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Scientific Notebooks No. 063: Seismic Rock  
Mechanics Research Project--Rock Dynamics  
Laboratory and Field Studies and Code  
Validation (11/03/1994 through 01/29/1997)

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# Seismic Rock Mechanics Research Project

## Task 4: Rock Dynamics Laboratory and Field Studies and Code Validation

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### 3.2.4 Task 4: Rock Dynamics Laboratory and Field Studies and Code Validation

#### 3.2.4.1 Objective

The objectives of this task are to:

- Develop and test <sup>1/15 ODK 11/03/94</sup> ~~1/27~~ scale models for jointed welded tuff to be used as the basic components for the study of the seismic response of the scale model segment
- Develop and test <sup>1/15 ODK 11/03/94</sup> ~~1/27~~ scale model aggregates of jointed welded tuff components to determine dynamic mechanical response of a representative tuff rock-mass segment
- Collect ground shock data at the Nevada Test Site
- Conduct instrumented field studies to measure the mechanical response of an underground structural system subject to localized rockbursts induced by underground mining activities
- Validate the computer codes qualified through the process performed in Tasks 2 and 3 by using the information obtained from the above four objectives.



1/12/93 MIXED FOLLOWING RECIPE:  
 9.6 oz TYPE I CEMENT  
 17.6 oz BARITE  
 3.2 oz BENTONITE  
 3.2 oz AIR ENTRAINMENT  
 300 ml WATER  
 POURED SAMPLES INTO PAPER TUBES. PAPER ABSORBED MUCH OF THE WATER LEAVING SAMPLES VERY DEHYDRATED.

MIXED FOLLOWING RECIPE

4.8 oz TYPE I CEMENT

9.6 oz BARITE

1.6 oz BENTONITE

1.6 oz AIR CUT.

150 ml WATER

POURED INTO PAPER SAMPLES

MIXED FOLLOWING RECIPE

135 gms TYPE I CEMENT

270 gms BARITE

45 gms BENTONITE

22.5 gms AIR CUT.

2175 ml WATER

POURED INTO PAPER SAMPLES

MIXED FOLLOWING RECIPE:

135 gms TYPE I CEMENT

270 gms BARITE

45 gms BENTONITE

22.5 gms AIR CUT.

130 ml WATER

POURED INTO PAPER SAMPLES

1/13/93 All 1/12 samples were very crumbly & DEHYDRATED. All specimens were DISCARDED

APR 93

1/13/93 POURED 5 SAMPLES WITH FOLLOWING RECIPE:  
 270 gms TYPE I CEMENT  
 452 gms BARITE (USED 1" X 2" ACRYLIC TUBES)  
 38 gms BENTONITE

240 gms WATER

1/14/93 REMOVED SPECIMENS FROM CYLINDERS, LABELED "A",  
 2 SPECIMENS WERE REBLENDED IN WATER.

1/15/93 270 gms TYPE I CEMENT

452 gms BARITE

38 gms BENTONITE

240 gms WATER

POURED CYL SAMPLES

1/18/93 SUBMERGED 2 SAMPLES IN WATER LABELED  
 SAMPLES "B".

2/5/93 MIXED 30 SAMPLES USING RECIPES AS LISTED  
 ABOVE ON 1/13/93 AND 1/15/93.

2/8/93 810 gms TYPE I CEMENT

1476 gms BARITE

114 gms BENTONITE

720 gms WATER

POURED CYL SAMPLES

2/9/93 810 gms TYPE I CEMENT

1476 gms BARITE

57 gms BENTONITE

720 gms WATER

POURED CYL SAMPLES

3/1/93 5.35# TYPE I CEMENT

8.74# BARITE

0.75# BENTONITE

4.75# WATER

POURED 2" X 2" X 24" INGOTS (2 EA) CEMENT WAS  
 POURED INTO BARE ALUMINUM MOLD. CEMENT  
 REACTED TO ALUMINUM.

APR 93



3/12/83 USEN REUPREHE LISTEN ON 3/1/83.  
POURED 2 - 2"X24" CYLINDRICAL SAMPLES  
+ 2 - 2"X4" CYLINDRICAL SAMPLES.  $\Delta$

3/22/83 10.7# TYPE I  
19.48# BBNITE  
1.5# BENTONITE  
9.5# WATER  
AN ADDITIONAL 350ml OF WATER WAS ADDED  
TO BBN MIXTURE TO A WORKABLE CONDITION  
POURED 30 - 2"X4" Cyl SAMPLES.  $\Delta$   
10.7# TYPE I 1.62 gms AIR ENT  
19.49# BBNITE  
1.51# BENTONITE  
10.7# WATER  
POURED 30 - 2X4 SAMPLES  $\Delta$

4/6/83 10.7# TYPE I  
19.49# BBNITE  
1.51# BENTONITE  
10.7# WATER  
POURED 30 - 2X4 SAMPLES  $\Delta$

4/7/83 10.7# TYPE I  
19.49# BBNITE  
3.02# BENTONITE  
1.62 gms AIR ENT.  
10.7# WATER  
POURED 30 - 2X4 SAMPLES  $\Delta$

4/28/83 10# 1102 TYPE I  
19# 802 BBNITE  
1# 802 BENTONITE  
3.24 gms AIR ENT.  
10# 1102 WATER  
POURED 30 2X4 SAMPLES  $\Delta$

5/10/83 10# 1102 TYPE I  
19# 802 BBNITE 1.2/1 WATER/CURRENT  
1# 802 BENTONITE  
1.62 gms AIR ENT.  
12# 302 WATER  
20 - 2X4 SAMPLES

Adrian

5/24/83 10# 1102 TYPE I  
19# 802 BBNITE  
1# 802 BENTONITE  
1.62 gms AIR ENT.  
12# 1302 WATER  
30 2X4 SAMPLES  $\Delta$

7/2/83 13# 1402 TYPE I  
25# 602 BBNITE  
1# 1102 BENTONITE  
2.11 gms AIR ENT.  
16# 1102 WATER  
40 - 2X4 SAMPLES  $\Delta$

8/13/83 18# 802 TYPE I  
33# 1202 BBNITE  
2# 802 BENTONITE  
2.81 gms AIR ENT  
18# 802 WATER  
84 gms DARCEN  
21 gms Ivory LIQUID SOAP 0.25%  
POURED 2 - 2"X2"X24" INVERTS USING  
MOTOR OIL (PEN 10W30), SILICONE LUBRICANT SPRAY  
AND TFE SPRAY FOR RELEASING AGENTS.  $\Delta$

8/17/83 20# 602 TYPE I  
37# 202 BBNITE  
2# 1302 BENTONITE  
3.10 gms AIR ENT  
20# 602 WATER  
82 gms DARCEN  
23 gms Ivory LIQ. 0.25%  
USEN DC 4 + MOTOR OIL AS RELEASING  
AGENTS.

Adrian

8/25/93  
 474 gms water  
 0.15 gms AIR ENT  
 474 gms TYPE I  
 864 gms BARITE  
 66 gms Bentonite  
 3 gms Danacem  
 1000 ml VERULITE (20 mesh)  
 ADD 200 ml OF WATER  
 Poured 3 - 2x4 Samples. A

8/30/93  
 4# 302 WATER  
 2.37 gms Ivory Soap 0.125%  
 0.60 gms AIR ENT.  
 4# 302 CEMENT TYPE I  
 2# 1002 BARITE  
 902 Bentonite

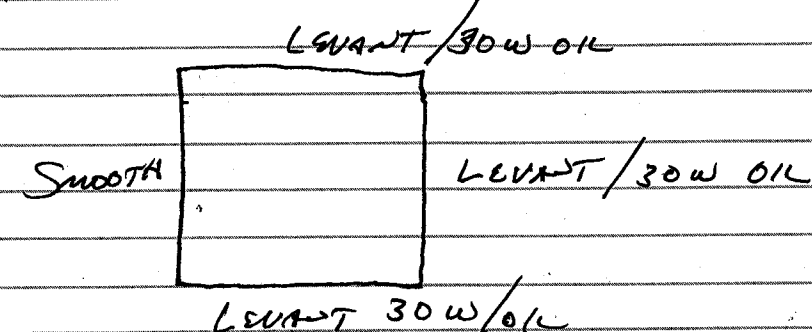
9/10/93  
 Poured 7 2x4 Samples A  
 20# 602 water  
 92 gms Danacem  
 3.10 gms AIR ENT.  
 17 gms Ivory LIQ. 0.184%  
 20# 602 TYPE I  
 37# 202 BARITE  
 2# 1302 Bentonite

MADE RECIPE TWICE.

Poured - 1 - 8" x 8" x 4" SMOOTH SAMPLE (PVC)  
 1 - 8" x 12 x 4" — — (PVC)  
 1 - 8 x 8 x 4 ABS LEVANT  
 1 - 8 x 12 x 4 ABS LEVANT  
 2 - 2x2x24 ABS LEVANT INGOTS  
 1 - 85W BEAR OIL RELEASE  
 1 - 30W MOTOR OIL RELEASE  
 2 - 2x2x24 SMOOTH INGOTS  
 - PAMPHOLUM MOLD.  
 12 - 2x4 CYL SAMPLES

A. P. King

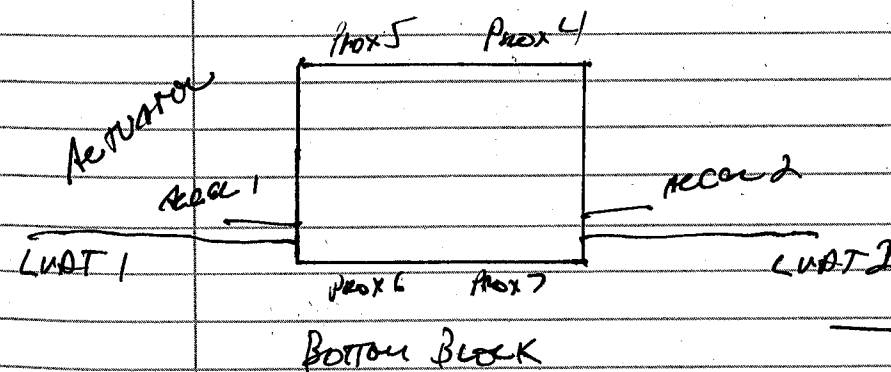
9/13/93  
 2# 702 WATER  
 0.35 gms AIR ENT.  
 11 gms Danacem  
 2.1 gms Ivory LIQ. 0.19%  
~~2# 202~~  
 2# 702 TYPE I  
 4# 702 BARITE  
 5.502 Bentonite  
 Poured 1 INGOT



9/29/93 GROUTS ARTIFICIAL SAMPLE Poured ON 8/5/93  
 RECIPE WAS AS LISTED ON 8/13/93. GROUT RECIPE WAS:

1# 1002 WATER  
 20 gms Danacem  
 3# 802 9/29/93  
 3# 502 TYPE III  
 8# 502 SAND

9/4/93 CURED SPECIMENS IN 105°C oven FOR 24 HOURS  
 INSOMAGUTS SPECIMEN AS FOLLOWS:



A. P. King

10/4/83 TOOK REBORNED MEASUREMENTS w/ DIM GUAGE ON STAND.

1 <sup>ST</sup> SET	2 <sup>ND</sup> SET	3 <sup>RD</sup> SET
22	41	0
25	41	11
34	40	8
31	42	2
28	45	4
44	40	-4
32	37	3
35	47	-5
35	46	1
42	41	8
39	40	4

10/8/83

RAN 5 NORMAL TESTS AS FOLLOWS  
 T33NS1.DAT THROUGH T33NS5.DAT.  
 605# NORMAL LOAD (WEIGHT OF APPARATUS)  
 INCREASE LOAD BY 4340# OVER 68 SECONDS  
 HOLD FOR 15.5 SEC  
 DECREASE LOAD TO "0" OR WEIGHT OF APPARATUS.  
 RAN FOLLOWING CYCLE TESTS:

T3354033.DAT 5.4 HZ 0.033"PK 605# NORMAL LD  
 - NO HORIZONTAL DISP DATA.  
 T335433A.DAT 5.4 HZ 0.033"PK DNP  
 T3354067.DAT 5.4 HZ 0.067 PK  
 T3381017.DAT 8.1 HZ 0.017 PK  
 T3381033.DAT 8.1 HZ 0.033 PK  
 T3310817.DAT 10.8 HZ 0.017 PK  
 T3310833.DAT 10.8 HZ 0.033 PK  
 T3313617.DAT 13.6 HZ 0.017 PK  
 T3313633.DAT 13.6 HZ 0.033 PK

APR 83

10/8/83

FOLLOWING WERE COMPUTER CHANNELS FOR T33 SERIES TESTING ON 10/8/83:

CHNL	XDER	CAL/INCH	CAL'D ON
0	VLC1	10,000#/V	4/12/83
1	VLC2	10,000#/V	4/12/83
2	VLC3	10,000#/V	4/13/83
3	TVL	10,000#/V	4/13/83
4	HL	496#/V	9/17/83
5	LVAT1	0.20"/V	4/30/83
6	LVAT2	0.20"/V	4/30/83
7	PROX4	1000000#/V	4/29/83
8	PROX5	89mm/V	4/29/83
9	PROX6	99mm/V	4/29/83
10	PROX7	103mm/V	4/29/83
11	ACCEL1	* SEE BELOW	BEFORE USE
12	ACCEL2	* SEE BELOW	BEFORE USE
13	HOR DSP	0.10"/VOLT	10/8/83

\* ACCELS WERE CAL'D AT 10g's/VOLT FOR TEST T3354033.DAT. GAIN WAS RAISED X10 FOR FOLLOWING TESTS. A

10/11/83

APPLIED SINE SWEEP FROM 5-200HZ AT  $\approx 800$  mV/V. FOUND RESONANCE AT APPROX 56-57 HZ. RESONANCE NOT CLEAR. PRIMARILY HORIZONTAL MOTION WITH SOME YAW ROTATION ABOUT THE X-AXIS. A

10/12/83

DISASSEMBLED APPARATUS. RAN PROFILE T33PTBAT.DAT A

10/13/83

RAN PROFILE T33PBBAT.DAT. A

10/14/83

TRIED TO REMOVE TOP BECK FROM BOX. SAMPLE WAS DESTROYED + DISCARDED. A

APR 83



10/15/93

T34 SERIES TESTING - ~~NOT~~ USED ARTIFICIAL SMOOTH SPECIMENS POURED ON 9/10/93. SPECIMENS ROUGHENED W/ M MEASURED ON TALYSURF MACHINE (DIV03). SCHMIDT HAMMER REBOUND TESTS:

## TOP ROCK SIDES

1) 13	9) 18
2) 18	10) 18
3) 17	11) 23
4) 20	12) 20
5) 16	13) 16
6) 24	14) 20
7) 22	15) 20
8) 20	16) 18

## TOP ROCK (TEST SURFACE)

1) 20	9) 17
2) 22	10) 24
3) 25	11) 18
4) 18	12) 19
5) 19	13) 17
6) 21	14) 18
7) 20	15) 19
8) 18	16) 16

## Bottom Rock (SIDES)

1) 23	9) 18
2) 22	10) 22
3) 23	11) 17
4) 20	12) 17
5) 20	13) 20
6) 18	14) 19
7) 21	15) 22
8) 19	16) 16

A. Fox

10/15/93

## Bottom Rock (TEST SURFACE)

1) 17	9) 23
2) 22	10) 28
3) 20	11) 23
4) 19	12) 19
5) 18	13) 17
6) 25	14) 26
7) 22	15) 25
8) 19	16) 17

TILT ANGLE - SIDE 3 THROUGH 1  $35^{\circ}$   
SIDE 1 THROUGH 3  $35^{\circ}$

TOP BLOCK NET WEIGHT WAS 14.8 #.

GROUTED BOTTOM BLOCK WITH RECIPE LISTED ON PAGE 7.

10/18/93

GROUTED TOP BLOCK WITH RECIPE LISTED ON PAGE 7.

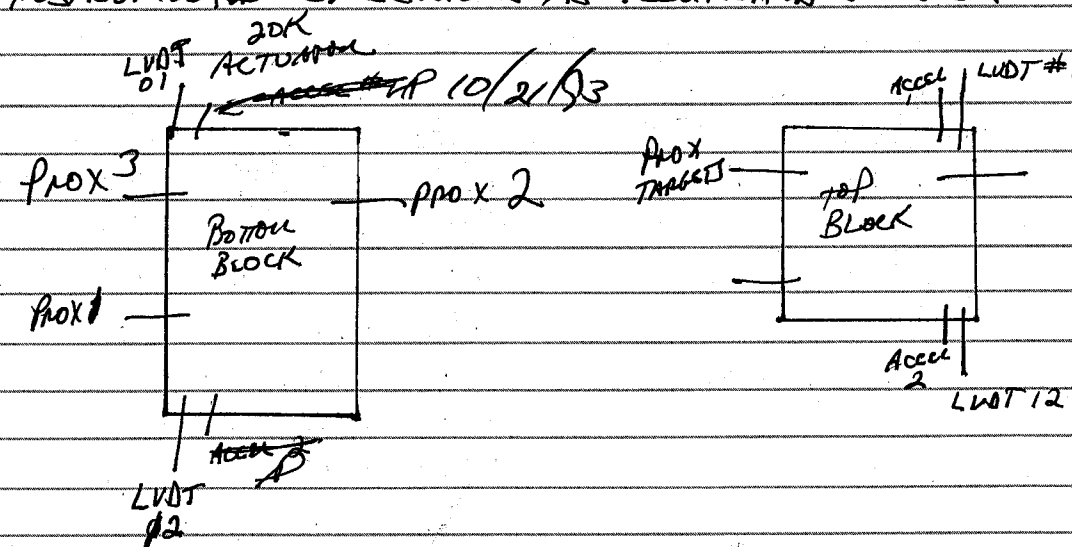
PLACED SPECIMENS IN  $105^{\circ}\text{C}$  OVEN.

10/20/93

REMOVED SPECIMENS FROM OVEN.

10/21/93

RAN PROFILES T34PBBBT.DAT & T34PTBBT.DAT  
INSTRUMENTED SPECIMENS AS ILLUSTRATED BELOW:



A. Fox

10/22/93

ASSEMBLED APPARATUS. FOLLOWING ARE THE  
COMPUTER CHANNELS USED FOR T34 SERVO TESTING

CHNL	XDCR	COL VALUE	CAL'D ON
0	VLC 1	10,000 #/V	10/20/93
1	VLC 2	10,000 #/V	10/20/93
2	VLC 3	10,000 #/V	10/20/93
3	TVL 3	10,000 #/V	10/20/93
4	Hor LD	496 #/V	9/17/93
5	LVAT 1	0.20 "/V	4/30/93
6	LVAT 12	0.20 "/V	4/30/93
7	PROX 1	10.06 mm/V	6/23/93
8	PROX 2	10.11 mm/V	6/23/93
9	PROX 3	10.06 mm/V	6/23/93
10	ACCEL 1	1G/V	BEFORE USE
11	ACCEL 2	1G/V	BEFORE USE
12	Hor DAP	0.10 "/V	10/8/93

RAN TESTS T34NS1-5.DAT (5 RUNS). NORMAL RUNS  
WERE RAMP TO 4 MPa OVER 2.5 MINUTES HOLD FOR  
1 MINUTE, RAMP DOWN TO ZERO IN 2.5 MINUTES.

RAN FOLLOWING CYCLIC TESTS:

FILENAME	PARAMETERS
T3454033.DAT	5.4 HZ, 0.033" PK, 605# VERT LD INPUT VOLTAGE 2.3 Vpp
T3454067.DAT	5.4 HZ, 0.067" PK, 605# VERT LD INPUT VOLTAGE 4.2 Vpp
T3481017.DAT	8.1 HZ, 0.017" PK, 605# VERT LD INPUT VOLTAGE 1.9 Vpp
T3481033.DAT	8.1 HZ, 0.033" PK, 605# VERT LD INPUT VOLTAGE 3.4 Vpp
T3410817.DAT	10.8 HZ, 0.017" PK, 605# VERT LD INPUT VOLTAGE 2.4 Vpp
T3410833.DAT	10.8 HZ, 0.033" PK, 605# VERT LD INPUT VOLTAGE 3.65 Vpp

APICKES

10/22/93

TESTING CONTINUED:

T3413617.DAT 13.6 HZ 0.017" PK 605# VERT LD  
INPUT VOLTAGE 3.65 Vpp

T3413633.DAT 13.6 HZ 0.033" PK 605# VERT LD  
INPUT VOLTAGE 6.50 Vpp

10/27/93

RAN A TEST AT 5.4 HZ, 0.033" PK, 605# VERT LD FOR  
8 SECONDS TO OBSERVE DRIFT IN MOVEMENT. NO DATA  
WAS TAKEN.

10/26/93

DISASSEMBLED APPARATUS. RAN PROFILE T34PBBAT.DAT

10/27/93

RAN PROFILE T34PTBAT.DAT

10/28/93

PERFORMED TILT TEST ON ~~THE~~ ARTIFICIAL SPECIMEN

PAIR T35. SIDE 1 THROUGH 3 AND 3 THROUGH 1 WERE  
38°. TOP BLOCK NET WEIGHT WAS 15.97.

SCHMIDT HAMMER REBOUNDS READINGS: SEE PAGE 16

TOP BLOCK (SIDES)

1	16	9	16
2	19	10	21
3	13	19	24
4	13	12	13
5	19	13	15
6	27	14	15
7	21	15	14
8	18	16	21

FOR REBOUNDS  
RESTORERS.

TOP BLOCK (JOINT SURFACES)

1	12	9	13
2	20	10	16
3	15	11	14
4	13	12	14
5	17	13	12
6	14	14	10
7	21	15	15
8	16	16	15

APICKES

10/28/93 Senior Hammer Rebound Readings:

## Bottom Block (Sides)

1	21	9	20
2	25	10	24
3	20	11	20
4	26	12	21
5	20	13	26
6	24	14	21
7	20	15	26
8	19	16	24

## Bottom Block (Joint Surface)

1	18	9	21
2	21	10	24
3	18	11	21
4	16	12	22
5	17	13	18
6	18	14	20
7	23	15	20
8	17	16	18

GROUTED T35 SPECIMENS USING RECIPE LISTED ON PAGE 2.

10/29/93 SPECIMENS WERE PLACED IN 105°C OVEN FOR 24 HOURS.

10/30/93 REMOVED SPECIMENS FROM OVEN.

10/31/93 RAN PROFILES T35PBBBT.DAT AND T35PTBBT.DAT.

11/1/93 INSTRUMENTED SPECIMENS AS LISTED ON PAGE 11.

11/2/93 ASSEMBLED APPARATUS. COMPUTER CHANNELS WERE AS FOLLOWS:

CHAN	XDER	CH VALUE	CAL'D ON
0	VLC1	10,000 #/V	10/20/93
1	VLC2	10,000 #/V	-
2	VLC3	10,000 #/V	-
3	TVL	10,000 #/V	-
4	HL	496 #/V	9/17/93
5	LVAT 01	0.20 %/V	11/1/93
6	LVAT 12	0.20 %/V	11/1/93
7	Prox 1	10.03 mils/V	11/1/93
8	Prox 2	10.11 mils/V	11/1/93

PICKER

11/2/93

CHAN	XDER	CH VALUE	CAL'D ON
9	Prox 3	10.26 mils/V	11/1/93
10	Accel 1	0.10 %/V	BEFORE USE
11	Accel 2	-	-
12	Non DISP	0.10 %/V	10/8/93

RAN NORMAL TEST T35NS1.DAT. PROX 1 MAXED OUT. ADJUSTED PROX 1 AND REZERSED. RAN TEST T35NS2-5.DAT. SPECIMEN CRACKED DURING NORMAL TESTING. 3 CRACKS AROUND BOTTOM ROCK. RAN THE FOLLOWING CYCLIC TESTS:

T3554033.DAT	5.4 HZ, 0.033" PK,	INPUT VOLTAGE 2.3 VPP
T3554067.DAT	5.4 HZ, 0.067" PK,	" 4.2 VPP
T3581017.DAT	8.10 HZ, 0.017" PK	1.8 VPP
T3581033.DAT	8.10 HZ, 0.033" PK	2.4 VPP
T3510817.DAT	10.8 HZ, 0.017" PK	2.4 VPP
T3510833.DAT	10.8 HZ, 0.033" PK	3.6 VPP
T3513607.DAT	13.6 HZ, 0.017" PK	3.6 VPP
T3513633.DAT	13.6 HZ, 0.033" PK	6.5 VPP
T3514500.DAT	1.4 HZ 0.50" PK	5 VPP
T3514100.DAT	1.4 HZ 1.0" PK	9.6 VPP

DUE TO EXCESSIVE ROCK WEAR, FULLSCALE CYCLIC TESTING WAS STOPPED. DUE TO THE SEVERE DAMAGE TO THE SPECIMEN, POST TEST PROFILES WERE NOT RUN.

11/4/93

USING A FLOATING ACCELEROMETER A RESONANCE SEARCH WAS PERFORMED ON THE APPARATUS. RAN KANA MADE THE FOLLOWING OBSERVATIONS DURING THE SEARCH: STRONG HORIZ RES AT 273 HZ, MINOR HORIZ RES AT 237 HZ. THESE MEAS ON ROCK ACCELEROMETER. NO MUCH VERTICAL RESPONSE ON APPARATUS AS MEAS WITH FLOATING ACCEL. 320 HZ HORIZ MEAS ON RETORTION - MINOR RES.

APERRY



11/4/93

VERTICAL CHECK SHOWS ONLY WEAK APPARENT RESONANCE RESPONSE BUT SOME TENDENCY TO EXCITE HORIZ MODE AT 273 HZ.

T35 SETUP WITH NO VERTICAL PRESSURE ON:

HORIZ LOA FREQUENCY  $\approx$  225 HZ BUT WEAK.

NOTE: NO RESONANCE AT  $\approx$  56 HZ.

VERTICAL SWEEP WITH 1 MPa HORIZONTAL SHOWS SOME RESONANCE IN 6-30 HZ RANGE BUT IS VERY DIFFICULT TO IDENTIFY & APPEARS TO BE VERY SENSITIVE TO INPUT AMPLITUDE.

HORIZ RECEL DROPPED OUT (DUE TO WEAK) WHEN DISASSEMBLING ROCK, HENCE NO CONCLUSION ON NO 56 HZ FREQUENCY.

T35 ROUGHNESS REMAINS

TOP BLOCK

BOTTOM BLOCK

10	22	60	65	83	68
15	14	55	69	72	77
24	13	56	74	74	82
19	16	60	70	78	72
23	21	62	78	82	73
29	18	60	67	77	81
21	18	65	75	69	84
24	20	72	74	75	70
33	22	73	76	76	71
24	25	65	74	78	84
19	27	61	71	84	81
31	27	52	77	75	72

11/4/93

FOLLOWING ARE SCHMIDT HAMMER READINGS FOR T36 SPECIMEN PAIR PERFORMED ON 8/13/93:

TOP BLOCK (SIDES)

JOINT SURF

1) 13	6) 13	11) 13	1) 12	6) 15
2) 11	7) 17	12) 13	2) 11	7) 13
3) 19	8) 12	13) 12	3) 15	8) 16
4) 12	9) 11	14) 10	4) 10	9) 13
5) 13	10) 13	15) 17	5) 11	10) 13

11/4/93

SCHMIDT HAMMER

BOTTOM BLOCK (SIDES)

JOINT SURF

1) 13	2) 14	1) 11	2) 13
2) 20	10) 12	2) 14	10) 13
3) 20	11) 15	3) 12	11) 17
4) 15	12) 16	4) 16	12) 18
5) 15	13) 12	5) 12	13) 14
6) 19	14) 19	6) 16	14) 14
7) 16	15) 20	7) 20	15) 12
8) 16	16) 13	8) 18	16) 10

TILT ANGLE WAS 43° IN BOTH DIRECTIONS.

TOP BLOCK NET WEIGHT WAS 14.2 LB.

GROUTED BOTTOM BLOCK USING RECIPE LISTED ON PAGE 7-2/25. AP

GROUTED TOP BLOCK AND PERFORMED SPECIMEN PAIR IN 105°C OVER. AP

11/5/93

11/8/93

11/10/93

REMOVED SPECIMENS FROM OVER. AP

RAW PROFILES T36 PTBBT.DAT + T36 PBBBT.DAT.

FOLLOWING ARE ROUGHNESS READINGS TAKEN FROM T36 SPEC PAIR.

TOP BLOCK

BOTTOM BLOCK

32	63	51	30	72	44
36	61	50	21	41	48
47	63	53	20	48	48
43	72	48	19	42	58
50	71	48	20	45	40
39	64	52	32	52	60
41	62	48	21	43	45
36	63	60	25	46	60
58	65	56	22	47	50
43	68	52	27	44	48

AP

11/11/83

INSTRUMENTS T36 AS ILLUSTRATED ON APRIL 11.

11/12/83

INSTALLED 2000# LOAD CELL CALIBRATED 11/8/83. A

FOLLOWING WERE COMPUTER CHANNELS FOR T36  
SERIES TESTING:

CHNL	YDER		
0	VLC1	10,000 #/V	10/20/83
1	VLC2	10,000 #/V	
2	VLC3	10,000 #/V	
3	TVL	10,000 #/V	
4	HL	200 #/V	11/8/83
5	PROX1 LVDT1	0.20" / V	11/1/83
6	PROX2 LVDT2	0.20" / V	
7	PROX3	10.21 mils/V	
8	PROX2	10.11 mils/V	
9	PROX3	10.06 mils/V	
10	NOT USED		
11	ACCEL 1	0.10 g/V	BEFORE USE
12	ACCEL 2	0.10 g/V	BEFORE USE
13	NOT DISP	0.25" / V	10/8/83

RAN THE FOLLOWING TESTS:

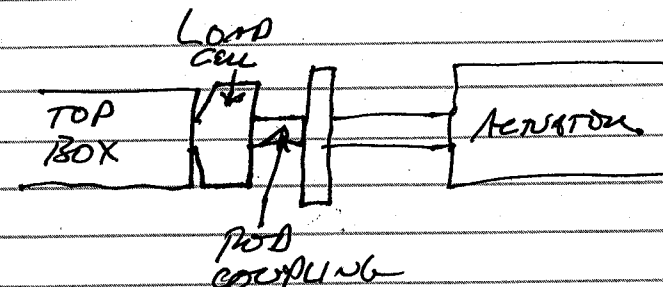
T36 NSI-J.DAT (5 FILES)

T36	FILE	FREQ	PK	INPUT VOLTAGE
T3654033	.DAT	5.4 KHZ	0.033" PK	0.66 VPP
T3654067	.DAT	5.4 KHZ	0.067" PK	1.4 VPP
T3681017	.DAT	8.10 KHZ	0.017" PK	0.36 VPP
T3681033	.DAT	8.10 KHZ	0.033" PK	0.84 VPP
T3610817	.DAT	10.8 KHZ	0.017" PK	0.41 VPP
T3610833	.DAT	10.8 KHZ	0.033" PK	1.20 VPP
T3613617	.DAT	13.6 KHZ	0.017" PK	0.68 VPP
* T3613633	.DAT	13.6 KHZ	0.033" PK	2.16 VPP

\* NOTE: INPUT VOLTAGE SEEMED VERY HIGH FOR  
LAST TEST ONLY.

APR 11

11/12/83

NOTICED A LOT OF LATERAL MOVEMENT BETWEEN THE  
ROD COUPLING AND THE LOAD CELL.\* ON 11/8/83 POURED 1 SAMPLE PORE WITH THE FOLLOWING  
RECIPE:

17# 10Z WATER

2.45gms AIR ENTRAINMENT

77gms DARACEM 100

14.7gms IRONY LIQ

17# 10Z TYPE I CEMENT

31# 10Z BARITE

2# 6.5oz BENTONITE

NO RELEASE AGENT. A

11/15/83

DISASSEMBLED APPARATUS - RAN PROFILE T36PRBAT.DAT AND

T36TRBAT.DAT. POURED SPECIMEN PAIR USING RECIPE

LISTED ABOVE. USED PENNZOIL 30W OIL AS RELEASE AGENT. A

11/17/83

POURED SPECIMEN PAIR, 8 INGOTS AND 2 CENTER INGOTS USING

SPE 30W OIL

RECIPE LISTED ABOVE. RECIPE WAS MADE TWICE. A

11/19/83

POURED 2 CENTER INGOTS AND 1 SPECIMEN PAIR USING

RECIPE LISTED ABOVE. USED 30W OIL FOR RELEASE

AGENT. A

11/22/83

POURED 7 INGOTS AND 2 CENTER INGOTS WITH 30W OIL

OIL AS RELEASE AGENT. USED SART MADE CONCRETE

PUMP. A

APR 11

- 11/30/93 Poured 8 ingots and 2 center ingots using recipe listed on page 6, 9/10/93. Used 30wt motor oil as release agent. J.
- 12/3/93 Poured 8 ingots and 2 center ingots using recipe listed on page 6, 9/10/93. Used 30wt motor oil as release agent. J.
- 12/15/93 P. 12/15/93
- 1/7/94 Poured 16 ingots and 2 center ingots using recipe listed on page 6, 9/10/93. Used 30wt motor oil as release agent. J.
- 1-17-94 Poured 16<sup>sq</sup> and 2 center ingots using recipe listed on page #6, 9-10-93. 30wt. Release Agent. J. Elizondo
- 1-18-94 Poured 8 sq ingots using recipe listed below  
17# 1oz. Water  
2.45 g Air Ent.  
77 g Paracem 100  
14.7 g Ivory  
17# 1oz. TYPE I  
2# 6.5oz. BNITE  
31# 1oz. BARITE  
Used 30wt motor oil release agent. J. ELIZONDO
- 1-19-94 Poured 16 sq. and 2 center ingots using recipe on page 6, 9-10-93. 30wt release agent. J. Elizondo. and 10 EA. Cylinder Samples from 1-19-94 A.
- 1-20-94 Poured 16 sq. ingots using recipe on page #20 used 30wt oil. J. Elizondo.
- 1-21-94 Poured 16 sq. ingots using recipe on page #20 30wt oil release agent. J. Elizondo.
- 1-24-94 Poured 16 sq. and 2 center ingots using recipe on page #6, 9-10-93 for BAT 1-24 A, BATCH 1-24 was poured using recipe on page #20 1/18/94 30wt Motor oil was used for release agent J.E.

- 1-25-94 Poured 8 sq. ingots using recipe on page #20, 1-18-94. used 30wt oil for release agent. J. Elizondo.
- 1-26-94 Poured 16 sq and 13 cylinder ingots. the recipe on page #20, 1-18-94. was used for batch # 1-26-94 and the recipe on page #6, 9-10-93 was used for batch # 1-26-94 A and the 13 cylinders. 30wt. oil was used for release agent. J. Elizondo.
- 1-27-94 Poured 8 sq. and 2 center ingots using recipe on page #6, 9-10-93. 30wt motor oil release agent was used. J. Elizondo.
- 1-28-94 Poured 16 sq ingots using recipe on page #20, 1-18-94. 30wt motor oil release agent. J. Elizondo.
- 1-31-94 Poured 16 sq. ingots using recipe on page #20, 1-18-94 - 30wt motor oil for release agent.
- 2-1-94 Poured 8 sq and 2 center ingots using recipe on page 6, 9-10-94. 30wt oil release agent. J. Elizondo.
- 2-2-94 Poured 8 sq. ingots using recipe on page #20, 1-18-94 30wt motor oil release agent. J. Elizondo.
- 2-3-94 Poured 16 sq. ingots using recipe on page #20, 1-18-94 30wt motor oil release agent. J. Elizondo.
- 2-4-94 Poured 16 sq. and 2 center ingots and 12 cylinder samples using recipe on page #6, 9-10-93. Batch # 2-4 A included the cylinder samples. 30wt motor oil was used as release agent. J. Elizondo.
- 2-7-94 Poured 8 sq. 8 triangle and 12 test cylinders recipe on page #6, 9-10-93 was used on batch # 2-7-94 and the recipe on page #20, 1-18-94 was used on batch # 2-7A-94 this included the test cylinders. 30wt release, J. Elizondo.



2/8/94 Poured 16 sq and 2 center ingots using the recipe on Page #20, 1-18-94 for all 3 Batches and 30wt release agent was used J.E. Elynde.

2/9/94 Poured 8 sq and 8 triangle ingots using the recipe on Page #20, 1-18-94 30wt release agent J.E. Elynde.

2/10/94 Poured 16 sq ingots using the recipe on Page #20, 1-18-94 30wt oil J.E. Elynde.

2/11/94 Poured 8 sq, 8 triangle and 2 center ingots using the recipe on Page #20, 1-18-94. 30wt motor oil J.E. Elynde.

2/15/94 Poured 8 sq, 8 triangle and 12 test cylinders the 8 sq triangle and 12 cylinders are numbered 2-15-A all of the above were poured using the recipe on Page #20, 1-18-94. J.E. Elynde.

2/16/94 Poured 8 sq ingots using the recipe on Page #20, 1-18-94 30wt motor oil J.E. Elynde.

2/17/94 Poured 16 sq ingots using the recipe on Page #20, 1-18-94 30wt motor oil J.E. Elynde.

2/18/94 Poured 8 sq and 8 triangle ingots using the recipe on Page #20 1-18-94 30wt motor oil J.E. Elynde.

2/21/94 Poured 8 sq, 8 triangle and 12 test cylinders the cylinders are ~~2-21-A~~ 2-21-A used the recipe on Page #20, 1-18-94 30wt motor oil J.E.

2/22/94 Poured 16 sq ingots, both batches were poured using the recipe on Page #20, 1-18-94 30wt motor oil J.E.

2/23/94 Poured 8 sq and 8 triangle ingots using the recipe on Page #20, 1-18-94 30wt motor oil J.E.

2/24/94 Poured 16 sq ingots using the recipe on Page #20, 1-18-94 30wt motor oil J.E.

2/25/94 Poured 8 sq and 8 triangle ingots using the recipe on Page #20, 1-18-94 30wt oil J.E.

2/28/94 Poured 8 sq, 8 triangle and 12 test cylinders using the recipe on Page #20, 1-18-94 the 8 triangle and cylinders were poured out off the same batch and are # 2-28A. 30wt oil was used. J.E.

3-1-94 Poured 8 sq ingots using the recipe on Page #20, 1-18-94 30wt oil J.E.

3-2-94 Poured 8 sq and 8 triangle ingots using the recipe on Page #20, 1-18-94 30wt oil was used as release agent J.E.

3-3-94 Poured 16 sq ingots using the recipe on Page #20, 1-18-94 30wt oil J.E.

3/4/94 Poured 8 sq and 8 triangle ingots using the recipe on Page #20, 1-18-94 30wt oil J.E.

3/8/94 Poured 8 sq and 8 triangle ingots and 12 #3-8A test cylinders all three were poured using the recipe on Page #20, 1-18-94 30wt oil J.E.

3/9/94 Poured 16 sq ingots using the recipe on Page #20, 1-18-94 30wt motor oil J.E.

3/10/94 Poured 16 sq ingots using the recipe on Page #20, 1-18-94 30wt oil J.E.

3/11/94 Poured 16 sq ingots all were poured using the recipe on Page #20, 1-18-94 30wt oil J.E.

3/14/94 Poured 16 sq ingots and 11 test cylinders all were poured using the recipe on Page #20, 9-10-93 the cylinders are # 3/14A 30wt oil was used J.E.

- 3/15/94 Poured 16 sq. ingots using the recipe on page # 20, 1-18-94 30 oil was used J.E.
- 3/17/94 Poured 16 sq. ingots using the recipe on page # 20, 1-18-94 30 oil was used J.E.
- 3/18/94 Poured 15 sq. ingots using the recipe on page # 20, 1-18-94 30 oil was used J.E.

- 06/06/94  
DDK Calibrated 50 Ch. Interface board into 486 computer with a fixed frequency and measured RMS level per notes prepared by Douglas Fox. Single sine wave paralleled into all 50 channels of computer interface board. Verified that computer recorded proper amplitude levels for each channel. All equipment identified in Douglas Fox notes.
- 06/10/94  
DDK Performed check of free table operation with 486 computer monitoring table input voltage and actuator displacement transducers. Input voltage recorded on channels 1-32 and actuator displacement recorded on channels 35-50.  
Run 1 is CISTC 02 bin at 0.6 in displacement peak on table with pot set at 1.0. Data stored on computer.  
Run 2 is CISTC 02 bin at pot set 0.5  
Sample rate is 2800 samples/sec for 10 sec.
- 06/10/94  
DDK Performed Computer Interface Check with 20 Hz sine wave into Ch 1-49 and 0 into Ch. 50. Ran 10 sec data @ 400 samples/sec. Saved in computer as CIC.CK
- 06/13/94  
DDK Connected all 50 transducer channels per diagram in notes. Ran computer 10 sec run of static levels. Computer acquisition malfunctioned. Found improper software switch programmed for Card #2. Diagnosis is all previous calibration valid on Ch. 0-32. Ch 32-49 calibration invalid. ~~Eliminated~~ Provided validation by reading static output levels of all channels on computer and verifying all levels by independent reading on calibrated voltmeter →

06/13/94  
DDK  
(Cont'd)

S/N 51502012. All computer data printed out on sheet 6/13/94 - 15:31 by Douglas Fox.

06/13/94  
DDK

Calibration summary status at this point. Ch. 0-32 valid per original procedure with sine wave input and free table input. Ch. 33-49 valid tested by D.C. voltage comparison with volt meter. Strain gages calibrated 06/13/94 with shunt procedure for precision resistor. Accelerometers calibrated by Allen Pickens per enclosed notes. LVDTs calibrated by Allen Pickens per enclosed notes. Load Cells calibrated by Allen Pickens per enclosed notes. Bently probes calibrated by Allen Pickens per enclosed notes. Cantilever Beams calibrated by Donald Massey per enclosed notes.

06/13/94  
DDK  
4:35

Performed vertical hoist bump test 1 and recorded all 50 channels on computer. Noted that AC10 (Ch 9) looked peculiar compared to rest of channels. Other channels normal. Checked AC10 & AC11. Raised Specimen one inch off table and held off table.

06/14/94  
08:20  
DDK

Recheck calibration on AC10 on standard cal. apparatus. Calibration checked Normal. Reinstalled AC10 and AC11.

06/14/94  
DDK  
09:55

Performed Bump Test 2. Raise Specimen ~3 in and set back down onto table, held up above table. Found AC10 & AC11 inadvertently left disconnected from cal Recheck.

10:38  
DDK

Performed Bump Test 3 with AC10 & AC11 reconnected. Raise Specimen ~3 in and set back down in 10 sec Run. — Electric surge apparently had caused computer to malfunction.

11:40  
DDK

Redo Bump Test 3 (write over file) Raise Specimen ~3 in and set back down in 10 sec. AC10 Still appears suspicious.

13:30  
DDK

Bump Test 4. Same procedure as 3, but use only 400 samples/sec for 10 sec and have spare accelerometer (AC12) on Ch 50. AC12 set right next to AC10. Computer malfunctioned — no data.

14:10  
DDK

Repeat Bump Test 4 Same procedure as 3 with 2800 samples/sec for 10 sec. AC1 disconnected and AC12 (spare) put in its place in Ch 0. AC12 mounted next to AC10. Everything great except Ch 26 (CB7) was open. Checked Bump 2 test data. Ch 26 on interface BD (Ch 27 on computer) also open. ~~Also found~~ amplifier for these two channels. Amp 109826 was put into place of Amp 108728 (Both Mount Group Model 2120A).

16:20  
DDK

Rechecked Gain Settings on all CB channels after changing out amplifier on CB7 & CB8. Also read cal A voltages on all channels.

06/15/94

0815  
DDK  
↓

Perform Bump Test 5, Raise & lower (~2-in) in 10 sec @ 2800 samples/sec

0940

Perform static run (DATA 6, bin).

0955

Perform free table run with specimen lifted off ~2 inches above table. Pat set at 0.5 Data 7



06/15/94 Perform Static 10 sec run 2800 samples/sec  
Data set 08

14:04 DPK  
13:58 ↓ Perform 1st data run on specimen.  
Pot Set 0.4 10 sec run @ 2800 samples/sec  
Data set 09

14:41  
14:36 ↓ Perform Run 2 on specimen. Pot Set 0.4  
10 sec run @ 2800 samples/sec  
Data set 10.

15:42 Perform Run 3 on specimen. Pot Set 0.4  
10 sec run @ 2800 samples/sec  
Data set 11

16:27 Perform Run 4 on specimen. Ch AC11 disconnected  
and AC12 mounted right next to AC11 position,  
AC11 output fed into Interface Ch. 10. Pot set 0.4  
10 sec run @ 2800 s/sec,  
Data Set 12  
Note: Found AC12 virtually identical to AC10  
for this run. Conclusion: AC11 data invalid  
for Runs previous to this.

06/16/94  
08:45 DPK  
↓ Verified that on Run 4 (Data set 12), AC12  
was fed thru its own calibrated amplifier, this  
output then thru filter Ch AC11 and then to  
interface board Ch 10. Hence AC11 and its  
amplifier were out of the circuit and no  
zero signal was experienced.

10:25 Returned all cables to original settings.

10:45 Perform Static level Run  
Data set 13

11:15 Perform Run 5, pot set 0.64  
Data Set 14  
DPK ↓

12:45 Retune all cables to original settings

13:48 Perform Run 6, pot set 0.64  
Data Set 15

13:55 Retune all cables to original settings  
Took photo series on both sides

14:34 Perform Run 7, pot set 0.64  
Data Set 16

15:00 Retune all cables

15:28 Perform Run 8, pot set 0.64  
Data Set 17

15:40 Checked cables for tension

06/17/94  
08:15 Took photo series on both sides

09:50 Checked polarity on all cantilever beams. Push  
up displacement on beam (away radially from tunnel)  
produced positive (+) voltage on scope for all  
CB1 thru CB8.

09:45 Perform Static level Run  
Data Set 18

09:50 Perform Run 9, pot set 0.85  
Data Set 19  
Noted that RH near corner 2 inputs nearest the  
corner were loose after the run  
BP5 found to be suspicious. Diagnosis shows

OK ↓ we have lost Ch 32 (of interface bd) to a open circuit somewhere in the computer interface. Hence we disconnect Ch 32. We take BP5 and put it into Ch 11 (of interface Bd) in lieu of SG1 (SG1 deleted). Then also LC1 (which was not recorded before) is put into Ch 12 in lieu of SG2. Hence hereafter SG1 & SG2 were deleted. Ch 32 is now grounded, since it was bad.

11:15 Restored corrected calibration constants for these channels. Retuned Cables 9F 5/30/95

11:20 Perform Static level Run. Interface Bd 33 had a function generator 20 Hz

Found 180 Hz oscillation in filter of Ch. 11. Flipped filter switches and it disappeared.

11:45 Perform Static level Run. Write over previous data Data set 20.

13:12 Perform Run 10, pot set 0.85 Data set 21. Had lost Ch 9 (AC10). performed 20 Hz signal into computer for check. Checked OK. 1st & 2nd 45° ingots on Top RH corner are still loose. Decided to go ahead with another run and see what AC10 does. Retuned Cables 9F 5/30/95

14:13 Perform Run 11, pot set 0.85 Data set 22. Had AC10 into both Ch 9 and Ch 32 (uncalibrated). Data shows Ch 32 now OK in mux unit. BP3 had high freq. oscillation. Switched 1600 Hz filter on and off and it disappeared. Retuned Cables 9F 5/30/95

15:06  
15:03 Perform Run 12, pot set 0.85 Data set 23. 1st & 2nd 45° ingots in RH corner still loose after run.

15:15 Took photo set on both sides

06/20/94

08:30

OK

10:00

↓

Read Voltages & frequencies of tension cables

Added AC13 Horizontal ⊕ East on near face. Center of 2nd full block <sup>down</sup> from top and 1st full block from Rt end plate (4.5" down from top plate and 1.65" from Rt end plate) AC13 S/N = 12678 Model 303A Amplifier S/N = 133, ch 3, Sensitivity = 10g/V AC/Amp calibration. Output them

Added AC14 Horizontal ⊕ East on near face. Center of 2nd full block down from top right ~~side~~ above tunnel. (4.5" down from top plate). AC 14 S/N = 12674 <sup>Model 303A</sup>, Amplifier S/N = 133, ch 4 Sensitivity = 10g/V. AC/Amp calibration. Output them

BP5 put back into Ch 32 with its filter SG1 put back into Ch 11 with no filter Note in the above SG3, SG4 deleted

10:45

Perform Static level Run Data Set 24

13:05

Perform Run 13, pot set 1.0 Data set 25 — All LVDT channels inadvertently switch off. AC10 bad and AC11 not in place. Repaired all this. Check cable voltages & frequencies. Took photograph set on both sides.

14:50

OK

Perform static level run and check all appropriate offsets carefully.  
Data set 26

15:02

Perform Run 14.0 pot set 1.0  
Data set 27. Took photograph set on both sides. Check cable voltages and frequencies

15:57

Perform Run 15, pot set 1.0  
Data set 28. After the run it was noted that total cumulative wear to this point has been such that the top plate is  $\frac{1}{4}$ " high above the end plate level ~~and is~~ <sup>OK 11/09/11</sup> on the south side and is  $\frac{1}{4}$ " low below the end plate level on the north side. This is ~~the~~ true on both east & west ends. Hence top plate is tilted  $\frac{1}{2}$  inch from south to north side about an east-west axis.

16:10

Measure cable voltages and frequencies. Took photograph set on both sides.

06/21/94

OK

0830 Checked voltage levels on all channels for cumulative deflection. OK for one more run at least

0835

Checked voltages and frequencies of all cables. Took photograph set on both sides.

0935

Perform static level run.  
Data set 29

10:04

Perform Run 16, pot set 1.0  
Data set 30. Visually noticeable gap occurred on far side in 2nd upper keft magnet with CB7 appearing to have large shear displacement (i.e. near max 0.125 inch on beam).  
Noted that AC11 was lost.

11:00

CB7 had permanent set of  $\sim 0.100$  inch. We sheared its target rod holder loose and let it straighten to zero deflection. Then we glued it back to the rock. Amplifier was rebalanced for this gage.

11:10

Noted crack at upper base of LVDT 4 on upper right rock from near side.

12:45

Perform static level run. AC10 found dead and 164 was open. Corrected both items.  
Data set 31

12:50

Tightened all vertical cables to 150 #.

13:25

Perform static level run. Data set 32

13:48

Perform Test Run 17, pot set 1.0  
Data set 33

Took photo set on both sides after run. Also measured cable voltages and frequencies.

14:25

↓ OK

Last run had 4-6 Hz range in AC11, but AC10 was as always. Suspect filter anomaly. For next run changed out AC11 filter for Ithaco Model 4302 S/N 59971L to see if AC11 signal will be affected.

15:03

↓ OK

Perform Test Run 18, got set 1.0  
Data set 34 — Noted that computer malfunctioned and we got only about first 3 seconds of the 10 sec data run. Took photograph of both sides. Perform static level run Data Set 35

15:45

16:25

Found all end plate structure hinge bolts (6 of them) to be loose on east side. Suspect this has caused intermittent AC11 responses as previously observed. Six bolts were tightened.

08/22/94

0830

↓ OK

Check all bolts for tightness. Everything found to be OK.

Measured horizontal distance between end plates (inside)  
Near side Bottom =  $48 \frac{1}{8}$  inches  
Near side Top =  $49 \frac{1}{8}$  inches  
Far side Top = 49 inches  
Far side Bottom =  $48 \frac{1}{8}$  inches

09:00

09:30

Checked voltage & frequency on cables  
New drive circuit installed with gain factor 2.0 compared to before. Results are:  
Effective Old Pot set 1.0 now is pot set 0.504  
Effective 1.0 pot set is now 0.554  
Equip used:  
ACOPIAN Power Supply Model K32S60 (Cal not reg'd)  
Voltmeter Fluke Model 88 S/N 51502012

09:41

↓ OK

Perform static level Run

Data Set 36

Readjusted BP6 it was at 0.08 in with 0.10 max.

10:12

Perform static level run again and wrote over Data Set 36

Found AC2 bad. Switched filter from Ithaco Model 4302 S/N 59971L to Ithaco 4302 S/N 59971L

10:37

Perform static level Run and again wrote over Data Set 36

10:55

Perform Test Run 19, got set 0.504 (Equip 1.0)  
Data Set 37 — Noted that computer malfunctioned again at same time data run as for Run 18.

Perform cable voltage & frequency check.

12:55

Perform static level Run

Data set 38

13:00-15:45

Copied all data on floppy disks

16:15

Perform static level Run

Data set 39

16:26

Perform Test Run 20 got set 0.554  
Data set 40

16:35

Checked cable voltages & frequencies

16:50

Switched Accelerometers AC10 and AC11 in their physical positions.



06/23/94

0900

DDK



Adjusted Pot setting to 0.718 with double series op-amp and Iran tape recorder drive signal thru computer directly and into computer from op-amp pair. Recording showed above pot setting gave uniform 1.12 gain on drive signal.

0920

Perform Static head Run - found AC11 <sup>1/2</sup> CBL not working. Corrected bad connections. Data set 41.

0925

Perform Cable voltage & frequency check

Note that AC10 and AC11 physical positions are switched for this last run.

Perform Static head Run again and overwrite data set 41.

10:15

Perform Test Run 21, pot set 0.718 (with modified input amp). Data set 42. Far side of tunnel opened wide.

10:30

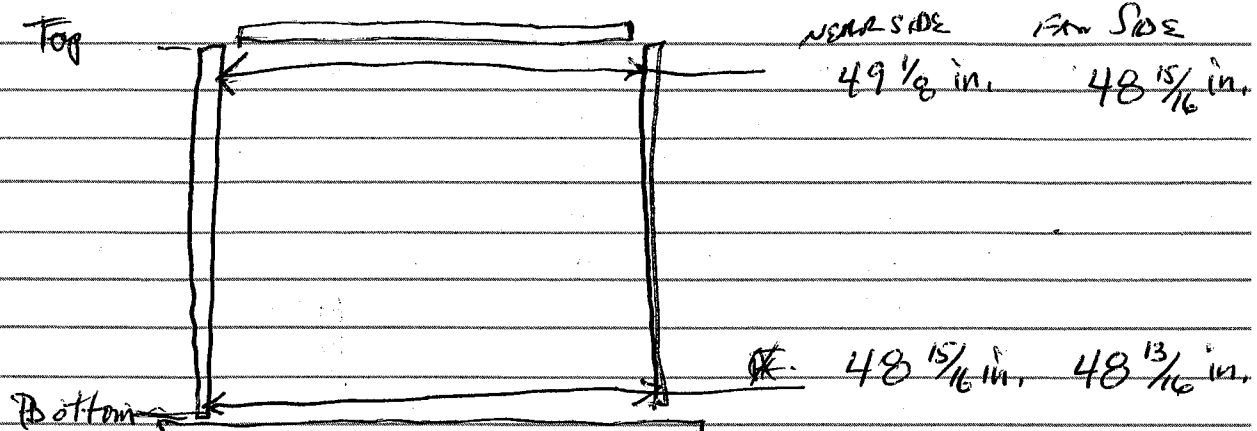
Performed cable voltage and frequency check and took photo sets on both sides.

Declared this to be last run.

David D. Kain

6/24/94

MEASURED DIMENSIONS BETWEEN <sup>END</sup> PLATES AT TOP & BOTTOM



AK

## T39 SERIES TESTING

8/23/94

Schmidt Hammer Readings on Artificial Sample Poured  
4/8/93:

## TOP BLOCK SIDES:

1	23	9	20
2	25	10	18
3	25	11	26
4	24	12	22
5	29	13	25
6	27	14	28
7	25	15	28
8	27	16	26

## TOP BLOCK JOINT SURFACE

1	16	9	19
2	25	10	16
3	17	11	20
4	17	12	
5	24	13	
6	22	14	
7	21	15	
8	21	16	

## Bottom Block Sides

1	27	9	31
2	22	10	30
3	29	11	28
4	33	12	24
5	20	13	26
6	25	14	22
7	27	15	28
8	24	16	26

## JOINT SURFACE

1	20	9	19
2	22	10	18
3	21	11	21
4	17	12	23
5	18		
6	12		
7	16		
8	20		

APR 1994

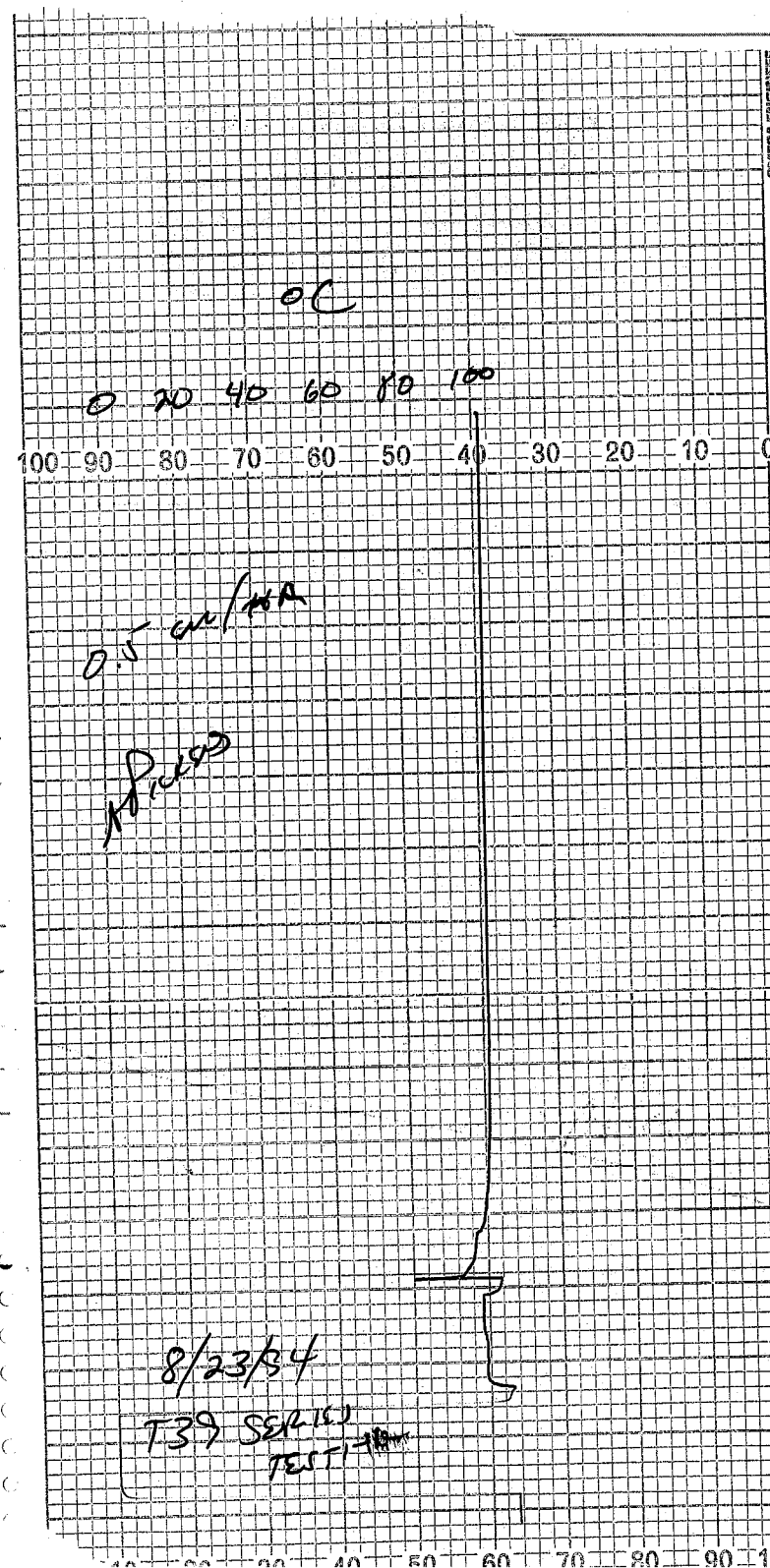
8/23/94

TOP BLOCK NET WEIGHT WAS 17.17. TILT ANGLE IN BOTH  
DIRECTIONS WAS 40°. GROUND TOP & BOTTOM SPECIMENS WITH  
RECIPE LISTED BELOW:

1 POUND 10oz WATER  
20gms DAKESIN 100  
3 POUNDS 5oz 8 TYPE # CONCUT  
~~100~~ 8 POUNDS 5oz SAND.

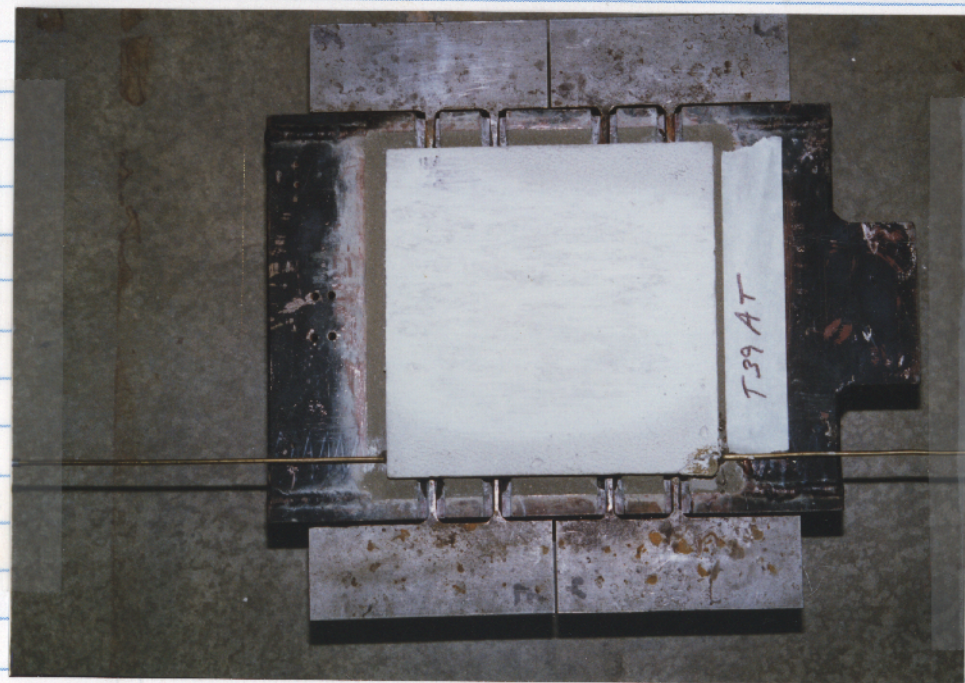
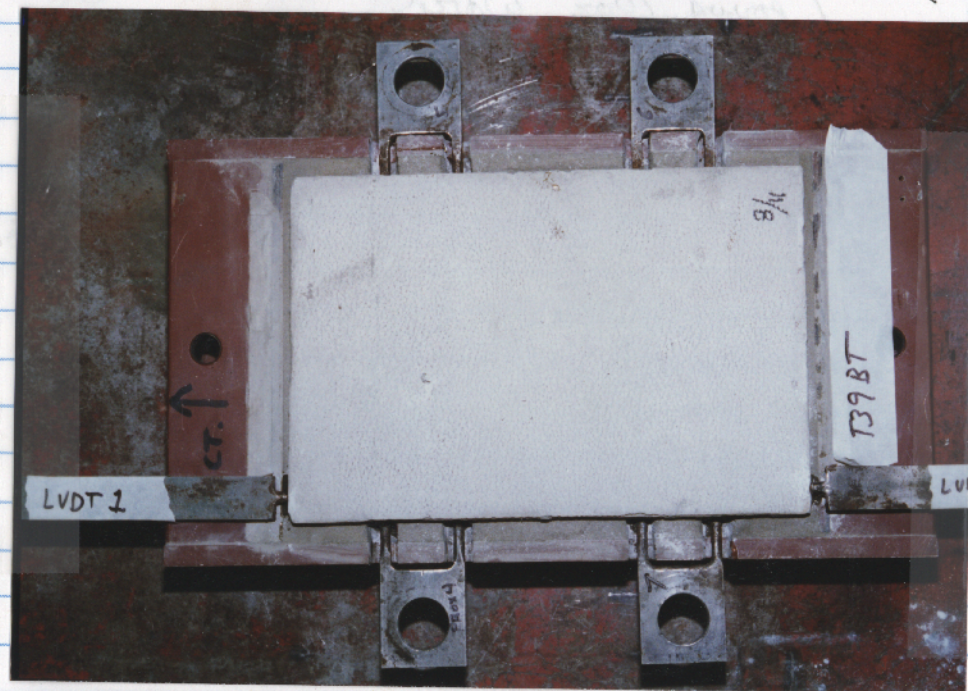
8/23/94

SPECIMENS WERE PLACED IN 105°C OVEN FOR 24 HRS.





8/25/94 RAN PROFILE T39PBBBT.DAT A  
 8/29/94 RAN PROFILE T39PTBBT.DAT A INSTRUCTIONS BOTTOM  
 BLOCK RAN PROFILE T39P A 8/29/94  
 8/30/94 INSTRUMENTED TOP BLOCK ILLUSTRATION BELOW A



AP 1003

8/30/94 RAN TEST T39START.DAT. RAN TEST T39US1-5.DAT.  
 (5 FILES). LOAD VERTICAL LOAD TO 494T#, HOLD FOR  
 15 SEC. RETURN TO ZERO. LOAD + UNLOAD TIME WAS  
 68 SEC. RAN TEST T39CND1.DAT. LOAD TO 920T#  
 VERTICAL. MOVE 2"/20MIN FORWARD AND BACK,  
 RELEASE NORMAL LOAD. RAN TEST T39CND2.DAT.  
 SAME AS ABOVE WITH NORMAL LOAD AT 2 MP. A  
 8/31/94 ASSEMBLED APPARATUS. BOTTOM SPECIMEN DISPLAYS CRACK  
 IN THE MIDDLE OF THE SPECIMEN SEE PHOTO.  
 9/4/94 RAN PROFILE T39PBBAT.DAT. A  
 RAN PROFILE T39PTBAT.DAT. A



CRACK IN BOTTOM ROCK

AP 1003



## T40 SERIES

8/30/84

SCHMIDT HAMMER READINGS ON ARTIFICIAL SPEC  
POURED ON 11/15/83.

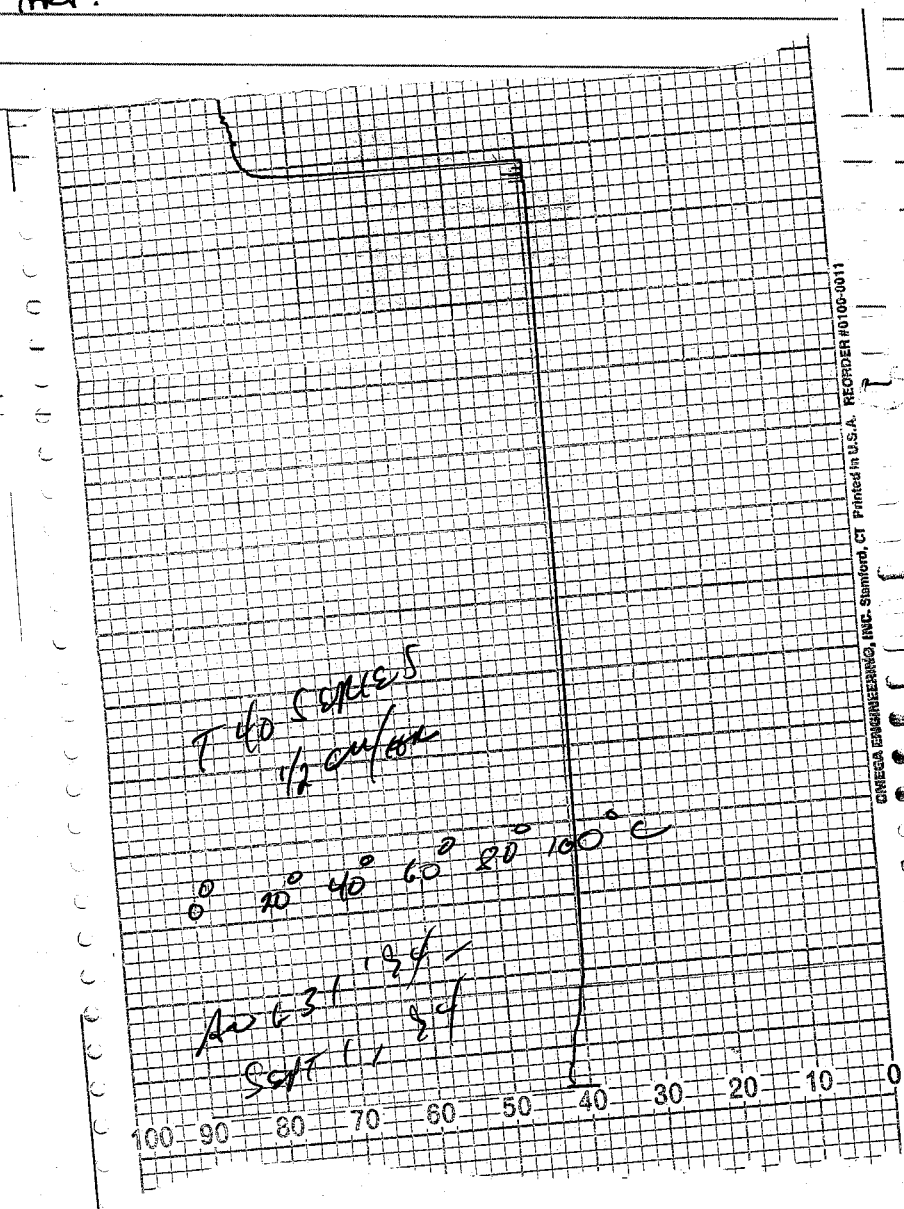
BOTTOM BLOCK SIDES				JOINT SURFACE			
1	23	9	24	1	19	9	22
2	24	10	25	2	25	10	25
3	24	11	23	3	22	11	18
4	23	12	21	4	16	12	23
5	23	13	27	5	16		
6	25	14	23	6	24		
7	27	15	23	7	23		
8	23	16	28	8	16		

TOP BLOCK SIDES				JOINT SURFACE			
1	21	9	26	1	15	9	14
2	26	10	25	2	23	10	23
3	22	11	17	3	23	11	19
4	23	12	24	4	16	12	16
5	21	13	22	5	17		
6	27	14	25	6	22		
7	25	15	27	7	21		
8	26	16	20	8	20		

TILT ANGLES IN BOTH DIRECTIONS WERE  $41^\circ$ . TOP BLOCK NET  
WEIGHT WAS 17.1 #.

8/31/84

GRAVITY TOP & BOTTOM SPECIMENS USING RECIPE LISTED  
ON PAGE 39. SPECIMENS WERE Poured IN OVEN AT  $\approx 105^\circ\text{C}$   
FOR 24 HRS.





9/6/54

RAW PROFILE T.40 PTBBT. DAT

MAX X = 7964

MAX Y = 7991

X OFF = 3719

Y OFF = 1543

INDEX = 1

RAW PROFILE T40 PBBBT. DAT

MAX X = 11959

MAX Y = 8016

X OFF = 3741

Y OFF = 1476

INDEX = 1

9/7/54

INSTRUMENTED SPECIMENS AS ILLUSTRATED ON PAGE 40.

ASSEMBLED APPARATUS. COMPUTER CHANNELS WERE AS FOLLOWS:

0	VLC 1	10000 #/V
1	VLC 2	10000 #/V
2	VLC 3	10000 #/V
3	TVL	10000 #/V
4	HOW LD.	5000 #/V
5	LVDT 1	0.20" / V
6	LVDT 2	0.20" / V
7	PROX 4	105 mils / V
8	PROX 5	92 mils / V
9	PROX 6	107 mils / V
10	PROX 7	110 mils / V
11	APR DISP	0.40" / V

RAW TEST T40 START. DAT. TOOK DATA WHILE ACTIVATING  
HYDRAULICS. RAW TESTS T40 NS1-5. DAT (5 FILES)

SEE T39 NS SERIES FOR PARAMETERS.

*APPROVED*

9/7/94

RAN TEST T40CND1.DAT. Parameters were:  
 SPAN 2" TOWARD ACTUATOR OVER 20 MINUTES WITH  
 605# LOAD FRAME WEIGHT ONLY. SPAN 2"  
 BACK TO "0" POSITION.

\* NOTE ON CHANNEL 11: THE WRONG CALIBRATION  
 VALUE WAS ENTERED. CALIBRATION VALUE  $\frac{5}{8}$  0.20"

Factor was corrected for succeeding tests.

RAN TEST T40CND2.DAT NORMAL LOAD WAS 0.5 MPa  
 AGAIN THE HORIZ DISP. HAD WRONG CR VALUE. VALUE  
 WAS CHANGED FOR FOLLOWING TESTS.

RAN TEST T40CND3.DAT CR VALUE FOR HORIZ  
 DISP WAS CHANGED TO 0.20" / VOLT. NORMAL LOAD  
 WAS 1 MPa. RAN TEST T40CND4.DAT. NORMAL LOAD WAS  
 1.5 MPa. RAN TEST T40CND5.DAT. NORMAL LOAD  
 WAS 2 MPa.

9/8/94

RAN PROFILE T40PTBAT.DAT

9/9/94

RAN PROFILE T40PBBAT.DAT

See Pages

## T41 SERIES TESTING

9/7/94

SCHMIDT HAMMER READINGS ON SAMPLE MOUNTED  
 ON 11/17/93:

BOTTOM BLOCK (SIDES)				(JOINT SURFACE)	
1	24	9	21	1	21
2	31	10	24	2	21
3	24	11	27	3	23
4	27	12	17	4	20
5	24	13	24	5	19
6	23	14	25	6	23
7	26	15	26	7	17
8	24	16	20	8	20

TOP BLOCK (SIDES)				(JOINT SURFACE)	
1	27	9	20	1	19
2	24	10	24	2	24
3	26	11	23	3	20
4	18	12	24	4	21
5	24	13	22	5	22
6	24	14	30	6	23
7	23	15	28	7	21
8	24	16	16	8	22

TILT ANGLE = 44° IN BOTH DIRECTIONS

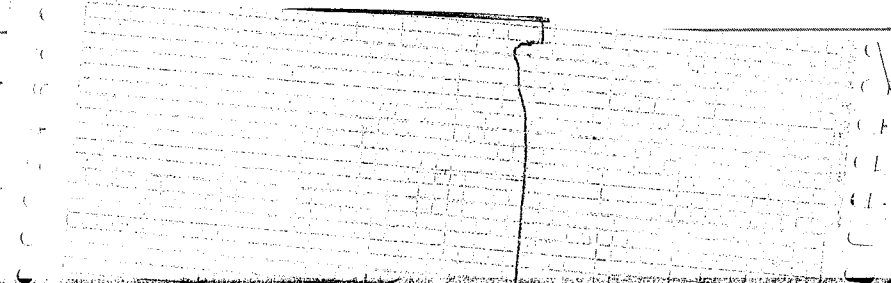
TOP BLOCK NET WEIGHT WAS 16.8#.

GROUT SPECIMENS USING RECIPE LISTED ON PAGE 39

PRECO SPECIMENS IN 105°C OVEN FOR 24 HRS.

RAN PROFILES T41PBBT.DAT & T41PTBBT.DAT

9/10/94



M. P. [Signature]

SCHMIDT HAMMERSH REPAIRS ON SAMPLE POURS  
ON 11/17/93:

(JOINT SURFACE)

8. 22

10 22

11

12

100

.....

$$UR = O(\epsilon)$$

8 17

10 23

9/7/94 - 9/8/94

74152258

0 10 20 30 40 50 60 70 80 90 100

10/94

2KE 32

*[Handwritten signature]*

MP

9/13/84

T41PBBBT.DAT

MAX X = 11859

MAX Y = 7850

X OFF = 3777

Y OFF = 1694

INDEX = 1

T41PTRBT.DAT

MAX X = 8053

MAX Y = 7882

X OFF = 3733

Y OFF = 1645

INDEX = 1

9/14/84

INSTRUMENTED SPECIMENS AS ILLUSTRATED ON PAGE 40.

ASSEMBLED APPARATUS. RUN TESTS T41INS1-5.DAT (5 FILES)

PARAMETERS WERE AS LISTED ON PAGE 41. RUN TEST

T41CND1.DAT, T41CND2.DAT, T41CND3.DAT + T41CND4.DAT

9/15/84

RUN PROFILE T41PTRBT.DAT

9/16/84

RUN PROFILE T41PBBBT.DAT

9/21/84

TEST PARAMETERS FOR T41 SERIES.

CND1 = 0.5 mpa

CND2 = 1 mpa

CND3 = 1.5 mpa

CND4 = 2 mpa

H. P. W.

T42 SERIES

9/14/84

SCHNOT HAMMER TEST. SPECIMENS POUNDED ON 9/12/84

BOTTOM BLOCK SIDES

1	21	9	19
2	22	10	18
3	22	11	19
4	24	12	22
5	28	13	17
6	24	14	21
7	26	15	25
8	23	16	28

JOINT SURFACES

1	16	9	24
2	23	10	22
3	18	11	19
4	12	12	20
5	21		
6	23		
7	19		
8	20		

TOP BLOCK SIDES

1	24	9	24
2	27	10	23
3	24	11	26
4	20	12	21
5	22	13	20
6	23	14	24
7	20	15	28
8	18	16	21

JOINT SURFACES

1	19	9	15
2	23	10	17
3	20	11	22
4	20	12	15
5	22		
6	24		
7	23		
8	22		

TOP BLOCK NET WEIGHT WAS 16.5#

TILT ANGLE = 42° BOTH DIRECTIONS

9/18/84

T42PBBBT.DAT

MAX X 12006

MAX Y 7980

X OFF 3765

Y OFF 1549

INDEX 1

T42PTRBT.DAT

MAX X 8001

MAX Y 7964

X OFF 3878

Y OFF 1594

INDEX 1

New references



9/20/94

INSTRUMENTED SPECIMENS ARE ILLUSTRATED ON PAGE 40.  
ASSEMBLED APPARATUS.

9/21/94

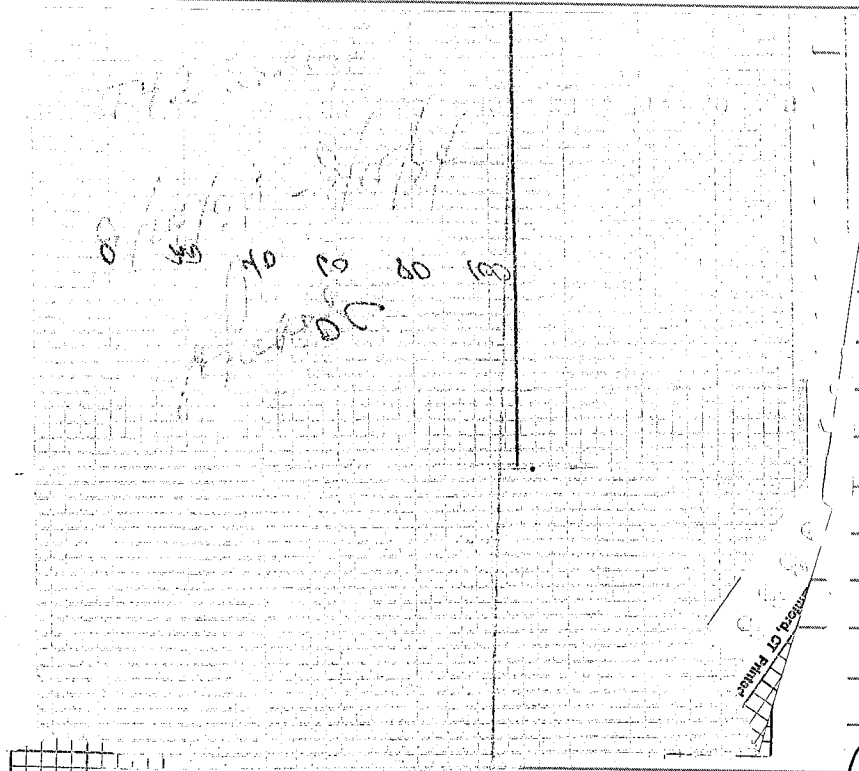
RAN TEST T42NS1-5.DAT (5 FILES). PARAMETERS WERE AS LISTED ON PAGE 41 (T39 SERIES). RAN TEST T42CND1.DAT. PARAMETERS WERE SHEAR TOP ROCK 2" OVER 20 MIN TOWARD ACTUATOR, HOLD 1 MIN. SHEAR BACK TO "Ø" ZERO POSITION, (2"/20 MIN), WITH LOAD FRAME WEIGHT ONLY. THIS TEST WAS RUN BUT THE DATA WAS LOST DUE TO COMPUTER ERROR. THE TEST WAS RERUN. RAN TEST T42CND2.DAT. PARAMETERS WERE THE SAME AS "CND1" ABOVE WITH 1/2 MPa VERTICAL LOAD. LOADING TIME IS 1 MPa/min.

RAN TEST T42CND3.DAT. PARAMETERS WERE THE SAME AS ABOVE WITH 1 MPa NORMAL LOAD.

9/22/94

RAN TEST T42CND4.DAT NORMAL LOAD WAS 1.5 MPa.

RAN TEST T42CND5.DAT NORMAL LOAD WAS 2.0 MPa. FOLLOWING IS THE RECORD OF CURING THE SPECIMENS BEFORE TESTING.



APR 95

9/20/94 INSTRUMENTED SPECIMENS ARE ILLUSTRATED ON PAGE 40.  
ASSEMBLED APPARATUS.

9/21/94 DAN TEST T42NS1-5.DAT (5 FILES). PARAMETERS WERE

AS LISTED

T4

ROCK

SITE

LOST

TME

TEST

WAVE

NEW

DAN

SA

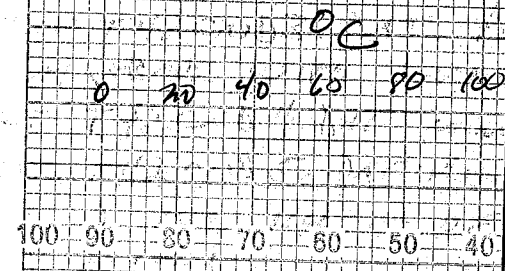
DAN

NEW

FOUR

BET

9/22/94



T42 SERIES

9/14/94 - 9/15/94

ASSEMBLED

DAN TEST

IN TOP

HOLD (MIN.)

IN), WITH

RUN BUT

TME

PARAMETERS

1/2 mpa

MIN.

TME

1/2 mpa

MIN.

TME

1/2 mpa

MIN.

TME

1/2 mpa

MIN.

TME

1/2 mpa

MIN.

TME

1/2 mpa

MIN.

TME

1/2 mpa

MIN.

TME

1/2 mpa

MIN.

TME

1/2 mpa

MIN.

TME

Pages 1 through 48 of this Scientific Notebook were reviewed for compliance with QAP-001 in response to Corrective Action Request 94-02. Corrections and clarifications were made as appropriate. In some cases, the date of a change will reflect the date of this review rather than the date of the original Scientific Notebook entry.

Randolph W. Tolk

SWRI-QA

11/04/94

I have reviewed this Scientific Notebook and find it in compliance with QAP-001

Manager, RDCO  
2/13/97

ASSEMBLED