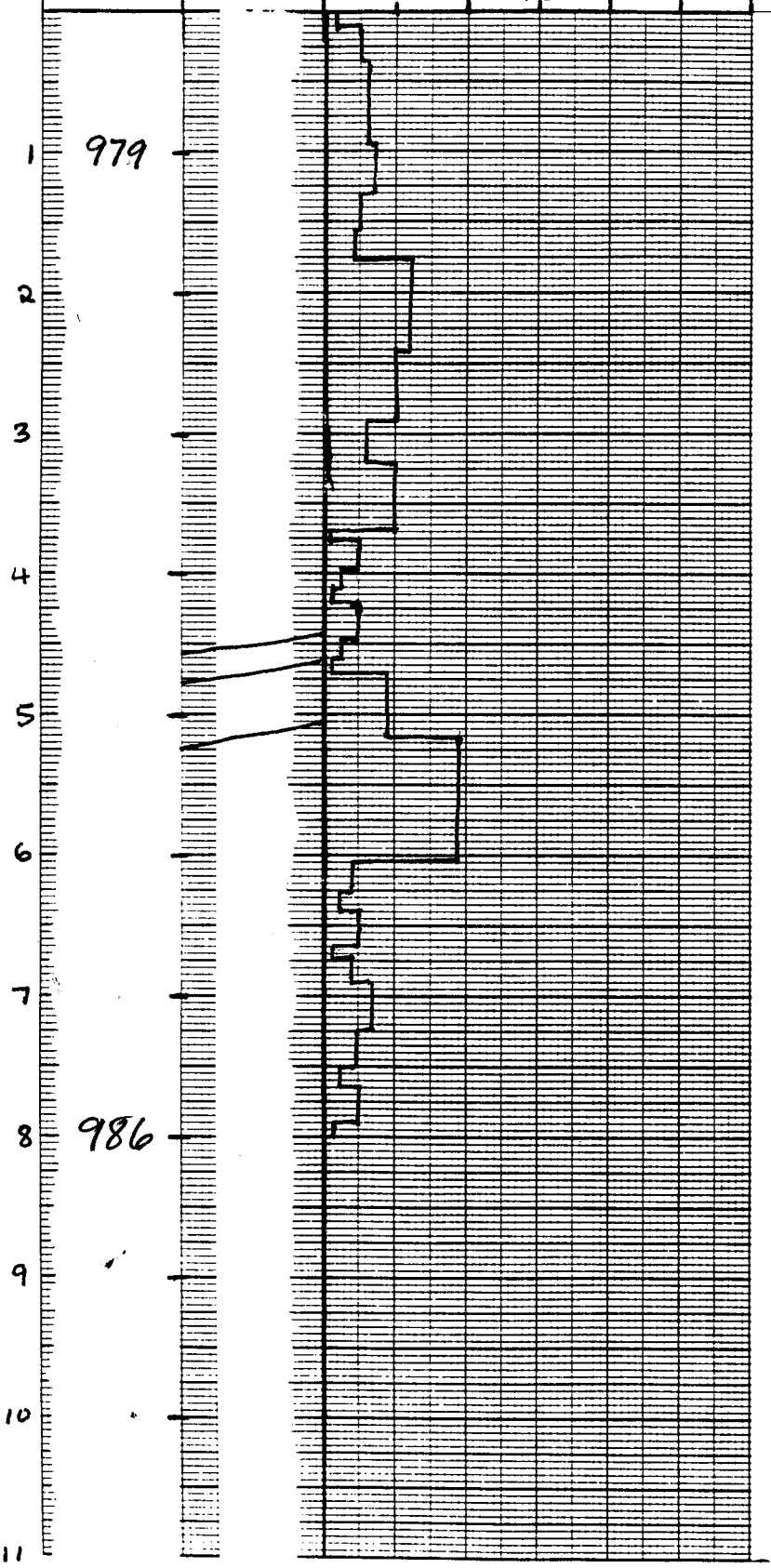
Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks
969			
974			
			Missing
978			



K•E 10 X 10 TO THE CENTIMETER 18 X 25 CM KEUFFEL & ESSER CO. MADE IN U.S.A. 46 1510

Box Number: 106 Start Depth: 978 End Depth: 986

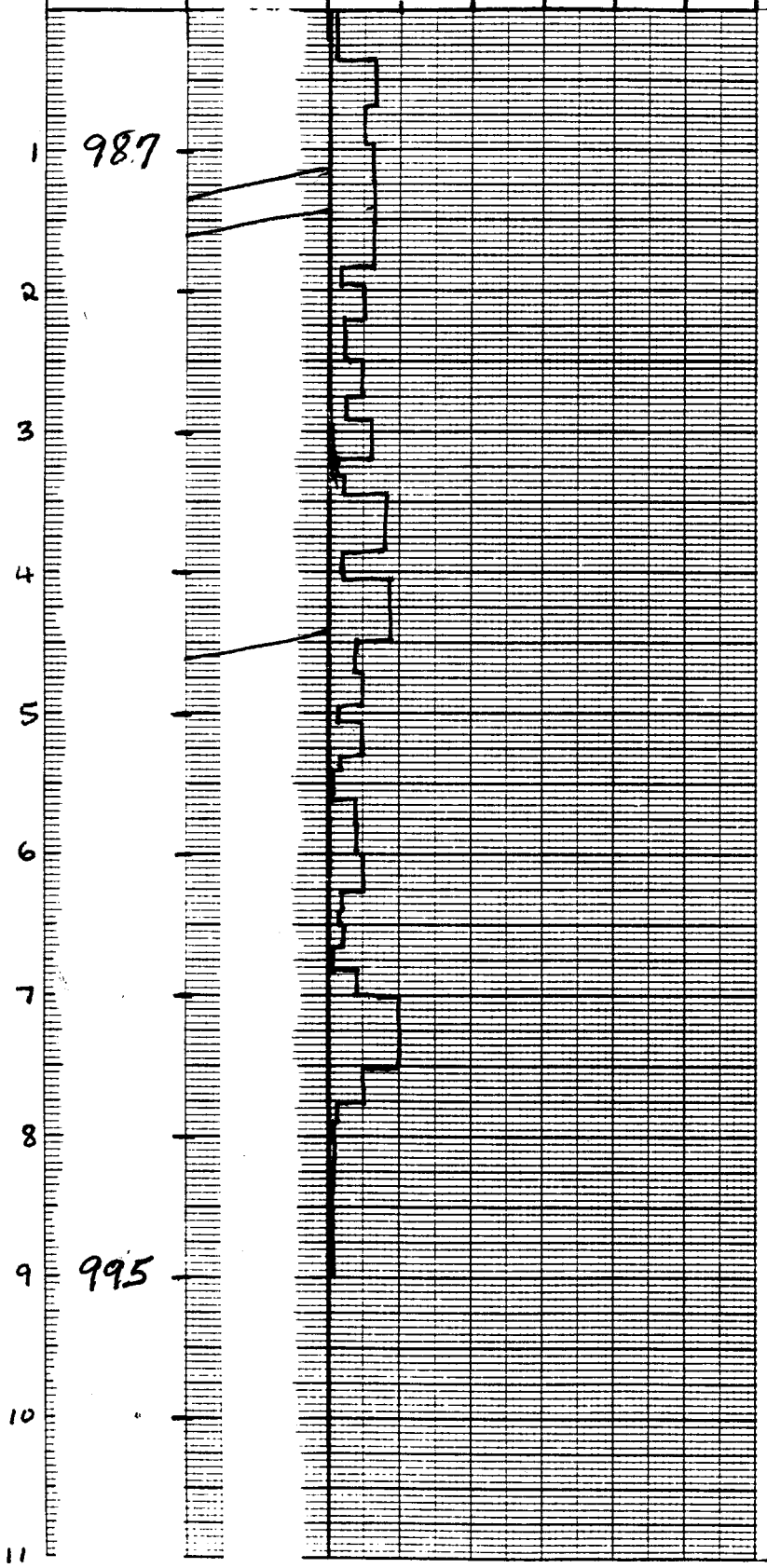
Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks



K·E 10 X 10 TO THE CENTIMETER 18 X 25 CM KEUFFEL & ESSER CO. MADE IN U.S.A. 461510

Box Number: 107 Start Depth: 986 End Depth: 995

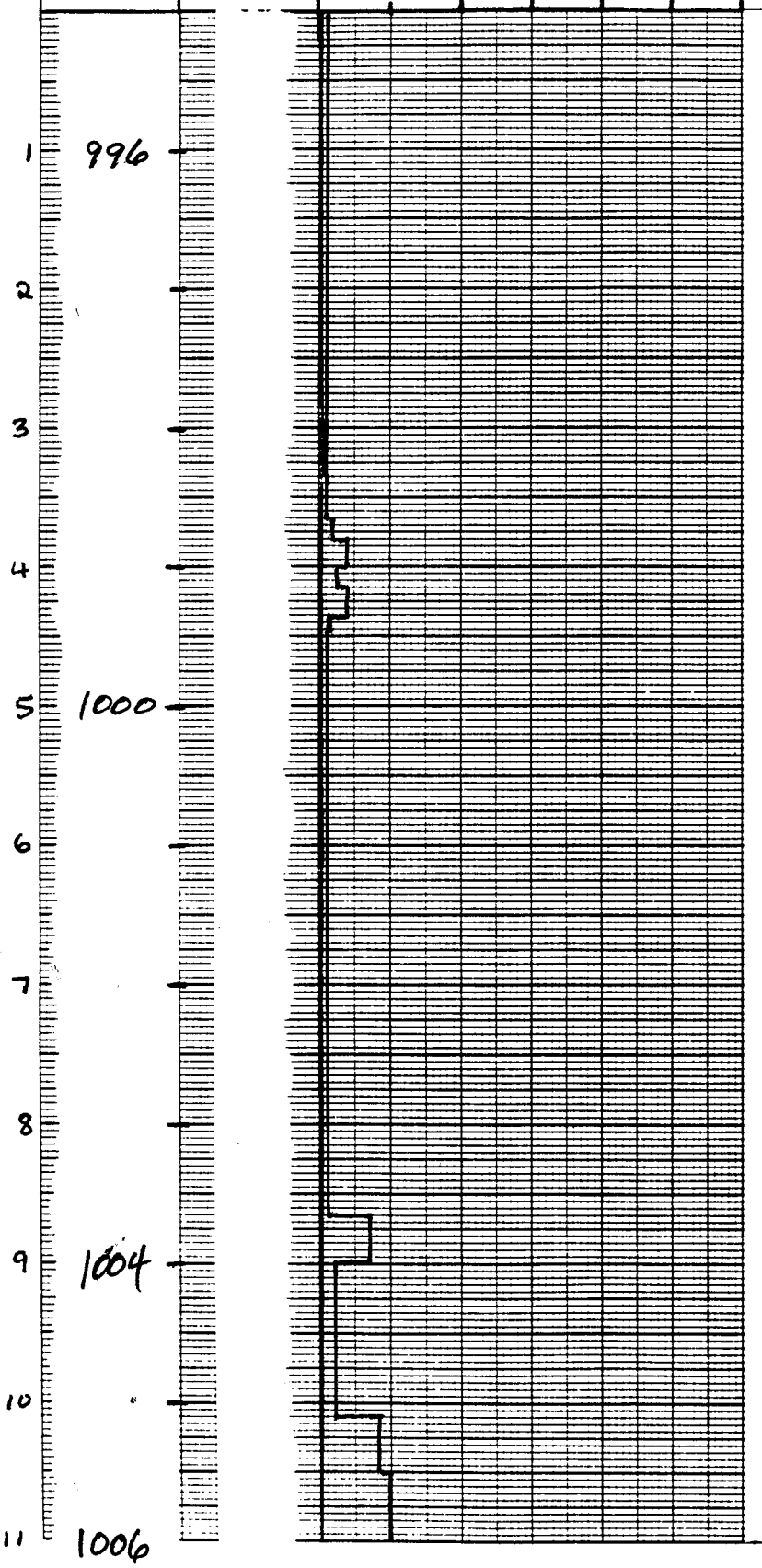
Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks



K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM KEUFFEL & ESSER CO. MADE IN U.S.A. 46 1510

Box Number: 108 Start Depth: 995 End Depth: 1008

Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks

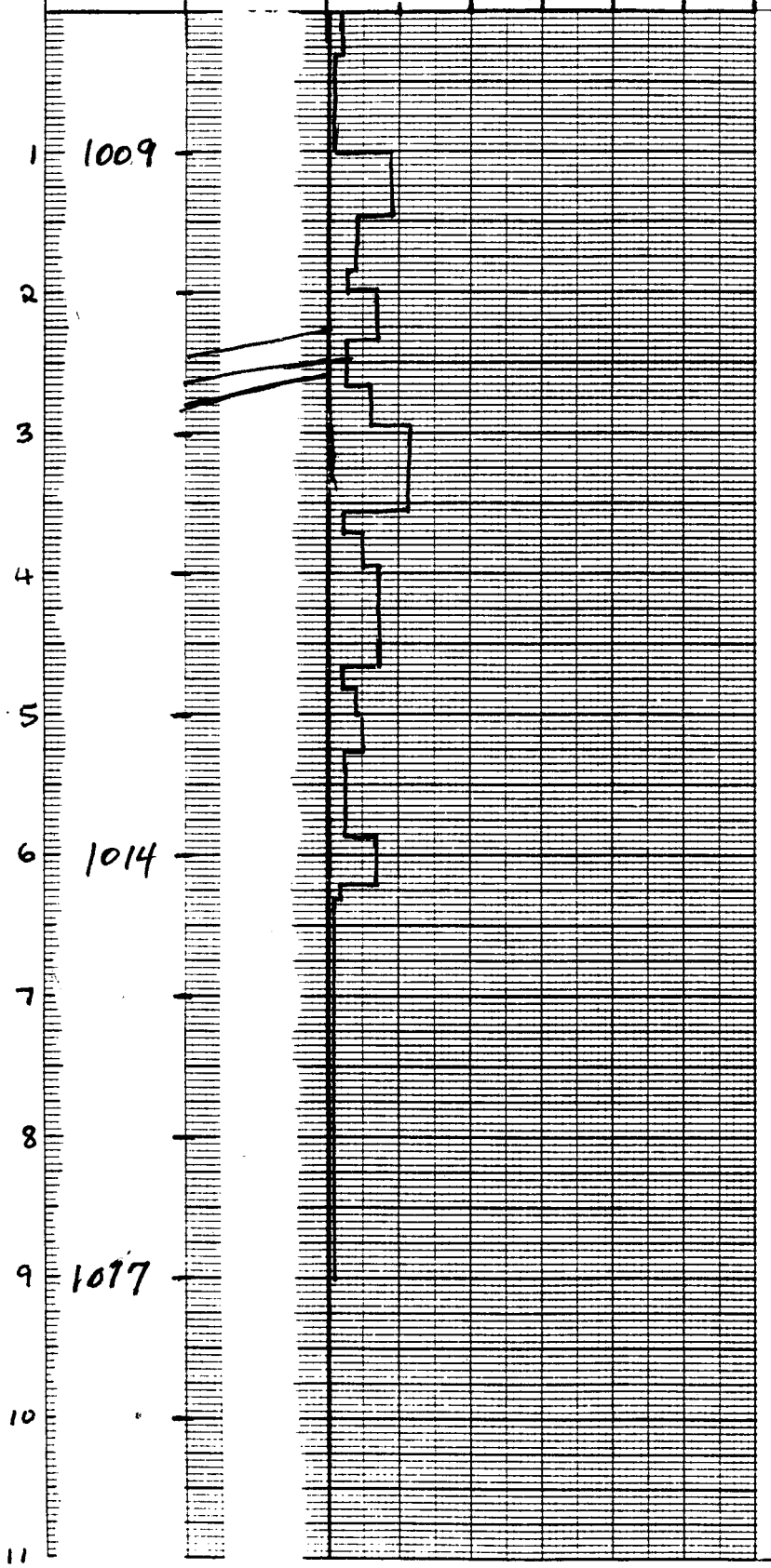


.15' to 1007'
Rubble to 1008'

K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM
KEUFFEL & ESSER CO. MADE IN U.S.A.
46 1510

Box Number: 109 Start Depth: 1008 End Depth: 1017

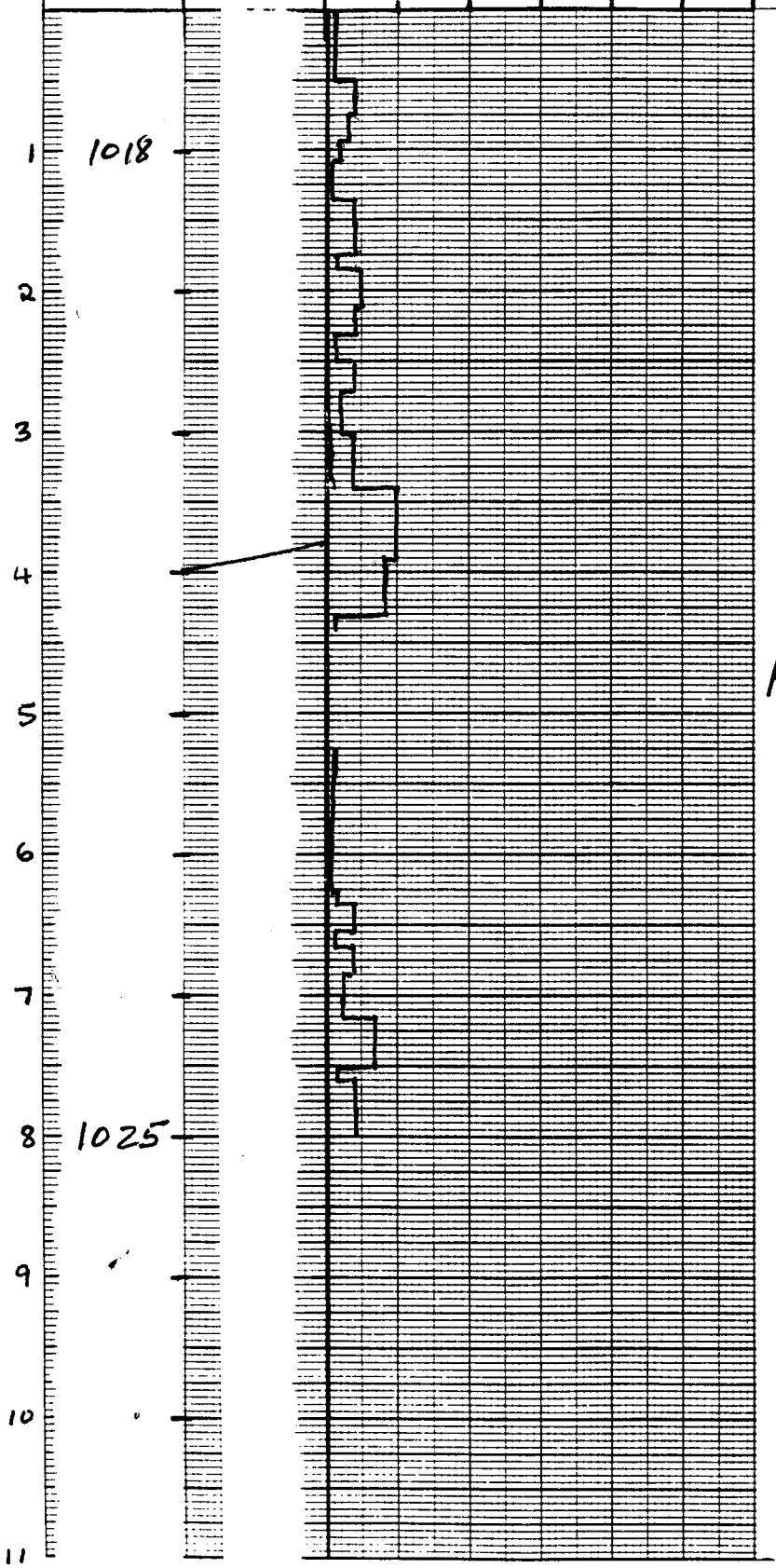
Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks



K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM KEUFFEL & ESSER CO. MADE IN U.S.A. 46 1510

Box Number: 110 Start Depth: 1017 End Depth: 1025

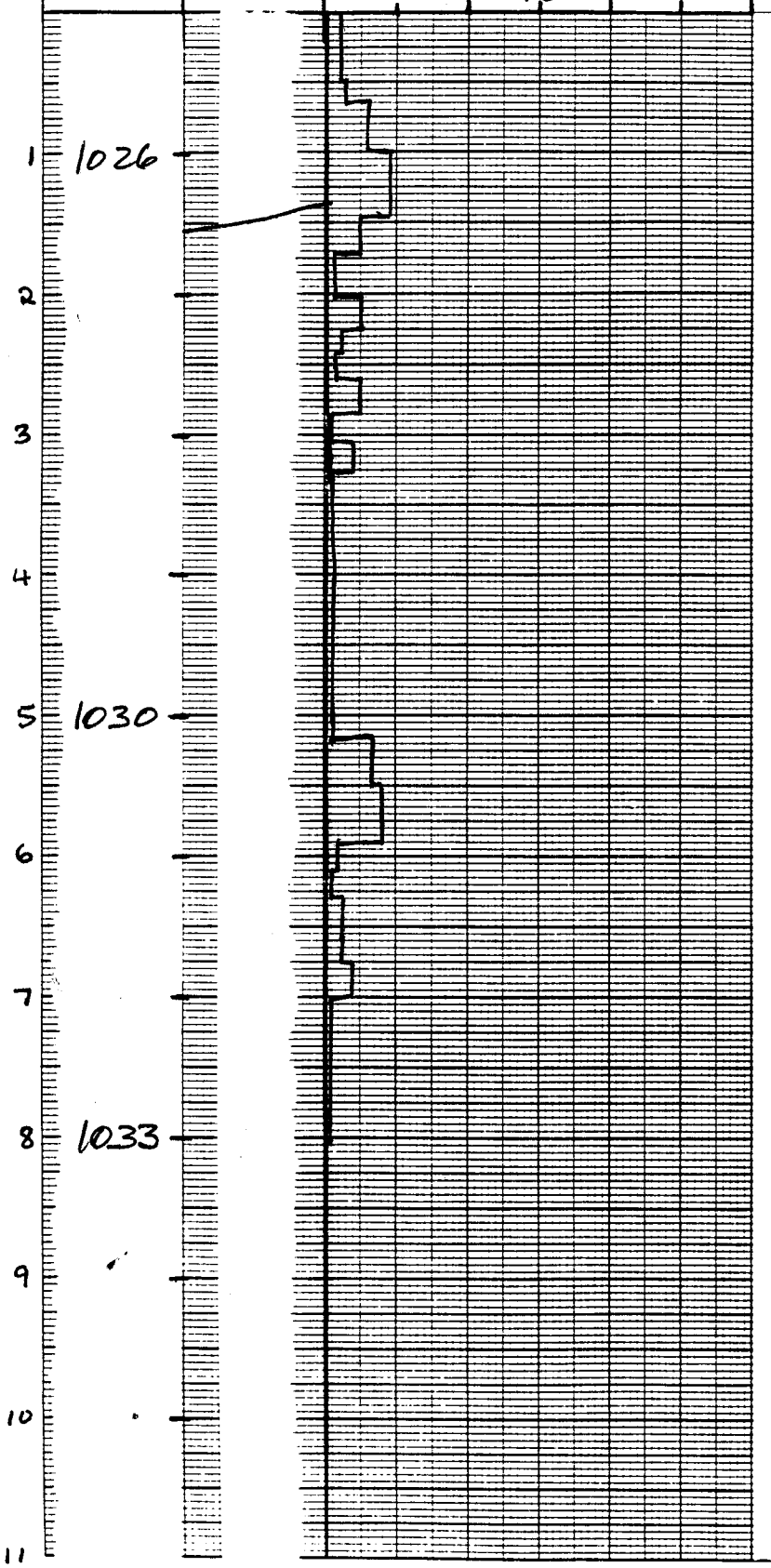
Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks
1018			
			Missing #6
1025			



K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM
KEUFFEL & ESSER CO. MADE IN U.S.A.
46 1510

Box Number: 111 Start Depth: 1025 End Depth: 1033

Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks



K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM KEUFFEL & ESSER CO. MADE IN U.S.A.
46 1510

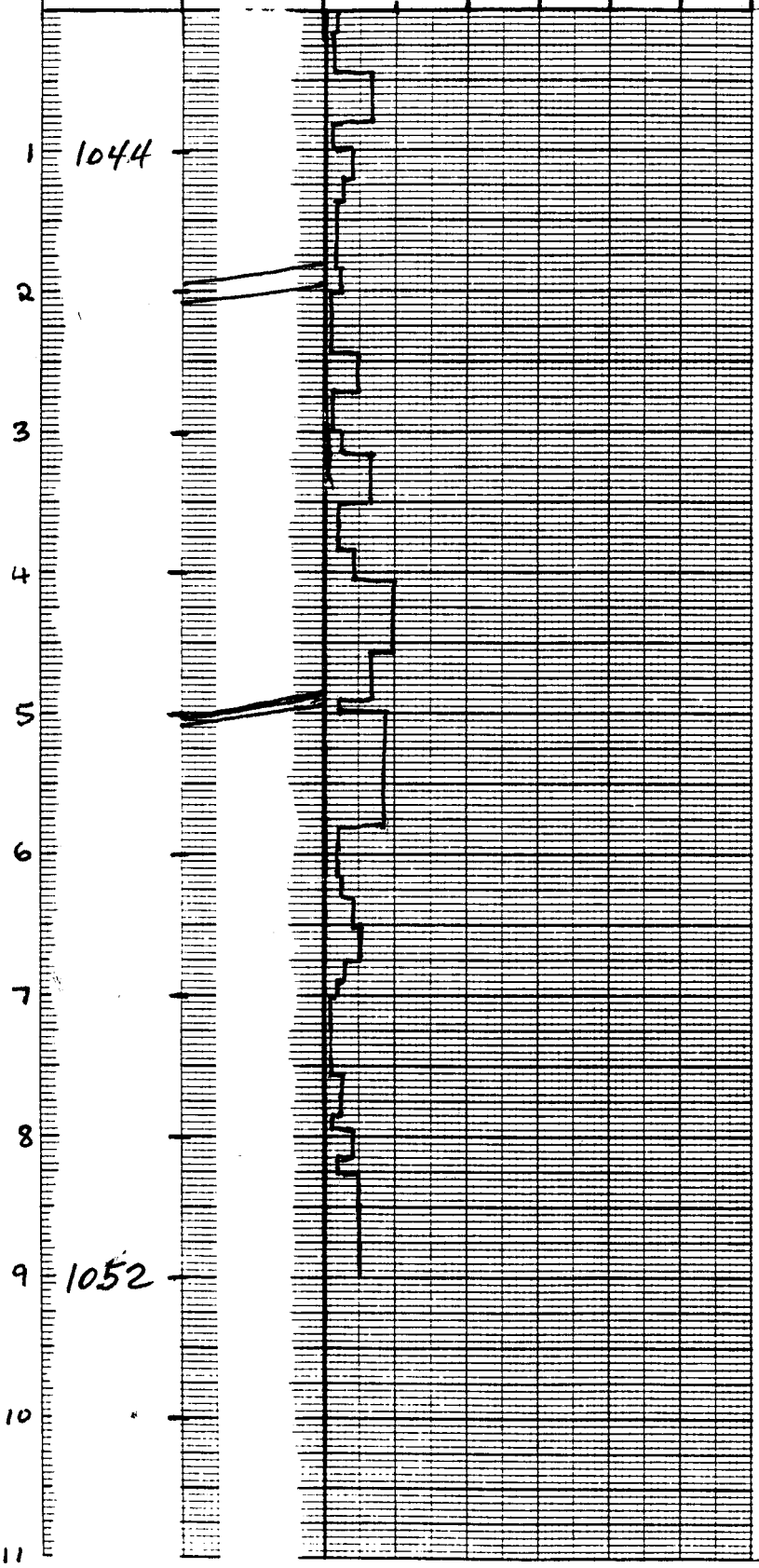
Box Number: 112 Start Depth: 1033 End Depth: 1043

Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks
1	1034		
2			
3			Missing
4			
5			
6			
7	1040		
8			
9			
10	1043		
11			

461510
K·E 10 X 10 TO THE CENTIMETER 18 X 25 CM
KEUFFEL & ESSER CO. MADE IN U.S.A.

Box Number: 113 Start Depth: 1043 End Depth: 1052

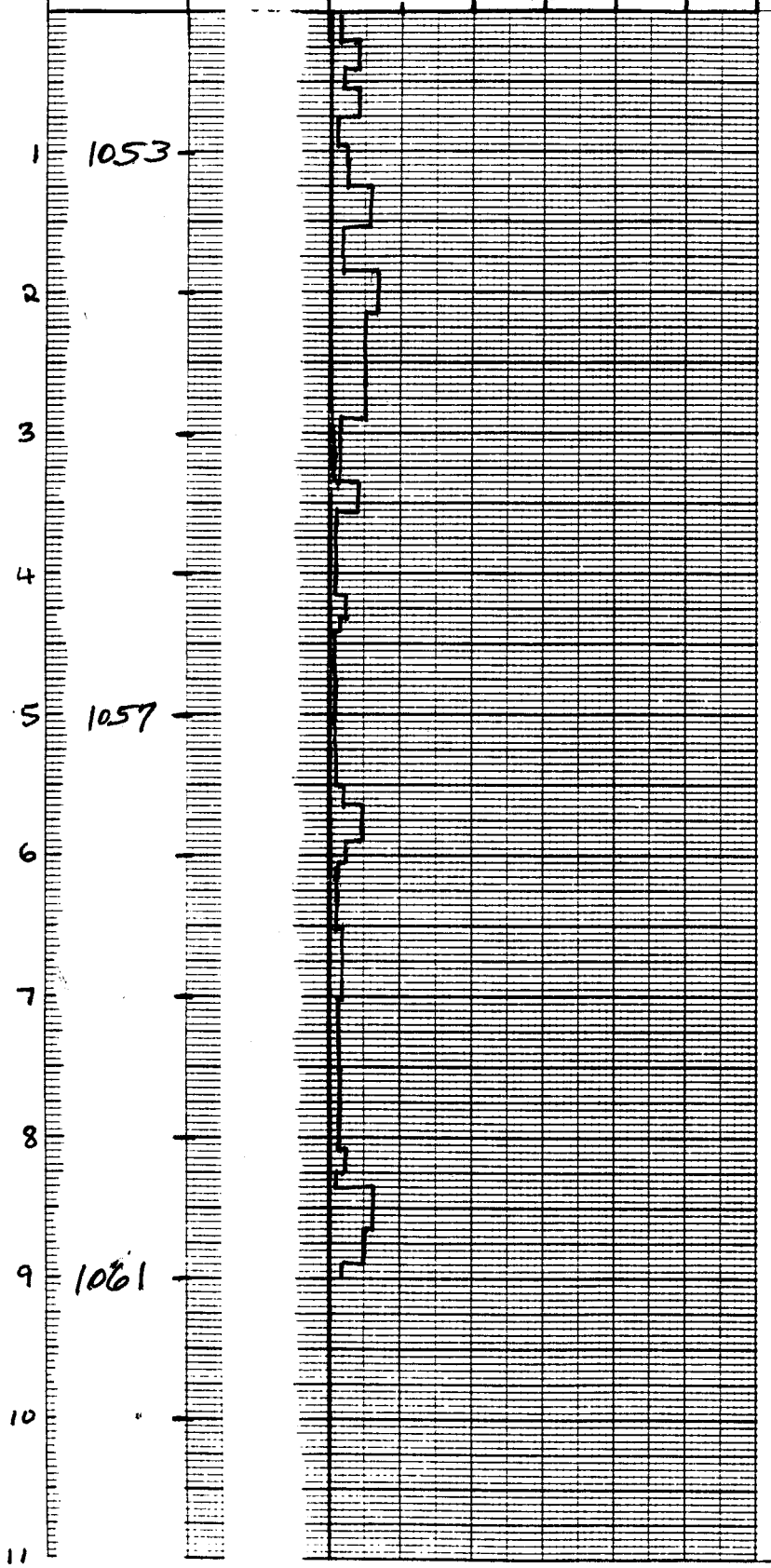
Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks



K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM KEUFFEL & ESSER CO. MADE IN U.S.A.
46 1510

Box Number: 114 Start Depth: 1052 End Depth: 1061

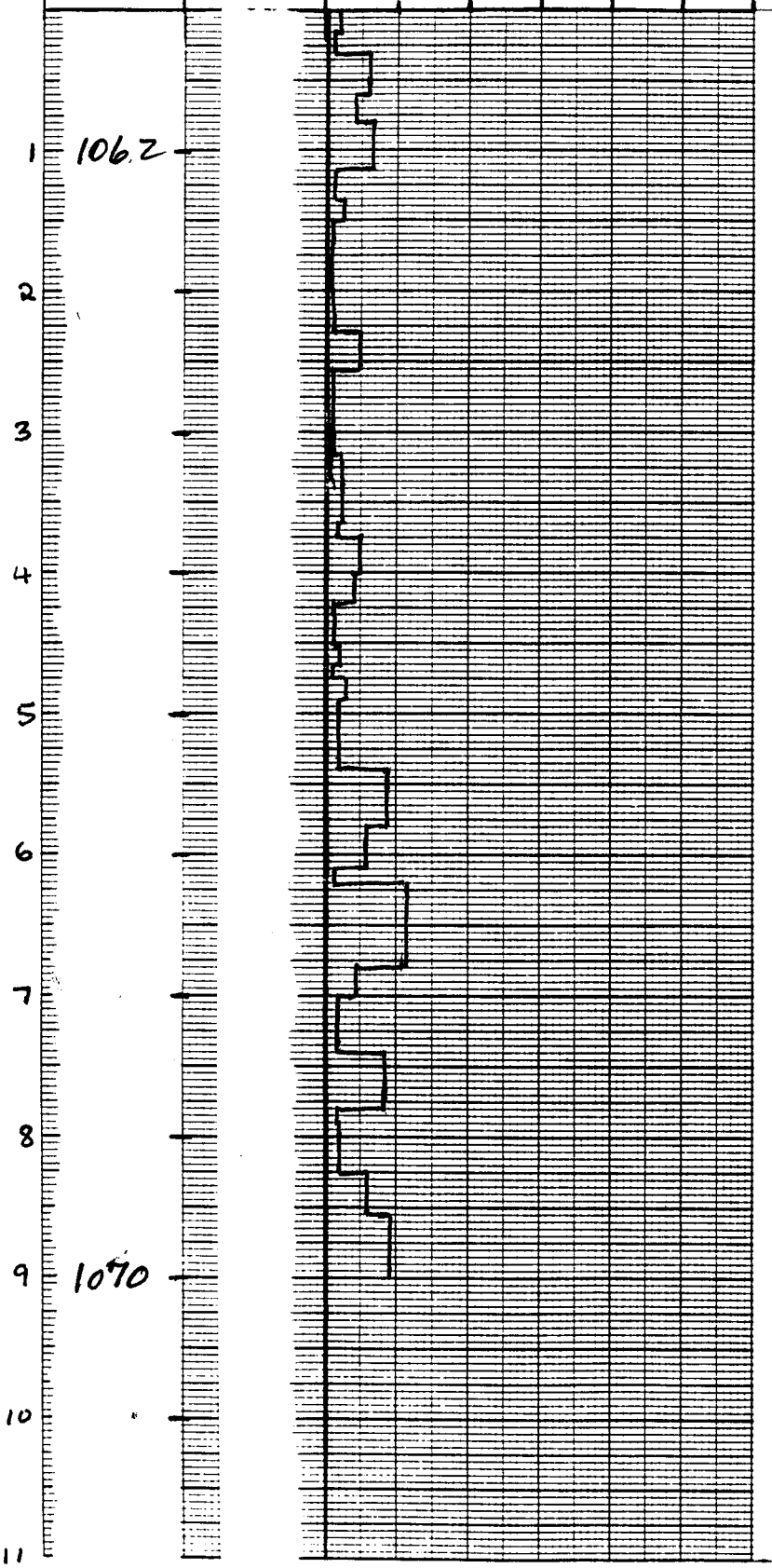
Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks



K·E 10 X 10 TO THE CENTIMETER 18 X 25 CM KEUFFEL & ESSER CO. MADE IN U.S.A. 461510

Box Number: 115 Start Depth: 1061 End Depth: 1070

Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks



K•E 10 X 10 TO THE CENTIMETER 18 X 25 CM KEUFFEL & ESSER CO. MADE IN U.S.A. 461510

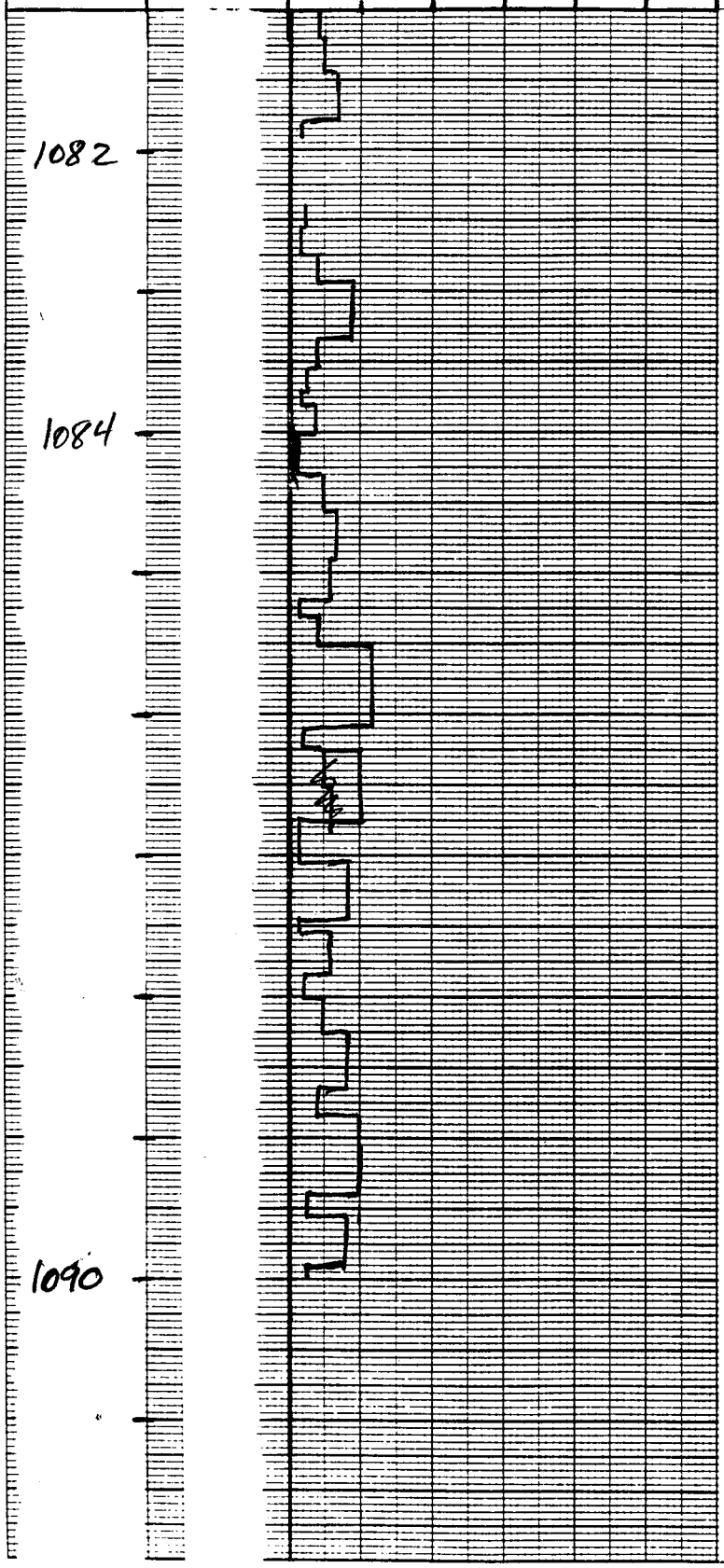
Box Number: 116 Start Depth: 1070 End Depth: 1081

Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks
1			
1071			
2			
3			
4			
			Missing
5			
6			
1076			
7			
8			
9			
10			
11			
1081			

K·E 10 X 10 TO THE CENTIMETER 18 X 25 CM KEUFFEL & ESSER CO. MADE IN U.S.A. 46 1510

Box Number: 117 Start Depth: 1081 End Depth: 1090.5

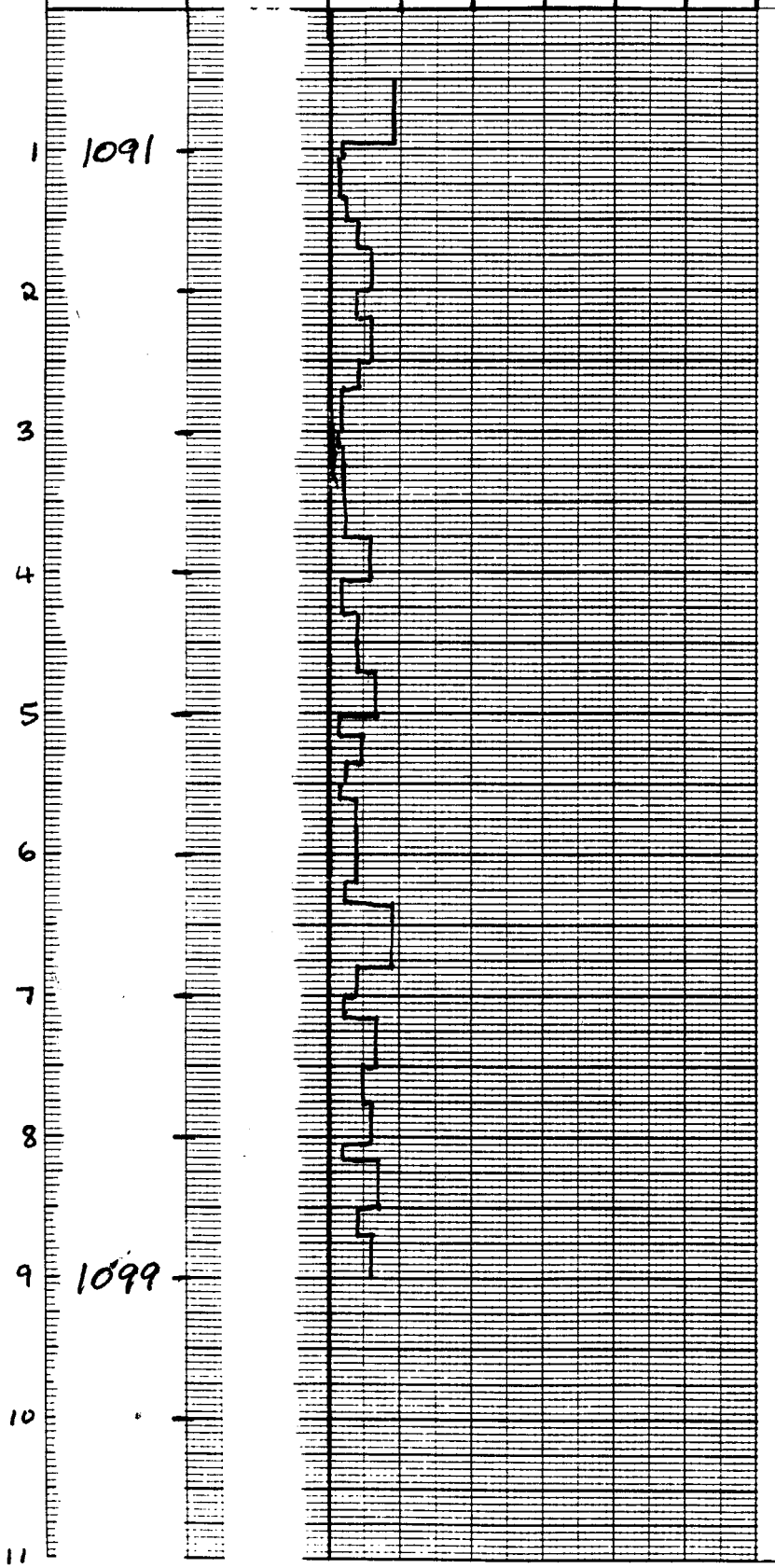
Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks
1082			Missing
1084			
1090			



K·E 10 X 10 TO THE CENTIMETER 18 X 25 CM KEUFFEL & ESSER CO. MADE IN U.S.A. 461510

Box Number: 118 Start Depth: 1090.5 End Depth: 1099

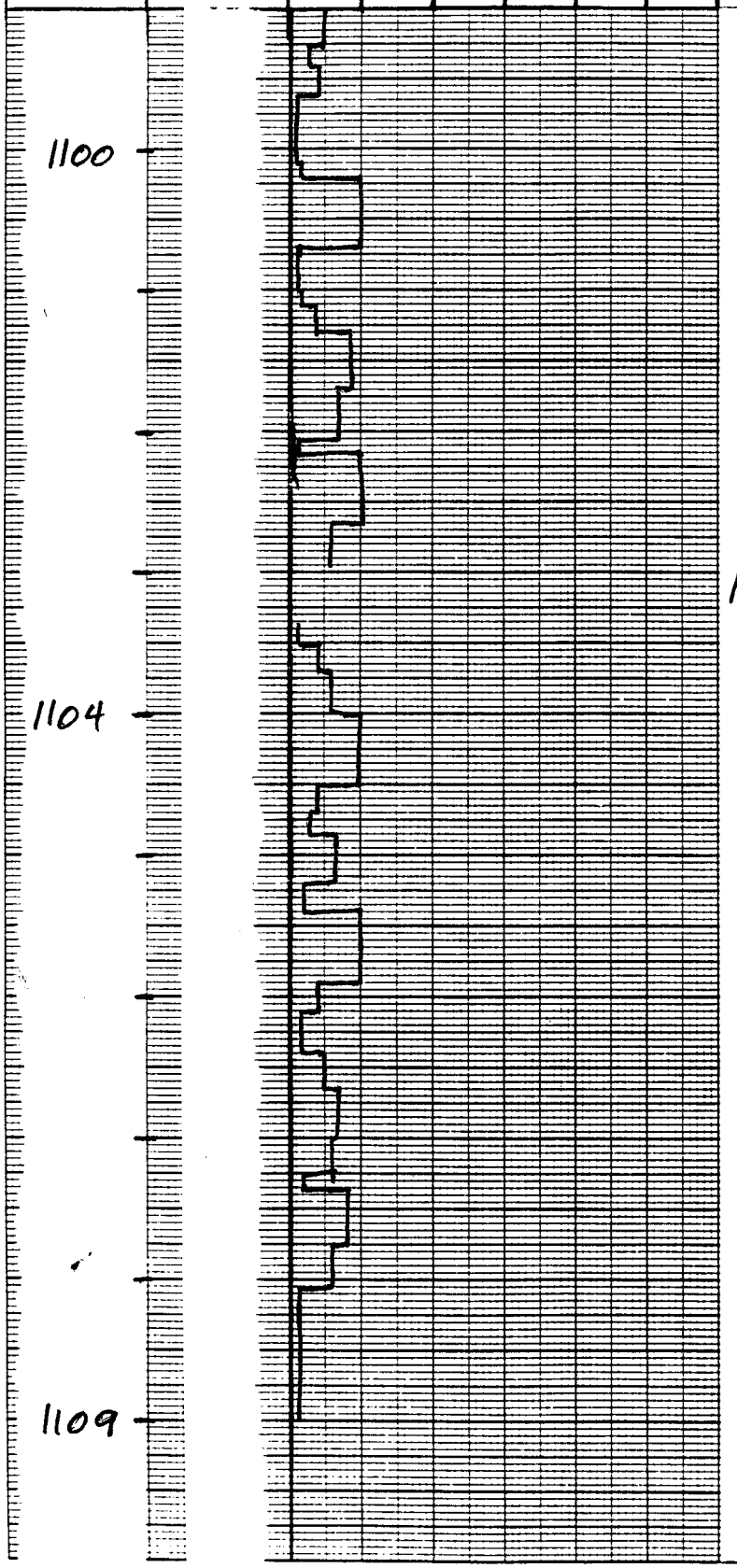
Depth (ft)	Major Fracture	Core Continuity (ft)	Remarks



K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM
KEUFFEL & ESSER CO. MADE IN U.S.A.
461510

Box Number: 119 Start Depth: 1099 End Depth: 1109

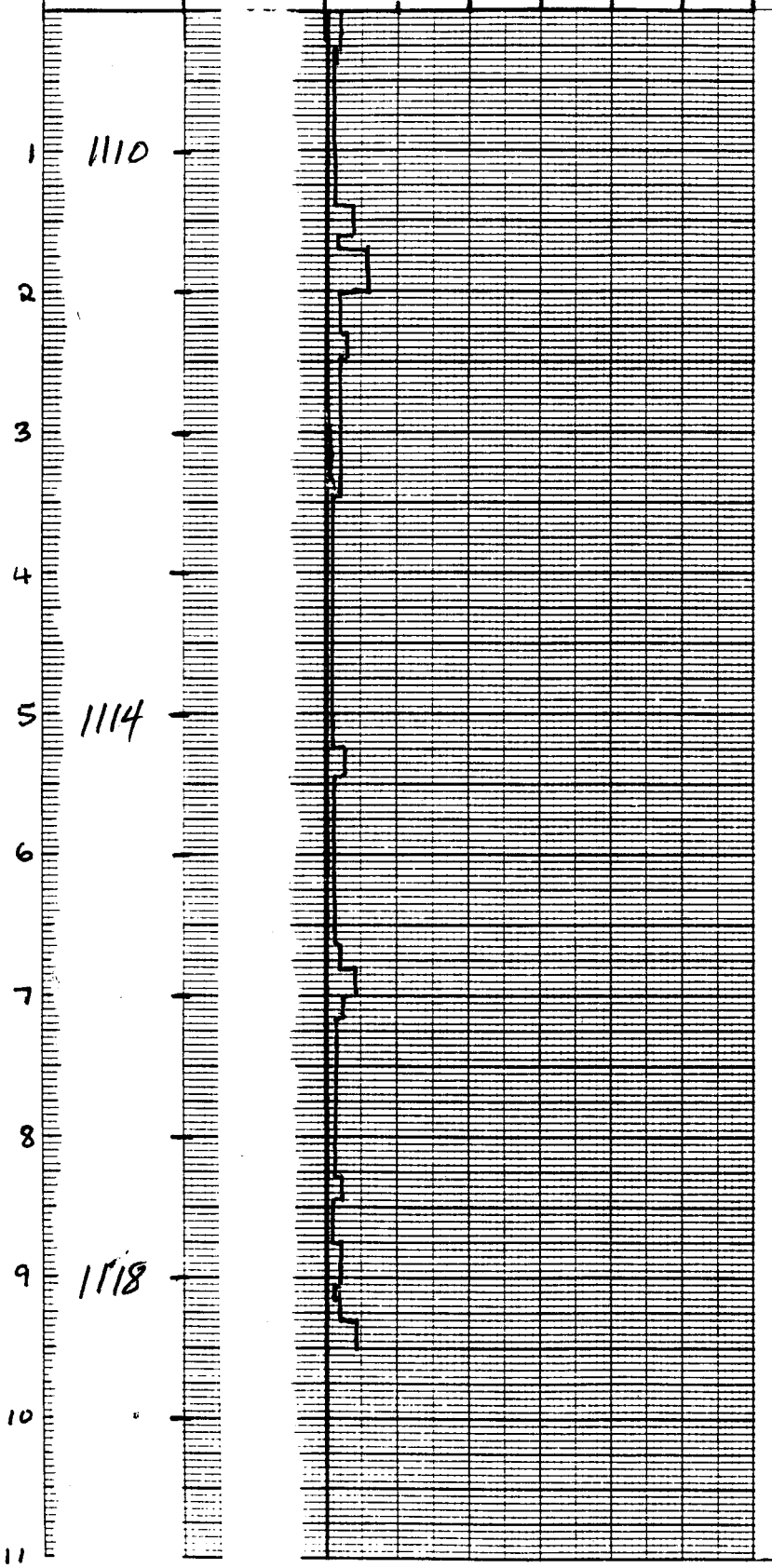
Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks
1100			
1			
2			
3			
4			Missing
1104			
5			
6			
7			
8			
9			
1109			
10			
11			



K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM
KEUFFEL & ESSER CO. MADE IN U.S.A.
46 1510

Box Number: 120 Start Depth: 1109 End Depth: 1118.5

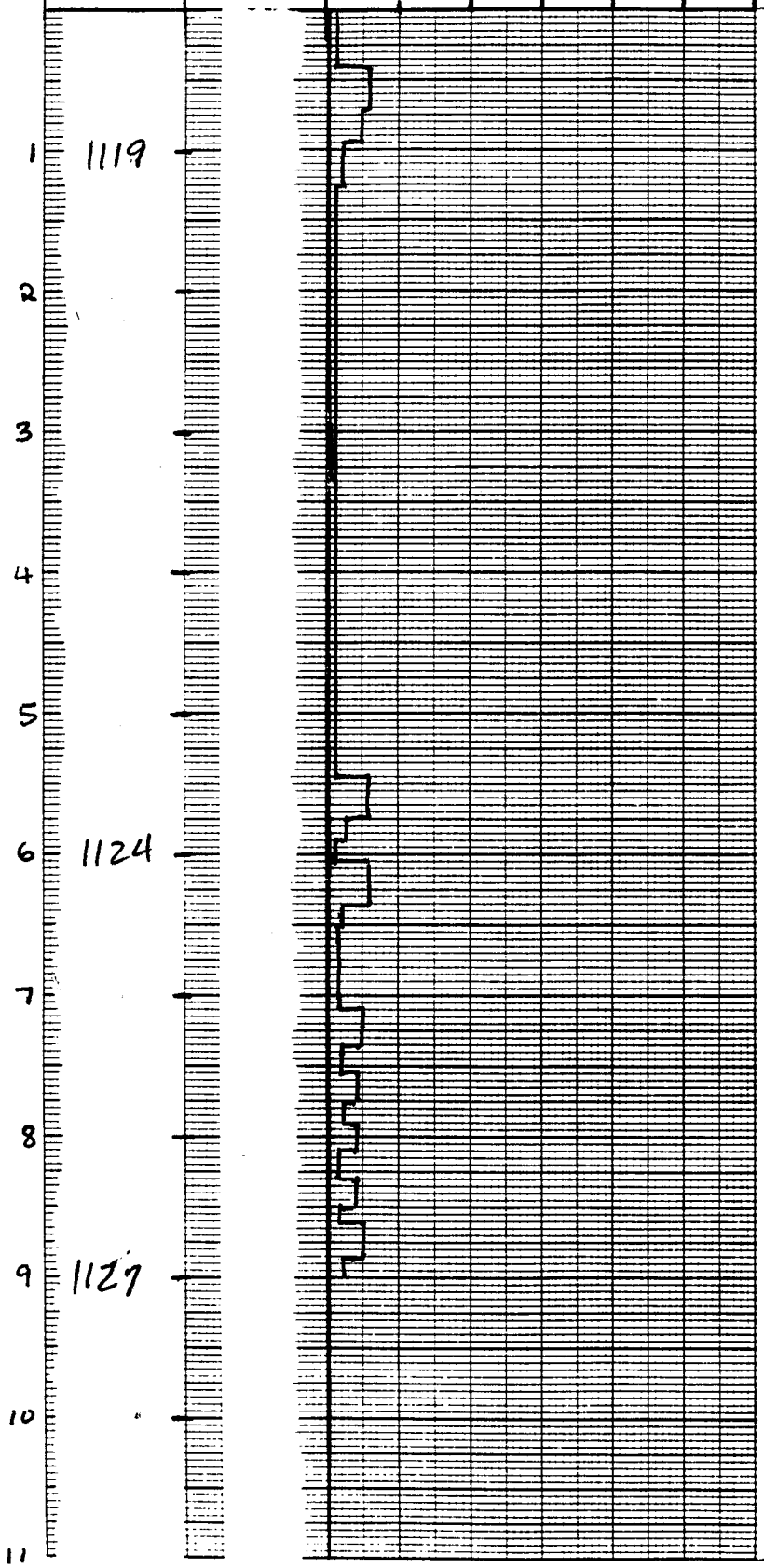
Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks



K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM KEUFFEL & ESSER CO. MADE IN U.S.A. 46 1510

Box Number: 121 Start Depth: 1118.5 End Depth: 1127

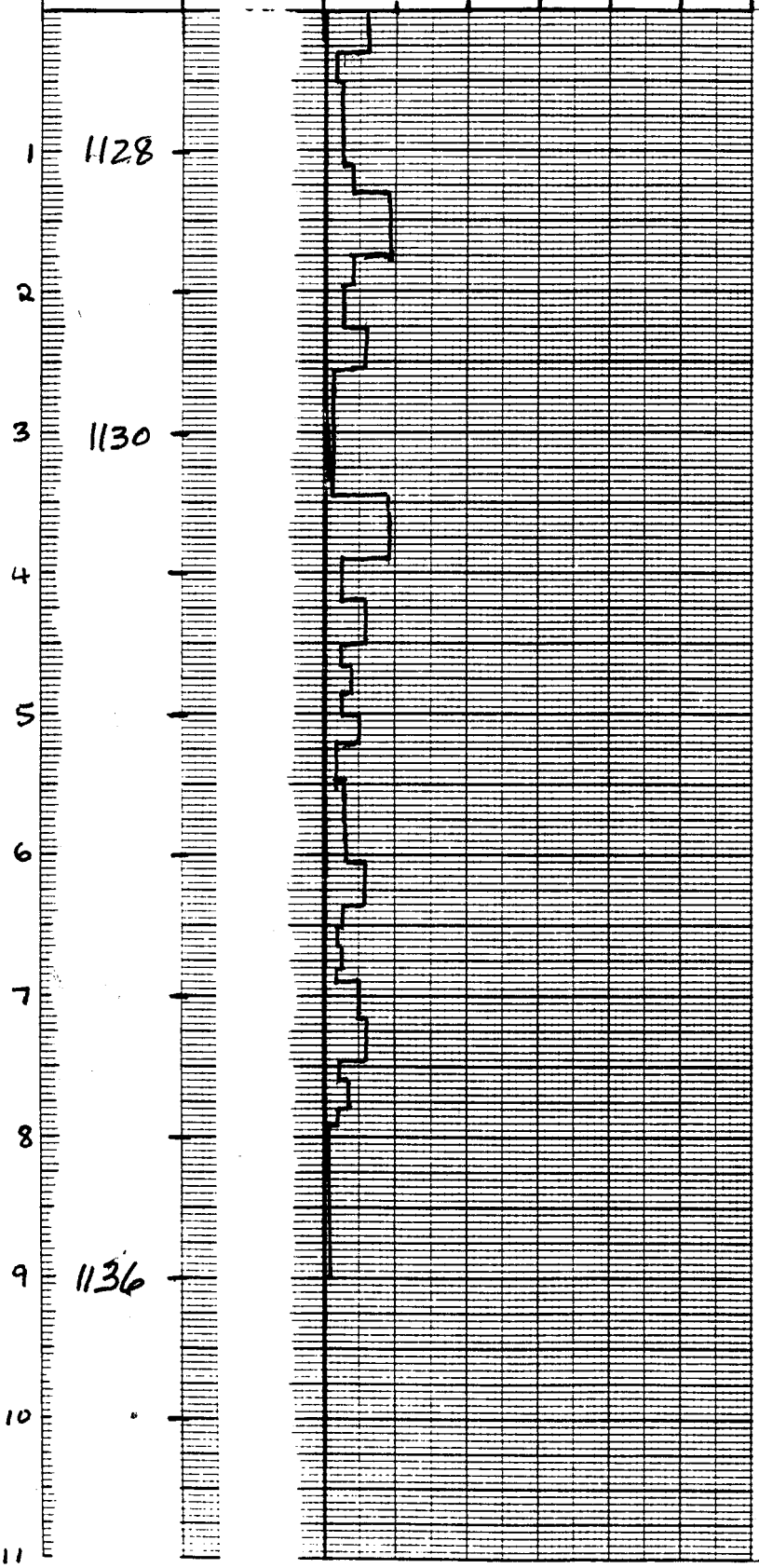
Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks
1119			
1124			
1127			



K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM
KEUFFEL & ESSER CO. MADE IN U.S.A.
46 1510

Box Number: 122 Start Depth: 1127 End Depth: 1136

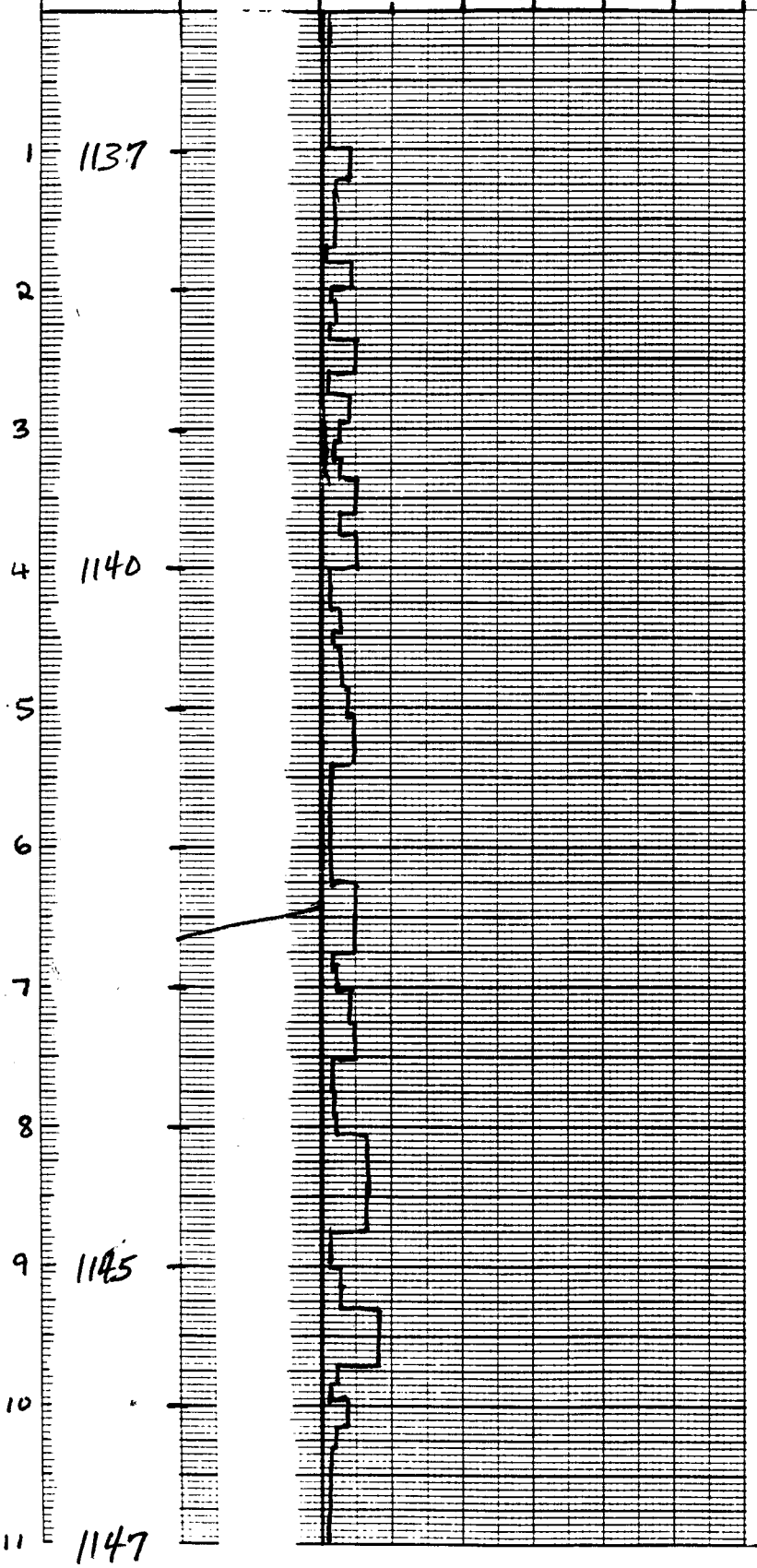
Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks



K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM KEUFFEL & ESSER CO. MADE IN U.S.A. 46 1510

Box Number: 123 Start Depth: 1136 End Depth: 1147

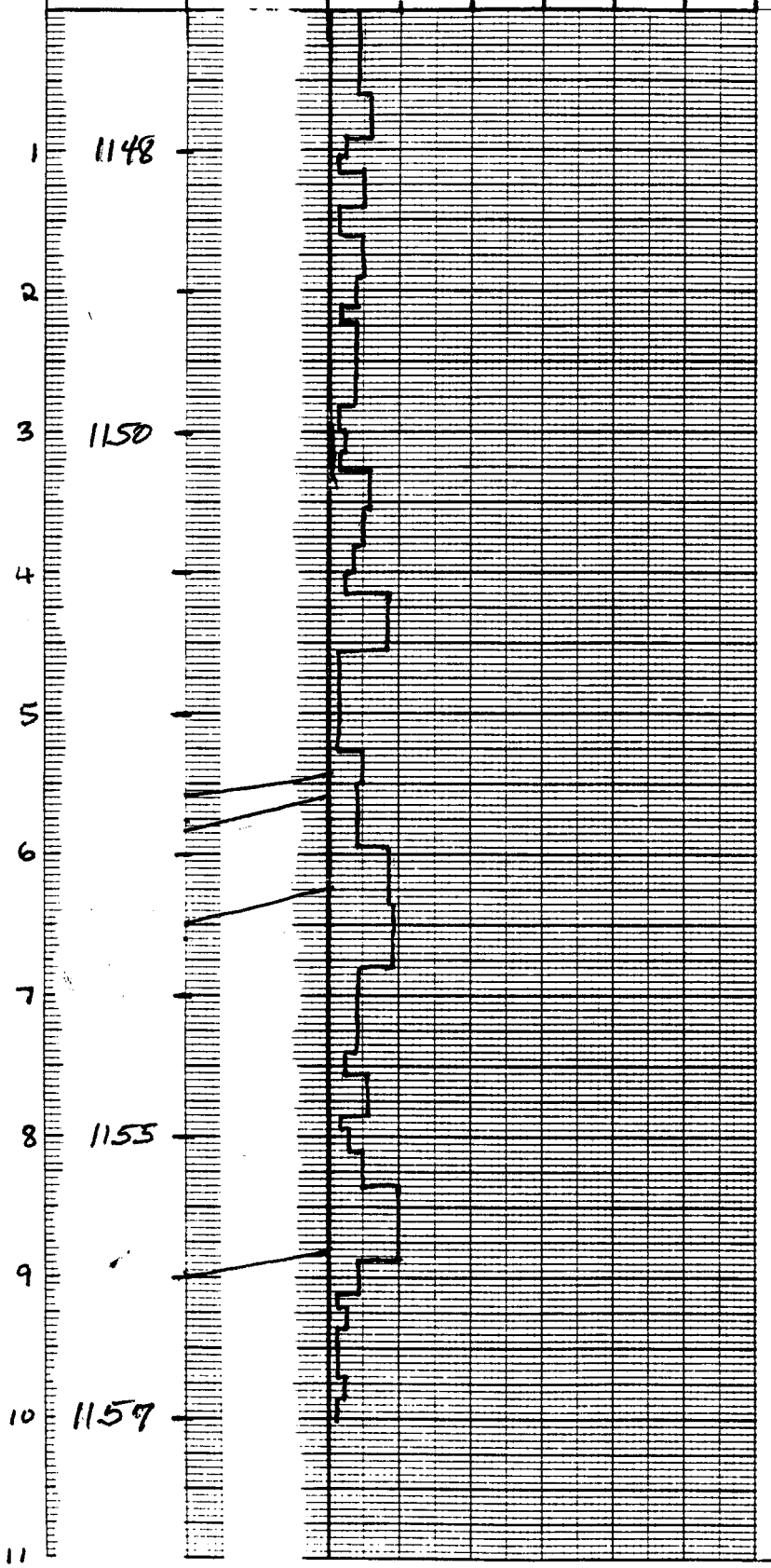
Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks



K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM KEUFFEL & ESSER CO. MADE IN U.S.A. 46 1510

Box Number: 124 Start Depth: 1147 End Depth: 1157

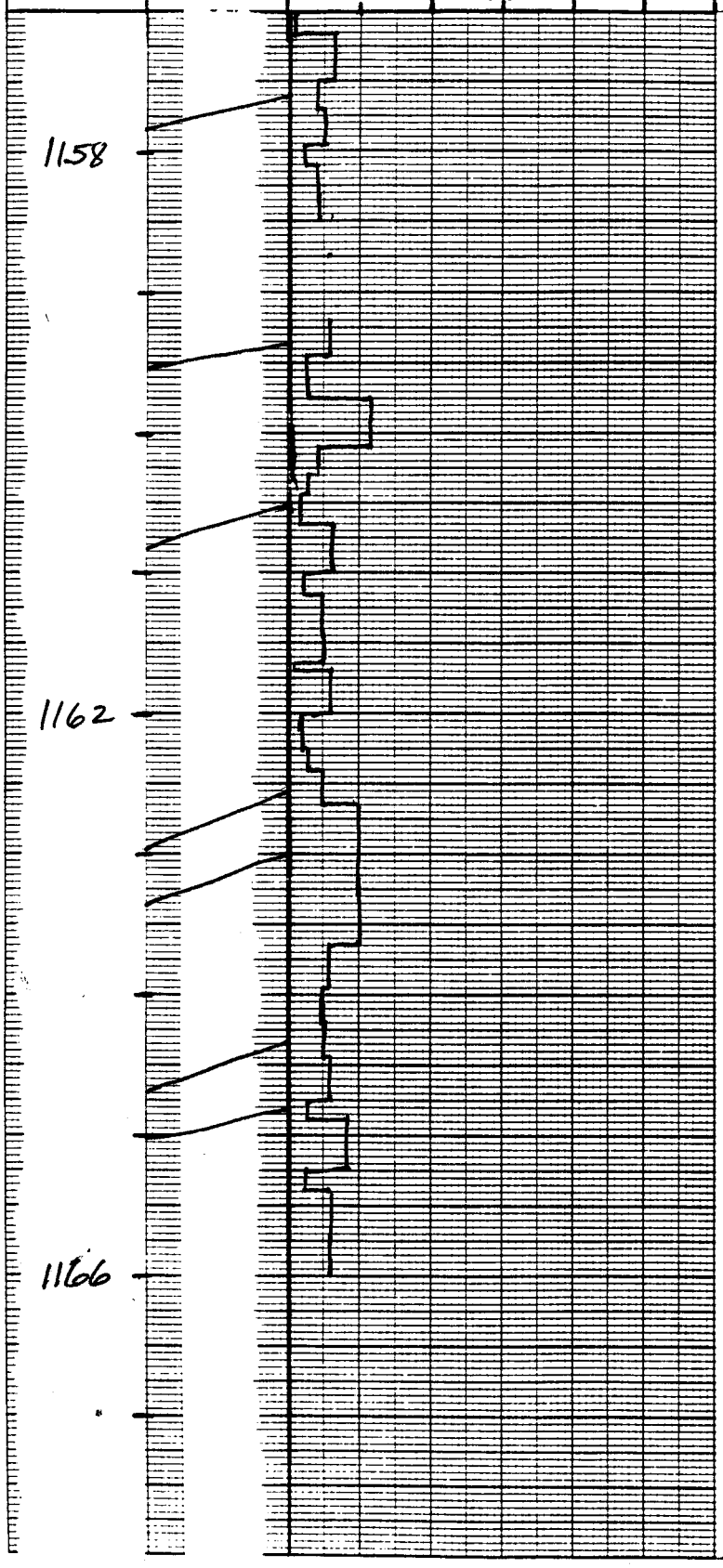
Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks



461510
K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM
KEUFFEL & ESSER CO. MADE IN U.S.A.

Box Number: 125 Start Depth: 1157 End Depth: 1166

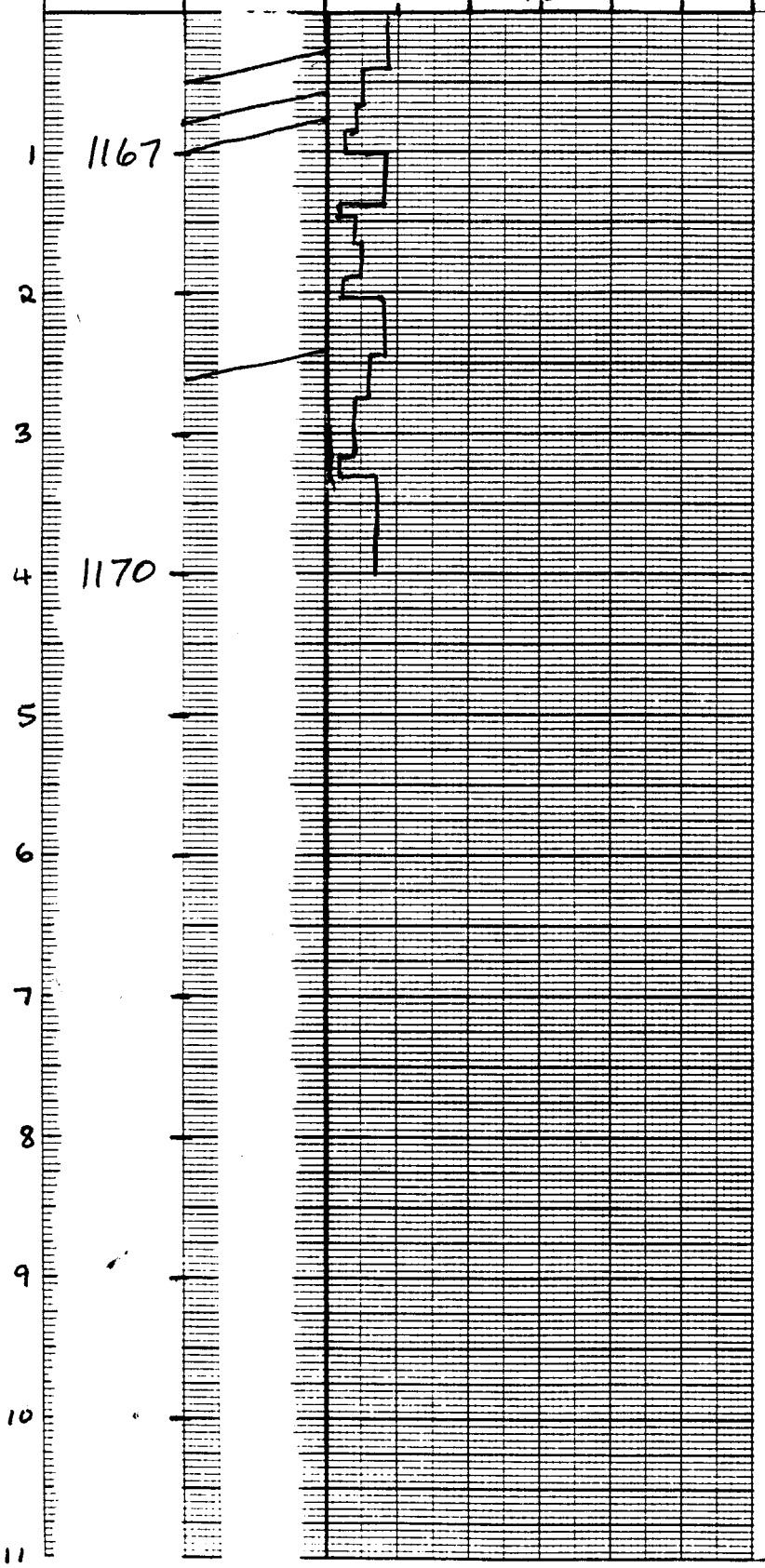
Depth (ft)	Major Fracture	Core Continuity (ft) 0.5 1.0 1.5 2.0 2.5	Remarks
1158			
			Missing
1162			
1166			



K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM KEUFFEL & ESSER CO. MADE IN U.S.A. 46 1510

Box Number: 126 Start Depth: 1166 End Depth: 1170

Depth (ft)	Major Fracture	Core Continuity (ft)	Remarks

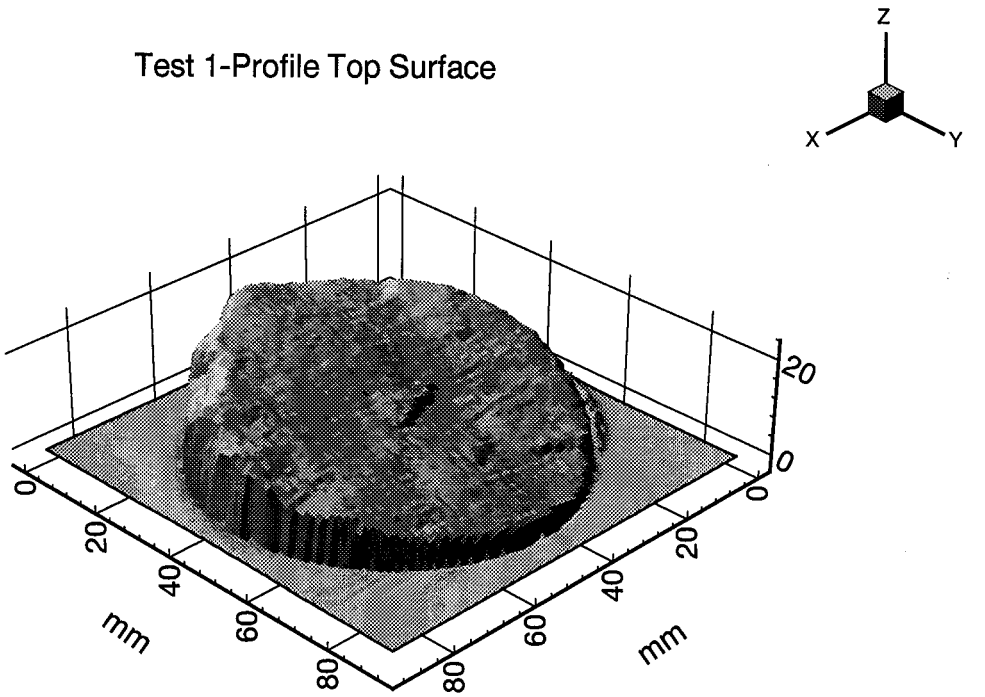


K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM KEUFFEL & ESSER CO. MADE IN U.S.A. 461510

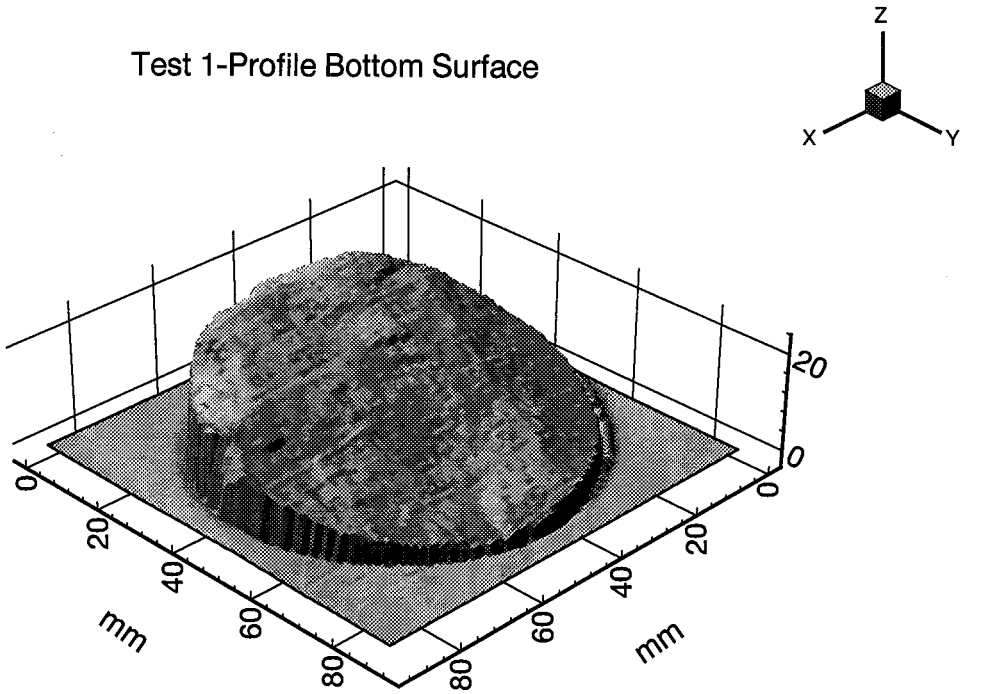
Core #	Depth
1	26'
2	38'
3	47'
4	98'
5	261'

National® Brand
42-381 50 SHEETS EYE-EASE® 5 SQUARE
42-382 100 SHEETS EYE-EASE® 5 SQUARE
42-389 100 RECYCLED WHITE 5 SQUARE
42-392 100 RECYCLED WHITE 5 SQUARE
42-399 200 RECYCLED WHITE 5 SQUARE
Made in U.S.A.

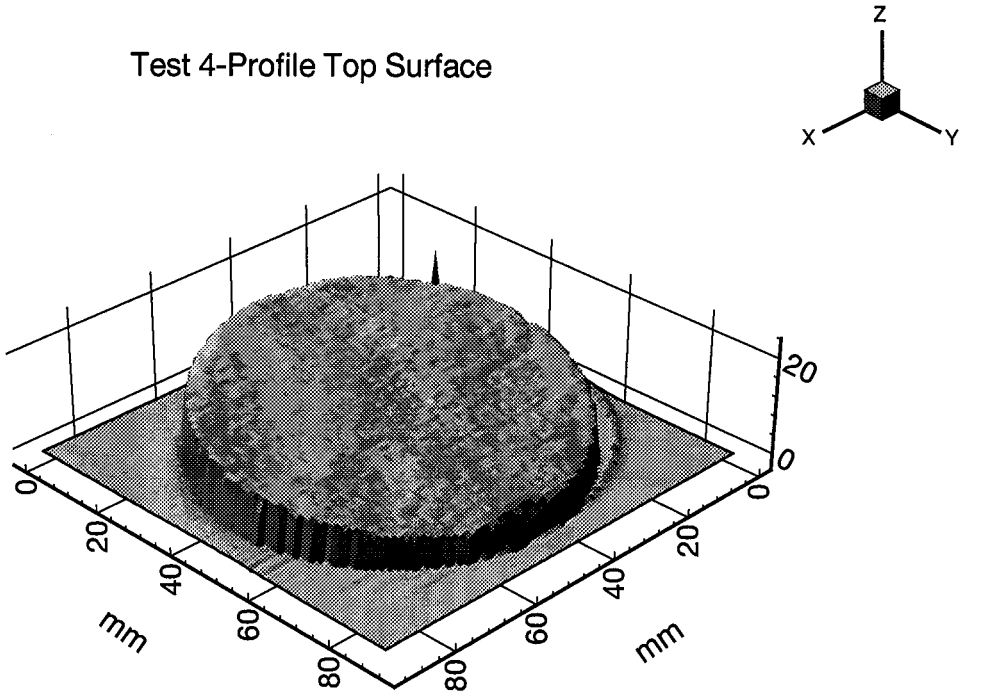
(3D) || Print || 17 Jun 1994 || c1a.plt || CORE 1A



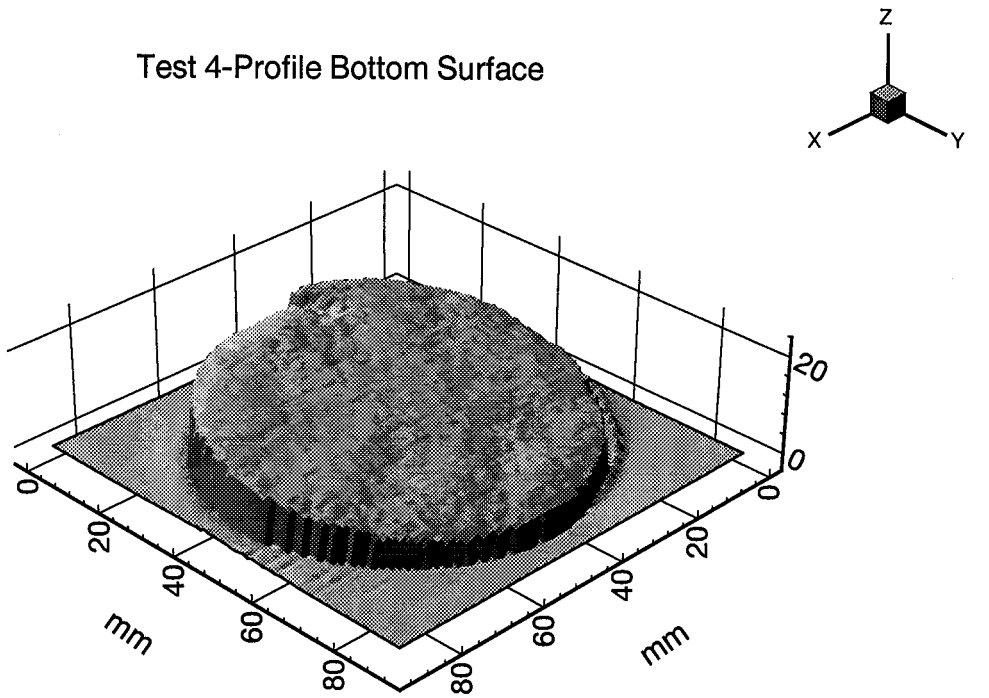
(3D) || Print || 17 Jun 1994 || c1b.plt || CORE 1B



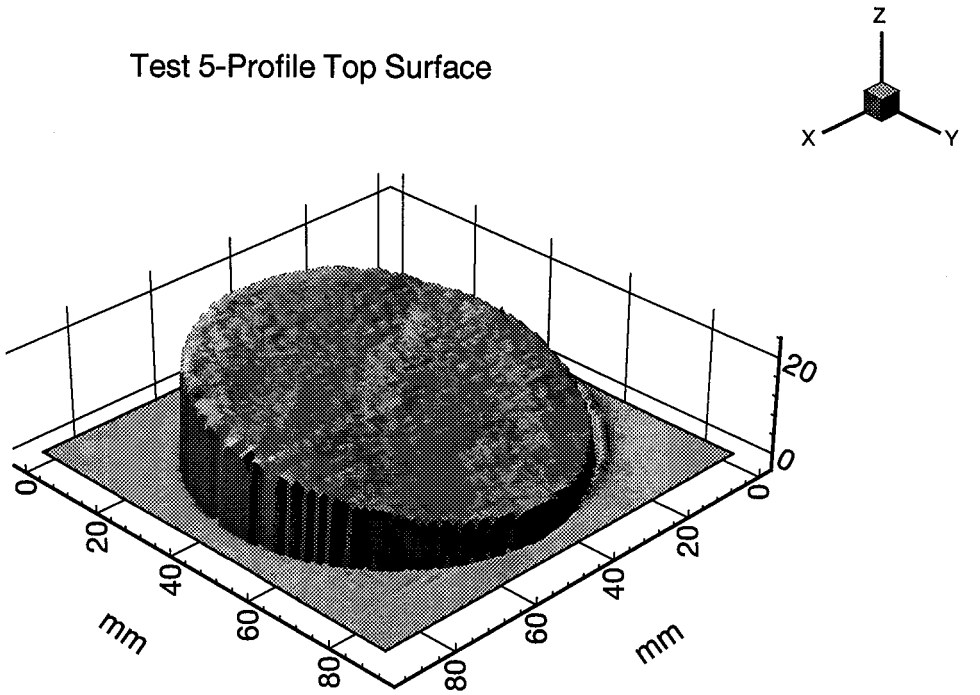
(3D) || Print || 17 Jun 1994 || c4a.plt || CORE 4A



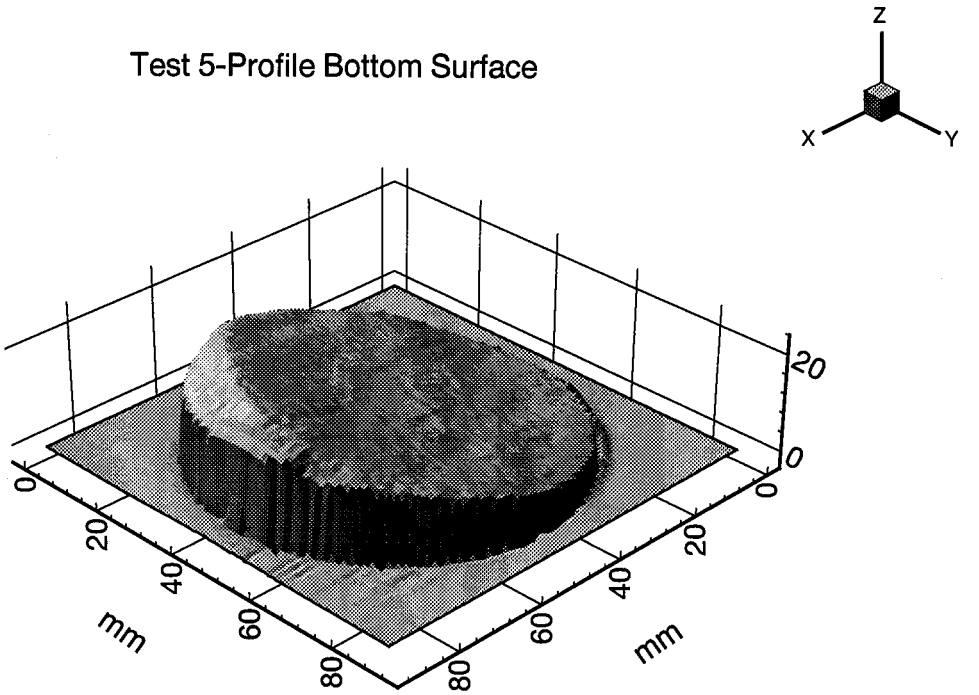
(3D) || Print || 17 Jun 1994 || c4b.plt || CORE 4B



(3D) || Print || 17 Jun 1994 || c5a.plt || CORE 5A



(3D) || Print || 17 Jun 1994 || c5b.plt || CORE 5B



Mikko Ahola

6/20/94 Lucky Friday Mine Cores

Schmidt Hammer Tests. (Schmidt hammer held in vertical position)

Core #1

~~Top~~

Test #	Rebound #
1	53
2	51
3	54
4	53
5	44
6	48
7	
8	Core
9	broke
10	

Bottom

Test #	Rebound #
1	44
2	52
3	53
4	56
5	50
6	60
7	47
8	52
9	56
10	61
11	56
12	60
13	45
14	61
15	60

Core #2

Top		Bottom	
Test #	Rebound #	Test #	Rebound #
	Core broke	1	
		2	
		3	
		4	
		5	
		6	
		7	
		8	
		9	Core broke
		10	during Schmidt
		11	hammer testing
		12	
		13	
		14	
		15	

Core #3

Top

Test #	Rebound #
1	54
2	42
3	45
4	44
5	48
6	56
7	43
8	45
9	53
10	54
11	54
12	54
13	58
14	50
15	58

Bottom

Test #	Rebound #
1	50
2	53
3	48
4	50
5	50
6	52
7	58
8	50
9	50
10	49
11	51
12	58
13	49

Core #4

Top Tst #	Rebound #	Bottom Tst #	Rebound #
		1	36
		2	34
	Core broke	3	23
		4	34
		5	Core broke

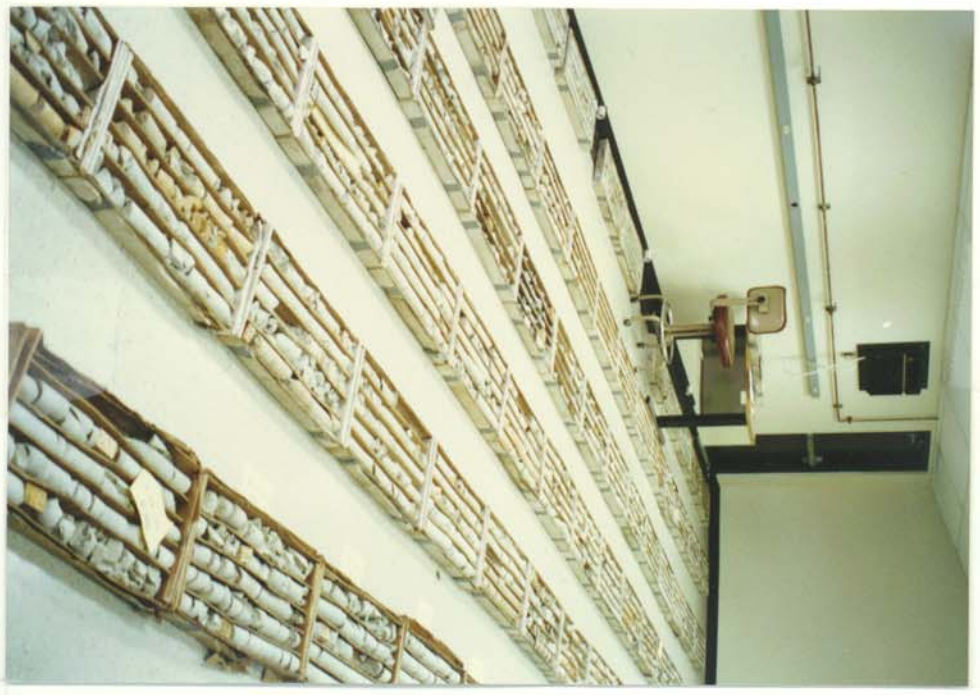
Core #5

Top Test #	Top Rebound #	Bottom Test #	Bottom Rebound #
1	34	1	22
2	52	2	23
3	36	3	33
4	26	4	52
5	46	5	42
6	32	6	50
7	38	7	22
8	55	8	47
9	44	9	37
10	43	10	50
11	37	11	52
12	35	12	36
13	42	13	58
14	48	14	49
15	39	15	50

Tilt Test

Core No.	Trial No.	Tilt Angle (Degrees)
1	1	58°
	2	55°
2	1	54°
	2	51°
3	1	58°
	2	59°
4	1	54°
		61°
5	1	45°
	2	58°

Core No.	Top/Sliding Block Weight (grams)
1	65.1 g
2	45.2 g
3	92.5 g
4	57.3 g
5	75 g



Box 3
20- 29.5

Hole No. 57-73
From 20 - 29.5
Box No. 3

Box 4
29.5- 38

Box 5
38- 46

Box 6
46-55

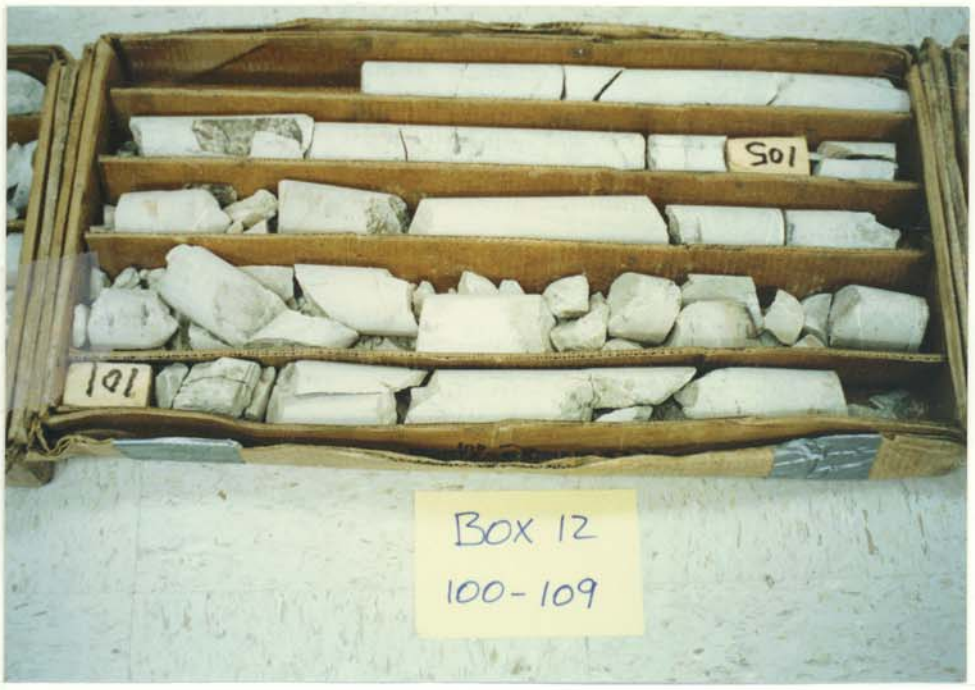
Box 7
55-64.5

Box 8
64.5-73

Box 9
73-83

DISC
Box 10
83-93

Box 11
91-100


Box 12
100-109

Box 13
109-119

Box 14
119-128

Box 15
128-136

Box 16
136-145

Box 17
145-154.5

Box 18
154.5-164

Box 19
164-173

Box 20
173-

Box 22
191-201

Box 23
201-209.5

223
228
BOX 24
220-228

230
233
BOX 26
228-236

243
233
BOX 27
236-248

254
253
248
BOX 28
248-257

263
259
BOX 29
257-265.5

268
273
274
BOX 30
265.5-275

279
273
284
BOX 31
275-284

286
290
284
BOX 32
284-293

295
300
310
BOX 33
293-302

295
300
310
BOX 33
293-302

305
310
BOX 34
302-312

315
320
BOX 35
312-322

325
329
BOX 36
322-331

334
339
342
BOX 37
331-340

342
346
349
BOX 38
340-347.5

352
354
359
BOX 39
347.5-361

363
368
BOX 40
361-371

373
380
375
BOX 41
371-380

380
384
BOX 42
380-388

389
394
BOX 43
388-396

399
BOX 44
396-404

Box 19
164-173
Box 20
173-
399
BOX 44
396-404

399
BOX 44
396-404

Box 20
173-
404
409
BOX 45
404-412

414
419
BOX 46
412-419

191-201
429
BOX 47
419-431

201-209.5
BOX 48
431-441.5

BOX 24
220-228
446
448
BOX 49
441.5-450

451.5
456.5
BOX 50
450-459

460
469
BOX 51
450-471.5

349
478
BOX 52
471.5-482

349
482.5
487.5
BOX 53
482-490.5

492.5
493
498
BOX 54
490.5-498.5

508
513
515
BOX 56
507.5-518

518
518.5
519
522
525
BOX 57
518-527

530
534
BOX 58
527-534

539
BOX 59
534-544

544
548
548.5
551
BOX 60
544-552.7

556
561
563
BOX 61
552.7-563

566
571
BOX 62
563-573

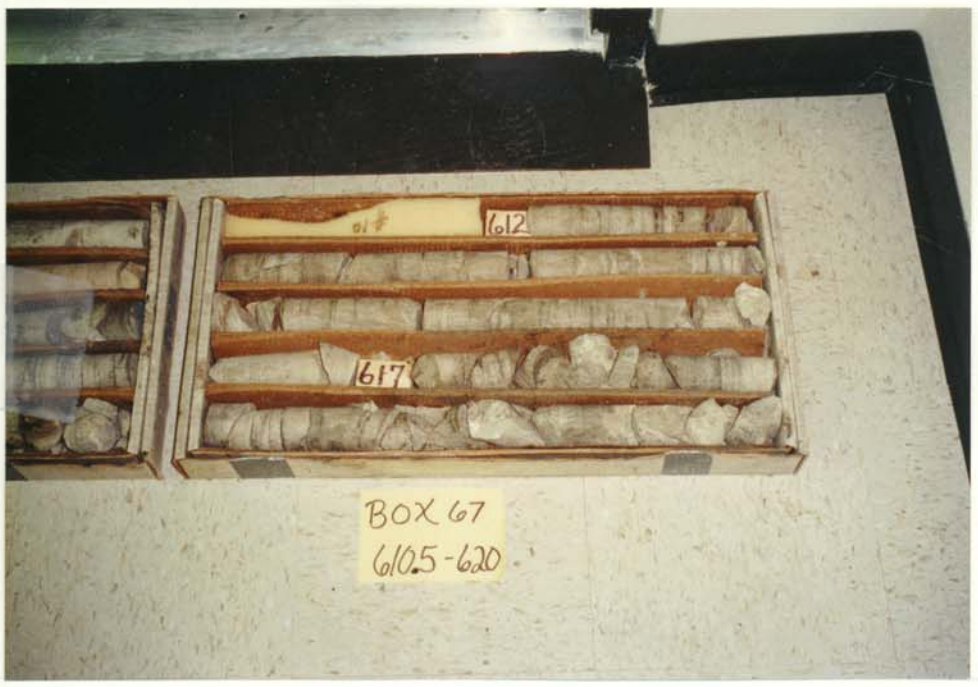
575
579
582
BOX 63
573-583

584
586
589
BOX 64
583-591

594
597
598
BOX 65
591-601

509
BOX 66
601-610.5

612
617
BOX 67
610.5-620


612
617
BOX 67
610.5-620

612
617
BOX 67
610.5-620

622
624

629
632
633
Box 69
228-237.5

629
632
633
Box69
628-637.5

638
639
644
BOX 70
237.5-246.5

638
639
644
BOX 70
637.5-646.5

648
653
BOX 71
646.5-655.5

657
662
665
665
BOX 72
655.5-666.5

BOX 60
544-552.5
668
673
BOX 73
666.5-675.5

676
681
686
BOX 74
675.5-686

figure_text
748
750
755
BOX 81
744.5-755

774
780
Box 84
773- 783

785
788
791
Box 85
783- 795

795
800
Box 86
795-803

805
810
Box 87
803- 812

815
817
822
Box 88
812-822.5

815
817
822
Box 88
812-822.5

815
817
822
Box 88
812-822.5

827
Box 89
822.5-831.5

832
837
Box 90
831.5-840

842
847
Box 91
840-848.5

852
853
858
Box 92
848.5-858

860
865
Box 93
858-868

870
875
Box 94
868-877

880
884
Box 95
877-886

Box 96
886-895

903
Box 97
895-904

908
BOX 98
904 – 913

940
BOX 101
933 – 942

BOX 102
942 - 951

BOX 103
951 – 960

BOX 105
968.5 - 978

BOX 106
978 - 986

BOX 107
986 – 995

BOX 108
995 – 1008

1009
BOX 109
1008-1017

#6
1021
BOX 110
1017-1025

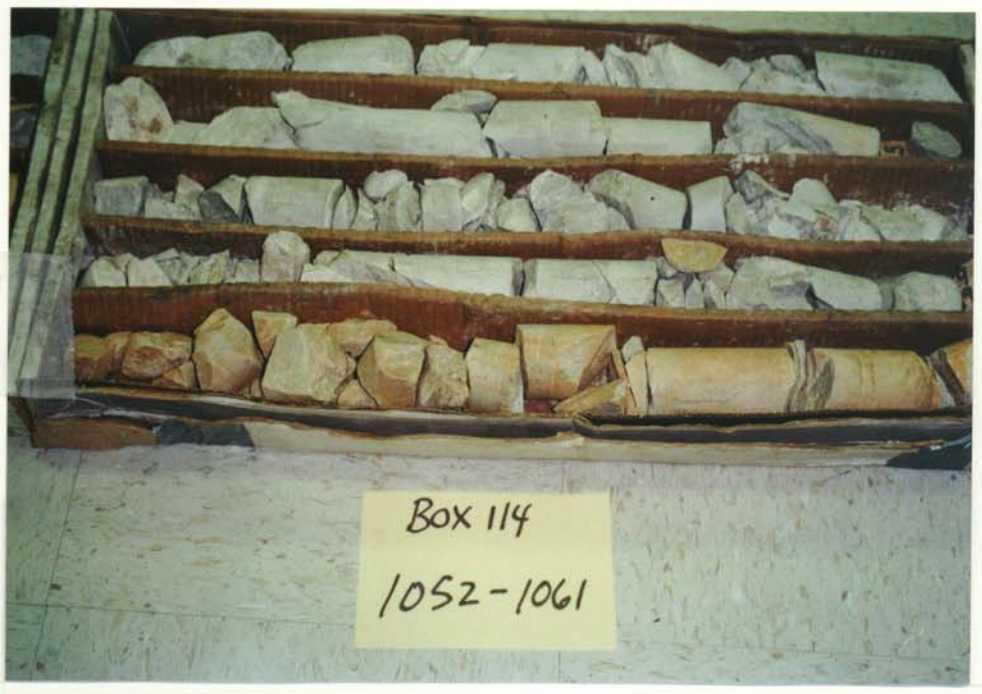
#6
1021
BOX 110
1017-1025

1029
BOX 111
1025-1033

1029
1031
BOX 111
1025-1033

BOX 112
1033-1043

BOX 113
1043-1052


BOX 114
1052-1061

BOX 115
1061-1070

BOX 116
1070-1081

BOX 117
1081-1090.5

BOX 118
1090.5-1099

BOX 119
1099-1109

BOX 120
1109-1118.5

BOX 121
1118.5-1127

BOX 122
1127-1136

BOX 123
1136 - 1147

BOX 124
1147 - 1157

BOX 125
1157 - 1166

BOX 126
1166 - 1170
EOH.

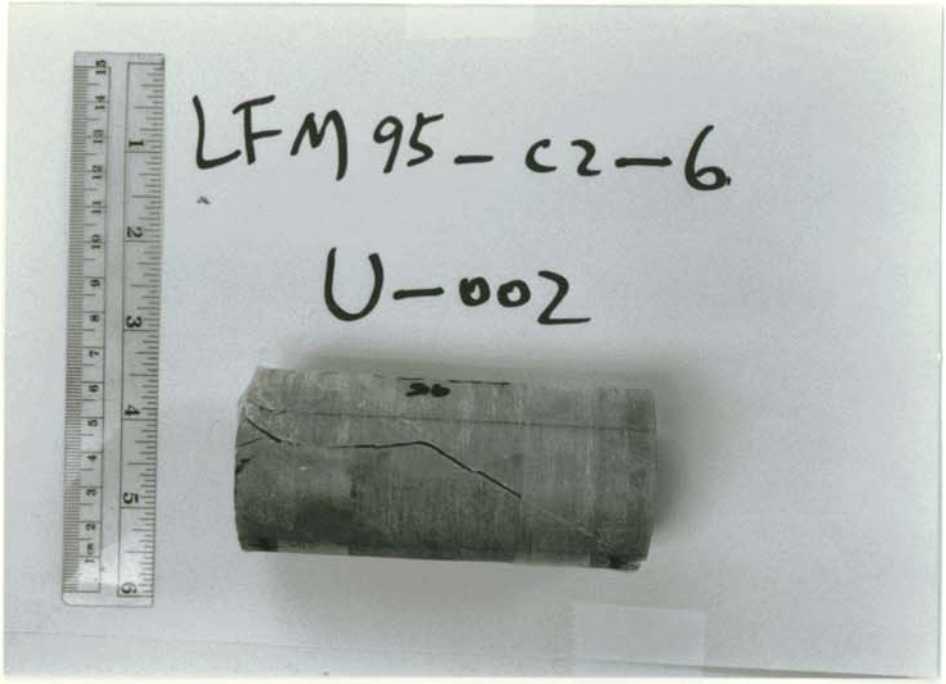
Share your memories...

COMPRESSION TEST SAMPLES

Treasured Moments

BEFORE TESTS

LFM-95-C2-6
U-001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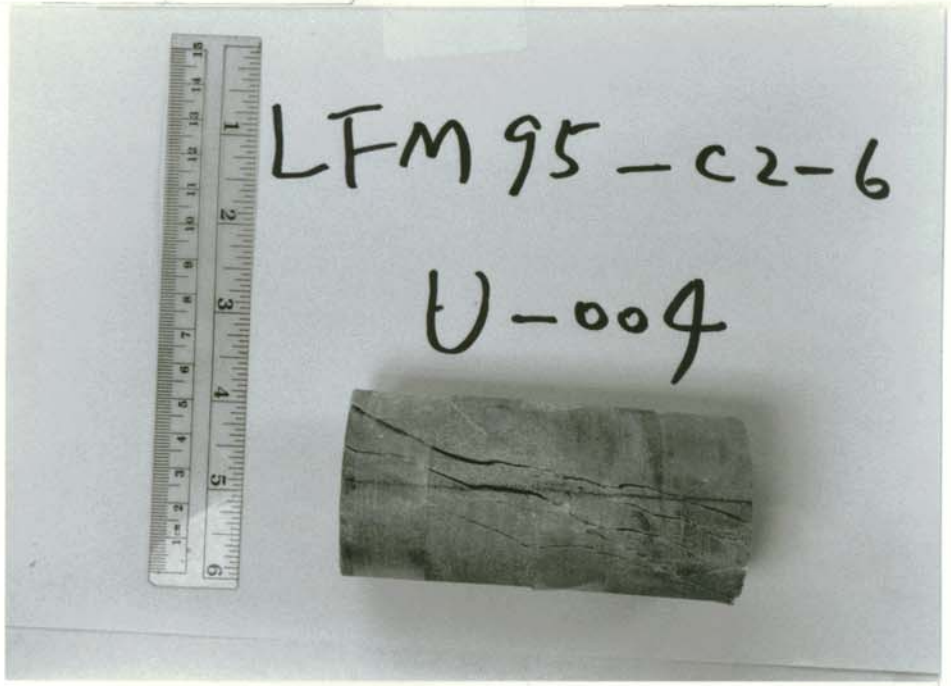
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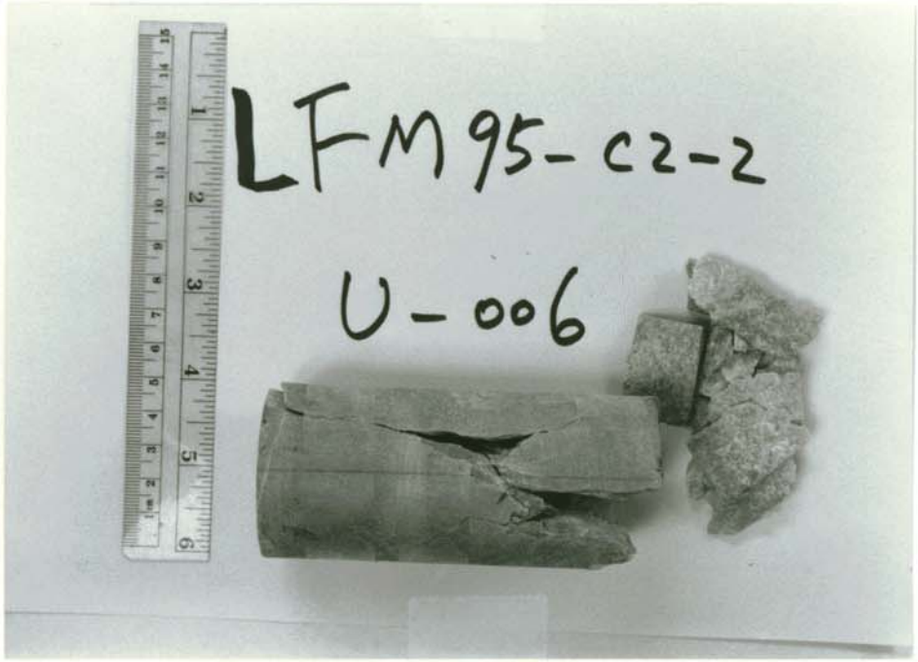
U-004

LFM 95-C2-6
U-005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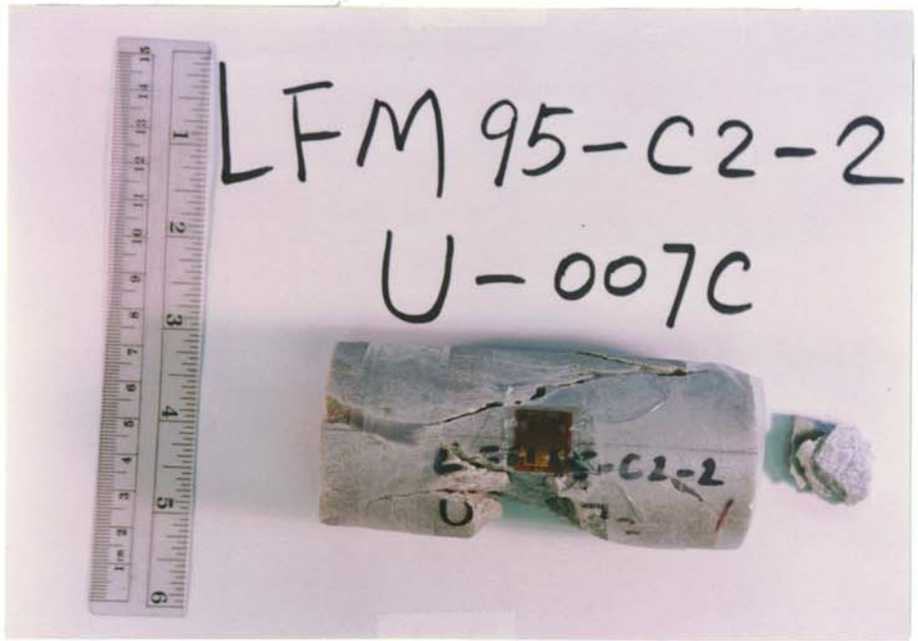
U-006

LFM95-C2-2
U-007b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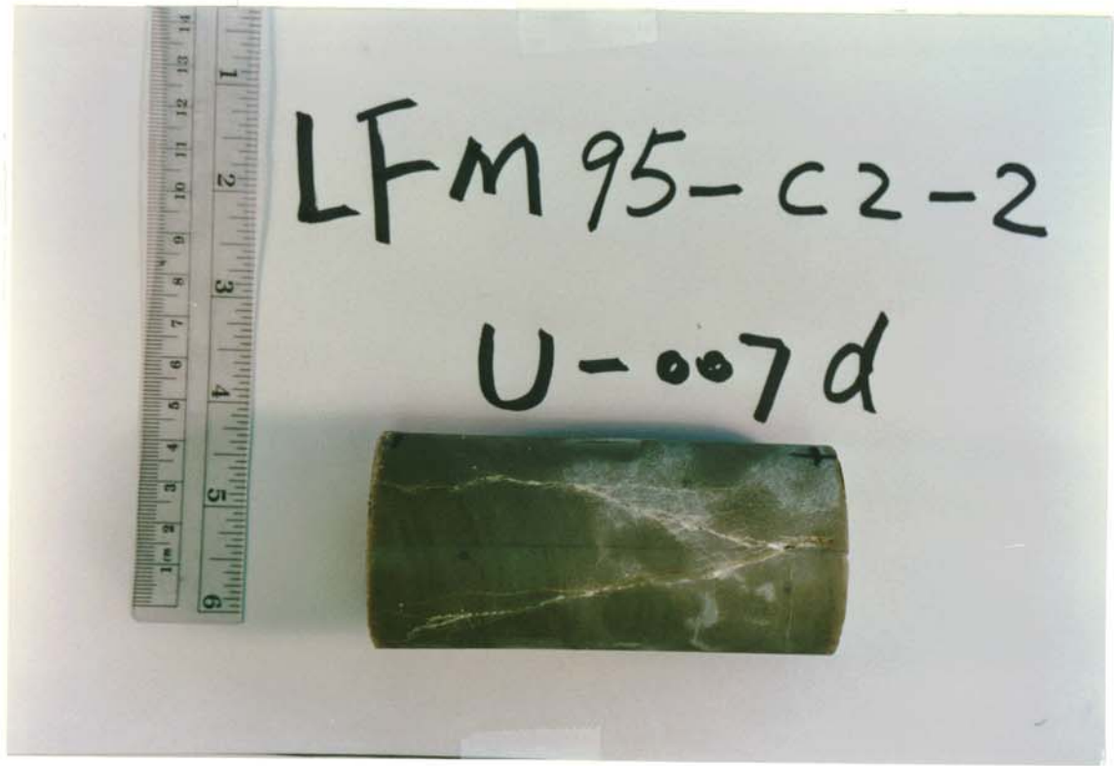
U-007C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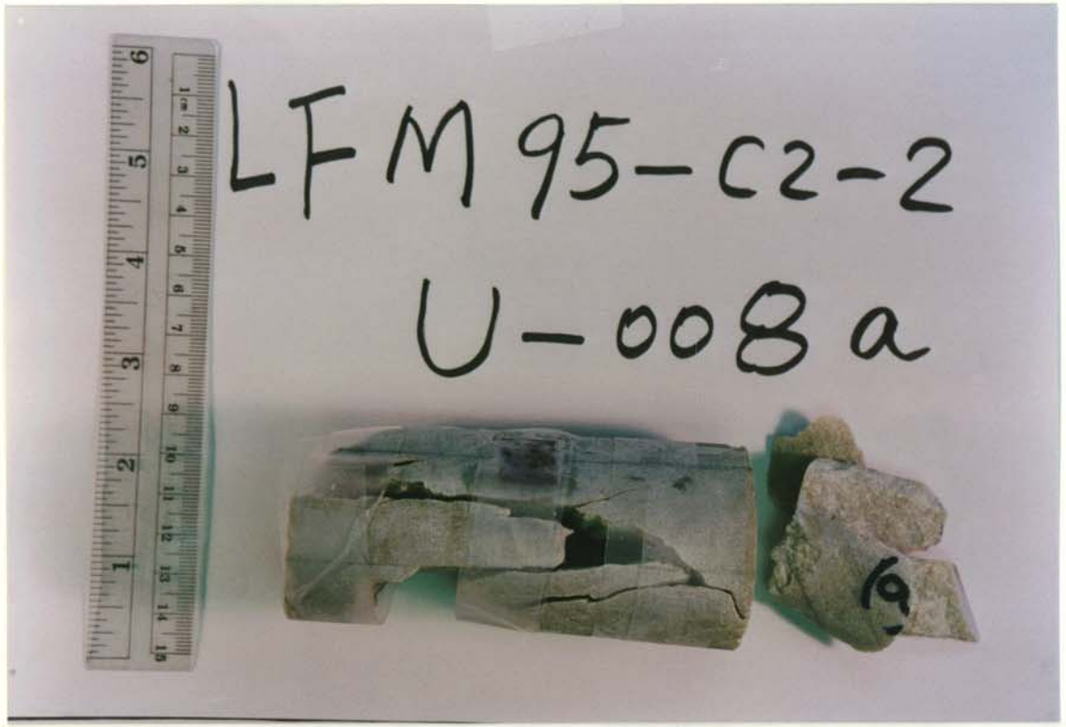
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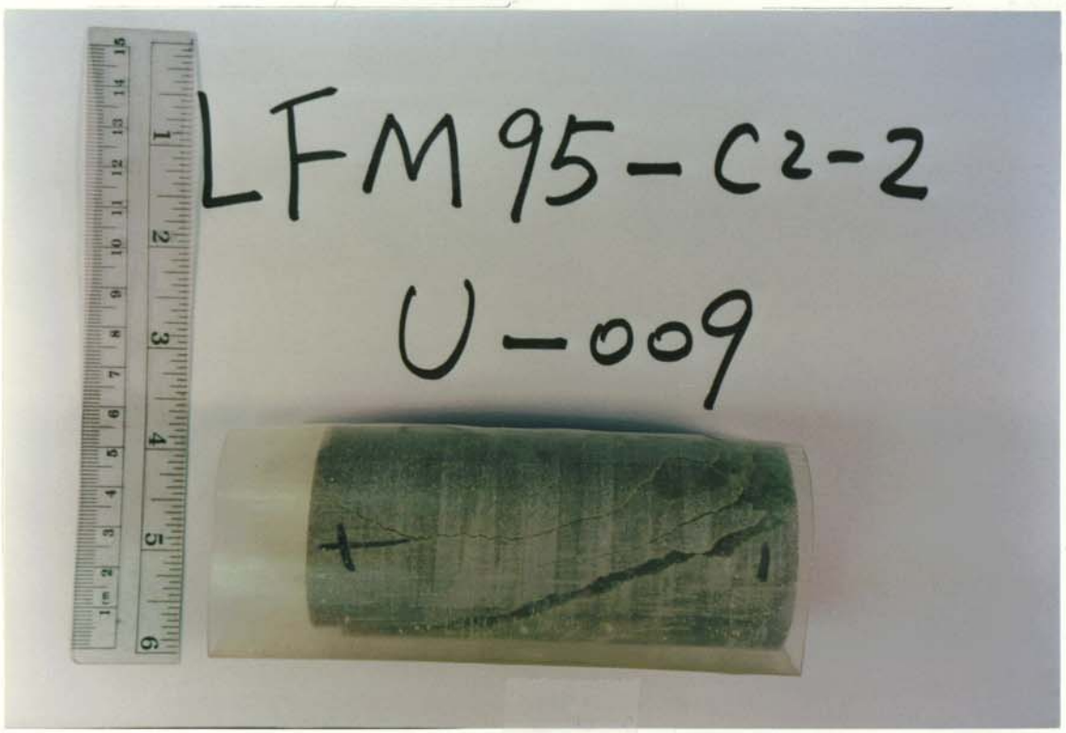
U-008b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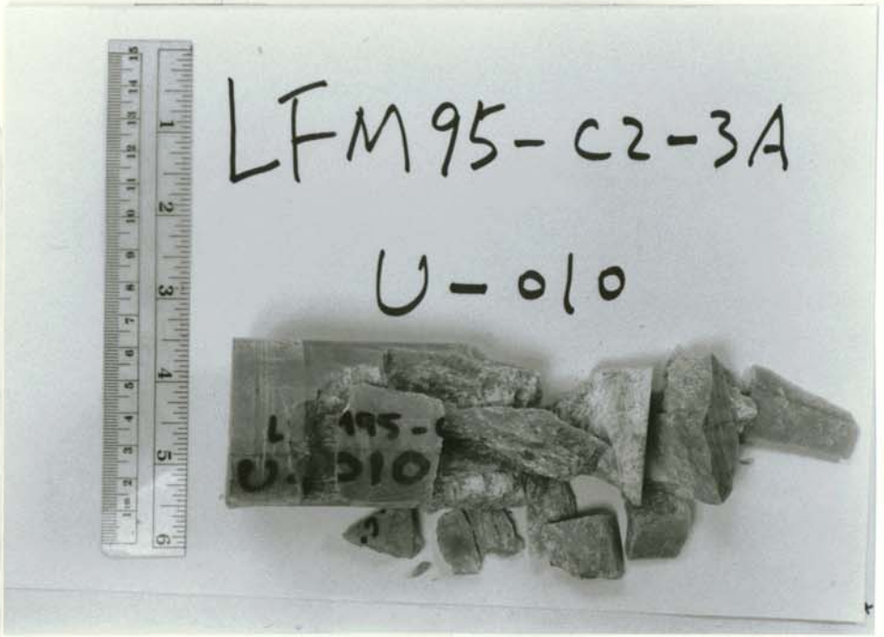
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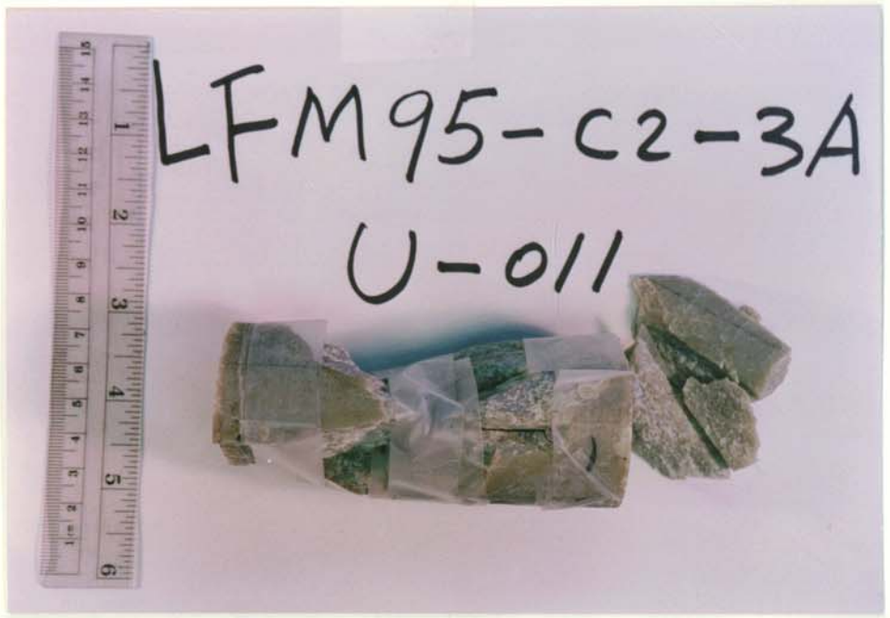
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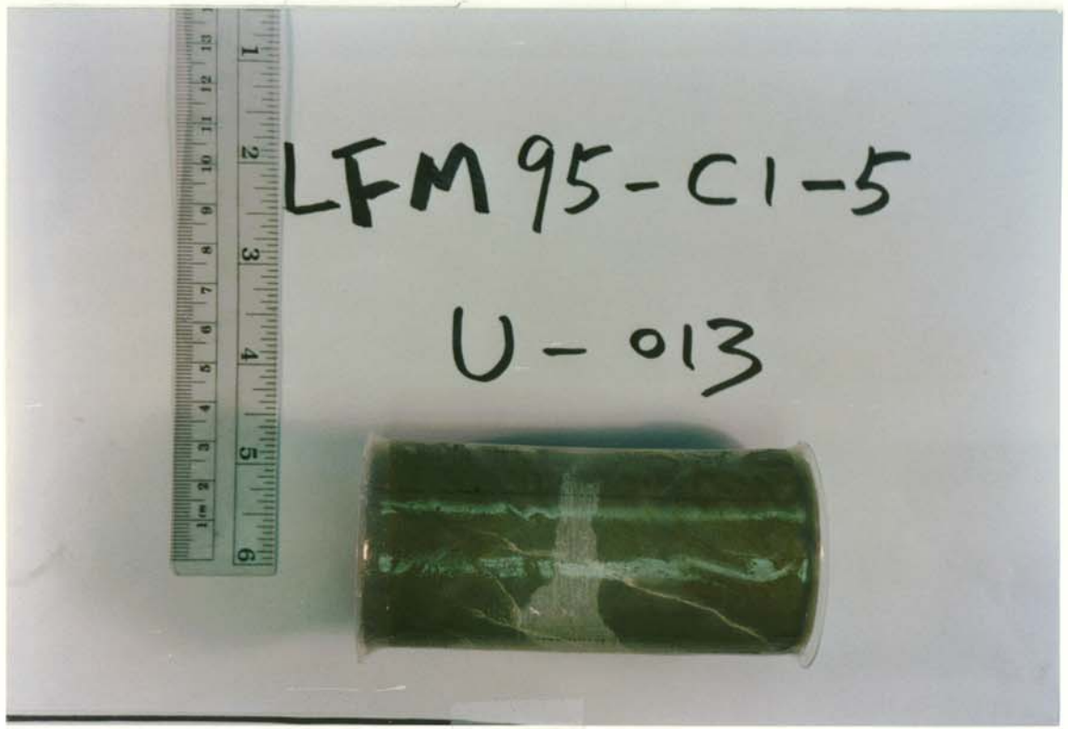
U-011

LFM95-C1-5
U-012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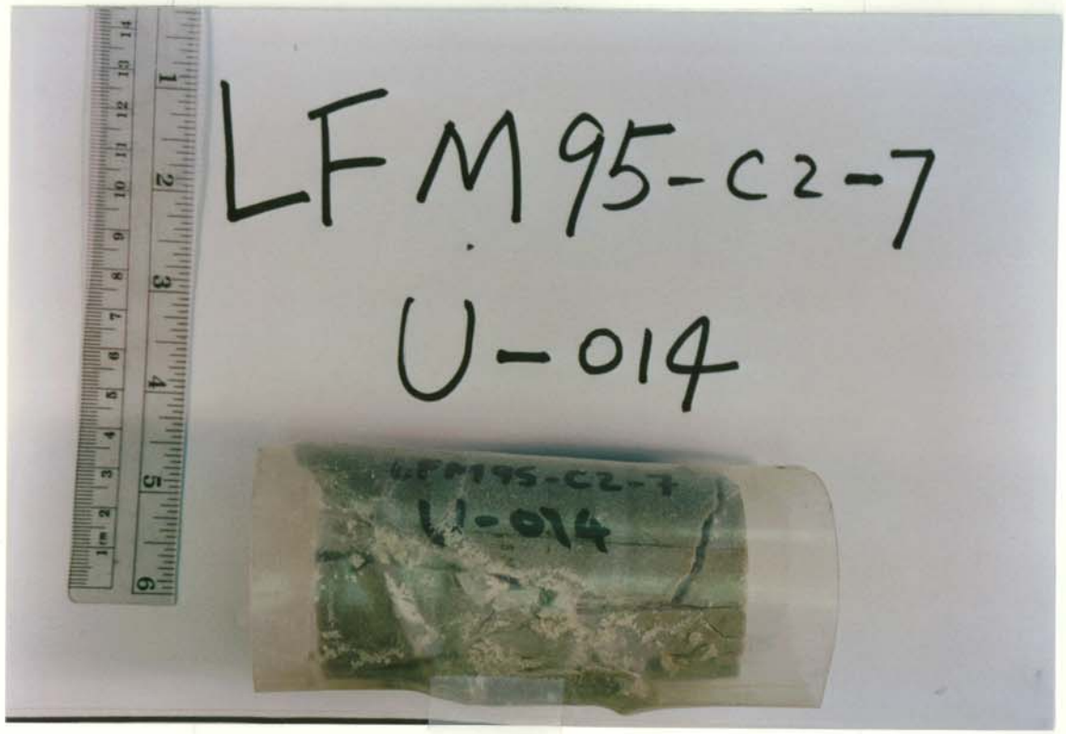
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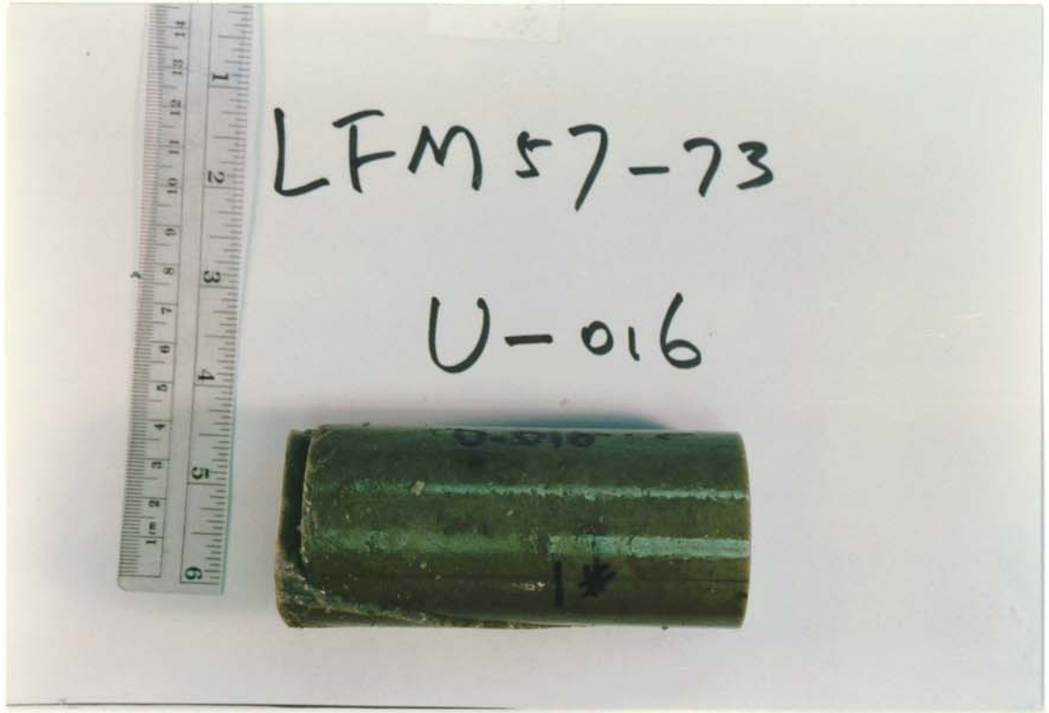
U-014

LFM95-C2-2
U-015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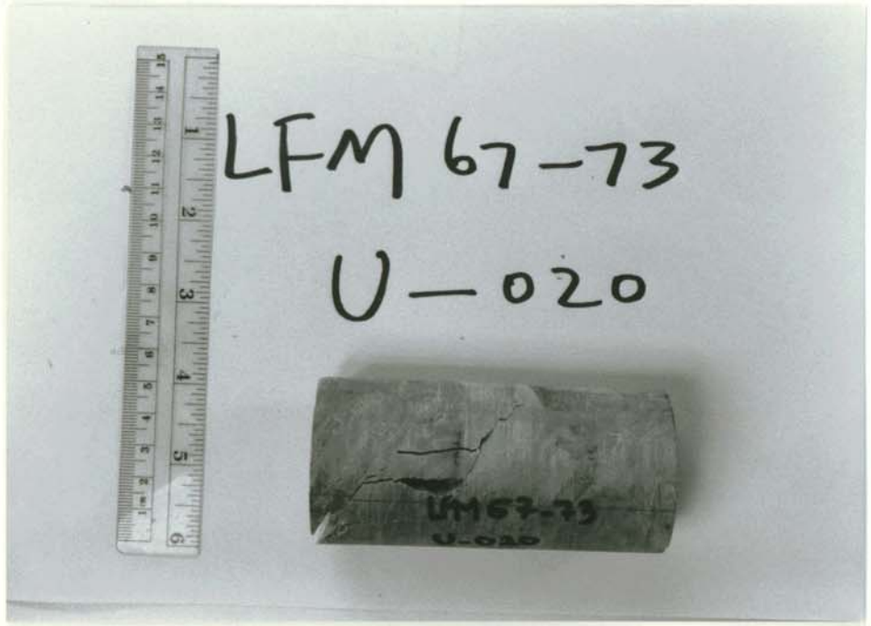
U-016

LFM57-73
U-017

LFM57-73
U-018

LFM 57-73
U-019b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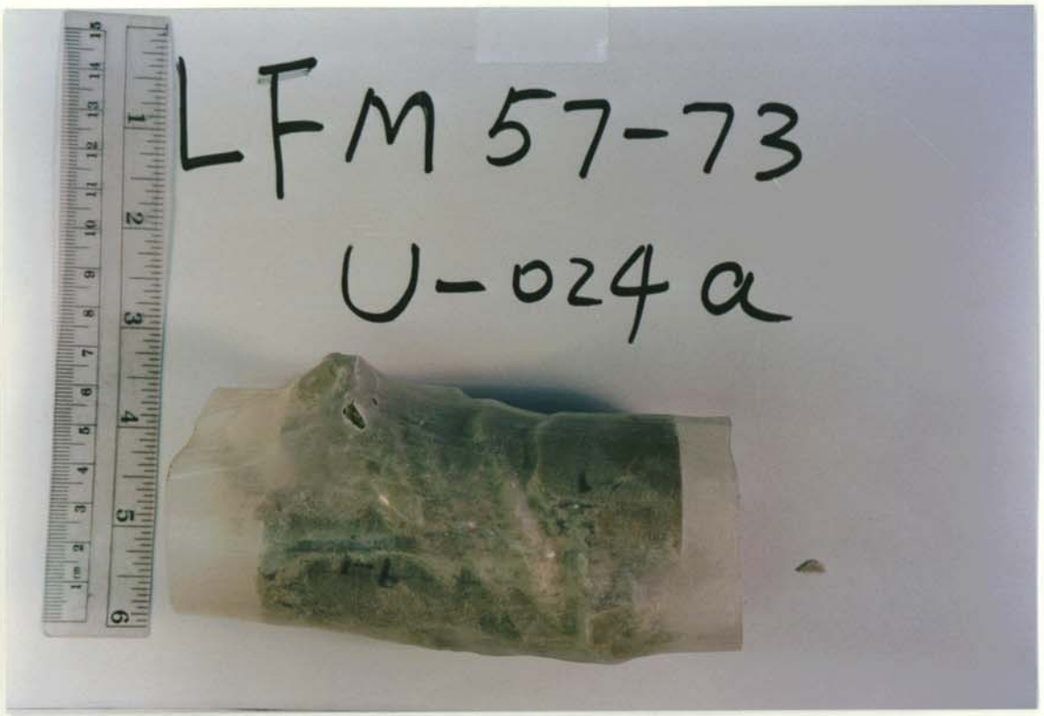
U-020

LFM 57-73
U-022

LFM 57-73
U-023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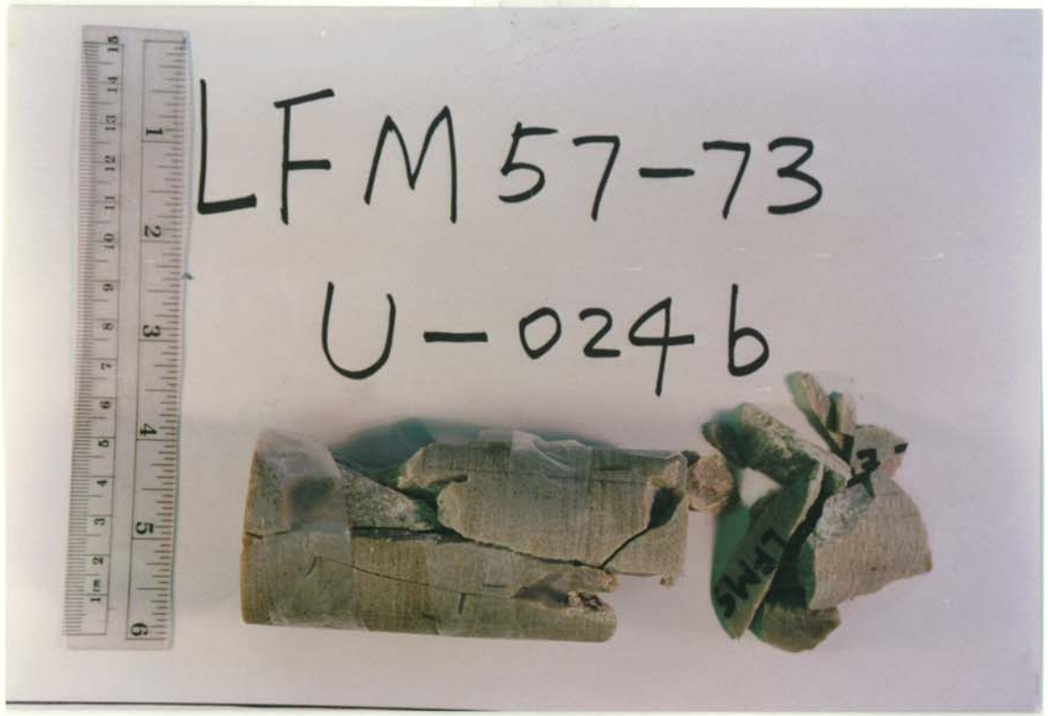
U-024a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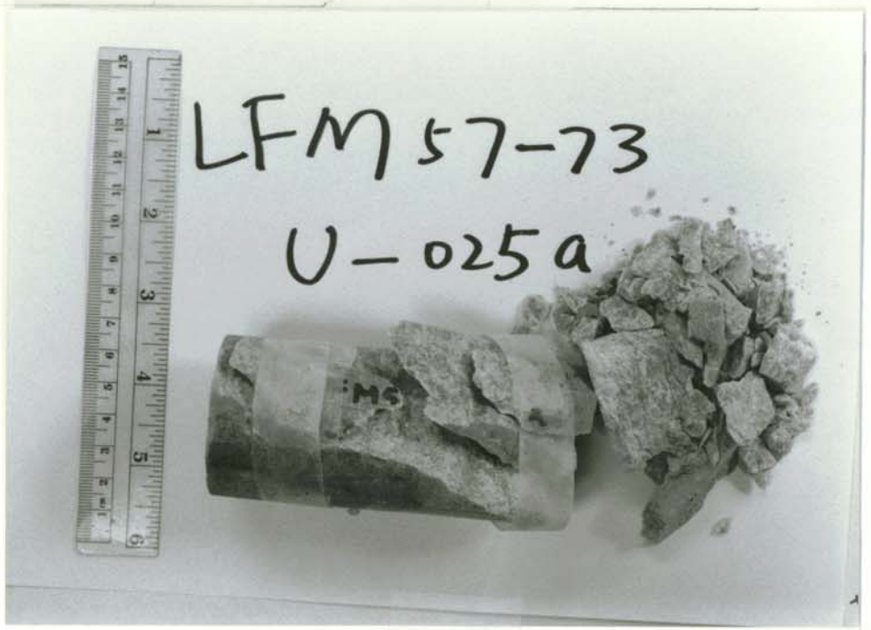
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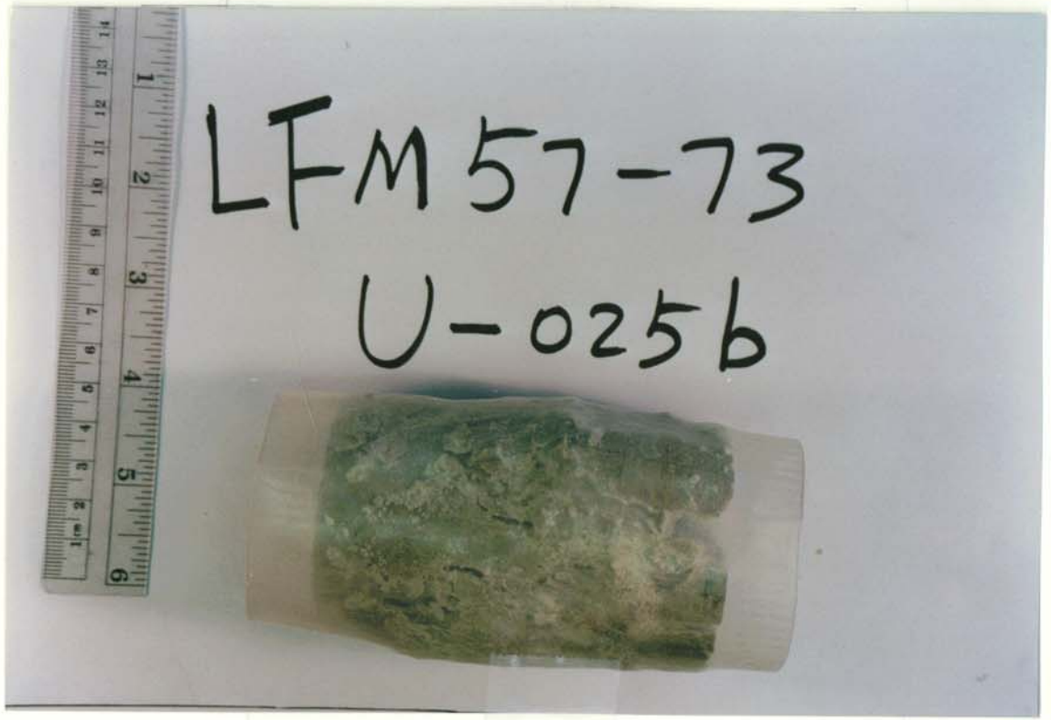
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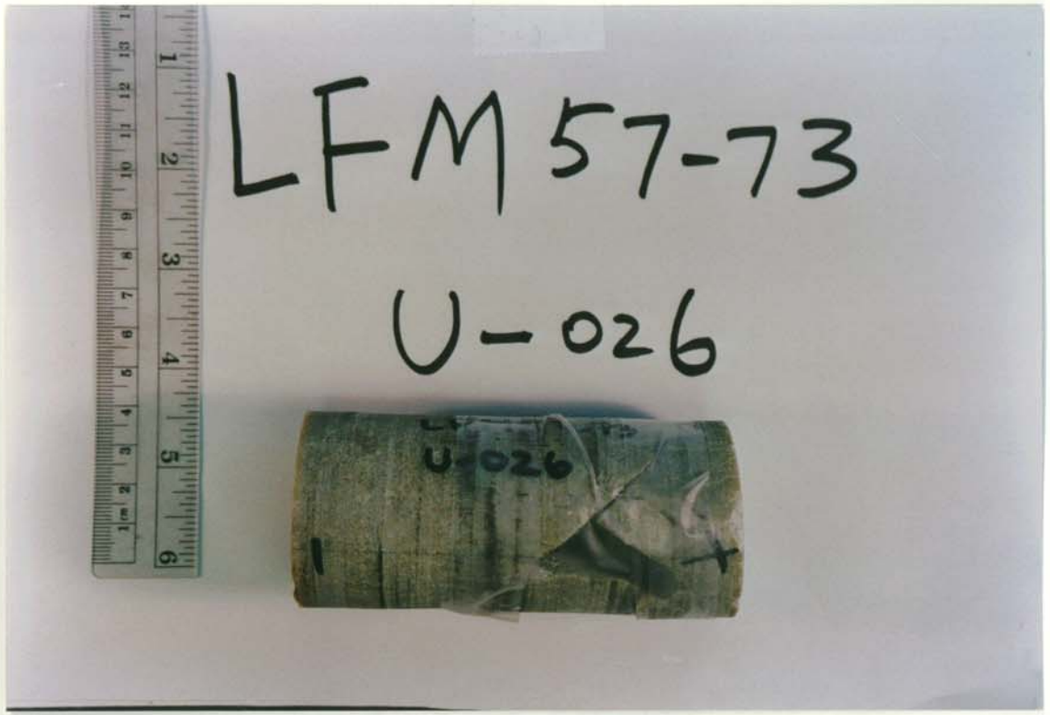
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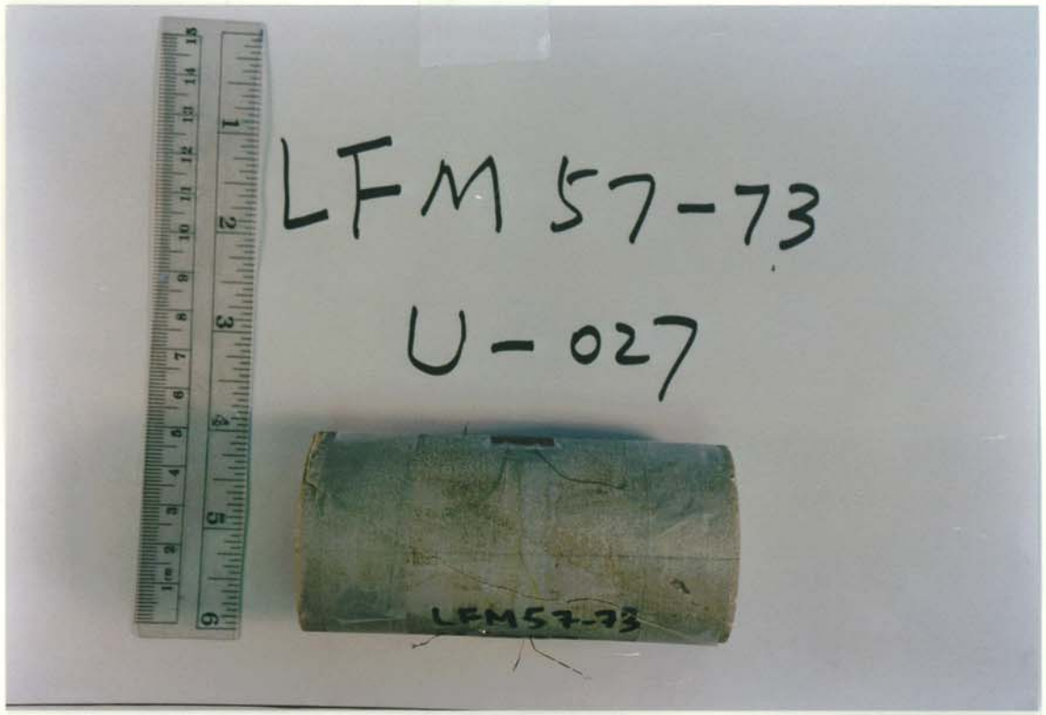
U-026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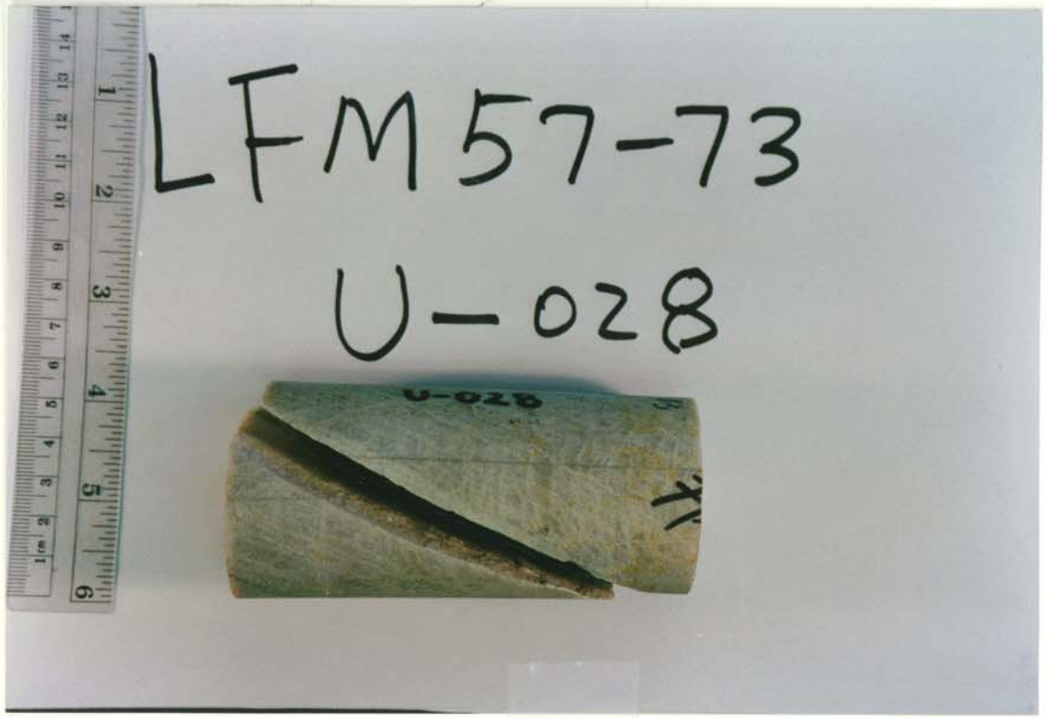
U-027
LFM57-73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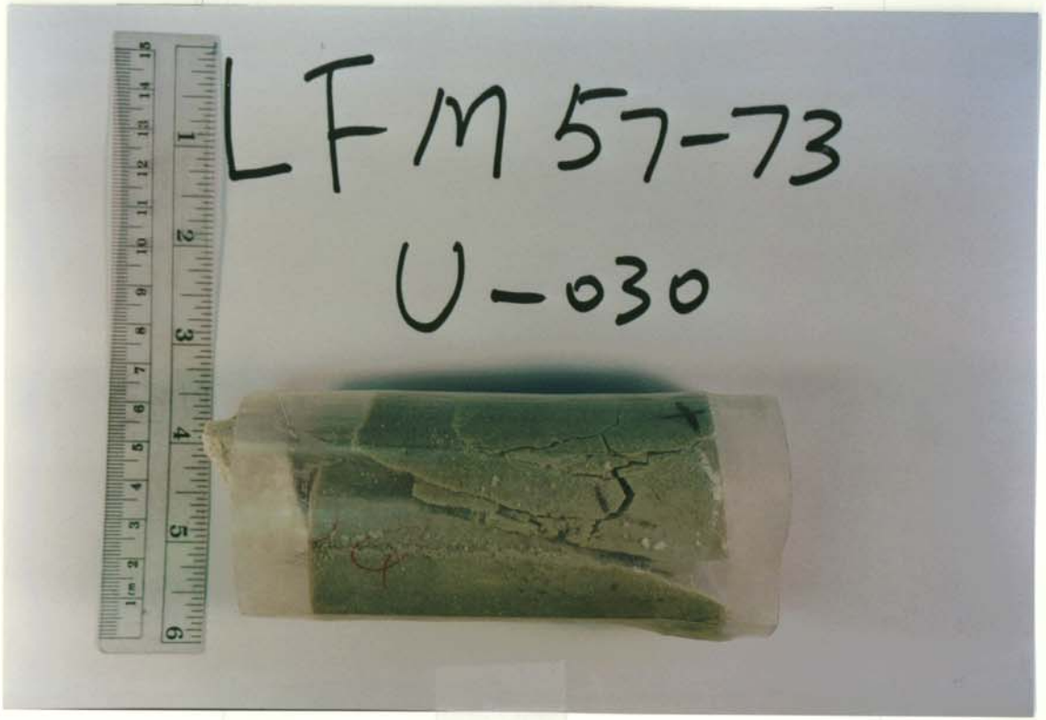
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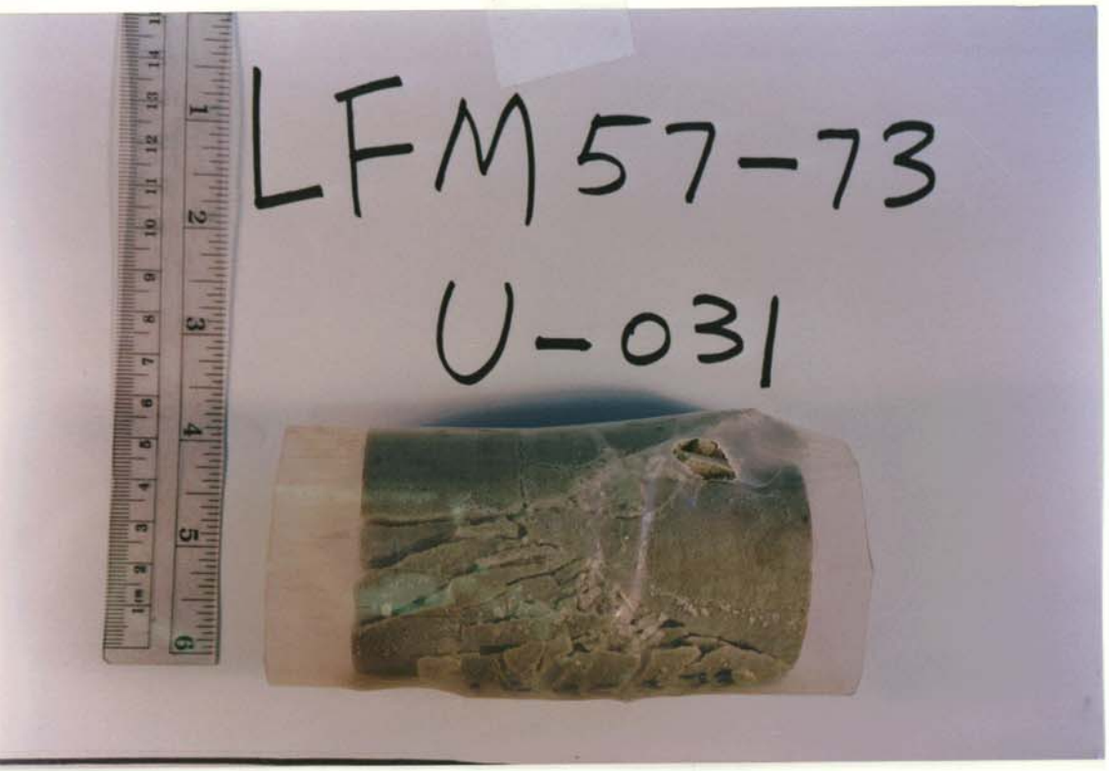
U-030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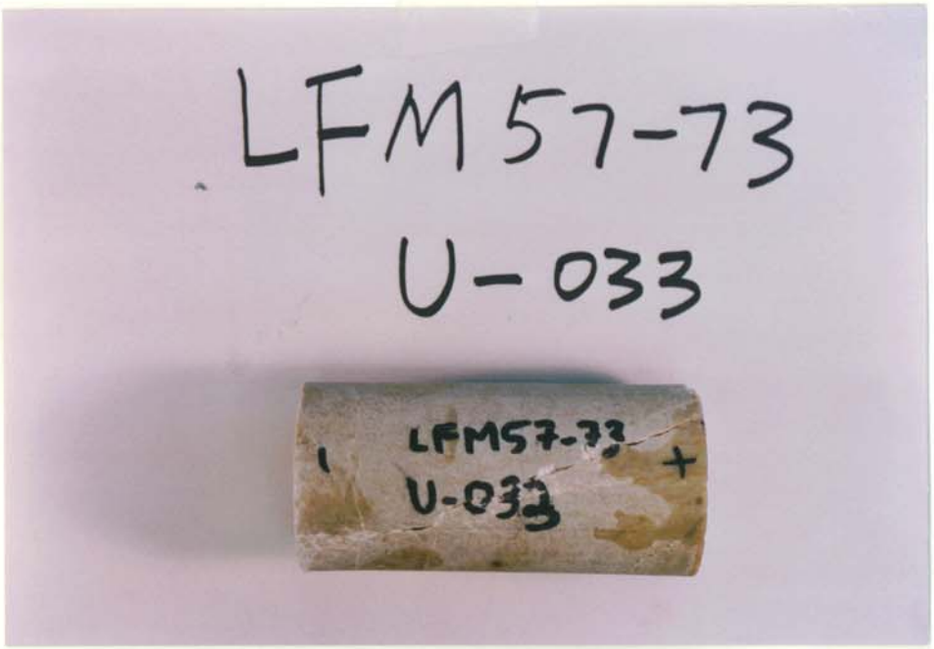
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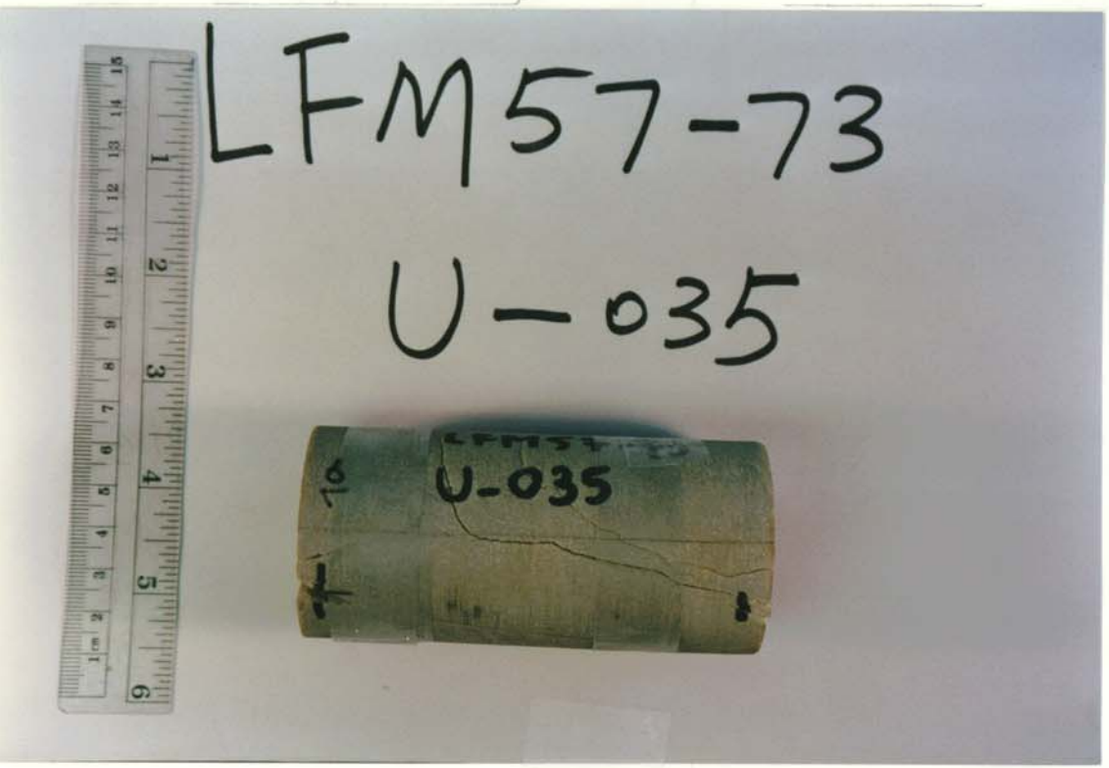
U-033
LFM57-73
U-033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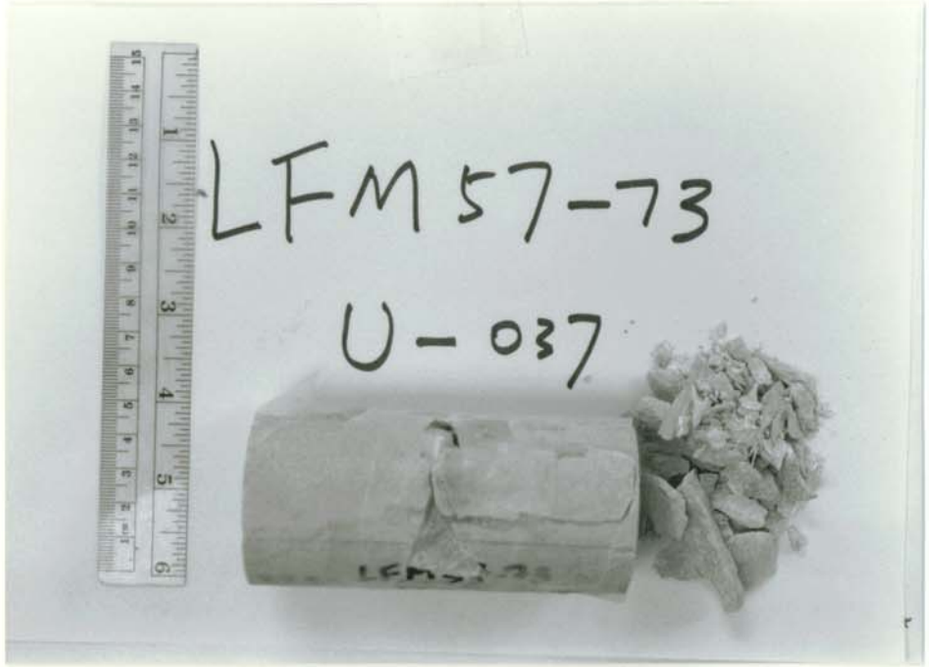
U-035
U-035

LFM 57-73
U-036 a

LFM 57-73
U-036b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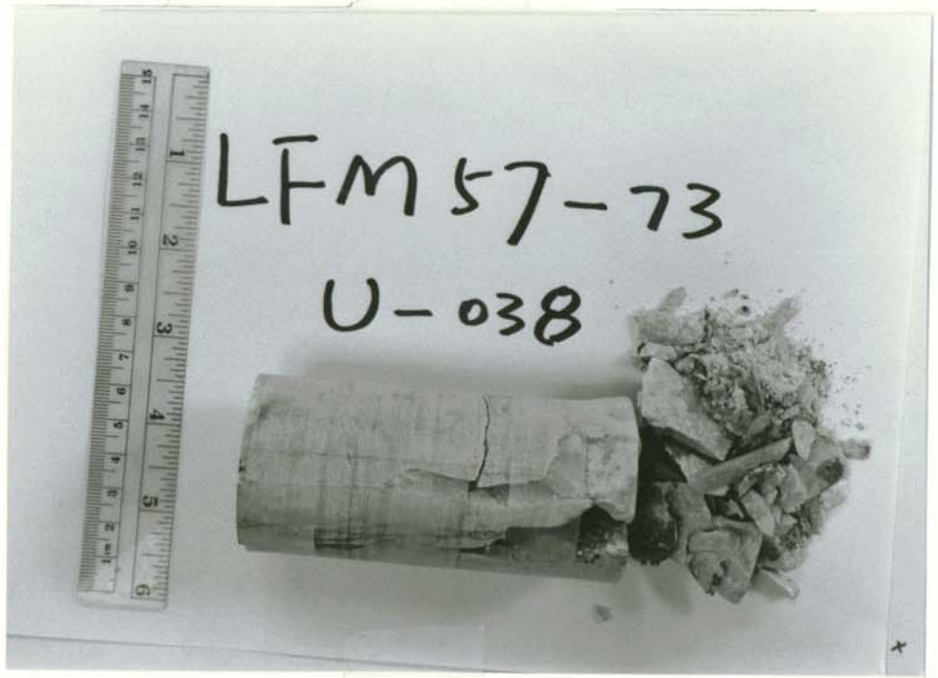
U-037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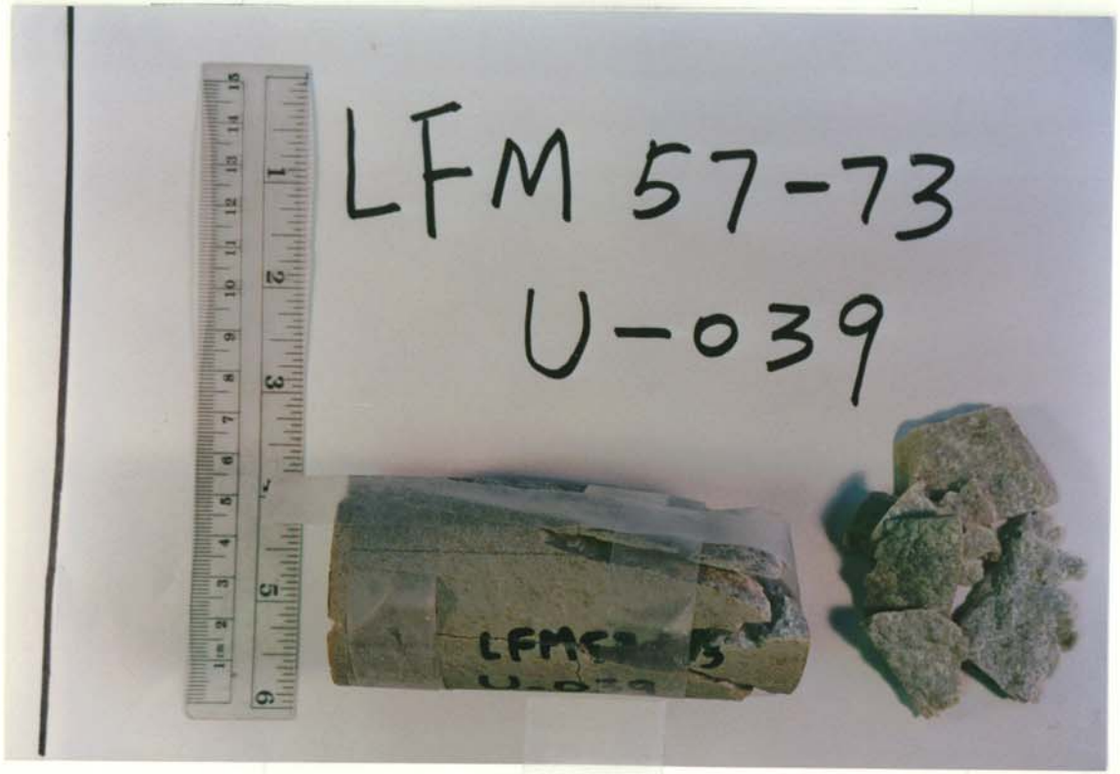
U-038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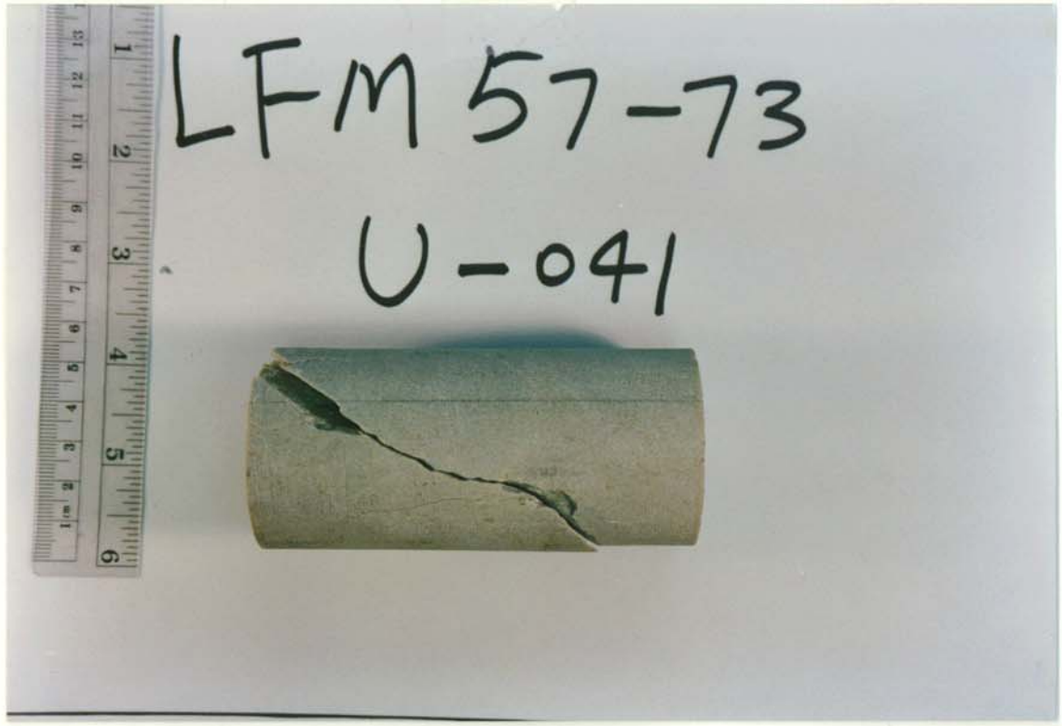
U-039

LFM 57-73
U-040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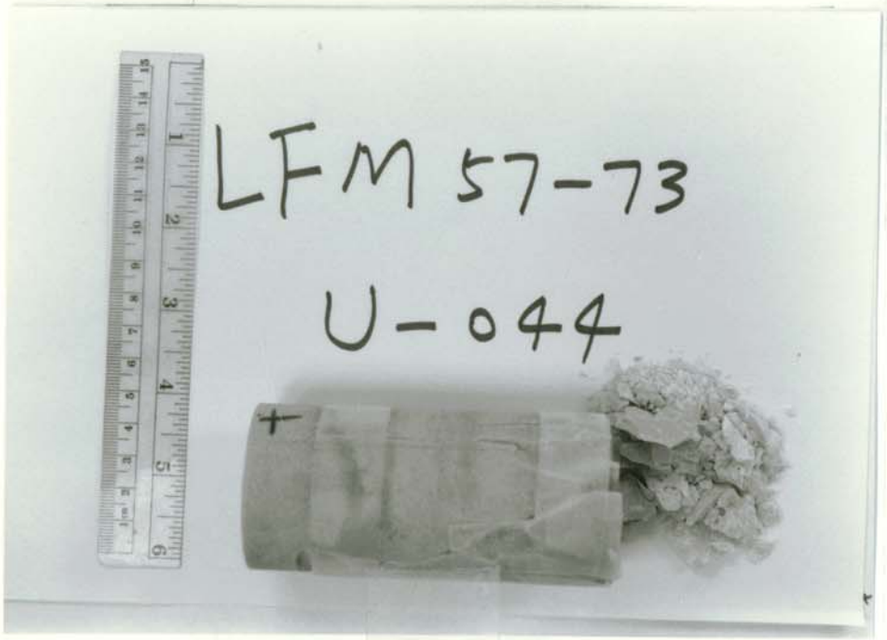
U-041

LFM 57-73
U-043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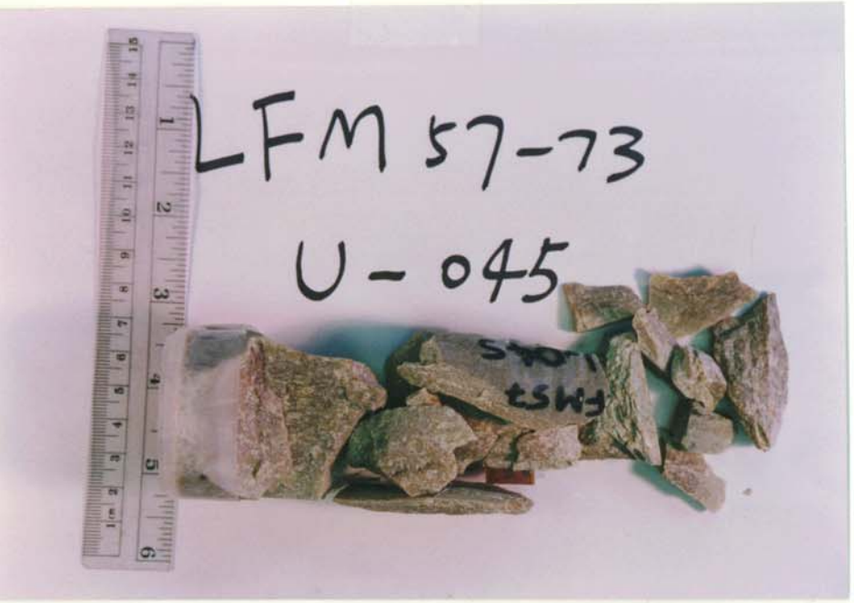
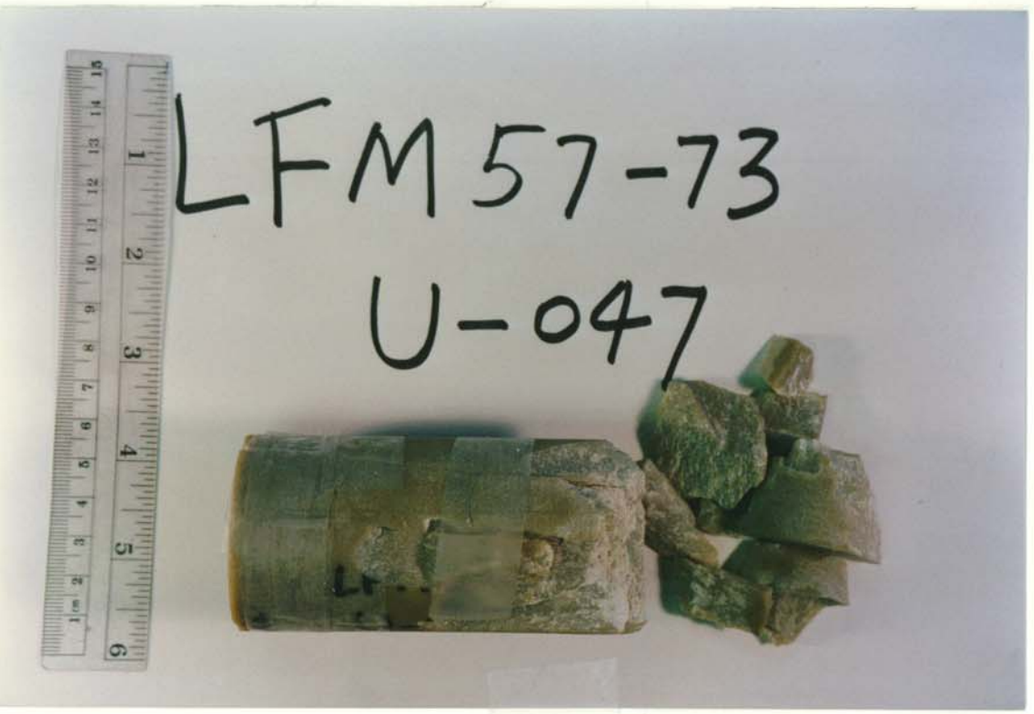
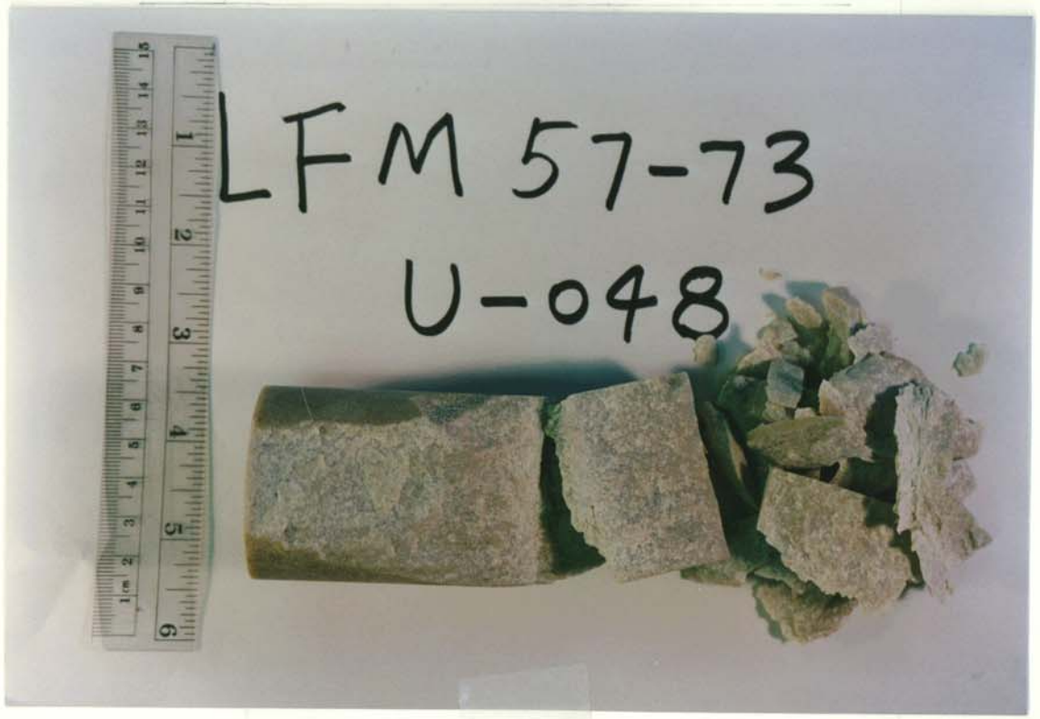
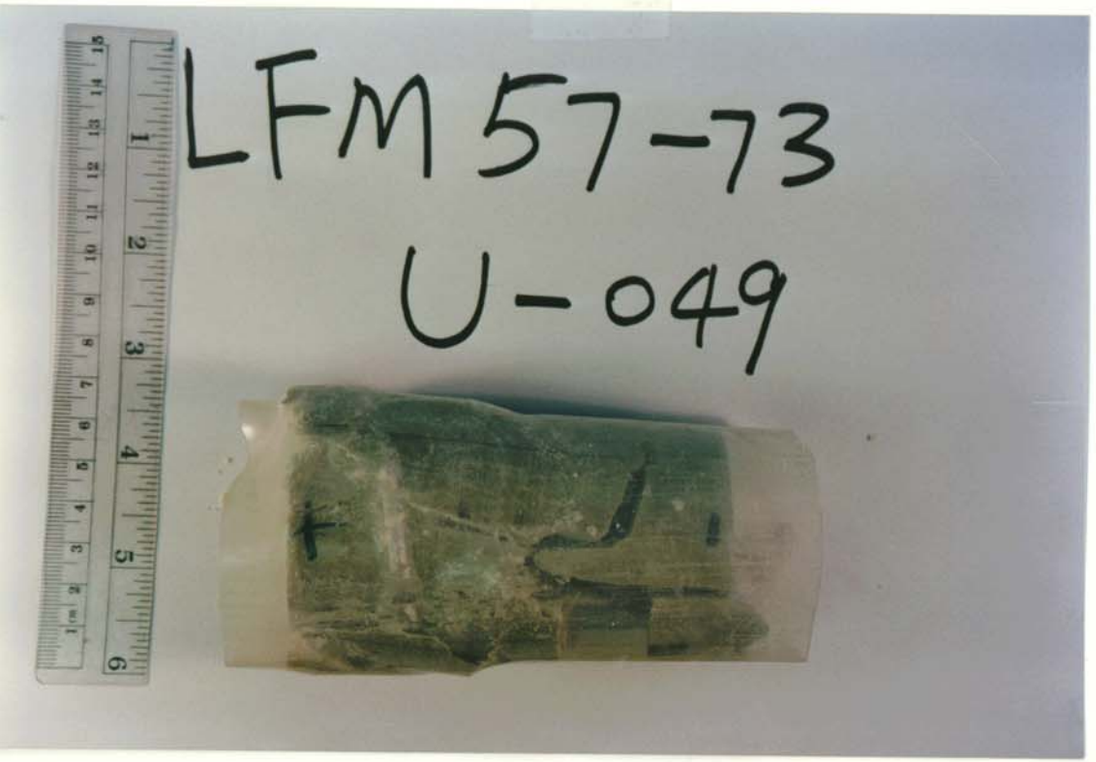


This is
LFM 57-73
U-046.
Mistake was corrected
by S. Jeon
on 5-27-93.



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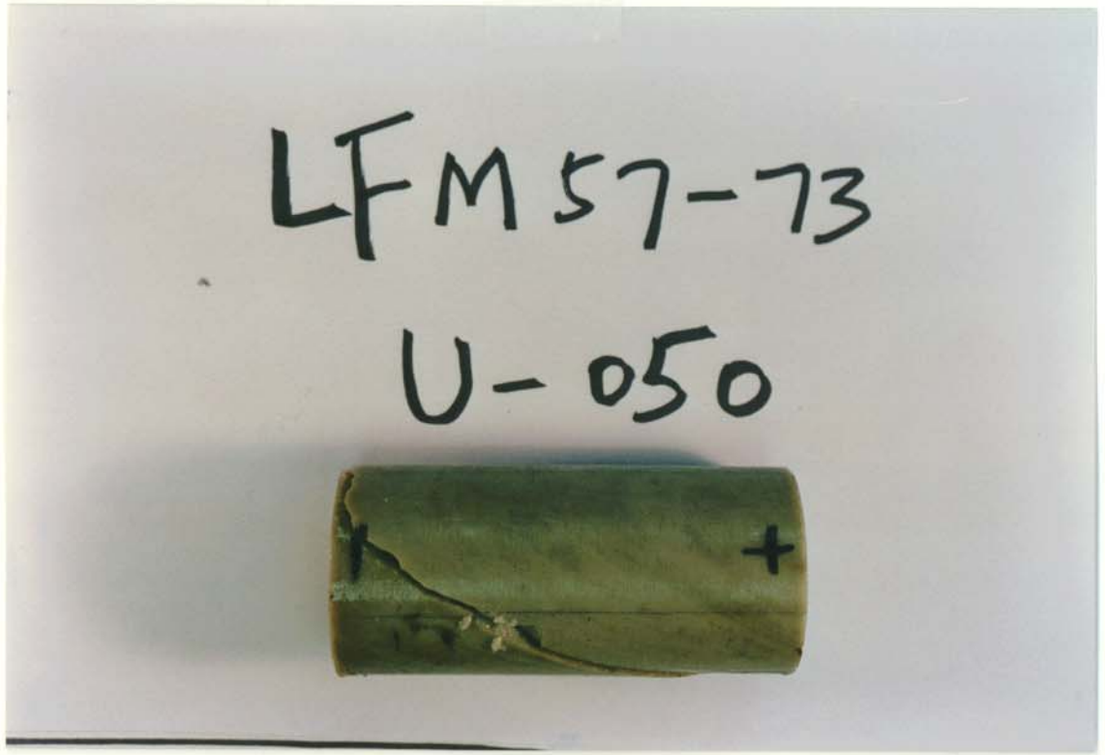
U-049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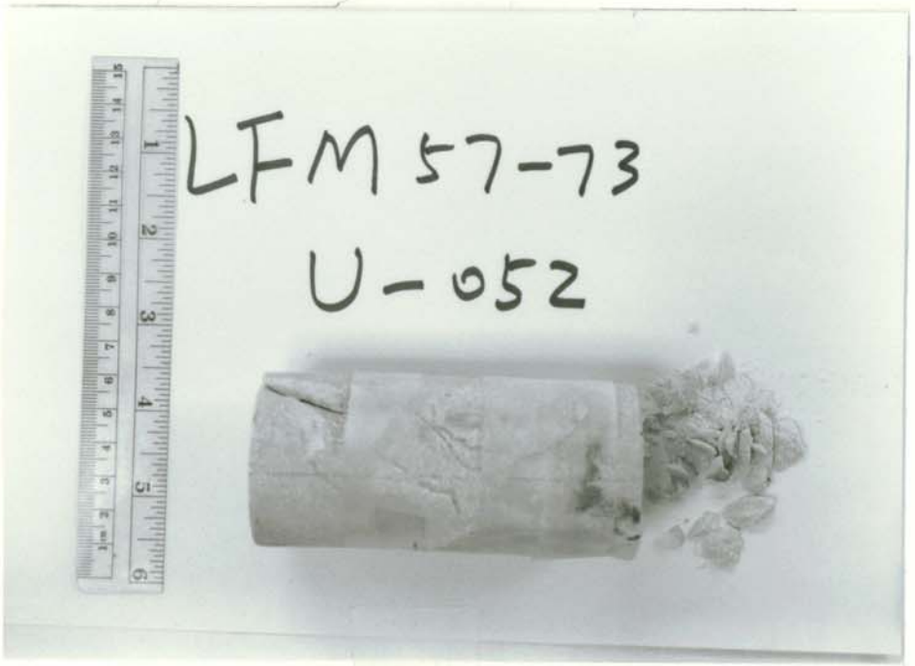
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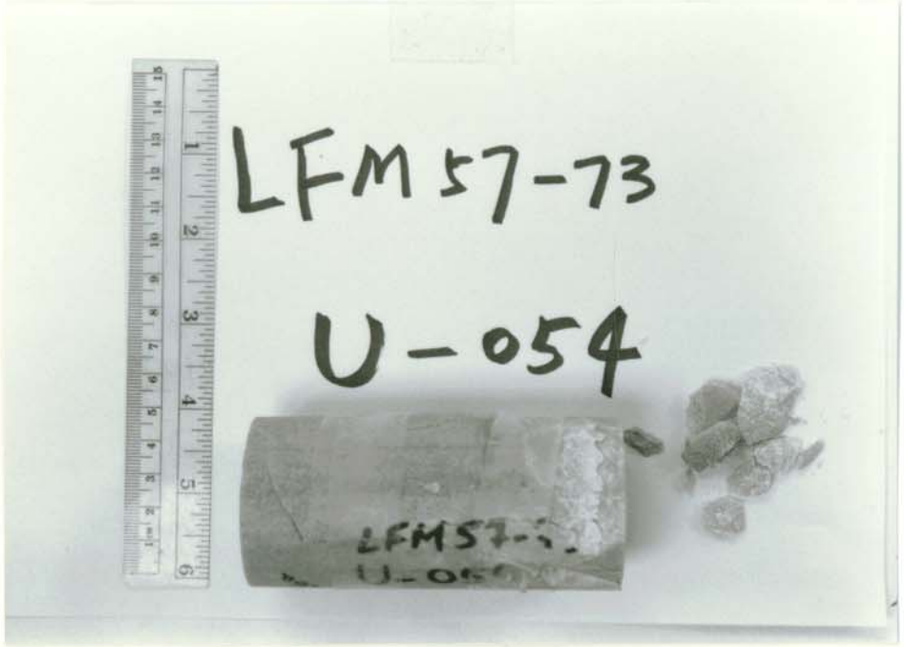
U-052

LFM 57-73
U-053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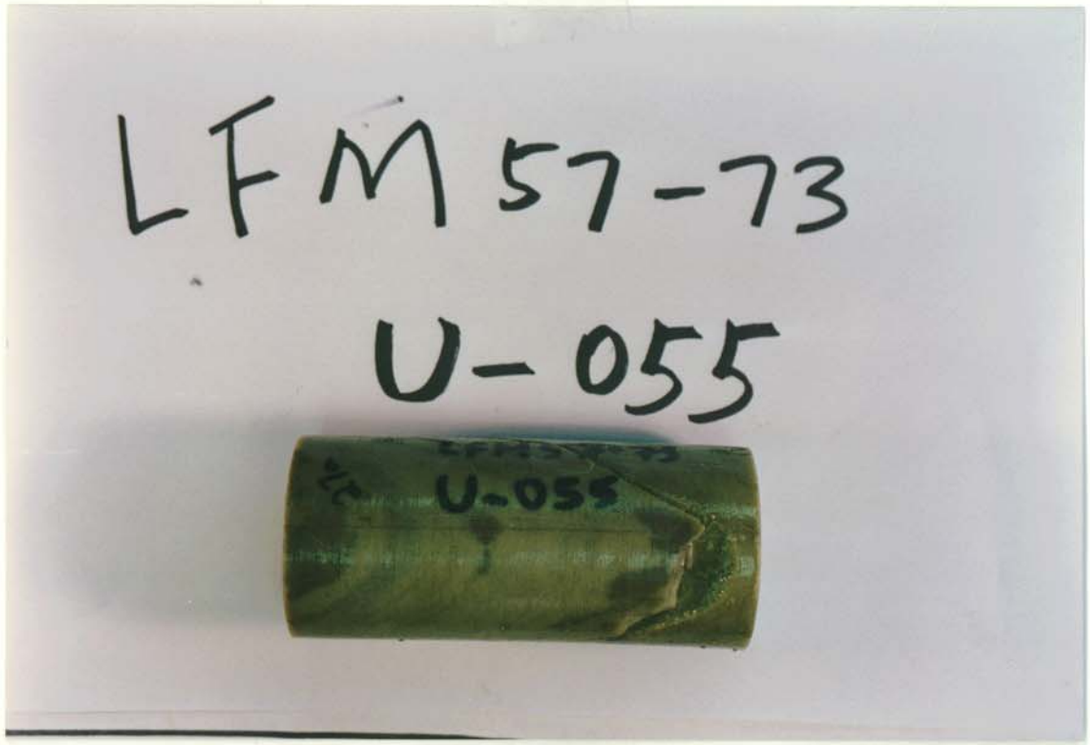
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U-055
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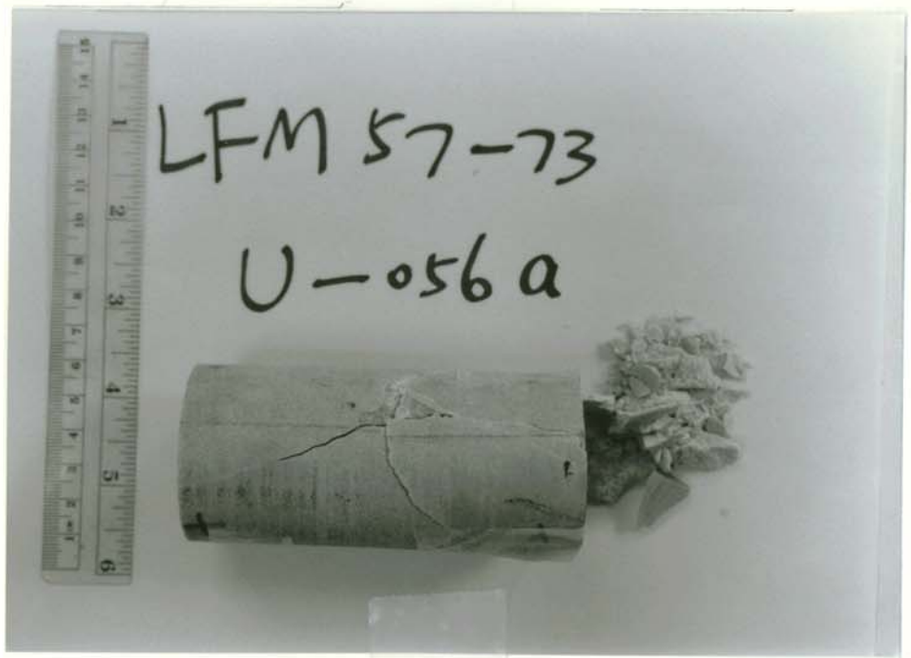
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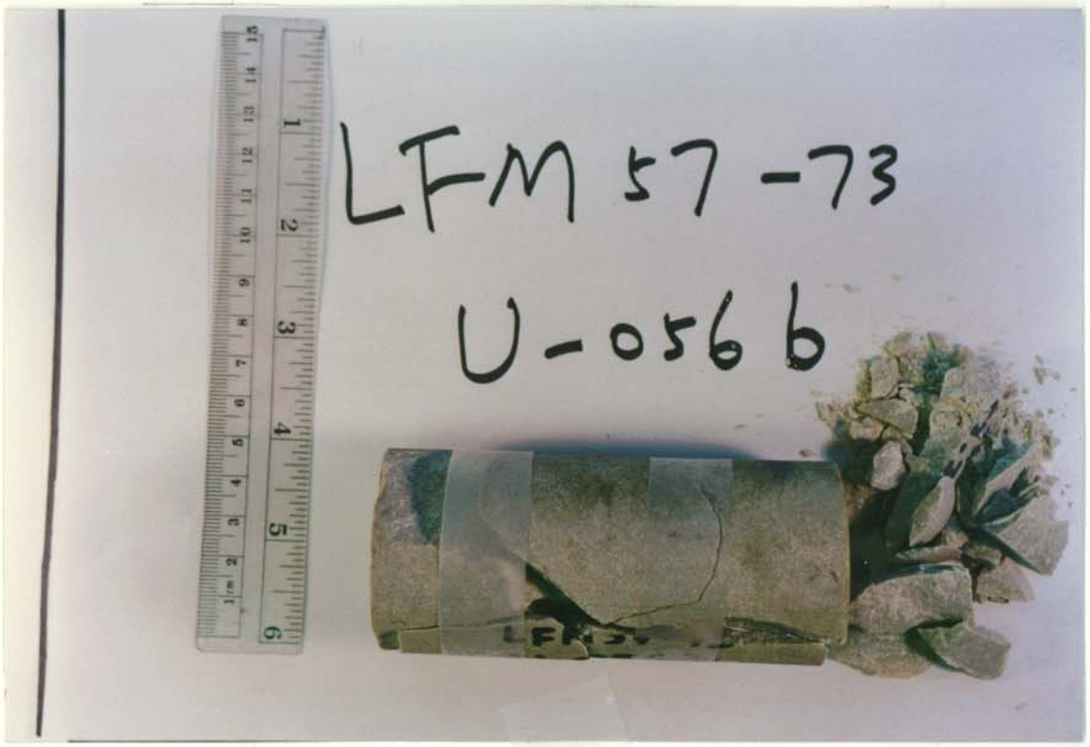
U-056 a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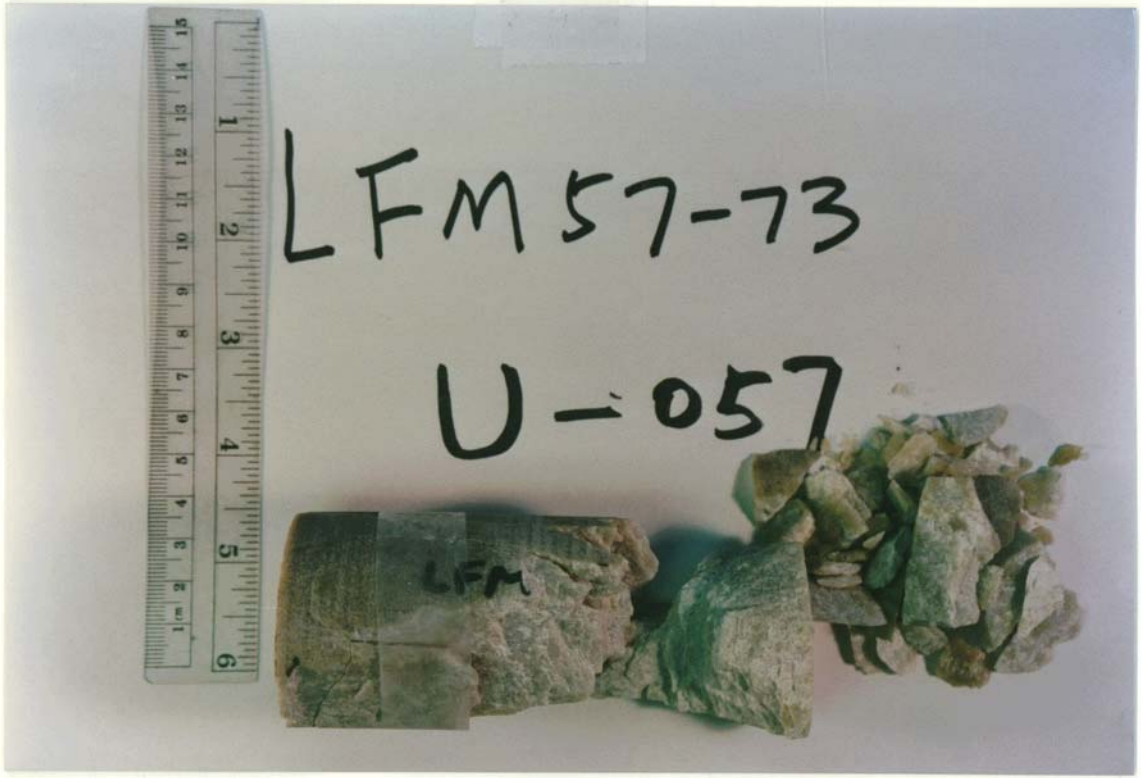
LFM 57-73
U-057
LFM

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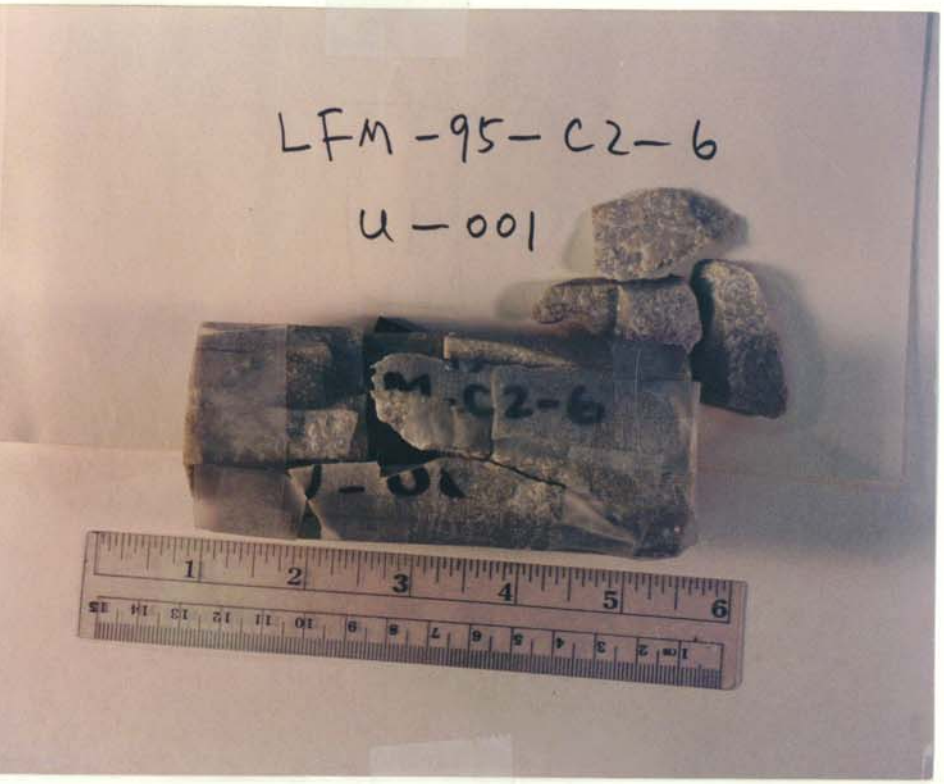
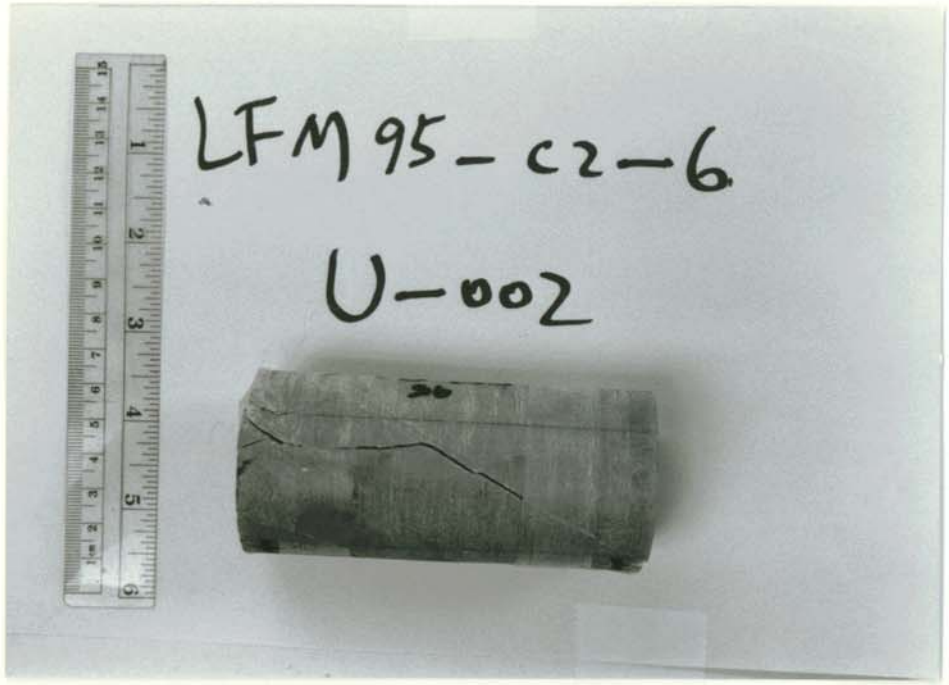
COMPRESSION TEST SAMPLES

Treasured Moments

BEFORE TESTS


LFM-95-C2-6
U-001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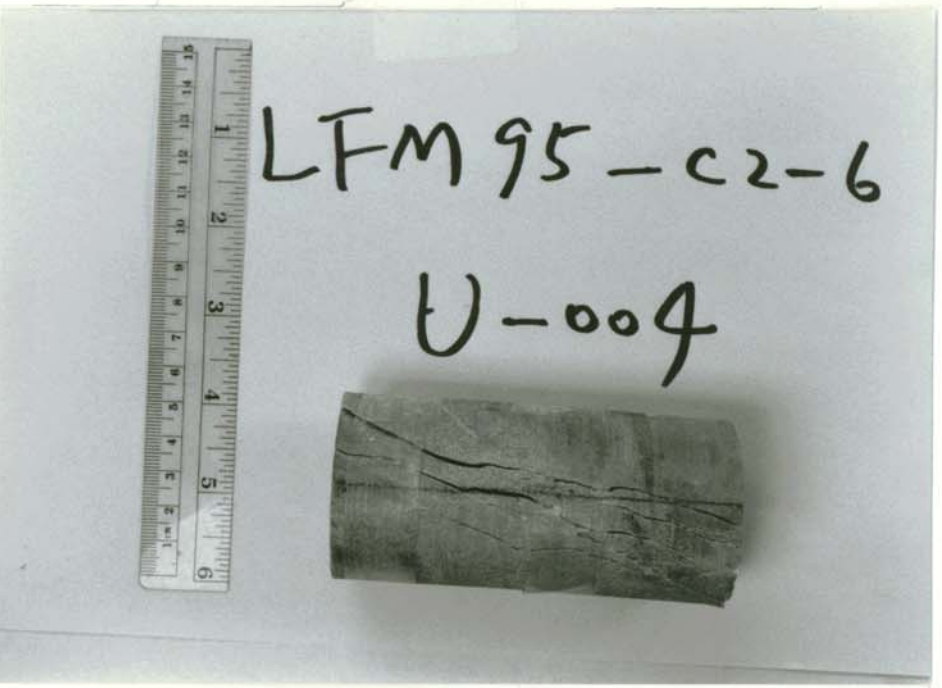
U-002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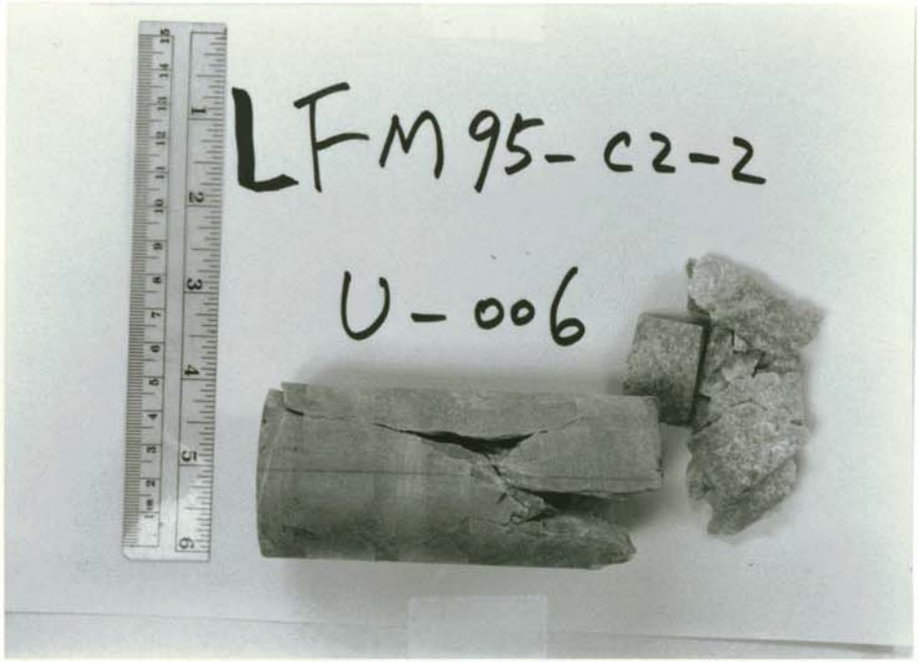
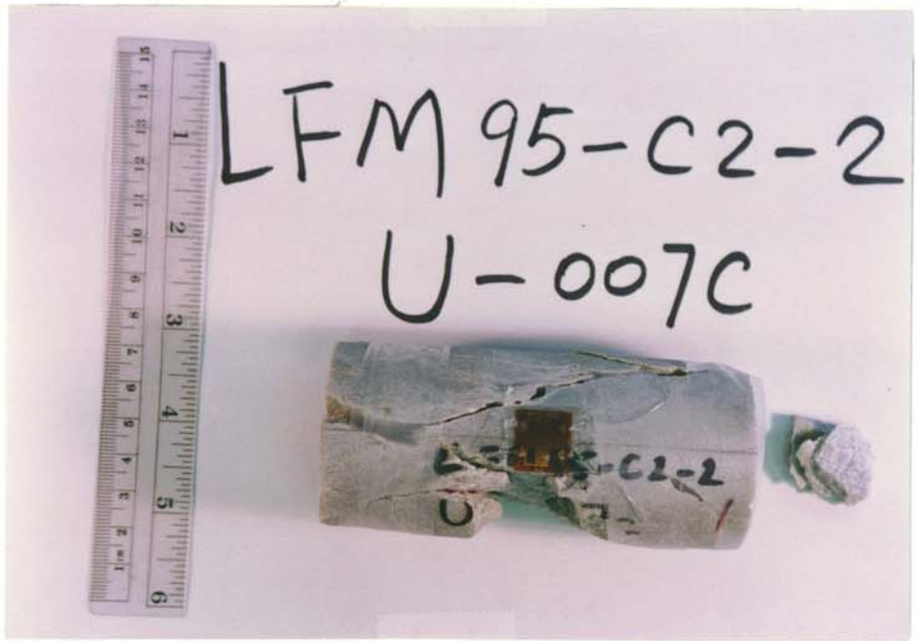
U-004

LFM95-C2-6
U-005


LFM95-C2-2
U-006

LFM95-C2-2
U-007b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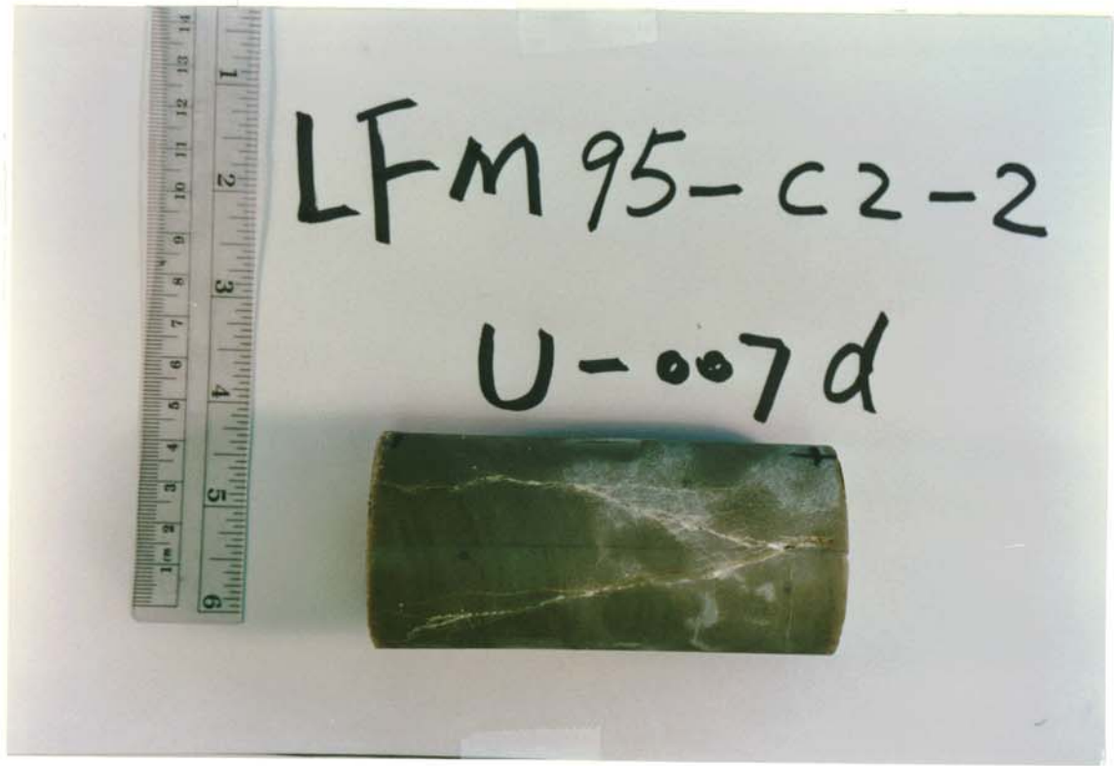
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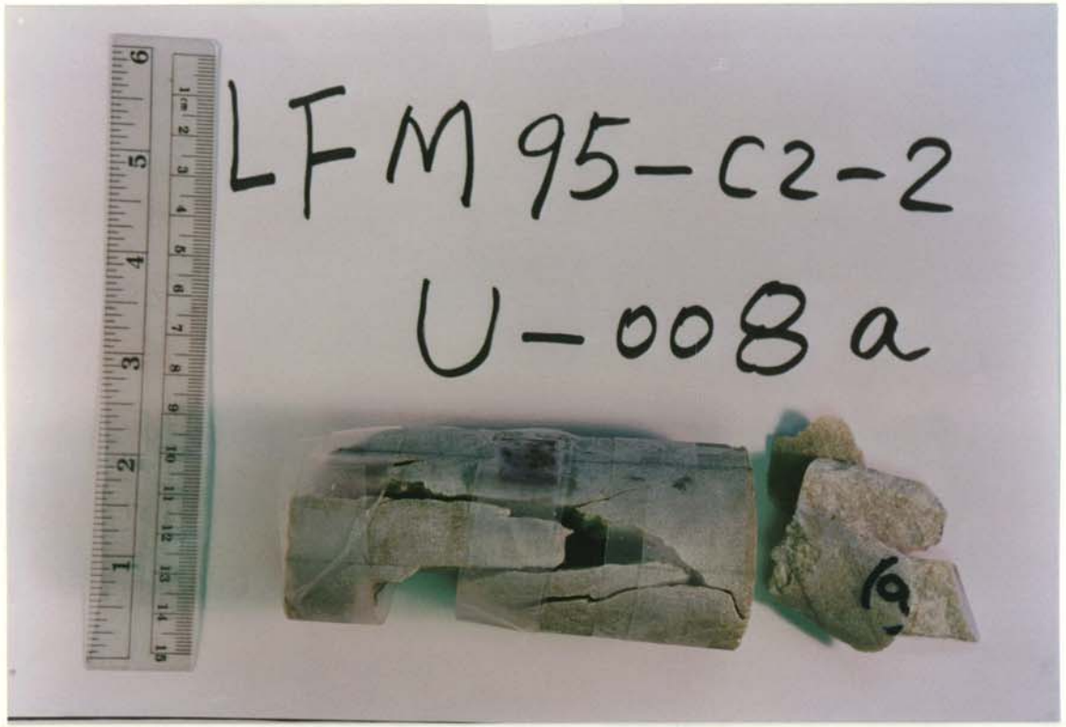
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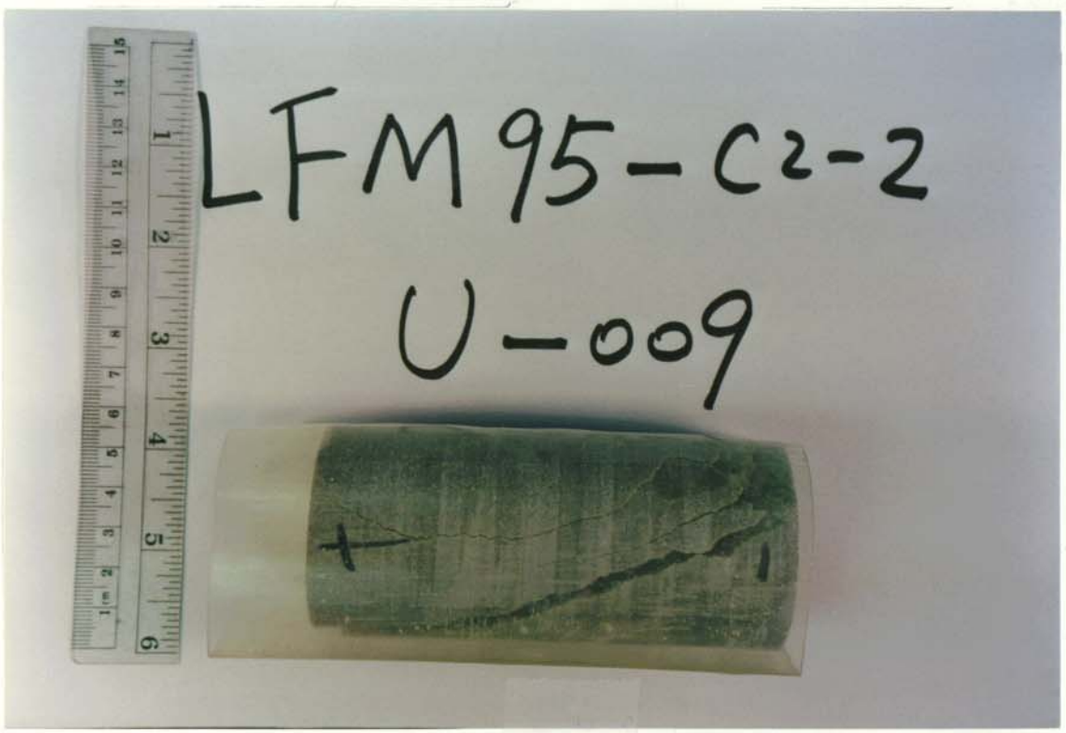
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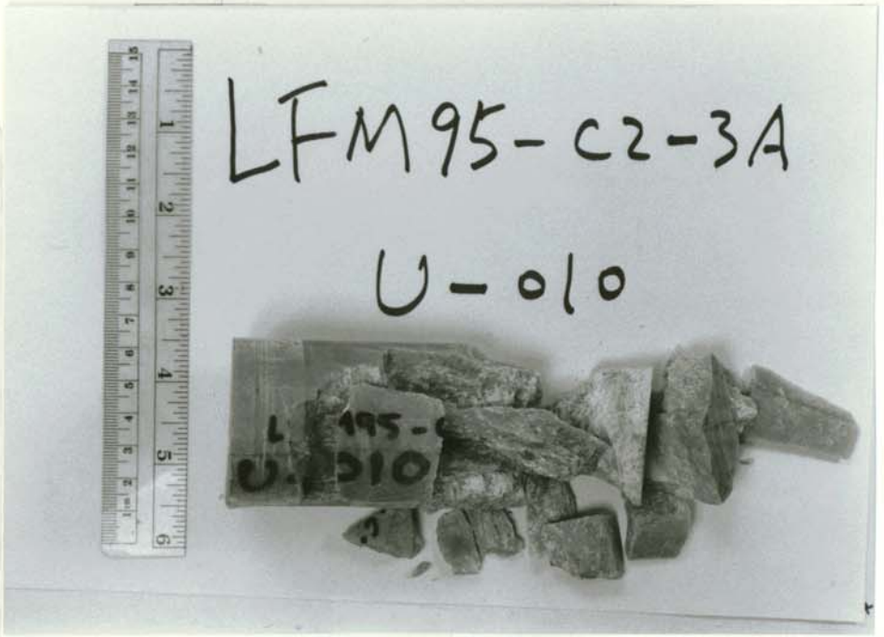
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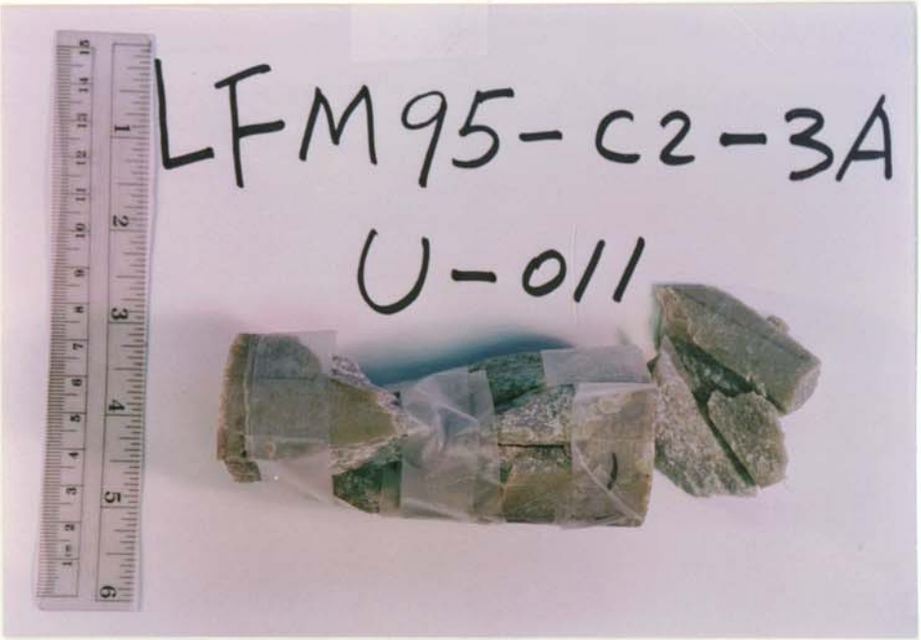
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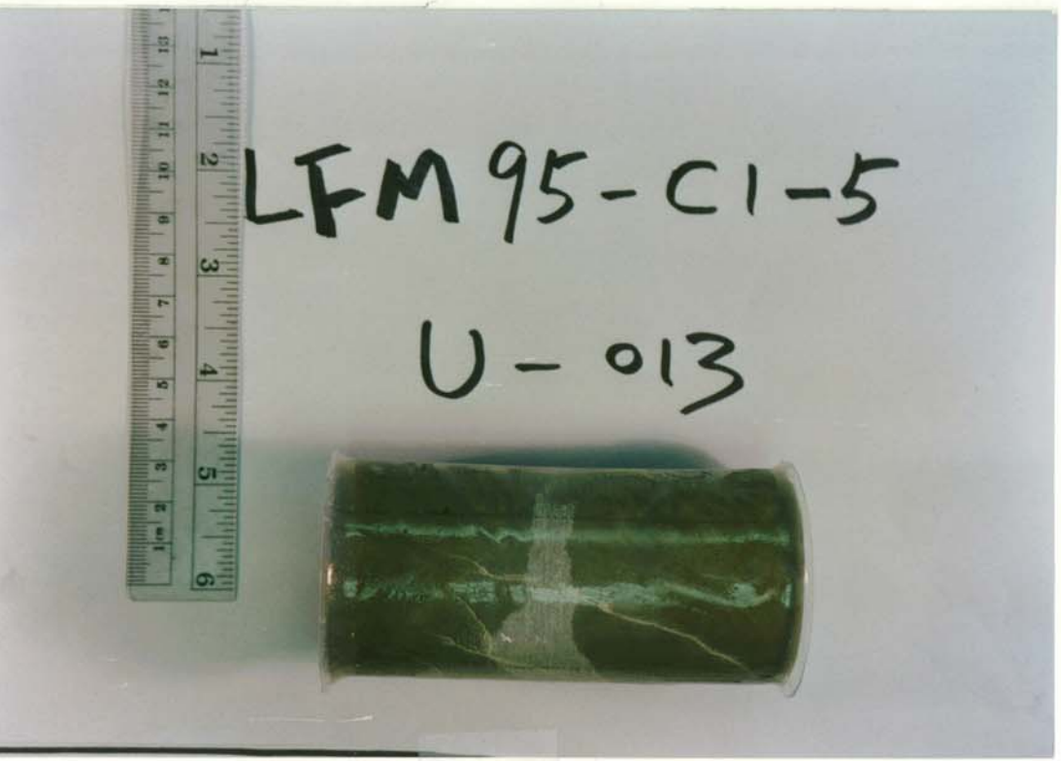
U-011

LFM95-C1-5
U-012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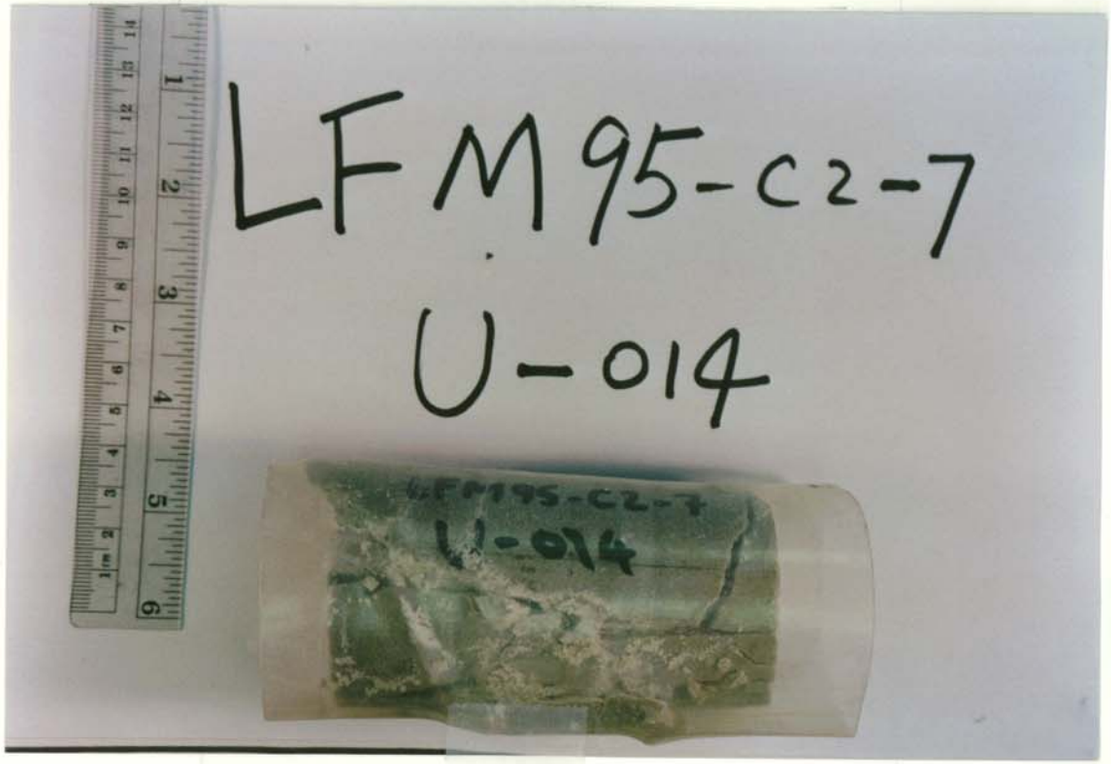
LFM95-C2-7
U-014

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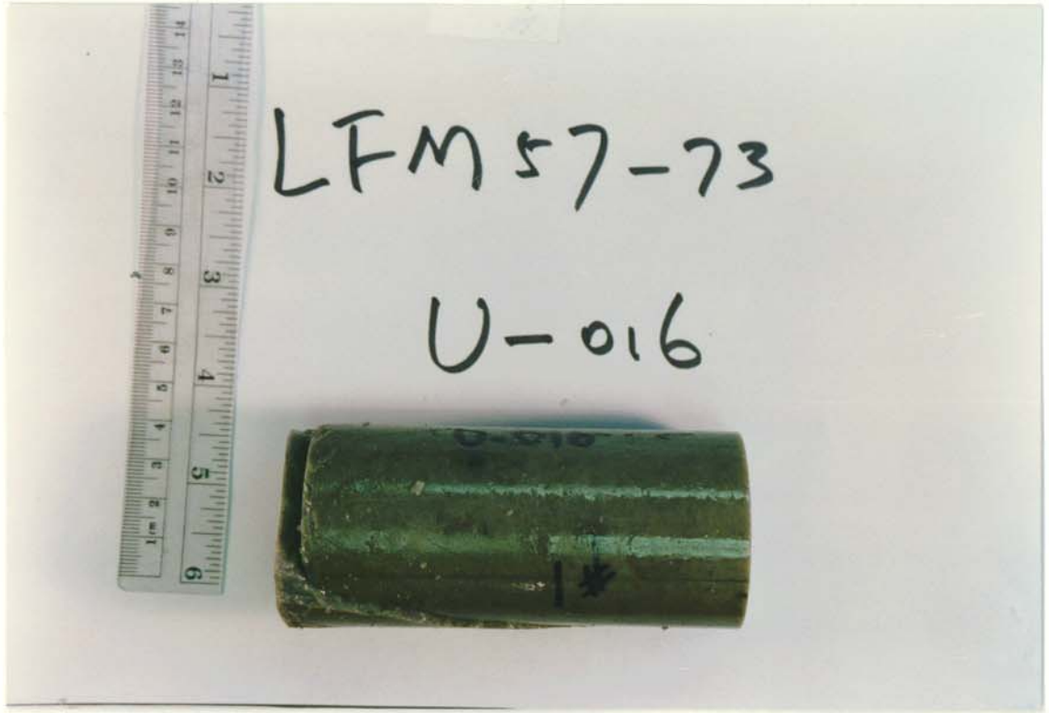
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U-018

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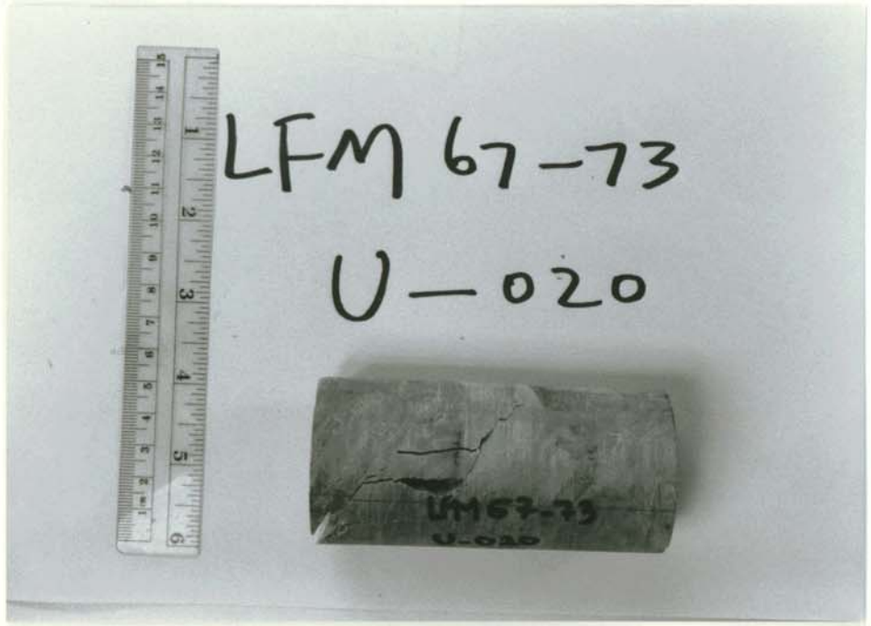
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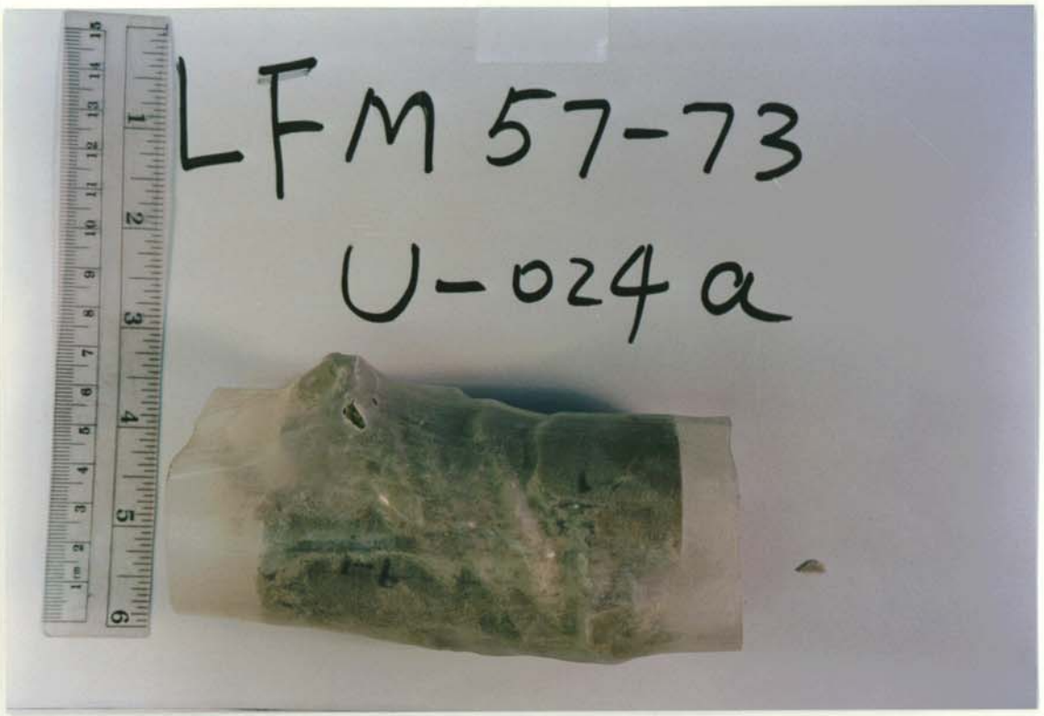
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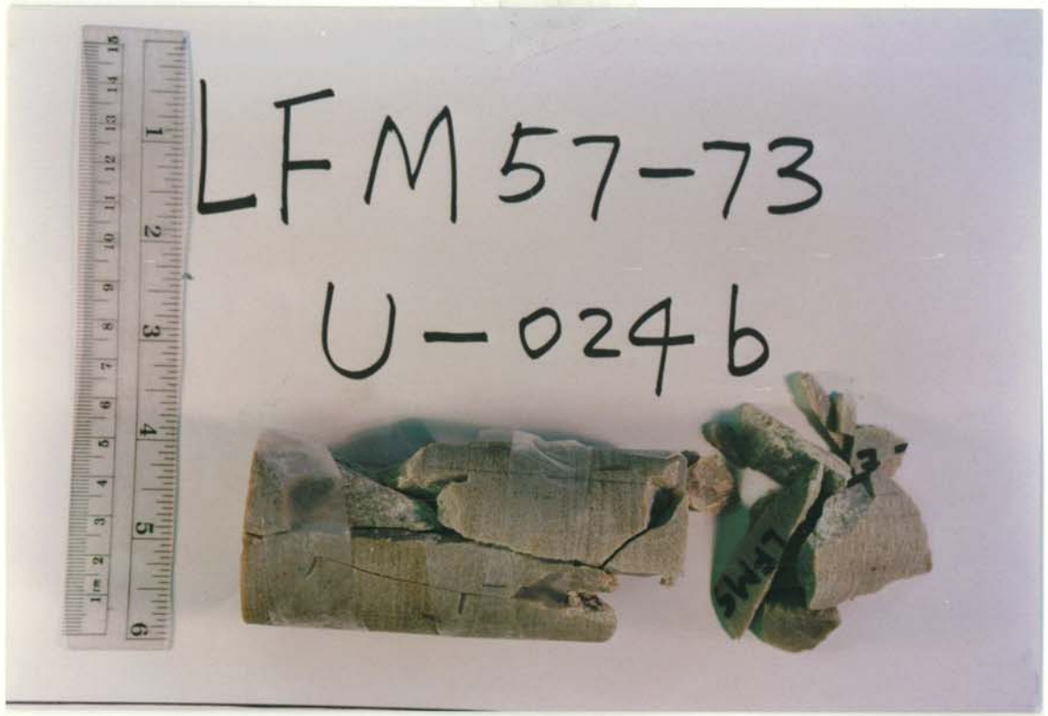
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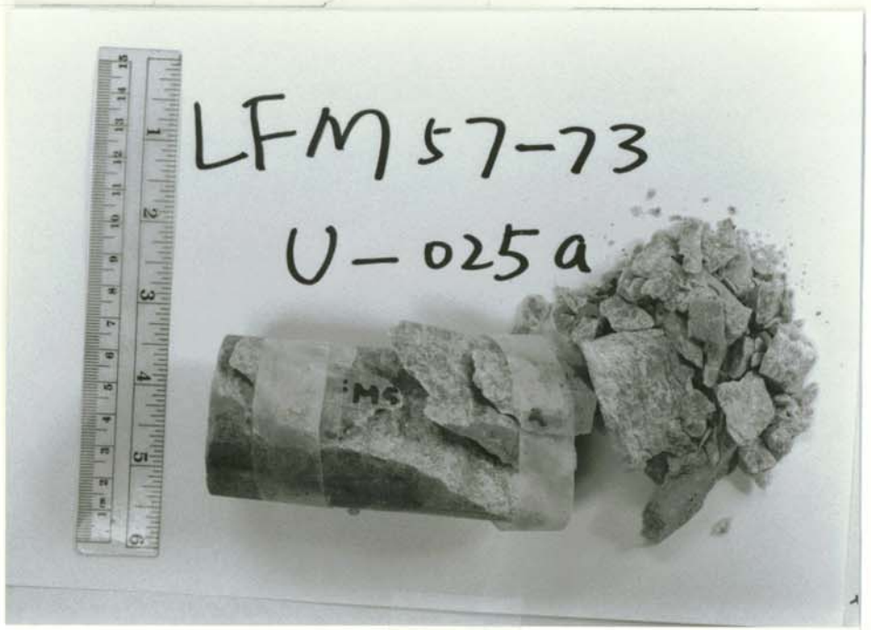
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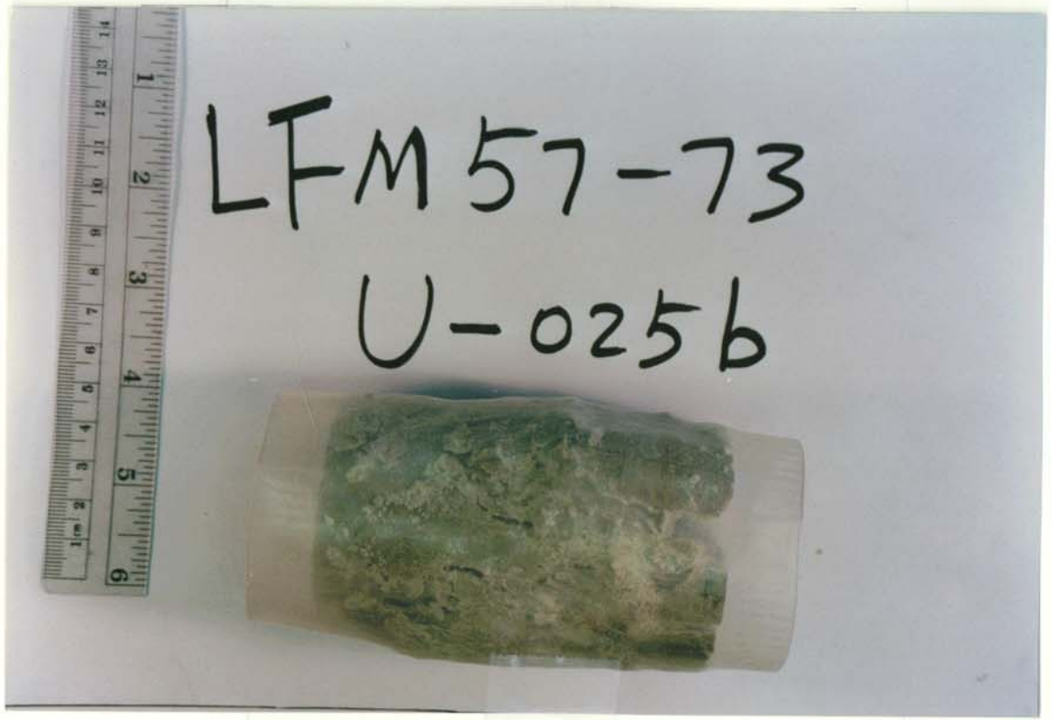
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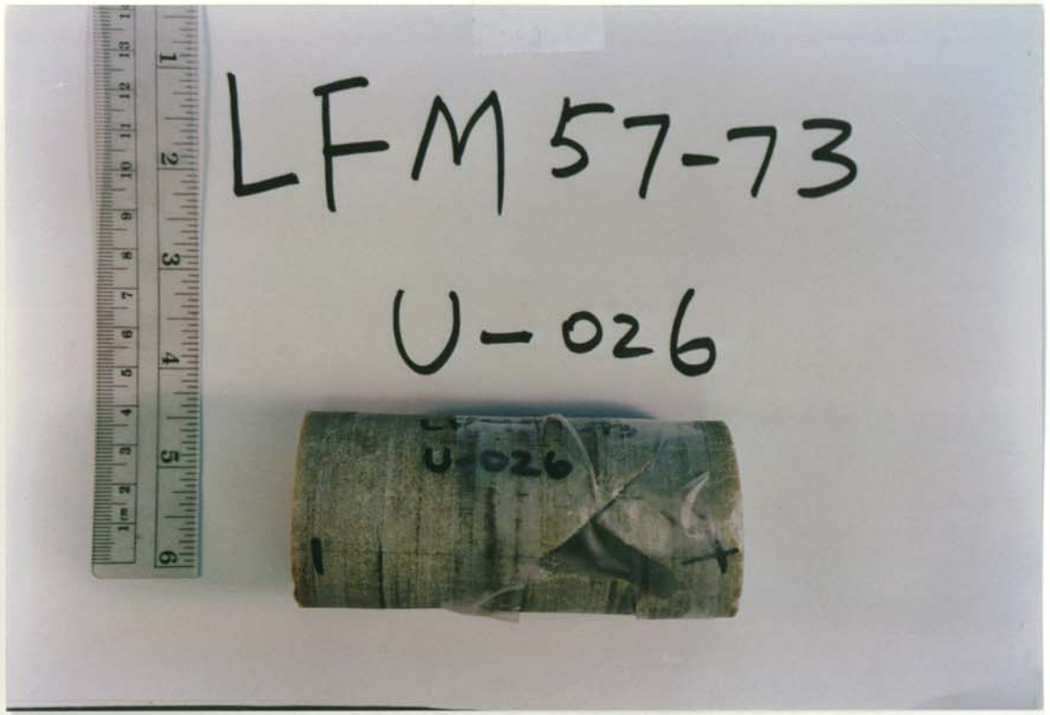
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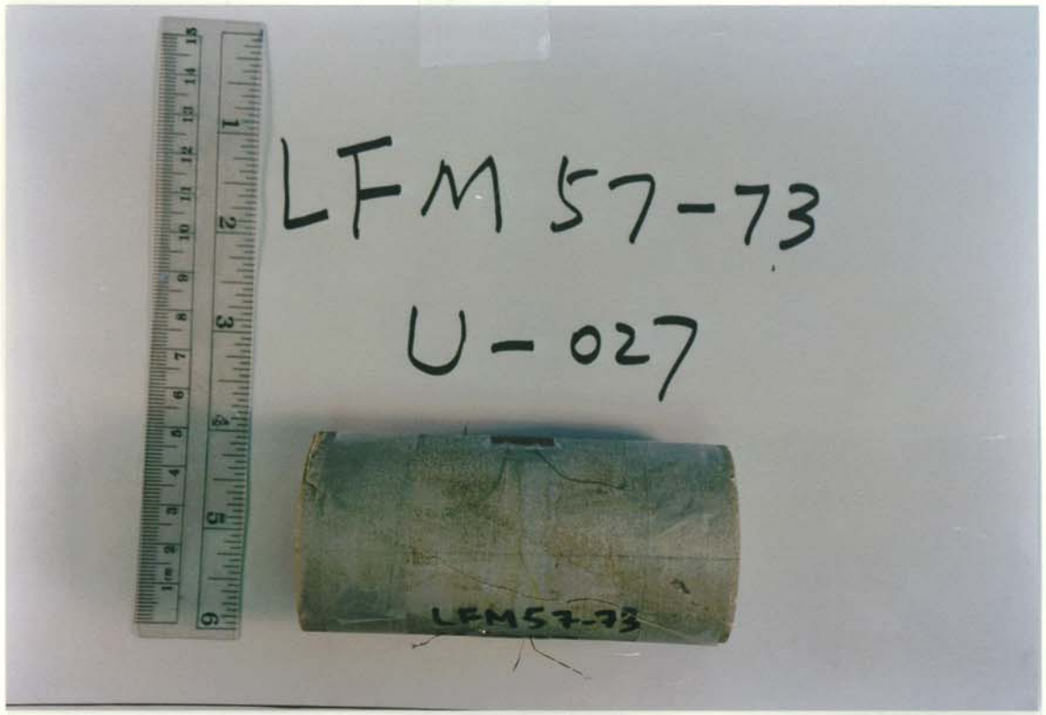
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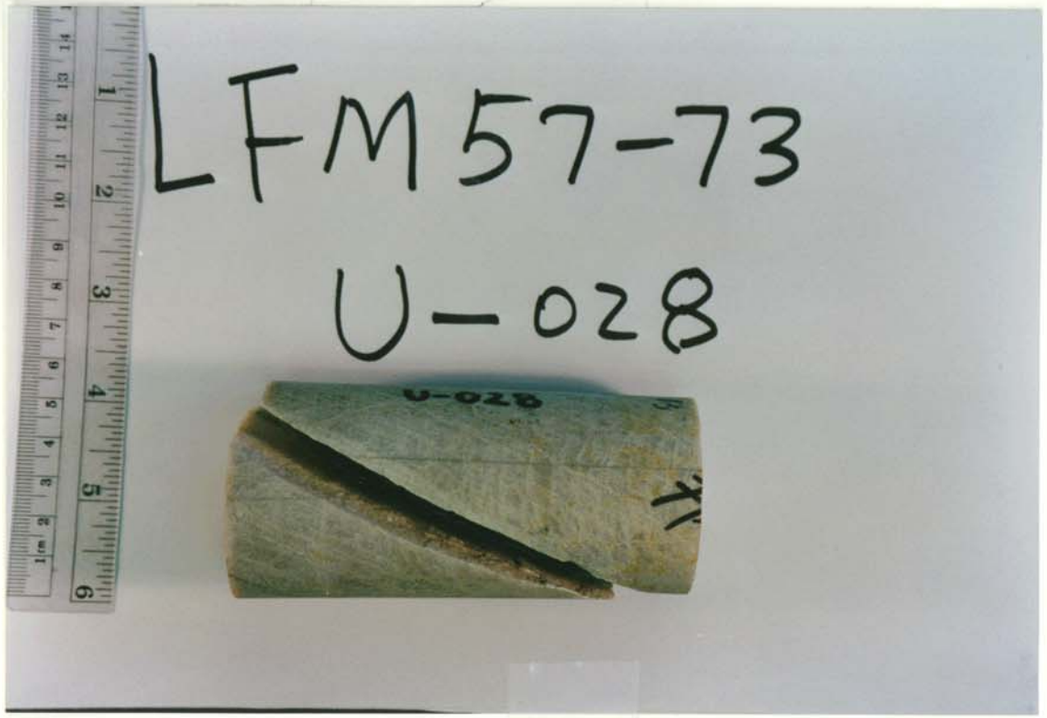
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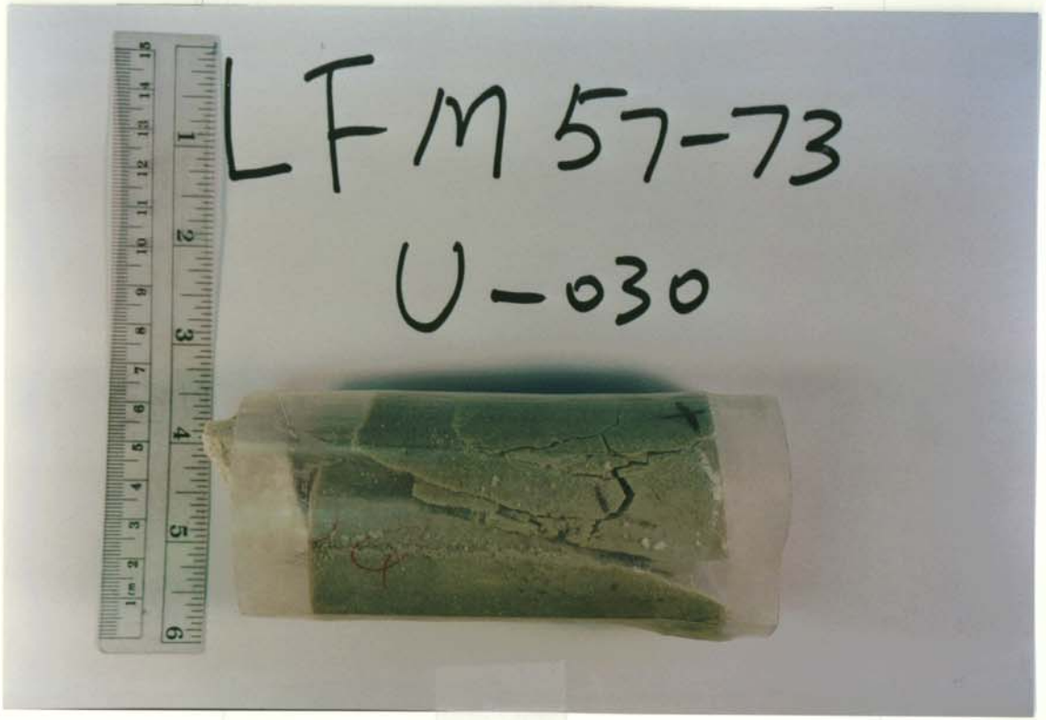
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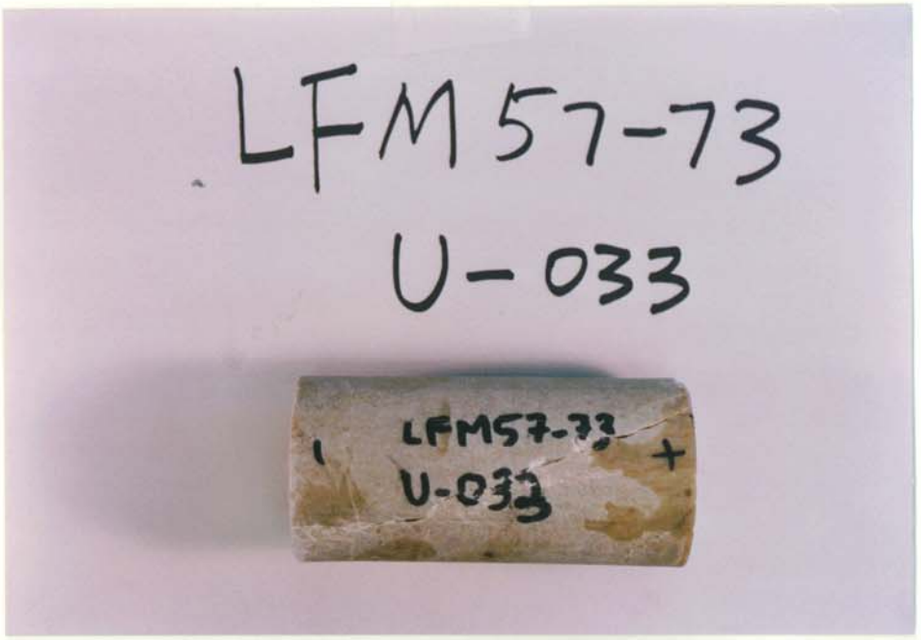
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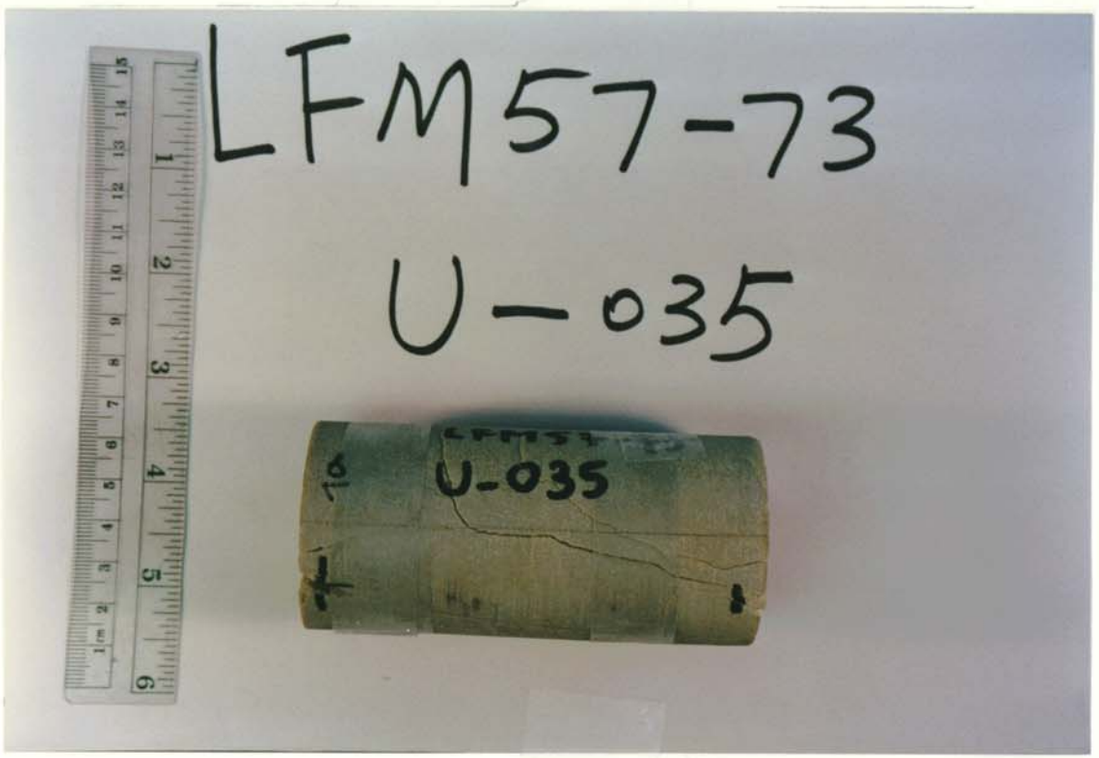
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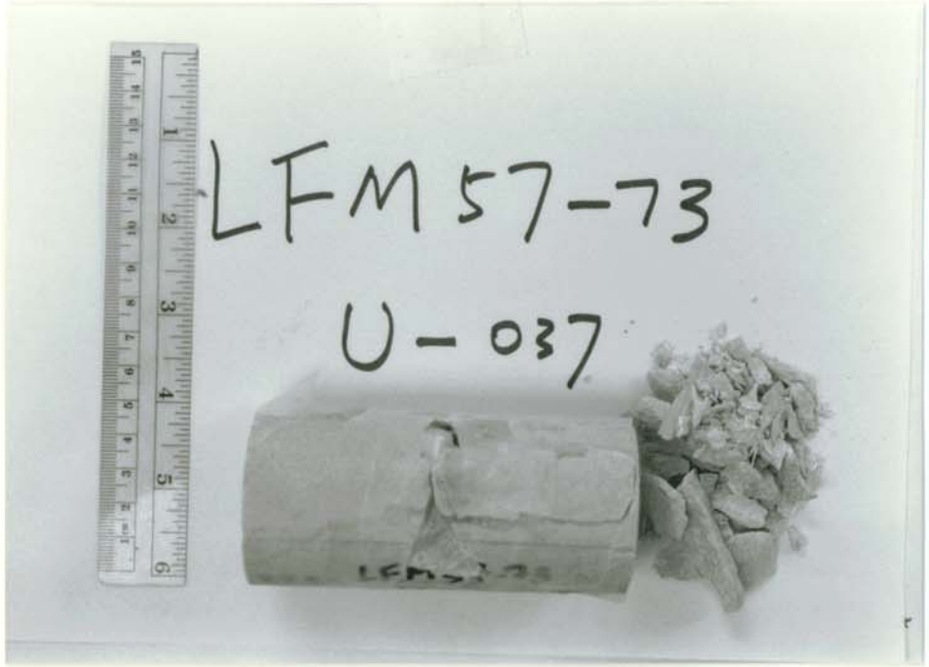
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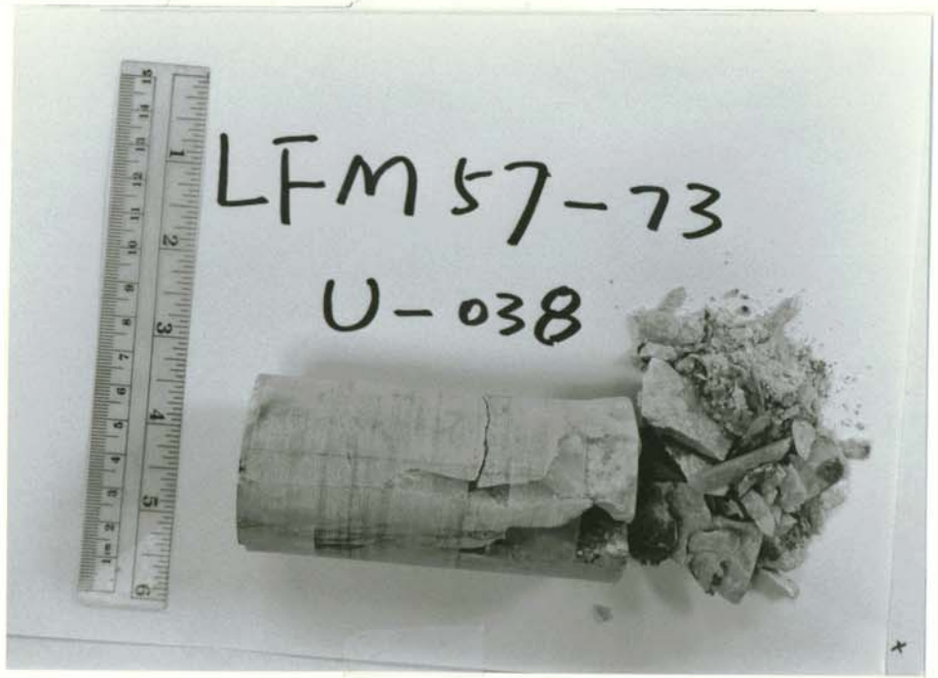
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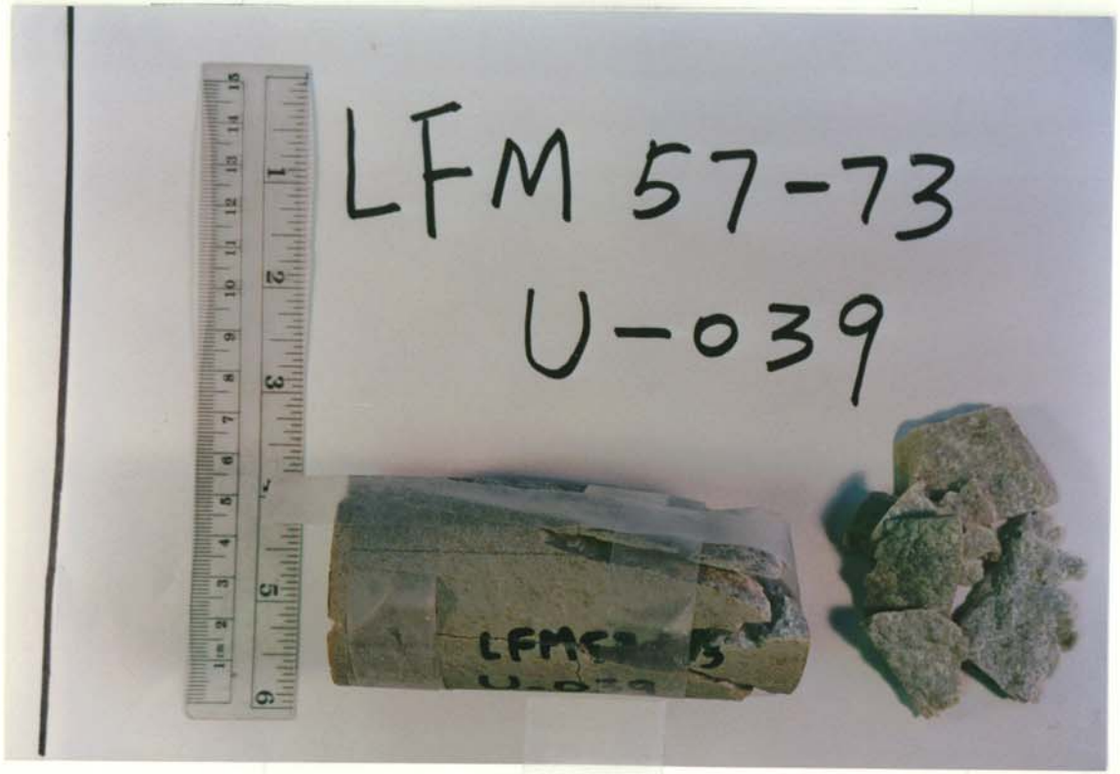
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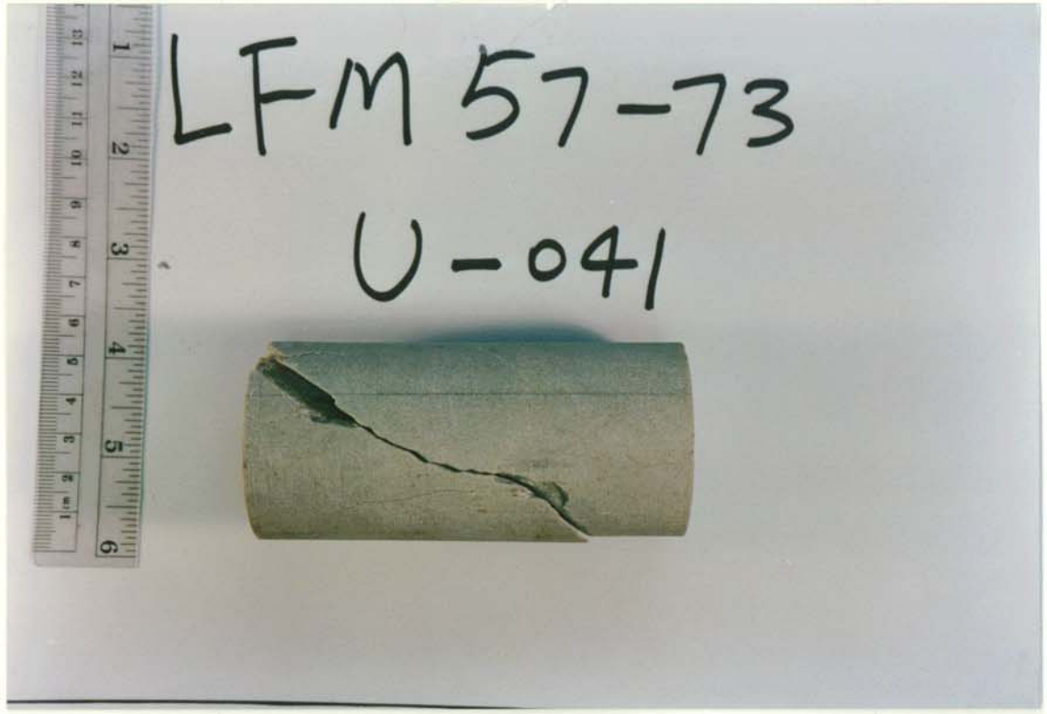
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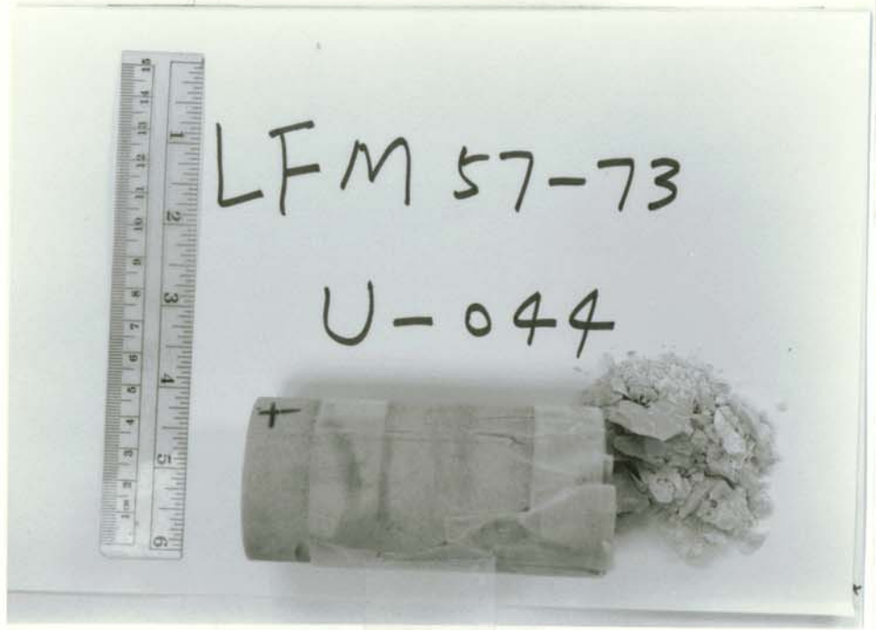
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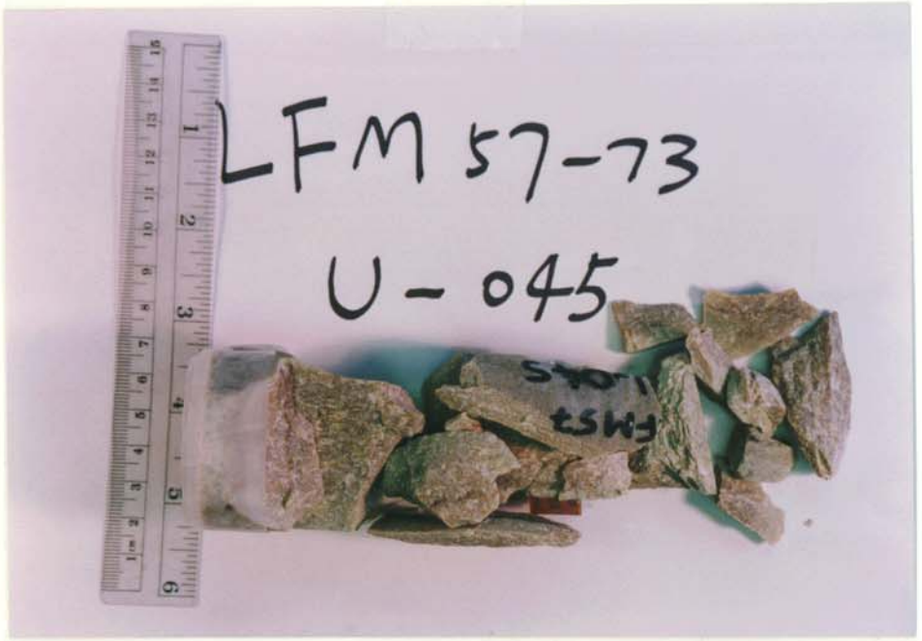

This is
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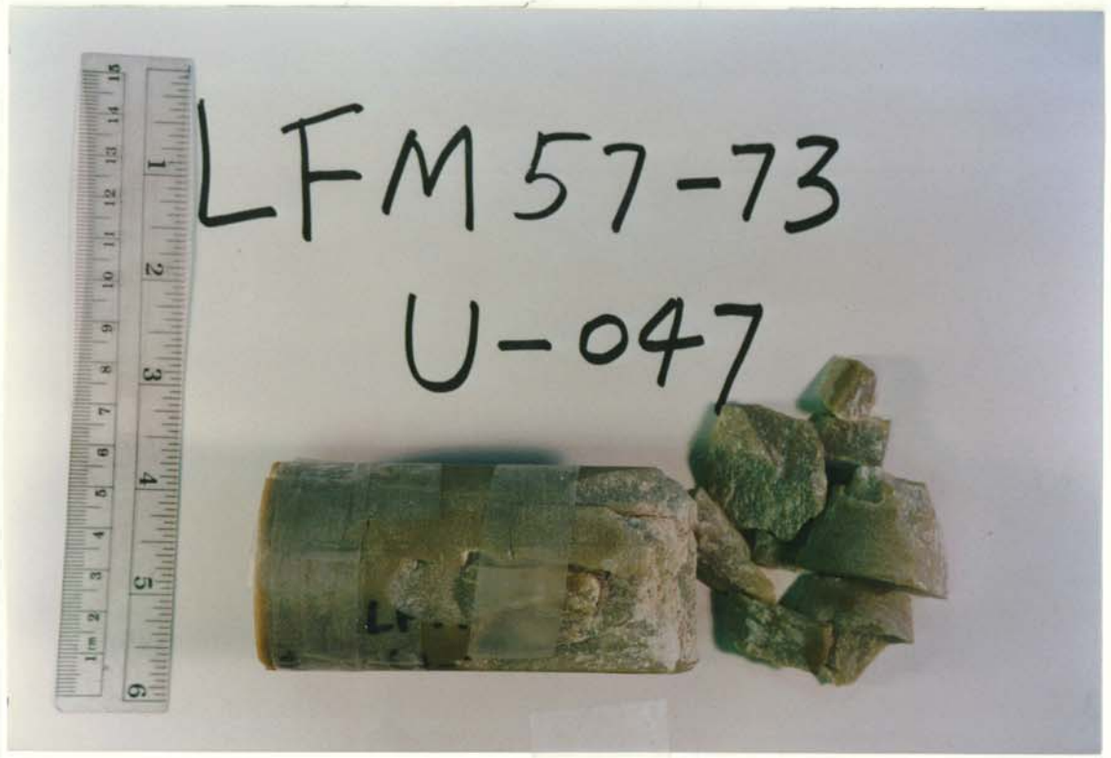
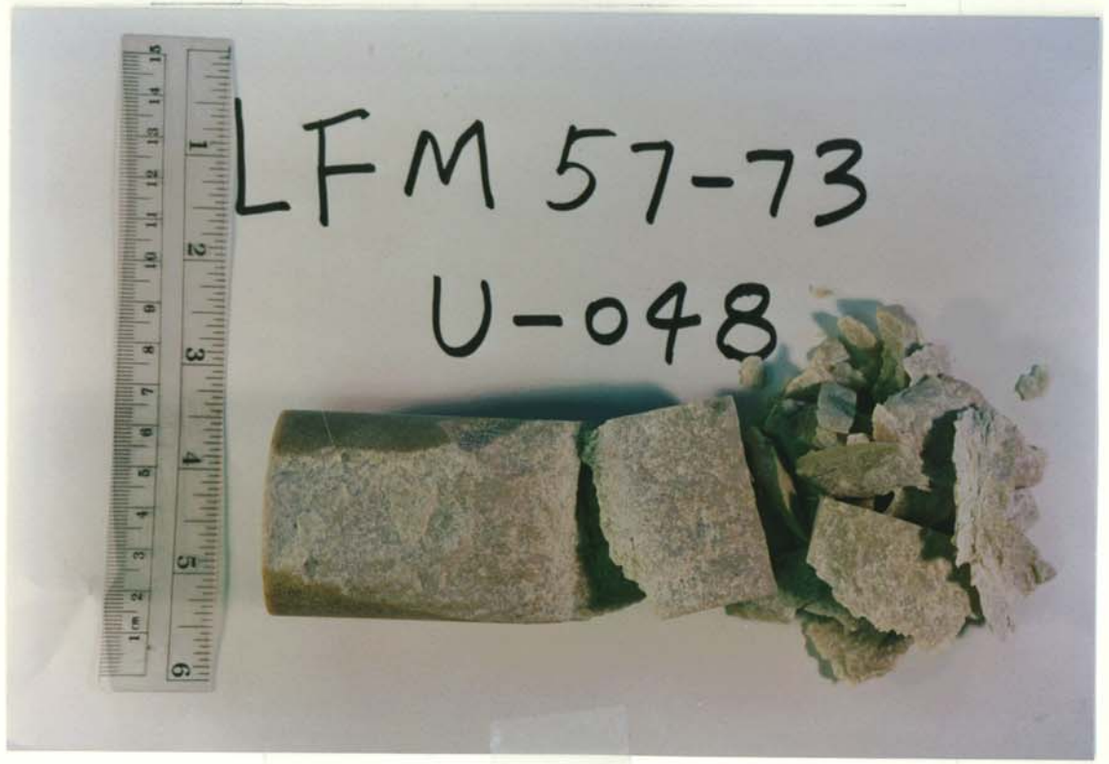
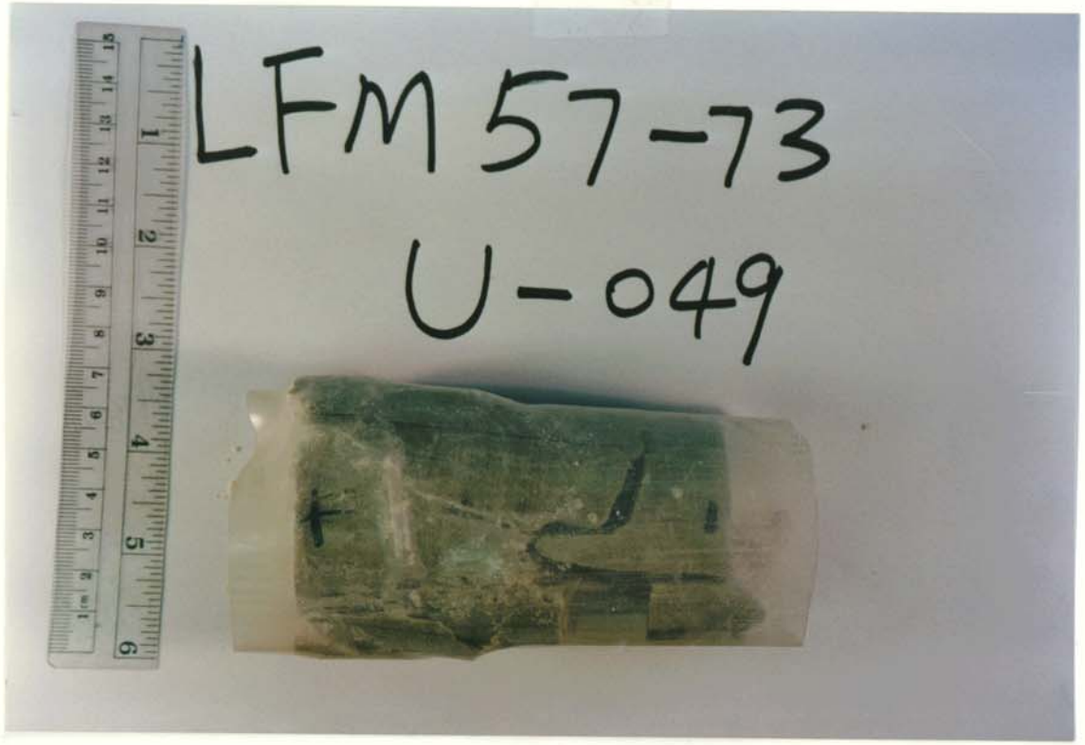
U-046.
Mistake was corrected
by S. Jeon
on 5-27-93.



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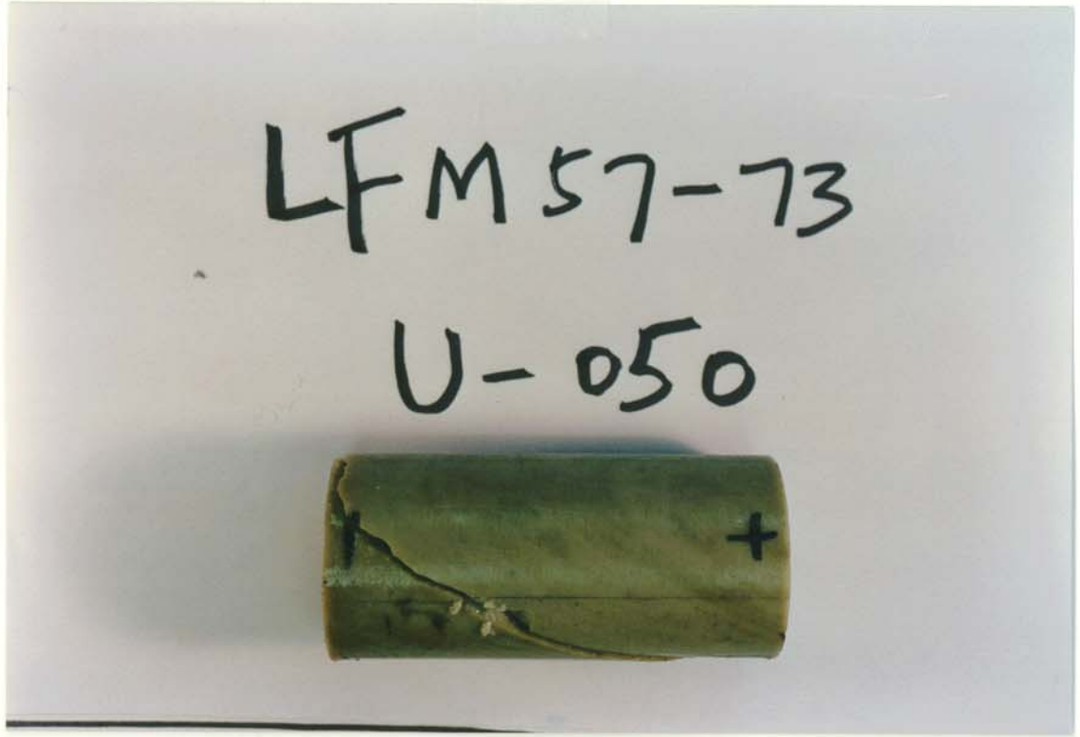
LFM 57-73
U-050

LFM 57-73
U-052

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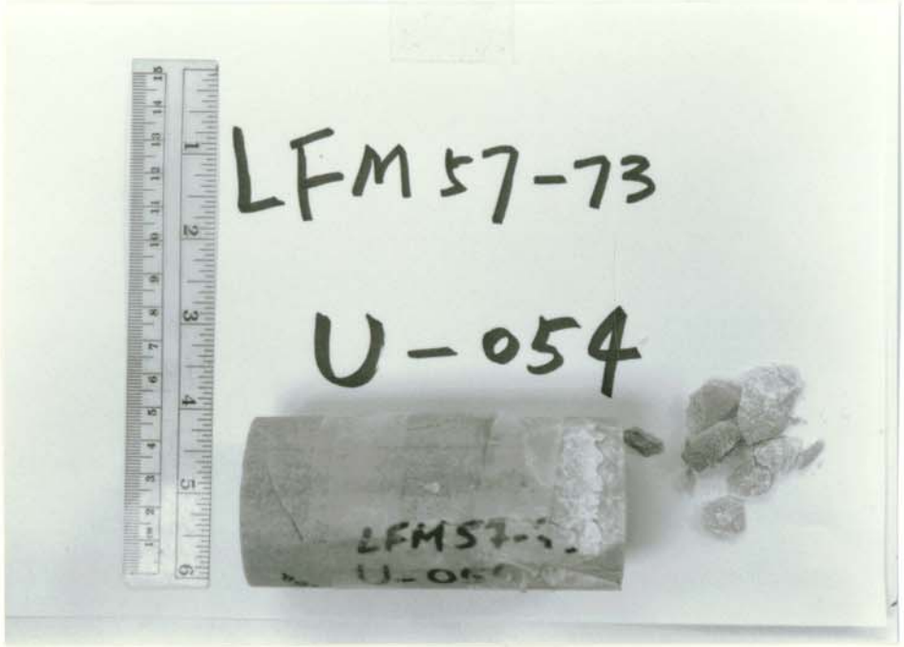
U-053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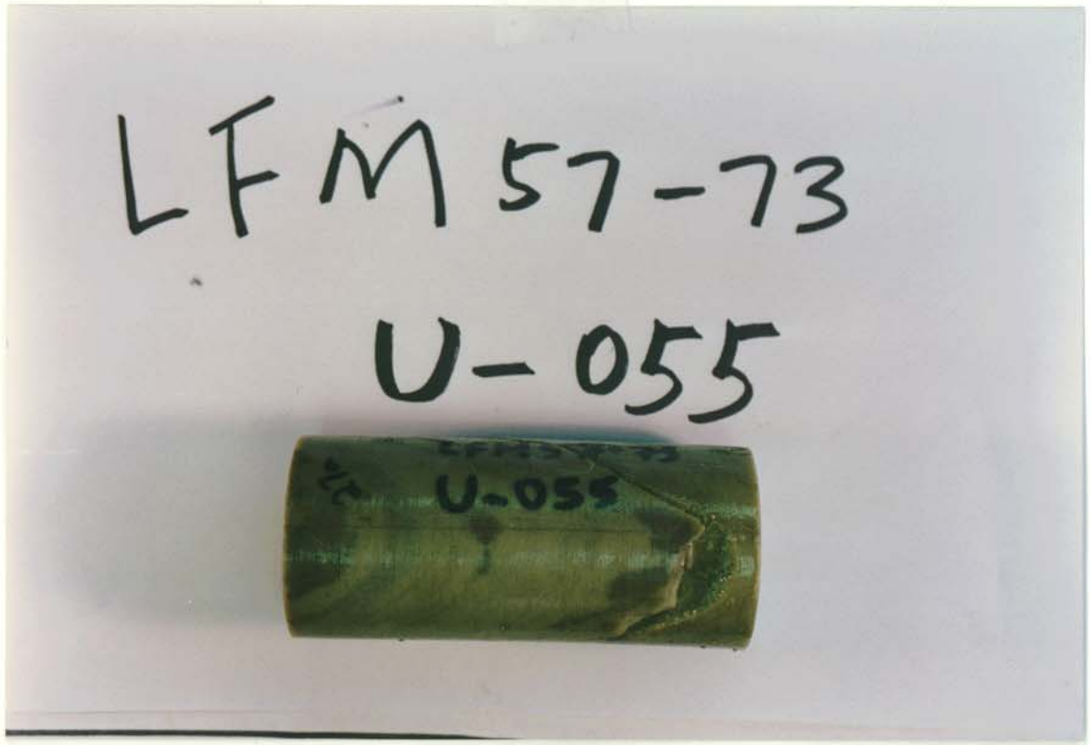
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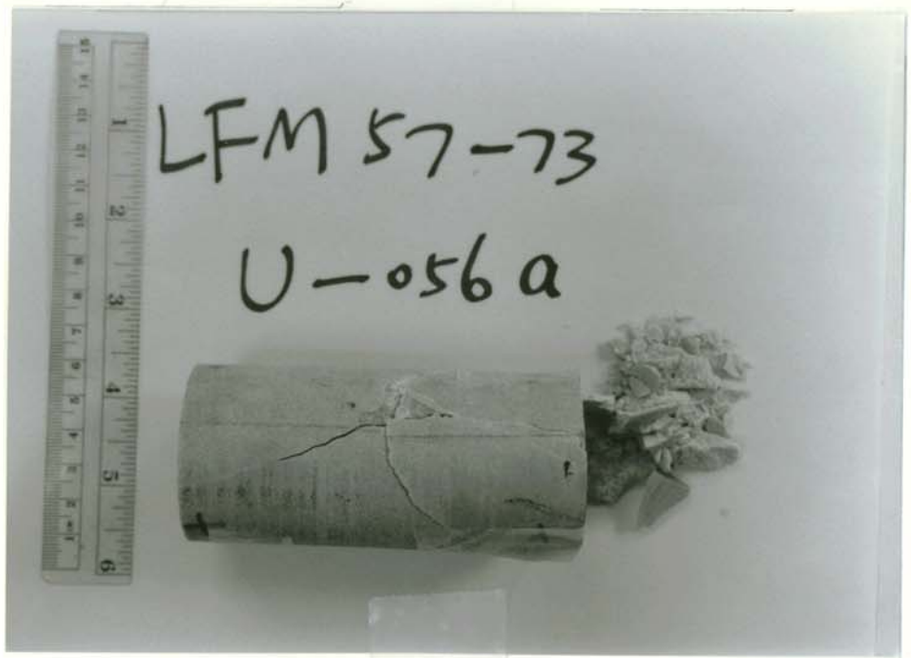
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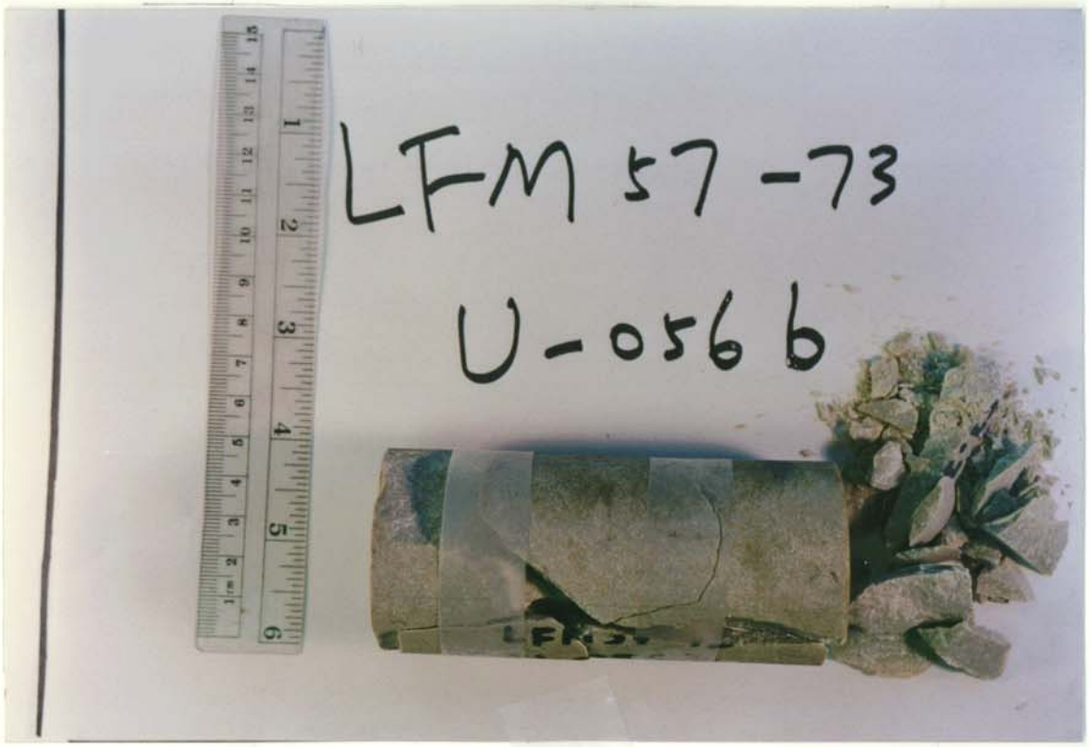

LFM 57-73
U-056 b

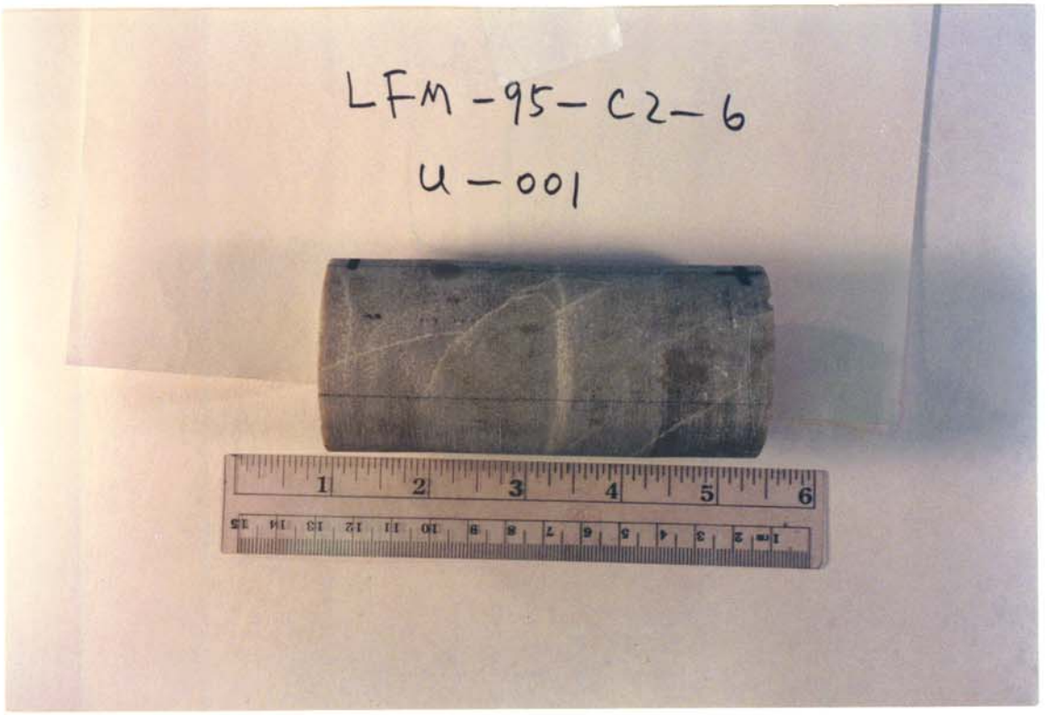
LFM 57-73
U-057
LFM

COMPRESSION TEST
SAMPLES

Treasured Moments

AFTER TESTS

Share your memories...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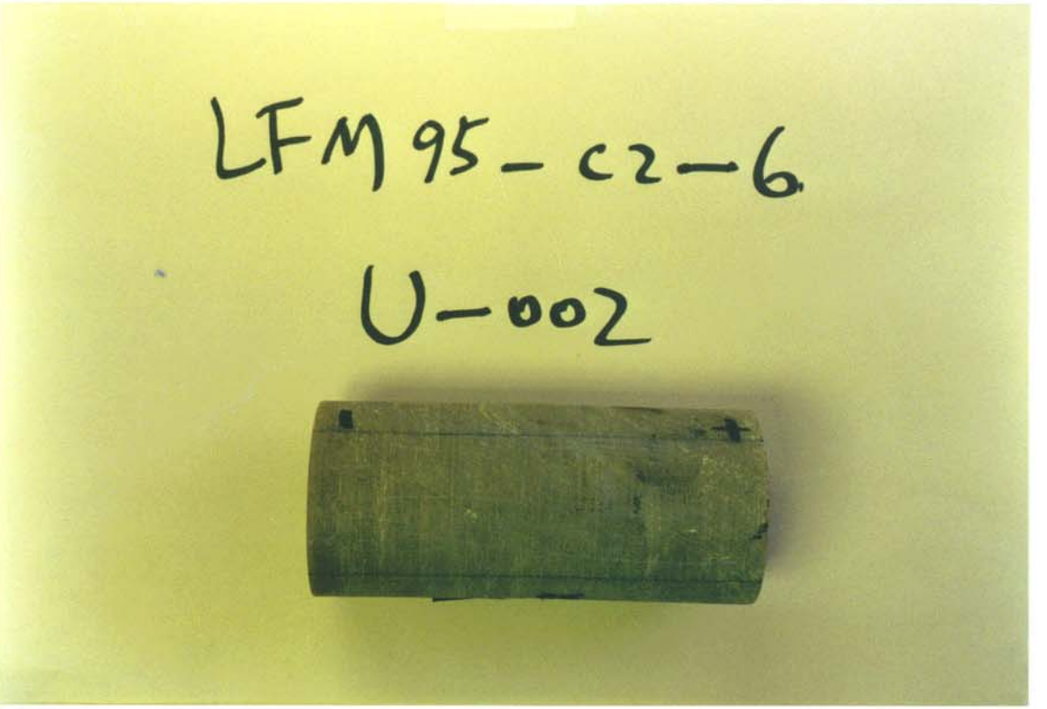
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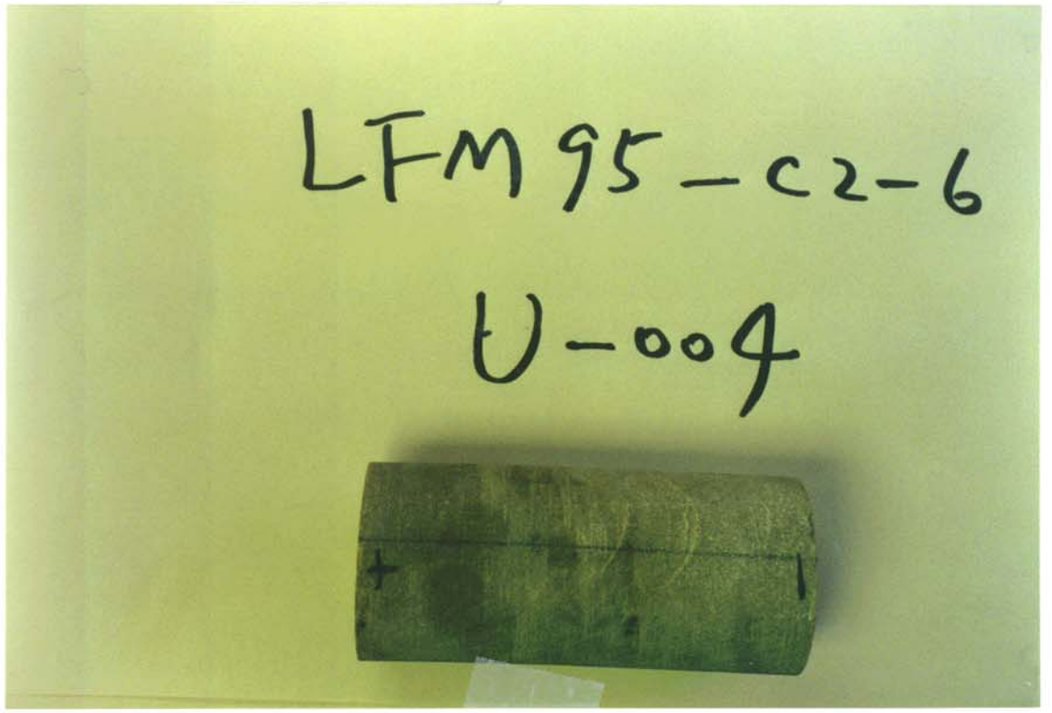
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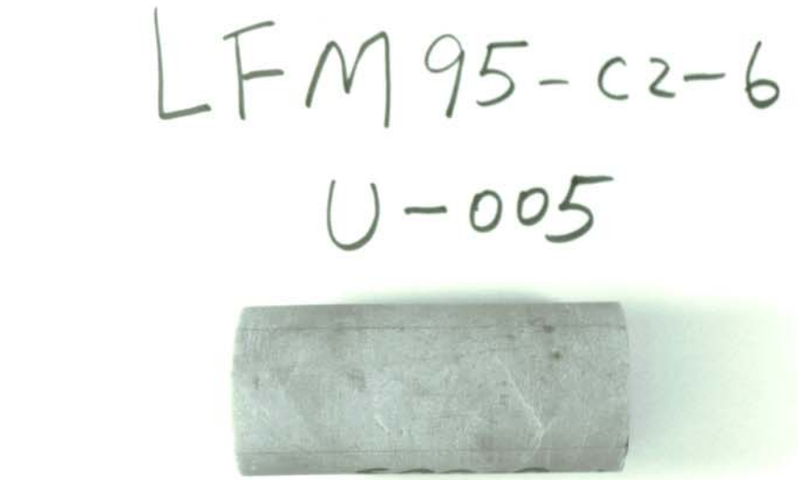
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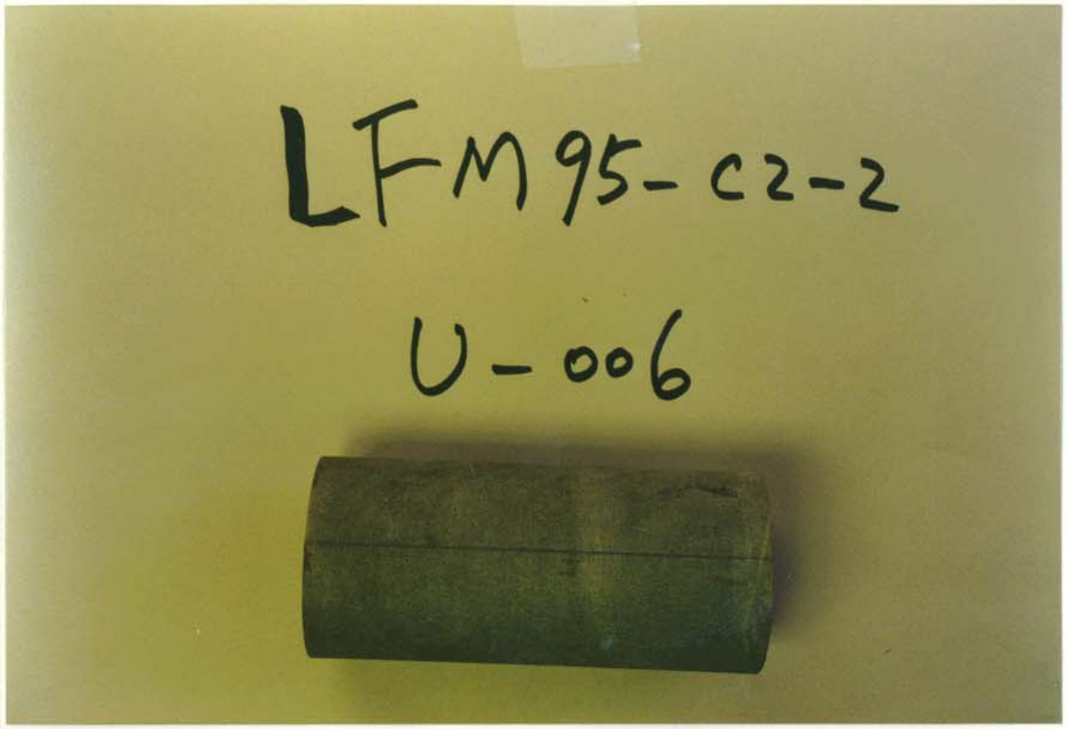
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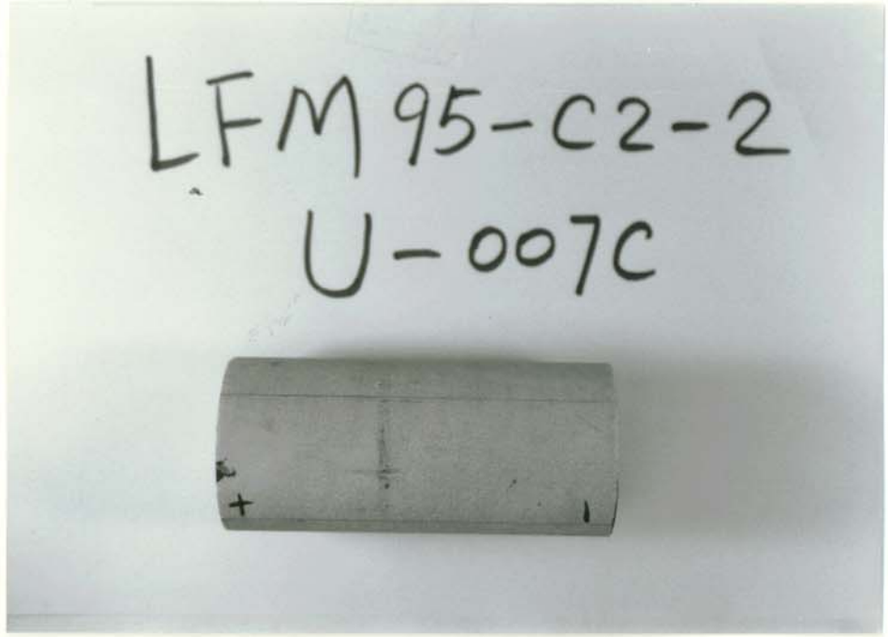
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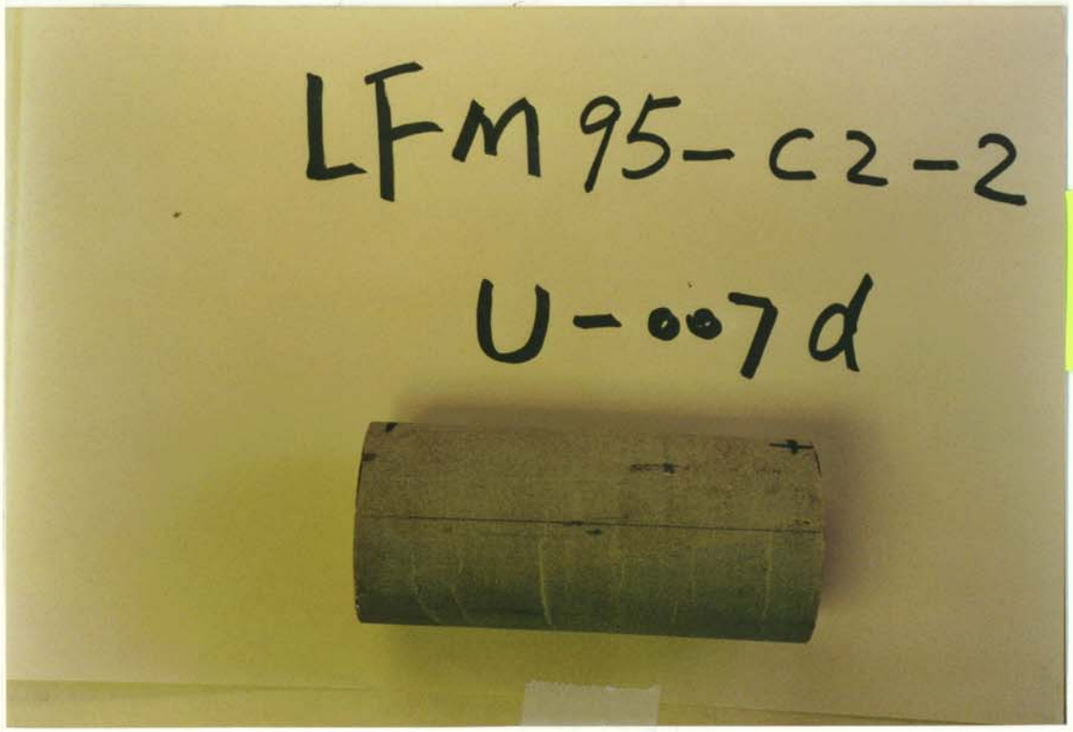
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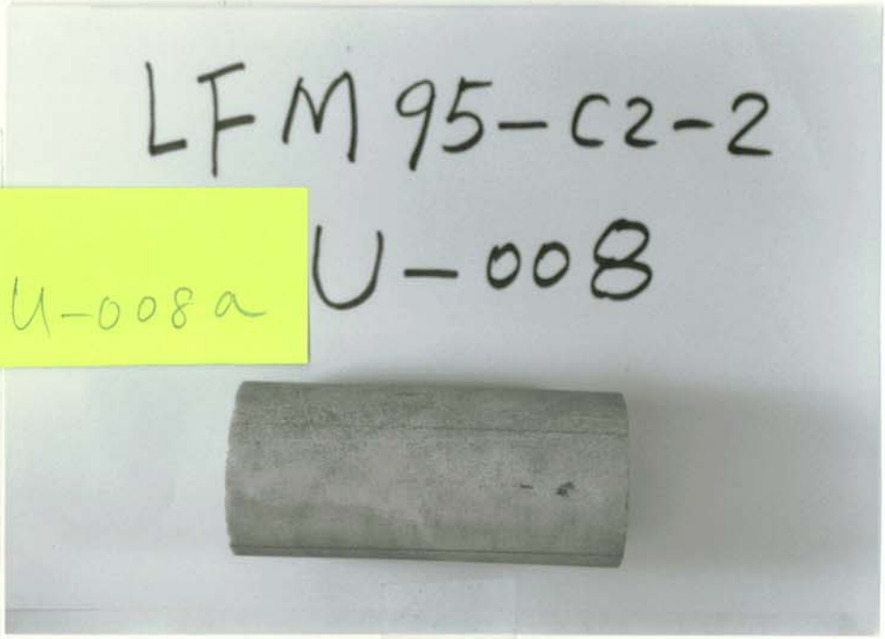
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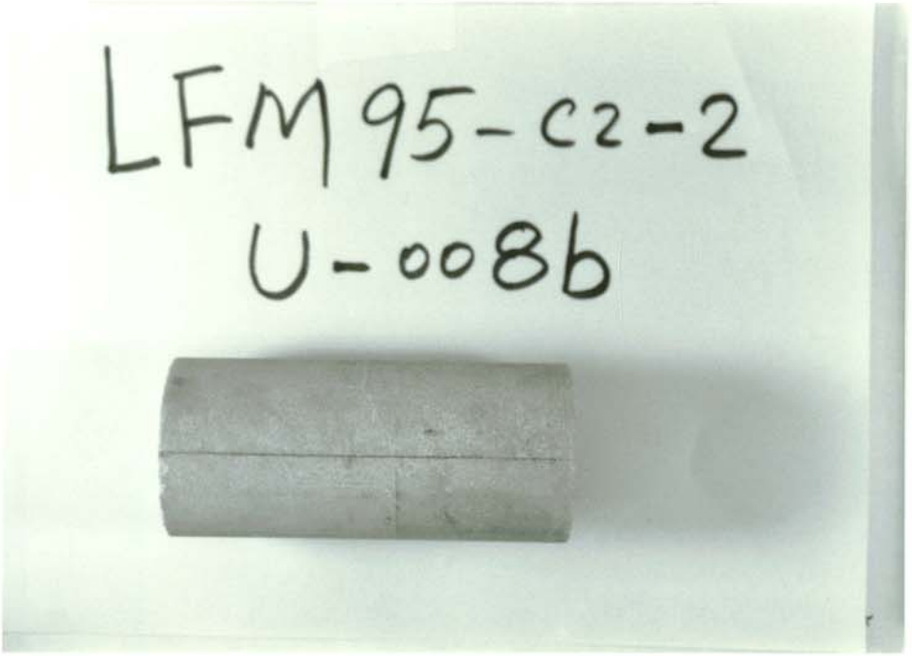
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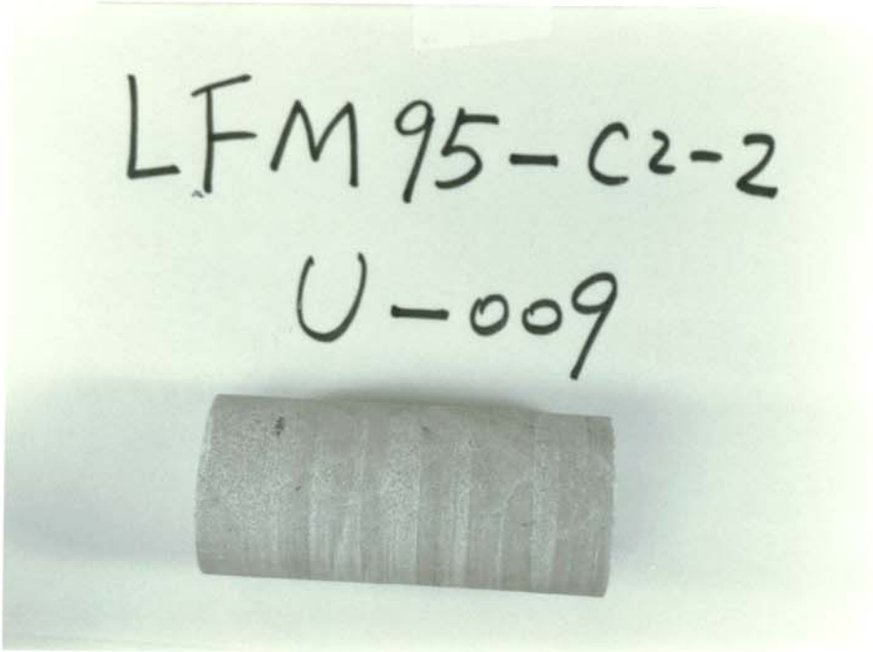
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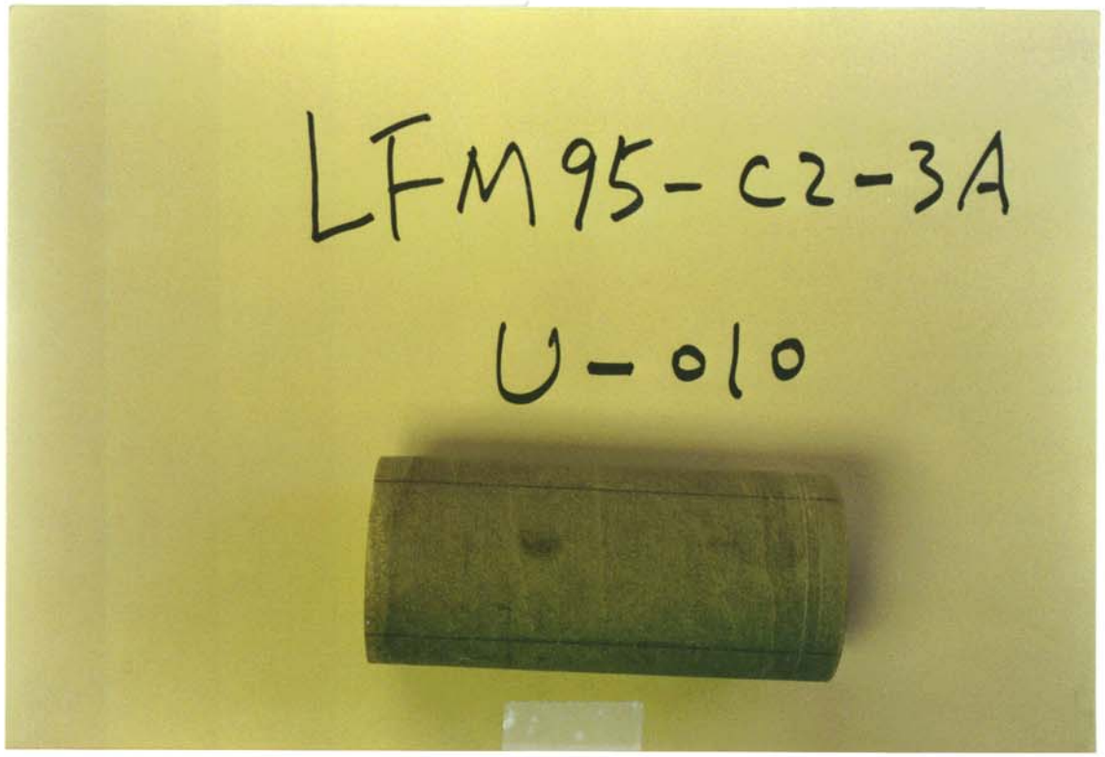
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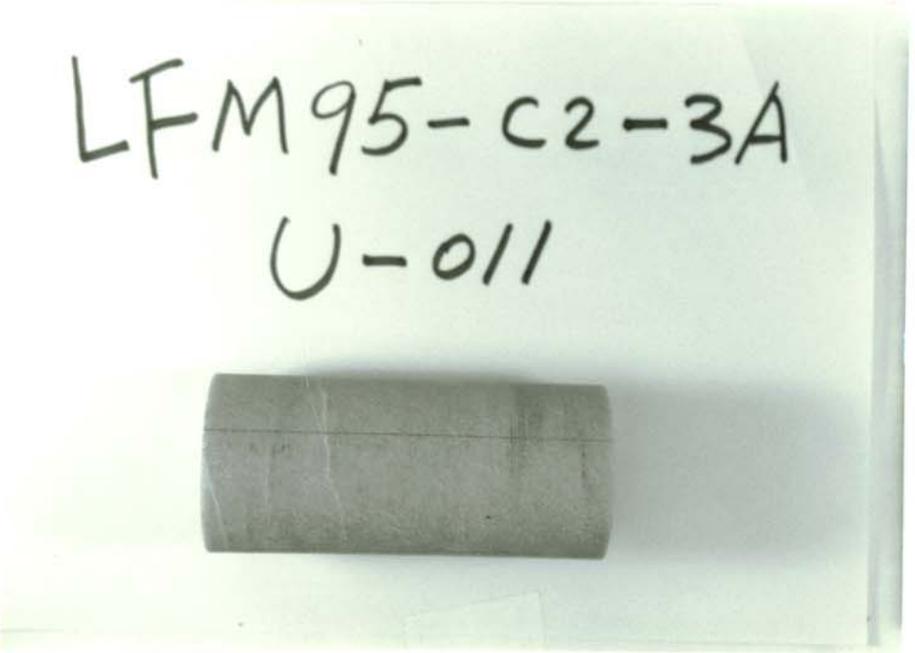
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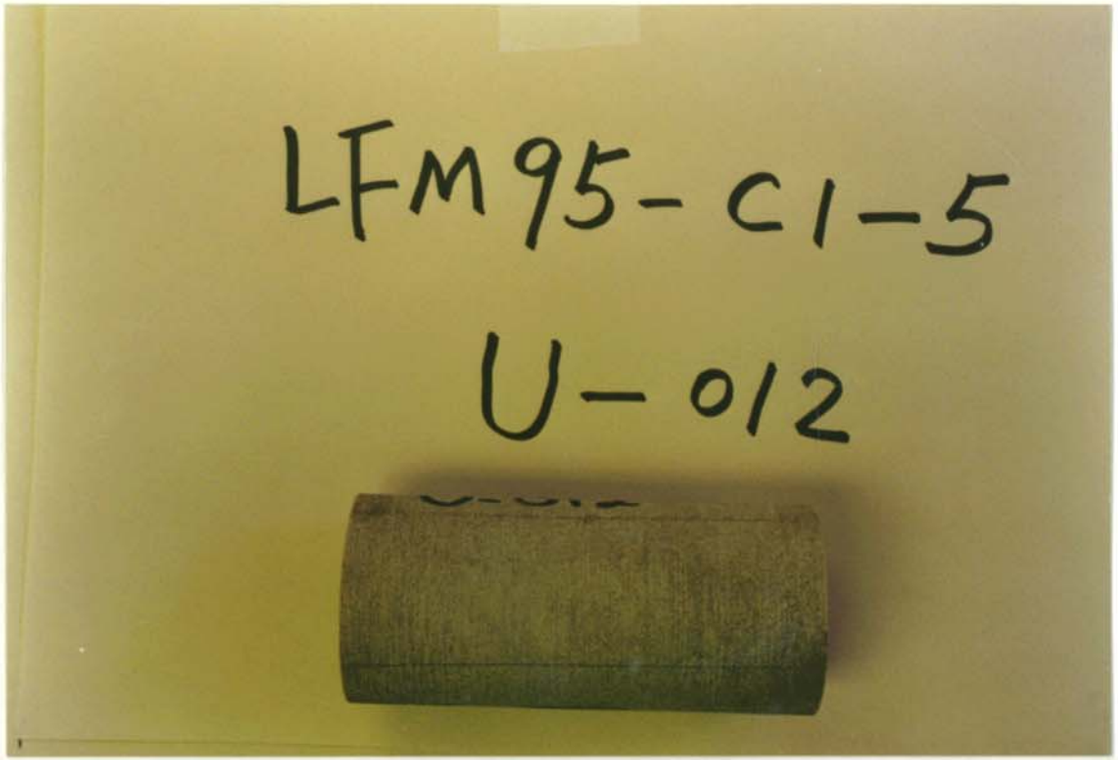
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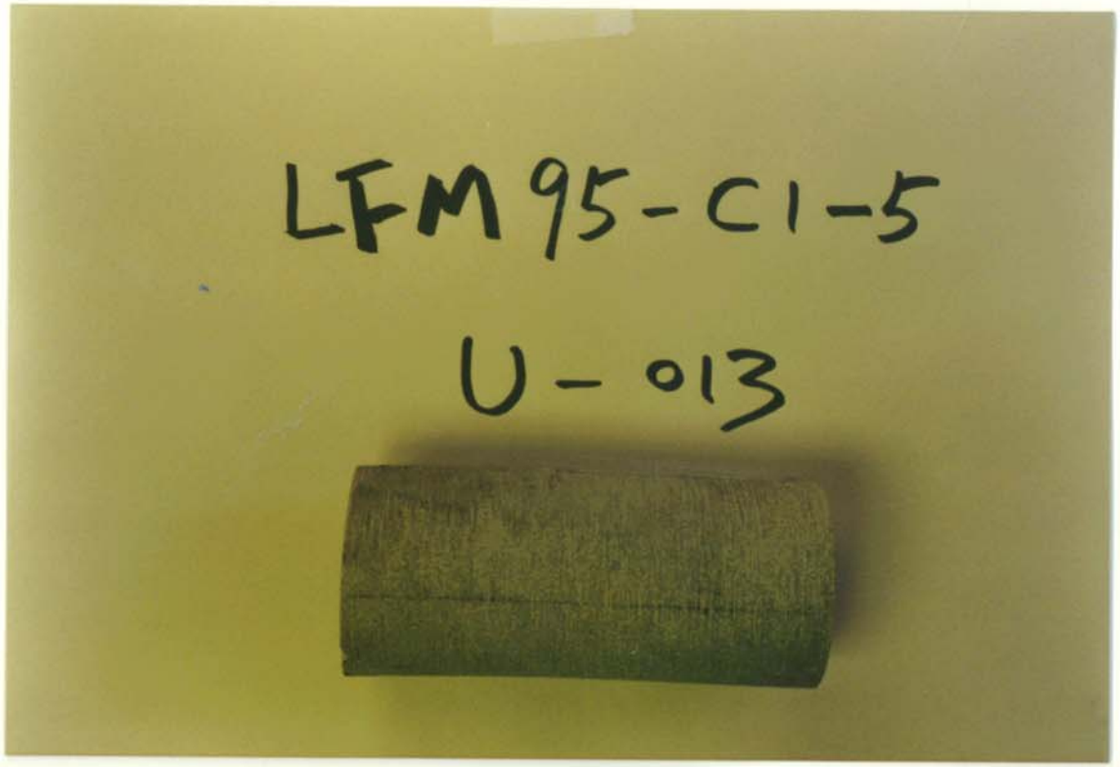
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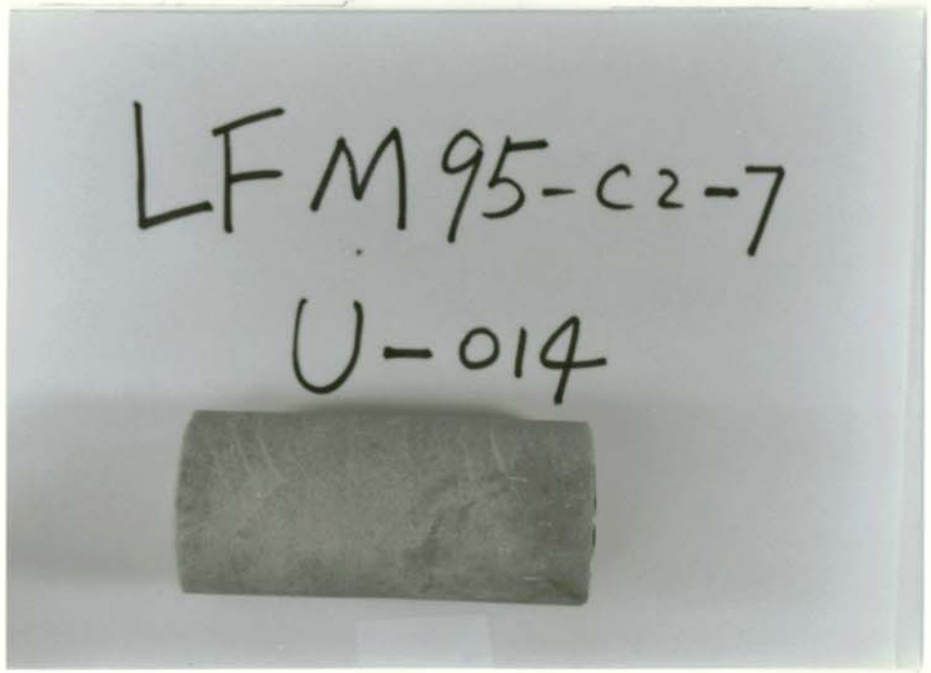
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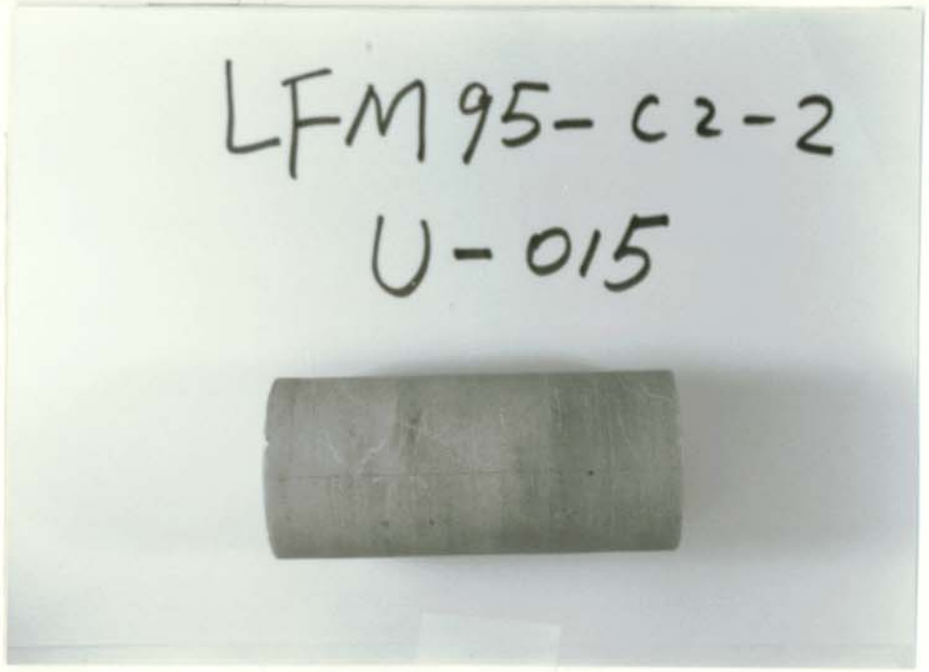
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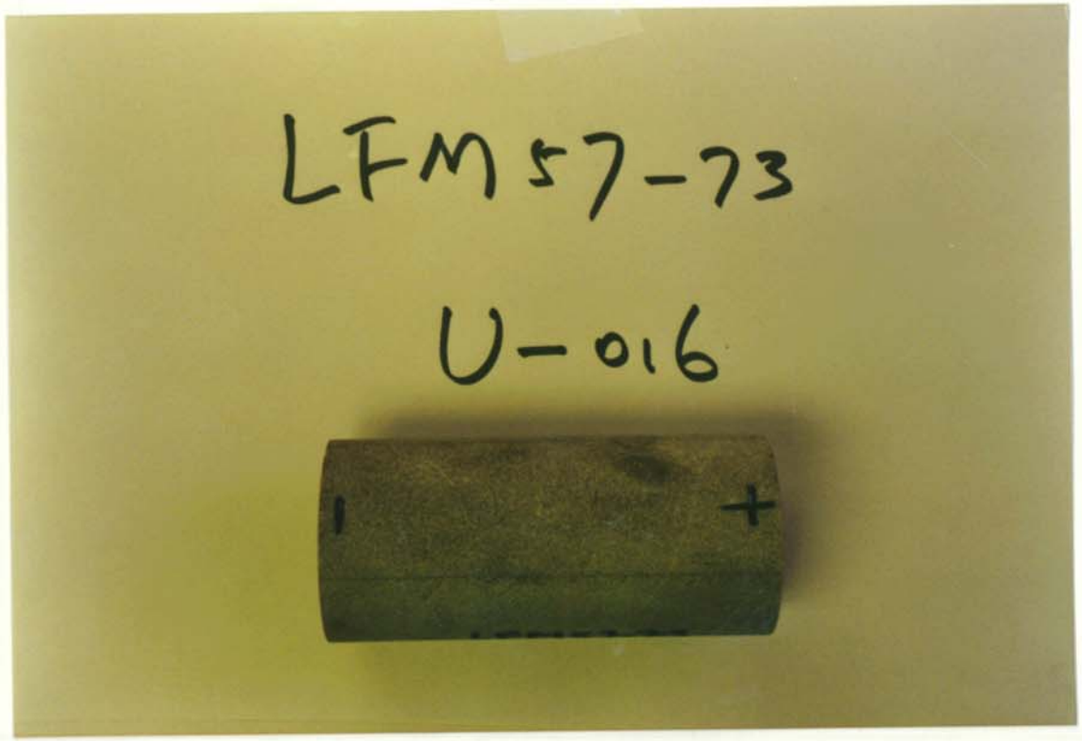
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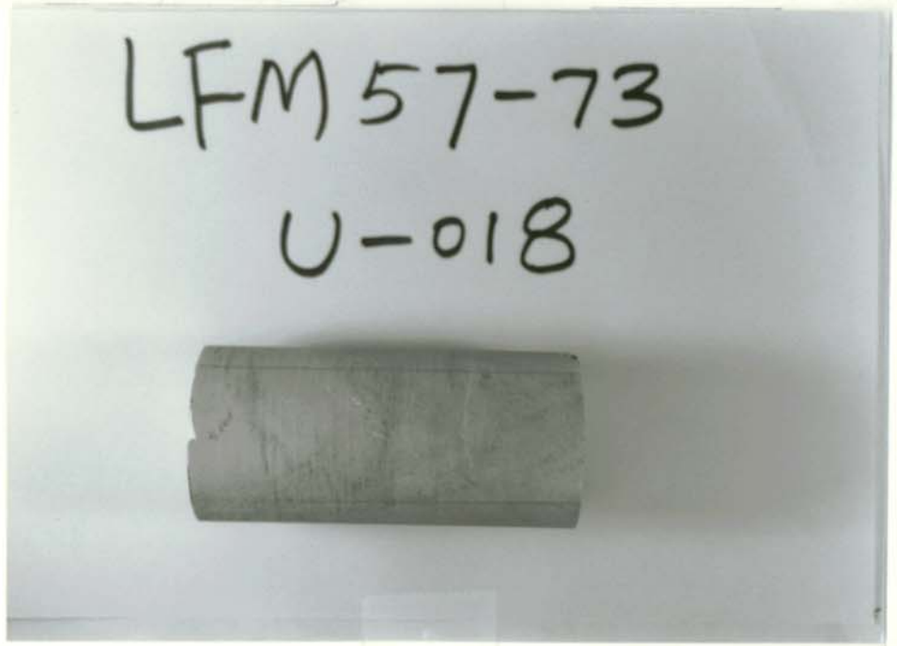
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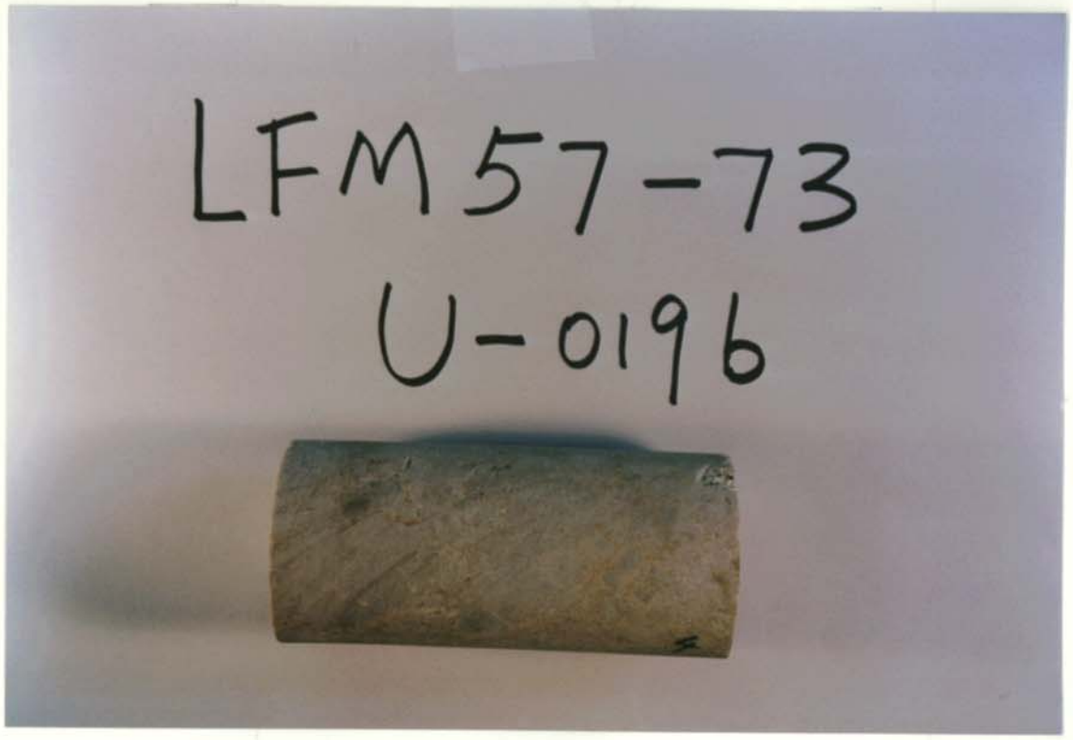
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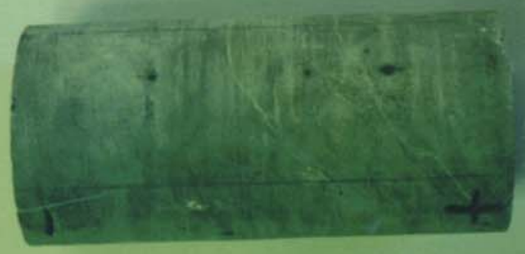
U-020



LFM 57-73

U-022

LFM 57-73

U-023

LFM 57-73

U-024 a

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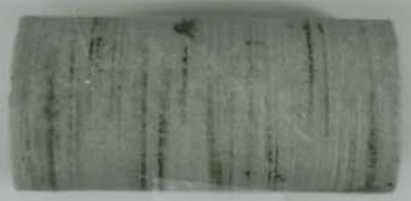

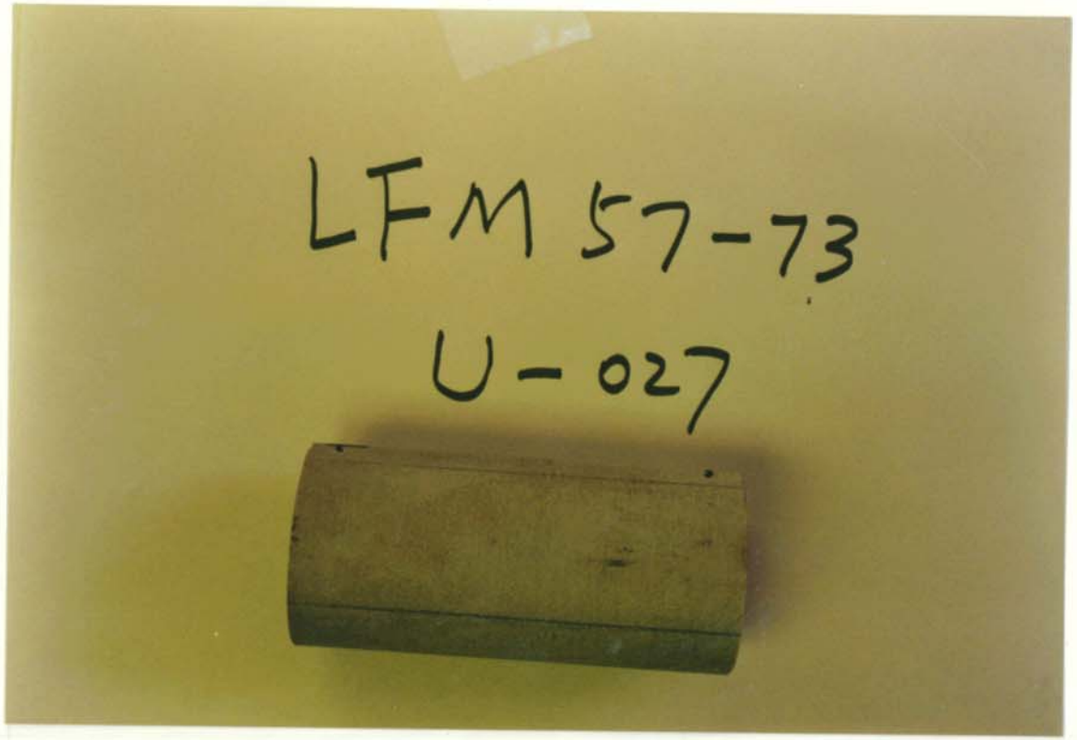
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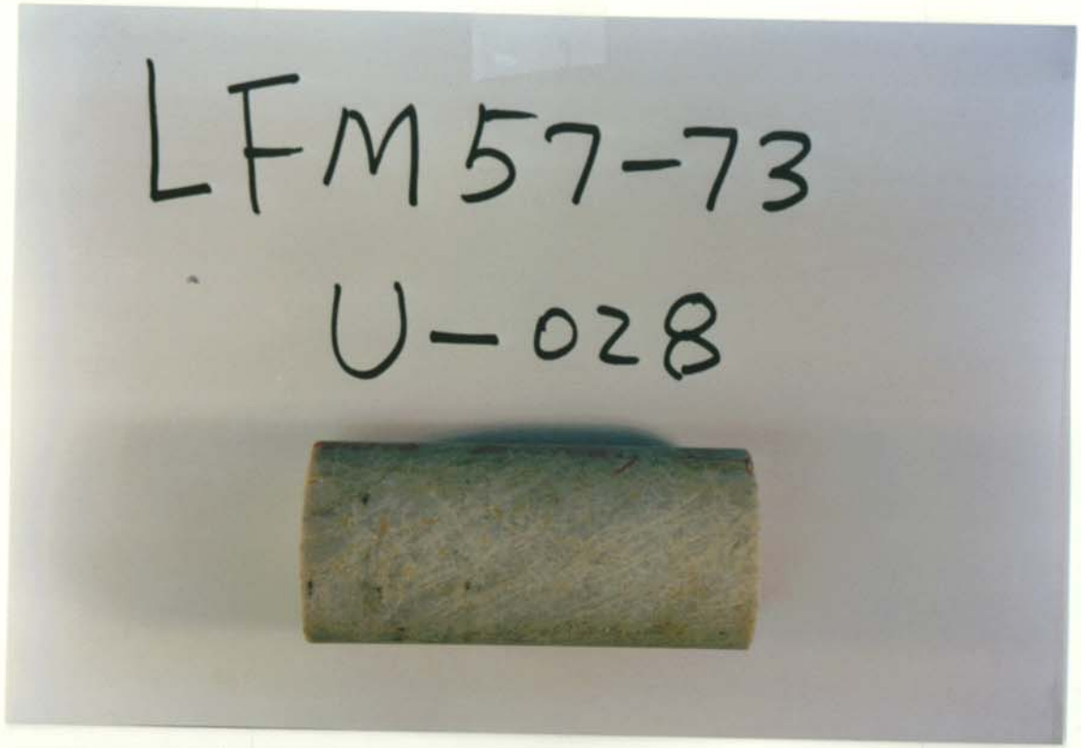
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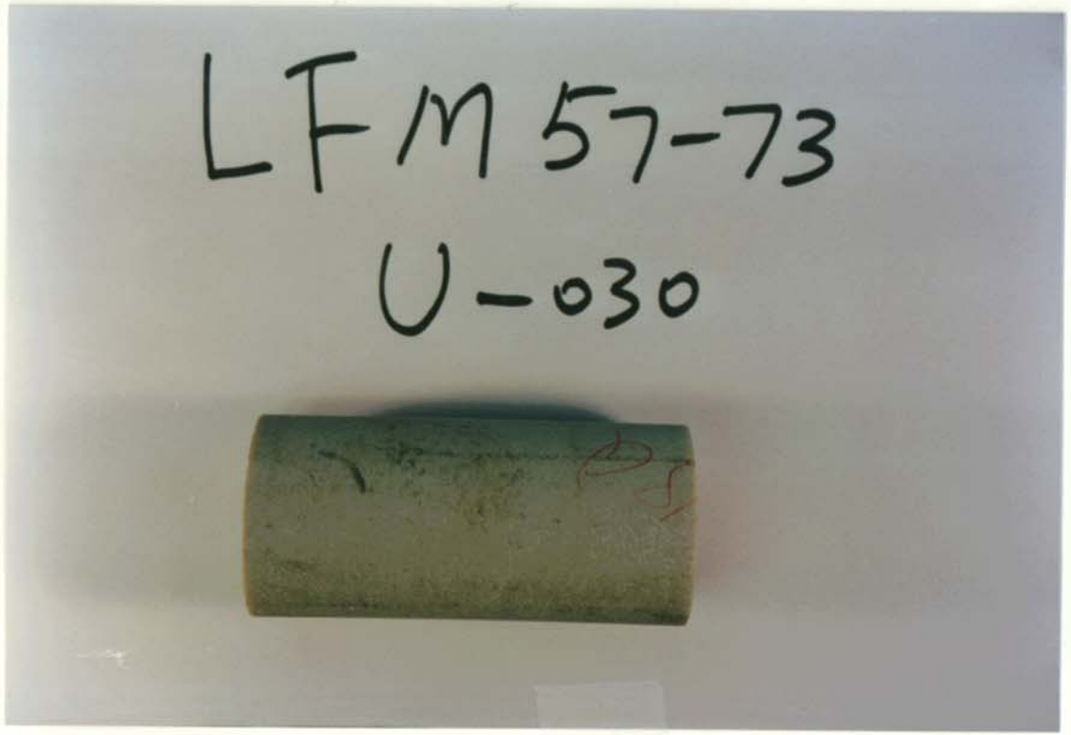
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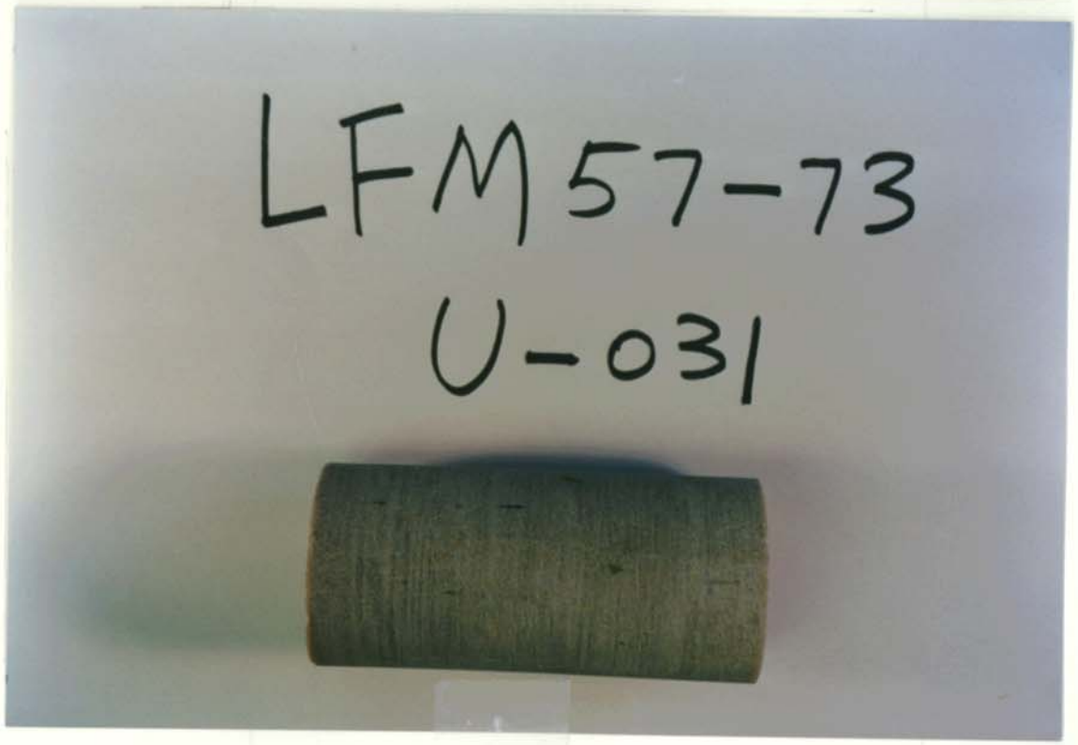
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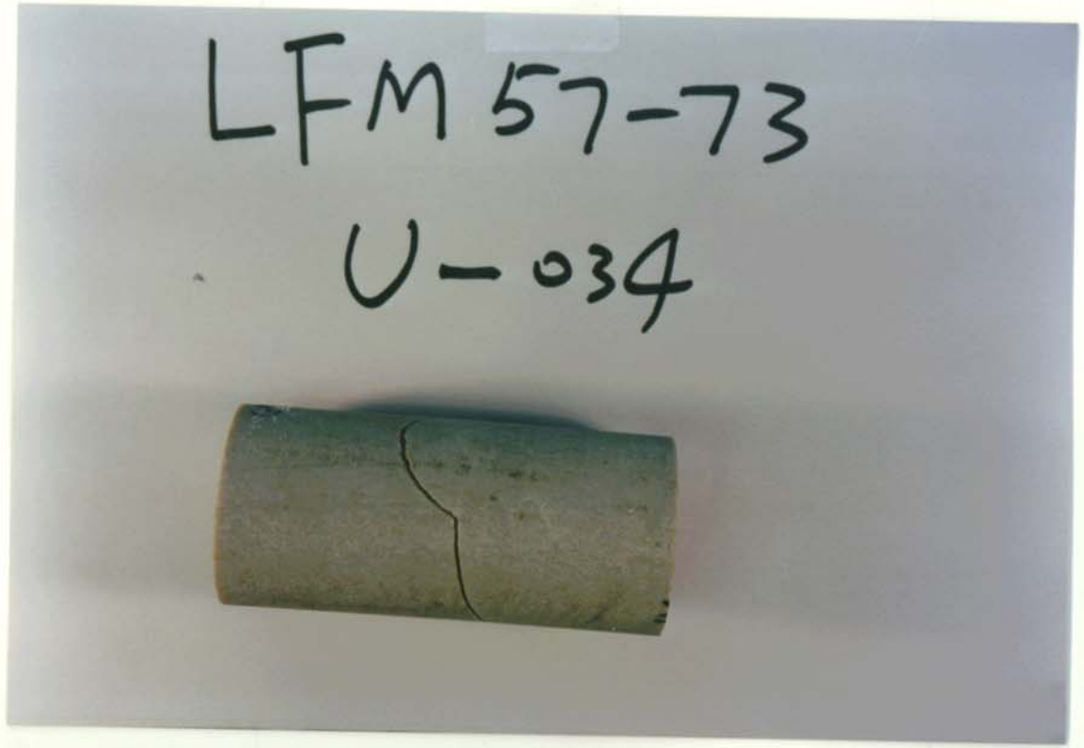
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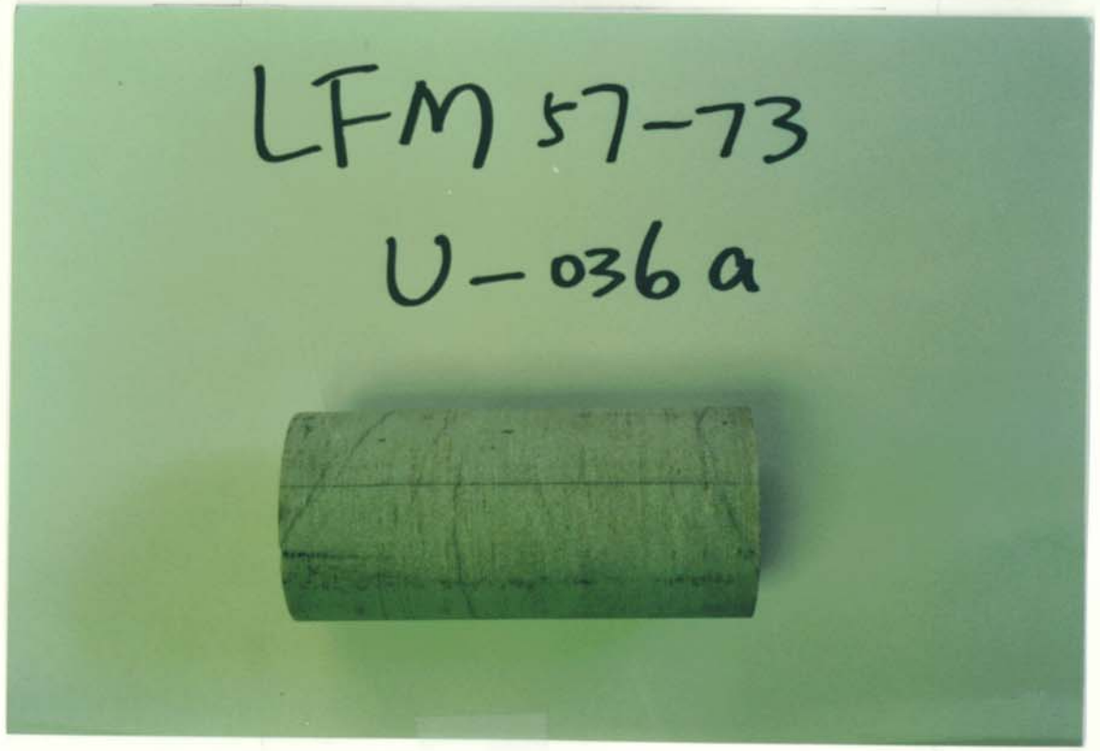
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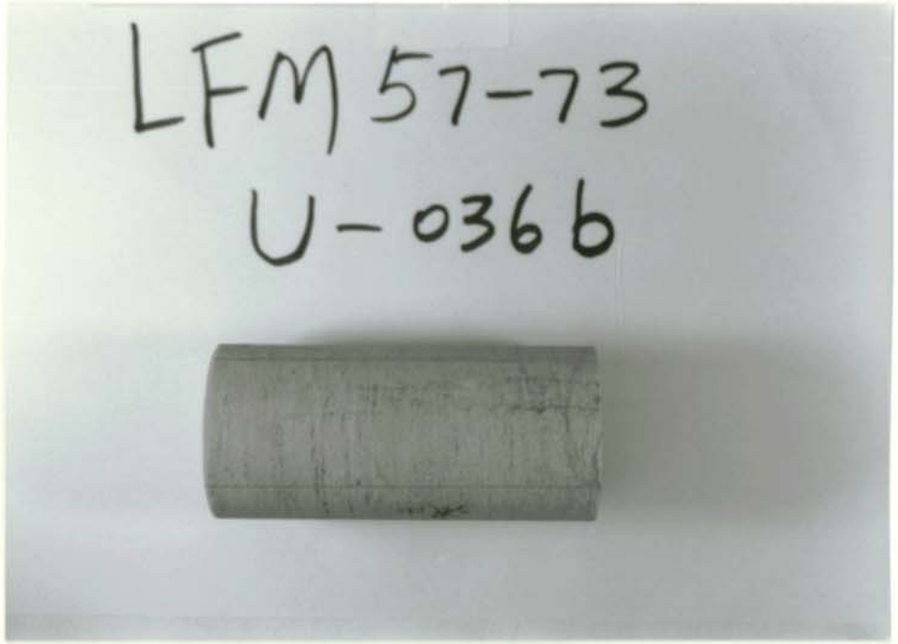
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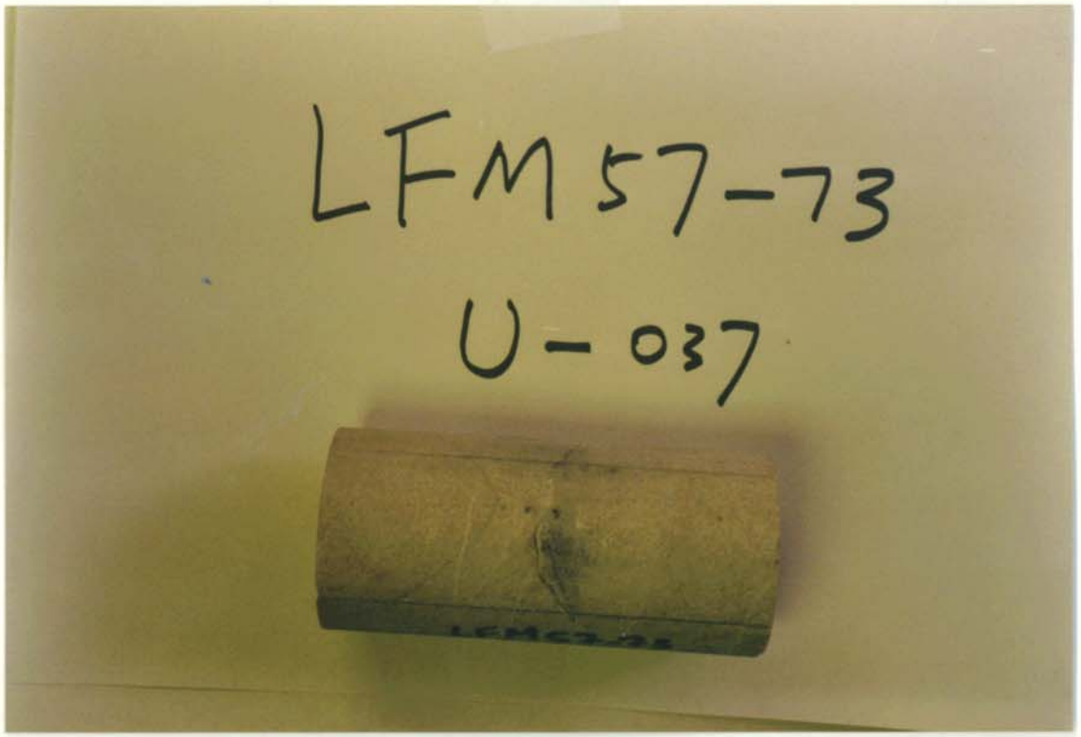
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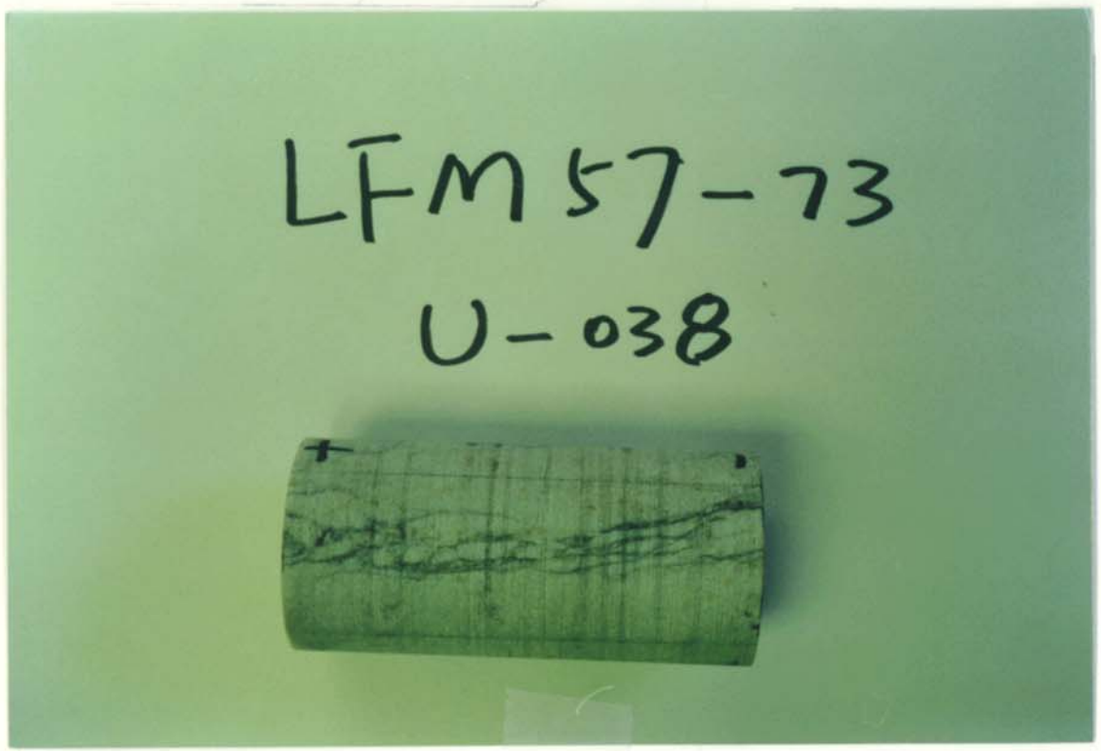
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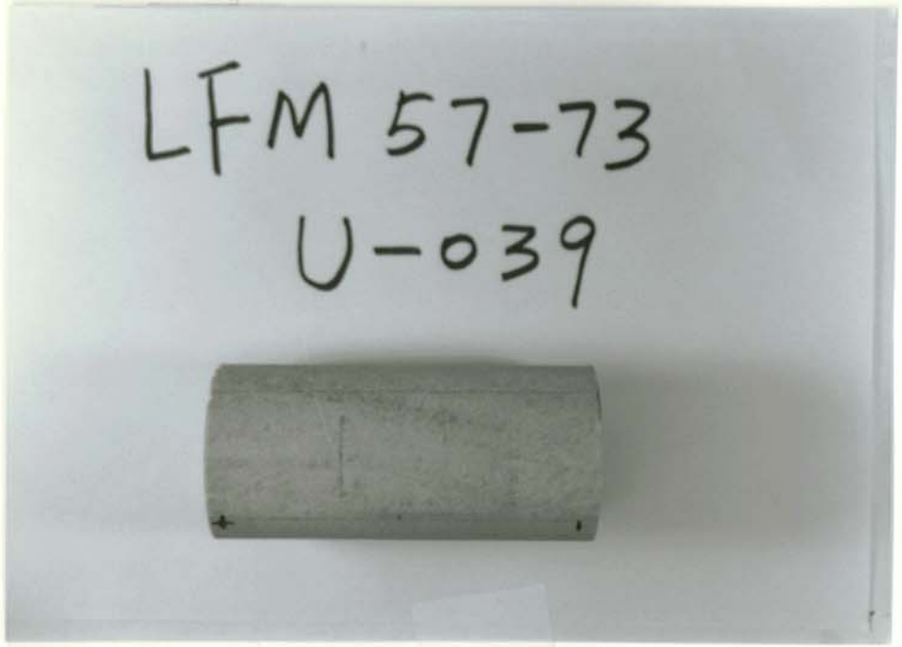
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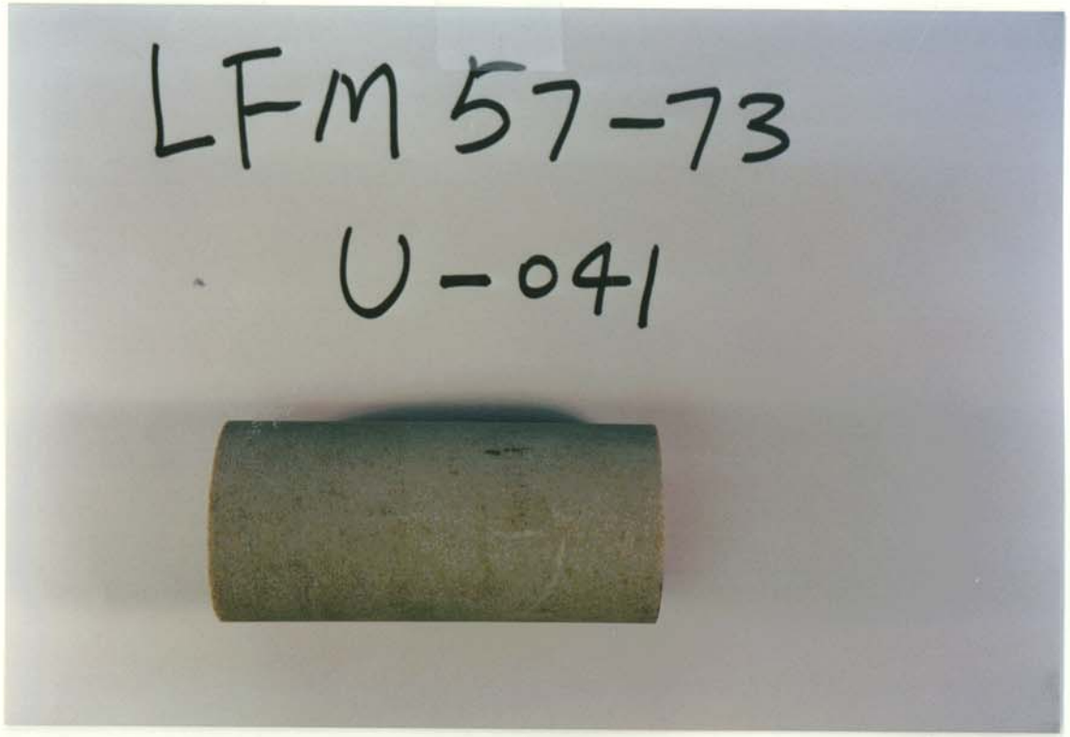
U-040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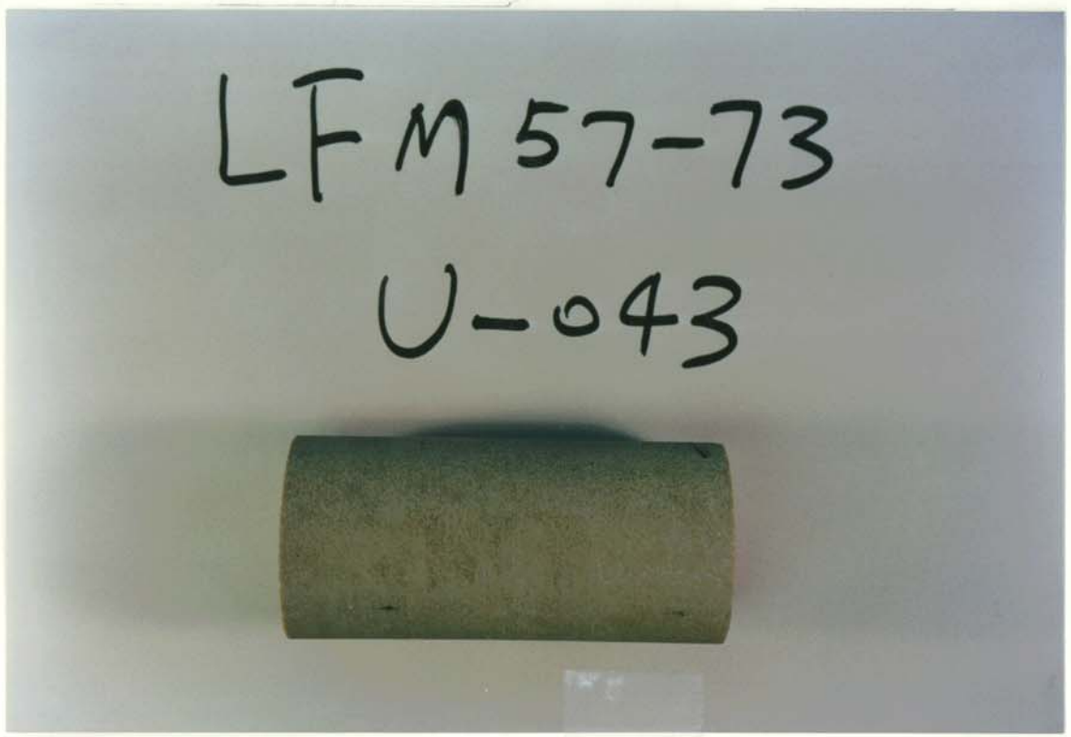
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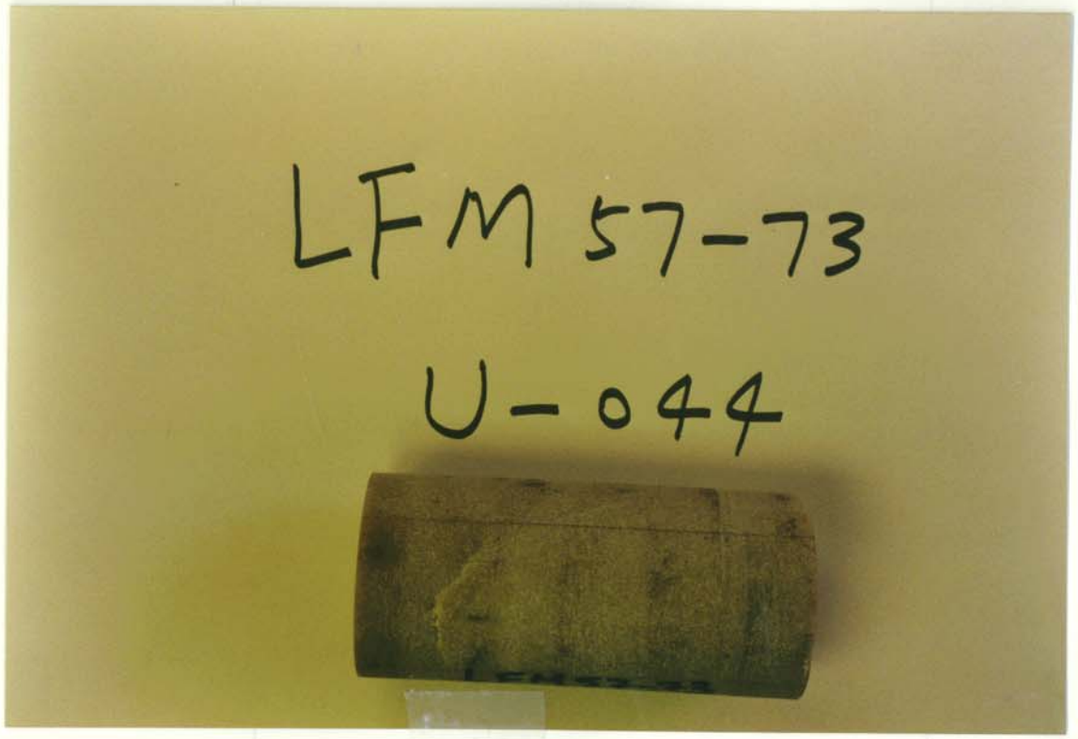
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U-044

LFM 57-73
U-045

LFM 57-73
U-046

LFM 57-73
U-047

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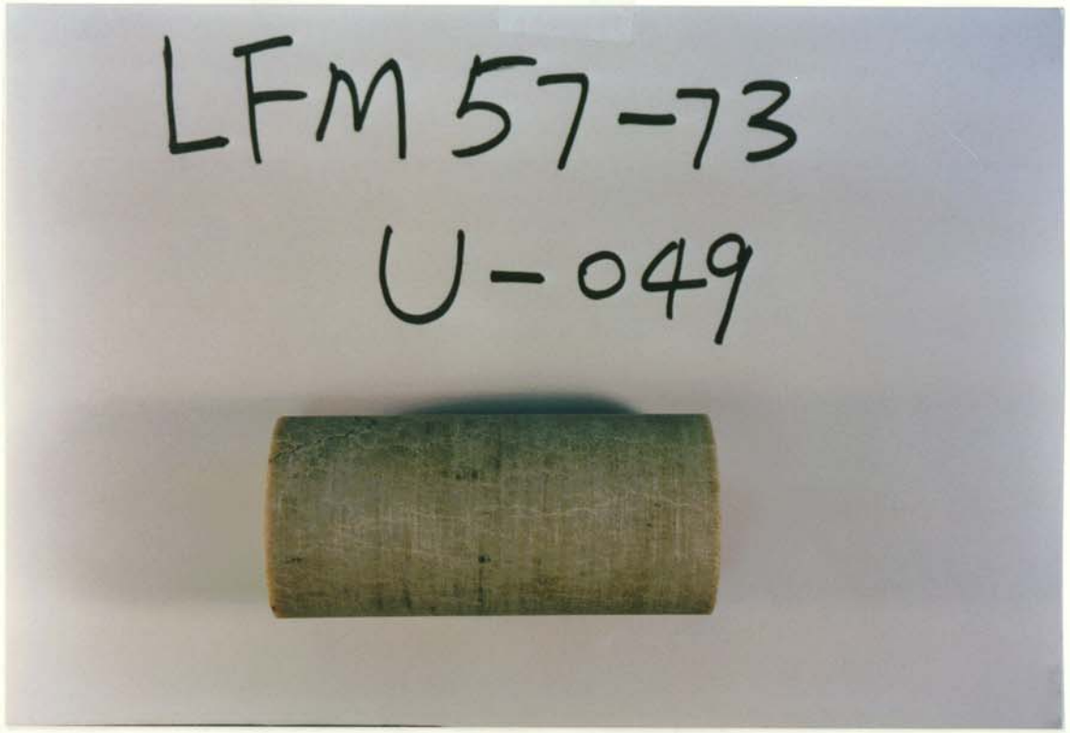
U-048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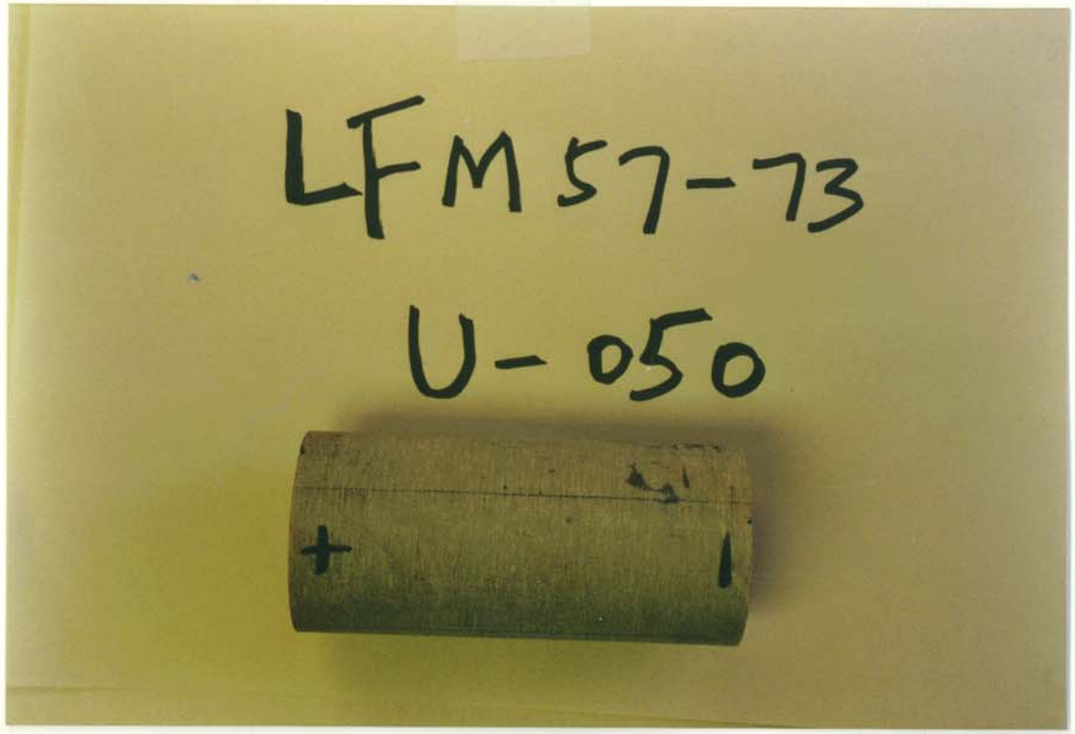
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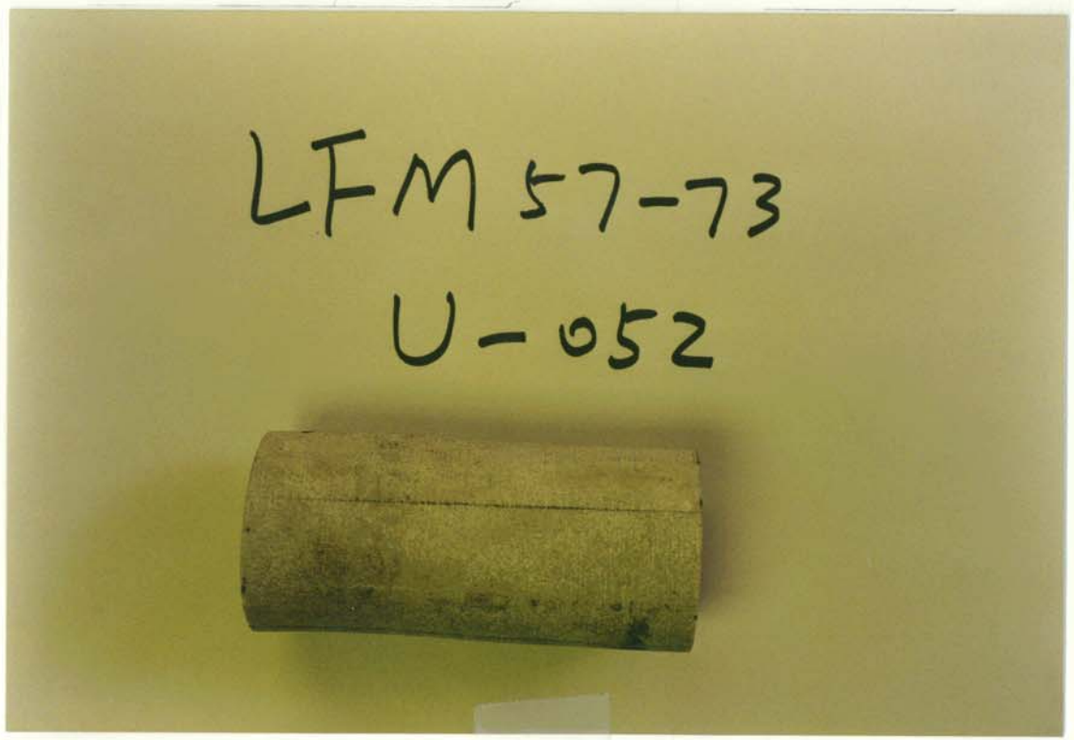
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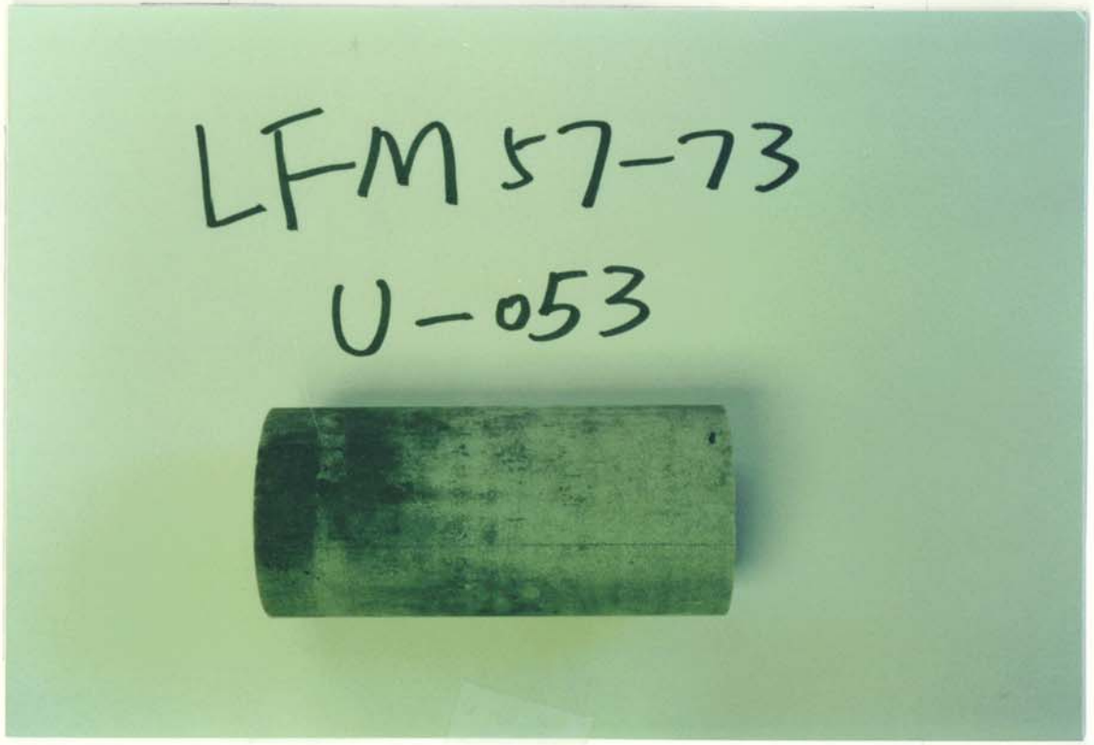
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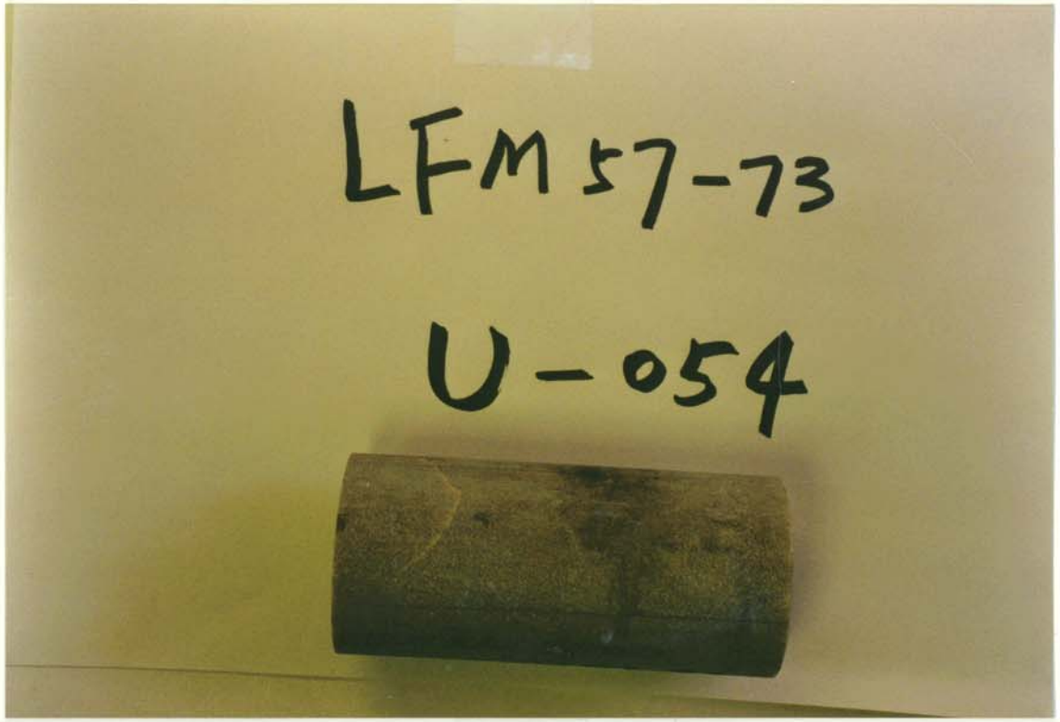
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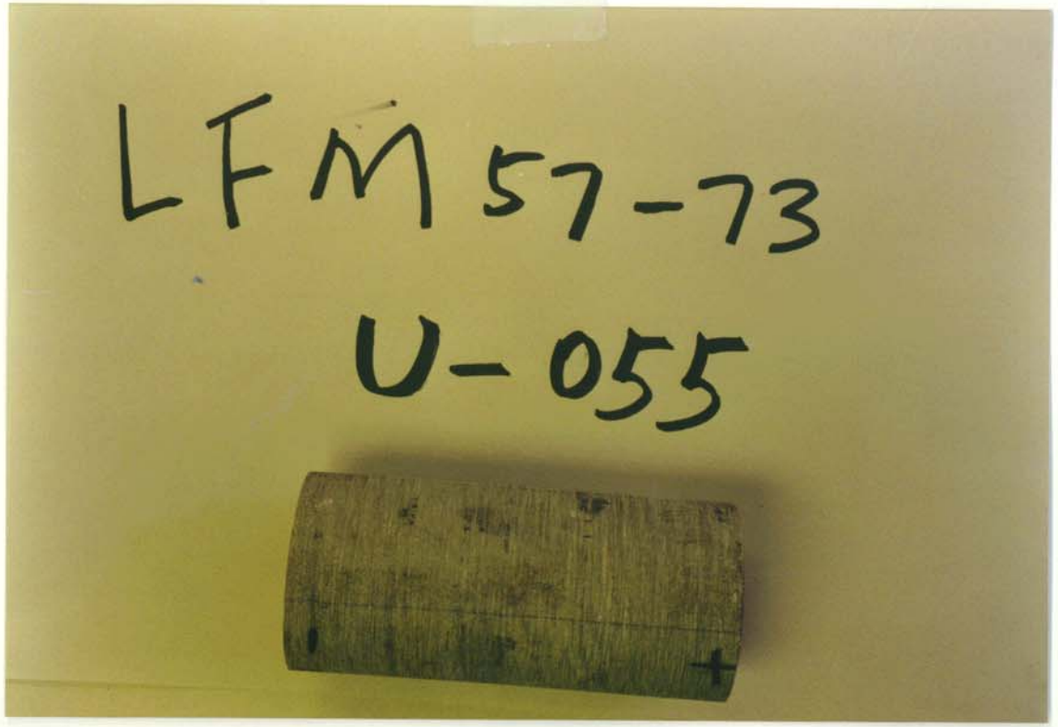
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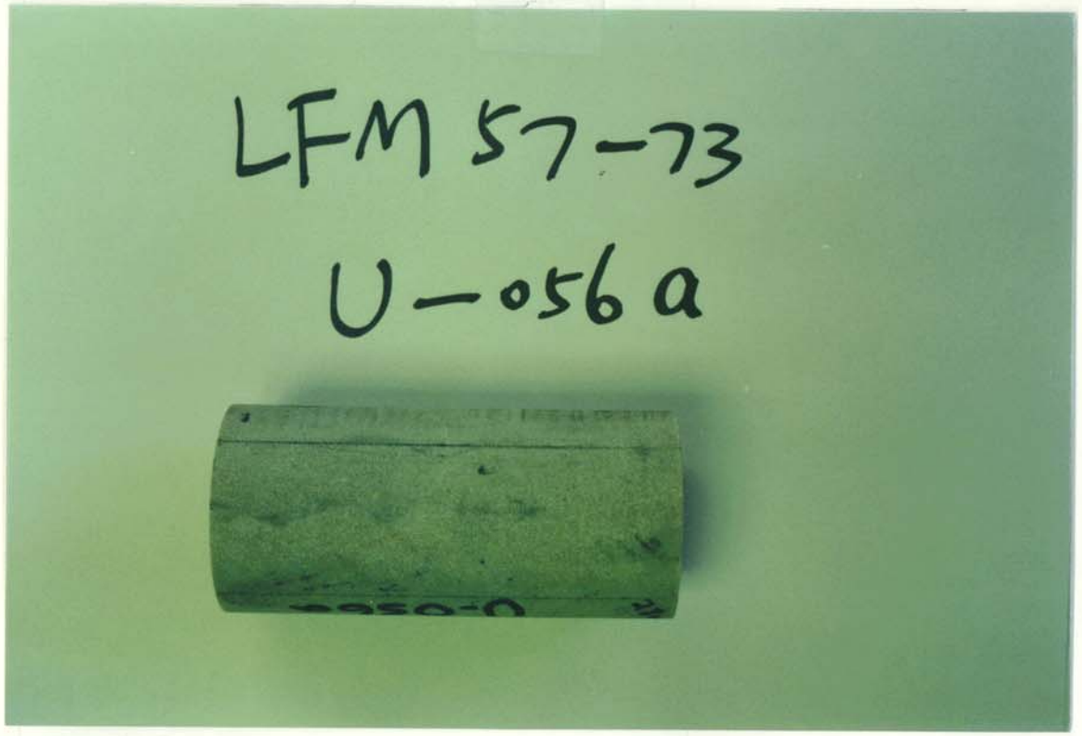
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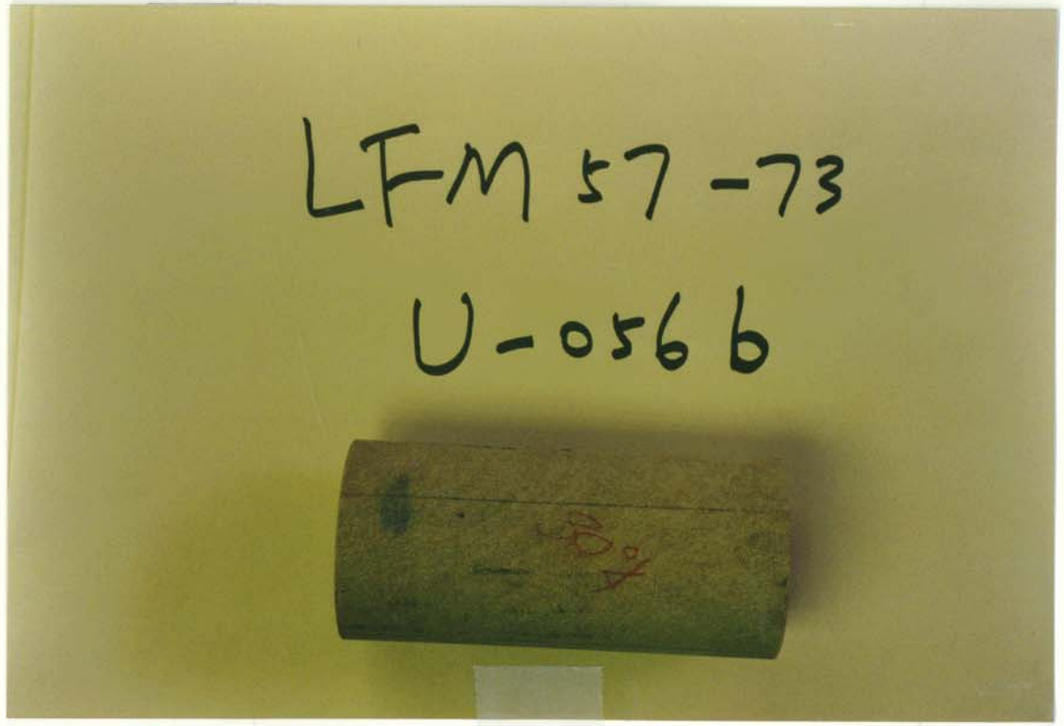
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U-056 b

LFM 57-73

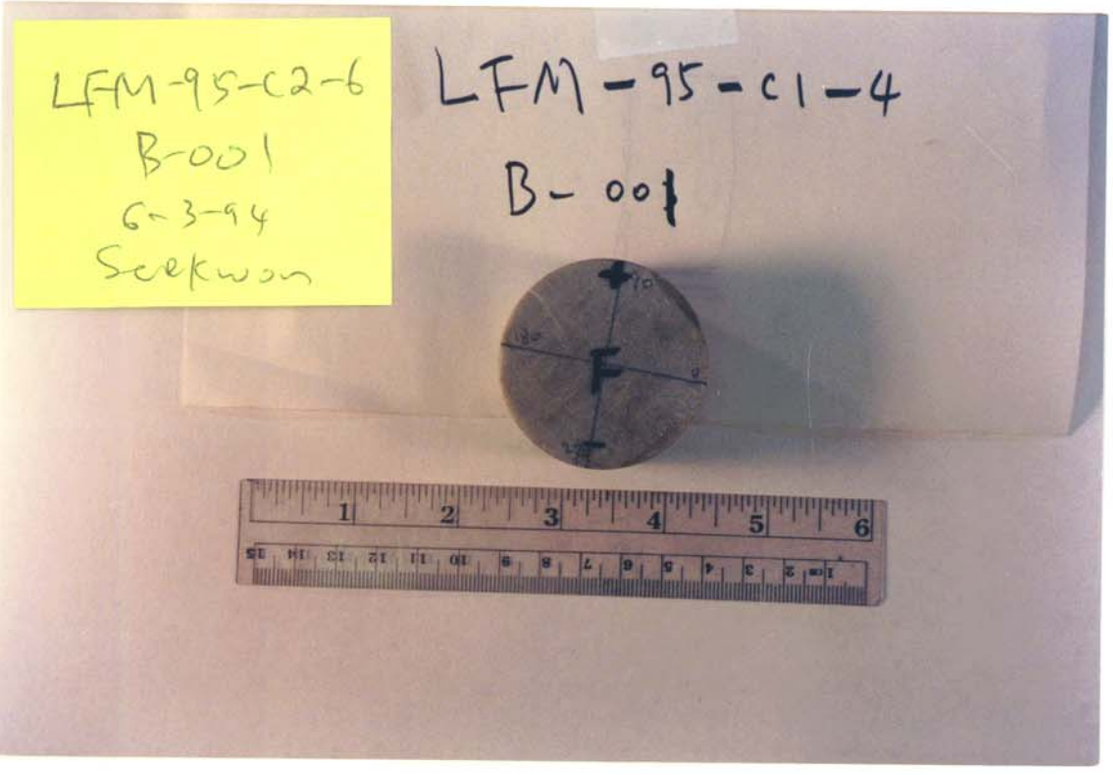
U-057

Share your memories...

BRAZILIAN TEST SAMPLES

Treasured Moments

BEFORE TESTS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B-001
6-3-94
Seekwon
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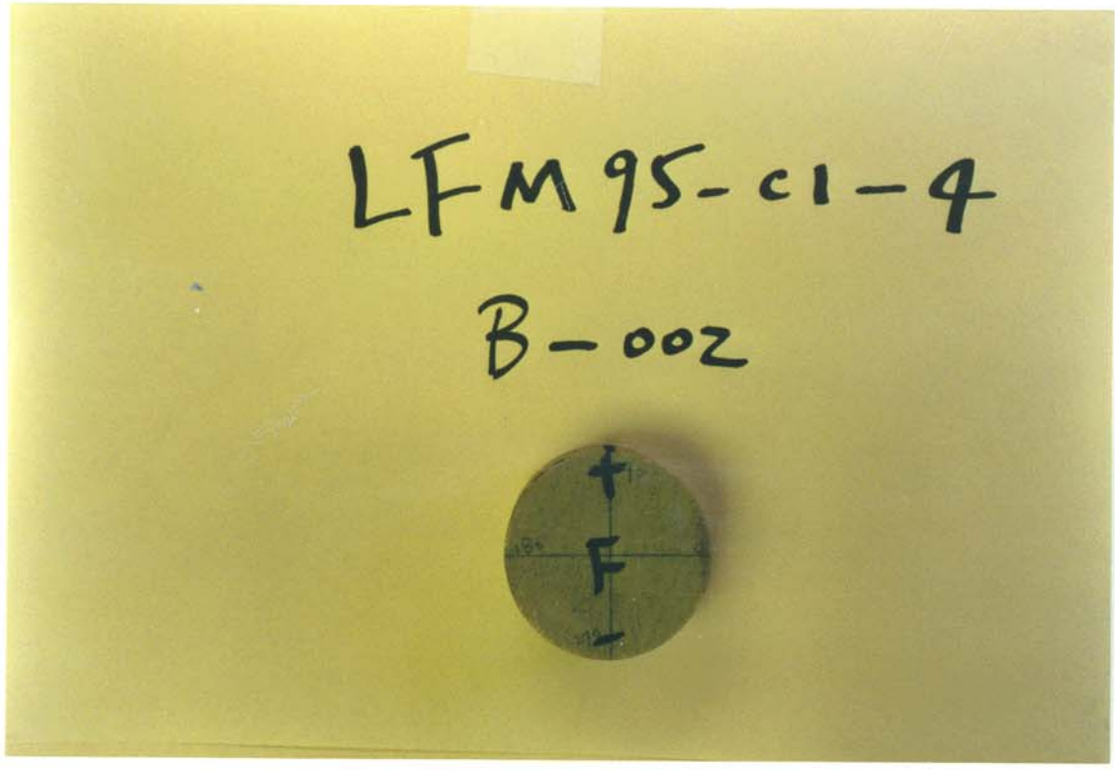
B-001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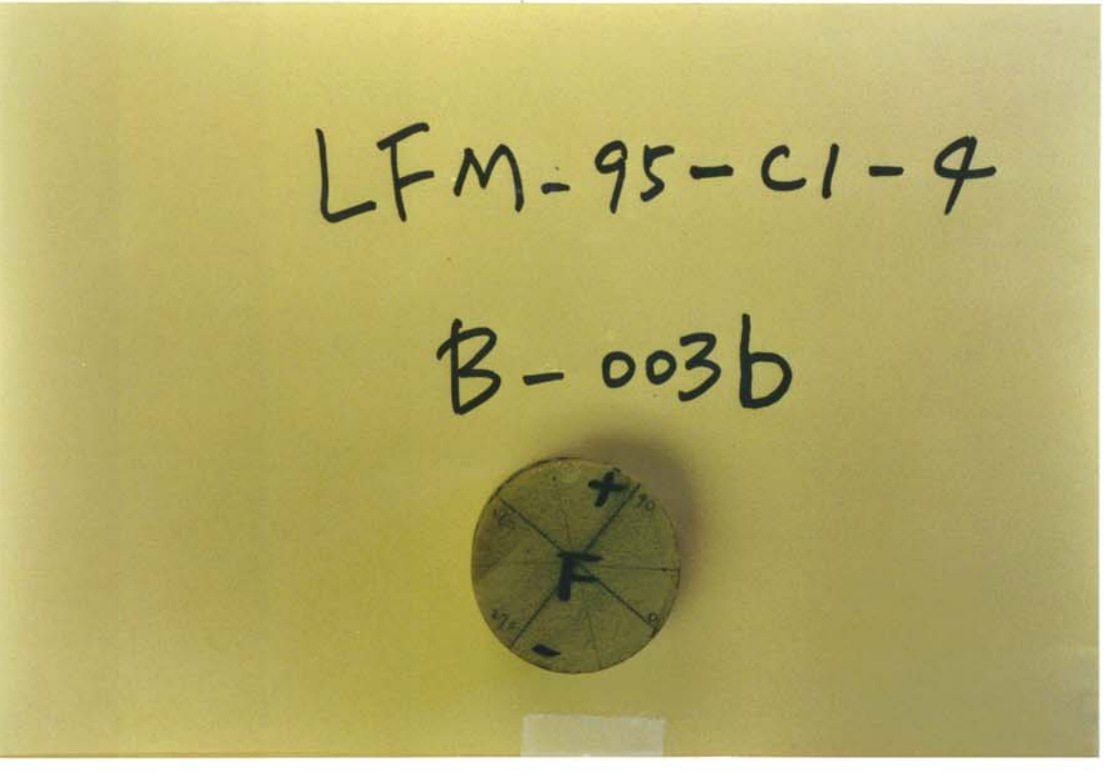
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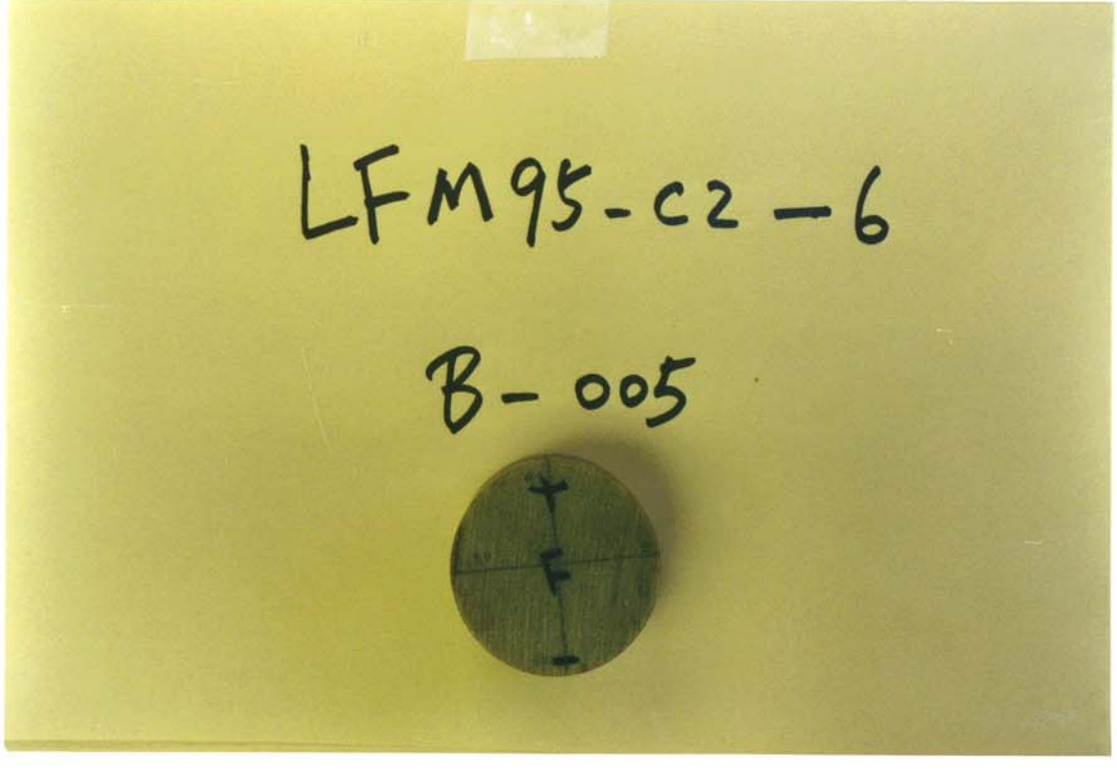
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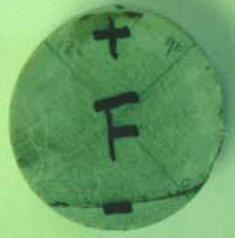
B-006a

LFM 95-C2-6

B-007

LFM 95-C2-6

B-009



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LFM95-C2-6

B-011

LFM95-C2-2

B-014C

LFM95-C1-5

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LFM95-C1-5

B-022

LFM95-C2-7

B-024

LFM95-C2-2

B-028

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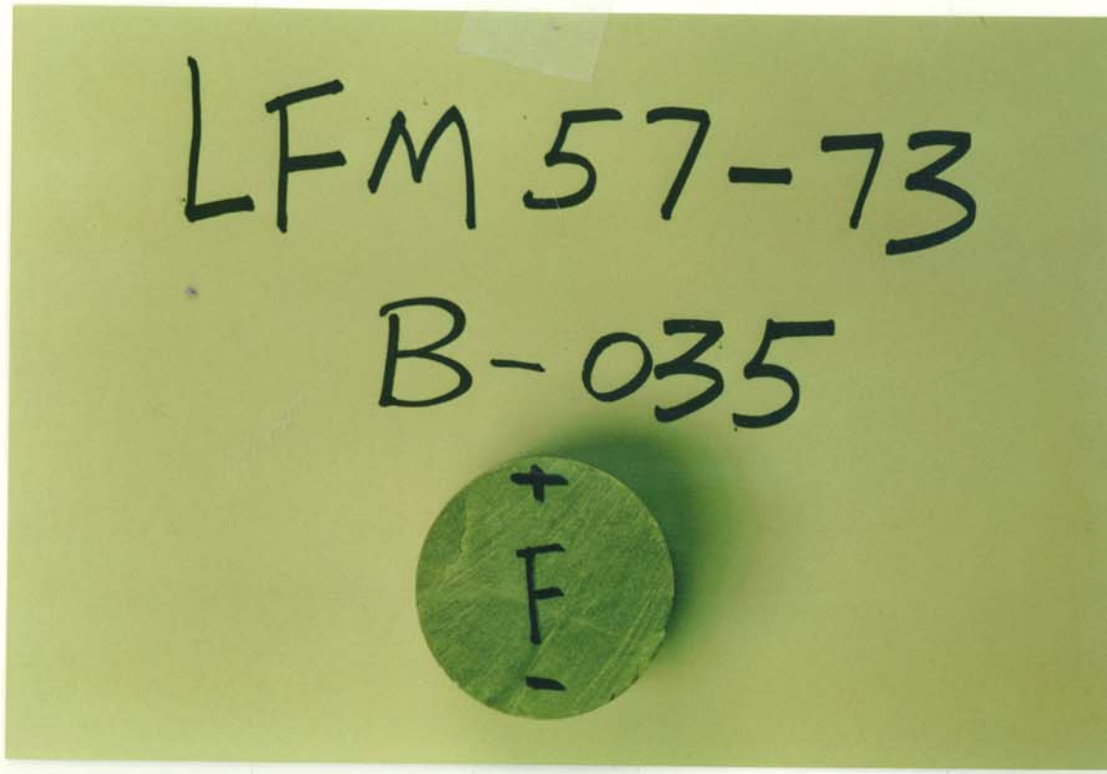
B-029

LFM95-C-4

B-031

LFM 57-73
B-032
+
F
-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B-035
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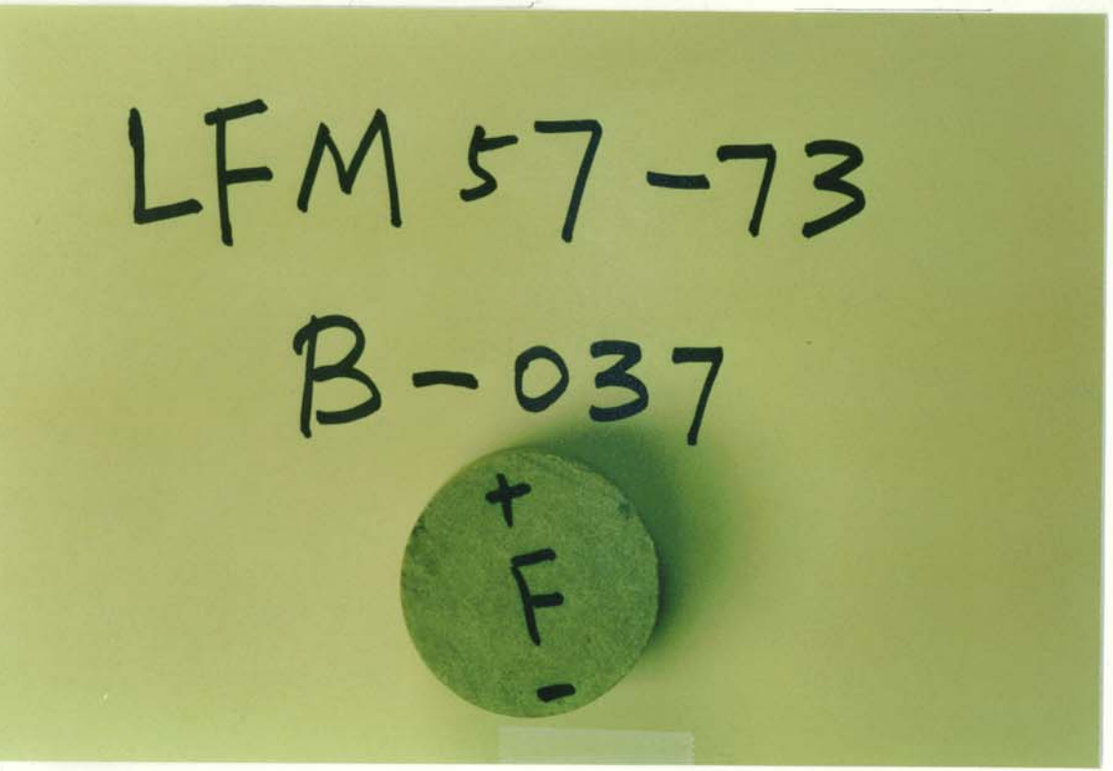
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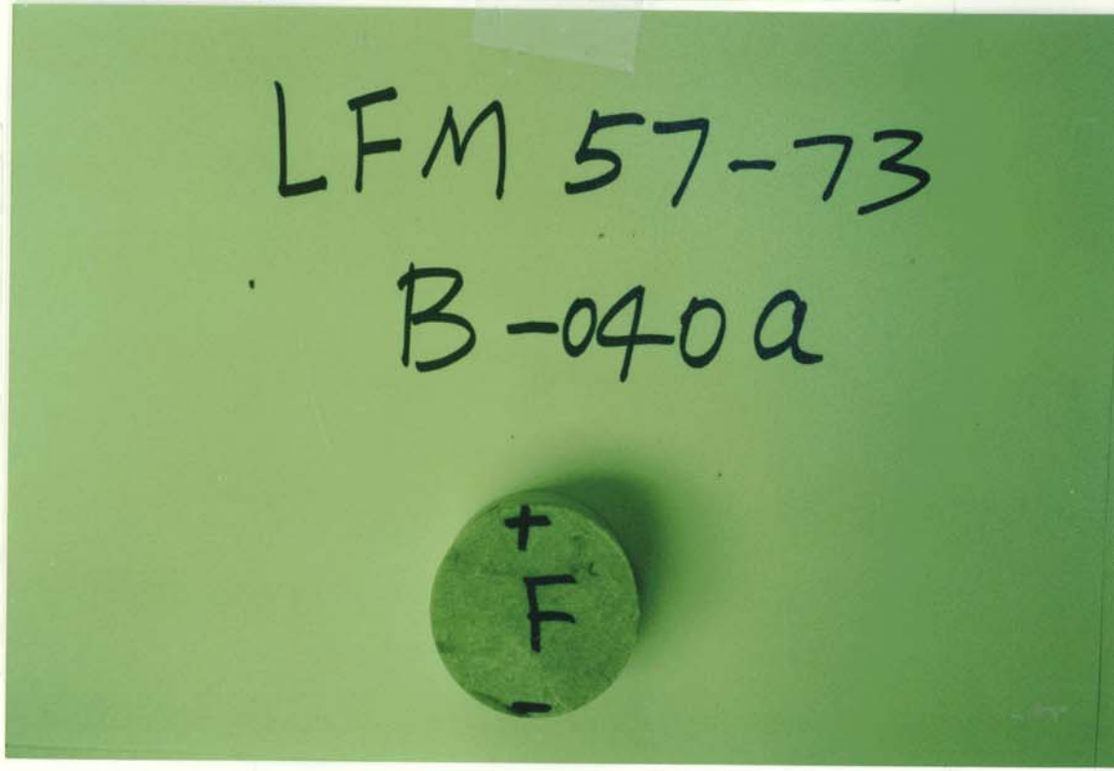
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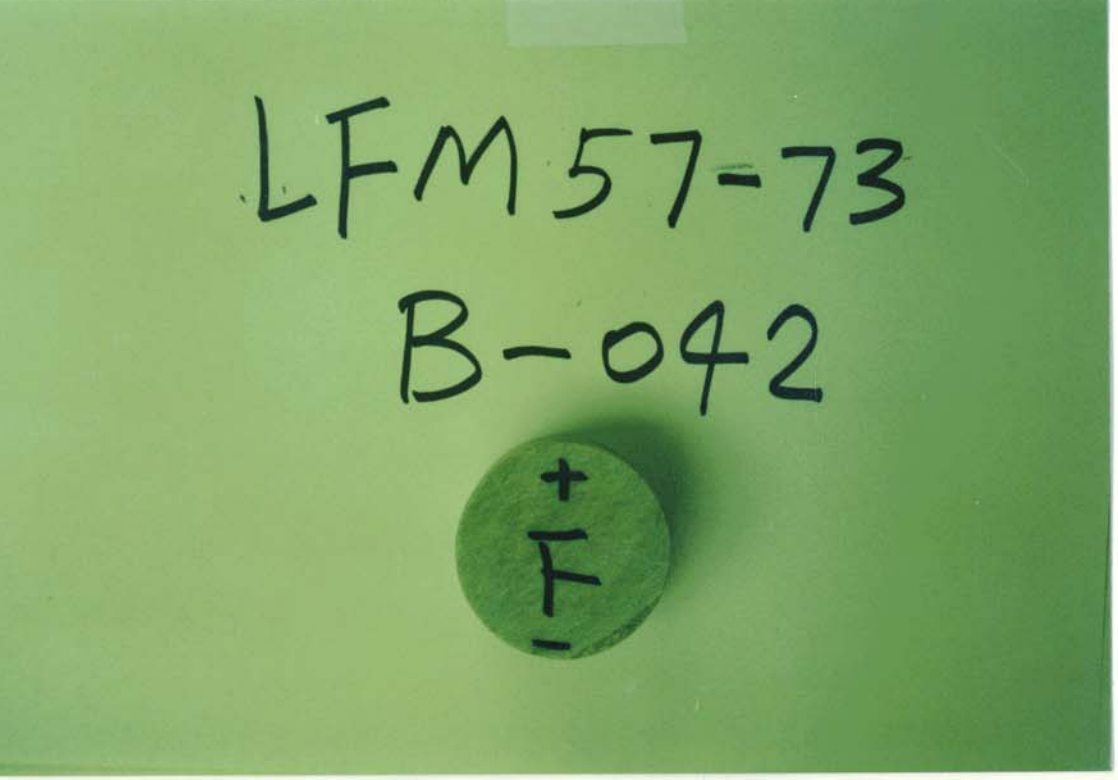
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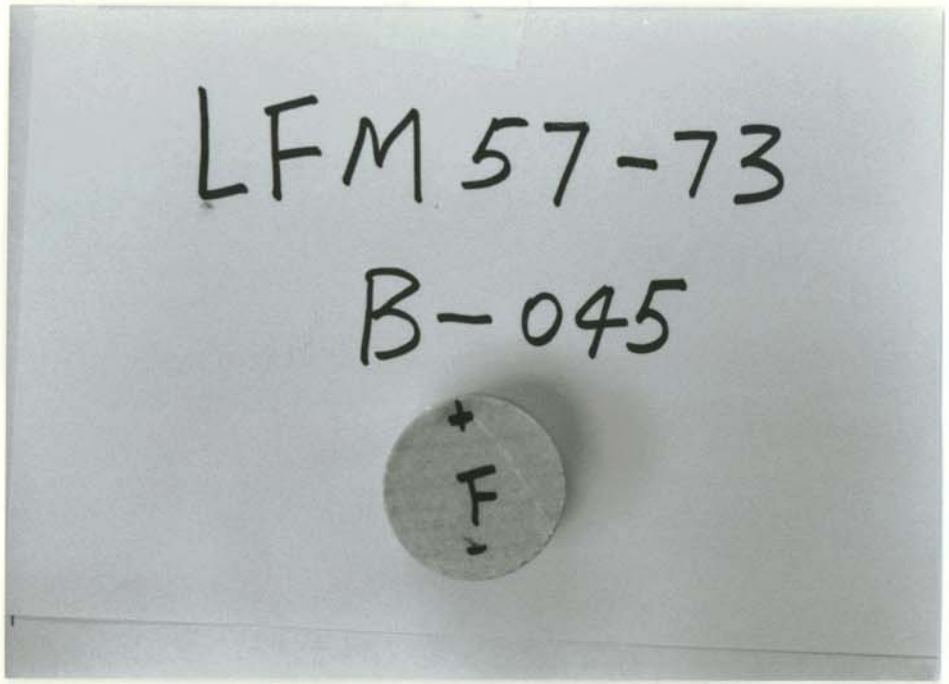
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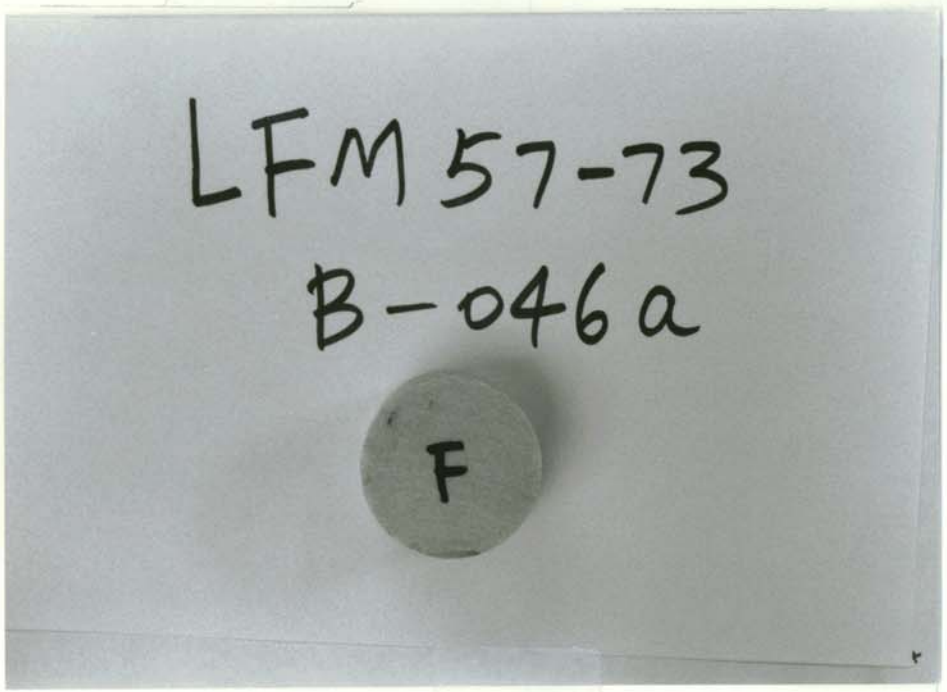
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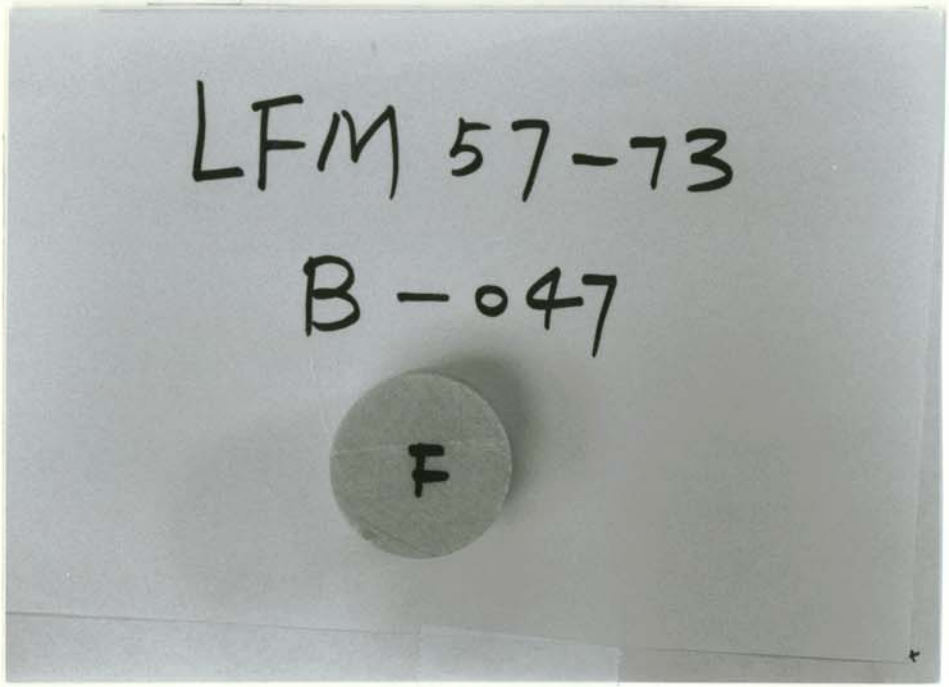
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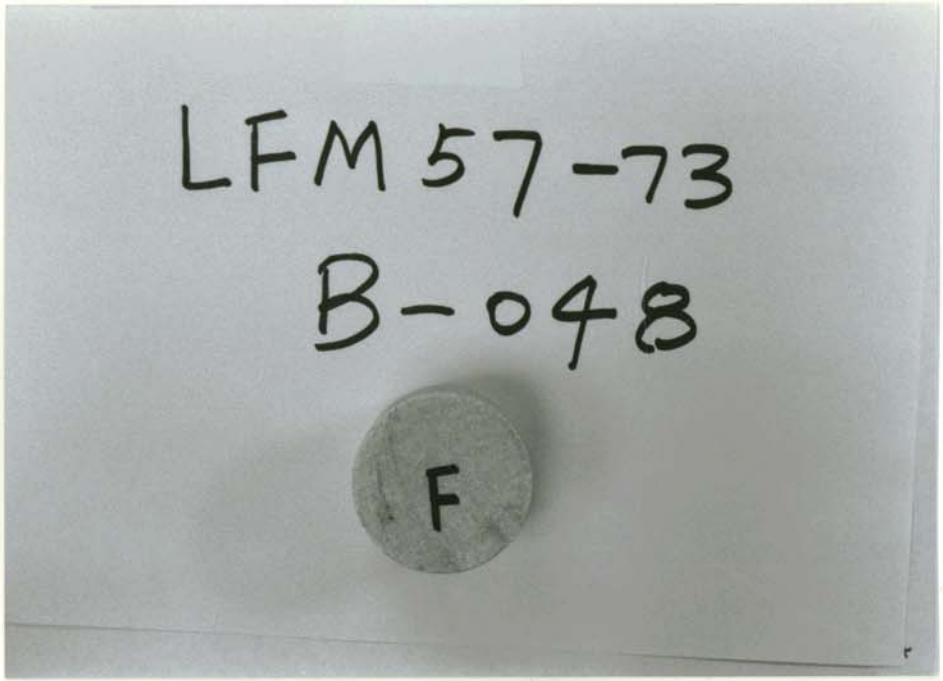
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LFM 57-73
B-050
F

LFM 57-73
B-051
F

LFM 57-73
B-052
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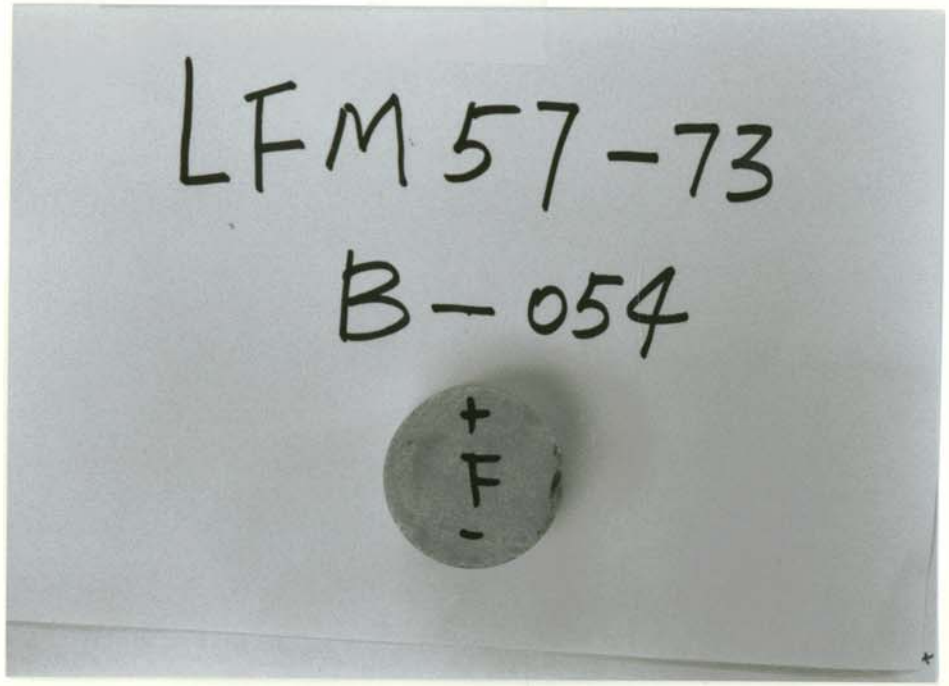
180
0
F
270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LFM 57-73
B-055
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LFM 57-73
B-056
F

LFM 57-73
B-057
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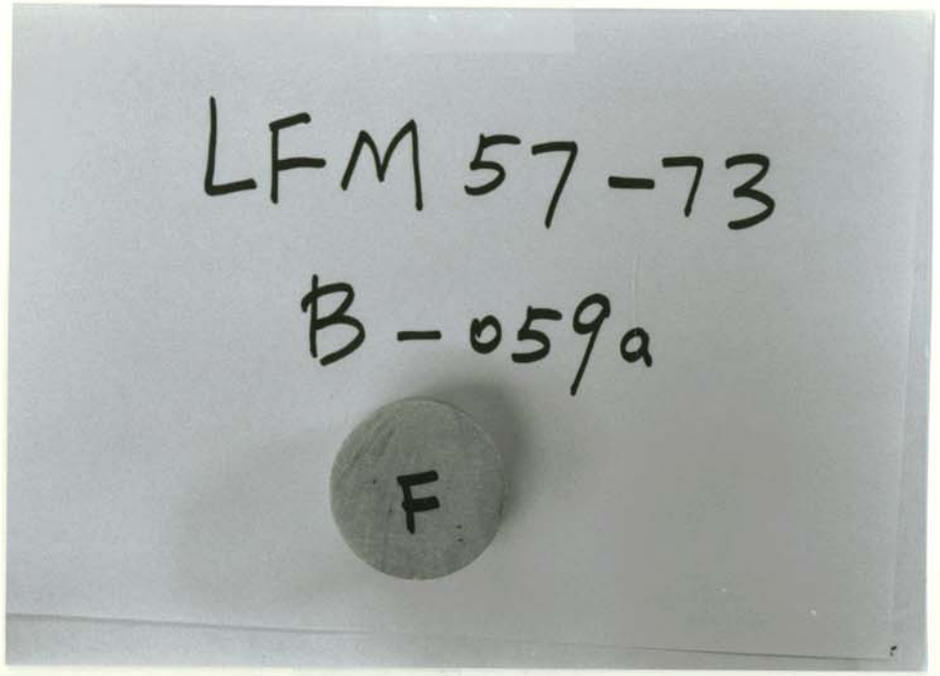
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LFM 57-73
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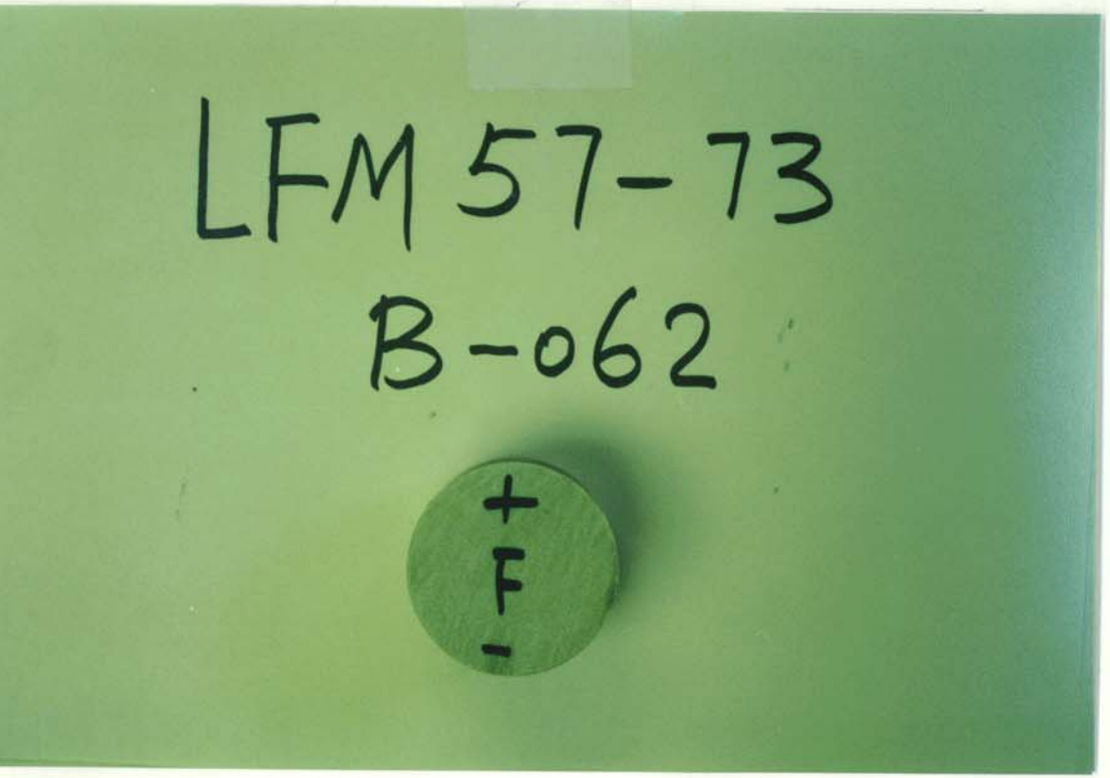
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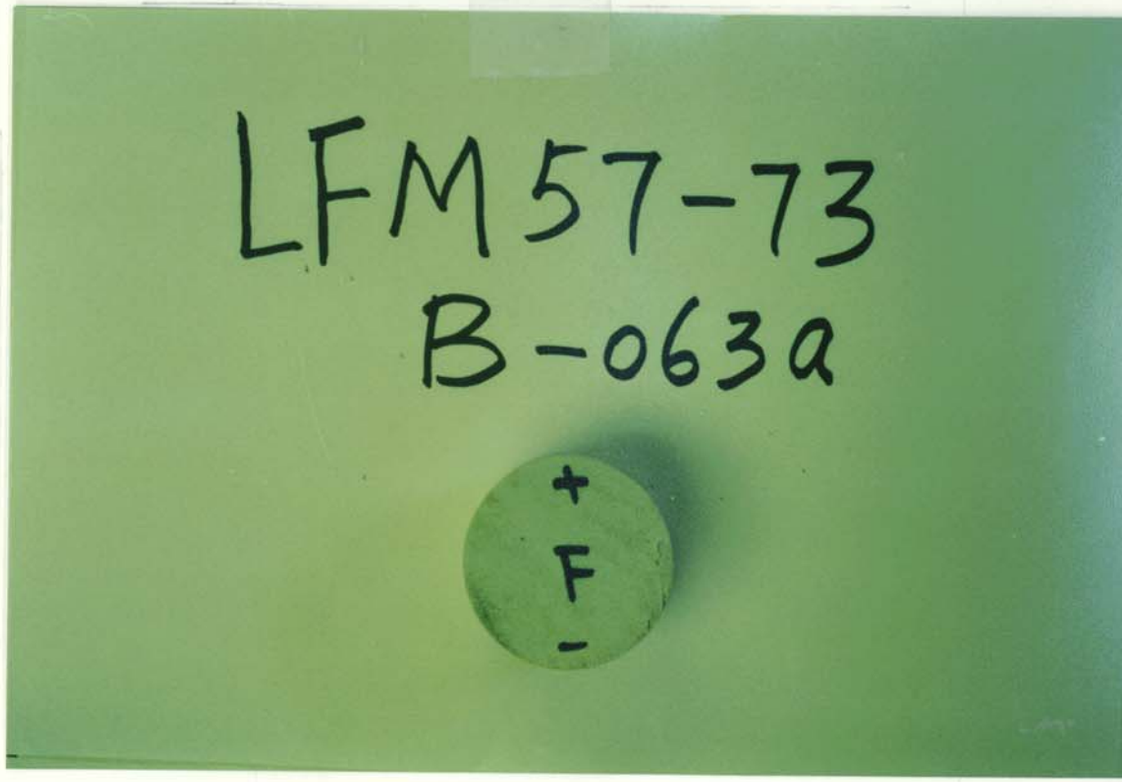
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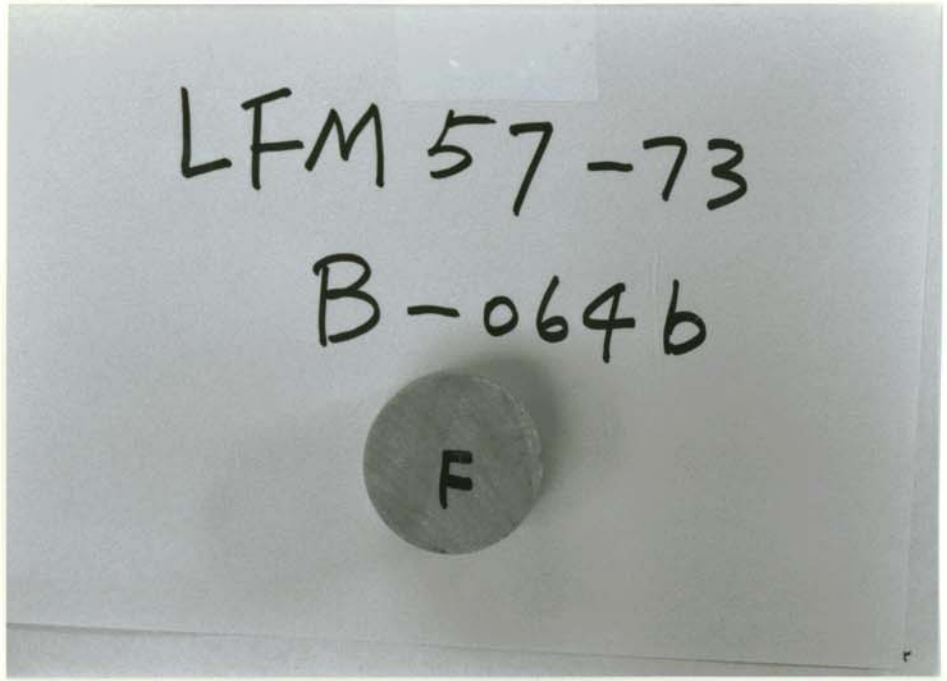
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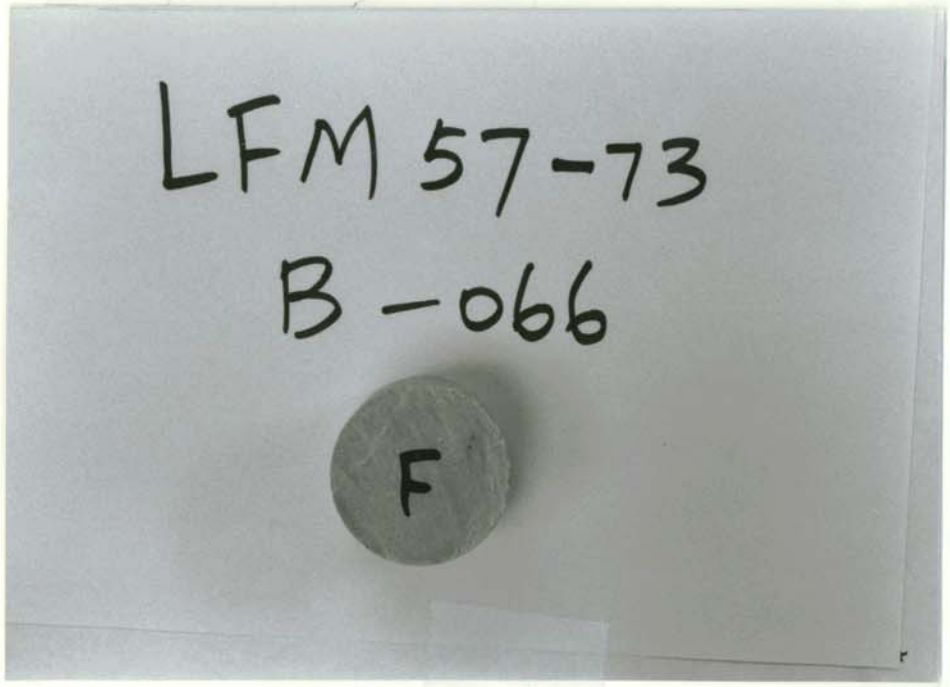
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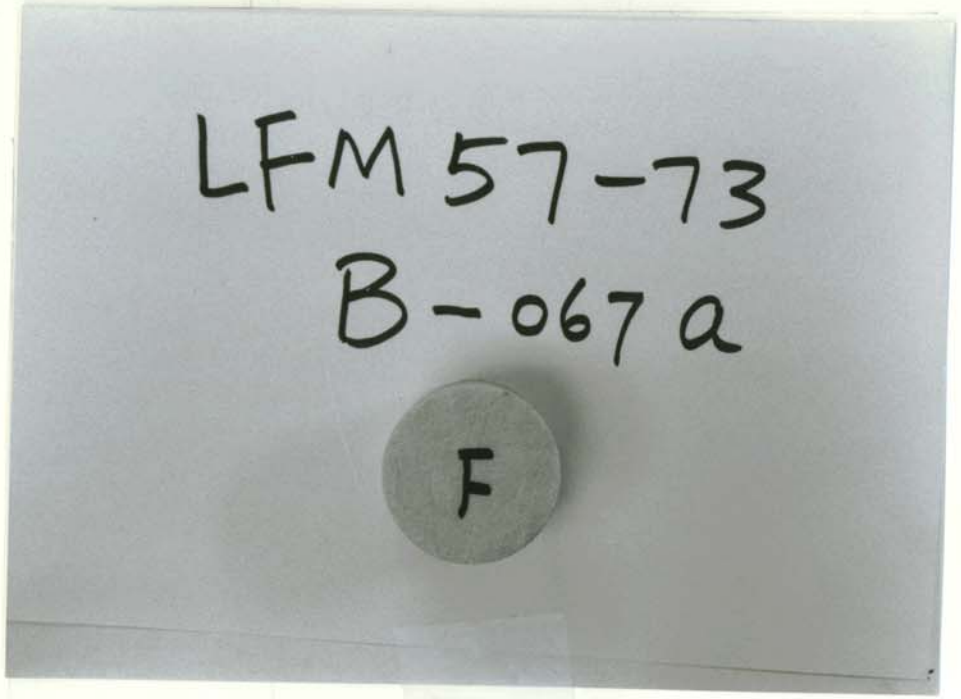
LFM 57-73
B-067a
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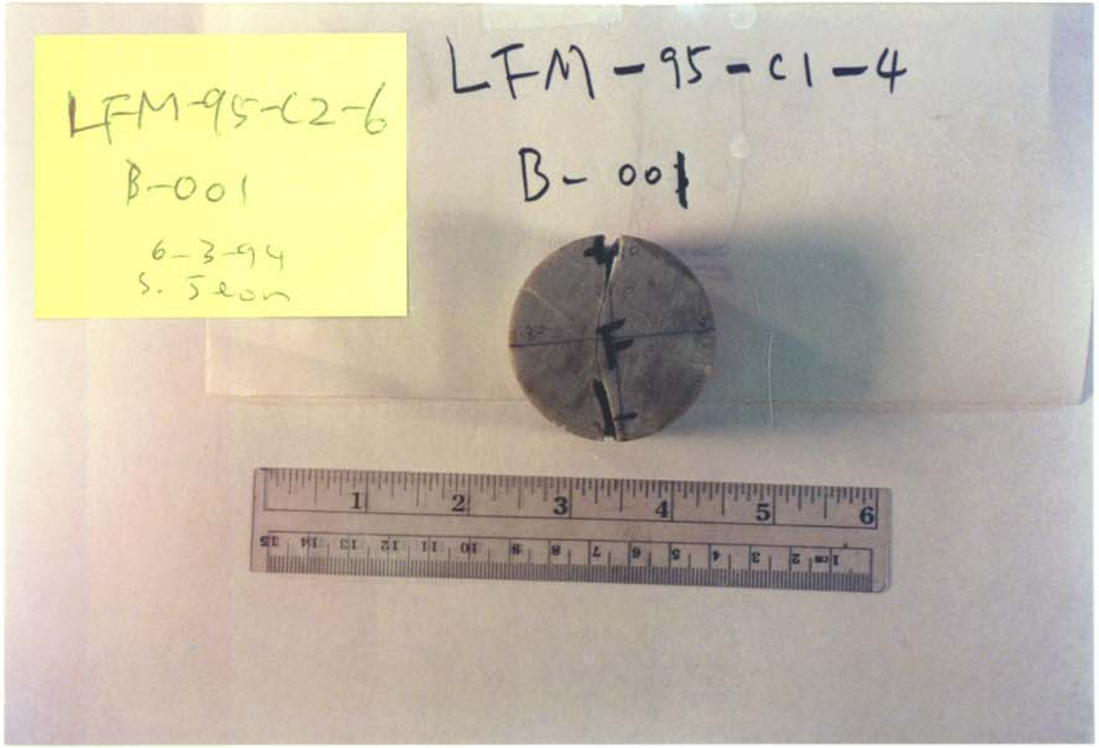
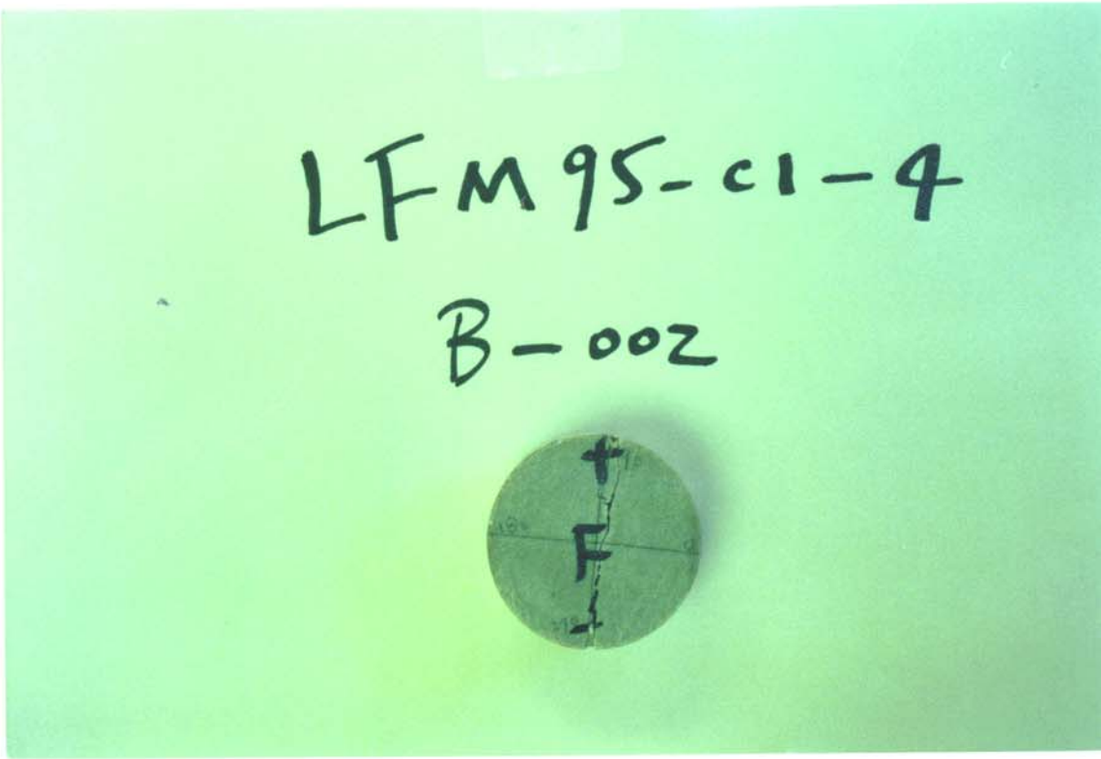
SAMPLES

Treasured Moments

AFTER TESTS


LFM-95-C2-6
B-001
6-3-94
S. Seon
LFM-95-C1-4
B-001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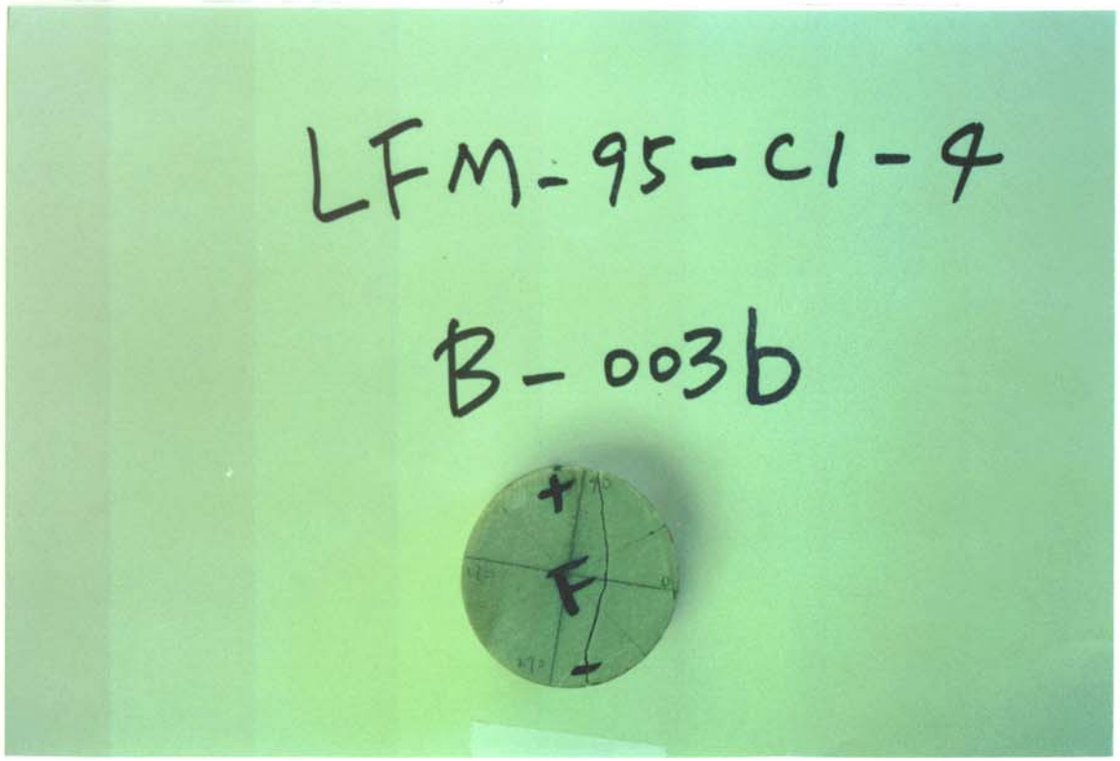
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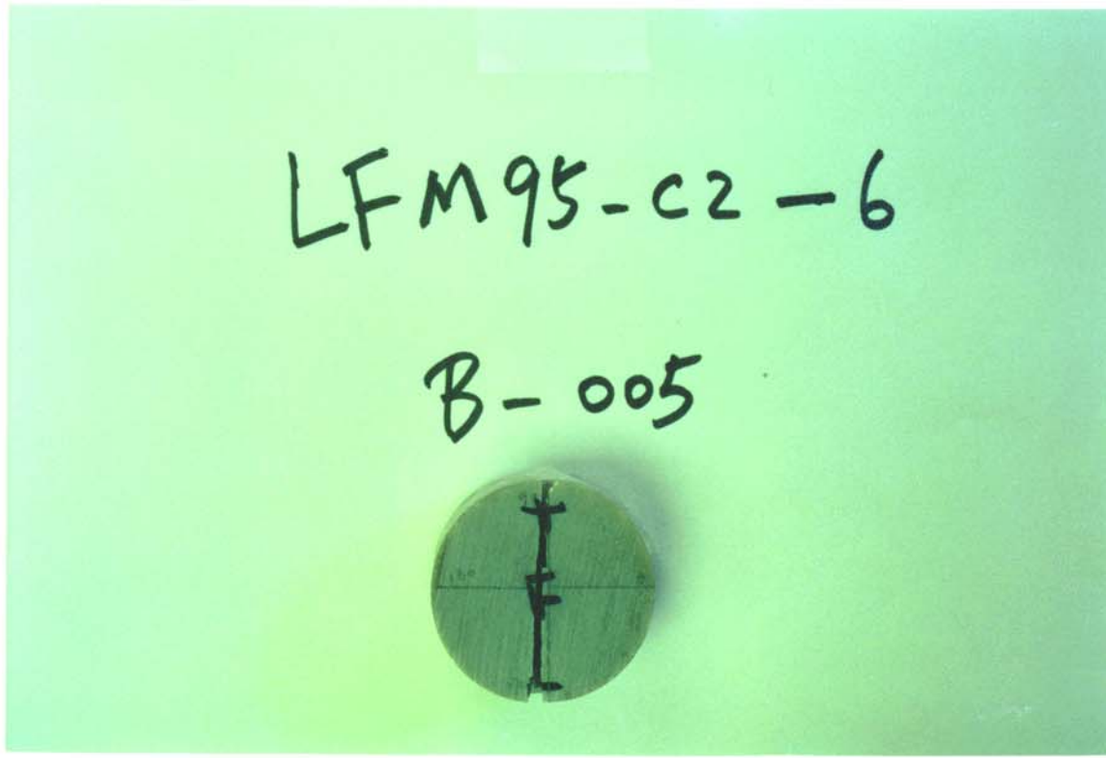
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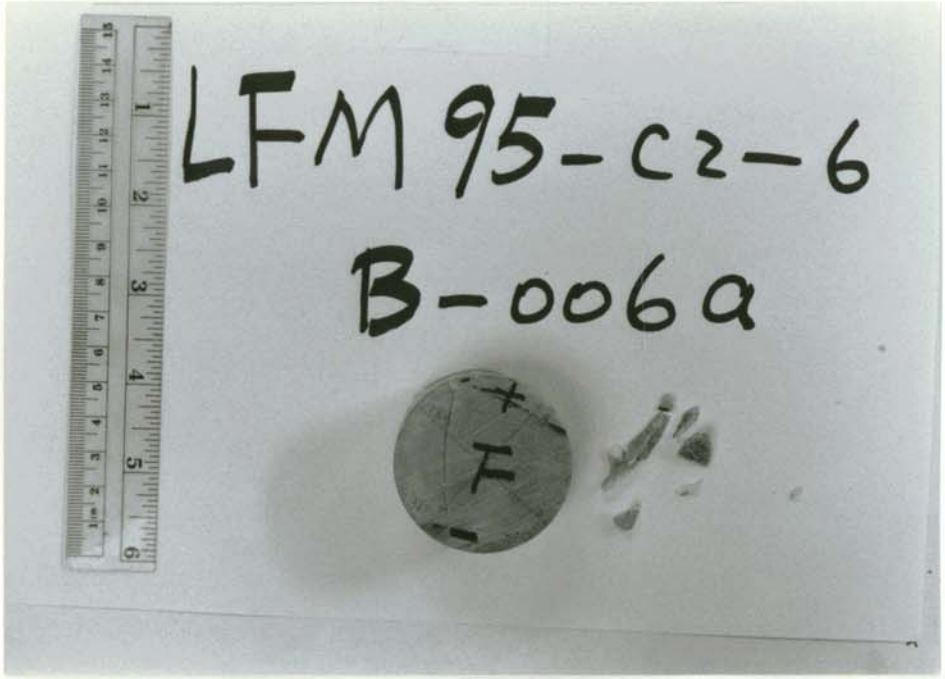
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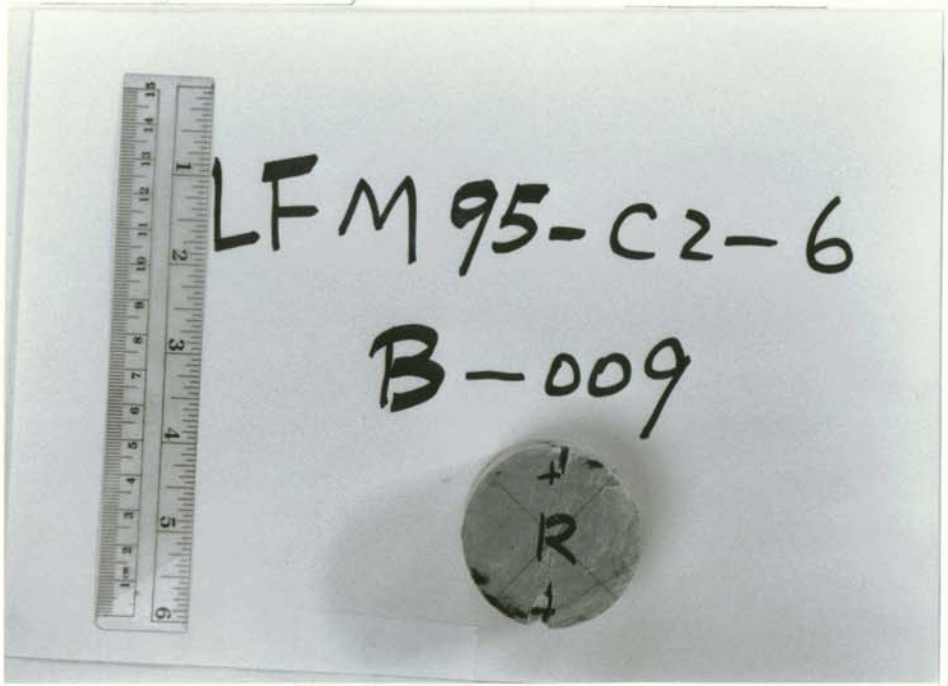
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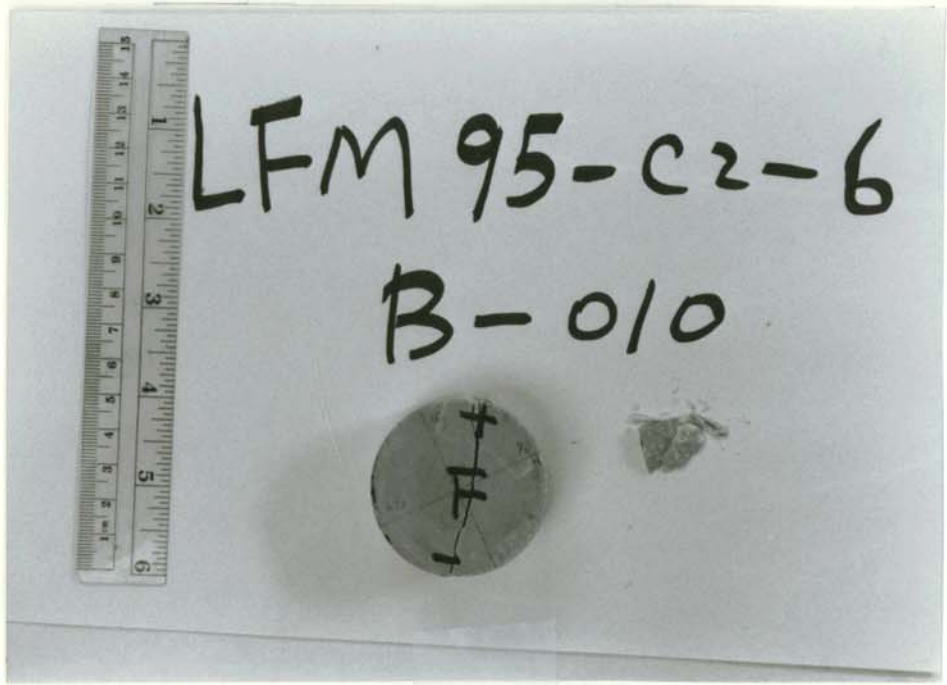
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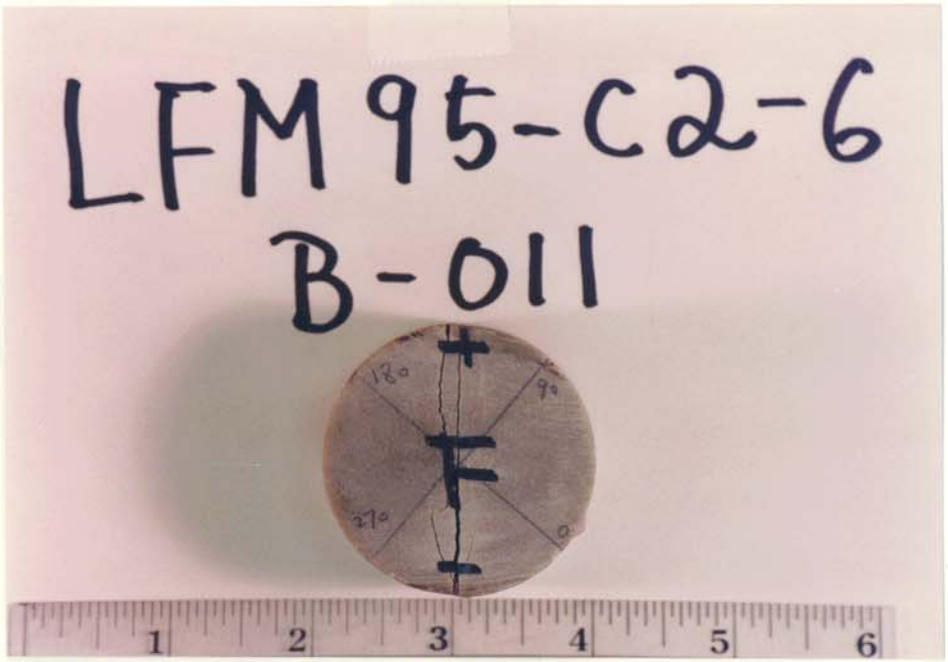
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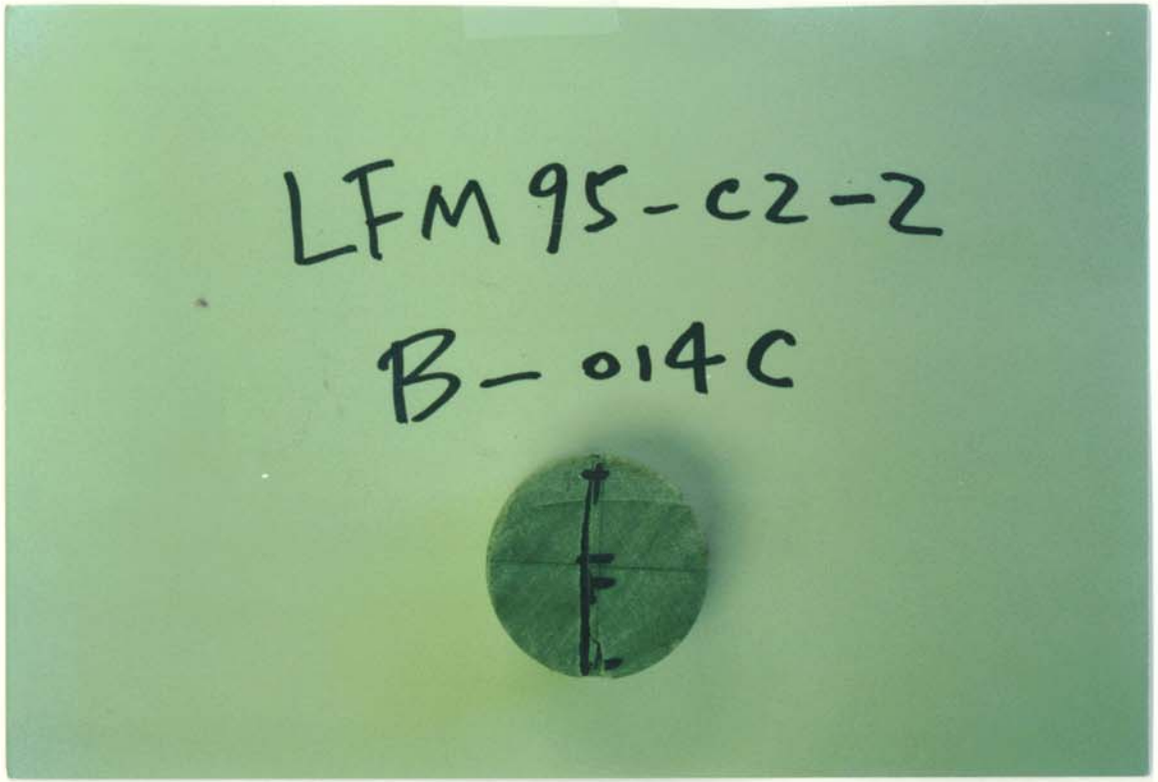
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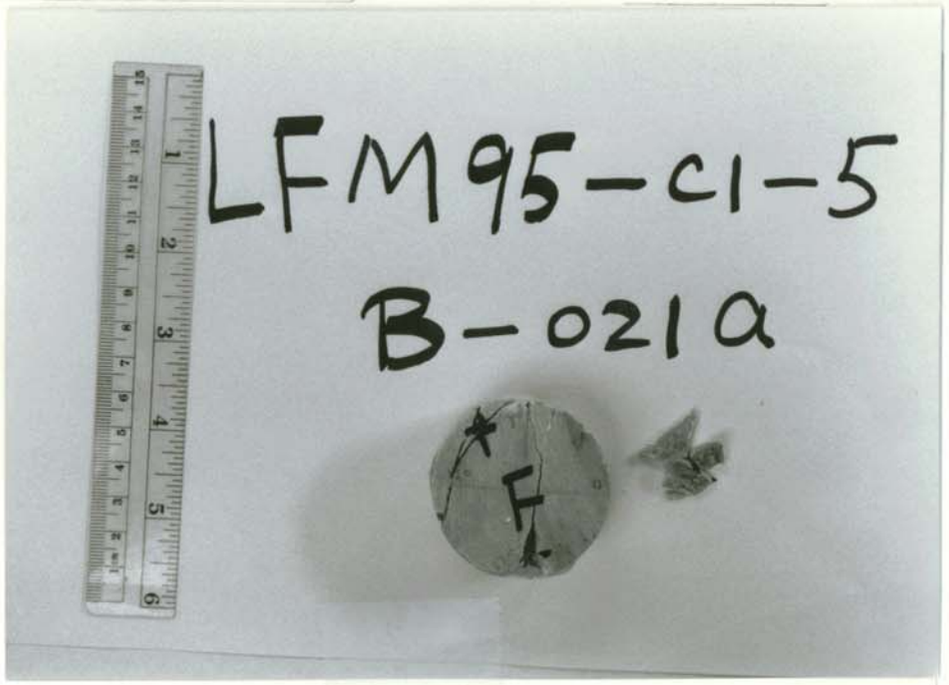
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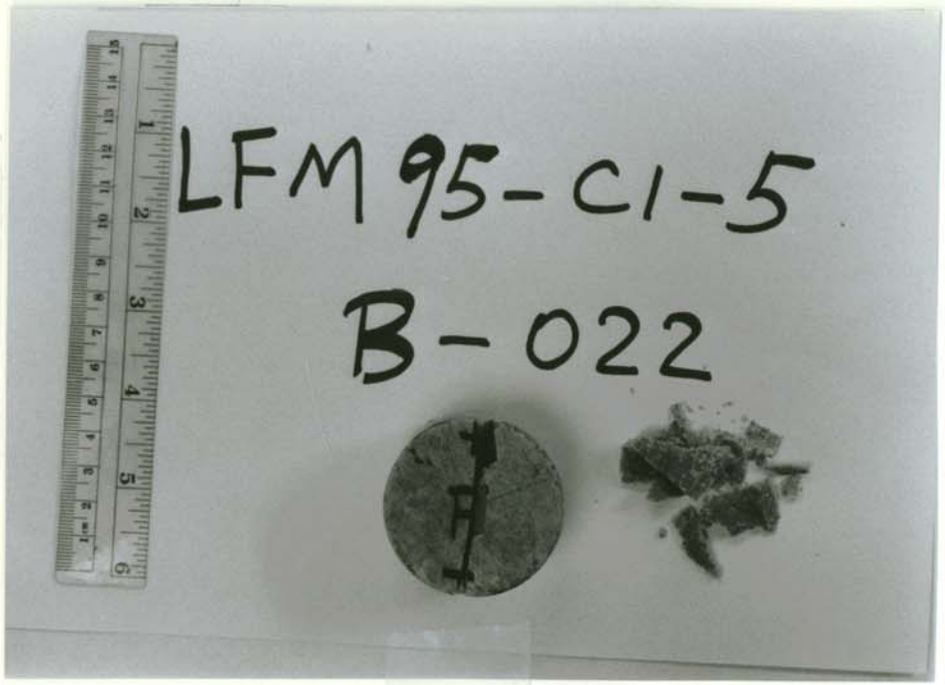
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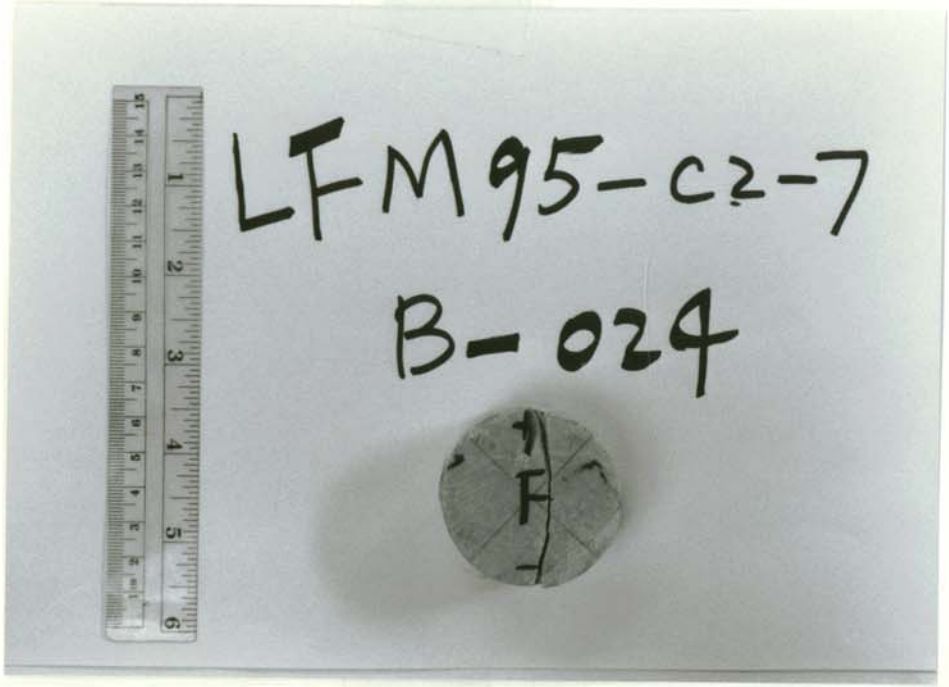
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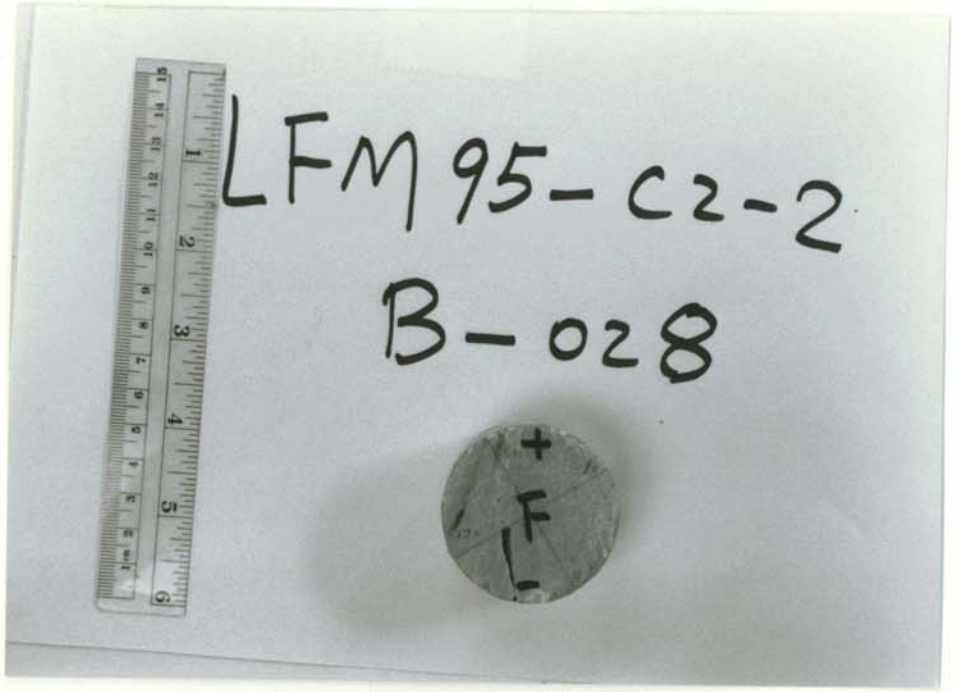
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LFM95-C2-2
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LFM95-C-4
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LFM 57-73

B-032

LFM 57-73

B-035

LFM 57-73

B-037

LFM 57-73

B-040a

LFM 57-73

B-042

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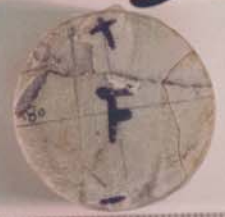
B-048

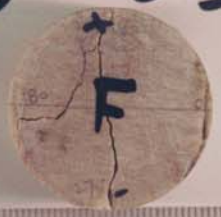
LFM 57-73

B-050



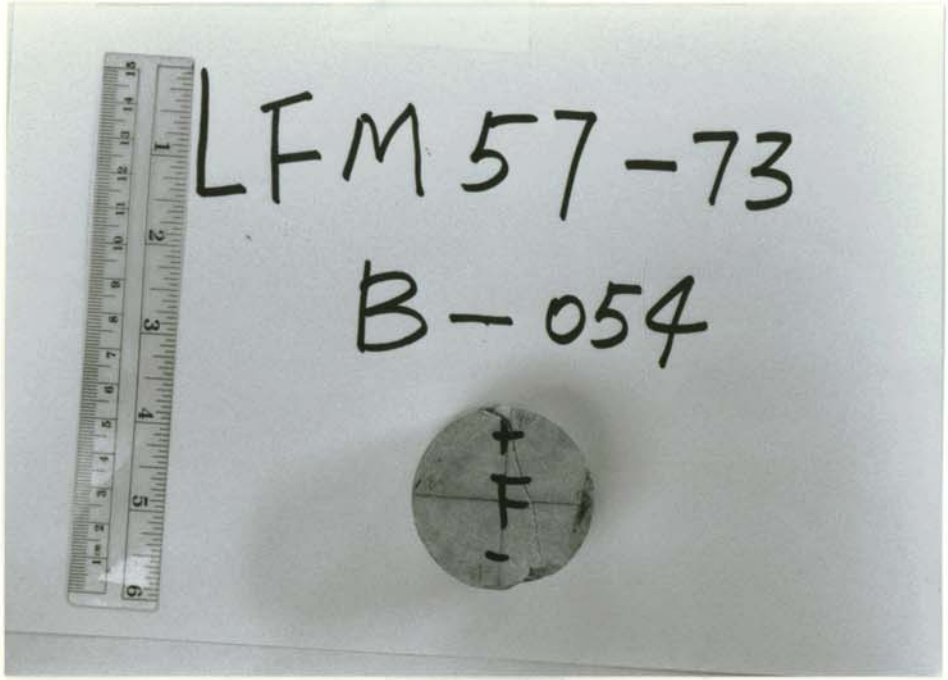
LFM 57-73

B-051



LFM 57-73

B-052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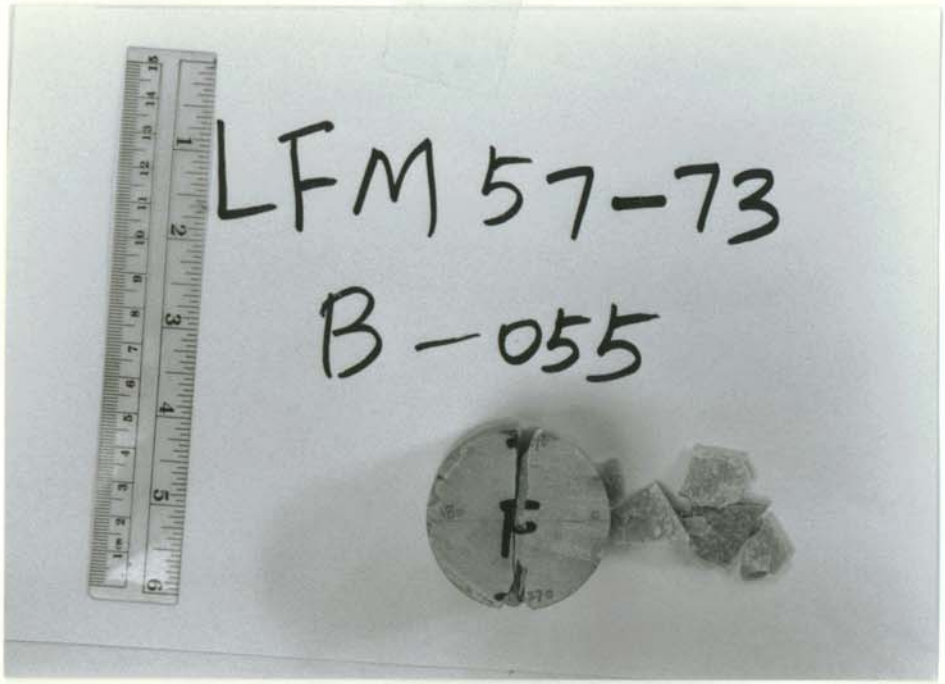
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LFM 57-73
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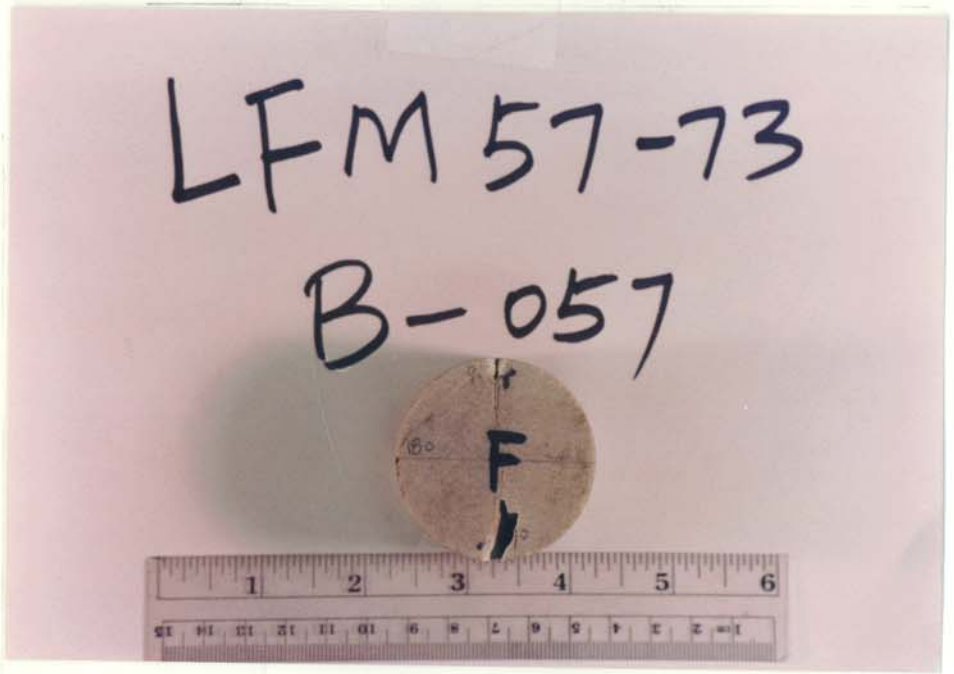
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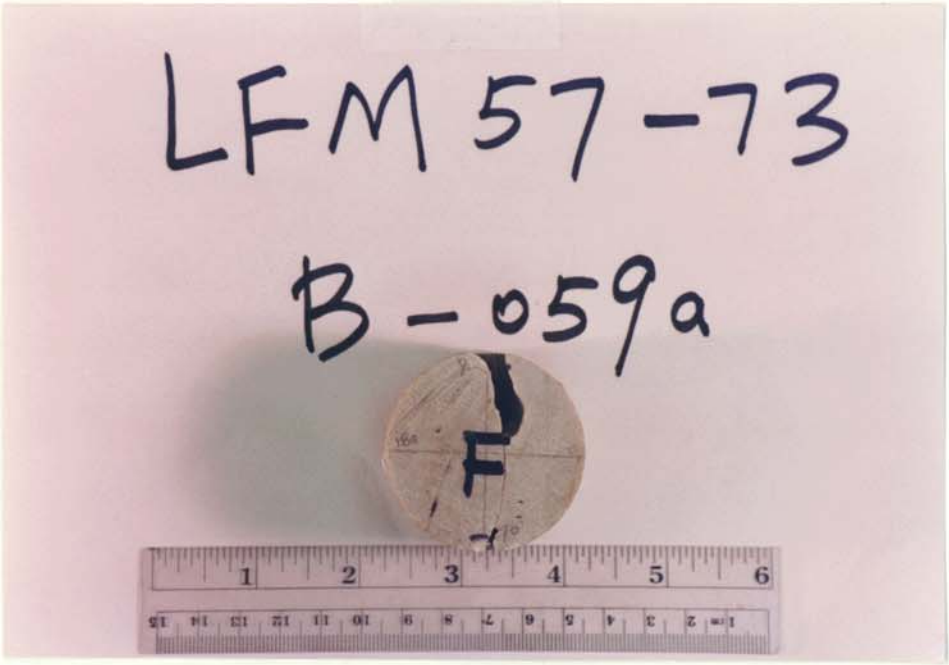
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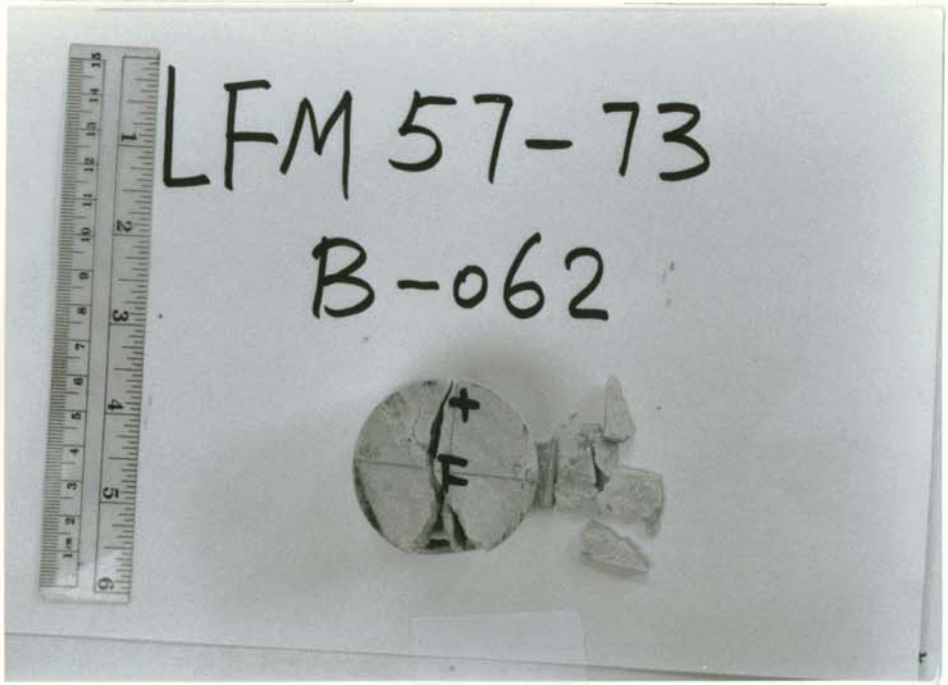
B-059a
F

LFM 57-73
B-060b
F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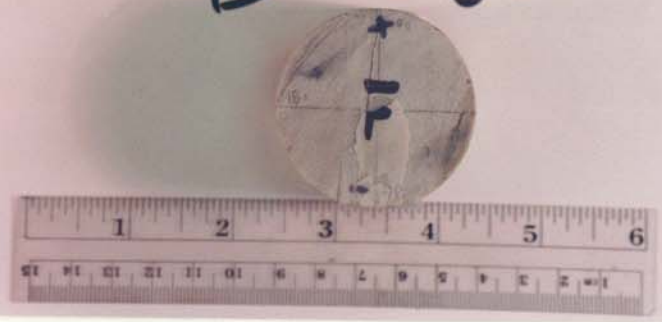
LFM 57-73
B-063a
F

LFM 57-73

B-064b

LFM 57-73

B-065



LFM 57-73

B-066

LFM 57-73

B-067a