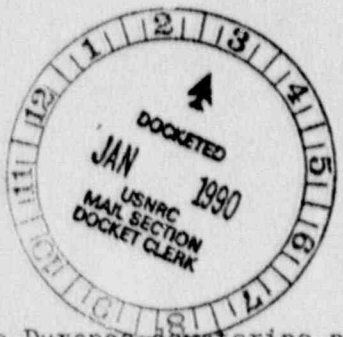
WM-48

Department of Energy
Albuquerque Operations Office
P.O. Box 5400
Albuquerque, New Mexico 87115

RETURN ORIGINAL TO PDR, HQ.

JAN 18 1990



Mr. Edward Hawkins, Chief
U.S. Nuclear Regulatory Commission
Region IV
Uranium Recovery Field Office
P.O. Box 25325
Denver, CO 80225

Dear Mr. Hawkins:

Enclosed for your information is the Durango dewatering project drawdown measured at all available wells on the disposal cell during November-December 1989, and through January 2, 1990. Also included are test results on the clay liner and 1987 vicinity property winter cover samples.

If you have any questions please call Elizabeth Damler of my staff at (505) 845-5654.

Sincerely,

Frank H. Bastian
for

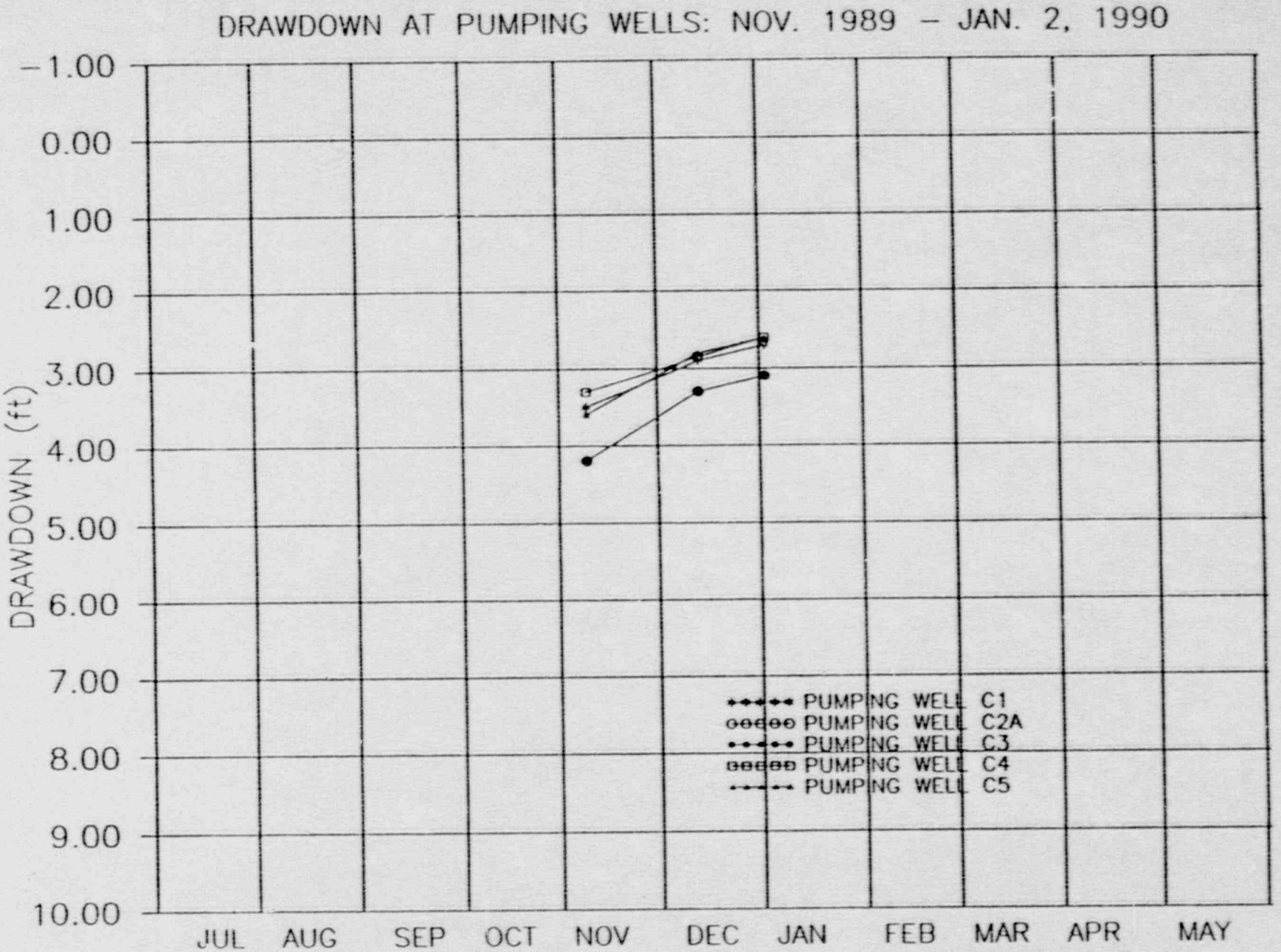
Mark L. Matthews
Acting Project Manager
Uranium Mill Tailings Project Office

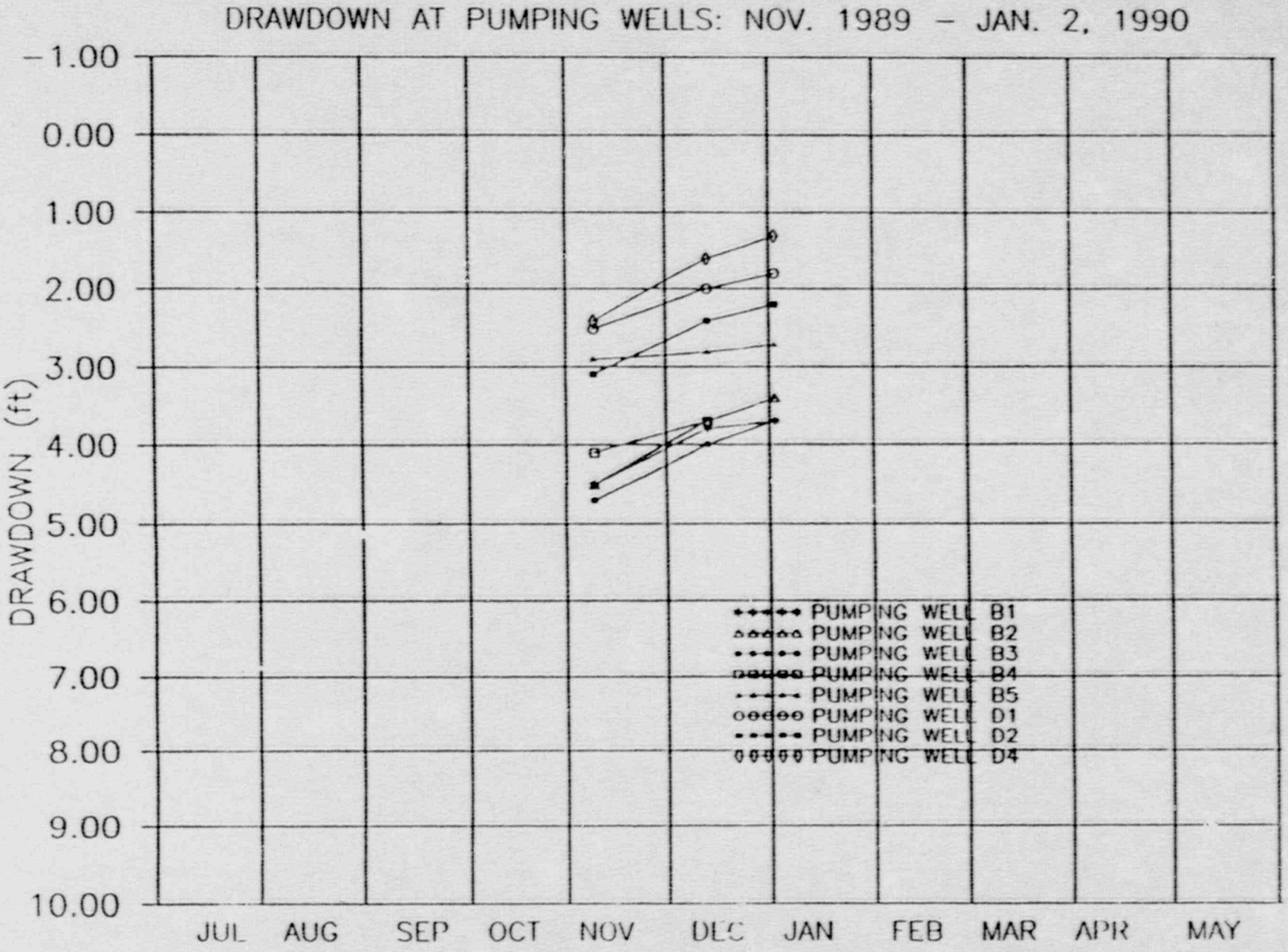
Enclosure

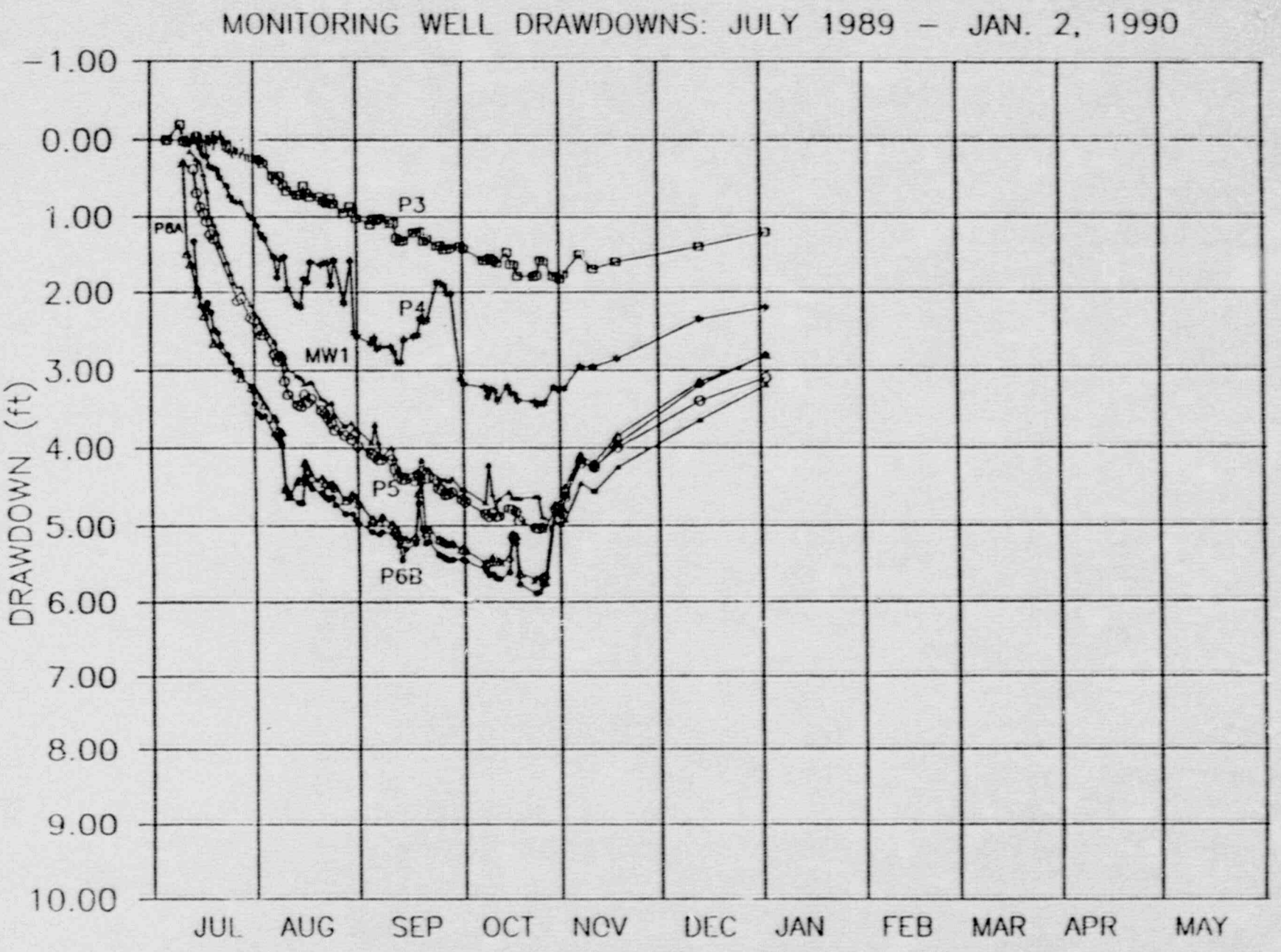
cc:
D. Gillen, NRC
C. Watson, UMTRA

D102
1/1

90-0227


DRAWDOWN AT PUMPING WELLS: NOV. 1989 – JAN. 2, 1990
DRAWDOWN (ft)
-1.00
0.00
1.00
2.00
3.00
4.00
5.00
6.00
7.00
8.00
9.00
10.00
JUL
AUG
SEP
OCT
NOV
DEC
JAN
FEB
MAR
APR
MAY
PUMPING WELL C1
PUMPING WELL C2A
PUMPING WELL C3
PUMPING WELL C4
PUMPING WELL C5


DRAWDOWN AT PUMPING WELLS: NOV. 1989 – JAN. 2, 1990
DRAWDOWN (ft)
-1.00
0.00
1.00
2.00
3.00
4.00
5.00
6.00
7.00
8.00
9.00
10.00
JUL
AUG
SEP
OCT
NOV
DEC
JAN
FEB
MAR
APR
MAY
PUMPING WELL B1
PUMPING WELL B2
PUMPING WELL B3
PUMPING WELL B4
PUMPING WELL B5
PUMPING WELL D1
PUMPING WELL D2
PUMPING WELL D4


MONITORING WELL DRAWDOWNS: JULY 1989 – JAN. 2, 1990
DRAWDOWN (ft)
-1.00
0.00
1.00
2.00
3.00
4.00
5.00
6.00
7.00
8.00
9.00
10.00
JUL
AUG
SEP
OCT
NOV
DEC
JAN
FEB
MAR
APR
MAY
P3
P4
P5
P6A
P6B
MW1

Lambert and Associates

mlw

CONSULTING GEOTECHNICAL ENGINEERS AND MATERIAL TESTING

TEST RESULTS

MKE DOC. 4005-DUR-R-09-03913-00

PROJECT Durango Testing: MK-191 PROJECT NO. D89004MT DATE

LOCATION Durango, CO SOURCE

SAMPLE NO. SPECIFICATION

PO#3050-511-9515

DURANGO UNTRA
D89004MT

SAMPLE I.D.	MK NUMBER	LABORATORY NUMBER	MOISTURE CONTENT	DRY DENSITY	SPECIFIC GRAVITY
VP-1	191	9439A	15.2	112.2	2.756
L-1	192	9439B	21.4	107.8	2.711
L-2	193	9439C	21.7	116.4	2.669
L-3	194	9439D	21.8	115.0	2.682
L-4 @ 0.3-0.6	195	9439E	19.1	104.6*	2.702
L-4 @ 0.6-0.9	196	9439F	19.1	110.2	2.701
L-4 @ 0.9-1.3	197	9439G	19.7	114.4	2.712
L-4 @ 1.3-1.8	198	9439H	21.2	108.7	2.707

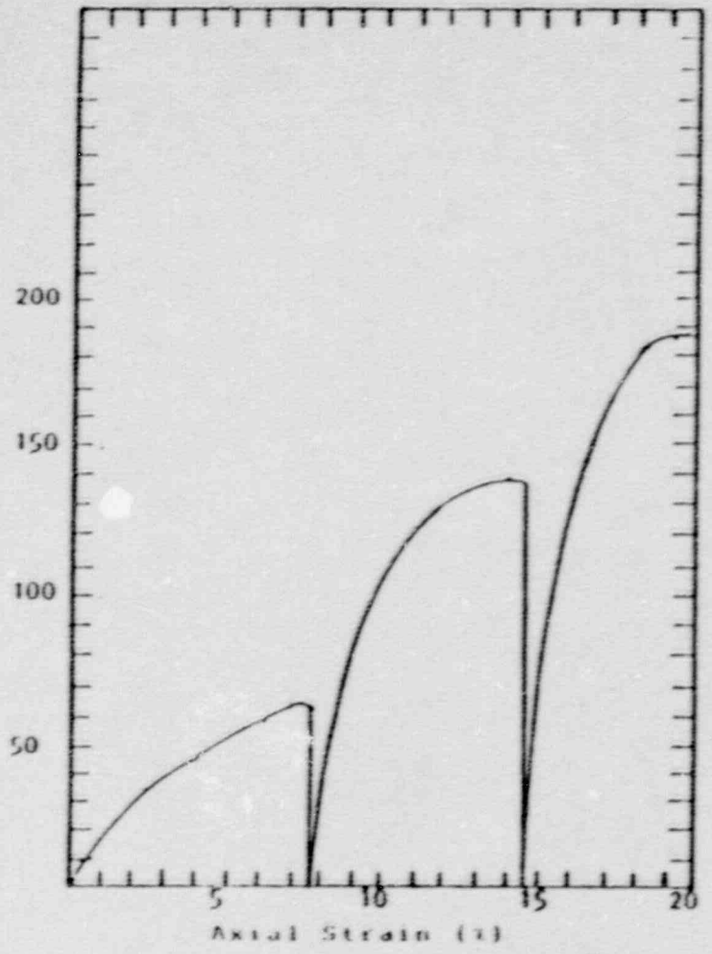
* Sample may have had some disturbance during sampling

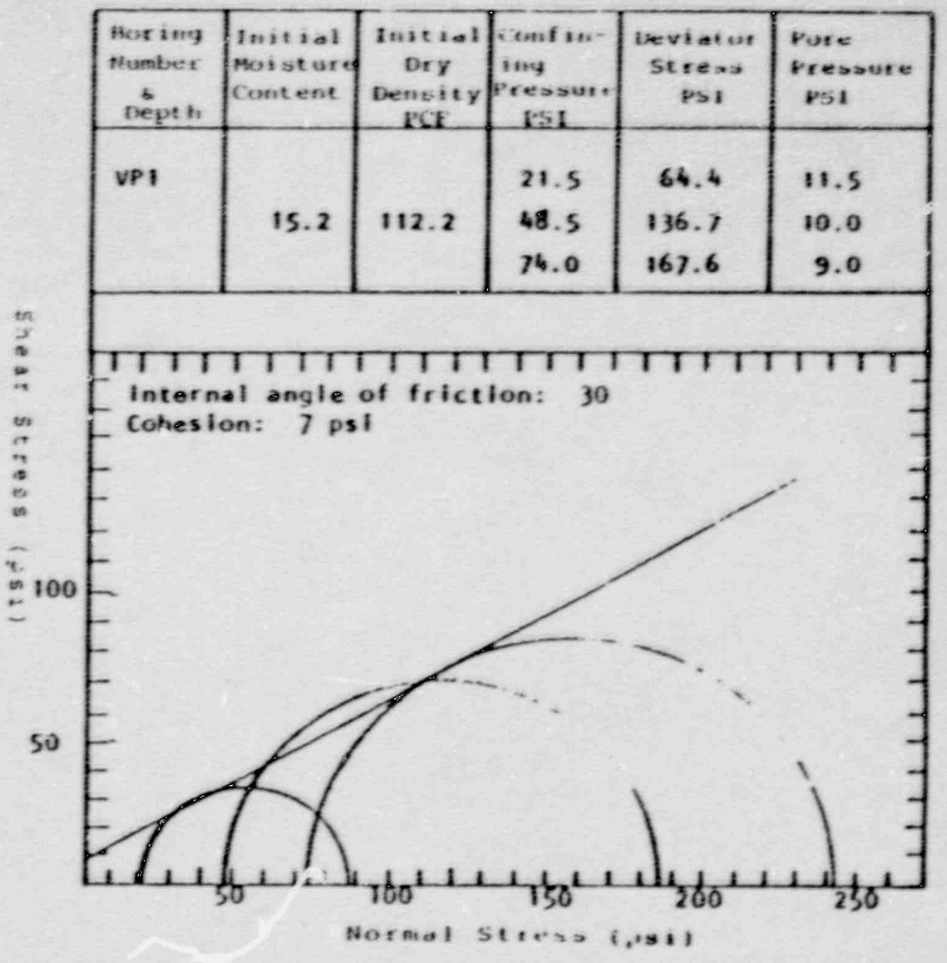
RECEIVED-MKE

UMTRA-S.F.

Lambert and Associates

Boring Number & Depth	Initial Moisture Content	Initial Dry Density PCF	Confining Pressure PSI	Deviator Stress PSI	Pore Pressure PSI
VP1	15.2	112.2	21.5	64.4	11.5
			48.5	136.7	10.0
			74.0	167.6	9.0





Sample Description: Clay, sandy, MK191

Type of Test: Staged, unconsolidated undrained

TRIAXIAL COMPRESSION TEST

Laboratory Sample Number: 3447

PO#3050-511-9515

Project No. 8305041

Date:

Lambert and Associates

CONSULTING GEOTECHNICAL ENGINEERS AND MATERIAL TESTING

TEST RESULTS

PROJECT Durango Testing: MK-191 PROJECT NO. D89004MT DATE 12-18-89

LOCATION Durango SOURCE VPI

SAMPLE NO. 3447 SPECIFICATION

PO#2050-511-9515

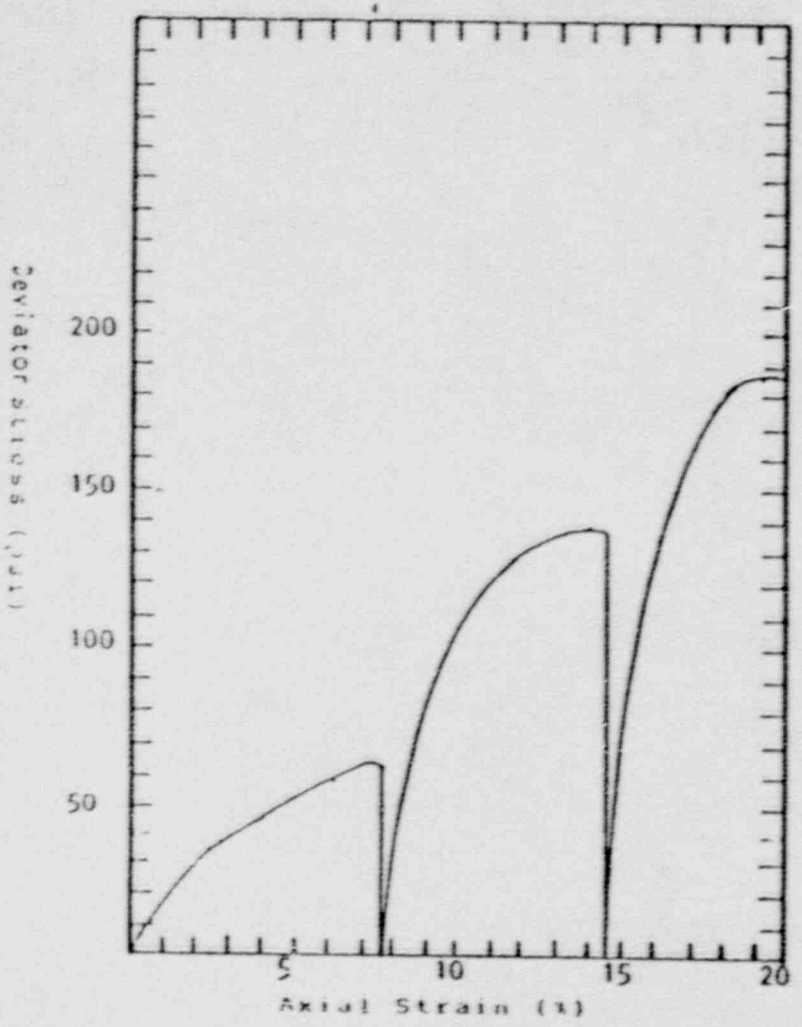
PERMEABILITY TEST RESULTS

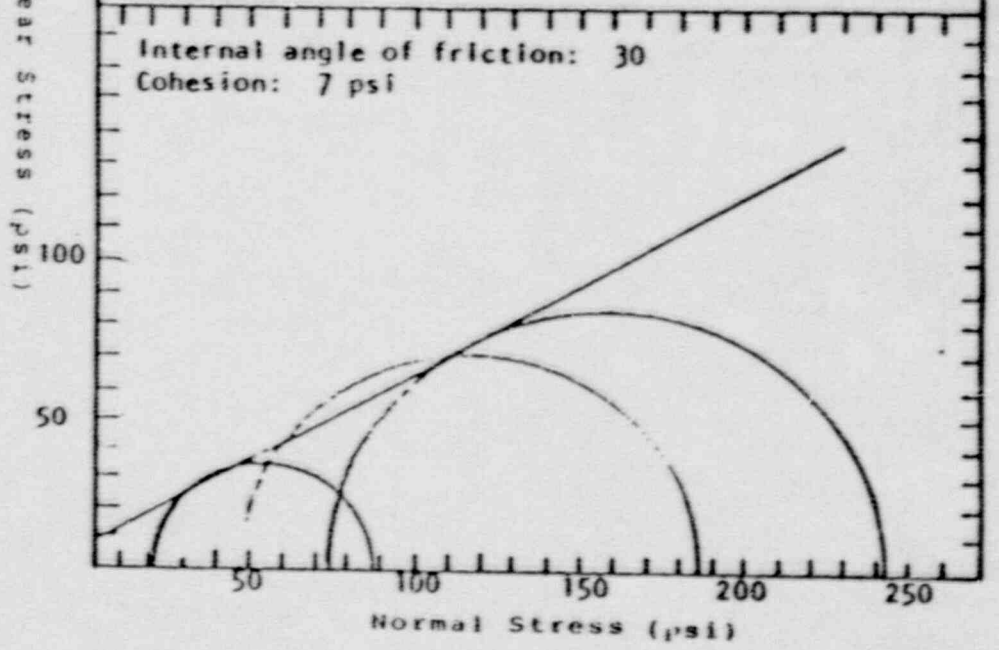
$K = 2.6 \times 10^{-8}$ cm/sec

SPECIFIC GRAVITY TEST

Specific gravity = 2.756

Boring Number & Depth	Initial Moisture Content	Initial Dry Density PCF	Confining Pressure PSI	Deviator Stress PSI	Pore Pressure PSI
VP1	15.2	112.2	21.5	64.4	11.5
			48.5	136.7	10.0
			74.0	167.6	9.0





Sample Description: Clay, sandy, MK191

Type of Test: Staged, unconcolidated undrained

Laboratory Sample Number: 3447

TRIAXIAL COMPRESSION TEST

CARBERE AND ASSOCIATES

MK Ferguson Company

TRIAXIAL COMPRESSION TEST

Job name (Typed) [illegible] Job number W.O. 1011 Technician Johnston Date 10 Dec 81

Sample Number 2447

HOLE NUMBER VP 1

DEPTH (ft.) 2 * Sleeve

LENGTH (in.) 3.635 DIAMETER (in.) 2.405

VOLUME (cc.) 8.53 cc 4.5

WET WEIGHT (gm) 255.0

WET DENSITY (lbs./cu. ft.) 129.3

DRY DENSITY (lbs./cu. ft.) 112.2

Classification Sample 1262.3

Sleeve wt = 276.5 gm

DRY DENSITY 112.2

MOISTURE CONTENT 15.2

DISH NUMBER 02

WET WEIGHT + TARE (gm) 577.0

DRY WEIGHT + TARE (gm) 498.5

WEIGHT OF WATER (gm)

TARE (gm) 81.0

WEIGHT OF SOIL (gm)

MOISTURE CONTENT (%)

SAMPLE DESCRIPTION

SKETCH OF FAILURE

(a) Time (min)	(b) Dial reading	(c) Deflection	① Strain %	② Corrected area (in²)	③ Proving ring reading	④ Load (lbs.)	⑤ Deviator stress $\sigma_1-\sigma_3$ = ② ÷ ④ (psi)	⑥ Axial stress σ_1	⑦ Cell pressure σ_3	⑧ Pore pressure μ	⑨ Effective cell pressure $\sigma_3'=\sigma_3-\mu$	⑩ Effective axial stress $\sigma_1'=\sigma_1-\mu$	Principal stress ratio σ_1'/σ_3'
					0				33.0	8.0	25		
0													
			.3	4.933	76	37.26	7.57	40.57	33.0	8.0	25	32.57	1.301
			.6	4.948	92	43.35	8.77	41.77	33.0	8.0	25	33.77	1.351
3			.8	4.951	104	48.54	10.397	43.397	33.0	8.25	24.75	35.25	1.424
			1.1	4.958	143	66.42	14.124	47.124	33.0	8.25	24.75	38.87	1.575
			1.4	4.966	215	99.58	20.07	53.07	33.0	8.25	24.75	45.32	1.847
			1.7	4.979	262	121.0	25.38	58.38	33.0	8.5	24.5	49.88	2.035
			1.9	4.982	299	138.24	28.673	61.7	33.0	8.0	25.0	52.7	2.096
			2.2	4.995	338	156.49	31.32	64.32	33.0	8.0	25.0	55.32	2.205
			.5	4.998	351	162.74	33.45	66.45	33.0	8.25	24.75	57.15	2.292
			2.8	5.002	380	176.29	35.26	68.26	33.0	8.5	24.5	59.76	2.430
			3.0	5.005	406	188.25	38.26	71.26	33.0	8.5	24.5	61.76	2.528
			3.3	4.998	433	200.83	40.064	73.064	33.0	10.0	23.0	63.064	2.769
			3.6	5.012	438	203.75	40.82	73.82	33.0	10.0	23.0	63.82	2.762
			3.9	5.025	481	224.71	41.80	74.80	33.0	10.5	22.5	64.30	2.991
			4.1	5.030	505	235.89	46.07	79.07	33.0	10.5	22.5	68.57	3.083
			4.4	5.043	526	245.68	48.67	81.67	33.0	10.5	22.5	71.17	3.162
			4.7	5.057	544	254.09	50.29	83.29	33.0	10.5	22.5	72.79	3.249
			5.0	5.070	571	266.66	52.59	85.59	33.0	11.0	22.0	74.59	3.391
			5.2	5.077	594	277.38	54.618	87.618	33.0	11.0	22.0	76.618	3.483
			5.5	5.091	613	286.24	56.24	89.24	33.0	11.0	22.0	78.24	3.556
			5.8	5.104	632	295.09	57.82	90.82	33.0	11.0	22.0	79.82	3.628
			6.1	5.118	650	303.45	59.43	92.43	33.0	11.5	21.5	80.93	3.764
			6.3	5.131	676	315.61	61.05	94.05	33.0	11.5	21.5	82.55	3.839
			6.6	5.145	697	325.19	62.23	95.23	33.0	11.5	21.5	83.73	3.893
			6.9	5.159	718	334.98	63.41	96.41	33.0	11.5	21.5	84.91	3.946
			7.2	5.173	738	344.28	64.15	97.22	33.0	11.5	21.5	85.72	3.987
			7.4	5.187	738	344.28	64.03	97.03	33.0	11.5	21.5	85.53	3.976
270					0	0			33.0	8.0	25.0		

(a) Time readings inclusive.

(b) Dial difference = reading ring

(c) Ring pressure = Cell pressure

DATA PRESENTATION:

Effective: 1) Stress/strain curve (6)(9) 2) Mohr's circle (9)(10)

Ultimate: 1) Stress/strain (6)(5) 2) Mohr's circle (6)(8)

Rubber Tool

W.O. AF 2

Tare wt = 65.5

Tare + soil wt = 55.5

Tare + soil + H2O = 49.9

H2O = 38.1

MC = 15.2

Sample Numbe 447

CARBEE AND ASSOCIATES

TRIAXIAL COMPRESSION TEST

JOB NAME MK 191 JOB NUMBER L-9004-MT TECHNICIAN Johnston DATE 11 Dec 89

Φ	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	Principal stress ratio
TIME ELAPSED (min.)	STRAIN (in./in.)	% STRAIN	STRAIN %	CORRECTED AREA (in.²)	PROVING RING READING # /1000	LOAD (LB.)	DEVIATOR STRESS $\sigma_1 - \sigma_3$ (psi)	AXIAL STRESS σ_1	CELL PRESSURE σ_3	PORE PRESSURE u	EFFECTIVE CELL PRESSURE $\sigma_3' = \sigma_3 - u$	EFFECTIVE AXIAL STRESS $\sigma_1' = \sigma_1 - u$	σ_1'/σ_3'
1)	—	—	7.4	—	0	0	—	—	58.5	8.5	50	—	—
			7.7	4.3	395	174.19	35.44	93.94	58.5	8.5	50	85.44	1.709
			8.0	4.527	611	267.97	54.77	113.27	58.5	8.5	50	104.77	2.095
2			8.3	4.953	780	341.	68.82	127.28	58.5	8.5	50	118.88	2.378
4			8.6	4.968	900	393.05	79.12	137.62	58.5	8.75	49.25	128.87	2.620
6			8.8	4.983	995	434.17	87.12	145.64	58.5	9.0	49.5	136.64	2.760
			9.1	4.998	1058	461.4	92.53	150.93	58.5	9.0	49.5	141.93	2.865
10			9.4	5.013	1075	550.88	109.81	169.39	58.5	9.0	49.5	159.39	3.222
12			9.7	5.028	1081	558.07	111.18	169.68	58.5	9.0	49.5	160.68	3.246
			9.9	5.043	1092	574.68	113.82	172.32	58.5	9.5	49.0	162.82	3.323
			10.2	5.058	1207	591.26	117.52	176.02	58.5	9.5	49.0	166.52	3.398
8			10.5	5.073	1220	612.3	120.66	179.16	58.5	9.5	49.0	169.66	3.462
			10.8	5.088	1222	623.22	122.43	180.93	58.5	9.5	49.0	171.43	3.498
16			11.03	5.104	1235	632.78	123.92	182.412	58.5	9.5	49.0	172.92	3.528
			11.3	5.122	1242	642.33	125.40	183.90	58.5	9.5	49.0	174.40	3.559
			11.6	5.138	1251	654.62	127.40	185.90	58.5	9.5	49.0	176.90	3.600
			11.8	5.154	1258	664.17	128.86	187.36	58.5	10.0	48.5	177.36	3.657
			12.1	5.170	1264	672.24	130.04	188.54	58.5	10.0	48.5	178.54	3.681
			12.40	5.187	1270	680.55	131.21	189.71	58.5	10.0	48.5	179.7	3.703
			12.7	5.203	1277	690.11	132.64	191.14	58.5	10.0	48.5	181.14	3735
			13.0	5.219	1282	696.93	133.32	192.02	58.5	10.0	48.5	182.02	3.753
			13.2	5.236	1287	703.76	134.40	192.90	58.5	10.0	48.5	182.90	3.771
			13.5	5.253	1292	710.28	135.28	193.78	58.5	10.0	48.5	183.78	3.789
			13.8	5.270	1297	717.41	136.14	194.64	58.5	10.0	48.5	184.64	3.807
			14.1	5.287	1301	722.87	136.79	195.29	58.5	10.0	48.5	185.29	3.819
			14.3	5.304	1301	722.87	136.13	194.63	58.5	10.0	48.5	184.63	3.810
			14.6	5.321	1301	722.87	135.46	194.26	58.5	10.0	48.5	184.26	3.801

(1) READINGS INCLUDE:
- elapsed time
- proving ring

deviator stress = axial stress − cell pressure

pore pressure

cell pressure

DATA PRESENTATION:

Effective: 1) Stress/strain curve (4)(5) 2) Mohr's circle (4)(6)

Ultimate: 1) Stress/strain (5)(8) 2) Mohr's circle (8)(9)

POLE NUMBER VP1

DEPTH (ft.) _____

LENGTH (in.) _____ DIAMETER (in.) _____

VOLUME (ft.³) _____

WET WEIGHT (gm) _____

WET DENSITY (lb./ft.³) _____

DRY DENSITY (lb./ft.³) _____

BEFORE TEST

DRY DENSITY _____

MOISTURE CONTENT _____

AFTER TEST

DISH NUMBER _____

WET WEIGHT + TARE (gm) _____

DRY WEIGHT + TARE (gm) _____

WEIGHT OF WATER (gm) _____

TARE (gm) _____

WEIGHT OF SOIL (gm) _____

MOISTURE CONTENT (%) _____

SAMPLE DESCRIPTION _____

SKETCH OF FAILURE

[illegible]

LAWRENCE AND ASSOCIATES

Page 3
Sample # 3417

HOLE NUMBER VP 1
DEPTH (ft.) _____
LENGTH (in.) _____ DIAMETER (in.) _____
VOLUME (ft.³) _____
WET WEIGHT (gm) _____
WET DENSITY (lb./ft.³) _____
DRY DENSITY (lb./ft.³) _____

BEFORE TEST
DRY DENSITY _____
MOISTURE CONTENT _____

AFTER TEST
DISH NUMBER _____
WET WEIGHT + TARE (gm) _____
DRY WEIGHT + TARE (gm) _____
WEIGHT OF WATER (gm) _____
TARE (gm) _____
WEIGHT OF SOIL (gm) _____
MOISTURE CONTENT (%) _____
SAMPLE DESCRIPTION _____

SKETCH OF FAILURE

TRIAXIAL COMPRESSION TEST

JOB NAME VIP 191 JOB NUMBER 89-00-1417 TECHNICIAN [illegible] DATE 15 Dec 89

① Time (min.)	② Strain (in./in.)	③ Strain (%)	④ Corrected Area (in.²)	⑤ Proving Ring Reading (.001 in.)	⑥ Load (lb.)	⑦ Deviator Stress $\sigma_1-\sigma_3$ = ⑥/④ (psi)	⑧ Axial Stress σ_1 (psi)	⑨ Cell Pressure σ_3 (psi)	⑩ Pore Pressure u (psi)	⑪ Effective Cell Pressure $\sigma_3'=\sigma_3-u$ (psi)	⑫ Effective Axial Stress $\sigma_1'=\sigma_1-u$ (psi)	Principal Stress Ratio σ_1'/σ_3'
				0	0			83.0	8.5	74.5		
		.19	5.328	17	240	44.96	127.96	83.0	9.0	74.0	118.96	1.608
		.32	5.355	27	400	74.69	157.69	83.0	9.0	74.0	148.69	2.009
		.47	5.373	36	540	100.51	183.51	83.0	9.0	74.0	174.51	2.358
		.57	5.390	43	630	116.88	199.88	83.0	9.0	74.0	190.88	2.579
		.60	5.408	49	720	133.13	216.13	83.0	9.0	74.0	207.13	2.799
		.63	5.426	54	780	143.76	226.76	83.0	9.0	74.0	217.76	2.943
		.66	5.444	57	820	150.68	233.68	83.0	9.0	74.0	224.63	3.036
		.68	5.462	58	840	153.79	236.79	83.0	9.0	74.0	227.79	3.078
		.71	5.480	60	860	156.92	239.92	83.0	9.0	74.0	230.93	3.121
		.74	5.498	61	880	160.05	243.05	83.0	9.0	74.0	234.05	3.163
		.77	5.517	62	890	161.33	244.33	83.0	9.0	74.0	235.33	3.180
				62	890			83.0	9.0	74.0		
10		.82	5.554	63	910	162.05	245.05	84.0	9.0	74.0	236.05	3.189
		.87	5.573	63½	910	162.29	276.79	83.0	9.0	74.0	237.29	3.207
		.92	5.592	64	920	164.53	247.53	83.0	9.0	74.0	238.53	3.223
		.97	5.611	64½	930	165.75	248.75	83.0	9.0	74.0	239.75	3.239
		2.02	5.629	65	940	166.97	249.97	83.0	9.0	74.0	240.92	3.256
		2.07	5.648	66	950	168.16	251.16	83.0	9.0	74.0	242.14	3.272
		2.12	5.668	66	950	167.58	250.58	83.0	9.0	74.0	241.59	3.265
		2.16	5.686	66	950	167.01	250.01	83.0	9.0	74.0	241.4	3.257
				66	950			83.0	9.0	74.0		
20		2.21	5.728	66	950	165.86	248.86	83.0	9.0	74.0	238.86	3.241

READINGS INTERVAL: [illegible]

Dial difference = Proving ring

Cell pressure = Pore pressure

DATA PRESENTATION:

Effective: 1) Stress/strain curve ⑦/③ 2) Mohr's circle ⑪ ⑫

Ultimate: 1) Stress/strain, ⑦/③ 2) Mohr's circle ⑨ ⑫