APPENDIX C

BORING GEOPHYSICAL LOGGING SYSTEMS - NIST TRACEABLE CALIBRATION PROCEDURES AND CALIBRATION RECORDS

CALIBRATION PROCEDURE FOR

GEOVision SEISMIC RECORDER/LOGGER

Reviewed 4/6/06

Objective

The timing/sampling accuracy of seismic recorders or data loggers is required for several GEOVision field procedures including Seismic Refraction, Downhole Seismic Velocity Logging, and P-S Suspension Logging. This procedure describes the method for measuring the timing accuracy of a seismic data logger, such as the OYO Model 170, OYO/Robertson Model 3403, Geometrics Strataview or Geometrics Geode. The objective of this procedure is to verify that the timing accuracy of the recorder is accurate to within 1%.

Frequency of Calibration

The calibration of each GEOVision seismic data logger is twelve (12) months. In the case of rented seismic data loggers, calibration must be performed prior to use.

Test Equipment Required

The following equipment is required. Item #2 must have current NIST traceable calibration.

1. Function generator, Krohn Hite 5400B or equivalent
2. Frequency counter, HP 5315A or equivalent
3. Test cables, from item 1 to item 2, and from item 1 to subject data logger.

Procedure

This procedure is designed to be performed using the accompanying Seismograph Calibration Data Sheet with the same revision number. All data must be entered and the procedure signed by the technician performing the test.

1. Record all identification data on the form provided.
2. Connect function generator to data logger (such as OYO Model 170) using test cable
3. Connect the function generator to the frequency counter using test cable.

4. Set up generator to produce a 100.0 Hz, 0.25 volt (amplitude is approximate, modify as necessary to yield less than full scale waveforms on logger display) peak square wave or sine wave. Verify frequency using the counter and initial space on the data sheet.

5. Initialize data logger and record a data record of at least 0.1 second using a 100 microsecond or less sample period.

6. Measure the recorded square wave frequency by measuring the duration of 9 cycles of data. This measurement can be made using the data logger display device, or by printing out a paper tape. If a paper tape can be printed, the resulting printout must be attached to this procedure. Record the data in the space provided.

7. Repeat steps 5 and 6 three more times using separate files.

Criteria

The duration for 9 cycles in any file must be 90.0 milliseconds plus or minus 0.9 milliseconds, corresponding to an average frequency for the nine cycles of 100.0 Hz plus or minus 1 Hz (obtained by dividing 9 cycles by the duration in milliseconds).

If the results are outside this range, the data logger must be marked with a GEOVision REJECT tag until it can be repaired and retested.

If results are acceptable affix label indicating the initials of the person performing the calibration, the date of calibration, and the due date for the next calibration (12 months).

Procedure Approval

Approved by:

John G. Diehl	President
Name	Title
	April 6, 2006
Signature	Date

Client Approval (if required):

Name	Title
Signature	Date

TEST NUMBER
501203

EDISON ESI

METROLOGY

Calibration Report

GEOVision Geophysical Services
1151 Pomona Road, Unit P
Corona, CA 92882
P.O. No.: 6162-060414-01

Manufacturer:	Oyo	**Calibration Date:**	04/21/2006
Model Number:	3403	**Calibration Due Date:**	04/21/2007
Description:	Unit, Suspension Telemetry	**Calibration Interval:**	12 Months
Asset Number:	160023	**Condition As Found:**	In Tolerance
Serial Number:	160023	**Condition As Left:**	In Tolerance

Remarks:
The UUT (unit under test) was calibrated using the customer's procedure. The UUT was operated by the customer's personnel and data collection was observed by SCE personnel. The UUT was found to be in tolerance to customer supplied specifications. The reference standards used are in compliance with ISO/IEC 17025:1999 and laboratory accreditation criteria established by NIST/NVLAP under the specific scope of accreditation for lab code 105014-0. Frequency is accredited.
Please see attached data.

Standards Utilized

I.D. No.	Mfg.	Model No.	Description	Cal. Date	Due Date
S1-01252	Hewlett Packard	5335A OPT 010,203040	Counter, Universal	12/09/2005	06/09/2006
S1-03355	Hewlett Packard	3325B OPT 001, 002	Generator, Function, Synthesizer	11/03/2005	11/03/2006
S1-03886	Fluke	910	Standard, Frequency, Controlled, Gps	01/16/2006	01/15/2007

Procedure: Customer
Temperature: 23° C
Humidity: 40% RH
Test No.: 501203

Calibration Performed By:			Quality Reviewer:
Branson, Craig A (Name)	Metrologist (Title)	714-895-0714 (Phone)	(Name) 04-21-06 (Date)

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4-21-06

GEOVision
geophysical services

SEISMOGRAPH CALIBRATION DATA SHEET REV 4/6/06

INSTRUMENT DATA

SYSTEM MFR:	OYO	MODEL NO.:	3403
SERIAL NO.:	160023	CALIBRATION DATE:	4/21/2006
BY:	ROBERT STELLER	DUE DATE:	4/21/2007
COUNTER MFR:	HEWLETT PACKARD	MODEL NO.:	5335A
SERIAL NO.:	2625A09881	CALIBRATION DATE:	12/9/2005
BY:	SCE #S1-01252	DUE DATE:	6/9/2006
FCTN GEN MFR:	HEWLETT PACKARD	MODEL NO.:	3325B
SERIAL NO.:	2847A14447	CALIBRATION DATE:	11/3/2005
BY:	SCE #S1-03355	DUE DATE:	11/3/2006

SYSTEM SETTINGS:

GAIN:	2
FILTER:	10 KHZ
RANGE:	100 MILLISEC, 100 MICROSECOND SAMPLE RATE
DELAY:	0
STACK: 1 (STD)	1
PULSE:	1.6
DISPLAY:	NA
SYSTEM: DATE = CORRECT DATE & TIME	4/21/2006, 11:07AM

PROCEDURE:

SET FREQUENCY TO 100.0HZ SQUAREWAVE WITH AMPLITUDE APPROXIMATELY 0.25 VOLT PEAK. RECORD BOTH ON DISK AND PAPER TAPE, IF AVAILABLE. ANALYZE AND PRINT WAVEFORMS FROM ANALYSIS UTILITY. ATTACH PAPER COPIES OF PRINTOUT AND PAPER TAPES, IF AVAILABLE, TO THIS FORM. AVERAGE FREQUENCY MUST BE BETWEEN 99.0 AND 101.0 HZ.

AS FOUND 100.0 AS LEFT 100.0

WAVEFORM	FILE NO	FREQUENCY	TIME FOR 9 CYCLES Hn	TIME FOR 9 CYCLES Hr	TIME FOR 9 CYCLES V	AVERAGE FREQ.
SQUARE	305	100.0	90.0	90.0	90.0	100.0
SQUARE	306	100.0	90.0	90.0	90.0	100.0
SINE	307	100.0	90.0	90.0	90.0	100.0
SINE	308	100.0	90.1	90.0	90.0	100.0

CALIBRATED BY: ROBERT STELLER 4/21/2006 Robert Steller
NAME DATE SIGNATURE

Seismic recorder/Logger Calibration Data Sheet Rev 1.30 4-6-06

TEST NUMBER
501204

EDISON ESI

Calibration Report

METROLOGY

GEOVision Geophysical Services
1151 Pomona Road, Unit P
Corona, CA 92882
P.O. No.: 6162-060414-01

Manufacturer:	Oyo	**Calibration Date:**	04/21/2006
Model Number:	3403	**Calibration Due Date:**	04/21/2007
Description:	Unit, Suspension Telemetry	**Calibration Interval:**	12 Months
Asset Number:	160024	**Condition As Found:**	In Tolerance
Serial Number:	160024	**Condition As Left:**	In Tolerance

Remarks:
The UUT (unit under test) was calibrated using the customer's procedure. The UUT was operated by the customer's personnel and data collection was observed by SCE personnel. The UUT was found to be in tolerance to customer supplied specifications. The reference standards used are in compliance with ISO/IEC 17025:1999 and laboratory accreditation criteria established by NIST/NVLAP under the specific scope of accreditation for lab code 105014-0. Frequency is accredited.
Please see attached data.

Standards Utilized

I.D. No.	Mfg.	Model No.	Description	Cal. Date	Due Date
S1-01252	Hewlett Packard	5335A OPT 010,203040	Counter, Universal	12/09/2005	06/09/2006
S1-03355	Hewlett Packard	3325B OPT 001, 002	Generator, Function, Synthesizer	11/03/2005	11/03/2006
S1-03686	Fluke	910	Standard, Frequency, Controlled, Gps	01/16/2006	01/16/2007

Procedure: Customer
Temperature: 23° C
Humidity: 40% RH
Test No.: 501204

Calibration Performed By:			Quality Reviewer:	
Bramson, Craig A (CAB)	Metrologist	714-895-0714		04-21-06
Name	Title	Phone	Name	Date

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MRA 4-21-06

GEOVision
geophysical services

SEISMOGRAPH CALIBRATION DATA SHEET REV 4/6/06

INSTRUMENT DATA

SYSTEM MFR:	OYO	MODEL NO.:	3403
SERIAL NO.:	160024	CALIBRATION DATE:	4/21/2006
BY:	ROBERT STELLER	DUE DATE:	4/21/2007
COUNTER MFR:	HEWLETT PACKARD	MODEL NO.:	5335A
SERIAL NO.:	2626A09881	CALIBRATION DATE:	12/9/2005
BY:	SCE #S1-01252	DUE DATE:	6/9/2006
FCTN GEN MFR:	HEWLETT PACKARD	MODEL NO.:	3325B
SERIAL NO.:	2847A14447	CALIBRATION DATE:	11/3/2005
BY:	SCE #S1-03355	DUE DATE:	11/3/2006

SYSTEM SETTINGS:

GAIN:	2
FILTER:	10 KHZ
RANGE:	100 MILLISEC, 100 MICROSECOND SAMPLE RATE
DELAY:	0
STACK: 1 (STD)	1
PULSE:	1.6
DISPLAY:	NA
SYSTEM: DATE = CORRECT DATE & TIME	4/21/2006, 11:30AM

PROCEDURE:

SET FREQUENCY TO 100.0HZ SQUAREWAVE WITH AMPLITUDE APPROXIMATELY 0.25 VOLT PEAK. RECORD BOTH ON DISK AND PAPER TAPE, IF AVAILABLE. ANALYZE AND PRINT WAVEFORMS FROM ANALYSIS UTILITY. ATTACH PAPER COPIES OF PRINTOUT AND PAPER TAPES, IF AVAILABLE, TO THIS FORM. AVERAGE FREQUENCY MUST BE BETWEEN 99.0 AND 101.0 HZ

AS FOUND 100.0 AS LEFT 100.0

WAVEFORM	FILE NO	FREQUENCY	TIME FOR 9 CYCLES Hn	TIME FOR 9 CYCLES Hr	TIME FOR 9 CYCLES V	AVERAGE FREQ.
SQUARE	401	100.0	90.0	90.0	90.0	100.0
SQUARE	402	100.0	90.0	90.0	90.0	100.0
SINE	403	100.0	89.9	90.0	90.1	100.0
SINE	404	100.0	90.0	90.1	90.1	99.9

CALIBRATED BY: ROBERT STELLER 4/21/2006 [signature]
NAME DATE SIGNATURE

Seismic recorder/Logger Calibration Data Sheet Rev 1.30 4-6-06

United States Department of Commerce
National Institute of Standards and Technology

NVLAP®

Certificate of Accreditation to ISO/IEC 17025:1999

NVLAP LAB CODE: 105014-0

Southern California Edison Company

Westminster, CA

is recognized by the National Voluntary Laboratory Accreditation Program for conformance with criteria set forth in NIST Handbook 150:2001 and all requirements of ISO/IEC 17025:1999.
Accreditation is granted for specific services, listed on the Scope of Accreditation, for:

CALIBRATION LABORATORIES

2006-04-01 through 2007-03-31

Effective dates

DEPARTMENT OF COMMERCE * UNITED STATES OF AMERICA *

C D Larson

For the National Institute of Standards and Technology

NVLAP-01C (REV. 2005-05-19)

National Voluntary Laboratory Accreditation Program

SCOPE OF ACCREDITATION TO ISO/IEC 17025:1999

Southern California Edison Company
7300 Fenwick Lane
Westminster, CA 92683
Ms. Jennifer E. Smith
Phone: 714-895-0133 Fax: 714-895-0781
E-mail: Jennifer.Smith@sce.com
URL: http://www.edisonmetrology.com

CALIBRATION LABORATORIES **NVLAP LAB CODE 105014-0**

NVLAP Code: 20/A01 ANSI/NCSL Z540-1-1994; Part 1 Compliant

DIMENSIONAL

NVLAP Code: 20/D03
Gage Blocks

Nominal Length in in	*Best Uncertainty (±) in µin* [note 1]
0.01 to < 0.05	1.9
0.05 to < 0.1	1.7
0.1 to < 1.0	1.2
1.0	1.4
2.0	1.8
3.0	2.2
4.0	2.9
5.0	5.4
6.0	5.6
7.0	5.8
8.0	6.0
10.0	6.8
12.0	7.2
16.0	8.1
20.0	9.4

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Nominal Length in mm	*Best Uncertainty (±) in nm* [note 1]
0.5 to < 1.0	52
1.0 to < 2.5	44
2.5 to < 25.0	39
25.0	44
50.0	47
75.0	60
100.0	80

NVLAP Code: 20/D11
Spherical Diameter; Ring Gages

Range in inches	*Best Uncertainty (±) in µin* [note 1]	*Remarks*
0.040 to 0.825	6	Comparison to gage blocks
> 0.825 to 1.510	7	Comparison to gage blocks
> 1.510 to 2.510	8	Comparison to gage blocks
> 2.510 to 4.510	12	Comparison to gage blocks
> 4.510 to 6.510	14	Comparison to gage blocks
> 6.510 to 9.010	16	Comparison to gage blocks
> 9.010 to 12.010	19	Comparison to gage blocks
> 12.010 to 13.25	31	Comparison to gage blocks

ELECTROMAGNETICS - DC/LOW FREQUENCY

NVLAP Code: 20/E02
AC Current

Range	*Best Uncertainty (±) in ppm* [note 1] *Frequency in Hz*			
	10	*20*	*40*	*400 to 10 k*
10 mA	270	199	127	116
20 mA	270	199	127	116
30 mA	270	199	127	116
50 mA	286	208	141	130
100 mA	270	199	127	116

2006-04-01 through 2007-03-31

Effective dates

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200 mA		270		199	127		116
300 mA		270		199	127		116
500 mA		270		208	141		130
	10	***20***	***40***	***400 to 5 k***	***10 k***		
1A	270	199	127	116	130		
	10	***20***	***40***	***400 to 10 k***			
2A	271	200	129	118			
3A	271	200	129	118			
	10	***20***	***40***	***400 to 5 k***	***10 k***		
5A	286	209	142	132	148		
	10	***20***	***40***	***400***	***1 k***	***5 k***	***10 k***
10A	273	233	132	121	121	143	143
							400 to 10 k
20A							144

NVLAP Code: 20/E05
DC Current

Range	***Best Uncertainty (±) in ppm*** [note 1]
10 nA	2.9
100 nA	2.3
1 µA	2.0
10 µA	2.0
100 µA	2.0
1 mA	1.9
10 mA	1.9
100 mA	1.9
1 A	10.4
10 A	10.4
30 A	20.6

2006-04-01 through 2007-03-31
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For the National Institute of Standards and Technology

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CALIBRATION LABORATORIES **NVLAP LAB CODE 105014-0**

DC Resistance

Nominal Value in Ω	*Best Uncertainty (±) in ppm* [note 1]	*Remarks*
100 μ	8.20	Automated DC Resistance Calibration System
1 m	5.50	Automated DC Resistance Calibration System
10 m	3.70	Automated DC Resistance Calibration System
100 m	2.10	Automated DC Resistance Calibration System
1	0.40	Automated DC Resistance Calibration System
10	0.40	Automated DC Resistance Calibration System
25	0.50	Automated DC Resistance Calibration System
100	0.50	Automated DC Resistance Calibration System
1 k	0.50	Automated DC Resistance Calibration System
10 k	0.50	Automated DC Resistance Calibration System
100 k	1.50	Automated DC Resistance Calibration System
1 M	2.30	Automated DC Resistance Calibration System
10 M	3.30	Automated DC Resistance Calibration System
100 M	4.00	Automated DC Resistance Calibration System

NVLAP Code: 20/E06
DC Voltage

Range	*Best Uncertainty (±) in ppm* [notes 1,2]	*Remarks*
1.018 V	0.80	Automated DC Calibration System
10.00 V	0.20	Automated DC Calibration System
1.000 V	0.80	Automated DC Calibration System
1 mV to 100 mV	1.3 [note 6]	Ratiometric Measurement Techniques performed by voltage transfer utilizing a high precision voltage
100 mV	0.7	Ratiometric Measurement Techniques performed by voltage transfer utilizing a high precision voltage
1.0 V	0.3	Ratiometric Measurement Techniques performed by voltage transfer utilizing a high precision voltage

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10.0 V	0.3	Ratiometric Measurement Techniques performed by voltage transfer utilizing a high precision voltage
20.0 V	0.5	Ratiometric Measurement Techniques performed by voltage transfer utilizing a high precision voltage
100.0 V	0.3	Ratiometric Measurement Techniques performed by voltage transfer utilizing a high precision voltage
1000.0 V	0.7	Ratiometric Measurement Techniques performed by voltage transfer utilizing a high precision voltage

NVLAP Code: 20/E09
LF AC Voltage

Best Uncertainty (±) in ppm *notes 1,3,4*
Frequency in Hz

Range	*10*	*20*	*40*	*100*	*1k*	*10k*	*20k*	*50k*	*100k*	*300k*	*500k*	*800k*	*1M*
2 mV	448	912	889	969	379	865	1073	405	1131	1265	2116	2595	2938
10 mV	119	230	102	177	245	169	180	220	343	243	676	425	488
20 mV	83	70	67	67	66	76	76	165	261	361	521	372	442
30 mV	134	111	80	78	62	63	71	133	219	345	535	688	791
100 mV	36	72	23	42	34	35	34	43	77	169	220	287	225
190 mV	36	31	22	20	21	26	21	42	80	136	124	264	215
300 mV	46	61	30	32	34	19	28	36	59	116	143	189	205
1 V	120	36	18	10	13	12	11	25	14	87	102	104	98
1.9 V	36	22	22	9	9	9	8	18	11	94	101	85	89
3 V	26	34	25	17	14	14	13	27	14	100	108	95	97
10 V	20	42	19	10	10	9	10	11	16	80	100	111	100
19 V	26	23	20	11	9	9	10	11	16	98	109	82	82
30 V	30	37	26	19	15	16	19	37	44	118			
100 V	140	46	20	16	15	19	11	40	22				
190 V	47	27	20	20	13	13	13	41	26				
300 V			37	29	18	27	22	29	46				
500 V			33	25	17	20	19	38	52				

2006-04-01 through 2007-03-31

Effective dates

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CALIBRATION LABORATORIES **NVLAP LAB CODE 105014-0**

700 V	29	23	18	17	19	44	54
1000 V	22	23	21	19	22		

TIME AND FREQUENCY

NVLAP Code: 20/F01
Frequency Dissemination

Range	*Best Uncertainty (±)* [note 1]	*Remarks*
10 MHz	1.2×10^{-12}	GPS Receiver

MECHANICAL

NVLAP Code: 20/M05
Flow Rate

Nominal Flow Rate	*Best Uncertainty (±) in percent* [notes 1, 5]
(0.8 to 30) L/s	0.3
(0.1 to 800) mL/s	0.4
(0.006 to 0.1) mL/s	0.7

NVLAP Code: 20/M06
Force

Nominal Force in lb	*Best Uncertainty (±)* [note 1]	*Remarks*
2 to 200	0.025 %	Dead Weight
> 200 to 300	0.086 lb	Proving Ring
> 300 to 500	0.14 lb	Proving Ring
> 500 to 1000	0.28 lb	Proving Ring
> 1000 to 2000	0.55 lb	Proving Ring
> 2000 to 5000	0.84 lb	Proving Ring
> 5000 to 10 000	1.7 lb	Proving Ring
> 10 000 to 20 000	5.5 lb	Proving Ring
> 20 000 to 35 000	5.8 lb	Proving Ring
> 35 000 to 50 000	13 lb	Proving Ring

2006-04-01 through 2007-03-31
Effective dates

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CALIBRATION LABORATORIES **NVLAP LAB CODE 105014-0**

> 50 000 to 60 000	16 lb	Proving Ring
> 60 000 to 100 000	26 lb	Proving Ring
> 100 000 to 300 000	113 lb	Proving Ring

NVLAP Code: 20/M08
Mass

Range	*Best Uncertainty (±) in mg* [notes 1,2]	*Remarks*
10 kg	2.3	Echelon I
5 kg	0.93	Echelon I
3 kg	0.65	Echelon I
2 kg	0.43	Echelon I
1 kg	0.052	Echelon I
500 g	0.043	Echelon I
300 g	0.041	Echelon I
200 g	0.034	Echelon I
100 g	0.020	Echelon I
50 g	0.013	Echelon I
30 g	0.013	Echelon I
20 g	0.0095	Echelon I
10 g	0.0073	Echelon I
5 g	0.0048	Echelon I
3 g	0.0038	Echelon I
2 g	0.0029	Echelon I
1 g	0.0030	Echelon I
500 mg	0.0017	Echelon I
300 mg	0.0013	Echelon I
200 mg	0.0010	Echelon I
100 mg	0.0009	Echelon I
50 mg	0.0007	Echelon I
30 mg	0.0007	Echelon I
20 mg	0.0005	Echelon I
10 mg	0.0005	Echelon I
5 mg	0.0006	Echelon I
3 mg	0.0006	Echelon I

2006-04-01 through 2007-03-31
Effective dates

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CALIBRATION LABORATORIES **NVLAP LAB CODE 105014-0**

2 mg	0.0005	Echelon I
1 mg	0.0005	Echelon I
30 kg	56	Echelon II
20 kg	22	Echelon II

THERMODYNAMIC

NVLAP Code: 20/T05
Pressure

Range	*Best Uncertainty (±) in ppm* [note 1]	*Remarks*
> 1.5 to 50	20	Gas
> 50 to 1450	45	Gas
> 1450 to 16 000	90	Gas
> 1000 to 10 000	60	Oil
> 10 000 to 30 000	110	Oil
> 30 000 to 50 000	210	Oil

1. Represents an expanded uncertainty using a coverage factor, k = 2, at an approximate level of confidence of 95 %.
2. Approximate value. Actual value determined by the test statistics.
3. All ACV measurements performed via AC/DC transfer system.
4. Uncertainties listed are representative of the laboratory's accredited capabilities within the stated ranges. Accreditation is not limited to only those fixed values shown.
5. Dependent upon principle of operation of device being calibrated and its performance relative to standards at the time of the test.
6. The equation: uncert. = $(A + B/mVDC^2)^{0.5}$ (where A = 0.16 and B = 0.013333) is provided in order for potential customers to calculate approximate uncertainties for values down to 1 mV. Example: uncertainty at 1 mVDC would calculate to approximately ±115.47 ppm.
7. The laboratory maintains Echelon II capability for ranges 20 kg to 1 mg and separate Echelon III for all ranges.
8. Avoirdupois mass calibration services are available by comparison to equivalent metric standards. Uncertainties may be appropriately larger.

2006-04-01 through 2007-03-31

Effective dates

For the National Institute of Standards and Technology

Calibration Report

MICRO PRECISION CALIBRATION INC.
[illegible] Homer Street, Garden Grove, CA 92841
Ph.: (714) 901-5659 Fax (714) 901-5649

Customer: GEOVISION
Corona CA 92882
Account#: 15214
Cust.PO#:
Page 1 of 2

MPC Ctrl#: AM6766
Report#: 199974
Print Date: 041006
MPC Job#: L25384

Instrument: Caliper Calibration Plate

Mfg: Robertson Geo Logging
Model: N/A
Size:
Res.:

Serial#: 201
Cust Ctrl#:
Location:
Department:

Work Performed: Inspected, cleaned, and calibrated.
Parts Replaced: None

Calibration Condition as Received: In tolerance
Calibration Condition as Returned: In tolerance

Functions/Parameters Tested

Actual Values (inch)	As Measured
1.969	1.965
3.937	3.939
8.000	7.995
12.00	11.9965

Unless noted otherwise, Pass/Fail criteria is based on published manufacturer specifications and, unless noted otherwise, this instrument meets these specifications.
Services provided comply with ISO 17025:1999, ISO 9001:2000, MPC QM rev.3, MPC CSD rev.2 and customer purchase order requirements as required.

Calibration standards used for performance testing:

MPC#	Instrument	Due Date	Traceability
K3263	Pratt & Whitney C Super Micrometer	060706	192068
I2111	Mitutoyo 516-126 Gage Block Set	082406	397060

Environmental: 69 Deg / 40% Rh
Accuracy Ratio: 4:1
Cal Procedure: 33K6-4-552-1
Technician: CHRIS SPANGLER

Cal Int.: 12
Cal Date: 040606
Due Date: 040607
Quality Approval: QC 82

Form Cert 04-25-05

All standards used are either traceable to the National Institute of Standards and Technology or have intrinsic accuracy. All services performed have used proper manufacturer and industrial service techniques and are warranted for no less than (30) days. This report may not be reproduced in part without written permission of Micro Precision's Quality Assurance Manager.

GEOVision Borehole Geophysics depth wheel verification

Performed by Robert Steller on September 23, 2006

	Depth reading in #1	Depth reading out	Depth reading in #2
Depth wheel S/N 101 500 pulse/revolution Circumference = 983mm (3225.07 millifeet)	100.1 feet (30.51 m)	99.95 feet (30.46 m)	100.05 feet (30.50 m)
Depth wheel S/N 102 500 pulse/revolution Circumference = 994mm (3261.15 millifeet)	100.00 feet (30.48) m	100.05 feet (30.50 m)	100.00 feet (30.48) m
Aries winch 200 pulse/revolution Circumference = 305.9mm (1003.51 millifeet)	100.05 feet (30.50) m	100.05 feet (30.50 m)	100.00 feet (30.48) m
Depth wheel S/N 103 500 pulse/revolution Circumference = 1000mm (3.281 feet)			
Comprobe winch 500 pulse/revolution Circumference = 1000mm (3.281 feet)			

All measurements taken with a Stanley 100ft flexible stainless steel tape model number 34-130, and a Keeson 300 foot fiberglass tape, both marked in feet, inches and 1/8ths of inches. Enough cable was spooled off of the winch to allow the cable and tape measures to be laid flat on the parking lot surface side-by-side. A permanent marker was used to mark a 100.0 foot interval on the cable, and the marks were also tagged with electrical tape for visibility. The cable was then spooled back onto the winch. When the first mark was at the top of the measuring wheel, a matching permanent mark was placed, and the recording system (Robertson Micrologger) was set to 0.0 feet depth. The cable was spooled in to the second mark, and the distance was recorded. The recording system was set to 0.0 feet again, and the cable spooled out to the first mark again, and the distance was recorded. The process was repeated one more time to spool the cable back onto the winch, and the distance was recorded.

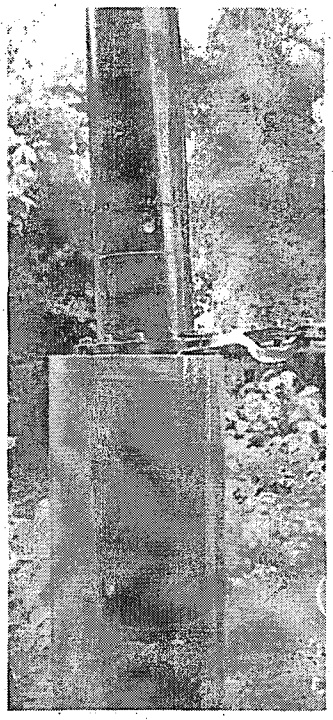
Estimated accuracy is of these measurements is +/- 0.1 foot or +/- 0.03m.

GEOVision Suspension PS probe Receiver 1–Receiver 2 (R1-R2) spacing verification

Performed by Robert Steller on September 23, 2006

	R2 center to R1 center hanging dry	R2 center to R1 center hanging submerged	R1 bottom to source center hanging submerged with 1m isolation tube S/N 280068
Receiver S/N 30086	40.2in 1.02m	40.0in 1.02m	76.0in 1.93m
Receiver S/N 20042	39.8in 1.01m	39.6in 1.01m	75.7in 1.92m
Receiver S/N 12008	40.2in 1.02m	40.0in 1.02m	76.0in 1.93m

All measurements taken with a Lufkin 3.7m flexible steel tape model number HV1034DM, marked in mm and 100th of feet. Probe suspended in 3-inch diameter clear PVC pipe, using chain clamp placed between bottom and center of Receiver 2 hard section (See Figure). Probe "bounced" to establish unrestricted hanging length before measurement. Probe allowed to relax for 5 minutes prior to each measurement. Water level set to submerge bottom of Receiver 2 hard section.. Estimated accuracy due to hysterisis in rubber section approximately +/- 0.01' or +/- 0.003m.



APPENDIX D

BORING GEOPHYSICAL LOGGING FIELD DATA LOGS

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B-302 BORING GEOPHYSICS FIELD LOG SUMMARY

SITE: SOUTH TEXAS PROJECT COL DATE: 12/5/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 1 OF 1

CONTACT: MIKE SUFNARSKI PHONE: 704-357-5633

BOREHOLE CONSTRUCTION: CASED ____ UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4 7/8" 0 TO 215 ; ____, ____ TO ____
BOREHOLE TOTAL DEPTH AS DRILLED: 215
CONDUCTOR CASING?: YES ✓ DEPTH TO BOTTOM OF CASING 20' ; NO ____ AUGER
DEPTH TO BEDROCK: NA
BOREHOLE FLUID: WATER ____; FRESH WATER MUD ✓; SALT WATER MUD ____;

LOGGING CREW: R. STELLER, C. CARTER

LOG TYPE	FILE NAME	DEPTH RANGE	DATE	TIMES
ELOG TEST	B302ELOGTEST01	Ø	12/5/06	14:35 - 14:38
ELOG/GAMMA	B302ELOGUP01	218.0' - 37.2'	12/5/06	15:46 - 16:07
SUSPENSION PS	B302_001 - 116.DAT	19.7' - 205.1'	"	16:23 - 18:04
CALIPER TEST	B302CALTEST01	Ø	"	18:18 - 18:21
CALIPER/GAMMA	B302CALUP01	210.0' - Ø	"	18:40 - 19:05
CALIPER TEST	B302CALTEST02	Ø	"	19:08 - 19:11
DEVIATION	B302AALUP01	210.0' - 2.5'	"	19:28 - 19:48

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B-302 ELOG FIELD LOG

SITE: SOUTH TEXAS PROJECT COL
DATE: 12/5/06
CLIENT: MACTEC
JOB: 6533
AUTHOR: R. STELLER
PAGE 1 OF 2

CONTACT: _____ _OFFICE_ PHONE: _____
CELL PHONE: _____
CONTACT: _____ _OFFICE_ PHONE: _____
_____ PHONE: _____
CONTACT: _____ _____ PHONE: _____
_____ PHONE: _____
CONTACT: _____ _____ PHONE: _____
_____ PHONE: _____
DRILLER: _____ _____ PHONE: _____
COMPANY: _____ _____ PHONE: _____

GENERAL SITE CONDITIONS/LOCATION: _____

BOREHOLE DESIGNATION: B-302-DH LOCATION: _____

COUNTY: _____ RANGE: _____ TOWNSHIP: _____ SECTION: _____
BOREHOLE CONSTRUCTION: CASED ____ UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4 7/8" 0 TO 215' ; _____, _____ TO _____
BOREHOLE TOTAL DEPTH AS DRILLED: 215'
CONDUCTOR CASING?: YES ___ DEPTH TO BOTTOM OF CASING _____; NO ____
DEPTH TO BEDROCK: NA DEPTH TO WATER TABLE: _____
BOREHOLE FLUID: WATER ____; FRESH WATER MUD ✓; SALT WATER MUD ____;
OTHER: _____
DEPTH TO BOREHOLE FLUID: Ø TIME SINCE LAST CIRCULATION: ½ hr

LOGGING CREW: R. STELLER, C. CARTER
VEHICLE(S) USED AND MILEAGE: RENTAL
MOBILIZED FROM: Bay City, Tx DEPARTURE TIME: 06:30
ARRIVED ON SITE: 07:00
STANDBY TIME: _____ CAUSE: _____
LOGGING STARTED: 14:35 LOGGING COMPLETED: 16:07

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SITE: SOUTH TEXAS PROJECT COL B-302 DATE: 12/5/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 2 OF 2

WINCH: COMPROBE ____ SILVER ✓ OYO ____ OTHER ____
MICROLOGGER 5301 ✓ OTHER ____
ELOG PROBE 5490 ✓ OTHER ____

PROBE LENGTH	2.50M(8.20 FT)	
PLUS YOKE 10.0M (32.8 FT)	32.8'	
MINUS CASING STICK-UP	- 1.6'	
DEPTH REF. OFFSET AT START	39.4'	
DEPTH REF. OFFSET AT END	39.3'	
AFTER SURVEY DEPTH ERROR	-0.1'	LESS THAN 0.4%? YES

LOG NAME	START DEPTH	START TIME	END DEPTH	END TIME
B302ELOGTOP01	Ø	14:35	Ø	14:38
B302ELOGUP01	218.0'	15:46	37.2'	16:07

MAINTENANCE PERFORMED ON SITE: ____

EQUIPMENT PROBLEMS OR FAILURES: ____

SUGGESTIONS, ADDITIONS, CHANGES: ____

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P-S SUSPENSION VELOCITY FIELD LOG

SITE: SOUTH TEXAS PROJECT COL B-302 DATE: 12/5/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 1 OF ____

CONTACT: MIKE SUFNARSKI OFFICE PHONE: 704-357-5633
CELL PHONE: 704-309-0624
CONTACT: OFFICE PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
DRILLER: PHONE:
COMPANY: PHONE:

DIRECTIONS TO SITE:

GENERAL SITE CONDITIONS/LOCATION:

EA#:
BOREHOLE DESIGNATION: LOCATION:

COUNTY: RANGE: TOWNSHIP: SECTION:
BOREHOLE CONSTRUCTION: CASED ✓ UNCASED
DIAMETERS AND DEPTH RANGES: 4% 0 TO 215' ; , TO
BOREHOLE TOTAL DEPTH AS DRILLED: 215
CONDUCTOR CASING?: YES ✓ DEPTH TO BOTTOM OF CASING 20'; NO AUGER.
DEPTH TO BEDROCK: NA DEPTH TO WATER TABLE: ≈20'
BOREHOLE FLUID: WATER ; FRESH WATER MUD ✓; SALT WATER MUD ;
OTHER:
DEPTH TO BOREHOLE FLUID: ∅ TIME SINCE LAST CIRCULATION: 1 HR

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SITE: SOUTH TEXAS PROJECT COL B-302 DATE: 12/5/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 2 OF ____

LOGGING CREW: R. STELLER, C. CARTER
VEHICLE(S) USED AND MILEAGE: RENTAL
MOBILIZED FROM: BAY CITY, TX DEPARTURE TIME: 06:30
ARRIVED ON SITE: 07:00
STANDBY TIME: ____ CAUSE: ____
LOGGING STARTED: 16:23 LOGGING COMPLETED: 18:04
STANDBY TIME: ____ CAUSE: ____
LOGGING STARTED: ____ LOGGING COMPLETED: ____
DEMOBILIZED TO: ____ ARRIVAL TIME: ____
ADDITIONAL DEMOB TIME: ____ REASON: ____

BATTERIES CHANGED BEFORE LOGGING: YES ____; NO ✓; STORED WITH NEW ____

WINCH	COMPROBE ☐		GREY ☐	OYO ☐	RG ☐	OTH ☑		
INSTRUMENT	OYO 12004 ☐	15014 ☐	19029 ☐		RG 160023 ☑	160024 ☐		
RECEIVER S/N	12008 ☐	20042 ☐	26066 ☐	11001 ☐	23053 ☐	30086 ☑		

MAINTENANCE PERFORMED ON SITE: ____

EQUIPMENT PROBLEMS OR FAILURES: ____

SUGGESTIONS, ADDITIONS, CHANGES: ____

COMMENTS: SIPPER DEPTH = 8.2' − 1.6' = 6.6' ⇒ 2.0 m.
EXIT DEPTH = 1.96 m

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GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: SOUTH TEXAS COL B-302 DATE: 12/5/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 3 OF 6

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
0.5	1.64			
1.0	3.28			
1.5	4.92			
2.0	6.56			
2.5	8.20			
3.0	9.84			
3.5	11.48			
4.0	13.12			
4.5	14.76			
5.0	16.40			
5.5	18.04			
6.0	19.69	001		AUGER TO @ 20'
6.5	21.33	2		
7.0	22.97	3		
7.5	24.61	4		
8.0	26.25	5		
8.5	27.89	6		
9.0	29.53	7		
9.5	31.17	8		
10.0	32.81	9		
10.5	34.45	10		
11.0	36.09	11		
11.5	37.73	12		
12.0	39.37	13		
12.5	41.01	14		
13.0	42.65	15		
13.5	44.29	16		
14.0	45.93	17		
14.5	47.57	18		
15.0	49.21	19		
15.5	50.85	20		
16.0	52.49	21		
16.5	54.13	22		
17.0	55.77	23		
17.5	57.41	24		
18.0	59.06	25		
18.5	60.70	26		
19.0	62.34	27		
19.5	63.98	28		
20.0	65.62	29		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: SOUTH TEXAS COL B-302 DATE: 12/5/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 4 OF 6

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
20.5	67.26	30		
21.0	68.90	31		
21.5	70.54	32		
22.0	72.18	33		
22.5	73.82	34		
23.0	75.46	35		
23.5	77.10	36		
24.0	78.74	37		
24.5	80.38	38		
25.0	82.02	39		
25.5	83.66	40		
26.0	85.30	41		
26.5	86.94	42		
27.0	88.58	43		
27.5	90.22	44		
28.0	91.86	45		
28.5	93.50	46		
29.0	95.14	47		
29.5	96.78	48		
30.0	98.43	49		
30.5	100.07	50		
31.0	101.71	51		
31.5	103.35	52		
32.0	104.99	53		
32.5	106.63	54		
33.0	108.27	55		
33.5	109.91	56		
34.0	111.55	57		
34.5	113.19	58		
35.0	114.83	59		
35.5	116.47	60		
36.0	118.11	61		
36.5	119.75	62		
37.0	121.39	63		
37.5	123.03	64		
38.0	124.67	65		
38.5	126.31	66		
39.0	127.95	67		
39.5	129.59	68		
40.0	131.23	69		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: SOUTH TEXAS COL B-302 DATE: 12/5/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 5 OF 6

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
40.5	132.87	70		
41.0	134.51	71		
41.5	136.15	72		
42.0	137.80	73		
42.5	139.44	74		
43.0	141.08	75		
43.5	142.72	76		
44.0	144.36	77		
44.5	146.00	78		
45.0	147.64	79		
45.5	149.28	80		
46.0	150.92	81		
46.5	152.56	82		
47.0	154.20	83		
47.5	155.84	84		
48.0	157.48	85		
48.5	159.12	86		
49.0	160.76	87		
49.5	162.40	88		
50.0	164.04	89		
50.5	165.68	90		
51.0	167.32	91		
51.5	168.96	92		
52.0	170.60	93		
52.5	172.24	94		
53.0	173.88	95		
53.5	175.52	96		
54.0	177.17	97		
54.5	178.81	98		
55.0	180.45	99		
55.5	182.09	100		
56.0	183.73	101		
56.5	185.37	102		
57.0	187.01	103		
57.5	188.65	104		
58.0	190.29	105		
58.5	191.93	106		
59.0	193.57	107		
59.5	195.21	108		
60.0	196.85	109		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: SOUTH TEXAS COL B-302 DATE: 12/5/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 6 OF 6

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
60.5	198.49	110		
61.0	200.13	111		
61.5	201.77	112		
62.0	203.41	113		BOTTOM MEASUREMENT?
62.5	205.05	114		HIT @ 62.7 m
63.0	206.69			
63.5	208.33			
64.0	209.97			
64.5	211.61			
65.0	213.25			
65.5	214.90			T.D.
66.0	216.54			
66.5	218.18			
67.0	219.82			
67.5	221.46			
68.0	223.10			
68.5	224.74			
69.0	226.38			
69.5	228.02			
70.0	229.66			
70.5	231.30			
71.0	232.94			
71.5	234.58			
72.0	236.22			
72.5	237.86			
73.0	239.50			
73.5	241.14			
74.0	242.78			
74.5	244.42			
75.0	246.06			
75.5	247.70			
76.0	249.34			
76.5	250.98			
77.0	252.62			
77.5	254.27			
78.0	255.91			
78.5	257.55			
79.0	259.19			
79.5	260.83			
80.0	262.47			

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B-302 CALIPER FIELD LOG

SITE: SOUTH TEXAS PROJECT COL DATE: 12/5/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 1 OF 2

CONTACT: MIKE SUFNARSKI OFFICE PHONE:
CELL PHONE: 704-357-5633
CONTACT: OFFICE PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
DRILLER: PHONE:
COMPANY: PHONE:

GENERAL SITE CONDITIONS/LOCATION:

BOREHOLE DESIGNATION: B-302-DH LOCATION:

COUNTY: RANGE: TOWNSHIP: SECTION:
BOREHOLE CONSTRUCTION: CASED UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4 7/8" 0 TO 215' ; , TO
BOREHOLE TOTAL DEPTH AS DRILLED: 215'
CONDUCTOR CASING?: YES ✓ DEPTH TO BOTTOM OF CASING 20' ; NO Auger
DEPTH TO BEDROCK: NA DEPTH TO WATER TABLE: ≈20'
BOREHOLE FLUID: WATER ; FRESH WATER MUD ✓ ; SALT WATER MUD ;
OTHER:
DEPTH TO BOREHOLE FLUID: Ø TIME SINCE LAST CIRCULATION:

LOGGING CREW: R. STELLER, C. CARTER
VEHICLE(S) USED AND MILEAGE: RENTAL
MOBILIZED FROM: BAY CITY, TX DEPARTURE TIME:
ARRIVED ON SITE:
STANDBY TIME: CAUSE:
LOGGING STARTED: LOGGING COMPLETED:

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SITE: SOUTH TEXAS PROJECT COL B-302 DATE: 12/5/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 2 OF 2

WINCH: COMPROBE ____ SILVER ✓ OYO ____ OTHER ____
MICROLOGGER 5301 ✓ OTHER ____
CALIPER PROBE 5368 ✓ OTHER ____

PROBE OFFSET	2.08M(6.82 FT) 12 IN MAX	
MINUS CASING STICK-UP	1.6'	
DEPTH REF. OFFSET AT START	5.22'	
DEPTH REF. OFFSET AT END	5.15	
AFTER SURVEY DEPTH ERROR	-0.07	LESS THAN 0.4%? YES

LOG NAME	START DEPTH	START TIME	END DEPTH	END TIME
B302CALTEST01	Ø	18:18	Ø	18:21
B302CALLIPO1	210.0'	18:40	Ø	19:05
B302 CALTEST02	Ø	19:08	Ø	19:11

CALIBRATION PLATE S/N 201

		AS BUILT			PVC FITTING
		1.968 IN	3.937 IN	8.000 IN	4.507 IN
	FILE NAME	(50 MM)	(100 MM)	(203.2 MM)	(114.3 MM)
AS MEAS.	B302CALTEST 01	2.00	3.94	8.02	4.55
AS MEAS.	B302 CALTEST 02	1.98	3.94	7.99	4.50
AS MEAS.					
AS MEAS.					
AS MEAS.					
AS MEAS.					

MAINTENANCE PERFORMED ON SITE: ____

EQUIPMENT PROBLEMS OR FAILURES: ____

SUGGESTIONS, ADDITIONS, CHANGES: ____

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B-302 ACOUSTIC TELEVIEWER FIELD LOG

SITE: SOUTH TEXAS PROJECT COL DATE: 12/5/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 1 OF 2

CONTACT: MIKE SUFNARSKI OFFICE PHONE: 704-357-5633
CELL PHONE: 704-309-0624
CONTACT: OFFICE PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
DRILLER: PHONE:
COMPANY: PHONE:

DIRECTIONS TO SITE:

GENERAL SITE CONDITIONS/LOCATION:

BOREHOLE DESIGNATION: B-302-DH LOCATION:

COUNTY: RANGE: TOWNSHIP: SECTION:
BOREHOLE CONSTRUCTION: CASED ____ UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4 7/8 0 TO 215' ; ____, ____ TO ____
BOREHOLE TOTAL DEPTH AS DRILLED: 215'
CONDUCTOR CASING?: YES ✓ DEPTH TO BOTTOM OF CASING 20' ; NO ____ AUGER
DEPTH TO BEDROCK: NA DEPTH TO WATER TABLE: ~20'
BOREHOLE FLUID: WATER ____ ; FRESH WATER MUD ✓ ; SALT WATER MUD ____ ;
OTHER:
DEPTH TO BOREHOLE FLUID: Ø TIME SINCE LAST CIRCULATION: ≈ 1 HR

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SITE: SOUTH TEXAS PROJECT COL B-302 DATE: 12/5/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 2 OF 2

LOGGING CREW: R. STELLER, C. CARTER
VEHICLE(S) USED AND MILEAGE: RENTAL
MOBILIZED FROM: BAY CITY, TX DEPARTURE TIME:
ARRIVED ON SITE:
STANDBY TIME: CAUSE:
LOGGING STARTED: 19:28 LOGGING COMPLETED: 19:48

WINCH: COMPROBE ___ SILVER ✓ OYO ___ OTHER ___
MICROLOGGER 5301 ✓ OTHER ___
TELEVIEWER ACOUSTIC #5174 ✓ OTHER ___

PROBE TILT TEST 88.3° BRUNTON TILT 89°
PROBE TILT TEST ___ BRUNTON TILT ___
PROBE TILT TEST ___ BRUNTON TILT ___
PROBE AZIMUTH TEST 299.4° BRUNTON AZIMUTH 300°
PROBE AZIMUTH TEST 212.4 BRUNTON AZIMUTH 209°
PROBE AZIMUTH TEST ___ BRUNTON AZIMUTH ___

PROBE OFFSET	1.44M(4.72FT)	
MINUS CASING STICK-UP	1.6'	
DEPTH REF. OFFSET AT START	3.12'	
DEPTH REF. OFFSET AT END	3.20	
AFTER SURVEY DEPTH ERROR	+0.08	LESS THAN 0.4%? YES

LOG NAME	START DEPTH	START TIME	END DEPTH	END TIME
B302 AM4P 01	210.0'	19:28	2.5'	19:48

MAINTENANCE PERFORMED ON SITE:

EQUIPMENT PROBLEMS OR FAILURES:

SUGGESTIONS, ADDITIONS, CHANGES:

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B-305-DHA BORING GEOPHYSICS FIELD LOG SUMMARY

SITE: SOUTH TEXAS PROJECT COL
CLIENT: MACTEC
AUTHOR: R. STELLER

DATE: 12/19/06
JOB: 6533
PAGE 1 OF 1

CONTACT: MIKE SUFNARSKI

PHONE: 704-357-5633

BOREHOLE CONSTRUCTION: CASED ____ UNCASED ✓
DIAMETERS AND DEPTH RANGES: 6" 0 TO 618' ; ____, ____ TO ____
BOREHOLE TOTAL DEPTH AS DRILLED: 618'
CONDUCTOR CASING?: YES ✓ DEPTH TO BOTTOM OF CASING 53' ; NO ____ AUGER
DEPTH TO BEDROCK: NA
BOREHOLE FLUID: WATER ____ ; FRESH WATER MUD ✓ ; SALT WATER MUD ____ ;

LOGGING CREW: R. STELLER

LOG TYPE	FILE NAME	DEPTH RANGE	DATE	TIMES
ELOG TEST	B305ELOGTEST03	Ø	12/19/06	13:30 - 13:33
ELOG/GAMMA	B305ELOGW03	575.0' - 18.1'	"	14:09 - 15:08

GEOVision Geophysical Services 1151 Pomona Road, Unit P, Corona, CA 92882 Ph (951) 549-1234 Fx (951) 549-1236

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B-305 DHA ELOG FIELD LOG

SITE: SOUTH TEXAS PROJECT COL
CLIENT: MACTEC
AUTHOR: R. STELLER

DATE: 12/19/06
JOB: 6533
PAGE 1 OF 2

CONTACT: _____ OFFICE PHONE: _____
CELL PHONE: _____
CONTACT: _____ OFFICE PHONE: _____
PHONE: _____
CONTACT: _____ PHONE: _____
PHONE: _____
CONTACT: _____ PHONE: _____
PHONE: _____
DRILLER: _____ PHONE: _____
COMPANY: _____ PHONE: _____

GENERAL SITE CONDITIONS/LOCATION: _____

BOREHOLE DESIGNATION: B-305-DHA LOCATION: _____

COUNTY: _____ RANGE: _____ TOWNSHIP: _____ SECTION: _____
BOREHOLE CONSTRUCTION: CASED ____ UNCASED ✓
DIAMETERS AND DEPTH RANGES: 6" 0 TO 618' ; ____, ____ TO ____
BOREHOLE TOTAL DEPTH AS DRILLED: 618'
CONDUCTOR CASING?: YES ✓ DEPTH TO BOTTOM OF CASING 53' ; NO ____ AUGER
DEPTH TO BEDROCK: NA DEPTH TO WATER TABLE: ~20'
BOREHOLE FLUID: WATER ____ ; FRESH WATER MUD ✓ ; SALT WATER MUD ____ ;
OTHER: _____
DEPTH TO BOREHOLE FLUID: Ø TIME SINCE LAST CIRCULATION: ≤ 1 HR

LOGGING CREW: R. STELLER
VEHICLE(S) USED AND MILEAGE: RENTAL
MOBILIZED FROM: BAY CITY, TX DEPARTURE TIME: 12:30
ARRIVED ON SITE: 13:00
STANDBY TIME: NA CAUSE: NA
LOGGING STARTED: 13:30 LOGGING COMPLETED: 15:08

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SITE: SOUTH TEXAS PROJECT COL B-305-04A DATE: 12/14/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 2 OF 2

WINCH: COMPROBE ____ SILVER ✓ OYO ____ OTHER ____
MICROLOGGER 5301 ✓ OTHER ____
ELOG PROBE 5490 ✓ OTHER ____

PROBE LENGTH	2.50M(8.20 FT)
PLUS YOKE 10.0M (32.8 FT)	+ 32.8'
MINUS CASING STICK-UP	− 2.25
DEPTH REF. OFFSET AT START	38.75'
DEPTH REF. OFFSET AT END	38.45'
AFTER SURVEY DEPTH ERROR	−0.35' LESS THAN 0.4%? YES

LOG NAME	START DEPTH	START TIME	END DEPTH	END TIME
B305 ELOG TEST 03	Ø	13:30	Ø	13:33
B305 ELOG UP 05	575.0	14:09	18.1	16:08

MAINTENANCE PERFORMED ON SITE: ____

EQUIPMENT PROBLEMS OR FAILURES: ____

SUGGESTIONS, ADDITIONS, CHANGES: SUDDENLY ≈ 560' → HIT OBSTACLE @ 575.8'

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B-305-DH A BORING GEOPHYSICS FIELD LOG SUMMARY

SITE: SOUTH TEXAS PROJECT COL DATE: 12/18/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 1 OF 1

CONTACT: MIKE SUFNARSKI PHONE: 704-357-5633

BOREHOLE CONSTRUCTION: CASED ____ UNCASED ✓
DIAMETERS AND DEPTH RANGES: 6" 0 TO 598' ; 3 7/8" 598' TO 618'
BOREHOLE TOTAL DEPTH AS DRILLED: 618'
CONDUCTOR CASING?: YES ✓ DEPTH TO BOTTOM OF CASING 53' ; NO ____ Auger
DEPTH TO BEDROCK: NA
BOREHOLE FLUID: WATER ____ ; FRESH WATER MUD ✓ ; SALT WATER MUD ____ ;

LOGGING CREW: R. STELLER

LOG TYPE	FILE NAME	DEPTH RANGE	DATE	TIMES
ELOG TEST	B305ELOGTEST02	Ø	12/18/06	16:00 – 16:05
ELOG/GAMMA	B305ELOGUP02	583.0' – 19.0'	"	16:43 – 17:46
SUSPENSION PS	B305_101 → 410.000	60.7' – 565.9'	"	18:10 – 21:42
CALIPER TEST	B305CALTEST03	Ø	"	~~10~~ 22:04 – 22:07
CALIPER/GAMMA	B305CALUP02	579.0' – Ø	"	22:24 – 23:21
CALIPER TEST	B305CALTEST04	Ø	"	23:27 – 23:30
DEVIATION	B305AMUP02	582.5' – Ø	"	23:53 – 00:21

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B-305 DH A ELOG FIELD LOG

SITE: SOUTH TEXAS PROJECT COL
DATE: 12/18/06
CLIENT: MACTEC
JOB: 6533
AUTHOR: R. STELLER
PAGE 1 OF 2

CONTACT: _____ OFFICE PHONE: _____
CELL PHONE: _____
CONTACT: _____ OFFICE PHONE: _____
PHONE: _____
CONTACT: _____ PHONE: _____
PHONE: _____
CONTACT: _____ PHONE: _____
PHONE: _____
DRILLER: _____ PHONE: _____
COMPANY: _____ PHONE: _____

GENERAL SITE CONDITIONS/LOCATION: SUNNY, CLEAR & 70°F

BOREHOLE DESIGNATION: B-305-DHA LOCATION: _____

COUNTY: _____ RANGE: _____ TOWNSHIP: _____ SECTION: _____
BOREHOLE CONSTRUCTION: CASED ____ UNCASED ✓
DIAMETERS AND DEPTH RANGES: 6" 0 TO 598'; 3 7/8, 598' TO 618
BOREHOLE TOTAL DEPTH AS DRILLED: 618'
CONDUCTOR CASING?: YES ✓ DEPTH TO BOTTOM OF CASING 53'; NO ____ AUGER
DEPTH TO BEDROCK: NA DEPTH TO WATER TABLE: 220'
BOREHOLE FLUID: WATER ____; FRESH WATER MUD ✓; SALT WATER MUD ____;
OTHER: _____
DEPTH TO BOREHOLE FLUID: Ø TIME SINCE LAST CIRCULATION: ≈1HR

LOGGING CREW: R. STELLER
VEHICLE(S) USED AND MILEAGE: RENTAL
MOBILIZED FROM: GRANBURY, TX DEPARTURE TIME: 03:00
ARRIVED ON SITE: 11:00
STANDBY TIME: NA CAUSE: NA
LOGGING STARTED: 16:00 LOGGING COMPLETED: 17:46

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SITE: SOUTH TEXAS PROJECT COL B-305 DATE: 12/18/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 2 OF 2

WINCH: COMPROBE ____ SILVER ✓ OYO ____ OTHER ____
MICROLOGGER 5301 ✓ OTHER ____
ELOG PROBE 5490 ✓ OTHER ____

PROBE LENGTH	2.50M(8.20 FT)	
PLUS YOKE 10.0M (32.8 FT)	+32.8'	
MINUS CASING STICK-UP	-2.25'	
DEPTH REF. OFFSET AT START	38.75'	
DEPTH REF. OFFSET AT END	39.45	
AFTER SURVEY DEPTH ERROR	+0.70'	LESS THAN 0.4%? YES

LOG NAME	START DEPTH	START TIME	END DEPTH	END TIME
B305ELOGTEST02	∅	16:00	∅	16:05
B305ELOGUP02	605.0'	16:43	19.0'	17:46

MAINTENANCE PERFORMED ON SITE: ____

EQUIPMENT PROBLEMS OR FAILURES: PULLED @ 583' - TRUE START DEPTH OF VALID DATA.

SUGGESTIONS, ADDITIONS, CHANGES: 931-242-6501 GLEN

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P-S SUSPENSION VELOCITY FIELD LOG

SITE: SOUTH TEXAS PROJECT COL B-305-DHA DATE: 12/18/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 1 OF 12

CONTACT: MIKE SUFNARSKI OFFICE PHONE: 704-357-5633
CELL PHONE: 704-309-0624
CONTACT: OFFICE PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
DRILLER: PHONE:
COMPANY: PHONE:

DIRECTIONS TO SITE:

GENERAL SITE CONDITIONS/LOCATION:

EA#:
BOREHOLE DESIGNATION: B-305-DHA LOCATION:

COUNTY: RANGE: TOWNSHIP: SECTION:
BOREHOLE CONSTRUCTION: CASED ____ UNCASED ✓
DIAMETERS AND DEPTH RANGES: 6" 0 TO 598' ; 3 7/8, 598 TO 618
BOREHOLE TOTAL DEPTH AS DRILLED: 618
CONDUCTOR CASING?: YES ✓ DEPTH TO BOTTOM OF CASING 53' ; NO ____ AUGER
DEPTH TO BEDROCK: NP DEPTH TO WATER TABLE: ≈20'
BOREHOLE FLUID: WATER ____ ; FRESH WATER MUD ✓ ; SALT WATER MUD ____ ;
OTHER:
DEPTH TO BOREHOLE FLUID: Ø TIME SINCE LAST CIRCULATION: ≈2HR

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SITE:_SOUTH TEXAS PROJECT COL 6-305 DATE: 12/18/06
CLIENT:_MACTEC JOB:_6533
AUTHOR:_R. STELLER PAGE 2 OF 12

LOGGING CREW: R. STELLER
VEHICLE(S) USED AND MILEAGE: _RENTAL
MOBILIZED FROM: GRANBURY, TX DEPARTURE TIME: 03:00
ARRIVED ON SITE: 11:00
STANDBY TIME: NA CAUSE: NA
LOGGING STARTED: 18:10 LOGGING COMPLETED: 21:42
STANDBY TIME: CAUSE:
LOGGING STARTED: LOGGING COMPLETED:
DEMOBILIZED TO: ARRIVAL TIME:
ADDITIONAL DEMOB TIME: REASON:

BATTERIES CHANGED BEFORE LOGGING: YES ✓; NO ____; STORED WITH NEW ____

WINCH		COMPROBE ☐		GREY ☐		OYO ☐		RG ☐		OTH ☑		
INSTRUMENT	OYO	12004 ☐	15014 ☐	19029 ☐			RG	160023 ☑	160024 ☐			
RECEIVER S/N		12008 ☐	20042 ☐	26066 ☐	11001 ☐	23053 ☐	30086 ☑					

MAINTENANCE PERFORMED ON SITE:

EQUIPMENT PROBLEMS OR FAILURES:

SUGGESTIONS, ADDITIONS, CHANGES:

COMMENTS: DEPTH ZERO = 2.5m - 0.7m = 1.8m
END DEPTH ZERO = 1.76
ASDE = -0.04m.

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GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: SOUTH TEXAS COL B-305 DATE: 12/18/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 3 OF 12

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
0.5	1.64			
1.0	3.28			
1.5	4.92			
2.0	6.56			
2.5	8.20			
3.0	9.84			
3.5	11.48			
4.0	13.12			
4.5	14.76			
5.0	16.40			
5.5	18.04			
6.0	19.69			
6.5	21.33			
7.0	22.97			
7.5	24.61			
8.0	26.25			
8.5	27.89			
9.0	29.53			
9.5	31.17			
10.0	32.81			
10.5	34.45			
11.0	36.09			
11.5	37.73			
12.0	39.37			
12.5	41.01			
13.0	42.65			
13.5	44.29			
14.0	45.93			
14.5	47.57			
15.0	49.21			
15.5	50.85			
16.0	52.49			
16.5	54.13			STEEL CASE (AUGER) TO 53'
17.0	55.77			
17.5	57.41			
18.0	59.06			
18.5	60.70	101		
19.0	62.34	102		
19.5	63.98	103		
20.0	65.62	104		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: SOUTH TEXAS COL B-305 DATE: 12/18/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 4 OF 12

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
20.5	67.26	105		
21.0	68.90	106		
21.5	70.54	107		
22.0	72.18	108		
22.5	73.82	109		
23.0	75.46	110		
23.5	77.10	111		
24.0	78.74	112		
24.5	80.38	113		
25.0	82.02	114		
25.5	83.66	115		
26.0	85.30	116		
26.5	86.94	117		
27.0	88.58	118		
27.5	90.22	119		
28.0	91.86	120		
28.5	93.50	121		
29.0	95.14	122		
29.5	96.78	123		
30.0	98.43	124		
30.5	100.07	125		
31.0	101.71	126		
31.5	103.35	127		
32.0	104.99	128		
32.5	106.63	129		
33.0	108.27	130		
33.5	109.91	131		
34.0	111.55	132		
34.5	113.19	133		
35.0	114.83	134		
35.5	116.47	135		
36.0	118.11	136		
36.5	119.75	137		
37.0	121.39	138		
37.5	123.03	139		
38.0	124.67	140		
38.5	126.31	141		
39.0	127.95	142 KAS 12/18/06		
39.5	129.59	143		
40.0	131.23	144		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: SOUTH TEXAS COL B-305 DATE: 12/18/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 5 OF 12

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
40.5	132.87	145		
41.0	134.51	146		
41.5	136.15	147		
42.0	137.80	148		
42.5	139.44	149		
43.0	141.08	150		
43.5	142.72	151		
44.0	144.36	152		
44.5	146.00	153		
45.0	147.64	154		
45.5	149.28	155		
46.0	150.92	156		
46.5	152.56	157		
47.0	154.20	158		
47.5	155.84	159		
48.0	157.48	160		
48.5	159.12	161		
49.0	160.76	162		
49.5	162.40	163		
50.0	164.04	164		
50.5	165.68	165		
51.0	167.32	166		
51.5	168.96	167		
52.0	170.60	168		
52.5	172.24	169		
53.0	173.88	170		
53.5	175.52	171		
54.0	177.17	172		
54.5	178.81	173		
55.0	180.45	174		
55.5	182.09	175		
56.0	183.73	176		
56.5	185.37	177		
57.0	187.01	178		
57.5	188.65	179		
58.0	190.29	180		
58.5	191.93	181		
59.0	193.57	182		
59.5	195.21	183		
60.0	196.85	184		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: SOUTH TEXAS COL B-305 DATE: 12/18/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 6 OF 12

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
60.5	198.49	185		
61.0	200.13	186		
61.5	201.77	187		
62.0	203.41	188		
62.5	205.05	189		
63.0	206.69	190		
63.5	208.33	191		
64.0	209.97	192		
64.5	211.61	193		
65.0	213.25	194		
65.5	214.90	195		
66.0	216.54	196		
66.5	218.18	197		
67.0	219.82	198		
67.5	221.46	199		
68.0	223.10	200		
68.5	224.74	201		
69.0	226.38	202		
69.5	228.02	203		
70.0	229.66	204		
70.5	231.30	205		
71.0	232.94	206		
71.5	234.58	207		
72.0	236.22	208		
72.5	237.86	209		
73.0	239.50	210		
73.5	241.14	211		
74.0	242.78	212		
74.5	244.42	213		
75.0	246.06	214		
75.5	247.70	215, 216		
76.0	249.34	217		
76.5	250.98	218		
77.0	252.62	219		
77.5	254.27	220		
78.0	255.91	221		
78.5	257.55	222		
79.0	259.19	223		
79.5	260.83	224		
80.0	262.47	225		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: SOUTH TEXAS COL B-305 DATE: 12/18/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 7 OF 12

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
80.5	264.11	226		
81.0	265.75	227		
81.5	267.39	228		
82.0	269.03	229		
82.5	270.67	230		
83.0	272.31	231		
83.5	273.95	232		
84.0	275.59	233		
84.5	277.23	234		
85.0	278.87	235		
85.5	280.51	236		
86.0	282.15	237		
86.5	283.79	238		
87.0	285.43	239		
87.5	287.07	240		
88.0	288.71	241		
88.5	290.35	242		
89.0	291.99	243		
89.5	293.64	244		
90.0	295.28	245		
90.5	296.92	246		
91.0	298.56	247		
91.5	300.20	248		
92.0	301.84	249		
92.5	303.48	250		
93.0	305.12	251		
93.5	306.76	252		
94.0	308.40	253		
94.5	310.04	254		
95.0	311.68	255		
95.5	313.32	256		
96.0	314.96	257		
96.5	316.60	258		
97.0	318.24	259		
97.5	319.88	260		
98.0	321.52	261		
98.5	323.16	262		
99.0	324.80	263		
99.5	326.44	264		
100.0	328.08	265		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: SOUTH TEXAS COL B-305 DATE: 12/18/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 8 OF 12

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
100.5	329.72	266		
101.0	331.36	267		
101.5	333.01	268		
102.0	334.65	269		
102.5	336.29	270		
103.0	337.93	271		
103.5	339.57	272		
104.0	341.21	273		
104.5	342.85	274		
105.0	344.49	275		
105.5	346.13	276		
106.0	347.77	277		
106.5	349.41	278		
107.0	351.05	279		
107.5	352.69	280		
108.0	354.33	281		
108.5	355.97	282		
109.0	357.61	283		
109.5	359.25	284		
110.0	360.89	285		
110.5	362.53	286		
111.0	364.17	287		365 - 397.5 HARD ZONE
111.5	365.81	288		ACCO
112.0	367.45	289		
112.5	369.09	290		
113.0	370.73	291		
113.5	372.38	292		
114.0	374.02	293		
114.5	375.66	294		
115.0	377.30	295		
115.5	378.94	296		
116.0	380.58	297		
116.5	382.22	298		
117.0	383.86	299		
117.5	385.50	300		
118.0	387.14	301		
118.5	388.78	302		
119.0	390.42	303		
119.5	392.06	304		
120.0	393.70	305		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: SOUTH TEXAS COL B-305 DATE: 12/18/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 9 OF 12

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
120.5	395.34	306		
121.0	396.98	307		
121.5	398.62	308		
122.0	400.26	309		
122.5	401.90	310		
123.0	403.54	311		
123.5	405.18	312		
124.0	406.82	313		
124.5	408.46	314		
125.0	410.10	315		
125.5	411.75	316		
126.0	413.39	317		
126.5	415.03	318		
127.0	416.67	319		
127.5	418.31	320		
128.0	419.95	321		
128.5	421.59	322		
129.0	423.23	323		
129.5	424.87	324		
130.0	426.51	325		
130.5	428.15	326		
131.0	429.79	327		
131.5	431.43	328		
132.0	433.07	329		
132.5	434.71	330		
133.0	436.35	331		
133.5	437.99	332		
134.0	439.63	333		
134.5	441.27	334		
135.0	442.91	335		
135.5	444.55	336		
136.0	446.19	337		
136.5	447.83	338		
137.0	449.48	339		
137.5	451.12	340		
138.0	452.76	341		
138.5	454.40	342		
139.0	456.04	343		
139.5	457.68	344		
140.0	459.32	345		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: SOUTH TEXAS COL B-305 DATE: 12/18/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 10 OF 12

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
140.5	460.96	346		
141.0	462.60	347		
141.5	464.24	348		
142.0	465.88	349		
142.5	467.52	350		
143.0	469.16	351		
143.5	470.80	352		
144.0	472.44	353		
144.5	474.08	354		
145.0	475.72	355		
145.5	477.36	356		
146.0	479.00	357		
146.5	480.64	358		
147.0	482.28	359		
147.5	483.92	360		
148.0	485.56	361		
148.5	487.20	362		
149.0	488.85	363		
149.5	490.49	364		
150.0	492.13	365		
150.5	493.77	366		
151.0	495.41	367		
151.5	497.05	368		
152.0	498.69	369		
152.5	500.33	370		
153.0	501.97	371		
153.5	503.61	372		SANDS @ 503?
154.0	505.25	373		
154.5	506.89	374		
155.0	508.53	375		
155.5	510.17	376		
156.0	511.81	377		
156.5	513.45	378		
157.0	515.09	379		
157.5	516.73	380		
158.0	518.37	381		
158.5	520.01	382		
159.0	521.65	383		
159.5	523.29	384		
160.0	524.93	385		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: SOUTH TEXAS COL B-305 DATE: 12/18/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 11 OF 12

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
160.5	526.57	386		
161.0	528.22	387		
161.5	529.86	388		
162.0	531.50	389		
162.5	533.14	390		
163.0	534.78	391		
163.5	536.42	392		
164.0	538.06	393		
164.5	539.70	394		540 - 541.5 HARD ACCORD
165.0	541.34	395		TO DRILLER. QUARTZ GRAVEL?
165.5	542.98	396		
166.0	544.62	397		HARD AGAIN. 542 - 543
166.5	546.26	398		
167.0	547.90	399		
167.5	549.54	400		
168.0	551.18	401		
168.5	552.82	402		
169.0	554.46	403		
169.5	556.10	404		
170.0	557.74	405		
170.5	559.38	406		
171.0	561.02	407		
171.5	562.66	408		
172.0	564.30	409		
172.5	565.94	410		
173.0	567.59			HIT @ 172.77 m.
173.5	569.23			
174.0	570.87			BOTTOM MEASUREMENT?
174.5	572.51			
175.0	574.15			
175.5	575.79			
176.0	577.43			
176.5	579.07			
177.0	580.71			
177.5	582.35			
178.0	583.99			EVER HIT BOTTOM?
178.5	585.63			
179.0	587.27			
179.5	588.91			
180.0	590.55			

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: SOUTH TEXAS COL B-305 DATE: 12/18/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 12 OF 12

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
180.5	592.19			
181.0	593.83			
181.5	595.47			
182.0	597.11			
182.5	598.75			
183.0	600.39			
183.5	602.03			
184.0	603.67			
184.5	605.31			
185.0	606.96			
185.5	608.60			
186.0	610.24			
186.5	611.88			
187.0	613.52			
187.5	615.16			
188.0	616.80			
188.5	618.44			T.D.@618'
189.0	620.08			
189.5	621.72			
190.0	623.36			
190.5	625.00			
191.0	626.64			
191.5	628.28			
192.0	629.92			
192.5	631.56			
193.0	633.20			
193.5	634.84			
194.0	636.48			
194.5	638.12			
195.0	639.76			
195.5	641.40			
196.0	643.04			
196.5	644.69			
197.0	646.33			
197.5	647.97			
198.0	649.61			
198.5	651.25			
199.0	652.89			
199.5	654.53			
200.0	656.17			

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B-305DHA CALIPER FIELD LOG

SITE: SOUTH TEXAS PROJECT COL DATE: 12/18/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 1 OF 2

CONTACT: MIKE SUFNARSKI OFFICE PHONE:
CELL PHONE: 704-357-5633
CONTACT: OFFICE PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
DRILLER: PHONE:
COMPANY: PHONE:

GENERAL SITE CONDITIONS/LOCATION:

BOREHOLE DESIGNATION: B-305-DHA LOCATION:

COUNTY: RANGE: TOWNSHIP: SECTION:
BOREHOLE CONSTRUCTION: CASED ____ UNCASED ✓
DIAMETERS AND DEPTH RANGES: 6" 0 TO 598' ; 3 7/8, 598 TO 618
BOREHOLE TOTAL DEPTH AS DRILLED: 618
CONDUCTOR CASING?: YES ✓ DEPTH TO BOTTOM OF CASING 53' ; NO AUGER
DEPTH TO BEDROCK: NA DEPTH TO WATER TABLE: ≈20'
BOREHOLE FLUID: WATER ____ ; FRESH WATER MUD ✓ ; SALT WATER MUD ____ ;
OTHER:
DEPTH TO BOREHOLE FLUID: Ø TIME SINCE LAST CIRCULATION: ≈5HR

LOGGING CREW: R. STELLER
VEHICLE(S) USED AND MILEAGE: RENTAL
MOBILIZED FROM: GRANBURY, TX DEPARTURE TIME: 03:00
ARRIVED ON SITE: 11:00
STANDBY TIME: NA CAUSE: NA
LOGGING STARTED: 10:04 LOGGING COMPLETED: 11:30

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SITE: SOUTH TEXAS PROJECT COL B-305 DATE: 12/18/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 2 OF 2

WINCH: COMPROBE ____ SILVER ✓ OYO ____ OTHER ____
MICROLOGGER 5301 ✓ OTHER ____
CALIPER PROBE 5368 ✓ OTHER ____

PROBE OFFSET	2.08M(6.82 FT) 12 IN MAX	
MINUS CASING STICK-UP	-2.25	
DEPTH REF. OFFSET AT START	4.57'	
DEPTH REF. OFFSET AT END	4.50'	
AFTER SURVEY DEPTH ERROR	-0.07'	LESS THAN 0.4%? YES

LOG NAME	START DEPTH	START TIME	END DEPTH	END TIME
B305CALTEST03	Ø	10:04 pm	Ø	10:07 pm
B305CALLP02	579.0'	10:24 pm	Ø	11:21 pm
B305 CALTEST04	Ø	11:27 pm	Ø	11:30 pm

CALIBRATION PLATE S/N 201

		AS BUILT			PVC FITTING
		1.968 IN	3.937 IN	8.000 IN	4.507 IN
	FILE NAME	(50 MM)	(100 MM)	(203.2 MM)	(114.3 MM)
AS MEAS.	B305 CALTEST03	2.00	3.92	8.02	4.52
AS MEAS.	B305 CALTEST04	1.96	3.93	8.03	4.50
AS MEAS.					
AS MEAS.					
AS MEAS.					
AS MEAS.					

MAINTENANCE PERFORMED ON SITE: ____

EQUIPMENT PROBLEMS OR FAILURES: ____

SUGGESTIONS, ADDITIONS, CHANGES: ____

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B-305-DH A ACOUSTIC TELEVIEWER FIELD LOG

SITE: SOUTH TEXAS PROJECT COL DATE: 12/18/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 1 OF 2

CONTACT: MIKE SUFNARSKI OFFICE PHONE: 704-357-5633
CELL PHONE: 704-309-0624
CONTACT: OFFICE PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
DRILLER: PHONE:
COMPANY: PHONE:

DIRECTIONS TO SITE:

GENERAL SITE CONDITIONS/LOCATION: NIGHT, MISTY ≈ 60°F

BOREHOLE DESIGNATION: LOCATION:

COUNTY: RANGE: TOWNSHIP: SECTION:
BOREHOLE CONSTRUCTION: CASED ____ UNCASED ✓
DIAMETERS AND DEPTH RANGES: 6" 0 TO 598 ; 3 7/8 598' TO 618'
BOREHOLE TOTAL DEPTH AS DRILLED: 618'
CONDUCTOR CASING?: YES ✓ DEPTH TO BOTTOM OF CASING 53' ; NO AUGER
DEPTH TO BEDROCK: NA DEPTH TO WATER TABLE: ≈ 20'
BOREHOLE FLUID: WATER ____ ; FRESH WATER MUD ✓ ; SALT WATER MUD ____ ;
OTHER:
DEPTH TO BOREHOLE FLUID: Ø TIME SINCE LAST CIRCULATION: ≈ 8 HR

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SITE: SOUTH TEXAS PROJECT COL B-305-OH A DATE: 12/18/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 2 OF 2

LOGGING CREW: R. STELLER
VEHICLE(S) USED AND MILEAGE: RENTAL
MOBILIZED FROM: BRGANBURT TX DEPARTURE TIME: 03:00
ARRIVED ON SITE: 11:00
STANDBY TIME: NA CAUSE: NA
LOGGING STARTED: 23:53 LOGGING COMPLETED: 00:21

WINCH: COMPROBE ___ SILVER ✓ OYO ___ OTHER ___
MICROLOGGER 5301 ✓ OTHER ___
TELEVIEWER ACOUSTIC #5174 ✓ OTHER ___

PROBE TILT TEST 90.1° BRUNTON TILT 90°
PROBE TILT TEST 18.5° BRUNTON TILT 19°
PROBE TILT TEST 14.3 BRUNTON TILT 14°
PROBE AZIMUTH TEST 196.7° BRUNTON AZIMUTH 194°
PROBE AZIMUTH TEST 351.2 BRUNTON AZIMUTH 350°
PROBE AZIMUTH TEST 217.3 BRUNTON AZIMUTH 220°

PROBE OFFSET	1.44M(4.72FT)	
MINUS CASING STICK-UP	-2.25	
DEPTH REF. OFFSET AT START	2.47'	
DEPTH REF. OFFSET AT END	2.45	
AFTER SURVEY DEPTH ERROR	-0.02'	LESS THAN 0.4%? YES

LOG NAME	START DEPTH	START TIME	END DEPTH	END TIME
B305AUU102	582.5'	23:53	∅	00:21

MAINTENANCE PERFORMED ON SITE:

EQUIPMENT PROBLEMS OR FAILURES: CAUGHT ON TRIP OUT @ 360'

SUGGESTIONS, ADDITIONS, CHANGES:

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B-305 BORING GEOPHYSICS FIELD LOG SUMMARY

SITE: SOUTH TEXAS PROJECT COL DATE: 12/8/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 1 OF 1

CONTACT: MIKE SUFNARSKI PHONE: 704-357-5633

BOREHOLE CONSTRUCTION: CASED ____ UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4" 0 TO 90' ; ____, ____ TO ____
BOREHOLE TOTAL DEPTH AS DRILLED: 90'
CONDUCTOR CASING?: YES ____ DEPTH TO BOTTOM OF CASING ____; NO ✓
DEPTH TO BEDROCK: NA
BOREHOLE FLUID: WATER ____; FRESH WATER MUD ✓; SALT WATER MUD ____;

LOGGING CREW: R. STELLER

LOG TYPE	FILE NAME	DEPTH RANGE	DATE	TIMES
~~B305 ELOG TEST~~	B305ELOGTEST01	∅	12/8/06	07:30 – 07:53
ELOG/GAMMA	B305ELOG UP01	90.0' – 35.0'	"	08:41 – 08:48
SUSPENSION P.S.	B305_001-007.DAT	1.6' – 77.1'	"	08:59 – 09:35
CALIPER TEST	B305CALTEST01	∅	"	09:49 – 09:51
CALIPER/GAMMA	B305CALUP01	88.0 – ∅	"	09:57 – 10:07
CALIPER TEST	B305CALTEST02	∅	"	10:08 – 10:11
DEVIATION	B305AMUP01	88.0 – ∅	"	10:40 – 10:50

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B-305 ELOG FIELD LOG

SITE: SOUTH TEXAS PROJECT COL DATE: 12/8/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 1 OF 2

CONTACT: _____ OFFICE PHONE: _____
CELL PHONE: _____
CONTACT: _____ OFFICE PHONE: _____
PHONE: _____
CONTACT: _____ PHONE: _____
PHONE: _____
CONTACT: _____ PHONE: _____
PHONE: _____
DRILLER: _____ PHONE: _____
COMPANY: _____ PHONE: _____

GENERAL SITE CONDITIONS/LOCATION: _____

BOREHOLE DESIGNATION: B-305-DH LOCATION: _____

COUNTY: _____ RANGE: _____ TOWNSHIP: _____ SECTION: _____
BOREHOLE CONSTRUCTION: CASED ____ UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4" 0 TO 90' ; _____, _____ TO _____
BOREHOLE TOTAL DEPTH AS DRILLED: 90'
CONDUCTOR CASING?: YES ___ DEPTH TO BOTTOM OF CASING _____; NO ✓
DEPTH TO BEDROCK: NA DEPTH TO WATER TABLE: ≈20'
BOREHOLE FLUID: WATER ____; FRESH WATER MUD ✓; SALT WATER MUD ____;
OTHER: _____
DEPTH TO BOREHOLE FLUID: Ø TIME SINCE LAST CIRCULATION: 1/2 HR

LOGGING CREW: R. STELLER, C. CARTER
VEHICLE(S) USED AND MILEAGE: RENTAL
MOBILIZED FROM: BAY CITY, TX DEPARTURE TIME: 06:30
ARRIVED ON SITE: 07:00
STANDBY TIME: _____ CAUSE: _____
LOGGING STARTED: 07:30 LOGGING COMPLETED: 08:48

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SITE: SOUTH TEXAS PROJECT COL B-305 DATE: 12/8/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 2 OF 2

WINCH: COMPROBE ____ SILVER ✓ OYO ____ OTHER ____
MICROLOGGER 5301 ✓ OTHER ____
ELOG PROBE 5490 ✓ OTHER ____

PROBE LENGTH	2.50M(8.20 FT)	
PLUS YOKE 10.0M (32.8 FT)	32.8'	
MINUS CASING STICK-UP	Ø	
DEPTH REF. OFFSET AT START	41.0	
DEPTH REF. OFFSET AT END	41.0	
AFTER SURVEY DEPTH ERROR	Ø	LESS THAN 0.4%? YES

LOG NAME	START DEPTH	START TIME	END DEPTH	END TIME
B305 ELOG TEST 01	Ø	07:30	Ø	07:35
B305 ELOG UP 01	90.0'	08:41	35.0	08:48

MAINTENANCE PERFORMED ON SITE: ____

EQUIPMENT PROBLEMS OR FAILURES: ____

SUGGESTIONS, ADDITIONS, CHANGES: ____

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P-S SUSPENSION VELOCITY FIELD LOG

SITE: SOUTH TEXAS PROJECT COL B-305 DATE: 12/8/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 1 OF 1

CONTACT: MIKE SUFNARSKI OFFICE PHONE: 704-357-5633
CELL PHONE: 704-309-0624
CONTACT: OFFICE PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
DRILLER: PHONE:
COMPANY: PHONE:

DIRECTIONS TO SITE:

GENERAL SITE CONDITIONS/LOCATION:

EA#:
BOREHOLE DESIGNATION: B-305 - DH LOCATION:

COUNTY: RANGE: TOWNSHIP: SECTION:
BOREHOLE CONSTRUCTION: CASED UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4" 0 TO 90' ; , TO
BOREHOLE TOTAL DEPTH AS DRILLED: 90'
CONDUCTOR CASING?: YES DEPTH TO BOTTOM OF CASING ; NO ✓
DEPTH TO BEDROCK: ND DEPTH TO WATER TABLE: ≈20'
BOREHOLE FLUID: WATER ; FRESH WATER MUD ✓ ; SALT WATER MUD ;
OTHER:
DEPTH TO BOREHOLE FLUID: 0 TIME SINCE LAST CIRCULATION: 1HR

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SITE: SOUTH TEXAS PROJECT COL B-305 DATE: 12/8/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 2 OF 4

LOGGING CREW: R. STELLER, Q. CARTER
VEHICLE(S) USED AND MILEAGE: RENTAL
MOBILIZED FROM: BAY CITY, TX DEPARTURE TIME: 06:30
ARRIVED ON SITE: 07:00
STANDBY TIME: CAUSE:
LOGGING STARTED: 09:59 LOGGING COMPLETED: 09:35
STANDBY TIME: CAUSE:
LOGGING STARTED: LOGGING COMPLETED:
DEMOBILIZED TO: ARRIVAL TIME:
ADDITIONAL DEMOB TIME: REASON:

BATTERIES CHANGED BEFORE LOGGING: YES ____; NO ✓; STORED WITH NEW ____

WINCH	COMPROBE ☐		GREY ☐	OYO ☐	RG ☐		OTH ☑	
INSTRUMENT	OYO 12004 ☐	15014 ☐	19029 ☐		RG 160023 ☑	160024 ☐		
RECEIVER S/N	12008 ☐	20042 ☐	26066 ☐	11001 ☐	23053 ☐	30086 ☑		

MAINTENANCE PERFORMED ON SITE:

EQUIPMENT PROBLEMS OR FAILURES:

SUGGESTIONS, ADDITIONS, CHANGES:

COMMENTS: DEPTH ZERO @ 0.5m
ZERO EXIT @ 0.5m

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GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: SOUTH TEXAS COL B-305 DATE: 12/8/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 3 OF 4

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
0.5	1.64	1		
1.0	3.28	2		
1.5	4.92	3		
2.0	6.56	4		
2.5	8.20	5		
3.0	9.84	6		
3.5	11.48	7		
4.0	13.12	8		
4.5	14.76	9		
5.0	16.40	10		
5.5	18.04	11		
6.0	19.69	12		
6.5	21.33	13		
7.0	22.97	14		
7.5	24.61	15		
8.0	26.25	16		
8.5	27.89	17		
9.0	29.53	18		
9.5	31.17	19		
10.0	32.81	20		
10.5	34.45	21		
11.0	36.09	22		
11.5	37.73	23		
12.0	39.37	24		
12.5	41.01	25		
13.0	42.65	26		
13.5	44.29	27		
14.0	45.93	28		
14.5	47.57	29		
15.0	49.21	30		
15.5	50.85	31		
16.0	52.49	32		
16.5	54.13	33		
17.0	55.77	34		
17.5	57.41	35		
18.0	59.06	36		
18.5	60.70	37		
19.0	62.34	38		
19.5	63.98	39		
20.0	65.62	40		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: SOUTH TEXAS COL B-305 DATE: 12/8/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 4 OF 4

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
20.5	67.26	41		
21.0	68.90	42		
21.5	70.54	43		
22.0	72.18	44		
22.5	73.82	45		
23.0	75.46	46		
23.5	77.10	47		BOTTOM MEASUREMENT?
24.0	78.74			HK BOTTOM @ 23.6m
24.5	80.38			
25.0	82.02			
25.5	83.66			
26.0	85.30			
26.5	86.94			
27.0	88.58			
27.5	90.22			T.D. @ 90
28.0	91.86			
28.5	93.50			
29.0	95.14			
29.5	96.78			
30.0	98.43			
30.5	100.07			
31.0	101.71			
31.5	103.35			
32.0	104.99			
32.5	106.63			
33.0	108.27			
33.5	109.91			
34.0	111.55			
34.5	113.19			
35.0	114.83			
35.5	116.47			
36.0	118.11			
36.5	119.75			
37.0	121.39			
37.5	123.03			
38.0	124.67			
38.5	126.31			
39.0	127.95			
39.5	129.59			
40.0	131.23			

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B-305 CALIPER FIELD LOG

SITE: SOUTH TEXAS PROJECT COL DATE: 12/8/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 1 OF 2

CONTACT: MIKE SUFNARSKI OFFICE PHONE:
CELL PHONE: 704-357-5633
CONTACT: OFFICE PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
DRILLER: PHONE:
COMPANY: PHONE:

GENERAL SITE CONDITIONS/LOCATION:

BOREHOLE DESIGNATION: B-305-DH LOCATION:

COUNTY: RANGE: TOWNSHIP: SECTION:
BOREHOLE CONSTRUCTION: CASED ____ UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4" 0 TO 90' ; ____ ; ____ TO ____
BOREHOLE TOTAL DEPTH AS DRILLED: 90'
CONDUCTOR CASING?: YES ____ DEPTH TO BOTTOM OF CASING ____; NO ✓
DEPTH TO BEDROCK: NA DEPTH TO WATER TABLE: ≈ 20'
BOREHOLE FLUID: WATER ____; FRESH WATER MUD ✓; SALT WATER MUD ____;
OTHER:
DEPTH TO BOREHOLE FLUID: 0 TIME SINCE LAST CIRCULATION: ≈ 2 HR

LOGGING CREW: R. STELLER, C. CARTER
VEHICLE(S) USED AND MILEAGE: RENTAL
MOBILIZED FROM: BAY CITY, TX DEPARTURE TIME: 06:30
ARRIVED ON SITE: 07:00
STANDBY TIME: CAUSE:
LOGGING STARTED: 09:09 LOGGING COMPLETED: 10:11

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SITE: SOUTH TEXAS PROJECT COL B-305 DATE: 12/8/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 2 OF 2

WINCH: COMPROBE ____ SILVER ✓ OYO ____ OTHER ____
MICROLOGGER 5301 ✓ OTHER ____
CALIPER PROBE 5368 ✓ OTHER ____

PROBE OFFSET	2.08M(6.82 FT) 12 IN MAX
MINUS CASING STICK-UP	∅
DEPTH REF. OFFSET AT START	6.82'
DEPTH REF. OFFSET AT END	6.80
AFTER SURVEY DEPTH ERROR	-0.02 LESS THAN 0.4%? YES

LOG NAME	START DEPTH	START TIME	END DEPTH	END TIME
B305 CAL TEST 01	∅	09:49	∅	09:51
B305 CAL UP 01	88.0	09:57	∅	10:02
B305 CAL TEST 02	∅	10:08	∅	10:11

CALIBRATION PLATE S/N 201

		AS BUILT			PVC FITTING
		1.968 IN	3.937 IN	8.000 IN	4.507 IN
	FILE NAME	(50 MM)	(100 MM)	(203.2 MM)	(114.3 MM)
AS MEAS.	B305 CAL TEST 01	2.00	3.96	8.02	4.52
AS MEAS.	B305 CAL TEST 02	1.97	3.94	8.01	4.49
AS MEAS.					
AS MEAS.					
AS MEAS.					
AS MEAS.					

MAINTENANCE PERFORMED ON SITE: ____

EQUIPMENT PROBLEMS OR FAILURES: ____

SUGGESTIONS, ADDITIONS, CHANGES: ____

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B-305 ACOUSTIC TELEVIEWER FIELD LOG

SITE: SOUTH TEXAS PROJECT COL DATE: 12/8/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 1 OF 2

CONTACT: MIKE SUFNARSKI OFFICE PHONE: 704-357-5633
CELL PHONE: 704-309-0624
CONTACT: OFFICE PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
DRILLER: PHONE:
COMPANY: PHONE:

DIRECTIONS TO SITE:

GENERAL SITE CONDITIONS/LOCATION:

BOREHOLE DESIGNATION: B-305 - DH LOCATION:

COUNTY: RANGE: TOWNSHIP: SECTION:
BOREHOLE CONSTRUCTION: CASED ____ UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4" 0 TO 90' ; ____, ____ TO ____
BOREHOLE TOTAL DEPTH AS DRILLED: 90'
CONDUCTOR CASING?: YES ____ DEPTH TO BOTTOM OF CASING ____; NO ✓
DEPTH TO BEDROCK: NA DEPTH TO WATER TABLE: ≈20'
BOREHOLE FLUID: WATER ____; FRESH WATER MUD ✓; SALT WATER MUD ____;
OTHER:
DEPTH TO BOREHOLE FLUID: Ø TIME SINCE LAST CIRCULATION: ≈ 3HR

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SITE: SOUTH TEXAS PROJECT COL B-305 DATE: 12/8/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 2 OF 2

LOGGING CREW: R. STELLER, C. CARTER
VEHICLE(S) USED AND MILEAGE: RENTAL
MOBILIZED FROM: BAY CITY, TX DEPARTURE TIME: 06:30
ARRIVED ON SITE: 07:00
STANDBY TIME: CAUSE:
LOGGING STARTED: 10:40 LOGGING COMPLETED: 10:50

WINCH: COMPROBE ___ SILVER ✓ OYO ___ OTHER ___
MICROLOGGER 5301 ✓ OTHER ___
TELEVIEWER ACOUSTIC #5174 ✓ OTHER ___

PROBE TILT TEST 89.5° BRUNTON TILT 89°
PROBE TILT TEST ___ BRUNTON TILT ___
PROBE TILT TEST ___ BRUNTON TILT ___
PROBE AZIMUTH TEST 212.3° BRUNTON AZIMUTH 211°
PROBE AZIMUTH TEST 103.1° BRUNTON AZIMUTH 107°
PROBE AZIMUTH TEST ___ BRUNTON AZIMUTH ___

PROBE OFFSET	1.44M(4.72FT)	
MINUS CASING STICK-UP	Ø	
DEPTH REF. OFFSET AT START	4.72	
DEPTH REF. OFFSET AT END	4.70	
AFTER SURVEY DEPTH ERROR	-0.02	LESS THAN 0.4%? YES

LOG NAME	START DEPTH	START TIME	END DEPTH	END TIME
B305 Run up on	88.0	10:40	Ø	10:50

MAINTENANCE PERFORMED ON SITE:

EQUIPMENT PROBLEMS OR FAILURES:

SUGGESTIONS, ADDITIONS, CHANGES:

GEOVision Geophysical Services *1151 Pomona Road, Unit P, Corona, CA 92882* *Ph (951) 549-1234 Fx (951) 549-1236*

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B-308-DH BORING GEOPHYSICS FIELD LOG SUMMARY

SITE: SOUTH TEXAS PROJECT COL DATE: 12/7/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 1 OF 1

CONTACT: MIKE SUFNARSKI PHONE: 704-357-5633

BOREHOLE CONSTRUCTION: CASED ____ UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4" 0 TO 215' ; ____, ____ TO ____
BOREHOLE TOTAL DEPTH AS DRILLED: 215
CONDUCTOR CASING?: YES ____ DEPTH TO BOTTOM OF CASING ____; NO ✓
DEPTH TO BEDROCK: NA
BOREHOLE FLUID: WATER ____; FRESH WATER MUD ✓; SALT WATER MUD ____;

LOGGING CREW: R. STELLER, C. CARTER

LOG TYPE	FILE NAME	DEPTH RANGE	DATE	TIMES
ELOG TEST	B308ELOGTEST01	Ø	12/7/06	13:30 - 13:34
ELOG/GAMMA	B308ELOGUP01	215.5' - 35.0'	"	13:44 - 14:04
SUSPENSION PS	B308_001 - 122.004	3.3' - 201.8'	"	14:15 - 16:00
CALIPER TEST	B308CALTEST01	Ø	"	16:08 - 16:11
CALIPER/GAMMA	B308CALLUP01	210.0' - Ø	"	16:20 - 16:41
CALIPER TEST	B308CALTEST02	Ø	"	16:44 - 16:46
DEVIATION	B308AZIMUP01	210.0' - Ø	"	17:00 - 17:15

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B-308 CALIPER FIELD LOG

SITE: SOUTH TEXAS PROJECT COL DATE: 12/7/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 1 OF 2

CONTACT: MIKE SUFNARSKI OFFICE PHONE:
CELL PHONE: 704-357-5633
CONTACT: OFFICE PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
DRILLER: PHONE:
COMPANY: PHONE:

GENERAL SITE CONDITIONS/LOCATION:

BOREHOLE DESIGNATION: B-308-DH LOCATION:

COUNTY: RANGE: TOWNSHIP: SECTION:
BOREHOLE CONSTRUCTION: CASED ____ UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4" 0 TO 215' ; ____ ____ TO ____
BOREHOLE TOTAL DEPTH AS DRILLED: 215'
CONDUCTOR CASING?: YES ____ DEPTH TO BOTTOM OF CASING ____ ; NO ✓
DEPTH TO BEDROCK: NA DEPTH TO WATER TABLE: ~20'
BOREHOLE FLUID: WATER ____ ; FRESH WATER MUD ✓ ; SALT WATER MUD ____ ;
OTHER:
DEPTH TO BOREHOLE FLUID: Ø TIME SINCE LAST CIRCULATION: ~3HR

LOGGING CREW: R. STELLER, C. CARTER
VEHICLE(S) USED AND MILEAGE: RENTAL
MOBILIZED FROM: BAY CITY, TX DEPARTURE TIME: 06:15
ARRIVED ON SITE: 06:45
STANDBY TIME: CAUSE:
LOGGING STARTED: 16:08 LOGGING COMPLETED: 16:46

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SITE: SOUTH TEXAS PROJECT COL B-308 DATE: 12/7/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 2 OF 2

RAS 12/7/06

WINCH: COMPROBE ✗ SILVER ✓ OYO ____ OTHER ____
MICROLOGGER 5301 ✓ OTHER ____
CALIPER PROBE 5368 ✓ OTHER ____

PROBE OFFSET	2.08M(6.82 FT) 12 IN MAX	
MINUS CASING STICK-UP	Ø	
DEPTH REF. OFFSET AT START	6.82'	
DEPTH REF. OFFSET AT END	6.80	
AFTER SURVEY DEPTH ERROR	-0.02'	LESS THAN 0.4%? YES

LOG NAME	START DEPTH	START TIME	END DEPTH	END TIME
B-308 CALTEST01	Ø	16:08	Ø	16:11
B308 CALUP01	210.0'	16:20	Ø	16:41
B308 CALTEST02	Ø	16:44	Ø	16:46

CALIBRATION PLATE S/N 201

		AS BUILT			PVC FITTING
		1.968 IN	3.937 IN	8.000 IN	4.507 IN
	FILE NAME	(50 MM)	(100 MM)	(203.2 MM)	(114.3 MM)
AS MEAS.	B308 CALTEST01	1.97	3.92	7.98	4.51
AS MEAS.	B308 CALTEST02	1.94	391	8.01	4.50
AS MEAS.					
AS MEAS.					
AS MEAS.					
AS MEAS.					

MAINTENANCE PERFORMED ON SITE: ____

EQUIPMENT PROBLEMS OR FAILURES: ____

SUGGESTIONS, ADDITIONS, CHANGES: ____

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B-308 ACOUSTIC TELEVIEWER FIELD LOG

SITE: SOUTH TEXAS PROJECT COL DATE: 12/7/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 1 OF 2

CONTACT: MIKE SUFNARSKI OFFICE PHONE: 704-357-5633
CELL PHONE: 704-309-0624
CONTACT: OFFICE PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
DRILLER: PHONE:
COMPANY: PHONE:

DIRECTIONS TO SITE:

GENERAL SITE CONDITIONS/LOCATION:

BOREHOLE DESIGNATION: B-308-DH LOCATION:

COUNTY: RANGE: TOWNSHIP: SECTION:
BOREHOLE CONSTRUCTION: CASED UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4" 0 TO 215' ; , TO
BOREHOLE TOTAL DEPTH AS DRILLED: 215'
CONDUCTOR CASING?: YES DEPTH TO BOTTOM OF CASING ; NO ✓
DEPTH TO BEDROCK: NA DEPTH TO WATER TABLE: ≈20'
BOREHOLE FLUID: WATER ; FRESH WATER MUD ✓ ; SALT WATER MUD ;
OTHER:
DEPTH TO BOREHOLE FLUID: Ø TIME SINCE LAST CIRCULATION: ≈4HR

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SITE: SOUTH TEXAS PROJECT COL B-308 DATE: 12/7/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 2 OF 2

LOGGING CREW: R. STELLER, C. CARTER
VEHICLE(S) USED AND MILEAGE: RENTAL
MOBILIZED FROM: BAY CITY, TX DEPARTURE TIME: 06:15
ARRIVED ON SITE: 06:45
STANDBY TIME: CAUSE:
LOGGING STARTED: 17:00 LOGGING COMPLETED: 17:15

WINCH: COMPROBE ___ SILVER ✓ OYO ___ OTHER ___
MICROLOGGER 5301 ✓ OTHER ___
TELEVIEWER ACOUSTIC #5174 ✓ OTHER ___

PROBE TILT TEST 90.2° BRUNTON TILT 91.0°
PROBE TILT TEST 0.4 BRUNTON TILT Ø
PROBE TILT TEST ___ BRUNTON TILT ___
PROBE AZIMUTH TEST 328.2° BRUNTON AZIMUTH 326°
PROBE AZIMUTH TEST 273.6° BRUNTON AZIMUTH 269°
PROBE AZIMUTH TEST ___ BRUNTON AZIMUTH ___

PROBE OFFSET	1.44M(4.72FT)	
MINUS CASING STICK-UP	Ø	
DEPTH REF. OFFSET AT START	4.72'	
DEPTH REF. OFFSET AT END	4.85	
AFTER SURVEY DEPTH ERROR	+0.13'	LESS THAN 0.4%? YES

LOG NAME	START DEPTH	START TIME	END DEPTH	END TIME
B308AllUP01.	210.0'	17:00	Ø	17:15

RAS 12/7/06

MAINTENANCE PERFORMED ON SITE:

EQUIPMENT PROBLEMS OR FAILURES:

SUGGESTIONS, ADDITIONS, CHANGES:

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P-S SUSPENSION VELOCITY FIELD LOG

SITE: SOUTH TEXAS PROJECT COL B-308 DATE: 12/7/05
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 1 OF 6

CONTACT: MIKE SUFNARSKI OFFICE PHONE: 704-357-5633
CELL PHONE: 704-309-0624
CONTACT: OFFICE PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
DRILLER: PHONE:
COMPANY: PHONE:

DIRECTIONS TO SITE:

GENERAL SITE CONDITIONS/LOCATION:

EA#:
BOREHOLE DESIGNATION: B-308-DH LOCATION:

COUNTY: RANGE: TOWNSHIP: SECTION:
BOREHOLE CONSTRUCTION: CASED ____ UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4" 0 TO 215' ; ____, ____ TO ____
BOREHOLE TOTAL DEPTH AS DRILLED: 215'
CONDUCTOR CASING?: YES ____ DEPTH TO BOTTOM OF CASING ____; NO ✓
DEPTH TO BEDROCK: NA DEPTH TO WATER TABLE: ~20'
BOREHOLE FLUID: WATER ____; FRESH WATER MUD ✓; SALT WATER MUD ____;
OTHER:
DEPTH TO BOREHOLE FLUID: 0 TIME SINCE LAST CIRCULATION: ~2HR

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SITE: SOUTH TEXAS PROJECT COL B-308 DATE: 12/7/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 2 OF 6

LOGGING CREW: R. STELLER, C. CARTER
VEHICLE(S) USED AND MILEAGE: RENTAL
MOBILIZED FROM: BAY CITY, TX DEPARTURE TIME: 06:15
ARRIVED ON SITE: 06:45
STANDBY TIME: CAUSE:
LOGGING STARTED: 14:15 LOGGING COMPLETED: 16:00
STANDBY TIME: CAUSE:
LOGGING STARTED: LOGGING COMPLETED:
DEMOBILIZED TO: ARRIVAL TIME:
ADDITIONAL DEMOB TIME: REASON:

BATTERIES CHANGED BEFORE LOGGING: YES ____; NO ✓; STORED WITH NEW ____

WINCH	COMPROBE ☐		GREY ☐	OYO ☐	RG ☐	OTH ☑		
INSTRUMENT	OYO 12004 ☐	15014 ☐	19029 ☐		RG 160023 ☑	160024 ☐		
RECEIVER S/N	12008 ☐	20042 ☐	26066 ☐	11001 ☐	23053 ☐	30086 ☑		

MAINTENANCE PERFORMED ON SITE:

EQUIPMENT PROBLEMS OR FAILURES:

SUGGESTIONS, ADDITIONS, CHANGES:

COMMENTS: DEPTH ZERO = 2.5m − 0.0 = 2.5 m
DEPTH END = 2.6 m.

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: SOUTH TEXAS COL B-308 DATE: 12/7/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 5 OF 6

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
0.5	1.64			
1.0	3.28	1		
1.5	4.92	2		
2.0	6.56	3		
2.5	8.20	4		
3.0	9.84	5		
3.5	11.48	6		
4.0	13.12	7		
4.5	14.76	8		
5.0	16.40	9		
5.5	18.04	10		
6.0	19.69	11		
6.5	21.33	12		
7.0	22.97	13		
7.5	24.61	14		
8.0	26.25	15		
8.5	27.89	16		
9.0	29.53	17		
9.5	31.17	18.		
10.0	32.81	19		
10.5	34.45	20		
11.0	36.09	21		
11.5	37.73	22		
12.0	39.37	23		
12.5	41.01	24		
13.0	42.65	25		
13.5	44.29	26		
14.0	45.93	27		
14.5	47.57	28		
15.0	49.21	29		
15.5	50.85	30		
16.0	52.49	31		
16.5	54.13	32		
17.0	55.77	33		
17.5	57.41	34		
18.0	59.06	35		
18.5	60.70	36		
19.0	62.34	37		
19.5	63.98	38		
20.0	65.62	39		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: SOUTH TEXAS COL B-308 DATE: 12/7/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 4 OF 6

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
20.5	67.26	40		
21.0	68.90	41		
21.5	70.54	42		
22.0	72.18	43		
22.5	73.82	44		
23.0	75.46	45		
23.5	77.10	46		
24.0	78.74	47		
24.5	80.38	48		
25.0	82.02	49		
25.5	83.66	50		
26.0	85.30	51		
26.5	86.94	52		
27.0	88.58	53		
27.5	90.22	54		
28.0	91.86	55		
28.5	93.50	56		
29.0	95.14	57		
29.5	96.78	58		
30.0	98.43	59		
30.5	100.07	60		
31.0	101.71	61		
31.5	103.35	62		
32.0	104.99	63		
32.5	106.63	64		
33.0	108.27	65		
33.5	109.91	66		
34.0	111.55	67		
34.5	113.19	68		
35.0	114.83	69		
35.5	116.47	70		
36.0	118.11	71		
36.5	119.75	72		
37.0	121.39	73		
37.5	123.03	74		
38.0	124.67	75		
38.5	126.31	76		
39.0	127.95	77		
39.5	129.59	78		
40.0	131.23	79		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: SOUTH TEXAS COL B-308 DATE: 12/7/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 5 OF 6

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
40.5	132.87	80		
41.0	134.51	81		
41.5	136.15	82		
42.0	137.80	83		
42.5	139.44	84		
43.0	141.08	85		
43.5	142.72	86		
44.0	144.36	87		
44.5	146.00	88		
45.0	147.64	89		
45.5	149.28	90		
46.0	150.92	91		
46.5	152.56	92		
47.0	154.20	93		
47.5	155.84	94		
48.0	157.48	95		
48.5	159.12	96		
49.0	160.76	97		
49.5	162.40	98		
50.0	164.04	99		
50.5	165.68	100		
51.0	167.32	101		
51.5	168.96	102		
52.0	170.60	103		
52.5	172.24	104		
53.0	173.88	105		
53.5	175.52	106		
54.0	177.17	107		
54.5	178.81	108		
55.0	180.45	109		
55.5	182.09	110		
56.0	183.73	111		
56.5	185.37	112		
57.0	187.01	113		
57.5	188.65	114		
58.0	190.29	115		
58.5	191.93	116		
59.0	193.57	117		
59.5	195.21	118		
60.0	196.85	119		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: SOUTH TEXAS COL B-308 DATE: 12/7/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 6 OF 6

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
60.5	198.49	120		
61.0	200.13	121		
61.5	201.77	122		BOTTOM MEASUREMENT ?
62.0	203.41			HIT BOTTOM @ 61.7
62.5	205.05			
63.0	206.69			
63.5	208.33			
64.0	209.97			
64.5	211.61			
65.0	213.25			
65.5	214.90			T.D. @ 215'
66.0	216.54			
66.5	218.18			
67.0	219.82			
67.5	221.46			
68.0	223.10			
68.5	224.74			
69.0	226.38			
69.5	228.02			
70.0	229.66			
70.5	231.30			
71.0	232.94			
71.5	234.58			
72.0	236.22			
72.5	237.86			
73.0	239.50			
73.5	241.14			
74.0	242.78			
74.5	244.42			
75.0	246.06			
75.5	247.70			
76.0	249.34			
76.5	250.98			
77.0	252.62			
77.5	254.27			
78.0	255.91			
78.5	257.55			
79.0	259.19			
79.5	260.83			
80.0	262.47			

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B-308 ELOG FIELD LOG

SITE: SOUTH TEXAS PROJECT COL DATE: 12/7/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 1 OF 2

CONTACT: _____ OFFICE PHONE: _____
CELL PHONE: _____
CONTACT: _____ OFFICE PHONE: _____
PHONE: _____
CONTACT: _____ PHONE: _____
PHONE: _____
CONTACT: _____ PHONE: _____
PHONE: _____
DRILLER: _____ PHONE: _____
COMPANY: _____ PHONE: _____

GENERAL SITE CONDITIONS/LOCATION: _____

BOREHOLE DESIGNATION: B-308-DH LOCATION: _____

COUNTY: _____ RANGE: _____ TOWNSHIP: _____ SECTION: _____
BOREHOLE CONSTRUCTION: CASED ____ UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4 0 TO 215' ; ____, ____ TO ____
BOREHOLE TOTAL DEPTH AS DRILLED: 215'
CONDUCTOR CASING?: YES ____ DEPTH TO BOTTOM OF CASING ____; NO ✓
DEPTH TO BEDROCK: NA DEPTH TO WATER TABLE: 120'
BOREHOLE FLUID: WATER ____; FRESH WATER MUD ✓; SALT WATER MUD ____;
OTHER: _____
DEPTH TO BOREHOLE FLUID: Ø TIME SINCE LAST CIRCULATION: 8 HR

LOGGING CREW: R. STELLER, C. CARTER
VEHICLE(S) USED AND MILEAGE: RENTAL
MOBILIZED FROM: BAY CITY, TX DEPARTURE TIME: 06:15
ARRIVED ON SITE: 06:45
STANDBY TIME: _____ CAUSE: _____
LOGGING STARTED: 13:30 LOGGING COMPLETED: 14:04

GEOVision Geophysical Services *1151 Pomona Road, Unit P, Corona, CA 92882* *Ph (951) 549-1234 Fx (951) 549-1236*

SITE: SOUTH TEXAS PROJECT COL B-308 DATE: 12/7/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 2 OF 2

WINCH: COMPROBE ____ SILVER ✓ OYO ____ OTHER ____
MICROLOGGER 5301 ✓ OTHER ____
ELOG PROBE 5490 ✓ OTHER ____

PROBE LENGTH	2.50M(8.20 FT)	
PLUS YOKE 10.0M (32.8 FT)	32.8 FT	
MINUS CASING STICK-UP	-0.0	
DEPTH REF. OFFSET AT START	41.0'	
DEPTH REF. OFFSET AT END	41.1	
AFTER SURVEY DEPTH ERROR	+0.1	LESS THAN 0.4%? YES.

LOG NAME	START DEPTH	START TIME	END DEPTH	END TIME
B308 ELOG TEST01	Ø	13:30	Ø	13:34
B308ELOGUP01	215.5'	13:44	35.0'	14:04

MAINTENANCE PERFORMED ON SITE: ____

EQUIPMENT PROBLEMS OR FAILURES: ____

SUGGESTIONS, ADDITIONS, CHANGES: ____

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B-319-DH BORING GEOPHYSICS FIELD LOG SUMMARY

SITE: SOUTH TEXAS PROJECT COL DATE: 12/7/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 1 OF 1

CONTACT: MIKE SUFNARSKI PHONE: 704-357-5633

BOREHOLE CONSTRUCTION: CASED ____ UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4" 0 TO 215' ; ____, ____ TO ____
BOREHOLE TOTAL DEPTH AS DRILLED: 215'
CONDUCTOR CASING?: YES ____ DEPTH TO BOTTOM OF CASING ____; NO ✓
DEPTH TO BEDROCK: NA
BOREHOLE FLUID: WATER ____; FRESH WATER MUD ✓; SALT WATER MUD ____;

LOGGING CREW: R. STELLER, C. CARTER

LOG TYPE	FILE NAME	DEPTH RANGE	DATE	TIMES
ELOG TEST	B319ELOGTEST01	Ø	12/7/06	08:15 - 08:17
ELOG/GAMMA	B319ELOGUP01	215.0' - 34.5	"	08:35 - 09:01
SUSPENSION PS	B319_001 - 123.004	1.6' - 201.8'	"	09:16 - 10:40
CALIPER TEST	B319CALTEST01	Ø	"	10:51 - 10:55
CALIPER/GAMMA	B319CALUP01	210.0' - 0.1'	"	11:14 - 11:37
CALIPER TEST	B319CALTEST02	Ø	"	11:40 - 11:43
DEVIATION	B319AMUP01	210.0' - Ø	"	11:55 - 12:16

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B-319 ELOG FIELD LOG

SITE: SOUTH TEXAS PROJECT COL DATE: 12/7/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 1 OF 2

CONTACT: _____ OFFICE PHONE: _____
CELL PHONE: _____
CONTACT: _____ OFFICE PHONE: _____
PHONE: _____
CONTACT: _____ PHONE: _____
PHONE: _____
CONTACT: _____ PHONE: _____
PHONE: _____
DRILLER: _____ PHONE: _____
COMPANY: _____ PHONE: _____

GENERAL SITE CONDITIONS/LOCATION: _____

BOREHOLE DESIGNATION: B-319-DH LOCATION: _____

COUNTY: _____ RANGE: _____ TOWNSHIP: _____ SECTION: _____
BOREHOLE CONSTRUCTION: CASED ____ UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4" 0 TO 215' ; _____, _____ TO ✓
BOREHOLE TOTAL DEPTH AS DRILLED: 215'
CONDUCTOR CASING?: YES ___ DEPTH TO BOTTOM OF CASING _____; NO ✓
DEPTH TO BEDROCK: NA DEPTH TO WATER TABLE: ≈20'
BOREHOLE FLUID: WATER ____; FRESH WATER MUD ✓; SALT WATER MUD ____;
OTHER: _____
DEPTH TO BOREHOLE FLUID: 0 TIME SINCE LAST CIRCULATION: ≈ 1 Hr

LOGGING CREW: R. STELLER C. CARTER
VEHICLE(S) USED AND MILEAGE: RENTAL
MOBILIZED FROM: Bay City, TX DEPARTURE TIME: 06:15
ARRIVED ON SITE: 06:45
STANDBY TIME: _____ CAUSE: _____
LOGGING STARTED: 08:15 LOGGING COMPLETED: 09:01

GEOVision Geophysical Services *1151 Pomona Road, Unit P, Corona, CA 92882* *Ph (951) 549-1234 Fx (951) 549-1236*

SITE: SOUTH TEXAS PROJECT COL B-319 DATE: 12/7/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 2 OF 2

WINCH: COMPROBE ____ SILVER ✓ OYO ____ OTHER ____
MICROLOGGER 5301 ✓ OTHER ____
ELOG PROBE 5490 ✓ OTHER ____

PROBE LENGTH	2.50M(8.20 FT)	
PLUS YOKE 10.0M (32.8 FT)	32.0'	
MINUS CASING STICK-UP	-0.0	RAS 12/7/06
DEPTH REF. OFFSET AT START	41.0'	
DEPTH REF. OFFSET AT END		
AFTER SURVEY DEPTH ERROR		LESS THAN 0.4%?

LOG NAME	START DEPTH	START TIME	END DEPTH	END TIME
B319 ELOG TEST01	0	08:15	0	08:17
B319 ELOG UP01	215.0'	08:35	34.5'	09:01

MAINTENANCE PERFORMED ON SITE: ____

EQUIPMENT PROBLEMS OR FAILURES: ____

SUGGESTIONS, ADDITIONS, CHANGES: ____

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P-S SUSPENSION VELOCITY FIELD LOG

SITE: SOUTH TEXAS PROJECT COL B-319 DATE: 12/7/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 1 OF 6

CONTACT: MIKE SUFNARSKI OFFICE PHONE: 704-357-5633
CELL PHONE: 704-309-0624
CONTACT: OFFICE PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
DRILLER: PHONE:
COMPANY: PHONE:

DIRECTIONS TO SITE:

GENERAL SITE CONDITIONS/LOCATION:

EA#:
BOREHOLE DESIGNATION: B-319-BH LOCATION:

COUNTY: RANGE: TOWNSHIP: SECTION:
BOREHOLE CONSTRUCTION: CASED ____ UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4" 0 TO 215' ; ____, ____ TO ____
BOREHOLE TOTAL DEPTH AS DRILLED: 215'
CONDUCTOR CASING?: YES ____ DEPTH TO BOTTOM OF CASING ____; NO ✓
DEPTH TO BEDROCK: NA DEPTH TO WATER TABLE: ≈20'
BOREHOLE FLUID: WATER ____; FRESH WATER MUD ✓; SALT WATER MUD ____;
OTHER:
DEPTH TO BOREHOLE FLUID: Ø TIME SINCE LAST CIRCULATION: ≈1 HR

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SITE: SOUTH TEXAS PROJECT COL B-319 DATE: 12/7/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 2 OF 6

LOGGING CREW: R. STELLER, C. CARTER
VEHICLE(S) USED AND MILEAGE: RENTAL
MOBILIZED FROM: BAY CITY, TX DEPARTURE TIME: 06:15
ARRIVED ON SITE: 06:45
STANDBY TIME: CAUSE:
LOGGING STARTED: 9:16 LOGGING COMPLETED: 10:00
STANDBY TIME: CAUSE:
LOGGING STARTED: LOGGING COMPLETED:
DEMOBILIZED TO: ARRIVAL TIME:
ADDITIONAL DEMOB TIME: REASON:

BATTERIES CHANGED BEFORE LOGGING: YES ____; NO ✓; STORED WITH NEW ____

WINCH	COMPROBE	☐	GREY	☐	OYO	☐	RG	☐	OTH	☑
INSTRUMENT	OYO 12004	☐	15014	☐	19029	☐	RG 160023	☑	160024	☐
RECEIVER S/N	12008	☐	20042	☐	26066	☐	11001 ☐	23053	☐	30086 ☑

MAINTENANCE PERFORMED ON SITE:

EQUIPMENT PROBLEMS OR FAILURES:

SUGGESTIONS, ADDITIONS, CHANGES:

COMMENTS: START ZERO @ 2.5m - 0 = 2.5m.

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GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: SOUTH TEXAS COL B-34 DATE: 12/7/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 3 OF 6

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
0.5	1.64	1		
1.0	3.28	2		
1.5	4.92	3		
2.0	6.56	4		
2.5	8.20	5		
3.0	9.84	6		
3.5	11.48	7		
4.0	13.12	8		
4.5	14.76	9		
5.0	16.40	10		
5.5	18.04	11		
6.0	19.69	12		
6.5	21.33	13		
7.0	22.97	14		
7.5	24.61	15		
8.0	26.25	16		
8.5	27.89	17		
9.0	29.53	18		
9.5	31.17	19		
10.0	32.81	20		
10.5	34.45	21		
11.0	36.09	22		
11.5	37.73	23		
12.0	39.37	24		
12.5	41.01	25		
13.0	42.65	26		
13.5	44.29	27		
14.0	45.93	28		
14.5	47.57	29		
15.0	49.21	30		
15.5	50.85	31		
16.0	52.49	32		
16.5	54.13	33		
17.0	55.77	34		
17.5	57.41	35		
18.0	59.06	36		
18.5	60.70	37		
19.0	62.34	38		
19.5	63.98	39		
20.0	65.62	40		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: SOUTH TEXAS COL B-319 DATE: 12/7/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 4 OF 6

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
20.5	67.26	41		
21.0	68.90	42		
21.5	70.54	43		
22.0	72.18	44		
22.5	73.82	45		
23.0	75.46	46		
23.5	77.10	47		
24.0	78.74	48		
24.5	80.38	49		
25.0	82.02	50		
25.5	83.66	51		
26.0	85.30	52		
26.5	86.94	53		
27.0	88.58	54		
27.5	90.22	55		
28.0	91.86	56		
28.5	93.50	57		
29.0	95.14	58		
29.5	96.78	59		
30.0	98.43	60		
30.5	100.07	61		
31.0	101.71	62		
31.5	103.35	63		
32.0	104.99	64		
32.5	106.63	65		
33.0	108.27	66		
33.5	109.91	67		
34.0	111.55	68		
34.5	113.19	69		
35.0	114.83	70		
35.5	116.47	71		
36.0	118.11	72		
36.5	119.75	73		
37.0	121.39	74		
37.5	123.03	75		
38.0	124.67	76		
38.5	126.31	77		
39.0	127.95	78		
39.5	129.59	79		
40.0	131.23	80		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: SOUTH TEXAS COL B-314 DATE: 12/7/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 5 OF 60

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
40.5	132.87	81		
41.0	134.51	82		
41.5	136.15	83		
42.0	137.80	84		
42.5	139.44	85		
43.0	141.08	86		
43.5	142.72	87		
44.0	144.36	88		
44.5	146.00	89		
45.0	147.64	90		
45.5	149.28	91		
46.0	150.92	92		
46.5	152.56	93		
47.0	154.20	94		
47.5	155.84	95		
48.0	157.48	96		
48.5	159.12	97		
49.0	160.76	98		
49.5	162.40	99		
50.0	164.04	100		
50.5	165.68	101		
51.0	167.32	102		
51.5	168.96	103		
52.0	170.60	104		
52.5	172.24	105		
53.0	173.88	106		
53.5	175.52	107		
54.0	177.17	108		
54.5	178.81	109		
55.0	180.45	110		
55.5	182.09	111		
56.0	183.73	112		
56.5	185.37	113		
57.0	187.01	114		
57.5	188.65	115		
58.0	190.29	116		
58.5	191.93	117		
59.0	193.57	118		
59.5	195.21	119		
60.0	196.85	120		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: SOUTH TEXAS COL B-319 DATE: 12/7/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 6 OF 6

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
60.5	198.49	121		
61.0	200.13	122		
61.5	201.77	123		BOTTOM MEASUREMENT?
62.0	203.41			HIT BOTTOM @ 61.7 m
62.5	205.05			
63.0	206.69			
63.5	208.33			
64.0	209.97			
64.5	211.61			
65.0	213.25			
65.5	214.90			T.D. @ 215'
66.0	216.54			
66.5	218.18			
67.0	219.82			
67.5	221.46			
68.0	223.10			
68.5	224.74			
69.0	226.38			
69.5	228.02			
70.0	229.66			
70.5	231.30			
71.0	232.94			
71.5	234.58			
72.0	236.22			
72.5	237.86			
73.0	239.50			
73.5	241.14			
74.0	242.78			
74.5	244.42			
75.0	246.06			
75.5	247.70			
76.0	249.34			
76.5	250.98			
77.0	252.62			
77.5	254.27			
78.0	255.91			
78.5	257.55			
79.0	259.19			
79.5	260.83			
80.0	262.47			

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B-319 CALIPER FIELD LOG

SITE: SOUTH TEXAS PROJECT COL DATE: 12/7/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 1 OF 2

CONTACT: MIKE SUFNARSKI OFFICE PHONE:
CELL PHONE: 704-357-5633
CONTACT: OFFICE PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
DRILLER: PHONE:
COMPANY: PHONE:

GENERAL SITE CONDITIONS/LOCATION:

BOREHOLE DESIGNATION: B-319-DH LOCATION:

COUNTY: RANGE: TOWNSHIP: SECTION:
BOREHOLE CONSTRUCTION: CASED UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4" 0 TO 215' ; , TO
BOREHOLE TOTAL DEPTH AS DRILLED: 215'
CONDUCTOR CASING?: YES DEPTH TO BOTTOM OF CASING ; NO ✓
DEPTH TO BEDROCK: NA DEPTH TO WATER TABLE: ≈26'
BOREHOLE FLUID: WATER ; FRESH WATER MUD ✓ ; SALT WATER MUD ;
OTHER:
DEPTH TO BOREHOLE FLUID: Ø TIME SINCE LAST CIRCULATION: < 3 HR

LOGGING CREW: R. STELLER, C. CARTER
VEHICLE(S) USED AND MILEAGE: RENTAL
MOBILIZED FROM: Bay City, TX DEPARTURE TIME: 6:15
ARRIVED ON SITE: 6:45
STANDBY TIME: CAUSE:
LOGGING STARTED: 10:51 LOGGING COMPLETED: 11:43

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SITE: SOUTH TEXAS PROJECT COL B-319 DATE: 12/7/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 2 OF 2

WINCH: COMPROBE ____ SILVER ✓ OYO ____ OTHER ____
MICROLOGGER 5301 ✓ OTHER ____
CALIPER PROBE 5368 ✓ OTHER ____

PROBE OFFSET	2.08M(6.82 FT) 12 IN MAX	
MINUS CASING STICK-UP	Ø	
DEPTH REF. OFFSET AT START	6.82'	
DEPTH REF. OFFSET AT END	6.90	
AFTER SURVEY DEPTH ERROR	+.08'	LESS THAN 0.4%? YES

LOG NAME	START DEPTH	START TIME	END DEPTH	END TIME
B319CALTEST01	Ø	10:51	Ø	10.55
B319CALTEST01	210.0'	11:14	0.1'	11:37
B319CALTEST02	Ø	11:40	Ø	11:43

CALIBRATION PLATE S/N 201

		AS BUILT			PVC FITTING
		1.968 IN	3.937 IN	8.000 IN	4.507 IN
	FILE NAME	(50 MM)	(100 MM)	(203.2 MM)	(114.3 MM)
AS MEAS.	B319CALTEST01	1.95	3.91	8.00	4.49
AS MEAS.	B319CALTEST02	1.97	3.91	7.99	4.50
AS MEAS.					
AS MEAS.					
AS MEAS.					
AS MEAS.					

MAINTENANCE PERFORMED ON SITE: ____

EQUIPMENT PROBLEMS OR FAILURES: ____

SUGGESTIONS, ADDITIONS, CHANGES: ____

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B-319 ACOUSTIC TELEVIEWER FIELD LOG

SITE: SOUTH TEXAS PROJECT COL DATE: 12/7/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 1 OF 2

CONTACT: MIKE SUFNARSKI OFFICE PHONE: 704-357-5633
CELL PHONE: 704-309-0624
CONTACT: OFFICE PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
DRILLER: PHONE:
COMPANY: PHONE:

DIRECTIONS TO SITE:

GENERAL SITE CONDITIONS/LOCATION:

BOREHOLE DESIGNATION: B-319-DH LOCATION:

COUNTY: RANGE: TOWNSHIP: SECTION:
BOREHOLE CONSTRUCTION: CASED UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4" 0 TO 215' ; , TO
BOREHOLE TOTAL DEPTH AS DRILLED: 215'
CONDUCTOR CASING?: YES DEPTH TO BOTTOM OF CASING ; NO ✓
DEPTH TO BEDROCK: NA DEPTH TO WATER TABLE: <20'
BOREHOLE FLUID: WATER ; FRESH WATER MUD ✓ ; SALT WATER MUD ;
OTHER:
DEPTH TO BOREHOLE FLUID: 0 TIME SINCE LAST CIRCULATION: <1 HR

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SITE: SOUTH TEXAS PROJECT COL B-314 DATE: 12/7/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 2 OF 2

LOGGING CREW: R. STELLER C. CARTER
VEHICLE(S) USED AND MILEAGE: RENTAL
MOBILIZED FROM: BAY CITY, TX DEPARTURE TIME: 6:15
ARRIVED ON SITE: 08:45
STANDBY TIME: CAUSE:
LOGGING STARTED: 11:55 LOGGING COMPLETED: 12:16

WINCH: COMPROBE ___ SILVER ✓ OYO ___ OTHER ___
MICROLOGGER 5301 ✓ OTHER ___
TELEVIEWER ACOUSTIC #5174 ✓ OTHER ___

PROBE TILT TEST 90.0° BRUNTON TILT 89.0°
PROBE TILT TEST 87.8° BRUNTON TILT 88.0°
PROBE TILT TEST ___ BRUNTON TILT ___
PROBE AZIMUTH TEST 271.0° BRUNTON AZIMUTH 264°
PROBE AZIMUTH TEST 351.7° BRUNTON AZIMUTH 351°
PROBE AZIMUTH TEST ___ BRUNTON AZIMUTH ___

PROBE OFFSET	1.44M(4.72FT)	
MINUS CASING STICK-UP	Ø	
DEPTH REF. OFFSET AT START	4.72'	
DEPTH REF. OFFSET AT END	4.75'	
AFTER SURVEY DEPTH ERROR	+0.03	LESS THAN 0.4%? YES

LOG NAME	START DEPTH	START TIME	END DEPTH	END TIME
B314AUUP 01	210.0'	11:55	Ø	12:16

MAINTENANCE PERFORMED ON SITE:

EQUIPMENT PROBLEMS OR FAILURES:

SUGGESTIONS, ADDITIONS, CHANGES:

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B-328-DH BORING GEOPHYSICS FIELD LOG SUMMARY

SITE: SOUTH TEXAS PROJECT COL DATE: 11/8/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 1 OF 1

CONTACT: MIKE SUFNARSKI PHONE: 704-357-5633

BOREHOLE CONSTRUCTION: CASED ____ UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4" 0 TO 215' ; ____, ____ TO ____
BOREHOLE TOTAL DEPTH AS DRILLED: 215'
CONDUCTOR CASING?: YES ____ DEPTH TO BOTTOM OF CASING ____; NO ✓
DEPTH TO BEDROCK: NA
BOREHOLE FLUID: WATER ____; FRESH WATER MUD ✓; SALT WATER MUD ____;

LOGGING CREW: R. STELLER

LOG TYPE	FILE NAME	DEPTH RANGE	DATE	TIMES
SUSPENSION PS	6328_001-125.DAT	3.3' – 205.1'	11/8/06	08:00 – 09:20
ELOG TEST	B328ELOGTEST01	Ø	"	09:45 – 09:48
ELOG/GAMMA	B328ELOGUP01	217.8' – 35.0'	"	10:05 – 10:25
CALIPER TEST	B328CALTEST01	Ø	"	15:23 – 15:26
CALIPER/GAMMA	B328CALUP01	210.0' – 0.5'	"	15:34 – 15:57
CALIPER TEST	B328CALTEST02	Ø	"	16:03 – 16:05
DEVIATION	B328AMUP01	217.5' – Ø	"	16:25 – 16:35

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P-S SUSPENSION VELOCITY FIELD LOG

SITE: SOUTH TEXAS PROJECT COL B-328 DH DATE: 11/8/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 1 OF 6

CONTACT: MIKE SUFNARSKI OFFICE PHONE: 704-357-5633
CELL PHONE: 704-309-0624
CONTACT: OFFICE PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
DRILLER: PHONE:
COMPANY: PHONE:

DIRECTIONS TO SITE:

GENERAL SITE CONDITIONS/LOCATION:

EA#:
BOREHOLE DESIGNATION: B-328-DH LOCATION:

COUNTY: RANGE: TOWNSHIP: SECTION:
BOREHOLE CONSTRUCTION: CASED ____ UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4" 0 TO 215 ; ____, ____ TO ____
BOREHOLE TOTAL DEPTH AS DRILLED: 215'
CONDUCTOR CASING?: YES ____ DEPTH TO BOTTOM OF CASING ____; NO ✓
DEPTH TO BEDROCK: NA DEPTH TO WATER TABLE: ~20'
BOREHOLE FLUID: WATER ____; FRESH WATER MUD ✓; SALT WATER MUD ____;
OTHER:
DEPTH TO BOREHOLE FLUID: Ø TIME SINCE LAST CIRCULATION: 16 HR.

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SITE: SOUTH TEXAS PROJECT COL B-328DH DATE: 11/8/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 2 OF 6

LOGGING CREW: R STELLER
VEHICLE(S) USED AND MILEAGE: RENTAL
MOBILIZED FROM: BAY CITY, TX DEPARTURE TIME: 6:00
ARRIVED ON SITE: 6:30
STANDBY TIME: CAUSE:
LOGGING STARTED: 08:00 LOGGING COMPLETED: 09:20
STANDBY TIME: CAUSE:
LOGGING STARTED: LOGGING COMPLETED:
DEMOBILIZED TO: ARRIVAL TIME:
ADDITIONAL DEMOB TIME: REASON:

BATTERIES CHANGED BEFORE LOGGING: YES____; NO____; STORED WITH NEW____

WINCH		COMPROBE ☐		GREY ☐	OYO ☐	RG ☐	OTH ☑				
INSTRUMENT	OYO	12004 ☐	15014 ☐	19029 ☐		RG	160023 ☑	160024 ☐			
RECEIVER S/N		12008 ☐	20042 ☐	26066 ☐	11001 ☐	23053 ☐	30086 ☑				

MAINTENANCE PERFORMED ON SITE:

EQUIPMENT PROBLEMS OR FAILURES:

SUGGESTIONS, ADDITIONS, CHANGES:

COMMENTS: DEPTH REFERENCE AT GROUND LEVEL. PROBE OFFSET = 2.5 m = 8.2 FT. ON START OF LOG. 2.5 m = 8.2 FT AT END OF LOG ASDE = 0.0'

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GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: SOUTH TEXAS COL B-328-DH DATE: 11/8/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 5 OF 6

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
0.5	1.64			
1.0	3.28	2		
1.5	4.92	3		
2.0	6.56	4		
2.5	8.20	001, 5		USE RECORD #5
3.0	9.84	6		
3.5	11.48	7		
4.0	13.12	8		
4.5	14.76	9		
5.0	16.40	10		
5.5	18.04	11		
6.0	19.69	12		
6.5	21.33	13		
7.0	22.97	14		
7.5	24.61	15		
8.0	26.25	16		
8.5	27.89	17		
9.0	29.53	18		
9.5	31.17	19		
10.0	32.81	20		
10.5	34.45	21		
11.0	36.09	22		
11.5	37.73	23		
12.0	39.37	24		
12.5	41.01	25		
13.0	42.65	26		
13.5	44.29	27		
14.0	45.93	28		
14.5	47.57	29		
15.0	49.21	30		
15.5	50.85	31		
16.0	52.49	32		
16.5	54.13	33		
17.0	55.77	34		
17.5	57.41	35		
18.0	59.06	36		
18.5	60.70	37		
19.0	62.34	38		
19.5	63.98	39		
20.0	65.62	40		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: SOUTH TEXAS COL B-328-DH DATE: 11/8/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 4 OF 6

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
20.5	67.26	41		
21.0	68.90	42		
21.5	70.54	43		
22.0	72.18	44		
22.5	73.82	45		
23.0	75.46	46		
23.5	77.10	47		
24.0	78.74	48		
24.5	80.38	49		
25.0	82.02	50		
25.5	83.66	51		
26.0	85.30	52		
26.5	86.94	53		
27.0	88.58	54		
27.5	90.22	55		
28.0	91.86	56		
28.5	93.50	57		
29.0	95.14	58		
29.5	96.78	59		
30.0	98.43	60		
30.5	100.07	61		
31.0	101.71	62		
31.5	103.35	63		
32.0	104.99	64		
32.5	106.63	65		
33.0	108.27	66		
33.5	109.91	67		
34.0	111.55	68		
34.5	113.19	69		
35.0	114.83	70		
35.5	116.47	71		
36.0	118.11	72		
36.5	119.75	73		
37.0	121.39	74		
37.5	123.03	75		
38.0	124.67	76		
38.5	126.31	77		
39.0	127.95	78		
39.5	129.59	79		
40.0	131.23	80		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: SOUTH TEXAS COL B-328-DH DATE: 11/9/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 5 OF 6

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
40.5	132.87	81		
41.0	134.51	82		
41.5	136.15	83		
42.0	137.80	84		
42.5	139.44	85		
43.0	141.08	86		
43.5	142.72	87		
44.0	144.36	88		
44.5	146.00	89		
45.0	147.64	90		
45.5	149.28	91		
46.0	150.92	92		CAUGHT ON WAY DOWN ?
46.5	152.56	93		
47.0	154.20	94		
47.5	155.84	95		
48.0	157.48	96		
48.5	159.12	97		
49.0	160.76	98		
49.5	162.40	99		
50.0	164.04	100		
50.5	165.68	101		
51.0	167.32	102		
51.5	168.96	103		
52.0	170.60	104		
52.5	172.24	105		
53.0	173.88	106		
53.5	175.52	107		
54.0	177.17	108		
54.5	178.81	109		
55.0	180.45	110		
55.5	182.09	111		
56.0	183.73	112		
56.5	185.37	113		
57.0	187.01	114		
57.5	188.65	115		
58.0	190.29	116		
58.5	191.93	117		
59.0	193.57	118		
59.5	195.21	119		
60.0	196.85	120		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: SOUTH TEXAS COL B-328-DH DATE: 11/8/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 6 OF 6

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
60.5	198.49	121		
61.0	200.13	122		
61.5	201.77	123		BOTTOM MEASUREMENT?
62.0	203.41	124		
62.5	205.05	125		HIT BOTTOM @ 62.6m. = 205.4
63.0	206.69			SO TIP @ 217.5'
63.5	208.33			
64.0	209.97			
64.5	211.61			
65.0	213.25			
65.5	214.90			T.D. @ 215'
66.0	216.54			
66.5	218.18			
67.0	219.82			
67.5	221.46			
68.0	223.10			
68.5	224.74			
69.0	226.38			
69.5	228.02			
70.0	229.66			
70.5	231.30			
71.0	232.94			
71.5	234.58			
72.0	236.22			
72.5	237.86			
73.0	239.50			
73.5	241.14			
74.0	242.78			
74.5	244.42			
75.0	246.06			
75.5	247.70			
76.0	249.34			
76.5	250.98			
77.0	252.62			
77.5	254.27			
78.0	255.91			
78.5	257.55			
79.0	259.19			
79.5	260.83			
80.0	262.47			

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B-328-DH ELOG FIELD LOG

SITE: SOUTH TEXAS PROJECT COL
DATE: 11/8/06
CLIENT: MACTEC
JOB: 6533
AUTHOR: R. STELLER
PAGE 1 OF 2

CONTACT: _____ OFFICE PHONE: _____
CELL PHONE: _____
CONTACT: _____ OFFICE PHONE: _____
PHONE: _____
CONTACT: _____ PHONE: _____
PHONE: _____
CONTACT: _____ PHONE: _____
PHONE: _____
DRILLER: _____ PHONE: _____
COMPANY: _____ PHONE: _____

GENERAL SITE CONDITIONS/LOCATION: _____

BOREHOLE DESIGNATION: B-328-DH LOCATION: _____

COUNTY: _____ RANGE: _____ TOWNSHIP: _____ SECTION: _____
BOREHOLE CONSTRUCTION: CASED ____ UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4" 0 TO 215' ; _____, _____ TO _____
BOREHOLE TOTAL DEPTH AS DRILLED: 215'
CONDUCTOR CASING?: YES ___ DEPTH TO BOTTOM OF CASING _____; NO ✓
DEPTH TO BEDROCK: NA DEPTH TO WATER TABLE: ≈20'
BOREHOLE FLUID: WATER ____; FRESH WATER MUD ✓; SALT WATER MUD ____;
OTHER: _____
DEPTH TO BOREHOLE FLUID: 0 TIME SINCE LAST CIRCULATION: ≈17 HR

LOGGING CREW: R. STELLER
VEHICLE(S) USED AND MILEAGE: RENTAL
MOBILIZED FROM: BAY CITY, TX DEPARTURE TIME: 06:00
ARRIVED ON SITE: 06:30
STANDBY TIME: _____ CAUSE: _____
LOGGING STARTED: 09:45 LOGGING COMPLETED: 10:25

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SITE: SOUTH TEXAS PROJECT COL B-328-DH DATE: 11/8/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 2 OF 2

WINCH: COMPROBE ____ SILVER ✓ OYO ____ OTHER ____
MICROLOGGER 5301 ✓ OTHER ____
ELOG PROBE 5490 ✓ OTHER ____

PROBE LENGTH	2.50M(8.20 FT)
PLUS YOKE 10.0M (32.8 FT)	~~41.0'~~ 32.8' RAB 11/8/06
MINUS CASING STICK-UP	Ø
DEPTH REF. OFFSET AT START	41.0'
DEPTH REF. OFFSET AT END	
AFTER SURVEY DEPTH ERROR	LESS THAN 0.4%?

LOG NAME	START DEPTH	START TIME	END DEPTH	END TIME
B328ELOG TEST 01	Ø	09:45	Ø	09:48
B328ELOG UP01	217.8'	10:05	~~10:25~~ 35.0'	10:26

RAB 11/8/06

MAINTENANCE PERFORMED ON SITE: ____

EQUIPMENT PROBLEMS OR FAILURES: ____

SUGGESTIONS, ADDITIONS, CHANGES: Hit Bottom @ 217.9'

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B-328-DH CALIPER FIELD LOG

SITE: SOUTH TEXAS PROJECT COL DATE: 11/8/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 1 OF 2

CONTACT: MIKE SUFNARSKI OFFICE PHONE:
CELL PHONE: 704-357-5633
CONTACT: OFFICE PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
DRILLER: PHONE:
COMPANY: PHONE:

GENERAL SITE CONDITIONS/LOCATION:

BOREHOLE DESIGNATION: LOCATION:

COUNTY: RANGE: TOWNSHIP: SECTION:
BOREHOLE CONSTRUCTION: CASED UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4" 0 TO 215' ; , TO
BOREHOLE TOTAL DEPTH AS DRILLED: 215'
CONDUCTOR CASING?: YES DEPTH TO BOTTOM OF CASING ; NO ✓
DEPTH TO BEDROCK: NA DEPTH TO WATER TABLE: 620'
BOREHOLE FLUID: WATER ; FRESH WATER MUD ✓ ; SALT WATER MUD ;
OTHER:
DEPTH TO BOREHOLE FLUID: 5' TIME SINCE LAST CIRCULATION: ~24 HR

LOGGING CREW: R. STELLER
VEHICLE(S) USED AND MILEAGE: RENTAL
MOBILIZED FROM: BAY CITY, TX DEPARTURE TIME: 06:00
ARRIVED ON SITE: 06:30
STANDBY TIME: CAUSE:
LOGGING STARTED: 15:23 LOGGING COMPLETED: 16:05

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SITE: SOUTH TEXAS PROJECT COL B-328-DH DATE: 11/8/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 2 OF 2

WINCH: COMPROBE ____ SILVER ✓ OYO ____ OTHER ____
MICROLOGGER 5301 ✓ OTHER ____
CALIPER PROBE 5368 ✓ OTHER ____

PROBE OFFSET	2.08M(6.82 FT) 12 IN MAX
MINUS CASING STICK-UP	Ø
DEPTH REF. OFFSET AT START	6.82'
DEPTH REF. OFFSET AT END	6.80
AFTER SURVEY DEPTH ERROR	-.02 LESS THAN 0.4%? YES

LOG NAME	START DEPTH	START TIME	END DEPTH	END TIME
B328CALTEST01	Ø	15:23	Ø	15:26
B328CALUP01	210.0'	15:34	.5	15:57
B328CALTEST02	Ø	16:03	Ø	16:05

CALIBRATION PLATE S/N 201

		AS BUILT			PVC FITTING
		1.968 IN	3.937 IN	8.000 IN	4.507 IN
	FILE NAME	(50 MM)	(100 MM)	(203.2 MM)	(114.3 MM)
AS MEAS.	B328CALTEST01	2.01	3.94	8.02	4.54
AS MEAS.	B328CALTEST02	2.01	3.96	8.00	4.54
AS MEAS.					
AS MEAS.					
AS MEAS.					
AS MEAS.					

MAINTENANCE PERFORMED ON SITE: ____

EQUIPMENT PROBLEMS OR FAILURES: ____

SUGGESTIONS, ADDITIONS, CHANGES: ____

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B-328 DH ACOUSTIC TELEVIEWER FIELD LOG

SITE: SOUTH TEXAS PROJECT COL DATE: 11/6/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 1 OF 2

CONTACT: MIKE SUFNARSKI OFFICE PHONE: 704-357-5633
CELL PHONE: 704-309-0624
CONTACT: OFFICE PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
DRILLER: PHONE:
COMPANY: PHONE:

DIRECTIONS TO SITE:

GENERAL SITE CONDITIONS/LOCATION:

BOREHOLE DESIGNATION: B-328-DH LOCATION:

COUNTY: RANGE: TOWNSHIP: SECTION:
BOREHOLE CONSTRUCTION: CASED ___ UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4" 0 TO 215' ; ___, ___ TO ___
BOREHOLE TOTAL DEPTH AS DRILLED: 215'
CONDUCTOR CASING?: YES ___ DEPTH TO BOTTOM OF CASING ___; NO ✓
DEPTH TO BEDROCK: NA DEPTH TO WATER TABLE: ≈20'
BOREHOLE FLUID: WATER ___; FRESH WATER MUD ✓; SALT WATER MUD ___;
OTHER:
DEPTH TO BOREHOLE FLUID: 5' TIME SINCE LAST CIRCULATION: ≈24 HR

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SITE: SOUTH TEXAS PROJECT COL B-328-DH DATE: 11/8/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 2 OF 2

LOGGING CREW: R. STELLER
VEHICLE(S) USED AND MILEAGE: RENTAL
MOBILIZED FROM: BAY CITY, TX DEPARTURE TIME: 06:00
ARRIVED ON SITE: 06:30
STANDBY TIME: CAUSE:
LOGGING STARTED: 16:23 LOGGING COMPLETED: 16:35

WINCH: COMPROBE ___ SILVER ✓ OYO ___ OTHER ___
MICROLOGGER 5301 ✓ OTHER ___
TELEVIEWER ACOUSTIC #5174 ✓ OTHER ___

PROBE TILT TEST 89.7° BRUNTON TILT 90°
PROBE TILT TEST 0.5° BRUNTON TILT Ø
PROBE TILT TEST ___ BRUNTON TILT ___
PROBE AZIMUTH TEST 126.6 BRUNTON AZIMUTH 128°
PROBE AZIMUTH TEST 341.2° BRUNTON AZIMUTH 343°
PROBE AZIMUTH TEST ___ BRUNTON AZIMUTH ___

PROBE OFFSET	1.44M(4.72FT)	
MINUS CASING STICK-UP	Ø	
DEPTH REF. OFFSET AT START	4.72	
DEPTH REF. OFFSET AT END	4.72	
AFTER SURVEY DEPTH ERROR	Ø	LESS THAN 0.4%? YES

LOG NAME	START DEPTH	START TIME	END DEPTH	END TIME
B328AU4POL	27.5'	16:23	Ø	16:35

MAINTENANCE PERFORMED ON SITE:

EQUIPMENT PROBLEMS OR FAILURES:

SUGGESTIONS, ADDITIONS, CHANGES:

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B-402-D4 BORING GEOPHYSICS FIELD LOG SUMMARY

SITE: SOUTH TEXAS PROJECT COL DATE: 12/6/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 1 OF 1

CONTACT: MIKE SUFNARSKI PHONE: 704-357-5633

BOREHOLE CONSTRUCTION: CASED ____ UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4" 0 TO 215' ; ____, ____ TO ____
BOREHOLE TOTAL DEPTH AS DRILLED: 215'
CONDUCTOR CASING?: YES ✓ DEPTH TO BOTTOM OF CASING 1' ; NO ____
DEPTH TO BEDROCK: NA
BOREHOLE FLUID: WATER ____ ; FRESH WATER MUD ✓ ; SALT WATER MUD ____ ;

LOGGING CREW: R. STELLER

LOG TYPE	FILE NAME	DEPTH RANGE	DATE	TIMES
ELOG TEST	B402ELOGTEST01	Ø	12/6/06	12:30 - 12:33
ELOG/GAMMA	B402ELOGUP01	216.0' - 34.8'	"	13:19 - 13:39
SUSPENSION PS	B402.001 - 122.DAT	3.3 - 201.8'	"	14:15 - 16:10
CALIPER TEST	B402CALTEST01	Ø	"	16:28 - 16:31
CALIPER/GAMMA	B402CALUP01	210.0' - Ø	"	16:38 - 17:02
CALIPER TEST	B402CALTEST02	Ø	"	17:06 - 17:08
DEVIATION	B402DEVUP01	210.0' - Ø	"	17:20 - 17:42

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B-402 ELOG FIELD LOG

SITE: SOUTH TEXAS PROJECT COL DATE: 12/6/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 1 OF 2

CONTACT: _____ OFFICE PHONE: _____
CELL PHONE: _____
CONTACT: _____ OFFICE PHONE: _____
PHONE: _____
CONTACT: _____ PHONE: _____
PHONE: _____
CONTACT: _____ PHONE: _____
PHONE: _____
DRILLER: _____ PHONE: _____
COMPANY: _____ PHONE: _____

GENERAL SITE CONDITIONS/LOCATION: _____

BOREHOLE DESIGNATION: B-402-DH LOCATION: _____

COUNTY: _____ RANGE: _____ TOWNSHIP: _____ SECTION: _____
BOREHOLE CONSTRUCTION: CASED ____ UNCASED ____
DIAMETERS AND DEPTH RANGES: 4" 0 TO 215' ; ____, ____ TO ____
BOREHOLE TOTAL DEPTH AS DRILLED: 215'
CONDUCTOR CASING?: YES ___ DEPTH TO BOTTOM OF CASING ____; NO ___
DEPTH TO BEDROCK: NA DEPTH TO WATER TABLE: ~20'
BOREHOLE FLUID: WATER ____; FRESH WATER MUD ✓; SALT WATER MUD ____;
OTHER: _____
DEPTH TO BOREHOLE FLUID: Ø TIME SINCE LAST CIRCULATION: 1/2 HR

LOGGING CREW: R. STELLER, C. CARTER
VEHICLE(S) USED AND MILEAGE: RENTAL
MOBILIZED FROM: BAY CITY, TX DEPARTURE TIME: 10:30
ARRIVED ON SITE: 11:00
STANDBY TIME: _____ CAUSE: _____
LOGGING STARTED: 12:30 LOGGING COMPLETED: 12:39

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SITE: SOUTH TEXAS PROJECT COL B-402 DATE: 12/6/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 2 OF 2

WINCH: COMPROBE ____ SILVER ✓ OYO ____ OTHER ____
MICROLOGGER 5301 ✓ OTHER ____
ELOG PROBE 5490 ✓ OTHER ____

PROBE LENGTH	2.50M(8.20 FT)	
PLUS YOKE 10.0M (32.8 FT)	+ 32.8'	
MINUS CASING STICK-UP	- 1.4'	
DEPTH REF. OFFSET AT START	39.6'	
DEPTH REF. OFFSET AT END	39.6	
AFTER SURVEY DEPTH ERROR		LESS THAN 0.4%?

LOG NAME	START DEPTH	START TIME	END DEPTH	END TIME
B402ELOG TEST01	Ø	12:30	Ø	12:33
B402ELOGLP01	210.0'	13:19	34.75	13:39

MAINTENANCE PERFORMED ON SITE: ____

EQUIPMENT PROBLEMS OR FAILURES: ____

SUGGESTIONS, ADDITIONS, CHANGES: ____

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P-S SUSPENSION VELOCITY FIELD LOG

SITE: SOUTH TEXAS PROJECT COL B-402 DATE: 12/6/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 1 OF 6

CONTACT: MIKE SUFNARSKI OFFICE PHONE: 704-357-5633
CELL PHONE: 704-309-0624
CONTACT: OFFICE PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
DRILLER: PHONE:
COMPANY: PHONE:

DIRECTIONS TO SITE:

GENERAL SITE CONDITIONS/LOCATION:

EA#:
BOREHOLE DESIGNATION: B-402-DH LOCATION:

COUNTY: RANGE: TOWNSHIP: SECTION:
BOREHOLE CONSTRUCTION: CASED ____ UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4" 0 TO 215' ; ____, ____ TO ____
BOREHOLE TOTAL DEPTH AS DRILLED: 215'
CONDUCTOR CASING?: YES ✓ DEPTH TO BOTTOM OF CASING 8'; NO ____
DEPTH TO BEDROCK: NA DEPTH TO WATER TABLE: 20'
BOREHOLE FLUID: WATER ____; FRESH WATER MUD ✓; SALT WATER MUD ____;
OTHER:
DEPTH TO BOREHOLE FLUID: Ø TIME SINCE LAST CIRCULATION: 1 HR

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SITE: SOUTH TEXAS PROJECT COL B-402 DATE: 12/6/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 2 OF 6

LOGGING CREW: R. STELLER, C. CARTER
VEHICLE(S) USED AND MILEAGE: RENTAL
MOBILIZED FROM: BAY CITY, TX DEPARTURE TIME: 10:30
ARRIVED ON SITE: 11:00
STANDBY TIME: CAUSE:
LOGGING STARTED: 14:15 LOGGING COMPLETED: 16:10
STANDBY TIME: CAUSE:
LOGGING STARTED: LOGGING COMPLETED:
DEMOBILIZED TO: ARRIVAL TIME:
ADDITIONAL DEMOB TIME: REASON:

BATTERIES CHANGED BEFORE LOGGING: YES ___; NO ✓; STORED WITH NEW ___

WINCH		COMPROBE ☐		GREY ☐		OYO ☐		RG ☐		OTH ☑		
INSTRUMENT	OYO	12004 ☐	15014 ☐	19029 ☐			RG	160023 ☑	160024 ☐			
RECEIVER S/N		12008 ☐	20042 ☐	26066 ☐	11001 ☐			23053 ☐	30086 ☑			

MAINTENANCE PERFORMED ON SITE:

EQUIPMENT PROBLEMS OR FAILURES:

SUGGESTIONS, ADDITIONS, CHANGES:

COMMENTS: DEPTH ZERO @ START = 2.5m − 0.4m = 2.1m.
Depth zero @ end = 2.06m

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GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: SOUTH TEXAS COL B-302 DATE: 12/6/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 3 OF 6

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
0.5	1.64			
1.0	3.28	122		
1.5	4.92	121		
2.0	6.56	120		
2.5	8.20	119		
3.0	9.84	118		
3.5	11.48	117		
4.0	13.12	116		
4.5	14.76	115		
5.0	16.40	114		
5.5	18.04	113		
6.0	19.69	1		
6.5	21.33	2		
7.0	22.97	3		
7.5	24.61	4		
8.0	26.25	5		
8.5	27.89	6		
9.0	29.53	7		
9.5	31.17	8		
10.0	32.81	9		
10.5	34.45	10		
11.0	36.09	11		
11.5	37.73	12		
12.0	39.37	13		
12.5	41.01	14		
13.0	42.65	15		
13.5	44.29	16		
14.0	45.93	17		
14.5	47.57	18		
15.0	49.21	19		
15.5	50.85	20		
16.0	52.49	21		
16.5	54.13	22		
17.0	55.77	23		
17.5	57.41	24		
18.0	59.06	25		
18.5	60.70	26		
19.0	62.34	27		
19.5	63.98	28		
20.0	65.62	29		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: SOUTH TEXAS COL B-402 DATE: 12/6/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 4 OF 6

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
20.5	67.26	30		
21.0	68.90	31		
21.5	70.54	32		
22.0	72.18	33		
22.5	73.82	34		
23.0	75.46	35		
23.5	77.10	36		
24.0	78.74	37		
24.5	80.38	38		
25.0	82.02	39		
25.5	83.66	40		
26.0	85.30	41		
26.5	86.94	42		
27.0	88.58	43		
27.5	90.22	44		
28.0	91.86	45		
28.5	93.50	46		
29.0	95.14	47		
29.5	96.78	48		
30.0	98.43	49		
30.5	100.07	50		
31.0	101.71	51		
31.5	103.35	52		
32.0	104.99	53		
32.5	106.63	54		
33.0	108.27	55		
33.5	109.91	56		
34.0	111.55	57		
34.5	113.19	58		
35.0	114.83	59		
35.5	116.47	60		
36.0	118.11	61		
36.5	119.75	62		
37.0	121.39	63		
37.5	123.03	64		
38.0	124.67	65		
38.5	126.31	66		
39.0	127.95	67		
39.5	129.59	68		
40.0	131.23	69		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: SOUTH TEXAS COL B-402 DATE: 12/6/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 5 OF 6

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
40.5	132.87	70		
41.0	134.51	71		
41.5	136.15	72		
42.0	137.80	73		
42.5	139.44	74		
43.0	141.08	75		
43.5	142.72	76		
44.0	144.36	77		
44.5	146.00	78		
45.0	147.64	79		
45.5	149.28	80		
46.0	150.92	81		
46.5	152.56	82		
47.0	154.20	83		
47.5	155.84	84		
48.0	157.48	85		
48.5	159.12	86		
49.0	160.76	87		
49.5	162.40	88		
50.0	164.04	89		
50.5	165.68	90		
51.0	167.32	91		
51.5	168.96	92		
52.0	170.60	93		
52.5	172.24	94		
53.0	173.88	95		
53.5	175.52	96		
54.0	177.17	97		
54.5	178.81	98		
55.0	180.45	99		
55.5	182.09	100		
56.0	183.73	101		
56.5	185.37	102		
57.0	187.01	103		
57.5	188.65	104		
58.0	190.29	105		
58.5	191.93	106		
59.0	193.57	107		
59.5	195.21	108		
60.0	196.85	109		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: SOUTH TEXAS COL B-402 DATE: 12/6/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 6 OF 6

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
60.5	198.49	110		
61.0	200.13	111		
61.5	201.77	112		
62.0	203.41			BOTTOM MEASUREMENT ?
62.5	205.05			hit bottom 61.8
63.0	206.69			
63.5	208.33			
64.0	209.97			
64.5	211.61			
65.0	213.25			
65.5	214.90			T.D. @ 215'
66.0	216.54			
66.5	218.18			
67.0	219.82			
67.5	221.46			
68.0	223.10			
68.5	224.74			
69.0	226.38			
69.5	228.02			
70.0	229.66			
70.5	231.30			
71.0	232.94			
71.5	234.58			
72.0	236.22			
72.5	237.86			
73.0	239.50			
73.5	241.14			
74.0	242.78			
74.5	244.42			
75.0	246.06			
75.5	247.70			
76.0	249.34			
76.5	250.98			
77.0	252.62			
77.5	254.27			
78.0	255.91			
78.5	257.55			
79.0	259.19			
79.5	260.83			
80.0	262.47			

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B-402 CALIPER FIELD LOG

SITE: SOUTH TEXAS PROJECT COL DATE: 12/6/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 1 OF 2

CONTACT: MIKE SUFNARSKI OFFICE PHONE:
CELL PHONE: 704-357-5633
CONTACT: OFFICE PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
DRILLER: PHONE:
COMPANY: PHONE:

GENERAL SITE CONDITIONS/LOCATION:

BOREHOLE DESIGNATION: B-402-DH LOCATION:

COUNTY: RANGE: TOWNSHIP: SECTION:
BOREHOLE CONSTRUCTION: CASED ____ UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4" 0 TO 215' ; ____, ____ TO ____
BOREHOLE TOTAL DEPTH AS DRILLED: 215
CONDUCTOR CASING?: YES ✓ DEPTH TO BOTTOM OF CASING 1' ; NO ____
DEPTH TO BEDROCK: NA DEPTH TO WATER TABLE: 620'
BOREHOLE FLUID: WATER ____; FRESH WATER MUD ✓ ; SALT WATER MUD ____;
OTHER:
DEPTH TO BOREHOLE FLUID: Ø TIME SINCE LAST CIRCULATION: 3HR

LOGGING CREW: R. STELLER, C. CARTER
VEHICLE(S) USED AND MILEAGE: RENTAL
MOBILIZED FROM: BAY CITY, TX DEPARTURE TIME: 10:30
ARRIVED ON SITE: 11:00
STANDBY TIME: CAUSE:
LOGGING STARTED: 16:28 LOGGING COMPLETED: 17:08

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SITE: SOUTH TEXAS PROJECT COL B-402 DATE: 12/6/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 2 OF 2

WINCH: COMPROBE ____ SILVER ✓ OYO ____ OTHER ____
MICROLOGGER 5301 ✓ OTHER ____
CALIPER PROBE 5368 ✓ OTHER ____

PROBE OFFSET	2.08M(6.82 FT) 12 IN MAX	
MINUS CASING STICK-UP	1.4'	
DEPTH REF. OFFSET AT START	5.42'	
DEPTH REF. OFFSET AT END	5.50	
AFTER SURVEY DEPTH ERROR	+0.08	LESS THAN 0.4%? YES

LOG NAME	START DEPTH	START TIME	END DEPTH	END TIME
B402CAL TEST01	Ø	16:28	Ø	16:31
B402CAL UP 01	210.0'	16:38	Ø	17:02
B402 CAL TEST 02	Ø	17:06	Ø	17:08

CALIBRATION PLATE S/N 201

		AS BUILT			PVC FITTING
		1.968 IN	3.937 IN	8.000 IN	4.507 IN
	FILE NAME	(50 MM)	(100 MM)	(203.2 MM)	(114.3 MM)
AS MEAS.	B402CALTEST01	1.96	3.94	7.99	4.49
AS MEAS.	B402 CAL TEST02	1.98	3.94	8.02	4.52
AS MEAS.					
AS MEAS.					
AS MEAS.					
AS MEAS.					

MAINTENANCE PERFORMED ON SITE: ____

EQUIPMENT PROBLEMS OR FAILURES: ____

SUGGESTIONS, ADDITIONS, CHANGES: ____

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B-402 ACOUSTIC TELEVIEWER FIELD LOG

SITE: SOUTH TEXAS PROJECT COL DATE: 12/6/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 1 OF 2

CONTACT: MIKE SUFNARSKI OFFICE PHONE: 704-357-5633
CELL PHONE: 704-309-0624
CONTACT: OFFICE PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
DRILLER: PHONE:
COMPANY: PHONE:

DIRECTIONS TO SITE:

GENERAL SITE CONDITIONS/LOCATION:

BOREHOLE DESIGNATION: B-402-DH LOCATION:

COUNTY: RANGE: TOWNSHIP: SECTION:
BOREHOLE CONSTRUCTION: CASED ____ UNCASED ✓
DIAMETERS AND DEPTH RANGES: 8" 0 TO 215 ; ____, ____ TO ____
BOREHOLE TOTAL DEPTH AS DRILLED: 215'
CONDUCTOR CASING?: YES ✓ DEPTH TO BOTTOM OF CASING 1' ; NO ____
DEPTH TO BEDROCK: NA DEPTH TO WATER TABLE: 220
BOREHOLE FLUID: WATER ____; FRESH WATER MUD ✓; SALT WATER MUD ____;
OTHER:
DEPTH TO BOREHOLE FLUID: Ø TIME SINCE LAST CIRCULATION: > 3 HR

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SITE: SOUTH TEXAS PROJECT COL B-402 DATE: 12/6/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 2 OF 2

LOGGING CREW: R. STELLER C. CARTER
VEHICLE(S) USED AND MILEAGE: RENTAL
MOBILIZED FROM: Bay City, TX DEPARTURE TIME: 10:30
ARRIVED ON SITE: 11:00
STANDBY TIME: CAUSE:
LOGGING STARTED: 17:20 LOGGING COMPLETED: 17:42

WINCH: COMPROBE ___ SILVER ✓ OYO ___ OTHER ___
MICROLOGGER 5301 ✓ OTHER ___
TELEVIEWER ACOUSTIC #5174 ✓ OTHER ___

PROBE TILT TEST 88.8° BRUNTON TILT 87°
PROBE TILT TEST 90.2° BRUNTON TILT 90°
PROBE TILT TEST ___ BRUNTON TILT ___
PROBE AZIMUTH TEST 223.8° BRUNTON AZIMUTH 220°
PROBE AZIMUTH TEST 106.1 BRUNTON AZIMUTH 111°
PROBE AZIMUTH TEST ___ BRUNTON AZIMUTH ___

PROBE OFFSET	1.44M(4.72FT)	
MINUS CASING STICK-UP	1.4'	
DEPTH REF. OFFSET AT START	3.32'	
DEPTH REF. OFFSET AT END	3.30	
AFTER SURVEY DEPTH ERROR	-0.02	LESS THAN 0.4%? YES

LOG NAME	START DEPTH	START TIME	END DEPTH	END TIME
B402AMUP01	210.0'	17:20	✓	17:42

MAINTENANCE PERFORMED ON SITE:

EQUIPMENT PROBLEMS OR FAILURES:

SUGGESTIONS, ADDITIONS, CHANGES:

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B-405-DH BORING GEOPHYSICS FIELD LOG SUMMARY

SITE: SOUTH TEXAS PROJECT COL DATE: 11/7/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 1 OF 1

CONTACT: MIKE SUFNARSKI PHONE: 704-357-5633

BOREHOLE CONSTRUCTION: CASED ____ UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4" 0 TO 93' ; 3 7/8" 93' TO 618'
BOREHOLE TOTAL DEPTH AS DRILLED: 618'
CONDUCTOR CASING?: YES ✓ DEPTH TO BOTTOM OF CASING 98' ; NO ____
DEPTH TO BEDROCK: NA
BOREHOLE FLUID: WATER ____ ; FRESH WATER MUD ✓ ; SALT WATER MUD ____ ;

LOGGING CREW: R. STELLER

LOG TYPE	FILE NAME	DEPTH RANGE	DATE	TIMES
SUSPENSION PS	B405_001-314.009	93.5 - 607.0	11/7/06	08:45 - 12:15
ELOG TEST	B405ELOGTEST01	Ø	11/7/06	13:12 - 13:22
ELOG	B405ELOGUP01	617.6' - 20.0'	11/7/06	13:36 - 14:40
CALIPER TEST	B405CALTEST01	Ø	11/7/06	15:02 - 15:03
"	B405CALTEST02	Ø	11/7/06	15:08 - 15:12
CALIPER	B405CALUP01	610.0' - Ø'	11/7/06	15:22 - 16:26
CALIPER TEST	B405CALTEST03	Ø	11/7/06	16:34 - 16:39
ACOUSTIC TV/ DENSIMODE	B405AMUP01	619.2' - Ø'	11/7/06	17:00 - 17:35

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P-S SUSPENSION VELOCITY FIELD LOG

SITE: SOUTH TEXAS PROJECT COL B-405-DH DATE: 11/7/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 1 OF 12

CONTACT: MIKE SUFNARSKI OFFICE PHONE: 704-357-5633
CELL PHONE: 704-309-0624
CONTACT: OFFICE PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
DRILLER: PHONE: 281-6321
COMPANY: PHONE:

DIRECTIONS TO SITE:

GENERAL SITE CONDITIONS/LOCATION:

EA#:
BOREHOLE DESIGNATION: B-405-DH LOCATION:

COUNTY: RANGE: TOWNSHIP: SECTION:
BOREHOLE CONSTRUCTION: CASED UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4 0 TO 93 ; 5 7/8 , 93' TO 618.
BOREHOLE TOTAL DEPTH AS DRILLED: 618
CONDUCTOR CASING?: YES ✓ DEPTH TO BOTTOM OF CASING 93' ; NO
DEPTH TO BEDROCK: NA DEPTH TO WATER TABLE: 520'
BOREHOLE FLUID: WATER ; FRESH WATER MUD ✓ ; SALT WATER MUD ;
OTHER:
DEPTH TO BOREHOLE FLUID: Ø TIME SINCE LAST CIRCULATION: 1/2 HR.

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SITE: SOUTH TEXAS PROJECT COL B-405-DH DATE: 11/7/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 2 OF 12

LOGGING CREW: R. STELLER
VEHICLE(S) USED AND MILEAGE: RENTAL
MOBILIZED FROM: BAY CITY, TX DEPARTURE TIME: 0:630
ARRIVED ON SITE: 07:00
STANDBY TIME: CAUSE:
LOGGING STARTED: 08:45 LOGGING COMPLETED: 12:15
STANDBY TIME: CAUSE:
LOGGING STARTED: LOGGING COMPLETED:
DEMOBILIZED TO: ARRIVAL TIME:
ADDITIONAL DEMOB TIME: REASON:

BATTERIES CHANGED BEFORE LOGGING: YES____; NO____; STORED WITH NEW ✓

WINCH	COMPROBE	☐	GREY	☐	OYO	☐	RG	☐	OTH	☑		
INSTRUMENT	OYO 12004	☐	15014	☐	19029	☐	RG 160023	☑	160024	☐		
RECEIVER S/N	12008	☐	20042	☐	26066	☐	11001	☐	23053	☐	30086	☑

MAINTENANCE PERFORMED ON SITE:

EQUIPMENT PROBLEMS OR FAILURES:

SUGGESTIONS, ADDITIONS, CHANGES:

COMMENTS: DEPTH REFERENCE TO TOP OF CASING 1.5' ABOVE GRADE PER DRILLER. SO: TOP OF PROBE = 8.2' - 1.5' = 6.7'
AT START OF LOG, 6.43' AT END
AFTER SURVEY DEPTH ERROR (ASDE) = -.27'

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: SOUTH TEXAS COL B-405-DH DATE: 11/7/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 3 OF 12

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
0.5	1.64			
1.0	3.28			
1.5	4.92			
2.0	6.56			
2.5	8.20			
3.0	9.84			
3.5	11.48			
4.0	13.12			
4.5	14.76			
5.0	16.40			
5.5	18.04			
6.0	19.69			
6.5	21.33			
7.0	22.97			
7.5	24.61			
8.0	26.25			
8.5	27.89			
9.0	29.53			
9.5	31.17		11/7/06	
10.0	32.81			
10.5	34.45			
11.0	36.09		RMS	
11.5	37.73			
12.0	39.37			
12.5	41.01			
13.0	42.65			
13.5	44.29			
14.0	45.93			
14.5	47.57			
15.0	49.21			
15.5	50.85			
16.0	52.49			
16.5	54.13			
17.0	55.77			
17.5	57.41			
18.0	59.06			
18.5	60.70			
19.0	62.34			
19.5	63.98			
20.0	65.62			

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: SOUTH TEXAS COL B-405-DH DATE: 11/7/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 4 OF 12

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
20.5	67.26			
21.0	68.90			
21.5	70.54			
22.0	72.18			
22.5	73.82			
23.0	75.46			
23.5	77.10			
24.0	78.74		11/7/06	
24.5	80.38			
25.0	82.02		PASS	
25.5	83.66			
26.0	85.30			
26.5	86.94			
27.0	88.58			
27.5	90.22			
28.0	91.86			
28.5	93.50	001		RAS BOTTOM OF STEEL CASE @ ~~98~~ 98'
29.0	95.14	2		
29.5	96.78	3		
30.0	98.43	4		
30.5	100.07	5		
31.0	101.71	6		
31.5	103.35	7		
32.0	104.99	8		
32.5	106.63	9		
33.0	108.27	10		
33.5	109.91	11		
34.0	111.55	12		
34.5	113.19	13		
35.0	114.83	14		
35.5	116.47	15		
36.0	118.11	16		
36.5	119.75	17		
37.0	121.39	18		
37.5	123.03	19		
38.0	124.67	20		
38.5	126.31	21		
39.0	127.95	22		
39.5	129.59	23		
40.0	131.23	24		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: SOUTH TEXAS COL B-405 - DH DATE: 11/7/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 5 OF 12

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
40.5	132.87	25		
41.0	134.51	26		
41.5	136.15	27		
42.0	137.80	28		
42.5	139.44	29		
43.0	141.08	30		
43.5	142.72	31		
44.0	144.36	32		
44.5	146.00	33		
45.0	147.64	34		
45.5	149.28	35		
46.0	150.92	36		
46.5	152.56	37		
47.0	154.20	38		
47.5	155.84	39		
48.0	157.48	40		
48.5	159.12	41		
49.0	160.76	42		
49.5	162.40	43		
50.0	164.04	44		
50.5	165.68	45		
51.0	167.32	46		
51.5	168.96	47		
52.0	170.60	48		
52.5	172.24	49		
53.0	173.88	50		
53.5	175.52	51		
54.0	177.17	52		
54.5	178.81	53		
55.0	180.45	54		
55.5	182.09	55		
56.0	183.73	56		
56.5	185.37	57		
57.0	187.01	58		
57.5	188.65	59		
58.0	190.29	60		
58.5	191.93	61		
59.0	193.57	62		
59.5	195.21	63		
60.0	196.85	64		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: SOUTH TEXAS COL B-405-DH DATE: 11/7/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 6 OF 12

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
60.5	198.49	65		
61.0	200.13	66		
61.5	201.77	67		
62.0	203.41	68		
62.5	205.05	69		
63.0	206.69	70		
63.5	208.33	71		
64.0	209.97	72		
64.5	211.61	73		
65.0	213.25	74		
65.5	214.90	75		
66.0	216.54	76		
66.5	218.18	77		
67.0	219.82	78		
67.5	221.46	79		
68.0	223.10	80		
68.5	224.74	81		
69.0	226.38	82		
69.5	228.02	83		
70.0	229.66	84		
70.5	231.30	85		SAND LATER? ↓
71.0	232.94	86		
71.5	234.58	87		
72.0	236.22	88		
72.5	237.86	89		
73.0	239.50	90		
73.5	241.14	91		
74.0	242.78	92		
74.5	244.42	93		
75.0	246.06	94		
75.5	247.70	95		
76.0	249.34	96		
76.5	250.98	97		
77.0	252.62	98		
77.5	254.27	99		
78.0	255.91	100		
78.5	257.55	101		
79.0	259.19	102		
79.5	260.83	103		
80.0	262.47	104		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: SOUTH TEXAS COL B-405-DH DATE: 11/7/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 7 OF 12

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
80.5	264.11	105		
81.0	265.75	106		
81.5	267.39	107		
82.0	269.03	108		
82.5	270.67	109		
83.0	272.31	110		
83.5	273.95	111		
84.0	275.59	112		
84.5	277.23	113		
85.0	278.87	114		
85.5	280.51	115		
86.0	282.15	116		
86.5	283.79	117		
87.0	285.43	118		
87.5	287.07	119		
88.0	288.71	120		
88.5	290.35	121		
89.0	291.99	122		
89.5	293.64	123		
90.0	295.28	124		
90.5	296.92	125		
91.0	298.56	126		
91.5	300.20	127		
92.0	301.84	128		
92.5	303.48	129		
93.0	305.12	130		
93.5	306.76	131		
94.0	308.40	132		
94.5	310.04	133		
95.0	311.68	134		
95.5	313.32	135		
96.0	314.96	136		
96.5	316.60	137		
97.0	318.24	138		
97.5	319.88	139		
98.0	321.52	140		
98.5	323.16	141		
99.0	324.80	142		
99.5	326.44	143		
100.0	328.08	~~143~~ 144	RAS 11/7/06	

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: SOUTH TEXAS COL B-405-DH DATE: 7/11/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 8 OF 12

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
100.5	329.72	~~144~~ 145		
101.0	331.36	~~145~~ 146		
101.5	333.01	~~146~~ 147		
102.0	334.65	~~147~~ 148		
102.5	336.29	~~148~~ 149		
103.0	337.93	~~149~~ 150	RAS 11/7/06	
103.5	339.57	~~150~~ 151		
104.0	341.21	~~151~~ 152		
104.5	342.85	~~152~~ 153		
105.0	344.49	~~153~~ 154		
105.5	346.13	~~154~~ 155		
106.0	347.77	~~155~~ 156		
106.5	349.41	~~156~~ 157		
107.0	351.05	158		
107.5	352.69	159		
108.0	354.33	160		
108.5	355.97	161		
109.0	357.61	162		
109.5	359.25	163		
110.0	360.89	164		
110.5	362.53	165		
111.0	364.17	166		
111.5	365.81	167		
112.0	367.45	168		
112.5	369.09	169		
113.0	370.73	170		
113.5	372.38	171		
114.0	374.02	172		
114.5	375.66	173		
115.0	377.30	174		
115.5	378.94	175		
116.0	380.58	176		
116.5	382.22	177		
117.0	383.86	178		
117.5	385.50	179		
118.0	387.14	180		
118.5	388.78	181		
119.0	390.42	182		
119.5	392.06	183		
120.0	393.70	184		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: SOUTH TEXAS COL B-405-DH DATE: 11/7/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 9 OF 12

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
120.5	395.34	185		
121.0	396.98	186		
121.5	398.62	187		
122.0	400.26	188		
122.5	401.90	189		
123.0	403.54	190		
123.5	405.18	191		
124.0	406.82	192		
124.5	408.46	193		
125.0	410.10	194		
125.5	411.75	195		
126.0	413.39	196		
126.5	415.03	197		
127.0	416.67	198		
127.5	418.31	199		
128.0	419.95	200		
128.5	421.59	201		
129.0	423.23	202		
129.5	424.87	203		
130.0	426.51	204		
130.5	428.15	205		
131.0	429.79	206		
131.5	431.43	207		
132.0	433.07	208		
132.5	434.71	209		
133.0	436.35	210		
133.5	437.99	211		
134.0	439.63	212		
134.5	441.27	213		
135.0	442.91	214		
135.5	444.55	215		
136.0	446.19	216		
136.5	447.83	217		
137.0	449.48	218		
137.5	451.12	219		
138.0	452.76	220		
138.5	454.40	221		
139.0	456.04	222		
139.5	457.68	223		
140.0	459.32	224		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: SOUTH TEXAS COL B-405-DH DATE: 11/7/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 10 OF 12

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
140.5	460.96	225		
141.0	462.60	226		
141.5	464.24	227		
142.0	465.88	228		
142.5	467.52	229		
143.0	469.16	230		
143.5	470.80	231		
144.0	472.44	232		
144.5	474.08	233		
145.0	475.72	234		
145.5	477.36	235		
146.0	479.00	236		
146.5	480.64	237		
147.0	482.28	238		
147.5	483.92	239		
148.0	485.56	240		
148.5	487.20	241		
149.0	488.85	242		
149.5	490.49	243		
150.0	492.13	244		
150.5	493.77	245		
151.0	495.41	246		
151.5	497.05	247		
152.0	498.69	248		
152.5	500.33	249		
153.0	501.97	250		
153.5	503.61	251		
154.0	505.25	252		
154.5	506.89	253		
155.0	508.53	254		
155.5	510.17	255		
156.0	511.81	256		
156.5	513.45	257		
157.0	515.09	258		
157.5	516.73	259		
158.0	518.37	260		
158.5	520.01	261		
159.0	521.65	262		
159.5	523.29	263		
160.0	524.93	264		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: SOUTH TEXAS COL B-405-DH DATE: 11/7/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 11 OF 12

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
160.5	526.57	265		
161.0	528.22	266		
161.5	529.86	267		
162.0	531.50	268		
162.5	533.14	269		
163.0	534.78	270		
163.5	536.42	271		
164.0	538.06	272		
164.5	539.70	273		
165.0	541.34	274		
165.5	542.98	275		SOUND LATER @ 542?
166.0	544.62	276		
166.5	546.26	277		
167.0	547.90	278		
167.5	549.54	279		
168.0	551.18	280		
168.5	552.82	281		
169.0	554.46	282		
169.5	556.10	283		
170.0	557.74	284		
170.5	559.38	285		
171.0	561.02	286		
171.5	562.66	287		
172.0	564.30	288		
172.5	565.94	289		
173.0	567.59	290		
173.5	569.23	291		
174.0	570.87	292		
174.5	572.51	293		
175.0	574.15	294		
175.5	575.79	295		
176.0	577.43	296		
176.5	579.07	297		
177.0	580.71	298		
177.5	582.35	299		
178.0	583.99	300		
178.5	585.63	301		
179.0	587.27	302		
179.5	588.91	303		
180.0	590.55	304		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: SOUTH TEXAS COL B-405-DH DATE: 11/7/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 12 OF 12

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
180.5	592.19	305		
181.0	593.83	306		
181.5	595.47	307		
182.0	597.11	308		
182.5	598.75	309		
183.0	600.39	310		
183.5	602.03	311		
184.0	603.67	312		
184.5	605.31	313		B.n.?
185.0	606.96	314		
185.5	608.60			
186.0	610.24			
186.5	611.88			
187.0	613.52			
187.5	615.16			
188.0	616.80			
188.5	618.44			T.D. @ 618'
189.0	620.08			
189.5	621.72			
190.0	623.36			
190.5	625.00			
191.0	626.64			
191.5	628.28			
192.0	629.92			
192.5	631.56			
193.0	633.20			
193.5	634.84			
194.0	636.48			
194.5	638.12			
195.0	639.76			
195.5	641.40			
196.0	643.04			
196.5	644.69			
197.0	646.33			
197.5	647.97			
198.0	649.61			
198.5	651.25			
199.0	652.89			
199.5	654.53			
200.0	656.17			

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B-405-DH ELOG FIELD LOG

SITE: SOUTH TEXAS PROJECT COL DATE: 11/7/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 1 OF 2

CONTACT: _____ OFFICE PHONE: _____
CELL PHONE: _____
CONTACT: _____ OFFICE PHONE: _____
PHONE: _____
CONTACT: _____ PHONE: _____
PHONE: _____
CONTACT: _____ PHONE: _____
PHONE: _____
DRILLER: _____ PHONE: _____
COMPANY: _____ PHONE: _____

GENERAL SITE CONDITIONS/LOCATION: _____

BOREHOLE DESIGNATION: B-405-DH LOCATION: _____

COUNTY: _____ RANGE: _____ TOWNSHIP: _____ SECTION: _____
BOREHOLE CONSTRUCTION: CASED ____ UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4 0 TO 93' ; 3 7/8, 93' TO 618
BOREHOLE TOTAL DEPTH AS DRILLED: 618'
CONDUCTOR CASING?: YES ✓ DEPTH TO BOTTOM OF CASING 93' ; NO ____
DEPTH TO BEDROCK: NA DEPTH TO WATER TABLE: ≈20'
BOREHOLE FLUID: WATER ____ ; FRESH WATER MUD ✓ ; SALT WATER MUD ____ ;
OTHER: _____
DEPTH TO BOREHOLE FLUID: ≈20' TIME SINCE LAST CIRCULATION: 5 HR.

LOGGING CREW: R. STELLER
VEHICLE(S) USED AND MILEAGE: RENTAL
MOBILIZED FROM: BAY CITY, TX DEPARTURE TIME: 06:30
ARRIVED ON SITE: 07:00
STANDBY TIME: _____ CAUSE: _____
LOGGING STARTED: 13:12 LOGGING COMPLETED: 16:40

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SITE: SOUTH TEXAS PROJECT COL B-405-DH DATE: 11/7/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 2 OF 2

WINCH: COMPROBE ___ SILVER ✓ OYO ___ OTHER ___
MICROLOGGER 5301 ✓ OTHER ___
ELOG PROBE 5490 ✓ OTHER ___

PROBE LENGTH	2.50M(8.20 FT)	
PLUS YOKE 10.0M (32.8 FT)	32.8'	
MINUS CASING STICK-UP	1.5'	
DEPTH REF. OFFSET AT START	39.5'	
DEPTH REF. OFFSET AT END	39.7	
AFTER SURVEY DEPTH ERROR	0.2	LESS THAN 0.4%? YES

LOG NAME	START DEPTH	START TIME	END DEPTH	END TIME
B405ELOGTEST01	Ø	13:12	Ø	13:22
B405 ELOG up 01	67.6	13:36	20	14:40

MAINTENANCE PERFORMED ON SITE: ___

EQUIPMENT PROBLEMS OR FAILURES: ___

SUGGESTIONS, ADDITIONS, CHANGES: ___

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B-405-DH CALIPER FIELD LOG

SITE: SOUTH TEXAS PROJECT COL DATE: 11/7/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 1 OF 2

CONTACT: MIKE SUFNARSKI OFFICE PHONE:
CELL PHONE: 704-357-5633
CONTACT: OFFICE PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
DRILLER: PHONE:
COMPANY: PHONE:

GENERAL SITE CONDITIONS/LOCATION:

BOREHOLE DESIGNATION: B-405-DH LOCATION:

COUNTY: RANGE: TOWNSHIP: SECTION:
BOREHOLE CONSTRUCTION: CASED UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4" 0 TO 93'; 3 7/8", 93 TO 618
BOREHOLE TOTAL DEPTH AS DRILLED: 618'
CONDUCTOR CASING?: YES ✓ DEPTH TO BOTTOM OF CASING 93'; NO
DEPTH TO BEDROCK: NA DEPTH TO WATER TABLE: ≈20'
BOREHOLE FLUID: WATER; FRESH WATER MUD ✓; SALT WATER MUD;
OTHER:
DEPTH TO BOREHOLE FLUID: ≈20' TIME SINCE LAST CIRCULATION: 6.5 HR.

LOGGING CREW: R. STELLER
VEHICLE(S) USED AND MILEAGE: RENTAL
MOBILIZED FROM: BAY CITY, TX DEPARTURE TIME: 06:30
ARRIVED ON SITE: 07:00
STANDBY TIME: CAUSE:
LOGGING STARTED: 15:02 LOGGING COMPLETED: 16:39

GEOVision Geophysical Services *1151 Pomona Road, Unit P, Corona, CA 92882* *Ph (951) 549-1234 Fx (951) 549-1236*

SITE: SOUTH TEXAS PROJECT COL B-405-DH DATE: 11/7/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 2 OF 2

WINCH: COMPROBE ____ SILVER ✓ OYO ____ OTHER ____
MICROLOGGER 5301 ✓ OTHER ____
CALIPER PROBE 5368 ✓ OTHER ____

PROBE OFFSET	2.08M(6.82 FT) 12 IN MAX	
MINUS CASING STICK-UP	1.5'	
DEPTH REF. OFFSET AT START	5.32'	
DEPTH REF. OFFSET AT END	5.35	
AFTER SURVEY DEPTH ERROR	.03	LESS THAN 0.4%? YES

LOG NAME	START DEPTH	START TIME	END DEPTH	END TIME
B405CAL TEST 01	Ø	15:02	Ø	15:03
B405 CAL TEST 02	Ø	15:08	Ø	15:12
B405CALUP 01	610	15:22	Ø	16:26
B405 CAL TEST 03	Ø	16:34	Ø	16:39

CALIBRATION PLATE S/N 201

		AS BUILT			PVC FITTING
		1.968 IN	3.937 IN	8.000 IN	4.507 IN
	FILE NAME	(50 MM)	(100 MM)	(203.2 MM)	(114.3 MM)
AS MEAS.	B405CALTEST01	2.05.	NOT COMPLETED- RECALIBRATED.		
AS MEAS.	B405CAL TEST 02	2.00	3.93	7.99	4.52
AS MEAS.	B405 CAL TEST 03	2.01	3.91	7.99	4.54
AS MEAS.					
AS MEAS.					
AS MEAS.					

MAINTENANCE PERFORMED ON SITE: ____

EQUIPMENT PROBLEMS OR FAILURES: ____

SUGGESTIONS, ADDITIONS, CHANGES: ____

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B-405-DH ACOUSTIC TELEVIEWER FIELD LOG

SITE: SOUTH TEXAS PROJECT COL DATE: 11/7/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 1 OF 2

CONTACT: MIKE SUFNARSKI OFFICE PHONE: 704-357-5633
CELL PHONE: 704-309-0624
CONTACT: OFFICE PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
DRILLER: PHONE:
COMPANY: PHONE:

DIRECTIONS TO SITE:

GENERAL SITE CONDITIONS/LOCATION:

BOREHOLE DESIGNATION: B-405-DH LOCATION:

COUNTY: RANGE: TOWNSHIP: SECTION:
BOREHOLE CONSTRUCTION: CASED UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4' 0 TO 93'; 3 7/8", 93' TO 618'
BOREHOLE TOTAL DEPTH AS DRILLED: 618'
CONDUCTOR CASING?: YES ✓ DEPTH TO BOTTOM OF CASING 93'; NO
DEPTH TO BEDROCK: NA DEPTH TO WATER TABLE: ≈20'
BOREHOLE FLUID: WATER ~~≈20'~~; FRESH WATER MUD ✓; SALT WATER MUD ;
OTHER: RDS 11/7/06
DEPTH TO BOREHOLE FLUID: ≈20 TIME SINCE LAST CIRCULATION: 7.5 HR

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SITE:_SOUTH TEXAS PROJECT COL B-405-DH DATE: 11/7/06
CLIENT:_MACTEC JOB:_6533
AUTHOR:_R. STELLER PAGE 2 OF 2

LOGGING CREW:_R. STELLER
VEHICLE(S) USED AND MILEAGE: _RENTAL
MOBILIZED FROM: BAY CITY, TX DEPARTURE TIME: 06:30
ARRIVED ON SITE: 07:00
STANDBY TIME: CAUSE:
LOGGING STARTED: 17:06 LOGGING COMPLETED: 17:35

WINCH: COMPROBE___ SILVER ✓ OYO___ OTHER___
MICROLOGGER 5301 ✓ OTHER___
TELEVIEWER ACOUSTIC #5174 ✓ OTHER___

PROBE TILT TEST 88.7° BRUNTON TILT 89°
PROBE TILT TEST 0.6° BRUNTON TILT 0°
PROBE TILT TEST ___ BRUNTON TILT ___
PROBE AZIMUTH TEST 356.9 BRUNTON AZIMUTH 359°
PROBE AZIMUTH TEST 180.9° BRUNTON AZIMUTH 178°
PROBE AZIMUTH TEST ___ BRUNTON AZIMUTH ___

PROBE OFFSET	1.44M(4.72FT)	
MINUS CASING STICK-UP	1.5'	
DEPTH REF. OFFSET AT START	4.22'	
DEPTH REF. OFFSET AT END	3.95	
AFTER SURVEY DEPTH ERROR	-.07'	LESS THAN 0.4%? YES

LOG NAME	START DEPTH	START TIME	END DEPTH	END TIME
B405 Annul 01	~~410~~ 619.2	17:06	Ø	17:35
	RAS			
	11/7/06			

MAINTENANCE PERFORMED ON SITE:

EQUIPMENT PROBLEMS OR FAILURES:

SUGGESTIONS, ADDITIONS, CHANGES:

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B-405-DH BORING GEOPHYSICS FIELD LOG SUMMARY

SITE:_SOUTH TEXAS PROJECT COL _____ DATE: 11/8/06
CLIENT:_MACTEC_____ JOB:_6533_____
AUTHOR:_R. STELLER_____ PAGE 1 OF 1

CONTACT:_MIKE SUFNARSKI_____ PHONE:_704-357-5633_

BOREHOLE CONSTRUCTION: CASED____ UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4" 0 TO 120' ; _____, _____ TO _____
BOREHOLE TOTAL DEPTH AS DRILLED: 120' CLEAR
CONDUCTOR CASING?: YES ✓ DEPTH TO BOTTOM OF CASING 20' ; NO___ (AUGER)
DEPTH TO BEDROCK: NA
BOREHOLE FLUID: WATER____; FRESH WATER MUD ✓ ; SALT WATER MUD ____;

LOGGING CREW:_R. STELLER_____

LOG TYPE	FILE NAME	DEPTH RANGE	DATE	TIMES
SUSPENSION PS	B405_501-553.0R4	21.5'- 106.6'	11/8/06	11:45 – 12:25
ELOG TEST	B405 ELOG TEST 02	Ø	"	11:01 – 11:04
ELOG/GAMMA	B405 ELOG UP 02	120.0'- 18.5'	"	11:12 – 11:23
DEVIATION	B405 AUUP 02	115.0' – Ø	"	13:43 – 13:49
CALIPER TEST	B405 CAL TEST 04	Ø	"	13:56 – 14:12
CALIPER/GAMMA	B405 CAL UP 02	115.0' – Ø	"	14:20 – 14:32
CALIPER TEST	B405 CAL TEST 05	Ø	"	14:41 – 14:44

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P-S SUSPENSION VELOCITY FIELD LOG

SITE: SOUTH TEXAS PROJECT COL B-405-DH DATE: 11/8/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 1 OF ____

CONTACT: MIKE SUFNARSKI OFFICE PHONE: 704-357-5633
CELL PHONE: 704-309-0624
CONTACT: OFFICE PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
DRILLER: PHONE:
COMPANY: PHONE:

DIRECTIONS TO SITE:

GENERAL SITE CONDITIONS/LOCATION:

EA#:
BOREHOLE DESIGNATION: B-405-DH LOCATION:

COUNTY: RANGE: TOWNSHIP: SECTION:
BOREHOLE CONSTRUCTION: CASED ____ UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4 0 TO 120' ; ____, ____ TO ____
BOREHOLE TOTAL DEPTH AS DRILLED: Clear to 120'
CONDUCTOR CASING?: YES ✓ DEPTH TO BOTTOM OF CASING 20' ; NO ____ (Auger)
DEPTH TO BEDROCK: NA DEPTH TO WATER TABLE: @ 20'
BOREHOLE FLUID: WATER ____; FRESH WATER MUD ✓ ; SALT WATER MUD ____;
OTHER:
DEPTH TO BOREHOLE FLUID: Ø TIME SINCE LAST CIRCULATION: 1 HR

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SITE: SOUTH TEXAS PROJECT COL B-405-DH DATE: 11/8/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 2 OF ____

LOGGING CREW: R. STELLER
VEHICLE(S) USED AND MILEAGE: RENTAL
MOBILIZED FROM: BAY CITY, TX DEPARTURE TIME: 06:00
ARRIVED ON SITE: 06:30
STANDBY TIME: ____ CAUSE: ____
LOGGING STARTED: 11:45 LOGGING COMPLETED: 12:25
STANDBY TIME: ____ CAUSE: ____
LOGGING STARTED: ____ LOGGING COMPLETED: ____
DEMOBILIZED TO: ____ ARRIVAL TIME: ____
ADDITIONAL DEMOB TIME: ____ REASON: ____

BATTERIES CHANGED BEFORE LOGGING: YES ____; NO ✓; STORED WITH NEW ____

WINCH	COMPROBE ☐		GREY ☐	OYO ☐	RG ☐	OTH ☑		
INSTRUMENT	OYO 12004 ☐	15014 ☐	19029 ☐		RG 160023 ☑	160024 ☐		
RECEIVER S/N	12008 ☐	20042 ☐	26066 ☐	11001 ☐	23053 ☐	30086 ☑		

MAINTENANCE PERFORMED ON SITE: ____

EQUIPMENT PROBLEMS OR FAILURES: ____

SUGGESTIONS, ADDITIONS, CHANGES: ____

COMMENTS: DEPTH OFFSET = PROBE LENGTH 2.5 m = 8.2' - STICKUP (1.5') = 6.7' = 2.04 m. AT START. DEPTH REF = 2.04m AT END OF LOG. DSOE = Ø

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GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: SOUTH TEXAS COL B- 405 - DH DATE: 11/8/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 3 OF 4

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
0.5	1.64			
1.0	3.28			
1.5	4.92			
2.0	6.56			
2.5	8.20			
3.0	9.84			
3.5	11.48			
4.0	13.12			
4.5	14.76			
5.0	16.40			
5.5	18.04			
6.0	19.69			AUGER TO 20'
6.5	21.33	501		
7.0	22.97	502		
7.5	24.61	503		
8.0	26.25	504		
8.5	27.89	505		
9.0	29.53	506		
9.5	31.17	507		
10.0	32.81	508		
10.5	34.45	509		
11.0	36.09	510		
11.5	37.73	511		
12.0	39.37	512		
12.5	41.01	513		
13.0	42.65	514		
13.5	44.29	515		
14.0	45.93	516		
14.5	47.57	517		
15.0	49.21	518		
15.5	50.85	519		
16.0	52.49	520		
16.5	54.13	521		
17.0	55.77	522		
17.5	57.41	523		
18.0	59.06	524		
18.5	60.70	525		
19.0	62.34	526		
19.5	63.98	527		
20.0	65.62	528		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: SOUTH TEXAS COL B-405-DH DATE: 11/8/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 4 OF 4

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
20.5	67.26	529		
21.0	68.90	530		
21.5	70.54	531		
22.0	72.18	532		
22.5	73.82	533		
23.0	75.46	534		
23.5	77.10	535		
24.0	78.74	536		
24.5	80.38	537		
25.0	82.02	538		
25.5	83.66	539		
26.0	85.30	540		
26.5	86.94	541		
27.0	88.58	542		
27.5	90.22	543		
28.0	91.86	544		
28.5	93.50	545		PREVIOUS LOG START.
29.0	95.14	546		
29.5	96.78	547		
30.0	98.43	548		
30.5	100.07	549		
31.0	101.71	550		
31.5	103.35	551		
32.0	104.99	552		
32.5	106.63	553		HIT BOTTOM? TIPE 118.7'
33.0	108.27			
33.5	109.91			
34.0	111.55			
34.5	113.19			
35.0	114.83			
35.5	116.47			
36.0	118.11			
36.5	119.75			
37.0	121.39			
37.5	123.03			
38.0	124.67			
38.5	126.31			
39.0	127.95			
39.5	129.59			
40.0	131.23			

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B-405-DH ELOG FIELD LOG

SITE: SOUTH TEXAS PROJECT COL
DATE: 11/8/06
CLIENT: MACTEC
JOB: 6533
AUTHOR: R. STELLER
PAGE 1 OF 2

CONTACT: _____ OFFICE PHONE: _____
CELL PHONE: _____
CONTACT: _____ OFFICE PHONE: _____
PHONE: _____
CONTACT: _____ PHONE: _____
PHONE: _____
CONTACT: _____ PHONE: _____
PHONE: _____
DRILLER: _____ PHONE: _____
COMPANY: _____ PHONE: _____

GENERAL SITE CONDITIONS/LOCATION: _____

BOREHOLE DESIGNATION: B-405-DH LOCATION: _____

COUNTY: _____ RANGE: _____ TOWNSHIP: _____ SECTION: _____
BOREHOLE CONSTRUCTION: CASED ____ UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4" 0 TO 120' ; _____, _____ TO _____
BOREHOLE TOTAL DEPTH AS DRILLED: CLEAR TO 120'
CONDUCTOR CASING?: YES ✓ DEPTH TO BOTTOM OF CASING 20' ; NO ____ (AUGER)
DEPTH TO BEDROCK: NA DEPTH TO WATER TABLE: ≈20'
BOREHOLE FLUID: WATER ____ ; FRESH WATER MUD ✓ ; SALT WATER MUD ____ ;
OTHER: _____
DEPTH TO BOREHOLE FLUID: Ø TIME SINCE LAST CIRCULATION: ≈ 1/2 HR

LOGGING CREW: R. STELLER
VEHICLE(S) USED AND MILEAGE: RENTAL
MOBILIZED FROM: BAY CITY, TX DEPARTURE TIME: 06:00
ARRIVED ON SITE: 06:30
STANDBY TIME: _____ CAUSE: _____
LOGGING STARTED: 11:12 LOGGING COMPLETED: 11:23

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SITE: SOUTH TEXAS PROJECT COL B-405-D4 DATE: 11/8/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 2 OF 2

WINCH: COMPROBE ____ SILVER ✓ OYO ____ OTHER ____
MICROLOGGER 5301 ✓ OTHER ____
ELOG PROBE 5490 ✓ OTHER ____

PROBE LENGTH	2.50M(8.20 FT)	
PLUS YOKE 10.0M (32.8 FT)	32.8'	
MINUS CASING STICK-UP	1.5	
DEPTH REF. OFFSET AT START	39.5'	
DEPTH REF. OFFSET AT END	39.45	
AFTER SURVEY DEPTH ERROR	-.05	LESS THAN 0.4%? YES

LOG NAME	START DEPTH	START TIME	END DEPTH	END TIME
B405ELOGTEST01	Ø	11:01	Ø	11:04
B405ELOGUP02	120.0'	11:12	18.5'	11:23

MAINTENANCE PERFORMED ON SITE: ____

EQUIPMENT PROBLEMS OR FAILURES: ____

SUGGESTIONS, ADDITIONS, CHANGES: ____

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B-405-DH ACOUSTIC TELEVIEWER FIELD LOG

SITE: SOUTH TEXAS PROJECT COL DATE: 11/8/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 1 OF 2

CONTACT: MIKE SUFNARSKI OFFICE PHONE: 704-357-5633
CELL PHONE: 704-309-0624
CONTACT: OFFICE PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
DRILLER: PHONE:
COMPANY: PHONE:

DIRECTIONS TO SITE:

GENERAL SITE CONDITIONS/LOCATION:

BOREHOLE DESIGNATION: B-405-DH LOCATION:

COUNTY: RANGE: TOWNSHIP: SECTION:
BOREHOLE CONSTRUCTION: CASED ____ UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4" 0 TO 120' ; ____, ____ TO ____
BOREHOLE TOTAL DEPTH AS DRILLED: CLEAR TO 120'
CONDUCTOR CASING?: YES ✓ DEPTH TO BOTTOM OF CASING 20' ; NO (Auger)
DEPTH TO BEDROCK: NA DEPTH TO WATER TABLE:
BOREHOLE FLUID: WATER ____; FRESH WATER MUD ✓; SALT WATER MUD ____;
OTHER:
DEPTH TO BOREHOLE FLUID: Ø TIME SINCE LAST CIRCULATION: ≈2.0 HR

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SITE: SOUTH TEXAS PROJECT COL B-405-04 DATE: 11/8/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 2 OF 2

LOGGING CREW: R. STELLER
VEHICLE(S) USED AND MILEAGE: RENTAL
MOBILIZED FROM: BAY CITY, TX DEPARTURE TIME: 06:00
ARRIVED ON SITE: 06:30
STANDBY TIME: CAUSE:
LOGGING STARTED: 13:43 LOGGING COMPLETED: 13:49

WINCH: COMPROBE ___ SILVER ✓ OYO ___ OTHER ___
MICROLOGGER 5301 ✓ OTHER ___
TELEVIEWER ACOUSTIC #5174 ✓ OTHER ___

PROBE TILT TEST 91.6° BRUNTON TILT 92°
PROBE TILT TEST 0.5° BRUNTON TILT 0°
PROBE TILT TEST ___ BRUNTON TILT ___
PROBE AZIMUTH TEST 357.6° BRUNTON AZIMUTH 360°
PROBE AZIMUTH TEST 159.6 BRUNTON AZIMUTH 160°
PROBE AZIMUTH TEST ___ BRUNTON AZIMUTH ___

PROBE OFFSET	1.44M(4.72FT)	
MINUS CASING STICK-UP	1.5'	
DEPTH REF. OFFSET AT START	3.22'	
DEPTH REF. OFFSET AT END	3.40'	
AFTER SURVEY DEPTH ERROR	+ 0.18'	LESS THAN 0.4%? YES

LOG NAME	START DEPTH	START TIME	END DEPTH	END TIME
B405AU4802	115	13:43	Ø	13:49

MAINTENANCE PERFORMED ON SITE:

EQUIPMENT PROBLEMS OR FAILURES:

SUGGESTIONS, ADDITIONS, CHANGES:

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B-405-DH CALIPER FIELD LOG

SITE: SOUTH TEXAS PROJECT COL DATE: 11/8/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 1 OF 2

CONTACT: MIKE SUFNARSKI OFFICE PHONE:
CELL PHONE: 704-357-5633
CONTACT: OFFICE PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
DRILLER: PHONE:
COMPANY: PHONE:

GENERAL SITE CONDITIONS/LOCATION:

BOREHOLE DESIGNATION: B-405-DH LOCATION:

COUNTY: RANGE: TOWNSHIP: SECTION:
BOREHOLE CONSTRUCTION: CASED ____ UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4" 0 TO 120' ; ____, ____ TO ____
BOREHOLE TOTAL DEPTH AS DRILLED: CLEAR TO 120'
CONDUCTOR CASING?: YES ✓ DEPTH TO BOTTOM OF CASING 20' ; NO (AUGER)
DEPTH TO BEDROCK: NA DEPTH TO WATER TABLE:
BOREHOLE FLUID: WATER ____; FRESH WATER MUD ✓; SALT WATER MUD ____;
OTHER:
DEPTH TO BOREHOLE FLUID: Ø TIME SINCE LAST CIRCULATION: 53 HR

LOGGING CREW: R. STELLER
VEHICLE(S) USED AND MILEAGE: RENTAL
MOBILIZED FROM: BAY CITY, TX DEPARTURE TIME: 06:00
ARRIVED ON SITE: 06:30
STANDBY TIME: CAUSE:
LOGGING STARTED: 13:56 LOGGING COMPLETED: 14:44

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SITE: SOUTH TEXAS PROJECT COL B-405-DH DATE: 11/8/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 2 OF 2

WINCH: COMPROBE ____ SILVER ✓ OYO ____ OTHER ____
MICROLOGGER 5301 ✓ OTHER ____
CALIPER PROBE 5368 ✓ OTHER ____

PROBE OFFSET	2.08M(6.82 FT) 12 IN MAX	
MINUS CASING STICK-UP	1.5	
DEPTH REF. OFFSET AT START	5.32'	
DEPTH REF. OFFSET AT END	5.35'	
AFTER SURVEY DEPTH ERROR	+.03	LESS THAN 0.4%? YES

LOG NAME	START DEPTH	START TIME	END DEPTH	END TIME
B405CALTEST04	Ø	13:56	Ø	14:12
B405 CAL UP 02	115.0'	14:20	Ø	14:32
B405 CAL TEST 05	Ø	14:41	Ø	14:44

CALIBRATION PLATE S/N 201

		AS BUILT			PVC FITTING
		1.968 IN	3.937 IN	8.000 IN	4.507 IN
	FILE NAME	(50 MM)	(100 MM)	(203.2 MM)	(114.3 MM)
AS MEAS.	B405CALTEST04	2.01	3.95	8.03	4.50
AS MEAS.	B405CALTEST05	2.02	3.96	8.02	4.54
AS MEAS.					
AS MEAS.					
AS MEAS.					
AS MEAS.					

MAINTENANCE PERFORMED ON SITE: ____

EQUIPMENT PROBLEMS OR FAILURES: ____

SUGGESTIONS, ADDITIONS, CHANGES: ____

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B-408-DH BORING GEOPHYSICS FIELD LOG SUMMARY

SITE: SOUTH TEXAS PROJECT COL DATE: 11/9/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 1 OF 1

CONTACT: MIKE SUFNARSKI PHONE: 704-357-5633

BOREHOLE CONSTRUCTION: CASED ____ UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4" 0 TO 215' ; ____, ____ TO ____
BOREHOLE TOTAL DEPTH AS DRILLED: 215'
CONDUCTOR CASING?: YES ____ DEPTH TO BOTTOM OF CASING ____; NO ✓
DEPTH TO BEDROCK: NA
BOREHOLE FLUID: WATER ____; FRESH WATER MUD ✓; SALT WATER MUD ____;

LOGGING CREW: R. STELLER

LOG TYPE	FILE NAME	DEPTH RANGE	DATE	TIMES
ELOG TEST	B408ELOG TEST01	Ø	11/9/06	08:37 – 08:40
ELOG/GAMMA	B408ELOGUP01	215.5' – 35.0'	"	12:29 – 12:50
SUSPENSION PS	B408_001-122.026	3.3' - 201.8'	"	13:07 – 14:11
CALIPER TEST	B408CAL TEST01	Ø	"	14:30 – 14:33
CALIPER/GAMMA	B408CALUP01	210.0' – 0.35'	"	14:41 – 15:07
CALIPER TEST	B408CAL TEST02	Ø	"	15:10 – 15:15
DEVIATION	B408DEVUP01	210.0' – Ø	"	15:35 – 15:46

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B-408-DH ELOG FIELD LOG

SITE: SOUTH TEXAS PROJECT COL
DATE: 11/9/06
CLIENT: MACTEC
JOB: 6533
AUTHOR: R. STELLER
PAGE 1 OF 2

CONTACT: _____ OFFICE PHONE: _____
CELL PHONE: _____
CONTACT: _____ OFFICE PHONE: _____
PHONE: _____
CONTACT: _____ PHONE: _____
PHONE: _____
CONTACT: _____ PHONE: _____
PHONE: _____
DRILLER: _____ PHONE: _____
COMPANY: _____ PHONE: _____

GENERAL SITE CONDITIONS/LOCATION: _____

BOREHOLE DESIGNATION: B-408-DH LOCATION: _____

COUNTY: _____ RANGE: _____ TOWNSHIP: _____ SECTION: _____
BOREHOLE CONSTRUCTION: CASED ____ UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4" 0 TO 215' ; _____, _____ TO _____
BOREHOLE TOTAL DEPTH AS DRILLED: 215
CONDUCTOR CASING?: YES ___ DEPTH TO BOTTOM OF CASING _____; NO ✓
DEPTH TO BEDROCK: NA DEPTH TO WATER TABLE: ≈20'
BOREHOLE FLUID: WATER ____; FRESH WATER MUD ✓; SALT WATER MUD ____;
OTHER: _____
DEPTH TO BOREHOLE FLUID: Ø TIME SINCE LAST CIRCULATION: ≈ 1/2 HR

LOGGING CREW: R. STELLER
VEHICLE(S) USED AND MILEAGE: RENTAL
MOBILIZED FROM: BAY CITY, TX DEPARTURE TIME: 07:00
ARRIVED ON SITE: 07:30
STANDBY TIME: _____ CAUSE: BORING OBSTRUCTED.
LOGGING STARTED: 08:37 LOGGING COMPLETED: 12:50.

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SITE: SOUTH TEXAS PROJECT COL B-A08-DH DATE: 11/9/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 2 OF 2

WINCH: COMPROBE ____ SILVER ✓ OYO ____ OTHER ____
MICROLOGGER 5301 ✓ OTHER ____
ELOG PROBE 5490 ✓ OTHER ____

PROBE LENGTH	2.50M(8.20 FT)	
PLUS YOKE 10.0M (32.8 FT)	32.8	
MINUS CASING STICK-UP	~~41.0'~~ 0'	
DEPTH REF. OFFSET AT START	41.0'	
DEPTH REF. OFFSET AT END	41.1'	
AFTER SURVEY DEPTH ERROR	+.1'	LESS THAN 0.4%? YES

LOG NAME	START DEPTH	START TIME	END DEPTH	END TIME
BA08ELOGTEST01	Ø	08:37	Ø	08:40
BA08ELOGUP01	215.5'	12:29	35.0'	12:50

MAINTENANCE PERFORMED ON SITE: ____

EQUIPMENT PROBLEMS OR FAILURES: ____

SUGGESTIONS, ADDITIONS, CHANGES: ____

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P-S SUSPENSION VELOCITY FIELD LOG

SITE: SOUTH TEXAS PROJECT COL B-~~505~~ 408-DH RDB 11/9/06 DATE: 11/9/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 1 OF 6

CONTACT: MIKE SUFNARSKI OFFICE PHONE: 704-357-5633
CELL PHONE: 704-309-0624
CONTACT: OFFICE PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
DRILLER: PHONE:
COMPANY: PHONE:

DIRECTIONS TO SITE:

GENERAL SITE CONDITIONS/LOCATION:

EA#:
BOREHOLE DESIGNATION: B-408-DH LOCATION:

COUNTY: RANGE: TOWNSHIP: SECTION:
BOREHOLE CONSTRUCTION: CASED UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4" 0 TO 215' ; , TO
BOREHOLE TOTAL DEPTH AS DRILLED: 215'
CONDUCTOR CASING?: YES DEPTH TO BOTTOM OF CASING ; NO ✓
DEPTH TO BEDROCK: NA DEPTH TO WATER TABLE: <20'
BOREHOLE FLUID: WATER ; FRESH WATER MUD ✓ ; SALT WATER MUD ;
OTHER:
DEPTH TO BOREHOLE FLUID: Ø TIME SINCE LAST CIRCULATION: 1 HR.

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SITE: SOUTH TEXAS PROJECT COL B-408-DH DATE: 11/9/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 2 OF 6

LOGGING CREW: R. STELLER
VEHICLE(S) USED AND MILEAGE: RENTAL
MOBILIZED FROM: BAY CITY, TX DEPARTURE TIME: 07:00
ARRIVED ON SITE: 07:30
STANDBY TIME: CAUSE:
LOGGING STARTED: 13:04 LOGGING COMPLETED: 14:11
STANDBY TIME: CAUSE:
LOGGING STARTED: LOGGING COMPLETED:
DEMOBILIZED TO: ARRIVAL TIME:
ADDITIONAL DEMOB TIME: REASON:

BATTERIES CHANGED BEFORE LOGGING: YES ✓; NO ____; STORED WITH NEW ____

WINCH		COMPROBE ☐		GREY ☐		OYO ☐		RG ☐		OTH ☑	
INSTRUMENT	OYO	12004 ☐	15014 ☐	19029 ☐			RG	160023 ☑	160024 ☐		
RECEIVER S/N		12008 ☐	20042 ☐	26066 ☐	11001 ☐			23053 ☐	30086 ☑		

MAINTENANCE PERFORMED ON SITE:

EQUIPMENT PROBLEMS OR FAILURES:

SUGGESTIONS, ADDITIONS, CHANGES:

COMMENTS:

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GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: SOUTH TEXAS COL B-408 - DH DATE: 11/9/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 3 OF 6

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
0.5	1.64			
1.0	3.28	1		
1.5	4.92	2		
2.0	6.56	3		
2.5	8.20	4		
3.0	9.84	5		
3.5	11.48	6		
4.0	13.12	7		
4.5	14.76	8		
5.0	16.40	9		
5.5	18.04	10		
6.0	19.69	11		
6.5	21.33	12		
7.0	22.97	13		
7.5	24.61	14		
8.0	26.25	15		
8.5	27.89	16		
9.0	29.53	17		
9.5	31.17	18		
10.0	32.81	19		
10.5	34.45	20		
11.0	36.09	21		
11.5	37.73	22		
12.0	39.37	23		
12.5	41.01	24		
13.0	42.65	25		
13.5	44.29	26		
14.0	45.93	27		
14.5	47.57	28		
15.0	49.21	29		
15.5	50.85	30		
16.0	52.49	31		
16.5	54.13	32		
17.0	55.77	33		
17.5	57.41	34		
18.0	59.06	35		
18.5	60.70	36		
19.0	62.34	37		
19.5	63.98	38		
20.0	65.62	39		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: SOUTH TEXAS COL B-408-DH DATE: 11/9/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 4 OF 6

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
20.5	67.26	40		
21.0	68.90	41		
21.5	70.54	42		
22.0	72.18	43		
22.5	73.82	44		
23.0	75.46	45		
23.5	77.10	46		
24.0	78.74	47		
24.5	80.38	48		
25.0	82.02	49		
25.5	83.66	50		
26.0	85.30	51		
26.5	86.94	52		
27.0	88.58	53		
27.5	90.22	54		
28.0	91.86	55		
28.5	93.50	56		
29.0	95.14	57		
29.5	96.78	58		
30.0	98.43	59		
30.5	100.07	60		
31.0	101.71	61		
31.5	103.35	62		
32.0	104.99	63		
32.5	106.63	64		
33.0	108.27	65		
33.5	109.91	66		
34.0	111.55	67		
34.5	113.19	68		
35.0	114.83	69		
35.5	116.47	70		
36.0	118.11	71		
36.5	119.75	72		
37.0	121.39	73		
37.5	123.03	74		
38.0	124.67	75		
38.5	126.31	76		
39.0	127.95	77		
39.5	129.59	78		
40.0	131.23	79		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: SOUTH TEXAS COL B-408-DH DATE: 11/9/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 5 OF 6

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
40.5	132.87	80		
41.0	134.51	81		
41.5	136.15	82		
42.0	137.80	83		
42.5	139.44	84		
43.0	141.08	85		
43.5	142.72	86		
44.0	144.36	87		
44.5	146.00	88		
45.0	147.64	89		
45.5	149.28	90		
46.0	150.92	91		
46.5	152.56	92		
47.0	154.20	93		
47.5	155.84	94		
48.0	157.48	95		
48.5	159.12	96		
49.0	160.76	97		
49.5	162.40	98		
50.0	164.04	99		
50.5	165.68	100		
51.0	167.32	101		
51.5	168.96	102		
52.0	170.60	103		
52.5	172.24	104		
53.0	173.88	105		
53.5	175.52	106		
54.0	177.17	107		
54.5	178.81	108		
55.0	180.45	109		
55.5	182.09	110		
56.0	183.73	111		
56.5	185.37	112		
57.0	187.01	113		
57.5	188.65	114		
58.0	190.29	115		
58.5	191.93	116		
59.0	193.57	117		
59.5	195.21	118		
60.0	196.85	119		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: SOUTH TEXAS COL B-408-DH DATE: 11/9/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 6 OF 6

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
60.5	198.49	120		
61.0	200.13	121		
61.5	201.77	122		BOTTOM MEASUREMENT
62.0	203.41			HIT BOTTOM @ 61.7m
62.5	205.05			
63.0	206.69			
63.5	208.33			
64.0	209.97			
64.5	211.61			
65.0	213.25			
65.5	214.90			T.D. @ 215
66.0	216.54			
66.5	218.18			
67.0	219.82			
67.5	221.46			
68.0	223.10			
68.5	224.74			
69.0	226.38			
69.5	228.02			
70.0	229.66			
70.5	231.30			
71.0	232.94			
71.5	234.58			
72.0	236.22			
72.5	237.86			
73.0	239.50			
73.5	241.14			
74.0	242.78			
74.5	244.42			
75.0	246.06			
75.5	247.70			
76.0	249.34			
76.5	250.98			
77.0	252.62			
77.5	254.27			
78.0	255.91			
78.5	257.55			
79.0	259.19			
79.5	260.83			
80.0	262.47			

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B-408-DH CALIPER FIELD LOG

SITE: SOUTH TEXAS PROJECT COL DATE: 11/9/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 1 OF 2

CONTACT: MIKE SUFNARSKI OFFICE PHONE:
CELL PHONE: 704-357-5633
CONTACT: OFFICE PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
DRILLER: PHONE:
COMPANY: PHONE:

GENERAL SITE CONDITIONS/LOCATION:

BOREHOLE DESIGNATION: B-408-DH LOCATION:

COUNTY: RANGE: TOWNSHIP: SECTION:
BOREHOLE CONSTRUCTION: CASED UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4" 0 TO 215' ; , TO
BOREHOLE TOTAL DEPTH AS DRILLED: 215'
CONDUCTOR CASING?: YES DEPTH TO BOTTOM OF CASING ; NO ✓
DEPTH TO BEDROCK: NA DEPTH TO WATER TABLE: ≈26'
BOREHOLE FLUID: WATER ; FRESH WATER MUD ✓ ; SALT WATER MUD ;
OTHER:
DEPTH TO BOREHOLE FLUID: Ø TIME SINCE LAST CIRCULATION: 2 HR

LOGGING CREW: R. STELLER
VEHICLE(S) USED AND MILEAGE: RENTAL
MOBILIZED FROM: BAY CITY, TX DEPARTURE TIME: 07:00
ARRIVED ON SITE: 07:30
STANDBY TIME: CAUSE:
LOGGING STARTED: 14:30 LOGGING COMPLETED: 15:15

GEOVision Geophysical Services *1151 Pomona Road, Unit P, Corona, CA 92882* *Ph (951) 549-1234 Fx (951) 549-1236*

SITE: SOUTH TEXAS PROJECT COL B-408-DH DATE: 11/9/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 2 OF 2

WINCH: COMPROBE ____ SILVER ✓ OYO ____ OTHER ____
MICROLOGGER 5301 ✓ OTHER ____
CALIPER PROBE 5368 ✓ OTHER ____

PROBE OFFSET	2.08M(6.82 FT) 12 IN MAX	
MINUS CASING STICK-UP	Ø	
DEPTH REF. OFFSET AT START	6.82	
DEPTH REF. OFFSET AT END	6.90	
AFTER SURVEY DEPTH ERROR	+.09'	LESS THAN 0.4%? YES

LOG NAME	START DEPTH	START TIME	END DEPTH	END TIME
B408CALTEST01	Ø	14:30	Ø	14:33
B408CALUP01	210.0'	14:41	0.35'	15:07
B408CALTEST02	Ø	~~15:00~~ 15:10	Ø	15:15
		RBS 11/9/06		

CALIBRATION PLATE S/N 201		AS BUILT			PVC FITTING
		1.968 IN	3.937 IN	8.000 IN	4.507 IN
	FILE NAME	(50 MM)	(100 MM)	(203.2 MM)	(114.3 MM)
AS MEAS.	B408CALTEST01	2.00	3.95	8.00	4.52
AS MEAS.	B408CALTEST02	2.00	3.94	8.02	4.51
AS MEAS.					
AS MEAS.					
AS MEAS.					
AS MEAS.					

MAINTENANCE PERFORMED ON SITE: ____

EQUIPMENT PROBLEMS OR FAILURES: ____

SUGGESTIONS, ADDITIONS, CHANGES: ____

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B-408-DH ACOUSTIC TELEVIEWER FIELD LOG

SITE: SOUTH TEXAS PROJECT COL DATE: 11/9/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 1 OF 2

CONTACT: MIKE SUFNARSKI OFFICE PHONE: 704-357-5633
CELL PHONE: 704-309-0624
CONTACT: OFFICE PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
DRILLER: PHONE:
COMPANY: PHONE:

DIRECTIONS TO SITE:

GENERAL SITE CONDITIONS/LOCATION:

BOREHOLE DESIGNATION: B-408-DH LOCATION:

COUNTY: RANGE: TOWNSHIP: SECTION:
BOREHOLE CONSTRUCTION: CASED ____ UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4" 0 TO 215' ; ____, ____ TO ____
BOREHOLE TOTAL DEPTH AS DRILLED: 215'
CONDUCTOR CASING?: YES ____ DEPTH TO BOTTOM OF CASING ____; NO ✓
DEPTH TO BEDROCK: NA DEPTH TO WATER TABLE: 220'
BOREHOLE FLUID: WATER ____; FRESH WATER MUD ✓; SALT WATER MUD ____;
OTHER:
DEPTH TO BOREHOLE FLUID: Ø TIME SINCE LAST CIRCULATION: 3 HR.

GEOVision Geophysical Services *1151 Pomona Road, Unit P, Corona, CA 92882* *Ph (951) 549-1234 Fx (951) 549-1236*

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SITE: SOUTH TEXAS PROJECT COL B-408-DH DATE: 11/9/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 2 OF 2

LOGGING CREW: R. STELLER
VEHICLE(S) USED AND MILEAGE: RENTAL
MOBILIZED FROM: BAY CITY, TX DEPARTURE TIME: 07:00
ARRIVED ON SITE: 07:30
STANDBY TIME: CAUSE:
LOGGING STARTED: 15:35 LOGGING COMPLETED: 15:46

WINCH: COMPROBE ___ SILVER ✓ OYO ___ OTHER ___
MICROLOGGER 5301 ✓ OTHER ___
TELEVIEWER ACOUSTIC #5174 ✓ OTHER ___

PROBE TILT TEST 88.1° BRUNTON TILT 89°
PROBE TILT TEST 0.8° BRUNTON TILT 0°
PROBE TILT TEST ___ BRUNTON TILT ___
PROBE AZIMUTH TEST 338.9° BRUNTON AZIMUTH 332°
PROBE AZIMUTH TEST 167.5° BRUNTON AZIMUTH 168°
PROBE AZIMUTH TEST ___ BRUNTON AZIMUTH ___

PROBE OFFSET	1.44M(4.72FT)	
MINUS CASING STICK-UP	Ø	
DEPTH REF. OFFSET AT START	4.72'	
DEPTH REF. OFFSET AT END	4.70	
AFTER SURVEY DEPTH ERROR	-.02'	LESS THAN 0.4%? YES

LOG NAME	START DEPTH	START TIME	END DEPTH	END TIME
B408BAccuP01	210.0'	15:35	Ø	15:46

MAINTENANCE PERFORMED ON SITE:

EQUIPMENT PROBLEMS OR FAILURES:

SUGGESTIONS, ADDITIONS, CHANGES:

GEOVision Geophysical Services *1151 Pomona Road, Unit P, Corona, CA 92882* *Ph (951) 549-1234 Fx (951) 549-1236*

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B-419 BORING GEOPHYSICS FIELD LOG SUMMARY

SITE: SOUTH TEXAS PROJECT COL DATE: 12/4/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 1 OF 1

CONTACT: MIKE SUFNARSKI PHONE: 704-357-5633

BOREHOLE CONSTRUCTION: CASED ____ UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4 7/8" 0 TO 215' ; ____, ____ TO ____
BOREHOLE TOTAL DEPTH AS DRILLED: 215
CONDUCTOR CASING?: YES ✓ DEPTH TO BOTTOM OF CASING 2' ; NO ____
DEPTH TO BEDROCK: NA
BOREHOLE FLUID: WATER ____ ; FRESH WATER MUD ✓ ; SALT WATER MUD ____ ;

LOGGING CREW: R. STELLER, C. CARTER

LOG TYPE	FILE NAME	DEPTH RANGE	DATE	TIMES
ELOG TEST	B419ELOGTEST01	Ø	12/4/06	09:35 – 09:38
ELOG/GAMMA	B419ELOGUP01	216.0' – 17.9'	"	09:54 – 10:16
SUSPENSION P.S.	B419_001 – 123.DAT	3.3' – 203.2'	"	10:35 – 12:04
CALIPER TEST	B419CALTEST01	Ø	"	12:29 – 12:31
CALIPER/GAMMA	B419CALUP01	210.0' – Ø	"	12:48 – 13:10
CALIPER TEST	B419CALTEST02	Ø	"	13:19 – 13:22
DEVIATION	B419AMUP01	210.0' – 94.0	"	13:40 – 13:50
DEVIATION	B419AMUD02	91.0' – Ø	"	14:03 – 14:16

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B-419 ELOG FIELD LOG

SITE: SOUTH TEXAS PROJECT COL DATE: 12/4/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 1 OF 2

CONTACT: _____ OFFICE PHONE: _____
CELL PHONE: _____
CONTACT: _____ OFFICE PHONE: _____
PHONE: _____
CONTACT: _____ PHONE: _____
PHONE: _____
CONTACT: _____ PHONE: _____
PHONE: _____
DRILLER: _____ PHONE: _____
COMPANY: _____ PHONE: _____

GENERAL SITE CONDITIONS/LOCATION: _____

BOREHOLE DESIGNATION: B-419 LOCATION: _____

COUNTY: B-419 RANGE: _____ TOWNSHIP: _____ SECTION: _____
BOREHOLE CONSTRUCTION: CASED ____ UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4 7/8" 0 TO 215' ; ____, ____ TO ____
BOREHOLE TOTAL DEPTH AS DRILLED: 215
CONDUCTOR CASING?: YES ✓ DEPTH TO BOTTOM OF CASING 2' ; NO ____
DEPTH TO BEDROCK: NA DEPTH TO WATER TABLE: ____
BOREHOLE FLUID: WATER ____ ; FRESH WATER MUD Ø ; SALT WATER MUD ____ ;
OTHER: _____
DEPTH TO BOREHOLE FLUID: Ø TIME SINCE LAST CIRCULATION: 1/2 HR

LOGGING CREW: R. STELLER, C. CARTER
VEHICLE(S) USED AND MILEAGE: RENTAL
MOBILIZED FROM: Houston DEPARTURE TIME: 0:4:30
ARRIVED ON SITE: 07:30
STANDBY TIME: _____ CAUSE: _____
LOGGING STARTED: 09:30 LOGGING COMPLETED: 10:16

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SITE: SOUTH TEXAS PROJECT COL B-419 DATE: 12/4/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 2 OF 2

WINCH: COMPROBE ___ SILVER ✓ OYO ___ OTHER ___
MICROLOGGER 5301 ✓ OTHER ___
ELOG PROBE 5490 ✓ OTHER ___

PROBE LENGTH	2.50M(8.20 FT)	
PLUS YOKE 10.0M (32.8 FT)	32.8	
MINUS CASING STICK-UP	1.2'	
DEPTH REF. OFFSET AT START	39.8'	
DEPTH REF. OFFSET AT END	40.0	
AFTER SURVEY DEPTH ERROR	+0.2	LESS THAN 0.4%?

LOG NAME	START DEPTH	START TIME	END DEPTH	END TIME
B419 ELOG TEST 01	Ø	09:35	Ø	09:38
B419 ELOG UP 01	26	09:54	17.9'	10:16

MAINTENANCE PERFORMED ON SITE: ___

EQUIPMENT PROBLEMS OR FAILURES: ___

SUGGESTIONS, ADDITIONS, CHANGES: ___

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P-S SUSPENSION VELOCITY FIELD LOG

SITE: SOUTH TEXAS PROJECT COL B-419 DATE: 12/4/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 1 OF ____

CONTACT: MIKE SUFNARSKI OFFICE PHONE: 704-357-5633
CELL PHONE: 704-309-0624
CONTACT: OFFICE PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
DRILLER: PHONE:
COMPANY: PHONE:

DIRECTIONS TO SITE:

GENERAL SITE CONDITIONS/LOCATION:

EA#:
BOREHOLE DESIGNATION: B-419 LOCATION:

COUNTY: RANGE: TOWNSHIP: SECTION:
BOREHOLE CONSTRUCTION: CASED ____ UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4 7/8 0 TO 215 ; ____, ____ TO ____
BOREHOLE TOTAL DEPTH AS DRILLED: 215
CONDUCTOR CASING?: YES ✓ DEPTH TO BOTTOM OF CASING 2'; NO ____
DEPTH TO BEDROCK: NA DEPTH TO WATER TABLE: ≈20'
BOREHOLE FLUID: WATER ____; FRESH WATER MUD ✓; SALT WATER MUD ____;
OTHER:
DEPTH TO BOREHOLE FLUID: Ø TIME SINCE LAST CIRCULATION: 2 hr

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SITE: SOUTH TEXAS PROJECT COL B-419 DATE: 12/4/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 2 OF ____

LOGGING CREW: R. STELLER, C. CARTER
VEHICLE(S) USED AND MILEAGE: RENTAL
MOBILIZED FROM: HOUSTON DEPARTURE TIME: 04:30
ARRIVED ON SITE: 07:30
STANDBY TIME: CAUSE:
LOGGING STARTED: 10:35 LOGGING COMPLETED: 12:04
STANDBY TIME: CAUSE:
LOGGING STARTED: LOGGING COMPLETED:
DEMOBILIZED TO: ARRIVAL TIME:
ADDITIONAL DEMOB TIME: REASON:

BATTERIES CHANGED BEFORE LOGGING: YES ✓; NO ____; STORED WITH NEW ____

WINCH	COMPROBE ☐		GREY ☐	OYO ☐	RG ☐	OTH ☑		
INSTRUMENT	OYO 12004 ☐	15014 ☐	19029 ☐		RG 160023 ☑	160024 ☐		
RECEIVER S/N	12008 ☐	20042 ☐	26066 ☐	11001 ☐	23053 ☐	30086 ☑		

MAINTENANCE PERFORMED ON SITE:

EQUIPMENT PROBLEMS OR FAILURES:

SUGGESTIONS, ADDITIONS, CHANGES:

COMMENTS: DEPTH ZERO = 8.2' - 1.2' = 7.0' = 2.13m.
EYM ZERO = 2.13m

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GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: SOUTH TEXAS COL B-419 DATE: 12/4/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 3 OF

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
0.5	1.64			
1.0	3.28	001		
1.5	4.92	2		
2.0	6.56	3		
2.5	8.20	4		
3.0	9.84	5		
3.5	11.48	6		
4.0	13.12	7		
4.5	14.76	8		
5.0	16.40	9		
5.5	18.04	10		
6.0	19.69	11		
6.5	21.33	12		
7.0	22.97	13		
7.5	24.61	14		
8.0	26.25	15		
8.5	27.89	16		
9.0	29.53	17		
9.5	31.17	18		
10.0	32.81	19		
10.5	34.45	20		
11.0	36.09	21		
11.5	37.73	22		
12.0	39.37	23		
12.5	41.01	24		
13.0	42.65	25		
13.5	44.29	26		
14.0	45.93	27		
14.5	47.57	28		
15.0	49.21	29		
15.5	50.85	30		
16.0	52.49	31		
16.5	54.13	32		
17.0	55.77	33		
17.5	57.41	34		
18.0	59.06	35		
18.5	60.70	36		
19.0	62.34	37		
19.5	63.98	38		
20.0	65.62	39		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: SOUTH TEXAS COL B-419 DATE: 12/4/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 4 OF

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
20.5	67.26	40		
21.0	68.90	41		
21.5	70.54	42		
22.0	72.18	43		
22.5	73.82	44		
23.0	75.46	45		
23.5	77.10	46		
24.0	78.74	47		
24.5	80.38	48		
25.0	82.02	49		
25.5	83.66	50		
26.0	85.30	51		
26.5	86.94	52		
27.0	88.58	53		
27.5	90.22	54		
28.0	91.86	55		
28.5	93.50	56		
29.0	95.14	57		
29.5	96.78	58		
30.0	98.43	59		
30.5	100.07	60		
31.0	101.71	61		
31.5	103.35	62		
32.0	104.99	63		
32.5	106.63	64		
33.0	108.27	65		
33.5	109.91	66		
34.0	111.55	67		
34.5	113.19	68		
35.0	114.83	69		
35.5	116.47	70		
36.0	118.11	71		
36.5	119.75	72		
37.0	121.39	73		
37.5	123.03	74		
38.0	124.67	75		
38.5	126.31	76		
39.0	127.95	77		
39.5	129.59	78		
40.0	131.23	79		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: SOUTH TEXAS COL B-419 DATE: 12/4/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 5 OF 6

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
40.5	132.87	80		
41.0	134.51	81		
41.5	136.15	82		
42.0	137.80	83		
42.5	139.44	84		
43.0	141.08	85		
43.5	142.72	86		
44.0	144.36	87		
44.5	146.00	88		
45.0	147.64	89		
45.5	149.28	90		
46.0	150.92	91		
46.5	152.56	92		
47.0	154.20	93		
47.5	155.84	94		
48.0	157.48	95		
48.5	159.12	96		
49.0	160.76	97		
49.5	162.40	98		
50.0	164.04	99		
50.5	165.68	100		
51.0	167.32	101		
51.5	168.96	102		
52.0	170.60	103		
52.5	172.24	104		
53.0	173.88	105		
53.5	175.52	106		
54.0	177.17	107		
54.5	178.81	108		
55.0	180.45	109		
55.5	182.09	110		
56.0	183.73	111		
56.5	185.37	112		
57.0	187.01	113		
57.5	188.65	114		
58.0	190.29	115		
58.5	191.93	116		
59.0	193.57	117		
59.5	195.21	118		
60.0	196.85	119		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: SOUTH TEXAS COL B-419 DATE: 12/4/06.
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 6 OF 6

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
60.5	198.49	120		
61.0	200.13	121		
61.5	201.77	122		B.M.:
61 ~~62.0~~	203.41	123		HR @ 62.0 m.
62.5	205.05			
63.0	206.69			
63.5	208.33			
64.0	209.97			
64.5	211.61			
65.0	213.25			
65.5	214.90			T.D. ≈ 215'
66.0	216.54			
66.5	218.18			
67.0	219.82			
67.5	221.46			
68.0	223.10			
68.5	224.74			
69.0	226.38			
69.5	228.02			
70.0	229.66			
70.5	231.30			
71.0	232.94			
71.5	234.58			
72.0	236.22			
72.5	237.86			
73.0	239.50			
73.5	241.14			
74.0	242.78			
74.5	244.42			
75.0	246.06			
75.5	247.70			
76.0	249.34			
76.5	250.98			
77.0	252.62			
77.5	254.27			
78.0	255.91			
78.5	257.55			
79.0	259.19			
79.5	260.83			
80.0	262.47			

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B-419 CALIPER FIELD LOG

SITE: SOUTH TEXAS PROJECT COL DATE: 12/4/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 1 OF 2

CONTACT: MIKE SUFNARSKI OFFICE PHONE:
CELL PHONE: 704-357-5633
CONTACT: OFFICE PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
DRILLER: PHONE:
COMPANY: PHONE:

GENERAL SITE CONDITIONS/LOCATION:

BOREHOLE DESIGNATION: B-419 LOCATION:

COUNTY: RANGE: TOWNSHIP: SECTION:
BOREHOLE CONSTRUCTION: CASED ____ UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4 7/8" 0 TO 215' ; ____, ____ TO ____
BOREHOLE TOTAL DEPTH AS DRILLED: 215'
CONDUCTOR CASING?: YES ✓ DEPTH TO BOTTOM OF CASING 2' ; NO ____
DEPTH TO BEDROCK: NA DEPTH TO WATER TABLE: ≈20'
BOREHOLE FLUID: WATER ____ ; FRESH WATER MUD ✓ ; SALT WATER MUD ____ ;
OTHER:
DEPTH TO BOREHOLE FLUID: Ø TIME SINCE LAST CIRCULATION: ~5 HR

LOGGING CREW: R. STELLER C. CARTER
VEHICLE(S) USED AND MILEAGE: RENTAL
MOBILIZED FROM: HOUSTON DEPARTURE TIME: 04:30
ARRIVED ON SITE: 07:30
STANDBY TIME: CAUSE:
LOGGING STARTED: 12:29 LOGGING COMPLETED: 13:22

GEOVision Geophysical Services *1151 Pomona Road, Unit P, Corona, CA 92882* *Ph (951) 549-1234 Fx (951) 549-1236*

SITE: SOUTH TEXAS PROJECT COL B419 DATE: 12/4/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 2 OF 2

WINCH: COMPROBE ✓ SILVER ✓ OYO ____ OTHER ____
MICROLOGGER 5301 ✓ OTHER ____
CALIPER PROBE 5368 ✓ OTHER ____

PROBE OFFSET	2.08M(6.82 FT) 12 IN MAX	
MINUS CASING STICK-UP	1.2	
DEPTH REF. OFFSET AT START	5.62'	
DEPTH REF. OFFSET AT END	5.60	
AFTER SURVEY DEPTH ERROR	-0.02	LESS THAN 0.4%? YES

LOG NAME	START DEPTH	START TIME	END DEPTH	END TIME
B419CALTEST01	Ø	12:24	Ø	12:31
B419CALUP01	210.0'	12:48	Ø	13:10
B419CALTEST01	Ø	13:19	Ø	13:22

CALIBRATION PLATE S/N 201

		AS BUILT			PVC FITTING
		1.968 IN	3.937 IN	8.000 IN	4.507 IN
	FILE NAME	(50 MM)	(100 MM)	(203.2 MM)	(114.3 MM)
AS MEAS.	B419CALTEST01	1.97	3.94	8.01	4.49.
AS MEAS.	B419CALTEST02	2.03	3.98	8.00	4.54.
AS MEAS.					
AS MEAS.					
AS MEAS.					
AS MEAS.					

MAINTENANCE PERFORMED ON SITE: ____

EQUIPMENT PROBLEMS OR FAILURES: ____

SUGGESTIONS, ADDITIONS, CHANGES: ____

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B-419 ACOUSTIC TELEVIEWER FIELD LOG

SITE: SOUTH TEXAS PROJECT COL DATE: 12/4/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 1 OF 2

CONTACT: MIKE SUFNARSKI OFFICE PHONE: 704-357-5633
CELL PHONE: 704-309-0624
CONTACT: OFFICE PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
DRILLER: PHONE:
COMPANY: PHONE:

DIRECTIONS TO SITE:

GENERAL SITE CONDITIONS/LOCATION:

BOREHOLE DESIGNATION: B-419 LOCATION:

COUNTY: RANGE: TOWNSHIP: SECTION:
BOREHOLE CONSTRUCTION: CASED UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4 7/8 0 TO 215' ; , TO
BOREHOLE TOTAL DEPTH AS DRILLED: 215
CONDUCTOR CASING?: YES ✓ DEPTH TO BOTTOM OF CASING 2' ; NO
DEPTH TO BEDROCK: NA DEPTH TO WATER TABLE: 220'
BOREHOLE FLUID: WATER ; FRESH WATER MUD ✓ ; SALT WATER MUD ;
OTHER:
DEPTH TO BOREHOLE FLUID: Ø TIME SINCE LAST CIRCULATION: 3 HR

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SITE: SOUTH TEXAS PROJECT COL B-419 DATE: 12/4/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 2 OF 2

LOGGING CREW: R. STELLER, C. CARTER
VEHICLE(S) USED AND MILEAGE: RENTAL
MOBILIZED FROM: HOUSTON DEPARTURE TIME: 04:30
ARRIVED ON SITE: 07:30
STANDBY TIME: CAUSE:
LOGGING STARTED: 13:40 LOGGING COMPLETED: 14:16

WINCH: COMPROBE ___ SILVER ✓ OYO ___ OTHER ___
MICROLOGGER 5301 ✓ OTHER ___
TELEVIEWER ACOUSTIC #5174 ✓ OTHER ___

PROBE TILT TEST 87.3 BRUNTON TILT 86°
PROBE TILT TEST 0.7° BRUNTON TILT 0°
PROBE TILT TEST ___ BRUNTON TILT ___
PROBE AZIMUTH TEST 323.2° BRUNTON AZIMUTH 320
PROBE AZIMUTH TEST 271.0° BRUNTON AZIMUTH 280
PROBE AZIMUTH TEST 131.9° BRUNTON AZIMUTH 132°

PROBE OFFSET	1.44M(4.72FT)	
MINUS CASING STICK-UP	1.2'	
DEPTH REF. OFFSET AT START	3.52'	
DEPTH REF. OFFSET AT END	3.42	
AFTER SURVEY DEPTH ERROR	-0.1'	LESS THAN 0.4%? YES

LOG NAME	START DEPTH	START TIME	END DEPTH	END TIME
B419AUX001	210'	13:40	94'	13:50
B419AUP002	97	14:03	Ø	14:16

MAINTENANCE PERFORMED ON SITE:

EQUIPMENT PROBLEMS OR FAILURES:

SUGGESTIONS, ADDITIONS, CHANGES:

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B-428 BORING GEOPHYSICS FIELD LOG SUMMARY

SITE: SOUTH TEXAS PROJECT COL DATE: 12/5/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 1 OF 1

CONTACT: MIKE SUFNARSKI PHONE: 704-357-5633

BOREHOLE CONSTRUCTION: CASED ____ UNCASED ✓
DIAMETERS AND DEPTH RANGES: ~~215~~ 4 7/8" 0 TO 215' ; ____, ____ TO ____
BOREHOLE TOTAL DEPTH AS DRILLED: 215
CONDUCTOR CASING?: YES ____ DEPTH TO BOTTOM OF CASING ____; NO ✓
DEPTH TO BEDROCK: NA
BOREHOLE FLUID: WATER ____; FRESH WATER MUD ✓; SALT WATER MUD ____;

LOGGING CREW: R. STELLER, C. CARTER

LOG TYPE	FILE NAME	DEPTH RANGE	DATE	TIMES
ELOG TEST	B428ELOGTEST01	Ø	12/5/06	08:05 – 08:08
ELOG/GAMMA	B428ELOGUP01	215.0' – 34.5'	"	09:37 – 10:05
SUSPENSION	B428-00-124.029	1.6' – 201.8'	"	10:30 – 12:10
CALIPER TEST	B428CALTEST01	Ø	"	12:26 – 12:34
CALIPER/GAMMA	B428CALUP01	210.0' – Ø'	"	12:42 – 13:03
CALIPER TEST	B428CALTEST02	Ø	"	13:10 – 13:13
DEVIATION	B428AUUP01	210.0' – 1.3'	"	13:33 – 13:55

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B-428 ELOG FIELD LOG

SITE: SOUTH TEXAS PROJECT COL DATE: 12/5/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 1 OF 2

CONTACT: _____ OFFICE PHONE: _____
CELL PHONE: _____
CONTACT: _____ OFFICE PHONE: _____
PHONE: _____
CONTACT: _____ PHONE: _____
PHONE: _____
CONTACT: _____ PHONE: _____
PHONE: _____
DRILLER: _____ PHONE: _____
COMPANY: _____ PHONE: _____

GENERAL SITE CONDITIONS/LOCATION: _____

BOREHOLE DESIGNATION: B-428 LOCATION: _____

COUNTY: _____ RANGE: _____ TOWNSHIP: _____ SECTION: _____
BOREHOLE CONSTRUCTION: CASED ____ UNCASED ✓
DIAMETERS AND DEPTH RANGES: 8" 0 TO 215' ; _____, _____ TO _____
BOREHOLE TOTAL DEPTH AS DRILLED: 215'
CONDUCTOR CASING?: YES ___ DEPTH TO BOTTOM OF CASING _____; NO ✓
DEPTH TO BEDROCK: NA DEPTH TO WATER TABLE: ≈20'
BOREHOLE FLUID: WATER ____; FRESH WATER MUD ✓; SALT WATER MUD ____;
OTHER: _____
DEPTH TO BOREHOLE FLUID: Ø TIME SINCE LAST CIRCULATION: ½ HR

LOGGING CREW: R. STELLER, C. CARTER
VEHICLE(S) USED AND MILEAGE: RENTAL
MOBILIZED FROM: BAY CITY DEPARTURE TIME: 06:30
ARRIVED ON SITE: 07:00
STANDBY TIME: _____ CAUSE: _____
LOGGING STARTED: 08:05 LOGGING COMPLETED: 10:05

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SITE: SOUTH TEXAS PROJECT COL B-428 DATE: 12/5/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 2 OF 2

WINCH: COMPROBE ____ SILVER ✓ OYO ____ OTHER ____
MICROLOGGER 5301 ✓ OTHER ____
ELOG PROBE 5490 ✓ OTHER ____

PROBE LENGTH	2.50M(8.20 FT)	
PLUS YOKE 10.0M (32.8 FT)	32.8'	
MINUS CASING STICK-UP	Ø	
DEPTH REF. OFFSET AT START	41.0'	
DEPTH REF. OFFSET AT END	41.1'	
AFTER SURVEY DEPTH ERROR	+0.1	LESS THAN 0.4%? YES

LOG NAME	START DEPTH	START TIME	END DEPTH	END TIME
B428ELOGTEST01	Ø	08:05	Ø	08:08
B428ELOGMP01	215.0'	09:37	24.5	10:05

MAINTENANCE PERFORMED ON SITE: ____

EQUIPMENT PROBLEMS OR FAILURES: ____

SUGGESTIONS, ADDITIONS, CHANGES: ____

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P-S SUSPENSION VELOCITY FIELD LOG

SITE: SOUTH TEXAS PROJECT COL B-428 DATE: 12/5/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 1 OF 6

CONTACT: MIKE SUFNARSKI OFFICE PHONE: 704-357-5633
CELL PHONE: 704-309-0624
CONTACT: OFFICE PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
DRILLER: PHONE:
COMPANY: PHONE:

DIRECTIONS TO SITE:

GENERAL SITE CONDITIONS/LOCATION:

EA#:
BOREHOLE DESIGNATION: B-428-DH LOCATION:

COUNTY: RANGE: TOWNSHIP: SECTION:
BOREHOLE CONSTRUCTION: CASED UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4 7/8" 0 TO 215' ; , TO
BOREHOLE TOTAL DEPTH AS DRILLED: 215'
CONDUCTOR CASING?: YES DEPTH TO BOTTOM OF CASING ; NO ✓
DEPTH TO BEDROCK: NA DEPTH TO WATER TABLE: ≈20'
BOREHOLE FLUID: WATER ; FRESH WATER MUD ✓ ; SALT WATER MUD ;
OTHER:
DEPTH TO BOREHOLE FLUID: Ø TIME SINCE LAST CIRCULATION: 1HR

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SITE: SOUTH TEXAS PROJECT COL B-428 DATE: 12/5/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 2 OF 6

LOGGING CREW: R. STELLER, C. CARTER
VEHICLE(S) USED AND MILEAGE: RENTAL
MOBILIZED FROM: BAY CITY, TX DEPARTURE TIME: 06:30
ARRIVED ON SITE: 07:00
STANDBY TIME: CAUSE:
LOGGING STARTED: 10:30 LOGGING COMPLETED: 12:10
STANDBY TIME: CAUSE:
LOGGING STARTED: LOGGING COMPLETED:
DEMOBILIZED TO: ARRIVAL TIME:
ADDITIONAL DEMOB TIME: REASON:

BATTERIES CHANGED BEFORE LOGGING: YES ____; NO ✓; STORED WITH NEW ____

WINCH	COMPROBE	☐	GREY	☐	OYO	☐	RG	☐	OTH	☑
INSTRUMENT	OYO 12004	☐	15014	☐	19029	☐	RG 160023	☑	160024	☐
RECEIVER S/N	12008	☐	20042	☐	26066	☐	11001 ☐	23053	☐	30086 ☑

MAINTENANCE PERFORMED ON SITE:

EQUIPMENT PROBLEMS OR FAILURES:

SUGGESTIONS, ADDITIONS, CHANGES:

COMMENTS: START DEPTH ZERO = 2.5m - 0.0 STICK-UP = 2.5m.

GEOVision Geophysical Services 1151 Pomona Road, Suite P, Corona, CA 92882 Ph (951) 549-1234 Fx (951) 549-1236

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: SOUTH TEXAS COL B-428 DATE: 12/8/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 3 OF 6

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
0.5	1.64	1		
1.0	3.28	2		
1.5	4.92	3		
2.0	6.56	4		
2.5	8.20	5		
3.0	9.84	6		
3.5	11.48	7		
4.0	13.12	8		
4.5	14.76	9		
5.0	16.40	10		
5.5	18.04	11		
6.0	19.69	12		
6.5	21.33	13		
7.0	22.97	14		
7.5	24.61	15		
8.0	26.25	16		
8.5	27.89	17		
9.0	29.53	18		
9.5	31.17	19		
10.0	32.81	20		
10.5	34.45	21		
11.0	36.09	22		
11.5	37.73	23		
12.0	39.37	24		
12.5	41.01	25		
13.0	42.65	26		
13.5	44.29	27		
14.0	45.93	28		
14.5	47.57	29		
15.0	49.21	30		
15.5	50.85	31		
16.0	52.49	32		
16.5	54.13	33		
17.0	55.77	34		
17.5	57.41	35		
18.0	59.06	36		
18.5	60.70	37		
19.0	62.34	38		
19.5	63.98	39		
20.0	65.62	40		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: SOUTH TEXAS COL B-428 DATE: 12/5/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 4 OF 6

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
20.5	67.26	41		
21.0	68.90	42		
21.5	70.54	43		
22.0	72.18	44		
22.5	73.82	45		
23.0	75.46	46		
23.5	77.10	47		
24.0	78.74	48		
24.5	80.38	49		
25.0	82.02	50		
25.5	83.66	51		
26.0	85.30	52		
26.5	86.94	53		
27.0	88.58	54		
27.5	90.22	55		
28.0	91.86	56		
28.5	93.50	57, 58		
29.0	95.14	~~58~~ 59 RAS	12/5/06	
29.5	96.78	60		
30.0	98.43	61		
30.5	100.07	62		
31.0	101.71	63		
31.5	103.35	64		
32.0	104.99	65		
32.5	106.63	66		
33.0	108.27	67		
33.5	109.91	68		
34.0	111.55	69		
34.5	113.19	70		
35.0	114.83	71		
35.5	116.47	72		
36.0	118.11	73		
36.5	119.75	74		
37.0	121.39	75		
37.5	123.03	76		
38.0	124.67	77		
38.5	126.31	78		
39.0	127.95	79		
39.5	129.59	80		
40.0	131.23	81		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: SOUTH TEXAS COL B-828 DATE: 12/5/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 5 OF 6

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
40.5	132.87	82		
41.0	134.51	83		
41.5	136.15	84		
42.0	137.80	85		
42.5	139.44	86		
43.0	141.08	87		
43.5	142.72	88		
44.0	144.36	89		
44.5	146.00	90		
45.0	147.64	91		
45.5	149.28	92		
46.0	150.92	93		
46.5	152.56	94		
47.0	154.20	95		
47.5	155.84	96		
48.0	157.48	97		
48.5	159.12	98		
49.0	160.76	99		
49.5	162.40	100		
50.0	164.04	101		
50.5	165.68	102		
51.0	167.32	103		
51.5	168.96	104		
52.0	170.60	105		
52.5	172.24	106		
53.0	173.88	107		
53.5	175.52	108		
54.0	177.17	109		
54.5	178.81	110		
55.0	180.45	111		
55.5	182.09	112		
56.0	183.73	113		
56.5	185.37	114		
57.0	187.01	115		
57.5	188.65	116		
58.0	190.29	117		
58.5	191.93	118		
59.0	193.57	119		
59.5	195.21	120		
60.0	196.85	121		

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: SOUTH TEXAS COL DATE:
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 6 OF 6

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
60.5	198.49	122		
61.0	200.13	123		
61.5	201.77	124		
62.0	203.41			BOTTOM MEASUREMENT ?
62.5	205.05			HK bottom @ 61.9 m
63.0	206.69			
63.5	208.33			
64.0	209.97			
64.5	211.61			
65.0	213.25			
65.5	214.90			T.D. @ 215'
66.0	216.54			
66.5	218.18			
67.0	219.82			
67.5	221.46			
68.0	223.10			
68.5	224.74			
69.0	226.38			
69.5	228.02			
70.0	229.66			
70.5	231.30			
71.0	232.94			
71.5	234.58			
72.0	236.22			
72.5	237.86			
73.0	239.50			
73.5	241.14			
74.0	242.78			
74.5	244.42			
75.0	246.06			
75.5	247.70			
76.0	249.34			
76.5	250.98			
77.0	252.62			
77.5	254.27			
78.0	255.91			
78.5	257.55			
79.0	259.19			
79.5	260.83			
80.0	262.47			

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B-428 CALIPER FIELD LOG

SITE: SOUTH TEXAS PROJECT COL DATE: 12/5/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 1 OF 2

CONTACT: MIKE SUFNARSKI OFFICE PHONE:
CELL PHONE: 704-357-5633
CONTACT: OFFICE PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
DRILLER: PHONE:
COMPANY: PHONE:

GENERAL SITE CONDITIONS/LOCATION:

BOREHOLE DESIGNATION: B-428-DH LOCATION:

COUNTY: RANGE: TOWNSHIP: SECTION:
BOREHOLE CONSTRUCTION: CASED UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4 7/8" 0 TO 215' ; , TO
BOREHOLE TOTAL DEPTH AS DRILLED: 215'
CONDUCTOR CASING?: YES DEPTH TO BOTTOM OF CASING ; NO ✓
DEPTH TO BEDROCK: NA DEPTH TO WATER TABLE: ≈20'
BOREHOLE FLUID: WATER ; FRESH WATER MUD ✓ ; SALT WATER MUD ;
OTHER:
DEPTH TO BOREHOLE FLUID: Ø TIME SINCE LAST CIRCULATION: ≈3HR

LOGGING CREW: R. STELLER, C. CARTER
VEHICLE(S) USED AND MILEAGE: RENTAL
MOBILIZED FROM: BAY CITY, TX DEPARTURE TIME: 06:30
ARRIVED ON SITE: 07:00
STANDBY TIME: CAUSE:
LOGGING STARTED: LOGGING COMPLETED:

GEOVision Geophysical Services *1151 Pomona Road, Unit P, Corona, CA 92882* *Ph (951) 549-1234 Fx (951) 549-1236*

SITE: SOUTH TEXAS PROJECT COL B-428 DATE: 12/5/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 2 OF 2

WINCH: COMPROBE ____ SILVER ✓ OYO ____ OTHER ____
MICROLOGGER 5301 ✓ OTHER ____
CALIPER PROBE 5368 ✓ OTHER ____

PROBE OFFSET	2.08M(6.82 FT) 12 IN MAX
MINUS CASING STICK-UP	Ø
DEPTH REF. OFFSET AT START	6.82
DEPTH REF. OFFSET AT END	
AFTER SURVEY DEPTH ERROR	LESS THAN 0.4%?

LOG NAME	START DEPTH	START TIME	END DEPTH	END TIME
B428CALTEST01	Ø	12:26	Ø	12:34
B428CALUP01	210.0'	12:42	Ø	13:03
B428CALTEST02	Ø	13:10	Ø	13:13

CALIBRATION PLATE S/N 201

		AS BUILT			PVC FITTING
		1.968 IN	3.937 IN	8.000 IN	4.507 IN
	FILE NAME	(50 MM)	(100 MM)	(203.2 MM)	(114.3 MM)
AS MEAS.	B428CALTEST01	1.97	3.92	7.98	4.52
AS MEAS.	B428CALTEST02	2.01	3.90	8.02	4.53
AS MEAS.					
AS MEAS.					
AS MEAS.					
AS MEAS.					

MAINTENANCE PERFORMED ON SITE: ____

EQUIPMENT PROBLEMS OR FAILURES: ____

SUGGESTIONS, ADDITIONS, CHANGES: ____

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B-428 ACOUSTIC TELEVIEWER FIELD LOG

SITE: SOUTH TEXAS PROJECT COL DATE: 12/5/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 1 OF 2

CONTACT: MIKE SUFNARSKI OFFICE PHONE: 704-357-5633
CELL PHONE: 704-309-0624
CONTACT: OFFICE PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
CONTACT: PHONE:
PHONE:
DRILLER: PHONE:
COMPANY: PHONE:

DIRECTIONS TO SITE:

GENERAL SITE CONDITIONS/LOCATION:

BOREHOLE DESIGNATION: B-428-DH LOCATION:

COUNTY: RANGE: TOWNSHIP: SECTION:
BOREHOLE CONSTRUCTION: CASED UNCASED ✓
DIAMETERS AND DEPTH RANGES: 4 7/8" 0 TO 215' ; , TO
BOREHOLE TOTAL DEPTH AS DRILLED: 215
CONDUCTOR CASING?: YES DEPTH TO BOTTOM OF CASING ; NO ✓
DEPTH TO BEDROCK: NA DEPTH TO WATER TABLE: 420'
BOREHOLE FLUID: WATER ; FRESH WATER MUD ✓; SALT WATER MUD ;
OTHER:
DEPTH TO BOREHOLE FLUID: Ø TIME SINCE LAST CIRCULATION: <4 HR

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SITE: SOUTH TEXAS PROJECT COL B-428 DATE: 12/5/06
CLIENT: MACTEC JOB: 6533
AUTHOR: R. STELLER PAGE 2 OF 2

LOGGING CREW: R. STELLER, C. CARTER
VEHICLE(S) USED AND MILEAGE: RENTAL
MOBILIZED FROM: BAY CITY, TX DEPARTURE TIME: 06:30
ARRIVED ON SITE: 07:00
STANDBY TIME: CAUSE:
LOGGING STARTED: LOGGING COMPLETED:

WINCH: COMPROBE ___ SILVER ✓ OYO ___ OTHER ___
MICROLOGGER 5301 ✓ OTHER ___
TELEVIEWER ACOUSTIC #5174 ✓ OTHER ___

PROBE TILT TEST 91.1 BRUNTON TILT 92.0
PROBE TILT TEST ___ BRUNTON TILT ___
PROBE TILT TEST ___ BRUNTON TILT ___
PROBE AZIMUTH TEST 81.2 BRUNTON AZIMUTH 90.0
PROBE AZIMUTH TEST ___ BRUNTON AZIMUTH ___
PROBE AZIMUTH TEST ___ BRUNTON AZIMUTH ___

PROBE OFFSET	1.44M(4.72FT)	
MINUS CASING STICK-UP	Ø	
DEPTH REF. OFFSET AT START	4.72'	
DEPTH REF. OFFSET AT END	4.66	
AFTER SURVEY DEPTH ERROR	+.06	LESS THAN 0.4%? YES

LOG NAME	START DEPTH	START TIME	END DEPTH	END TIME
B428 AU UP 01	210.0'	13:33	1.3'	13:55

MAINTENANCE PERFORMED ON SITE:

EQUIPMENT PROBLEMS OR FAILURES:

SUGGESTIONS, ADDITIONS, CHANGES:

GEOVision Geophysical Services *1151 Pomona Road, Unit P, Corona, CA 92882* *Ph (951) 549-1234 Fx (951) 549-1236*

APPENDIX E

BORING GEOPHYSICAL LOGGING FIELD MEASUREMENT PROCEDURES

PROCEDURE FOR

OYO P-S SUSPENSION SEISMIC VELOCITY LOGGING

Background

This procedure describes a method for measuring shear and compressional wave velocities in soil and rock. The OYO P-S Suspension Method is applied by generating shear and compressional waves in a borehole using the OYO P-S Suspension Logger borehole tool and measuring the travel time between two receiver geophones or hydrophones located in the same tool.

Objective

The outcome of this procedure is a plot and table of P and S_H wave velocity versus depth for each borehole. Standard analysis is performed on receiver to receiver data. Data is presented in report format, with ASCII data files and digital records transmitted on diskette.

Instrumentation

1. OYO Model 170 Digital Logging Recorder or equivalent
2. OYO P-S Suspension Logger probe or equivalent, including two sets horizontal and vertical geophones, seismic source, and power supply for the source and receivers
3. Winch and winch controller, with logging cable
4. Batteries to operate P-S Logger and winch

The Suspension P-S Logger system, manufactured by OYO Corporation, or the Robertson Digital P-S Suspension Probe with the Robertson Micrologger2 are currently the only commercially available suspension logging systems. As shown in Figure 1, these systems consists of a borehole probe suspended by a cable and a recording/control electronics package on the surface.

The suspension system probe consists of a combined reversible polarity solenoid horizontal shear-wave generator (S_H) and compressional-wave generator (P), joined to

two biaxial geophones by a flexible isolation cylinder. The separation of the two geophones is one meter, allowing average wave velocity in the region between the geophones to be determined by inversion of the wave travel time between the two geophones. The total length of the probe is approximately 7 meters; the center point of the geophones is approximately 5 meters above the bottom end of the probe.

The probe receives control signals from, and sends the amplified geophone signals to, the instrumentation package on the surface via an armored 4 or 7 conductor cable. The cable is wound onto the drum of a winch and is used to support the probe. Cable travel is measured by a rotary encoder to provide probe depth data.

The entire probe is suspended by the cable and may be centered in the borehole by nylon "whiskers." Therefore, source motion is not coupled directly to the borehole walls; rather, the source motion creates a horizontally propagating pressure wave in the fluid filling the borehole and surrounding the source. This pressure wave produces a horizontal displacement of the soil forming the wall of the borehole. This displacement propagates up and down the borehole wall, in turn causing a pressure wave to be generated in the fluid surrounding the geophones as the soil displacement wave passes their location.

Environmental Conditions

The OYO P-S Suspension Logging Method can be used in either cased or uncased boreholes. For best results, the uncased borehole must be between 10 and 20 cm in diameter, or 4 to 8 inches. A cased borehole may be as small as 3 inches, if properly grouted (see below) and the grout annulus does not exceed 1 inch.

Uncased boreholes are preferred because the effects of the casing and grouting are removed. It is recommended that the borehole be drilled using the rotary mud method. This method does little damage to the borehole wall, and the drilling fluid coats and seals the borehole wall reducing fluid loss and wall collapse. The borehole fluid is required for the logging, and must be well circulated prior to logging.

If the borehole must be cased, the casing must be PVC and properly installed and grouted. Any voids in the grout will cause problems with the data. Likewise, large grout bulbs used to fill cavities will also cause problems. The grout must be set before testing. This means the grouting must take place at least 48 hours before testing.

For borehole casing, applicable preparation procedures are presented in ASTM Standard D4428/D4428M-91 Section 4.1 (see ASTM website for copy).

Calibration

Calibration of the digital recorder is required. Calibration is limited to the timing accuracy of the recorder. GEOVision's Seismograph Calibration Procedure or equivalent should be used. Calibration must be performed on an annual basis.

Measurement Procedure

The entire probe is lowered into the borehole to a specific measurement depth by the winch. A measurement sequence is then initiated by the operator from the instrumentation package control panel. No further operator intervention is then needed to complete the measurement sequence described below.

The system electronics activates the SH-wave source in one direction and records the output of the two horizontally oriented geophone axes which are situated parallel to the axis of motion of the source. The source is then activated in the opposite direction, and the horizontal output signals are again recorded, producing a SH-wave record of polarity opposite to the previous record. The source is finally actuated in the first direction again, and the responses of the vertical geophone axes to the resultant P-wave are recorded during this sampling.

The data from each geophone during each source activation is recorded as a different channel on the recording system. The seismograph has at least six channels (two simultaneous recording channels), each with at least a 12 bit 1024 sample record. Newer seismographs may have longer record lengths. The recorded data is displayed on a CRT or LCD display and possibly on paper tape output as six channels with a common time scale. Data is stored on digital media for further processing. Up to 8 sampling sequences can be stacked (averaged) to improve the signal to noise ratio of the signals.

Review of the data on the display or paper tape allows the operator to set the gains, filters, delay time, pulse length (energy), sample rate, and stacking number in order to optimize the quality of the data before recording. In the case of the Model 170, printed data is verified by the operator prior to moving the probe. In the case of the Robertson Micrologger2, storage on the hard disk should be verified from time-to-time, certainly before exiting the borehole.

Typical depth spacing for measurements is 1.0 meters, or 3.3 feet. Alternative spacing is 0.5 meter, or 1.6 feet.

Required Field Records

1) Field log for each borehole showing

   a) Borehole identification

   b) Date of test

   c) Tester or data recorder

d) Description of measurement

e) Any deviations from test plan and action taken as a result

f) QA Review

2) Paper output records are no longer required, since the Micrologger2 cannot generate them. However, data must be stored in at least 2 places prior to leaving the site

3) List of record ID numbers (for data on digital media) and corresponding depth

4) Diskettes, CDRom, or USB flash drives with backup copies of data on hard disk, labeled with borehole designation, record ID numbers, date, and tester name.

An example Field Log is attached to this procedure.

Analysis

Following completion of field work, the recorded digital records are processed by computer using the OYO Corporation software program PSLOG and interactively analyzed by an experienced geophysicist to produce plots and tables of P and S_H wave velocity versus depth.

The digital time series records from each depth are transferred to a personal computer for analysis. Figure 2 shows a sample of the data from a single depth. These digital records are analyzed to locate the first minima on the vertical axis records, indicating the arrival of P-wave energy. The difference in travel time between these arrivals is used to calculate the P-wave velocity for that 1-meter interval. When observable, P-wave arrivals on the horizontal axis records are used to verify the velocities determined from the vertical axis data. In addition, the soil velocity calculated from the travel time from source to first receiver is compared to the velocity derived from the travel time between receivers.

The digital records are studied to establish the presence of clear SH-wave pulses, as indicated by the presence of opposite polarity pulses on each pair of horizontal records. Ideally, the SH-wave signals from the 'normal' and 'reverse' source pulses are very nearly inverted images of each other. Digital FFT – IFFT lowpass filtering are used to remove the higher frequency P-wave signal from the SH-wave signal.

The first maxima are picked for the 'normal' signals and the first minima are picked for the 'reverse' signals. The absolute arrival time of the 'normal' and 'reverse' signals may vary by +/- 0.2 milliseconds, due to differences in actuation time of the solenoid source caused by constant mechanical bias in the source or by borehole inclination. This variation does not affect the velocity determinations, as the differential time is measured between arrivals of waves created by the same source actuation. The final velocity

value is the average of the values obtained from the 'normal' and 'reverse' source actuations.

In Figure 2, the time difference over the 1-meter interval of 1.70 millisecond is equivalent to a SH-wave velocity of 588 m/sec. Whenever possible, time differences are determined from several phase points on the S_H -wave pulse trains to verify the data obtained from the first arrival of the S_H -wave pulse. In addition, the soil velocity calculated from the travel time from source to first receiver is compared to the velocity derived from the travel time between receivers.

Figure 3 is a sample composite plot of the far normal horizontal geophone records for a range of depths. This plot shows the waveforms at each depth, clearly showing the S-wave arrivals. This display format is used during analysis to observe trends in velocity with changing depth.

Once the proper picks are entered in PSLOG, the picks are transferred to an Excel spreadsheet where Vs and Vp are calculated. The spreadsheet allows output for presentation in charts and tables.

Standard analysis is performed on receiver 1 to receiver 2 data, with separate analysis performed on source to receiver data as a quality assurance procedure.

Registered Geophysicist Anthony Martin Date 4/10/06

QA Review Date 4/10/06

References:

1. "In Situ P and S Wave Velocity Measurement", Ohya, S. 1986. Proceedings of In-Situ '86, *Use of In-Situ Tests In Geotechnical Engineering*, an ASCE Specialty Conference sponsored by the Geotechnical Engineering Division of ASCE and co-sponsored by the Civil Engineering Dept of Virginia Tech.

2. Guidelines for Determining Design Basis Ground Motions, Report TR-102293, Electric Power Research Institute, Palo Alto, California, November 1993, Sections 7 and 8.

3. "Standard test Methods for Crosshole Seismic Testing", ASTM Standard D4428/D4428M-91, July 1991, Philadelphia, PA

OYO SUSPENSION P-S VELOCITY LOGGING SETUP

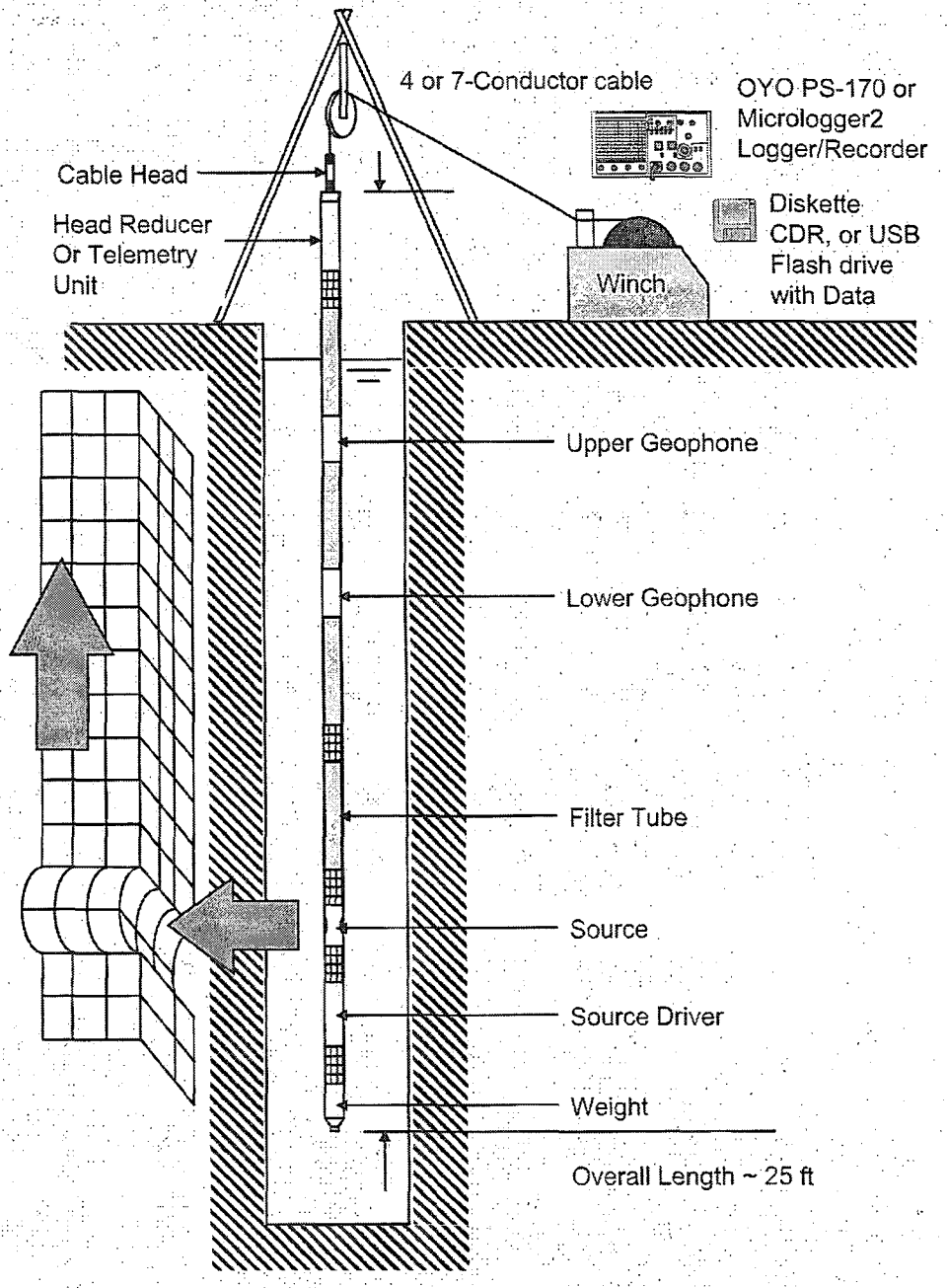

Figure 1. Suspension PS logging method setup

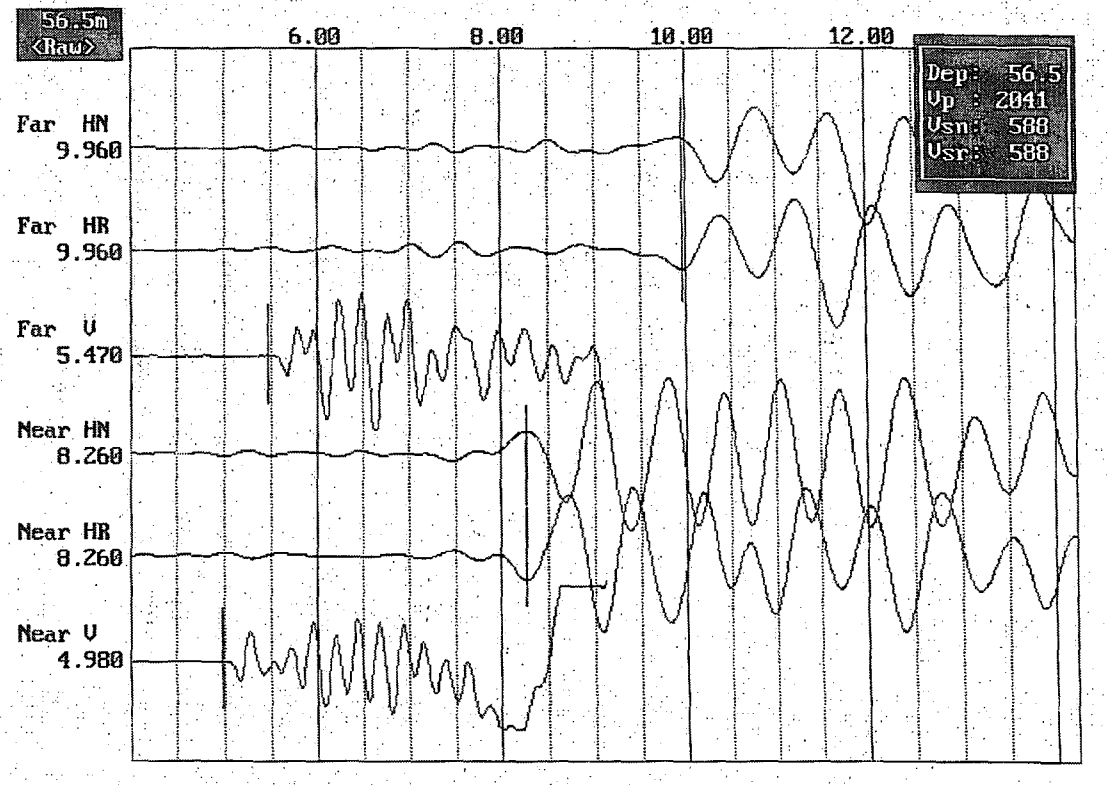

Figure 2. Sample suspension method waveform data showing horizontal normal and reversed (HR and HN), and vertical (V) waveforms received at the near (bottom 3 channels) and far (top 3 channels) geophones. The arrivals in milliseconds for each pick are shown on the left. The box in the upper right corner shows the depth in the borehole and the velocities calculated based on the picks.

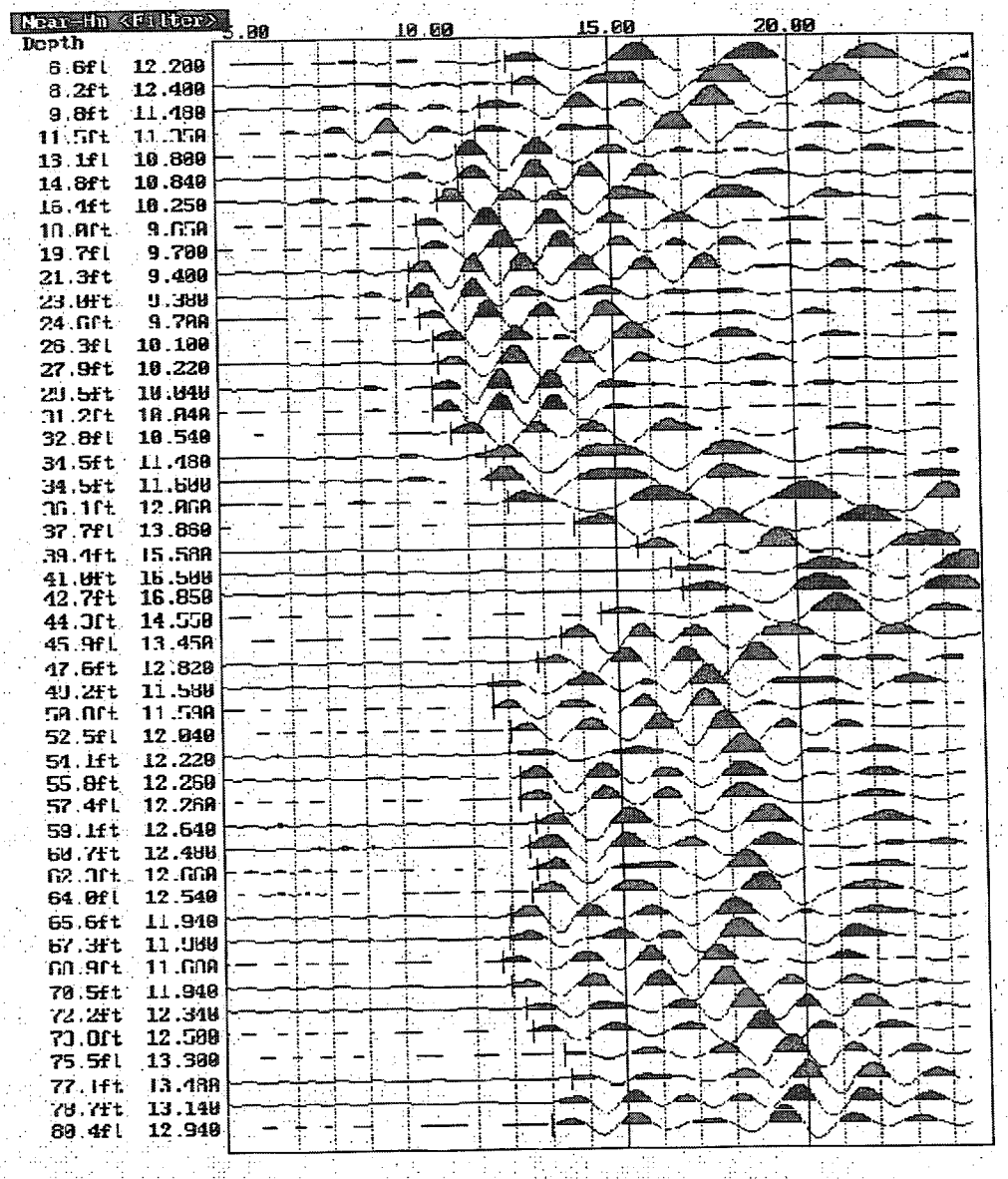

Figure 3. Sample composite waveform plot for normal shear waves received at the near geophone in a single borehole

GEOVision geophysical services

P-S SUSPENSION VELOCITY FIELD LOG

SITE:_____ DATE:_____
CLIENT:_____ JOB:_____
AUTHOR:_____ PAGE 1 OF _____

CONTACT:_____ OFFICE PHONE:_____
_____ PHONE:_____
CONTACT:_____ OFFICE PHONE:_____
_____ PHONE:_____
CONTACT:_____ _____ PHONE:_____
_____ PHONE:_____
CONTACT:_____ _____ PHONE:_____
_____ PHONE:_____
DRILLER:_____ _____ PHONE:_____
COMPANY:_____ _____ PHONE:_____

DIRECTIONS TO SITE:_____
_____
_____
_____
_____

GENERAL SITE CONDITIONS/LOCATION:_____
_____

EA#:_____
BOREHOLE DESIGNATION:_____LOCATION:_____
_____
COUNTY:_____RANGE:_____TOWNSHIP:_____SECTION:_____
BOREHOLE CONSTRUCTION: CASED_____ UNCASED_____
DIAMETERS AND DEPTH RANGES: _____ 0 TO _____ ; _____, _____ TO _____
BOREHOLE TOTAL DEPTH AS DRILLED:_____
CONDUCTOR CASING?: YES____ DEPTH TO BOTTOM OF CASING_____; NO____
DEPTH TO BEDROCK:_____ DEPTH TO WATER TABLE:_____
BOREHOLE FLUID: WATER_____; FRESH WATER MUD_____; SALT WATER MUD _____;
OTHER:_____
DEPTH TO BOREHOLE FLUID:_____ TIME SINCE LAST CIRCULATION:_____

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GEOVision
geophysical services

SITE:_____ DATE:_____
CLIENT:_____ JOB:_____
AUTHOR:_____ PAGE 2 OF _____

LOGGING CREW:_____
VEHICLE(S) USED AND MILEAGE: _____
MOBILIZED FROM:_____ DEPARTURE TIME:_____
ARRIVED ON SITE:_____
STANDBY TIME:_____ CAUSE:_____
LOGGING STARTED:_____ LOGGING COMPLETED:_____
STANDBY TIME:_____ CAUSE:_____
LOGGING STARTED:_____ LOGGING COMPLETED:_____
DEMOBILIZED TO:_____ ARRIVAL TIME:_____
ADDITIONAL DEMOB TIME:_____ REASON:_____

BATTERIES CHANGED BEFORE LOGGING: YES_____; NO_____; STORED WITH NEW_____

WINCH	COMPROBE ☐		GREY ☐	OYO ☐	RG ☐	OTH ☐		
INSTRUMENT	OYO 12004 ☐	15014 ☐	19029 ☐		RG 160023 ☐	160024 ☐		
RECEIVER S/N	12008 ☐	20042 ☐	26066 ☐	11001 ☐	23053 ☐			

MAINTENANCE PERFORMED ON SITE:_____

EQUIPMENT PROBLEMS OR FAILURES:_____

SUGGESTIONS, ADDITIONS, CHANGES:_____

COMMENTS:_____

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GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: _____ DATE: _____
CLIENT: _____ JOB: _____
AUTHOR: _____ PAGE _____ OF _____

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
0.5	1.64			
1.0	3.28			
1.5	4.92			
2.0	6.56			
2.5	8.20			
3.0	9.84			
3.5	11.48			
4.0	13.12			
4.5	14.76			
5.0	16.40			
5.5	18.04			
6.0	19.69			
6.5	21.33			
7.0	22.97			
7.5	24.61			
8.0	26.25			
8.5	27.89			
9.0	29.53			
9.5	31.17			
10.0	32.81			
10.5	34.45			
11.0	36.09			
11.5	37.73			
12.0	39.37			
12.5	41.01			
13.0	42.65			
13.5	44.29			
14.0	45.93			
14.5	47.57			
15.0	49.21			
15.5	50.85			
16.0	52.49			
16.5	54.13			
17.0	55.77			
17.5	57.41			
18.0	59.06			

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: _____ DATE: _____
CLIENT: _____ JOB: _____
AUTHOR: _____ PAGE _____ OF _____

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
18.5	60.70			
19.0	62.34			
19.5	63.98			
20.0	65.62			
20.5	67.26			
21.0	68.90			
21.5	70.54			
22.0	72.18			
22.5	73.82			
23.0	75.46			
23.5	77.10			
24.0	78.74			
24.5	80.38			
25.0	82.02			
25.5	83.66			
26.0	85.30			
26.5	86.94			
27.0	88.58			
27.5	90.22			
28.0	91.86			
28.5	93.50			
29.0	95.14			
29.5	96.78			
30.0	98.43			
30.5	100.07			
31.0	101.71			
31.5	103.35			
32.0	104.99			
32.5	106.63			
33.0	108.27			
33.5	109.91			
34.0	111.55			
34.5	113.19			
35.0	114.83			
35.5	116.47			
36.0	118.11			

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: _____ DATE: _____
CLIENT: _____ JOB: _____
AUTHOR: _____ PAGE _____ OF _____

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
36.5	119.75			
37.0	121.39			
37.5	123.03			
38.0	124.67			
38.5	126.31			
39.0	127.95			
39.5	129.59			
40.0	131.23			
40.5	132.87			
41.0	134.51			
41.5	136.15			
42.0	137.80			
42.5	139.44			
43.0	141.08			
43.5	142.72			
44.0	144.36			
44.5	146.00			
45.0	147.64			
45.5	149.28			
46.0	150.92			
46.5	152.56			
47.0	154.20			
47.5	155.84			
48.0	157.48			
48.5	159.12			
49.0	160.76			
49.5	162.40			
50.0	164.04			
50.5	165.68			
51.0	167.32			
51.5	168.96			
52.0	170.60			
52.5	172.24			
53.0	173.88			
53.5	175.52			
54.0	177.17			

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: _____ DATE: _____
CLIENT: _____ JOB: _____
AUTHOR: _____ PAGE _____ OF _____

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
54.5	178.81			
55.0	180.45			
55.5	182.09			
56.0	183.73			
56.5	185.37			
57.0	187.01			
57.5	188.65			
58.0	190.29			
58.5	191.93			
59.0	193.57			
59.5	195.21			
60.0	196.85			
60.5	198.49			
61.0	200.13			
61.5	201.77			
62.0	203.41			
62.5	205.05			
63.0	206.69			
63.5	208.33			
64.0	209.97			
64.5	211.61			
65.0	213.25			
65.5	214.90			
66.0	216.54			
66.5	218.18			
67.0	219.82			
67.5	221.46			
68.0	223.10			
68.5	224.74			
69.0	226.38			
69.5	228.02			
70.0	229.66			
70.5	231.30			
71.0	232.94			
71.5	234.58			
72.0	236.22			

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: _____ DATE: _____
CLIENT: _____ JOB: _____
AUTHOR: _____ PAGE _____ OF _____

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
72.5	237.86			
73.0	239.50			
73.5	241.14			
74.0	242.78			
74.5	244.42			
75.0	246.06			
75.5	247.70			
76.0	249.34			
76.5	250.98			
77.0	252.62			
77.5	254.27			
78.0	255.91			
78.5	257.55			
79.0	259.19			
79.5	260.83			
80.0	262.47			
80.5	264.11			
81.0	265.75			
81.5	267.39			
82.0	269.03			
82.5	270.67			
83.0	272.31			
83.5	273.95			
84.0	275.59			
84.5	277.23			
85.0	278.87			
85.5	280.51			
86.0	282.15			
86.5	283.79			
87.0	285.43			
87.5	287.07			
88.0	288.71			
88.5	290.35			
89.0	291.99			
89.5	293.64			
90.0	295.28			

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: _____ DATE: _____
CLIENT: _____ JOB: _____
AUTHOR: _____ PAGE _____ OF _____

DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
90.5	296.92			
91.0	298.56			
91.5	300.20			
92.0	301.84			
92.5	303.48			
93.0	305.12			
93.5	306.76			
94.0	308.40			
94.5	310.04			
95.0	311.68			
95.5	313.32			
96.0	314.96			
96.5	316.60			
97.0	318.24			
97.5	319.88			
98.0	321.52			
98.5	323.16			
99.0	324.80			
99.5	326.44			
100.0	328.08			
100.5	329.72			
101.0	331.36			
101.5	333.01			
102.0	334.65			
102.5	336.29			
103.0	337.93			
103.5	339.57			
104.0	341.21			
104.5	342.85			
105.0	344.49			
105.5	346.13			
106.0	347.77			
106.5	349.41			
107.0	351.05			
107.5	352.69			
108.0	354.33			

GEOVISION SUSPENSION LOGGING FIELD NOTES

SITE: _____ DATE: _____
CLIENT: _____ JOB: _____
AUTHOR: _____ PAGE _____ OF _____

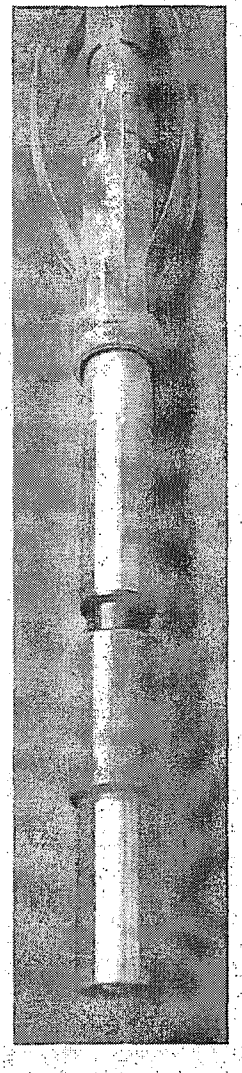
DEPTH METERS	DEPTH FEET	UNFILTERED FILE NO.	FILTERED FILE NO.	COMMENTS CASING, WATER, ROCK, ETC
108.5	355.97			
109.0	357.61			
109.5	359.25			
110.0	360.89			
110.5	362.53			
111.0	364.17			
111.5	365.81			
112.0	367.45			
112.5	369.09			
113.0	370.73			
113.5	372.38			
114.0	374.02			
114.5	375.66			
115.0	377.30			
115.5	378.94			
116.0	380.58			
116.5	382.22			
117.0	383.86			
117.5	385.50			
118.0	387.14			
118.5	388.78			
119.0	390.42			
119.5	392.06			
120.0	393.70			
120.5	395.34			
121.0	396.98			
121.5	398.62			
122.0	400.26			
122.5	401.90			
123.0	403.54			
123.5	405.18			
124.0	406.82			
124.5	408.46			
125.0	410.10			
125.5	411.75			
126.0	413.39			

PROCEDURE FOR USING THE ROBERTSON GEOLOGGING HI-RESOLUTION ACOUSTIC TELEVIEWER (HiRAT)

Reviewed 2/13/06

Background

The acoustic televiewer is a device for producing a qualitative image of the wall of a borehole. Because it uses ultrasound rather than visible light it is able to work in dirty or opaque borehole fluids, although heavy drilling mud will cause excessive dispersion of the acoustic beam. The picture below shows the sonde's lower nylon section, and one of the bowspring attachments which are used to centralize the sonde in the borehole.



Pulses of ultrasound (0.5 - 1.5MHz) are generated by a piezo-electric resonator. The pulses are transmitted through the oil in which the resonator is immersed, through the wall of the acoustic housing, then propagate through the borehole fluid and are reflected from the wall of the borehole. The reflected energy is picked up by the same transducer, from which is recorded both the ***amplitude*** of the returned pulse and the ***travel-time*** which have elapsed. Blanking must be applied to prevent the transducer from registering reflections from the inside surface of the acoustic housing. The material of the housing is chosen so that its acoustic properties are similar to the oil which fills it. The housing is not designed to withstand borehole fluid pressures, but has a piston device to allow equalization between inside and outside pressure.

The ***amplitude*** of the returned pulse is a function of the acoustic reflectivity of the borehole wall. If the beam strikes a hard borehole wall normally to the surface the energy will be returned to the transducer and a strong return will be recorded. If the formation is softer, then less energy will be reflected. Also, if the surface of the borehole is rough, or effectively missing because of the presence of a fracture or other structure, then energy will be dispersed and a poor return will be recorded.

The ***travel-time*** is a simple function of the diameter of the borehole and the velocity of sound in the borehole fluid (typically 1.5Km/sec). An A/D converter monitors the output from the transducer once the blanking period has expired and a comparator is used to detect the peak amplitude during the sampling window.

The coaxially-mounted transducer has a planar radiating surface, but the vibration characteristics are such that the acoustic pulse is emitted as a 'pencil' beam. The emitted beam is deflected by a planar mirror so that it leaves the acoustic housing at right angles to the sonde axis. The mirror is rotated to scan the borehole wall. The ultrasound pulses are synchronized with rotation of the mirror so that up to 360 pulses are emitted in every revolution. Because of the time which must elapse for the two-way transit of the borehole fluid, there is an upper limit upon the number of radial samples that may be acquired from a borehole of a particular radius. In larger boreholes, therefore, it may be necessary to reduce the number of radial samples. The sonde is able to operate at 90, 180 or 360 samples per revolution.

An image of the borehole wall is produced by moving the sonde along the borehole axis while it is scanning radially. By the same logic as shown above, it can be seen that any horizontal point will be imaged by more than one sweep of the acoustic beam so long as the axial movement of the sonde during one complete sweep is no greater than the beam diameter. An upper limit is therefore imposed upon the logging speed which will be a function of the rotational speed of the transducer, the radial sampling interval and borehole diameter.

Objective

The objective of this procedure is to provide a pseudo "core" of the borehole, and map the orientation and angles of cracks and voids in rock boreholes.

Instrumentation

This procedure is written specifically for the Robertson Geologging High-Resolution Acoustic Televiewer (HiRAT). The required equipment includes:

1. The Robertson High-Resolution Acoustic Televiewer (HiRAT) sonde with centralizers
2. A 4-conductor wire-line winch with cable at least 30m (100ft) longer than the depth of the borehole (RG Smart Winch or equivalent. GEOVision has adapted all our 4-conductor winches)
3. A sheave with depth encoder with minimum 500 pulse/revolution
4. A Robertson Geologging Micrologger II
5. A laptop with Winlogger installed and the following minimum system requirements:
   - Windows 98SE or above
   - 64M System memory
   - 800x600x24 SVGA Display with DirectX 8.0
   - 500Mhz CPU
   - USB 2.0 connection
6. Battery power supply with cables

Environmental Conditions

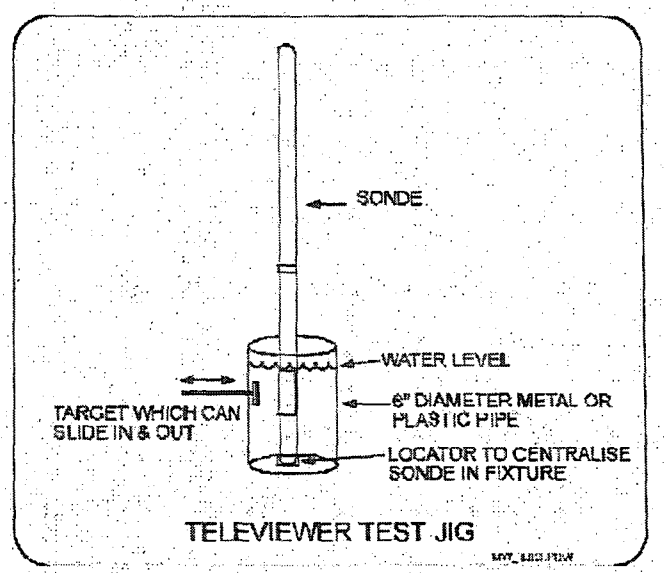
This tool is designed for fluid-filled boreholes between 67 and 150mm (3-6in) in rock. Since fine cracks are usually not visible in the walls of soil borings, the televiewers add very little information from a soil boring than a simple video. Now if the boring has soil AND rock, televiewer visuals in the soil may still be useful.

Calibration

The acoustic televiewer uses the variability in reflectance and the travel time to make an image of the borehole wall, mostly resulting from relative differences of materials and the physical characteristics of the wall. Since these are relative measurements, no field calibration of the sonde is required. However, it is important that the same location in the borehole be checked at the start and finish of the logging to make sure that the response or functionality haven't changed during the measurement.

A test fixture may be used to check function of the acoustic televiewer prior to use. This test fixture should comprise a plastic pipe, with a known internal diameter between 3 and 6 inches. This should be filled with water and the sonde stood upright in the fixture. A target made of metal or metal foil is glued on the inside of the container, or optionally on a seal and shaft so that it can be moved in and out on a line radial to the center-line of the pipe. A representation of this is shown in the figure below.

The purpose of this test fixture is to check the ability of the sonde to differentiate between materials of different acoustic reflectances, and different travel times, and to check the calibration of the caliper function of the sensor using the measured diameter of the pipe. However, if calibrated caliper measurements are required, it is recommended that a mechanical 3-arm caliper tool be used for this purpose because it can be calibrated in the field prior to use. The HiRAT will give very accurate results but this procedure does not cover calibration.

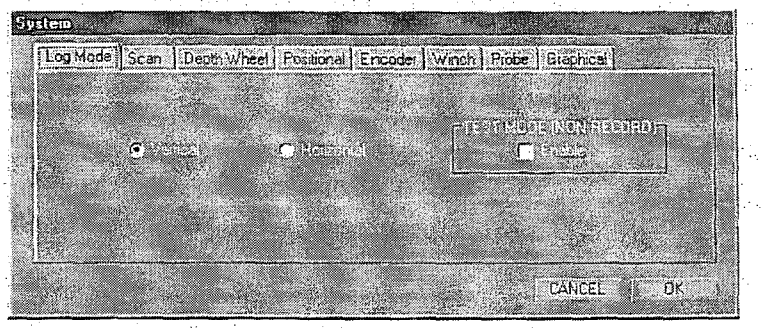


Hi-RAT Field Procedure

Because the logging software is a standalone module, there are a number of settings which must be initialized independently of the WinLogger software. These include the depth measurement subsystem and sonde operating modes. Click on 'System' on the menu bar to show the following dialog boxes:

1.0 Log Mode

The sonde can operate in three distinct modes:



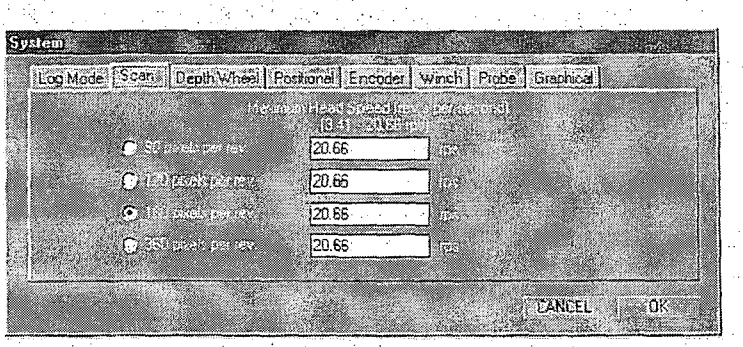
- Vertical mode is used for boreholes which are drilled from the surface and are deviated at less than 70 degrees from the vertical. Most exploration boreholes will fall into this class. In this mode the image is orientated according to compass directions (magnetic co-ordinates).

- Horizontal mode is used for boreholes which are sub-horizontal so their inclination will probably exceed 70 degrees from the vertical. Boreholes in this class would normally be drilled as part of ground investigations for tunneling and mining, drilling ahead of a drive to determine the nature and extent of fracturing. In this mode the image is orientated according to gravitational coordinates (up/down) since there is no unique point of the image circle which can be orientated to North with any precision.

- Test mode is used to exercise all sonde functions without creating a log. The image will scroll on the screen in the normal fashion, and orientation readouts will be refreshed continuously.

2.0 Scan Parameters

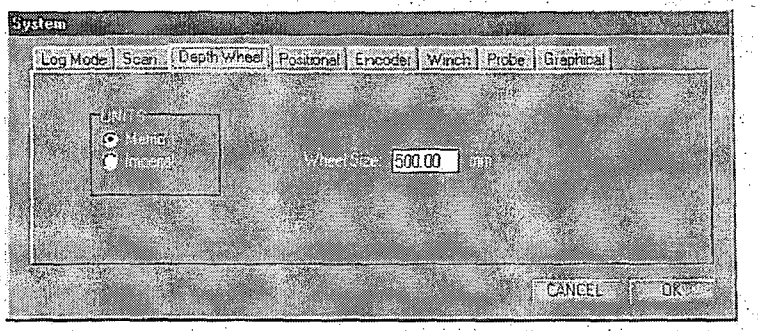
The scan parameters control the radial sampling of the borehole. The values will be retained between logging sessions, so the sonde will be initialized correctly at power-on. There are three parameters in the dialog:



- The radial sampling rate can be set to one of 90, 120, 180, 360 samples per revolution. There is a relationship between the logging speed and the radial sampling rate, since the time taken to send the dataset to the surface depends upon its length. The size of the log file is also determined by the radial sampling rate. The probe will always try to use the maximum head speed entered. If limited by a low Baud rate or a large 'window' setting then the probe will reduce its head speed automatically to compensate - see sonde operation section.

3.0 Depth Wheel Configuration

The depth measurement system is dependent upon the combination of depth measurement wheel with its calibrated groove, and the shaft encoder which translates rotation into pulses which are counted by the logging system controller. Two parameters are therefore required: depth wheel circumference and encoder pulse rate. The encoder parameters are covered in a subsequent topic.

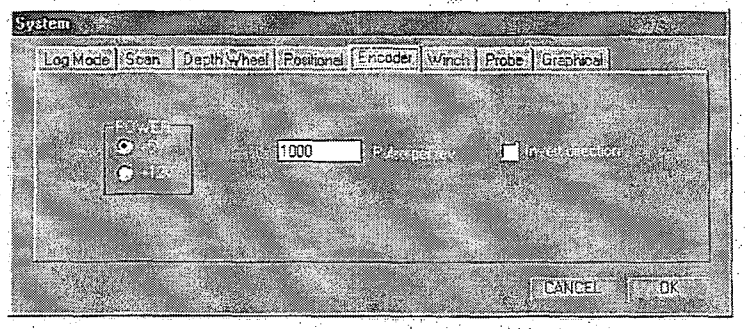


- Select Metric or Imperial depth measurement units from the left-hand pane.

- Type the circumference of the depth measurement wheel into the 'wheel size' box. The standard sizes of GEOVision wheels are 1000mm. If you are measuring in Imperial units (or changing back to metric units), the standard wheel size can be converted automatically by clicking the left mouse button and choosing the appropriate conversion. The size is always specified in units of 1/1000 of the depth unit i.e. millimetres (mm) or millifeet (mft).

4.0 Encoder Configuration

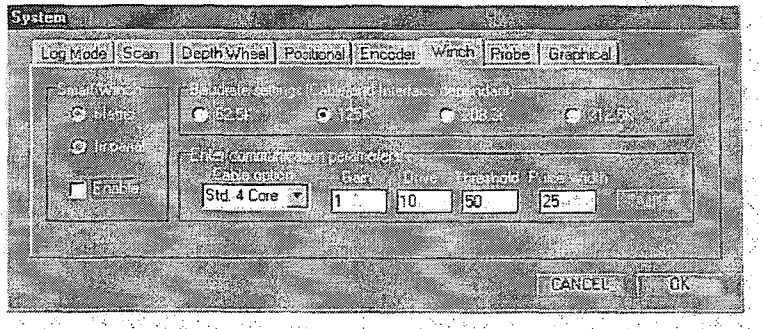
The depth measurement system is dependent upon the combination of depth measurement wheel with its calibrated groove, and the shaft encoder which translates rotation into pulses which are counted by the logging system controller. The depth wheel circumference is covered in a previous topic. In order to accommodate a variety of encoders, their operational characteristics can be configured in the software.



- Select supply voltage from the radio buttons in the left-hand pane. The options are 5 Volt and 12 Volt. GEOVision encoders are always specified for 5 Volt operation.
- Type the number of pulses emitted per revolution into the central box. The standard values for all GEOVision winches are 500 pulses/rev.
- The logical direction of movement can be reversed if required to accommodate the directional characteristics (phase lead or lag) of the different encoder types.

5.0 Winch and Cable Configuration

Support for remote control of the RG Smart Winch is provided, and can be enabled by checking the ***Enable*** control in the left-hand Smart Winch pane. If the Smart Winch control is enabled, it is also necessary to select the measure units in force - select ***Metric*** or ***Imperial*** from the radio buttons on offer.



The Baud settings can be chosen to match the *quality* of the communication channel. The channel will be effected by cable type and length. Typically a Baudrate of 312.5K is used. The remaining controls in the dialog relate to the communications parameters. The operation is entirely compatible with the WinLogger software operation and the values would be expected to be the same as those in force for logging six-channel type sondes with that software. (Certain probe types may be fitted with a digital interface that does not require set-up and in this case the parameter edit boxes will not appear.)

- ***Cable Option*** is used to select the logging cable type which is available on the winch. The options are *Not Connected*, *Std. 4 Core*, *Differential* and *Monocable*. The only cable types used in GEOVision systems is Std. 4 Core. Select the appropriate type from the drop-down menu box. Note this value can only be changed when the probe power is turned off.

- ***Gain*** is related to cable length and uphole signal attenuation. Gain values range from 0-3 and control the amplification applied to the incoming signal. Use the *Scope* dialog to visualize the incoming signals. Gain should be set so that the signal reaches between 70% and 100% of the height of the display, generally obtained with a setting of 0 for GEOVision winches. If the peak height exceeds this level, clipping will result in artifacts which will be detected erroneously. Click *Apply* to set the parameters before proceeding to the *Scope* dialog.

- ***Threshold*** is the level at which the incoming signals are detected. Gain and Threshold are related, and can be visualized using the *Scope* dialog. Set the gain so that the signal reaches between 70% and 100% of the height of the display. Then adjust the threshold so that it is between 50% and 70% of the height of the pulses displayed and clear of any region of 'overshoot' of the positive and negative pulses. This will ensure that peaks are detected and noise is ignored. Generally a setting of 25 is used for GEOVision winches. When the scope dialog is displayed, the position of the mouse is reported as a threshold value to make it simpler to infer the correct setting. The scope option is greyed out when the probe power is turned off.

- ***Drive*** sets the strength of the downhole signal. It is not possible to visualize the downhole signal, but the effect of insufficient drive is to disable downhole communication, which will result in the commands being ignored by the sonde. Values range from 0 -127, and for GEOVision winches will be around 10. Increase the drive for longer cables.

- ***Pulse Width*** This is the width of the transmitted communication pulses in 100nS steps. The default is 25 equivalent to 2.5uS. The range is from 8 to 64. The pulse width can be reduced to prevent signal overshoot on short cables. The default value is used in most cases. Note any changes only come into effect during a log. (Note setting too large a pulse width when using the highest Baud rates will automatically be prevented within the probe and the pulse width reduced.)

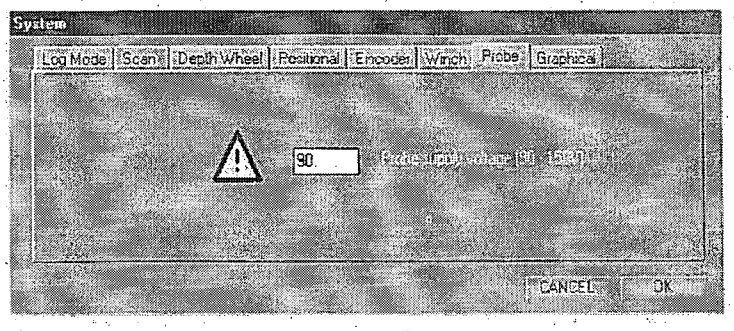
IMPORTANT Please note the effects of changing 'Baud' will not appear until the first new log is made. The setting for 'threshold' may be effected by an increase in the 'Baud' rate please recheck 'threshold' if 'Baud' is altered using the 'Scope' function after making a short test log.

The parameters which are entered will be applied automatically if you close the dialog with ***OK***. The above parameters once set correctly will be remembered by the system and should never need to be altered.

6.0 Probe Configuration

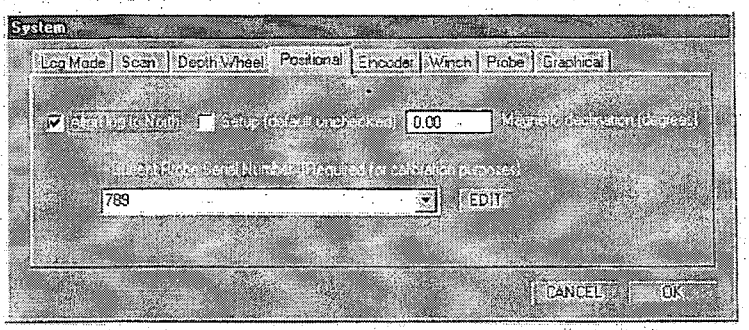
The probe is normally energized at 90 Volts from the surface. However, it may be necessary to compensate for voltage drop on longer cables due to the higher power draw of this sonde. The voltage at

the surface may be increased in order to deliver 90 Volts at the sonde. Simply type the value into the text box provided. The voltage should be set at 90V for all GEOVision winches. Values outside the indicated range will be rejected.



7.0 Positional Configuration

The probe includes a 3-axis orientation package, and is capable of producing a borehole image aligned to geographic North. This is achieved by determining and applying two image rotation parameters:



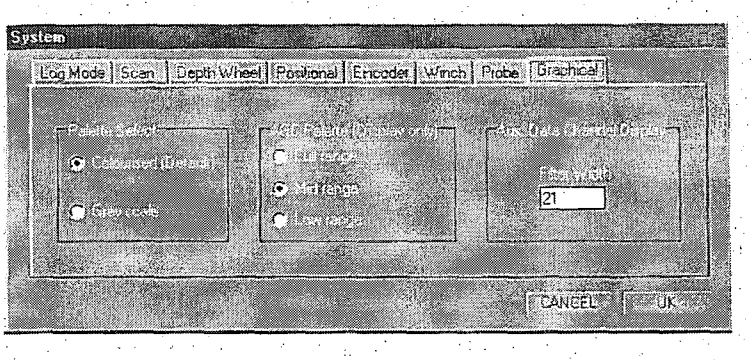
- ***Magnetic Declination*** is used to correct for the difference between Magnetic North and True North. The value varies from place to place, so the local value must be inserted here if you wish to perform this correction during data collection. This correction may also be made during processing. If the value is zero, the log will be referred to Magnetic North.
- ***Align to North*** is a check-box used to select image rotation to start at Magnetic North. If in addition a value is set for Magnetic Declination (see above) the image will be rotated to start at True North. If the box is not checked, the image will not be oriented to geographic co-ordinates, but will use the local co-ordinate frame of the sonde (X, Y, Z axis of the orientation module). This mode may be used to inspect the inside of magnetic casing, where an orientated image would be subjected to random effects caused by the metalwork.
- Set-up mode is selected by checking the ***Setup*** box, and is used to determine the required image rotation offset to correct for the angle between the axis of the orientation package and the index mark of the rotating transducer section. In set-up mode the normal sonde azimuth display is modified, and will instead show the 'relative bearing' which is measured between the high side of the borehole and the orientation sensor index. Check ***Setup***, then OK to close the dialog. The icon adjacent to the sonde azimuth readout at the top of the screen is modified with the legend CAL when the system is in set-up mode. The sonde must now be placed in a stand or jig so that it

is inclined at about 20 degrees to the vertical, and adjacent to a target fixed to the jig so that it is directly above the transducer in the vertical plane. Lower the sonde with its attachment into a large bucket of water so that the transducer and target are fully immersed. Start the radial amplitude display, when it will be possible to see the strong signal returning from the target. Rotate the sonde so that the image of the target moves to the top of the display. When the two are coincident, the 'relative bearing' reads out the image rotation offset. This value is fixed for the sonde unless it is disassembled and rebuilt, at which point the procedure MUST be repeated. Please see the additional topic on the Radial Amplitude Display for further details.

- The ***Serial Number*** list box is used to select the sonde which is in use. When the appropriate sonde is selected, the image rotation offset determined by the above procedure is selected. To edit the image offset click the '***Edit***' and enter the new offset. Several serial numbers and associated offsets can be stored and selected as required.

8.0 Graphical

The palette can be changed between a colored and grey scale setting. The changes affect the log screen palette display and are also applied when replaying a log. Selecting Full range in the 'AGC Palette' will cause the software to spread the palette over the full 16bit signal. 'Mid range' will spread the palette over the first quarter of the 16bit range and 'Low range' will spread the palette over the first eighth of the 16 bit range. In most cases the 'Low range' selection is used. Note these settings do not affect the stored log data in any way. The 'Filter Width' is applied to the Natural Gamma trace data and is a simply running average filter. The range of the filter width is from 1 to 50 (x 10 millidepth units ie. mm or mft).

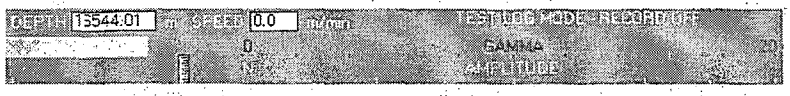


9.0 Sonde Operation

When the operations specified above have been reviewed and the correct settings have been selected, the system is ready for use. The main screen area is divided into 3 horizontal elements. At the top is the depth and orientation readout, together with the scale headings for the scrolling display of unwrapped borehole image.

On the left side of the depth track is the travel time display, with text boxes for sonde inclination, azimuth and head temperature.

On the right side is the display of amplitude and indication of current operating mode. Located in the center above the depth track are the text boxes for depth and cable speed (computed at the surface). The ranges for the 'Natural Gamma' channel overlay (optional) are shown above the Amplitude.



The central area is utilized for the scrolling display of unwrapped borehole data. The display is orientated with the left edge corresponding to North point of the aligned image data (if orientation is selected) according to the outputs of the sonde's orientation package.

The lower area has controls for the winch (applicable to RG Smart Winch only), depth initialization and sonde control.

The winch control area is only displayed when RG SmartWinch operation is enabled - see section 5 - and has four controls. Set Target Speed by typing the required speed into the window and pressing Enter.

Cable movement is initiated by clicking on either the UP or DOWN arrow control.

Cable movement is halted by clicking on the square STOP control.

Depth is initialized by typing the required value into the entry box and pressing Enter. The entry box is not available at times when the system is in logging mode and the depth should not be changed by user entry.

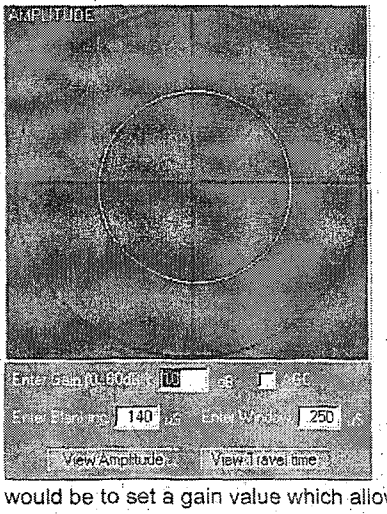
Sonde power is applied by clicking on the green-colored 1 button. Power is turned off by clicking on the red-colored 0 button. There is no indicator for the state of the power supply on the desktop, so the external indicators should be observed for this purpose.

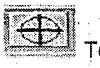
To make a log ensure that the Test Mode is disabled - see section 1, Log Mode setting. Click File|New Log and select a filename. Old logs may be overwritten if necessary -TAKE CARE. The header editor will be started automatically. A previous set of header data may be loaded by clicking LOAD and choosing a template.

To start logging, click on the red Record (circle) control. The log data will start to scroll down the screen after a brief pause for synchronization. The messages "DSP2: Detecting data stream" and "Updating probe settings" will be observed at the bottom of the screen during this process. Note that the screen scrolling direction is not affected by the actual direction of movement of the sonde. To cease logging, click on the black STOP control (square). The data should be immediately backed up to a USB drive, CD, or other data storage prior to beginning another log.

If the data display from a probe which is properly connected appears to occupy only half of the track area,

with the remainder filled with random colors such as green which are not part of the regular palette, then it is most likely that the downhole data communication is not functioning properly. This symptom is due to the fact that the probe settings cannot be communicated properly, and it is operating in its default power-up mode. If this is the case, the Drive setting of the System|Winch dialog should be increased or decreased accordingly. See section 5 for full details.





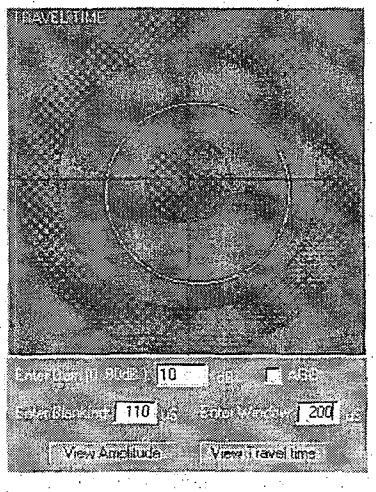
To adjust the sonde gain it is necessary to use the Radial Amplitude plot, which is enabled by clicking on the circle with cross-hairs symbol. When the dialog is active a new window will open on top of the unwrapped data display. In this display, the data is presented as a 'polar' plot. Press the 'View Amplitude' button to display the amplitude plot. This plot shows amplitude increasing towards the outside of the circle and the compass direction following the sweep of the transducer. The line indicating the data is drawn in the regular palette, so that high amplitudes are drawn in white and low amplitudes in black/brown. The picture here shows the image of the inside of a cylinder.

If the data is concentrated in a small circle at the center, the gain is too low and should be increased. If the data is obviously clipped at the outside of the circle, then the gain should be reduced. Type the new gain value into the entry box and press Enter. The ideal would be to set a gain value which allows the peak values to be displayed without clipping, with the majority of the data around the half-way level. It may also be necessary to adjust the blanking to ensure that internal reflections from the acoustic housing are not detected at the new gain value. This will be apparent in the unwrapped data display as pronounced patterning unrelated to the true target. The AGC option causes the probe to set gain automatically thus preventing signal saturation in most cases. (The gain is varied in 6dB steps

Blanking Period and window length can be set independently. Blanking is set to avoid reflections from the housing of the acoustic transducer or random reflections from a rugose borehole, and window length is set to accommodate the range of borehole radius that might be expected. An error will be indicated if the sum of the blanking period and window length would be greater than 409 microseconds, which is the maximum range of the timer. The default value for the blanking period is 145 microseconds, which is the minimum required for the two-way transit from the transceiver to the outer surface of the acoustic housing. It is not advisable to reduce this value beyond the default setting, although it may be increased for larger boreholes at the rate of 1.5mm of one-way travel per microsecond.

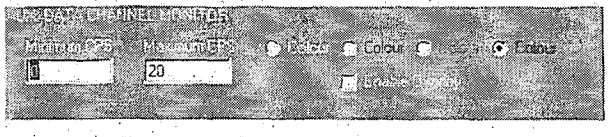
Window Length (sample time) defines the period during which the arrival gate remains open to detect the returned acoustic pulse. The acoustic pulse will travel in water at a speed of approximately 1.5mm per microsecond. The default window length is 150 microseconds, which is equivalent to 225 mm of (two-way) travel in the borehole fluid, or approximately 110mm of borehole diameter. If this is added to the default blanking period, which is equivalent to the outside diameter of the acoustic housing, it can be seen that the default set-up will be correct for boreholes up to 150mm. An error will be indicated if the sum of the blanking period and window length would be greater than 409 microseconds, which is the maximum range of the timer. Choose your window setting to best match the borehole diameter.

Pressing the 'View Travel time' button changes the display to that shown below:



The unhatched ring between the two cross hatched zones represents the sample window. The width of this ring will vary with window length value. The profile of a cylinder is represented here appearing as a circle in the sample window.

Pressing this button displays the following dialog box:



This box allows you to enable the Natural Gamma option by checking the 'Enable Overlay' check box. The Overlay appears as a trace upon the Amplitude plot. The trace range and color can also be set by this dialog. The level of filtering can also be altered (see section 8) (note that any displayed trace data is automatically aligned with the acoustic scan data but only when logging up. The Natural Gamma sensor occupies a higher position in the probe so sufficient data has to be prebuffered so that the acoustic data can depth aligned with gamma. The prebuffering results in a delay at the start of a log before correct gamma data appears this is normal.)

Data Analysis and Interpretation

RG-DIP, the manufacturer's image interpretation package, offers manual and automatic feature recognition options. Feature orientations (dip/strike and azimuth) are automatically calculated. Display options include stereographic projections of zone axes, orientation frequency plots and 'synthetic cores' for comparison with real core data. The last option is invaluable for orientating core samples, particularly in the case of incomplete recovery.

Reporting

The final report will include the objective and scope of the survey, location of the boreholes, discussion of instrumentation and procedures in the field and lab. For each borehole there will be a plot showing the dip/strike and azimuth of features. The next page shows an example.

Assumptions and limitations of the results will be discussed. Supporting references will be listed as necessary

Required Field Records

Field log for each borehole showing

a) Location and description of the borehole

b) Date of test

c) Field personnel

d) Instrumentation

e) Any deviations from test plan and action taken as a result

This procedure has been reviewed and approved by the undersigned:

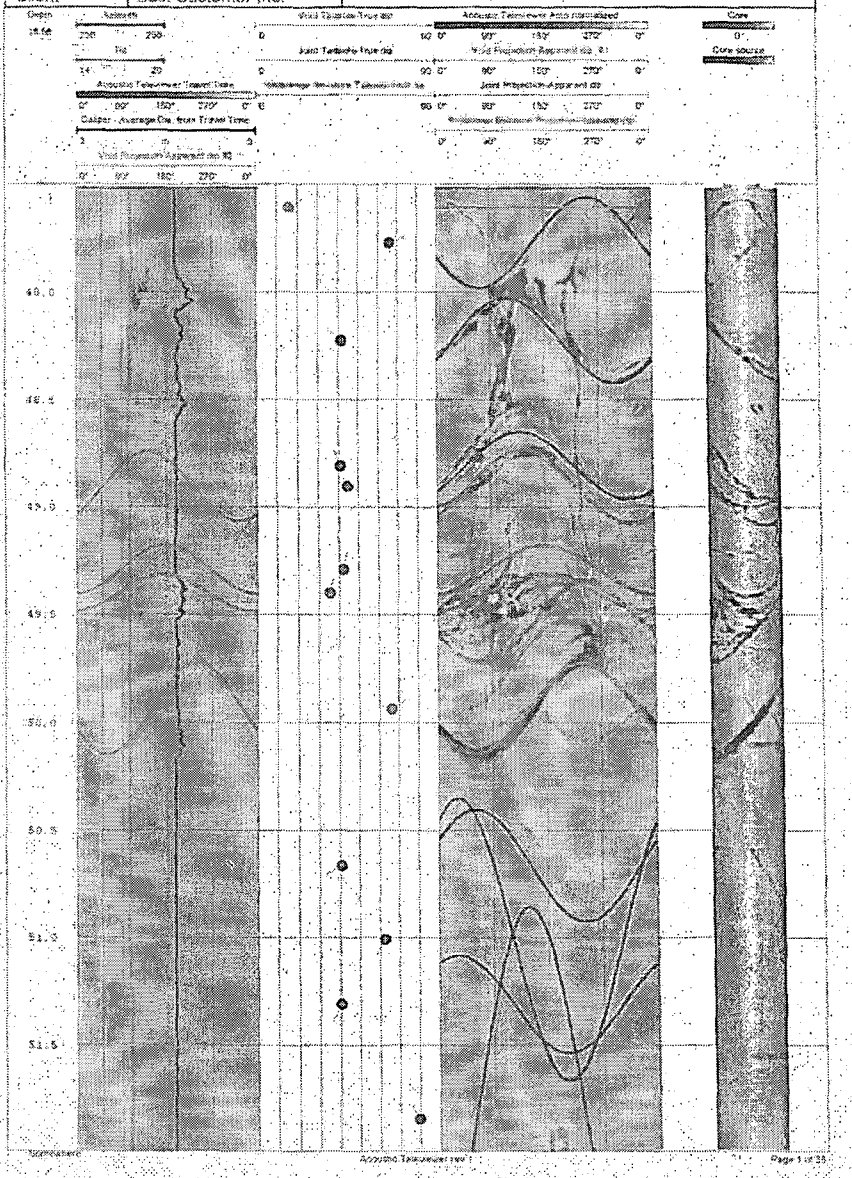
Professional Geophysicist Antony Martin Date Feb 13, 2006

QA Review Date Feb 13, 2006

B-XXX	Company	Geovision Geophysical Services
	Location	Somewhere Dam

BH	B-XXX Acoustic Televiewer		
Date	7/8/05	BH Fluid	Air/Water
Casing	4" Steel to 15 ft		
File Name	BXXXdown1		
Depth Drilled	300 feet		
Depth Logged	299.3 feet		
Logged by	Rob Steller		
Client	Best Customer Inc.		

Notes:
1) All orientations referenced to True North
2) Tadpole tails indicate dip direction with True North at up.



Designation: D 5753 – 05

Standard Guide for Planning and Conducting Borehole Geophysical Logging[1]

This standard is issued under the fixed designation D 5753; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This guide covers the documentation and general procedures necessary to plan and conduct a geophysical log program as commonly applied to geologic, engineering, ground-water, and environmental (hereafter referred to as geotechnical) investigations. It is not intended to describe the specific or standard procedures for running each type of geophysical log and is limited to measurements in a single borehole. It is anticipated that standard guides will be developed for specific methods subsequent to this guide.

1.2 Surface or shallow-depth nuclear gages for measuring water content or soil density (that is, those typically thought of as construction quality assurance devices), measurements while drilling (MWD), cone penetrometer tests, and logging for petroleum or minerals are excluded.

1.3 Borehole geophysical techniques yield direct and indirect measurements with depth of the (*1*) physical and chemical properties of the rock matrix and fluid around the borehole, (*2*) fluid contained in the borehole, and (*3*) construction of the borehole.

1.4 To obtain detailed information on operating methods, publications (for example, **2**, **5**, **7**, **18**, **24**, **29**, **34**, **35**, and **36**)[2] should be consulted. A limited amount of tutorial information is provided, but other publications listed herein, including a glossary of terms and general texts on the subject, should be consulted for more complete background information.

1.5 This guide provides an overview of the following: (*1*) the uses of single borehole geophysical methods, (*2*) general logging procedures, (*3*) documentation, (*4*) calibration, and (*5*) factors that can affect the quality of borehole geophysical logs and their subsequent interpretation. Log interpretation is very important, but specific methods are too diverse to be described in this guide.

1.6 Logging procedures must be adapted to meet the needs of a wide range of applications and stated in general terms so that flexibility or innovation are not suppressed.

1.7 *This standard does not purport to address all of the safety and liability concerns, if any, (for example, lost or lodged probes and radioactive sources[3]) associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

1.8 *This guide offers an organized collection of information or a series of options and does not recommend a specific course of action. This document cannot replace education or experience and should be used in conjunction with professional judgment. Not all aspects of this guide may be applicable in all circumstances. This ASTM standard is not intended to represent or replace the standard of care by which the adequacy of a given professional service must be judged, nor should this document be applied without consideration of a project's many unique aspects. The word "Standard" in the title of this document means only that the document has been approved through the ASTM consensus process.*

2. Referenced Documents

2.1 *ASTM Standards:*[4]

D 653 Terminology Relating to Soil, Rock, and Contained Fluids

D 5088 Practice for the Decontamination of Field Equipment Used at Non-Radioactive Waste Sites

D 5608 Practice for the Decontamination of Field Equipment Used at Low Level Radioactive Waste Sites

3. Terminology

3.1 Definitions—Definitions shall be in accordance with Terminology D 653.

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[1] This guide is under the jurisdiction of ASTM Committee D18 on Soil and Rock and is the direct responsibility of Subcommittee D18.01 on Surface and Subsurface Characteristics.

Current edition approved June 1, 2005. Published June 2005. Originally approved in 1995. Last previous edition approved in 1995 as D 5753–95.

[2] The boldface numbers in parentheses refer to the list of references at the end of this standard.

[3] The use of radioactive materials required for some log measurements is regulated by federal, state, and local agencies. Specific requirements and restrictions must be addressed prior to their use.

[4] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

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3.2 *Definitions of Terms Specific to This Standard:* Descriptions of Terms Specific to This Standard—Terms shall be in accordance with Ref (**1**).

4. Summary of Guide

4.1 This guide applies to borehole geophysical techniques that are commonly used in geotechnical investigations. This guide briefly describes the significance and use, apparatus, calibration and standardization, procedures and reports for planning and conducting borehole geophysical logging. These techniques are described briefly in Table 1 and their applications in Table 2.[5]

4.2 Many other logging techniques and applications are described in the textbooks in the reference list. There are a number of logging techniques with potential geotechnical applications that are either still in the developmental stage or have limited commercial availability. Some of these techniques and a reference on each are as follows: buried electrode direct current resistivity (**37**), deeply penetrating electromagnetic techniques (**38**), gravimeter (**39**), magnetic susceptibility (**40**), magnetometer, nuclear activation (**41**), dielectric constant (**42**), radar (**50**), deeply penetrating seismic (**39**), electrical polarizability (**45**), sequential fluid conductivity (**46**), and diameter (**48**). Many of the guidelines described in this guide also apply to the use of these newer techniques that are still in the research phase. Accepted practices should be followed at the present time for these techniques.

5. Significance and Use

5.1 An appropriately developed, documented, and executed guide is essential for the proper collection and application of borehole geophysical logs.

5.1.1 The benefits of its use include improving the following:

5.1.1.1 Selection of logging methods and equipment,

5.1.1.2 Log quality and reliability, and

5.1.1.3 Usefulness of the log data for subsequent display and interpretation.

5.1.2 This guide applies to commonly used logging methods (see Table 1 and Table 2) for geotechnical investigations.

5.1.3 It is essential that personnel (see 7.3.3) consult up-to-date textbooks and reports on each of the logging techniques, applications, and interpretation methods. A partial list of selected publications is given at the end of this guide.

5.1.4 This guide is not meant to describe the specific or standard procedures for running each type of geophysical log and is limited to measurements in a single borehole.

6. Apparatus

6.1 *Geophysical Logging System*, including probes, cable, draw works, depth measurement system, interfaces and surface controls, and digital and analog recording equipment.

6.1.1 Logging probes, also called sondes or tools, enclose the sensors, sources, electronics for transmitting and receiving signals, and power supplies.

6.1.2 Logging cable routinely carries signals to and from the logging probe and supports the weight of the probe.

6.1.3 The draw works move the logging cable and probe up and down the borehole and provide the connection with the interfaces and surface controls.

6.1.4 The depth measurement system provides probe depth information for the interfaces and surface controls and recording systems.

6.1.5 The surface interfaces and controls provide some or all of the following: electrical connection, signal conditioning, power, and data transmission between the recording system and probe.

6.1.6 The recording system includes the digital recorder and an analog display or hard copy device.

7. Calibration and Standardization of Geophysical Logs

7.1 *General:*

7.1.1 National Institute of Standards and Technology (NIST) calibration and operating procedures do not exist for the borehole geophysical logging industry. However, calibration or standardization physical models are available (see Appendix X1).

7.1.2 Geophysical logs can be used in a qualitative (for example, comparative) or quantitative manner, depending on the project objectives. (For example, a gamma-gamma log can be used to indicate that one rock is more or less dense than another, or it can be expressed in density units.)

7.1.3 The calibration and standardization scope and frequency shall be sufficient for project objectives.

7.1.3.1 Calibration or standardization should be performed each time a logging probe is modified or repaired or at periodic intervals.

7.2 *Calibration:*

7.2.1 Calibration is the process of establishing values for log response. It can be accomplished with a representative physical model or laboratory analysis of representative samples. Calibration data values related to the physical properties (for example, porosity) may be recorded in units (for example, pulses/s or μm/ft) that can be converted to apparent porosity units.

7.2.1.1 At least three, and preferably more, values are needed to establish a calibration curve, and the interface or contact between different values in the model should be recorded. Because of the variability in subsurface conditions, many more values are needed if sample analyses are used for calibration.

7.2.1.2 The statistical scatter in regression of core analysis against geophysical log values may be caused by the difference between the sample size and geophysical volume of investigation and may not represent measurement error.

7.2.2 *Physical Models*—A representative model simulates the chemical and physical composition of the rock and fluids to be measured.

7.2.2.1 Physical models include calibration pits, coils, resistors, rings, temperature baths, etc.

7.2.2.2 The calibration of nuclear probes should be performed in a physical model that is nearly infinite with respect to probe response.

[5] The references indicated in these tables should be consulted for detailed information on each of these techniques and applications.

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TABLE 1 Common Geophysical Logs

Type of Log (References)	Varieties and Related Techniques	Properties Measured	Required Hole Conditions	Other Limitations	Typical Measuring Units and Calibration or Standardization	Brief Probe Description
Spontaneous potential (7, 8, 12)	differential	electric potential caused by salinity differences in borehole and interstitial fluids, streaming potentials	uncased hole filled with conductive fluid	salinity difference needed between borehole fluid and interstitial fluids; needs correction for other than NaCl fluids	mV; calibrated power supply	records natural voltages between electrode in well and another at surface
Single-point resistance (7)	conventional, differential	resistance of rock, saturating fluid, and borehole fluid	uncased hole filled with conductive fluid	not quantitative; hole diameter effects are significant	Ω; V-Ω meter	constant current applied across lead electrode in well and another at surface of well
Multi-electrode resistivity (7, 8, 13)	various normal focused, guard, lateral arrays	resistivity and saturating fluids	uncased hole filled with conductive fluid	reverses or provides incorrect values and thickness in thin beds	Ω-m; resistors across electrodes	current and potential electrodes in probe and remote current and potential electrodes
Induction (10, 11)	various coil spacings	conductivity or resistivity of rock and saturating fluids	uncased hole or nonconductive casing; air or fluid filled	not suitable for high resistivities	mS or Ω-m; standard dry air zero check or conductive ring	transmitting coil(s) induce eddy currents in formation; receiving coil(s) measures induced voltage from secondary magnetic field
Gamma (5, 7, 22)	gamma spectral (44)	gamma radiation from natural or artificial radioisotopes	any hole conditions	may be problem with very large hole, or several strings of casing and cement	pulses per second or API units; gamma source	scintillation crystal and photomultiplier tube measure gamma radiation
Gamma-gamma (23, 24)	compensated (dual detector)	electron density	optimum results in uncased hole; can be calibrated for casing	severe hole-diameter effects; difficulty measuring formation density through casing or drill stem	gs/cm³; Al, Mg, or Lucite blocks	scintillation crystal(s) shielded from radioactive source measure Compton scattered gamma
Neutron (7, 14, 25)	epithermal, thermal, compensated sidewall, activation, pulsed	hydrogen content	optimum results in uncased hole; can be calibrated for casing	hole diameter and chemical effects	pulses/s or API units; calibration pit or plastic sleeve	crystal(s) or gas-filled tube(s) shielded from radioactive neutron source
Acoustic velocity (5, 26, 27)	compensated, waveform, cement bond	compressional wave velocity or transit time, or compressional wave amplitude	fluid filled, uncased, except cement bond	does not detect secondary porosity; cement bond and wave form require expert analysis	velocity units, for example, ft/s or m/s or μs/ft; steel pipe	1 or more transmitters and 2 or more receivers
Acoustic televiewer (28, 7)	acoustic caliper	acoustic reflectivity of borehole wall	fluid filled, 3 to 16-in. diameter; problems in deviated holes	heavy mud or mud cake attenuate signal; very slow logging speed	orientated image-magnetometer must be checked	rotating transducer sends and receives high-frequency pulses
Borehole video	axial or side view (radial)	visual image on tape	air or clean water; clean borehole wall	may need special cable	NA[A]	video camera and light source
Caliper (29, 7)	oriented, 4-arm high-resolution, *x-y* or max-min bow spring	borehole or casing diameter	any conditions	deviated holes limit some types; significant resolution difference between tools	distance units, for example, in.; jig with holes or rings	1 to 4 retractable arms contact borehole wall
Temperature (30, 31, 32)	differential	temperature of fluid near sensor	fluid filled	large variation in accuracy and resolution of tools	°C or °F; ice bath or constant temperature bath	thermistor or solid-state sensor
Fluid conductivity (7)	fluid resistivity	most measure resistivity of fluid in hole	fluid filled	accuracy varies; requires temperature correction	μS/cm or Ω-m; conductivity cell	ring electrodes in a tube
Flow (12, 33, 7)	impellers, heat pulse	vertical velocity of fluid column	fluid filled	impellers require higher velocities. Needs to be centralized.	velocity units, for example, ft/min; lab flow column or log in casing	rotating impellers; thermistors detect heated water; other sensors measure tagged fluid.
Deviation (4, 7, 47)	magnetic, gyroscopic, or mechanical	horizontal and vertical displacement of borehole	any conditions (see limitations)	magnetic methods orientation not valid in steel casing	degrees and depth units; orientation and inclination must be checked	various techniques to measure inclination and bearing of borehole

[A] NA = not applicable.

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TABLE 2 Log Selection Chart for Geotechnical Applications Using Common Geophysical Logs[A]

	Acoustic		Electric and Induction					Fluid Logs				Radioactive or Nuclear				Other Methods			
Information Desired	Acoustic Tele-viewer	Acoustic Velocity, Δt, CBL, VDL, FWS	Induced Potent-ization	Multi-electrode Resistivity, Normal, Lateral, Micro Guard Resistivity	Single-Point Resis-tance	Sponta-neous Poten-tial	Induc-tion (Conduc-tivity)	Flow Meter	Fluid Resistivity	Fluid Sampler	Temper-ature, Differ-ential Temper-ature	Gamma-Gamma Density	Gamma	Neutron	Spectral Gamma	Borehole Video	Caliper	Casing Collar Locator	Deviation
Lithology and Correlation																			
Bed/aquifer thickness; correlation, structure	●	●		●	●	●	★					Δ	√	Δ	√	◇	√		
Lithology—depositional environment	?	●		●	●	●	★					Δ	√	Δ	√	◇	√		
Shale or clay content			●	●		●	★					Δ	√	Δ	√				
Bulk density												Δ							
Formation resistivity				●			★												
Injection/production profiles				?			?	□	□		□	Δ		Δ					
Permeability estimates		●						□	□		□		√						
Porosity (amount and type)	●	●		●			★					Δ		Δ					
Mineral identification			●									Δ			√				
Potassium-uranium thorium content (KUT)															√				
Rock Structure																			
Strike and dip of bedding	●															◇			√
Fracture detection (number of fractures), RQD	●	●		●	●											◇	√		
Fracture orientation and character	●															◇			√
Thin bed resolution	●			?	●											◇	√		
Fluid Parameters																			
Borehole fluid characteristics								?	□	□	□								
Fluid flow						●		□	□		□					◇			
Formation water quality				●		●	★			□									
Moisture content—water saturation				?			?					Δ		Δ					
Temperature		?									□								
Water level and water table	●	●		●	●	●	?		□		□	Δ		Δ		◇			
Borehole Parameters																			
Casing evaluation integrity, leaks, damage, screen location	■	■					?	■			■					♦	√	†	
Deviation of borehole																			√
Diameter of borehole	●																√		
Examination behind casing		●					★					Δ		Δ					
Location of debris in wells	●															♦	√	√	
Well completion evaluation, for example, cement bond, seal location, grout location	?	■					★					Δ	√	Δ					

[A] Required hole conditions: ■ = cased fluid-filled hole, ♦ = clear fluid or dry cased hole, □ = screened or open fluid-filled hole, ◇ = clear fluid or dry open hole, † = steel casing only, Δ = active nuclear log to be run in stable holes, ★ = open or nonconductive cased holes, dry or fluid filled, √ = no restrictions, ● = open fluid-filled hole only, and ? = possible applications.

7.2.2.3 Some probes have internal devices such as resistors, but this does not substitute for checking the probe response in an environment that simulates borehole conditions, and the use of such devices is considered standardization.

7.2.2.4 *Calibration Facilities*—Commonly used calibration pits or models for use by anyone at the present time are listed in Appendix X1 (14-18). The user should inquire concerning the present validity of any facility.

7.2.3 *Sample Analyses*:

7.2.3.1 Representative samples from boreholes in the project area that have been collected carefully and analyzed quantitatively also may be used to calibrate log response.

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7.2.3.2 To reduce depth errors, the sample recovery of rock cores in calibration holes needs to approach 100 % for the intervals used for calibration. Log response should be used to select sample depths to span the range of desired log calibration values and to be within thick units to minimize the effects of potential depth errors. Samples need to be analyzed immediately or steps taken to preserve them for later analysis.

7.2.3.3 Samples to be used for log calibration should be analyzed only from depth intervals at which the log response is relatively uniform for a depth interval considerably greater than the vertical dimension of the volume of investigation of the logging probe. Samples near lithologic contacts or fluid interfaces should not be used because of possible boundary effects or depth errors.

7.3 *Standardization:*

7.3.1 Standardization is the process of checking the log response to reveal evidence of repeatability and consistency.

7.3.2 Standardization is needed to establish comparability between logs made with different equipment or at different times and to ensure the accuracy of measurements.

7.3.2.1 Standardization checks should include at least two different measurement values approximating the range of interest (For example, aluminum and magnesium or plastic blocks are used commonly to check the response of gamma-gamma density logging systems in the field.)

7.3.3 Standardization uses some type of a standard that may be used in the field or laboratory and repeat logs.

7.3.3.1 Log response needs to be checked using field standards often enough to satisfy the project objectives. Standardization of the log response provides the basis for correcting for changes (for example, changes in output with time due to system drift or changes of equipment).

7.3.3.2 Selected log intervals should be repeated (that is, re-logged). Repeat logs provide information on the stability of logging equipment.

7.3.3.3 A representative borehole may be used to check log response periodically. This borehole environment and the rocks and fluids penetrated may change with time.

8. Procedure

8.1 *Planning the Logging Program:*

8.1.1 A work plan should be developed prior to implementing the logging program.

8.1.2 The key steps in developing a logging work plan should include the following:

8.1.2.1 *Log Selection*—See Table 1 and Table 2.

8.1.2.2 *Personnel Selection*—See 8.3.2.

8.1.2.3 *Quality Control and Documentation*—See 8.4.

8.1.2.4 *Calibration and Standardization Procedures*—See Section 7.

8.1.2.5 *Equipment Liability*—See 1.7.

8.1.2.6 *Equipment Decontamination*—In environmental investigations, equipment decontamination may be required before, after, and between individual wells. Equipment decontamination may involve a number of standardized procedures, depending on the nature of the project (see Practices D 5088 and D 5608). A decontamination program should be agreed upon by all parties before logging commences, and procedures specified by the work plan should be followed.[6]

8.1.2.7 *Log Interpretation*—See 8.5.

8.2 *Field Assessment of Borehole Conditions:*

8.2.1 Borehole conditions can have a profound influence on the quality of log data and subsequent interpretation. Important parameters to consider include the following:

8.2.1.1 Drilling method, casing, drill hole history, and well completion materials.

8.2.1.2 *Borehole Fluid Properties*—Resistivity, temperature, density, viscosity, and chemistry at the time of logging.

8.2.1.3 Borehole diameter, rugosity, and stability.

8.2.1.4 Deviation of borehole.

8.2.1.5 Wellhead pressure.

8.2.2 *Logging Operations:*

8.2.2.1 Determine the sequence and direction of logging. The sequence in which a suite of logs is run is important from both a data quality and operational viewpoint. Because logging operations mix the borehole fluid, logs of fluid properties (for example, temperature, fluid resistivity, and fluid sampling should be run prior to other logs). Consideration should also be given to when borehole video surveys are performed because some logging tools may degrade borehole clarity. Tools that have arms or bowsprings that contact the borehole wall should be run late in the logging sequence because of the greater possibility of material from the borehole wall falling into the borehole. Because of the consequences of losing a tool with a radioactive source, these tools should be run last, and after a caliper log. Unstable boreholes should not be logged with radioactive source probes. All logs except fluid properties and video should be run with the probe moving up the borehole to reduce depth errors.

8.2.2.2 Select the depth reference. The selected depth reference needs to be stable and accessible.

8.2.2.3 Select horizontal and vertical scales.

8.2.2.4 Select the digitizing interval. See 8.3.1.2.

8.3 *Other Considerations:*

8.3.1 *Data Formats*—There are two methods of recording log data, digital and analog. Digital recording of logs should be used because of the numerous benefits of data manipulation. Digital recording is not yet practical for some logs such as video or acoustic televiewer.

8.3.1.1 An analog display should be available to be viewed in the field to verify the correct tool operation. Depth scales and units of measurement for the horizontal scale must be indicated clearly on each log.

8.3.1.2 The digital data are recorded at an operator-selected depth interval that should be as small as possible, at most, half the thickness of the smallest rock unit that can be resolved. The time interval for digital samples can also be selected by the operator. ASCII is the recommended format except for such logs as spectral gamma, full waveform sonic, borehole video, and acoustic televiewer. The digital file header should include all of the necessary information to reconstruct the logging

[6] Equipment decontamination procedures may have specific safety and equipment limitations that must be addressed prior to their use.

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procedures accurately and should duplicate the information included in the written header of the log.

8.3.1.3 Unprocessed data should be available. Nonproprietary processing algorithms shall be furnished if processed data is provided.

8.3.2 *Personnel*:

8.3.2.1 Personnel not having specialized training or experience should be cautious about using borehole geophysics and should solicit assistance from qualified practitioners or attend courses on borehole geophysics.

8.3.2.2 Personnel operating logging equipment should have an understanding of the theory, field procedures, and methods of log interpretation.

8.3.2.3 A geoscientist, with experience in borehole geophysics, who understands the project objectives and local geohydrology may need to be available to examine logging results during logging operations when consistent with objectives of the program. This geoscientist is responsible for determining whether the instructions selected in the pre-logging conference are being followed and whether changes should be made.

8.3.2.4 Log interpretation should be performed by a geoscientist with experience in borehole geophysics and knowledge of the site geology and hydrology.

8.4 *Field Documentation*—A documentation plan for both the analog plot and digital data file should be established and become part of the work plan. Documentation of the following procedures is needed: calibration of logging probes, field operation of geophysical logging equipment, applicable decontamination, and format for presenting geophysical well log data. Repair, standardization, and calibration information should also be documented. Probes should be numbered to simplify the identification of associated documentation. Document all field problems including equipment malfunctions. This should include the steps taken to solve the problem and how the logs might have been affected. Repeat runs and field standardization should be more frequent when equipment problems occur. The use of one borehole on the project to check the probe response may aid in the identification of equipment or other problems. Probes should be recalibrated in a physical model after major repairs have been made.

8.4.1 *Log Headings (Headers)*—The log heading should contain all of the information that is necessary to analyze the log trace. Because auxiliary documents are frequently unavailable to other users of the log, all of the critical information concerning the log should be included on the final log heading. The header information should also be included in the same computer file as the log data. The following items listed are necessary and should be included on the log headings and computer files when appropriate. If information is not available or applicable, it should be noted on the heading. The following information should be included:

8.4.1.1 *Background Well Information*:

Owner of well and address, location of well (UTM coordinates, ¼ section, etc.); date; logging contractor and address; logging operator; drilling contractor and address; client and address; observer and address; elevation of top casing and distance above ground; and drilling history, methods etc.

8.4.1.2 *Borehole Conditions*:

Casing description; description of log depth datum; elevation of log depth datum; type of drilling fluid; resistivity and temperature of borehole fluid; depth of origin of borehole fluid samples; fluid level; time since last mud circulation; bottom hole temperature; and problems and unusual conditions.

8.4.1.3 *Equipment Data and Logging Parameters*:

Description of probe reference point; model and manufacturer of logging tools; logging company tool number; date and type of last calibration; date, type, and response of field standardization; top and bottom of logged interval; logging speed and direction; vertical depth error after logging; time constant or the time interval of digital samples; identification of disk containing digitized logs; and equipment problems.

8.4.1.4 *Specific Information for Nuclear Logging Probes*:

Source description, initial source strength, and date determined; source to detector or receiver spacing; detector description; and data filtering or enhancement parameters.

8.4.1.5 *Specific Information for Acoustic and Electric Logging Probes*:

source or transmitter description and signal output; source or transmitter to detector or receiver spacing; detector or receiver description; and data filtering or enhancement parameters.

8.4.2 *Quality Control During Logging Operations*:

request changes in logging speed and time constant; repeat logs or log intervals based on field log analysis; check depth readout against log; note errors or changes on the log; and verify documentation listed above.

8.5 *Log Interpretation*—The full potential of a logging program cannot be realized until the logging measurements are interpreted. Log interpretation should start at the time of data acquisition and should continue as an iterative process throughout the project.

8.5.1 Logs should be analyzed and described as a suite and combined with information on lithology and fluid quality because of the synergistic nature of log data. The nonunique response of logs dictates the use of data from other sources to check the log interpretation, and this background data must be included in the report. A computer will be used in most cases to aid analysis of the logs, and information on the software and algorithms used should be included in the report.

8.5.2 Important interpretation steps include the following:

8.5.2.1 Establishing database (for example, format conversion, depth corrections, editing, and filtering).

8.5.2.2 Applying borehole corrections (for example, correct electric logs for borehole diameter and fluid resistivity).

8.5.2.3 Performing initial data inversion-conversion, log units to values appropriate for investigation (for example, density units to porosity).

8.5.2.4 Performing large-scale data inversion (for example, cross sections, regional correlation, and model parameters).

9. Report

9.1 Depending on the project objective, report only data or data and interpretations.

9.1.1 Both types of reports should include the following:

9.1.1.1 Objectives and scope.

9.1.1.2 Field Documentation (for example, site conditions, borehole conditions, data collection procedures, calibration and

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standardization of logging probes, field operation of geophysical logging equipment, and format for recording geophysical log data, including any filtering or processing of the data, problems, and unusual conditions; see 8.4).

9.1.1.3 Both the digital log data and log plots.

9.1.1.4 Abstract, executive summary, or conclusions.

9.1.2 Interpretation reports should include the following:

9.1.2.1 Log composites (for example, summary plots showing logs, lithology, well construction, and water quality zones). These composites are commonly annotated to indicate the features of interest and correlated with lithologic descriptions.

9.1.2.2 Brief description of the geologic and hydrologic setting.

9.1.2.3 Specific information on log analysis, that is, depth corrections and recalibration of logs, physical models or sample analyses that were used for calibration, methods of log interpretation, software used, and copies of cross-plots or other plots of data resulting from log analysis.

9.1.2.4 Well-to-well correlation sections and comparison to surface geophysical and other testing data, when available.

10. Keywords

10.1 acoustic logging; acoustic televiewer; borehole geophysics; borehole video; caliper logging; chemical properties and physical properties; deviation; electric logging; environmental; fluid conductivity/resistivity logging; fluid logging; gamma logging; gamma-gamma logging; geology; geophysics; geotechnical; ground water; hydrology; induction logging; log calibration and standardization; log headings; neutron logging; nuclear logging; resistivity logging; singlepoint resistance logging; spontaneous potential logging; temperature logging; well logging

APPENDIX

(Nonmandatory Information)

X1. CALIBRATION FACILITIES AVAILABLE FOR PUBLIC USE (1989)

X1.1 *Name and Location*—American Petroleum Institute Calibration Facility, University of Houston, Houston, TX: four pits **(14, 19, 20)**.

X1.2 *Who to Contact:* University of Houston, Cullen College of Engineering, (713) 749-3423.

X1.3 *Probes That Can Be Calibrated*—Pit 1: neutron and gamma-gamma; Pit 2: gamma (simulated shale); Pits 3 and 4: spectral gamma.

X1.3.1 *Name and Location*—U.S. Department of Energy, Grand Junction, CO: 20 models or pits **(18)**.

X1.3.2 *Who to Contact*—U.S. Department of Energy, Grand Junction Operations Office, or the prime contractor at the U.S. Department of Energy office, (303) 248-7768 or 6702.

X1.4 *Probes That Can Be Calibrated*—Gamma, gamma spectral, neutron, gamma-gamma, and magnetic susceptibility. Also, wet and dry borehole size factors and a 300-ft borehole with radium foil at known depths for check of depth measurements.

X1.4.1 *Name and Location*—U.S. Bureau of Mines density pits Pit 1: six holes and magnetic susceptibility (Pits 2). Denver Federal Center, Lakewood, CO: Pit six holes; Pit 2: three holes **(17)**.

X1.4.2 *Who to Contact*—U.S. Geological Survey, Water Resources Division, Borehole Geophysics Project, Building 25, Denver Federal Center, (303) 236-5913.

X1.5 *Probes That Can Be Calibrated*—Pit 1: gamma-gamma, acoustic, resistivity; and Pit 2: magnetic susceptibility.

X1.5.1 *Name and Location*—U.S. Department of Energy, Fractured igneous rock calibration models, Denver Federal Center, Lakewood, CO: Three models or pits **(16)**.

X1.5.2 *Who to Contact*—U.S. Geological Survey, Water Resources Division, Borehole Geophysics Project, Building 25, Denver Federal Center, (303) 236-5913.

X1.6 *Probes That Can Be Calibrated*—Fracture detection probes, neutron, gamma-gamma, short-spaced resistivity, and acoustic velocity.

X1.7 *Other Facilities*—The Geological Survey of Canada is developing a system of deep test holes and calibration facilities that are presently available at several locations in Canada. Gamma, gamma spectral, and coal property models are completed, and other physical property models are under construction **(15)**. Calibration facilities at universities, private logging companies, and government agencies may also be available at other locations for use by outside logging groups.

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REFERENCES

The following is a partial list of references intended to provide basic information on the various logging methods. There are many more pertinent references, but they are too numerous for listing in this guide **(34, 36, 51)**.

(1) *Glossary of Terms and Expressions Used in Well Logging*, 2nd Ed., Society of Professional Well Log Analysts, Houston, TX, 1984, p. 74.

(2) Bateman, R. M., *Log Quality Control*, IHRDC, Boston, MA, 1985, p. 398.

(3) Doveton, J. H., *Log Analysis of Subsurface Geology—Concepts and Computer Methods*, John Wiley and Sons, Inc., New York, NY, 1986, p. 273.

(4) Hallenberg, J. K., *Geophysical Logging for Mineral and Engineering Applications*, Penn Well Books, p. 264.

(5) Hearst, J. R., and Nelson, P. H., *Well Logging for Physical Properties*, McGraw-Hill Book Co., 1985, p. 576.

(6) Hilchie, D. W., *Applied Open Hole Log Interpretation for Geologists and Engineers*, Douglas W. Hilchie Inc., 1978.

(7) Keys, W. S., *Borehole Geophysics Applied To Ground-Water Investigations*, National Water Well Association, 1989, p. 313.

(8) Lynch, E. J., *Formation Evaluation*, Harper and Row, New York, NY, 1962, p. 422.

(9) Guyod, H., "Interpretation of Electric and Gamma Ray Logs in Water Wells," *The Log Analyst*, Vol 6, No. 5, 1966, pp. 29–44.

(10) Taylor, K. C., Hess, J. W., and Mazzela, A., "Field Evaluation of a Slim-Hole Borehole Induction Tool," *Ground Water Monitoring Review*, Vol 9, No. 1, 1989.

(11) Darr, P. S., Gilkeson, R. H., and Yearsley, E. N.," Intercomparison of Borehole Geophysical Techniques in a Complex Depositional Environment," *Proceedings of the Fourth Outdoor Action Conference on Aquifer Restoration, Ground Water Monitoring and Geophysical Methods*, Las Vegas, NV, May 14–17, 1990.

(12) Patten, E. P., and Bennett, G. D., "Methods of Flow Measurement in Well Bores," *U.S. Geological Survey Water-Supply Paper 1544-C*, 1962, p. 28.

(13) Society of Professional Well Log Analysts, *The Art of Ancient Log Analysis*, Houston, TX, 1979, p. 131.

(14) Belknap, W. B., Dewan, J. F., Kirkpatrick, C. V., Mott, W. E., Pearson, A. J., and Robson, W. R.," API Calibration Facility for Nuclear Logs," *Drilling, and Production Practice*: American Petroleum Institute, 1959, pp. 289–316.

(15) Killeen, P. G., "A System of Deep Test Holes and Calibration Facilities for Developing and Testing New Borehole Geophysical Techniques," *Borehole Geophysics for Mining and Geotechnical Applications*, Paper 85-27, Geological Survey of Canada, 1986, pp. 29–46.

(16) Mathews, M. A., Scott, J. H., and LaDelfe, C. M., *Test Pits for Calibrating Well Logging Equipment in Fractured Hard-Rock Environment*, Los Alamos National Laboratory Report LA-UR-85-859, 1985, p. 84.

(17) Snodgrass, J. J., *Calibration Models for Geophysical Borehole Logging*, U.S. Bureau of Mines Report of Investigations 8148, p. 21.

(18) Stromswold, D. C., and Wilson, R. D., "Calibration and Data Correction Techniques for Spectral Gamma-Ray Logging," *Society of Professional Well Log Analysts 22nd Annual Logging Symposium Transactions*, 1981, pp. M1–18.

(19) Bryant, T. M., and Gage, T. D., "API Calibration of MWDGamma Ray Tools," *Society of Professional Well Log Analysts 29th Annual Logging Symposium Transactions*, 1988, pp. B1–14.

(20) Scott, H. D., "Analysis of Samples from the API K-U-TH Logging Calibration Facility," *Society of Professional Well Log Analysts 30th Annual Logging Symposium Transactions*, 1989, pp. MM 1–25.

(21) Wahl, J. S., "Gamma-Ray Logging," *Geophysics*, Vol 48, No. 11, 1983, pp. 1536–1550.

(22) Killeen, P. G., "Gamma-Ray Logging and Interpretation," *Developments in geophysical exploration methods: Barking, Essex, England*, A. A. Fitch, ed., Applied Science Publishers, Book 3, Chapter 7, 1982, pp. 95–150.

(23) Tittman, J., and Wahl, J. S., "The Physical Foundations of Formation Density Logging (Gamma-Gamma)," *Geophysics*, Vol 30, No. 2, 1965, pp. 284–294.

(24) Scott, J. H., "Borehole Compensation Algorithms for a Small-Diameter, Dual-Detector Density Well-Logging Probe," *Society of Professional Well Log Analysts Annual Logging Symposium 18th Symposium Transactions*, 1977, pp. S1–S17.

(25) Arnold, D. M., and Smith, H. D., Jr., "Experimental Determination of Environmental Corrections for a Dual-Spaced Neutron Porosity Log," *Society of Professional Well Log Analysts Annual Logging Symposium Transactions*, Mexico City, Vol 2, 1981, pp. VV1–VV24.

(26) Guyod, H., and Shane, L. E., "Introduction to Geophysical Well Logging—Acoustical Logging," *Geophysical Well Logging: Houston, Texas*, Vol 1, Hubert Guyod, 1969, p. 256.

(27) Pirson, S. J., *Handbook of Well Log Analysis*, Prentice Hall, Englewood Cliffs, NJ, 1963, p. 326.

(28) Zemanek, J., Caldwell, R. L., Glenn, E. E., Jr., Holcomb, S. V., Norton, L. J., and Straus, A. J. D., "The Borehole Televiewer—A New Logging Concept for Fracture Location and Other Types of Borehole Inspection," *Journal of Petroleum Technology*, Vol 21, No. 6, 1969, pp. 762–774.

(29) Hilchie, D. W.," Caliper Logging—Theory and practice," *The Log Analyst*, Vol 9, No. 1, 1968, pp. 3–12.

(30) Stevens, H. H., Jr., Ficke, J. F., and Smoot, G. F.," Water Temperature-Influential Factors, Field Measurement, and Data Presentation," *U.S. Geological Survey Techniques of Water-Resources Investigations*, Book 1, Chapter D1, 1975.

(31) Sammel, E. A., "Convective Flow and Its Effect on Temperature Logging in Small-Diameter Wells," *Geophysics*, Vol 33, No. 6, 1968, pp. 1004–1012.

(32) Conaway, J. G., "Deconvolution of Temperature Gradient Logs," *Geophysics*, Vol 42, No. 4, 1977, pp. 823–837.

(33) Hess, A. E., *A Heat-Pulse Flowmeter for Measuring Low Velocities in Boreholes*, U.S. Geological Survey Open-File Report 82-699, 1982, p. 44.

(34) Prensky, S. E., "Geological Applications of Well Logs—An Introductory Bibliography and Survey of Well Logging Literature Through September 1986, Arranged by Subject and First Author," *The Log Analyst*, Parts A and B, Vol 28, No. 1, 1987, pp. 71–107; Part C, Vol 28, No. 2, 1987, pp. 219–248.

(35) Prensky, S. E., "Geological Applications of Well Logs—An Introductory Bibliography and Survey of Well Logging Literature: Annual Update, October 1986 through September 1987," *The Log Analyst*, Vol 28, No. 6, 1987, pp. 558–575. Bibliographic update for October 1987 through September 1988, *The Log Analyst*, Vol 29, No. 6, 1988, pp. 426–443.

(36) Prensky, S. E., "Bibliography of Well Log Applications," October 1988–September 1989, annual update; *The Log Analyst*, Vol 30, No. 6, 1989, pp. 448–470. October 1989–September 1990, annual update: *The Log Analyst*, Vol 31, No. 6, 1990, pp. 395–424.

(37) Daniels, J. J., "Extending the Range of Investigation of Borehole Electrical Measurements," *Transactions of the SPWLA 18th Annual Logging Symposium*, 1977, 17 pp.

(38) Dyck, A. V., *A Method for Quantitative Interpretation of Wideband Drill-Hole EM Surveys in Mineral Exploration*, University of Toronto PhD Thesis, 1981.

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(39) Labo, J., "A Practical Introduction to Borehole Geophysics," *Geophysical References, Soc. Explor. Geophysicists*, Vol 2, Chapter 9, 1987, pp. 179–195.

(40) Scott, J. H., Seeley, R. L., and Barth, J. J., "A Magnetic Susceptibility Well Logging System for Mineral Exploration," *Transactions of the SPWLA 22nd Annual Logging Symposium*, 1981.

(41) Senftle, F. E., "Application of Gamma Ray Spectral Analysis to Subsurface Mineral Exploration," *A Short Course Handbook for Neutron Activation Analysis in the Geosciences*, Mineralogical Association of Canada, Halifax, N.S., 1980.

(42) Freedman, R., and Vogiatzis, J. P., "Theory of Microwave Dielectric Constant Logging Using the Electromagnetic Wave Propagation Method," *Geophysics*, Vol 44, No. 5, 1979, pp. 969–986.

(43) Wright, D. L., Watts, R. D., and Bramsoe, E., "A Short-Pulse Electromagnetic Transponder for Hole-to-hole Use," *IEEE Transactions on Geoscience and Remote Sensing*, Vol GE-22, No. 6, 1984, pp. 720–725.

(44) Quirein, J. A., Gardner, J. S., and Watson, J. T., "Combined Natural Gamma Ray Spectral/Lith-Density Measurements Applied to Complex Lithologies," *Society of Petroleum Engineering of AIME Paper SPE 11143*, 1982, 14 pp.

(45) Olhoeft, G. R., and Scott, J. H., "Nonlinear Complex Resistivity Logging," *Transactions of SPWLA 21st Annual Logging Symposium*, 1980.

(46) Tsang, C., Hufschmied, P., and Hale, F. V., "Determination of Fracture Inflow Parameters with a Borehole Fluid Conductivity Logging Method," *Water Resources Research*, Vol 26, No. 4, 1990, pp. 561–578.

(47) Craig, J. T., Jr., and Randall, B. V., "Directional Survey Calculation," *Pet. International*, 1976, pp. 38–54.

(48) Bigelow, E. L., "Making More Intelligent Use of Log Derived Dip Information, Parts I–V," *Log Analyst*, Vol 26, 1985, No. 1, pp. 41–51; No. 2, pp. 25–41; No. 3, pp. 18–31; No. 4, pp. 21–43; and No. 5, pp. 25–64.

(49) Hodges, R. E., and Teasdale, W. E., *Considerations Related To Drilling Methods in Planning and Performing Borehole-Geophysical Logging for Ground-Water Studies*, U.S. Geological Survey Water-Resources Investigations Report 91–4090, Denver, CO, 1991.

(50) Sandberg, E. V., Olsson, O. L., and Falk, L. R., "Combined Interpretation of Fracture Zones in Crystalline Rock Using Single-Hole and Crosshole Tomography and Directional Borehole-Radar Data," *The Log Analyst*, Vol 32, No. 2, 1991, pp. 108–119.

(51) Boulding, J. R., *Use of Airborne, Surface, and Borehole Geophysical Techniques at Contaminated Sites: A Reference Guide*, U.S. EPA/625/R-92/007, 295 pp.

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Standard Guide for Conducting Borehole Geophysical Logging: Mechanical Caliper[1]

This standard is issued under the fixed designation D 6167; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This guide covers the general procedures necessary to conduct caliper logging of boreholes, wells, access tubes, caissons, or shafts (hereafter referred as boreholes) as commonly applied to geologic, engineering, ground-water, and environmental (hereafter referred as geotechnical) investigations. Caliper logging for mineral or petroleum exploration and development are excluded.

1.2 This guide defines a caliper log as a record of borehole diameter with depth.

1.2.1 Caliper logs are essential in the interpretation of geophysical logs since they can be significantly affected by borehole diameter.

1.2.2 Caliper logs are commonly used to measure borehole diameter, shape, roughness, and stability; calculate borehole volume; provide information on borehole construction; and delineate lithologic contacts, fractures, and solution cavities and other openings.

1.3 This guide is restricted to mechanically based devices with spring-loaded arms, which are the most common calipers used in caliper logging with geotechnical applications.

1.4 This guide provides an overview of caliper logging, including general procedures, specific documentation, calibration and standardization, and log quality and interpretation.

1.5 To obtain additional information on caliper logs see Section 9 of this guide.

1.6 This guide is to be used in conjunction with Guide D 5753.

1.7 This guide should not be used as a sole criterion for caliper logging and does not replace professional judgement. Caliper logging procedures should be adapted to meet the needs of a range of applications and stated in general terms so that flexibility or innovation is not suppressed.

1.8 The geotechnical industry uses English or SI units. The caliper log is typically recorded in units of inches, millimetres, or centimetres.

1.9 *This guide does not purport to address all of the safety and liability problems (for example, lost or lodged probes and equipment decontamination) associated with its use.*

1.10 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:* [2]

D 653 Terminology Relating to Soil, Rock and Contained Fluids

D 5088 Practice for Decontamination of Field Equipment Used at Nonradioactive Waste Sites

D 5608 Practice for Decontamination of Field Equipment Used at Low Level Radioactive Waste Sites

D 5753 Guide for Planning and Conducting Borehole Geophysical Logging

3. Terminology

3.1 *Definitions:* Definitions shall be in accordance with Terminology D 653, Section 12, Ref **(1)**,[3] or as defined below:

3.1.1 *accuracy, n*—how close a measured log values approaches true value. It is determined in a controlled environment. A controlled environment represents a homogeneous sample volume with known properties.

3.1.2 *depth of investigation, n*—the radial distance from the measurement point to a point where the predominant measured response may be considered centered, that is not to be confused with borehole depth (for example, distance) measured from the surface.

3.1.3 *measurement resolution, n*—the minimum change in measured value that can be detected.

[1] This guide is under the jurisdiction of ASTM Committee D18 on Soil and Rock and is the direct responsibility of Subcommittee D18.01 on Surface and Subsurface Characterization.

Current edition approved July 1, 2004. Published August 2004. Originally approved in 1997. Last previous edition approved in 1997 as D 6167 - 97[ε1].

[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[3] The boldface numbers given in parentheses refer to a list of references at the end of the text.

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3.1.4 *repeatability, n*—the difference in magnitude of two measurements with the same equipment and in the same environment.

3.1.5 *vertical resolution, n*—the minimum thickness that can be separated into distinct units.

3.1.6 *volume of investigation, n*—the volume that contributes 90 % of the measured response. It is determined by a combination of theoretical and empirical modeling. The volume of investigation is non-spherical and has gradational boundaries.

4. Summary of Guide

4.1 This guide applies to borehole caliper logging and is to be used in conjunction with Guide D 5753.

4.2 This guide briefly describes the significance and use, apparatus, calibration and standardization, procedures, and reports for conducting borehole caliper logging.

5. Significance and Use

5.1 An appropriately developed, documented, and executed guide is essential for the proper collection and application of caliper logs. This guide is to be used in conjunction with Guide D 5753.

5.2 The benefits of its use include the following: improving selection of caliper logging methods and equipment, caliper log quality and reliability, and usefulness of the caliper log data for subsequent display and interpretation.

5.3 This guide applies to commonly used caliper logging methods for geotechnical applications.

5.4 It is essential that personnel (see the Personnel section of Guide D 5753) consult up-to-date textbooks and reports on the caliper technique, application, and interpretation methods.

6. Interferences

6.1 Most extraneous effects on caliper logs are caused by instrument problems and borehole conditions.

6.2 Instrument problems include the following: electrical leakage of cable and grounding problems, temperature drift, wear of mechanical components including the hinge pins and in the linear potentiometer (mechanical hysteresis), damaged or bent arms, and lack of lubrication of the mechanical components.

6.3 Borehole conditions include heavy drilling mud, borehole deviation, and drilling-related borehole irregularities.

7. Apparatus

7.1 A geophysical logging system has been described in the general guide (see the Apparatus section of Guide D 5753).

7.2 Caliper logs may be obtained with probes having a single arm, three arms (averaging or summation), multiple independent arms (x-y caliper), multiple-feeler arms, bow springs, or gap wheels. Single-arm and three-arm averaging probes are most commonly used for geotechnical investigations.

7.2.1 A single-arm caliper commonly provides a record of borehole diameter while being used to decentralize another type of log, such as a side-collimated gamma-gamma probe (see Fig. 1). The caliper arm generally follows the high side of a deviated hole. The single-arm decentralizing caliper may not have the resolution needed for some applications.

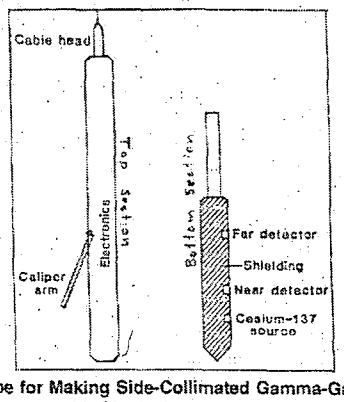

FIG. 1 Probe for Making Side-Collimated Gamma-Gamma Logs with Single-Arm Caliper (2)

7.2.2 The three-arm averaging or summation caliper has arms of equal length oriented 120° apart (see Fig. 2). All arms move together, which provides an average diameter measurement. This caliper provides higher resolution than the single-arm caliper measurement (see Fig. 3).

7.2.3 Multiple independent arm calipers generally have three or four independent arms of equal length; these arms are sometimes oriented. Horizontal resolution, that provides accurate borehole-diameter measurement regardless of borehole shape, is related to the number of independent arms. In general, calipers with four or more independent arms will have higher resolution than three-arm averaging (see Fig. 3). The four independent-arm caliper log may show borehole elongation (elliptical borehole shape) and better indicates the actual irregularity of the borehole.

7.3 Caliper probes using arms are typically spring loaded. The arms are retracted and opened with an electric motor and

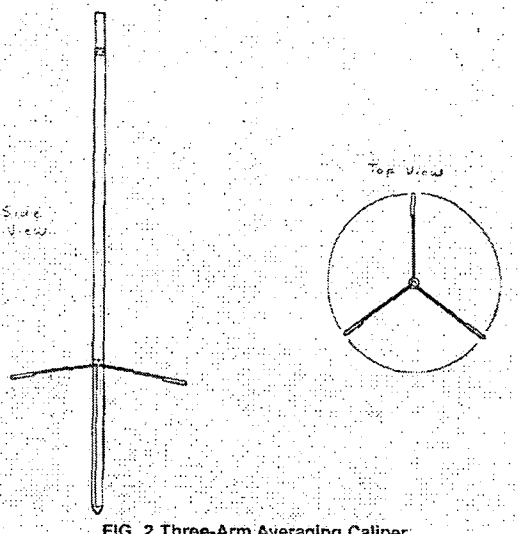

FIG. 2 Three-Arm Averaging Caliper

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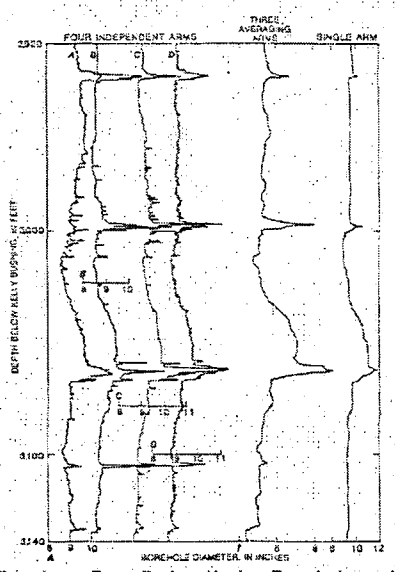

FIG. 3 Caliper Logs From Probes Having Four Independent Arms, Three Averaging Arms, and a Single Arm, Madison Limestone Test Well 1, Wyoming (2)

retention spring. The arms and gears are lubricated. Caliper probes closed by hand are held closed with an electric solenoid or weighted retention ring that is released with a sudden drop. Typically, the caliper arms are mechanically connected to a linear or rotary potentiometer such that changes in the angle of the arms causes changes in resistance. These changes in resistance are proportional to average borehole diameter. In some probes, the voltage changes are converted to a varying pulse rate or digitized downhole to eliminate or minimize cable transmission noise. Different arm length can be used to optimize sensitivity for the borehole-diameter range expected.

7.4 The concepts of volume of investigation and depth of investigation are not applicable to caliper logs since it is a surface-contact measurement.

7.5 Vertical resolution of caliper measurements is a function of the size of the contact surface (arm tip or pad), the response of the mechanical and electronic components, and digitizing interval used. The theoretical limit of vertical resolution is equal to the width of the caliper pad or tip. Selection of arm lengths and angle, and tip diameter will affect sensitivity. Shorter arms generally will provide more detail of the rugosity (borehole roughness as defined by Ref. (2)) of the borehole wall than longer arms. However, size of caliper probe and borehole diameter may also determine arm lengths used.

7.6 Measurement resolution of typical caliper probes is 0.05 in. (0.13 cm) of borehole diameter.

7.7 A variety of caliper logging equipment is available for geotechnical investigations. It is not practical to list all of the sources of potentially acceptable equipment.

8. Calibration and Standardization of Caliper Logs

8.1 *General:*

8.1.1 National Institute of Standards and Technology (NIST) calibration and standardization procedures do not exist for caliper logging.

8.1.2 Caliper logs can be used in a qualitative (for example, comparative) or quantitative (for example, borehole diameter corrections) manner depending upon the project objectives.

8.1.3 Caliper calibration methods and frequency shall be sufficient to meet project objectives.

8.1.3.1 Calibration and standardization should be performed each time a caliper probe is suspected to be damaged, modified, repaired, and at periodic intervals.

8.2 Calibration is the process of establishing values for caliper response and is accomplished with a physical model of a known diameter. Calibration data values related to the physical properties (for example, borehole diameter, roughness) may be recorded in units (for example, counts per second), that can be converted to units of length (for example, inches, millimetres, or centimetres.)

8.2.1 At least two, and preferably more, values, which approximate the anticipated operating range, are needed to establish a calibration curve (for example, 4- and 10-in. (10.2- and 25.4-cm) rings) if the borehole diameter to be logged is 5 in. (12.7 cm)).

8.2.2 Physical models of measured diameter that may be used to calibrate the caliper response may include rings or bars made of rigid materials that are not easily deformed and resist wear.

8.2.2.1 Calibration of caliper probes is done most accurately in rings of different diameters.

8.2.2.2 A calibration bar is a plate that is drilled and marked at regular intervals and machined to fit over the body of the probe (see Fig. 4). One arm is placed in the appropriate hole for the range to be logged.

8.2.2.3 Calibration can be checked by using casing of measured diameter logged in the borehole.

8.3 Standardization is the process of checking logging response to show evidence of repeatability and consistency.

8.3.1 Calibration serves as a check of standardization.

8.3.2 A representative borehole may be used to periodically check caliper response providing the borehole environment does not change with time. Caliper response may not repeat exactly because the probe may rotate, causing the arms to follow slightly different paths within the borehole.

9. Procedure

9.1 See the Procedure section of Guide D 5753 for planning a logging program, data formats, personnel qualifications, field documentation, and header documentation.

9.2 Caliper specific information (for example, arm length) should be documented.

9.3 Identify caliper logging objectives.

9.4 Select appropriate equipment to meet objectives.

9.4.1 Caliper equipment decontamination is addressed according to project specifications (see Practice D 5088 for non-radioactive waste sites and Practice D 5608 for low level radioactive waste sites). Some materials commonly used for caliper-arm lubrication may be environmentally sensitive.

9.5 Select the order in the logging sequence in which the caliper probe is to be run (see 8.2.2.1 of Guide D 5753).

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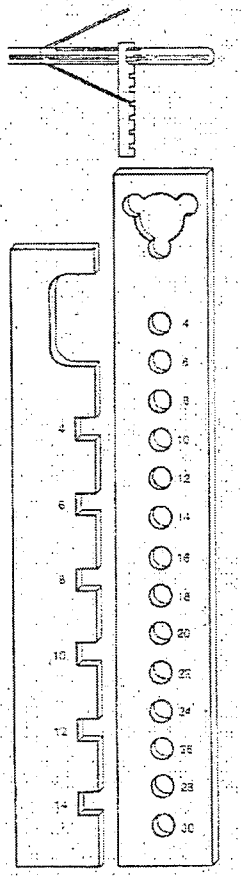

FIG. 4 Calibration Bars for Caliper Probes (3)

9.5.1 Caliper probes are run before any probe utilizing nuclear sources and more expensive centralized probes.

9.5.2 Caliper probes are run after any television camera and fluid property probes are run.

9.6 Caliper operation and calibration are checked at the start of each borehole or at an interval consistent with project objectives. (see the Procedure section of Guide D 5753). After calibration, the caliper arms are closed before lowering.

9.7 Select and document the depth reference.

9.7.1 The selected depth reference needs to be stable and accessible (for example, top of borehole casing).

9.8 Determine and document probe zero reference point (for example, top of probe or cablehead) and depth offset to caliper measurement point.

9.8.1 The measurement point of a caliper is the end of caliper arms and it changes as the arms open and close with the sine of arm angle multiplied by length of arm. Typically, the measurement point varies less than a few tenths of a foot (a few centimetres).

9.8.2 The measurement point will change if the arm length is changed.

9.9 Select horizontal and vertical scales for log display.

9.10 Select digitizing interval (or sample rate if applicable) to meet project objectives (see 8.3.1.2 of Guide D 5753).

9.10.1 Maximum vertical resolution requires the selection of a digitizing interval at least as small as the arm tip contact height.

9.10.2 Typically, this interval is no larger than 0.1 ft (0.03 m) for high-resolution applications.

9.11 The caliper probe is lowered to the bottom of the borehole.

9.11.1 Any time the caliper probe is lowered in the borehole, the arms should be closed to avoid damaging equipment or borehole.

9.11.2 Selection of probe speed while lowering is based on knowledge of borehole depth, stability, and other conditions.

9.12 Open caliper arm(s).

9.13 Select logging speed.

9.13.1 A logging speed of approximately 15 ft (5 m) per min is recommended for high-resolution applications. Faster logging speeds may induce noise due to the caliper probe bumping the borehole wall. Slower logging speeds will not enhance measurement resolution for most systems.

9.14 Collect caliper data while the probe is moving up the borehole.

9.15 When the probe reaches the top of the borehole:

9.15.1 If surface casing is present, compare and document caliper measurement.

9.15.2 Check depth reference and document after survey depth error (ASDE).

9.15.3 Determine if ASDE meets project objectives.

9.15.4 Typical tolerance for ASDE is ±0.4 ft per 100-ft (0.4 m per 100-m) interval logged.

9.16 Selected borehole intervals should be repeated (that is, relogged) under similar logging parameters as the initial log. Repeat logs provide information on the stability of the caliper equipment. The interval repeated should have enough variability, if possible, to check repeatability and resolution.

9.16.1 Repeat logs should be compared with the original log to ensure correct operation of the probe prior to ending a logging event.

9.16.2 Repeat sections may not repeat exactly due to a different orientation of the logging probe on the repeat run or changes in the borehole between logging runs (see Section 6).

9.16.3 Close caliper arms prior to lowering the probe down the borehole for a repeat section.

9.17 Evaluate the field log quality and compare log with drilling and completion information.

9.17.1 A reduction in borehole diameter over large depth sections may be indicative of borehole deviation on three-arm averaging caliper logs.

9.17.1.1 The magnitude of borehole deviation that causes this effect depends upon the length of the caliper arms being used and the strength of the tensioning spring within the caliper. Typically, a borehole deviation of greater than 15° is likely to produce this effect.

9.17.1.2 Converting the three-arm averaging caliper by removing two of the caliper arms may allow a good log to be obtained in these types of boreholes.

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9.17.2 Mud can prevent caliper arms from opening fully, and thick mud cake may prevent accurate measurement of drilled diameter. Lack of caliper arm movement, especially in the bottom of a mud drilled borehole, may be indicative of arm sticking due to heavy mud.

9.17.2.1 If mud interferences are suspected, the borehole may be reconditioned, the caliper probe cleaned and lubricated, and the caliper log repeated.

9.18 Post-acquisition calibration checks may be required (surface casing or calibration standard) to meet the objectives of the logging program. Typical tolerances between pre- and post-calibration are ±0.2 in. (0.5 cm).

10. Interpretation of Results

10.1 See the Log Interpretation section of Guide D 5753 for procedures on log interpretation.

10.2 A valid caliper log is essential in the interpretation of the logs that are affected by changes in borehole diameter, including those logs that are labeled 'borehole compensated.' It is not always possible to compensate logs for substantial differences in borehole diameter.

10.2.1 Caliper logs can be analyzed individually (that is, borehole volume).

10.2.2 Caliper logs can be analyzed as part of a suite to take advantage of the synergistic nature of log data.

10.3 The caliper log should be depth correlated with the other geophysical logs as the first step to interpretation. This is especially important for logs that use the caliper data for borehole correction and depth adjustment.

10.4 Other pertinent information, including borehole construction (casing size), drilling history (hole size, drill method, penetration rate, core loss, fluid loss, etc.), and geologic information, should be integrated with the caliper-log data.

10.5 Interpretations based on changes in borehole diameter may be related to changes in drilling, mud cake, mud rings, borehole construction, lithology and structure, fractures and solution openings, and stress-induced breakouts.

10.6 The measured borehole diameter may be significantly different than the drilled diameter because of plastic formations extruded into the borehole and friable formations enlarging the borehole. A series of caliper logs may also show increases or decreases in borehole diameter with time.

10.6.1 Caliper logs are useful for determining what other logs can be made and what range of borehole diameters will be accepted by centralizers or decentralizers.

10.7 Fractures and solution openings may be obvious on a caliper log; however, their character may not be uniquely defined.

10.7.1 The single-arm caliper log may completely miss a feature or indicate only a small anomaly.

10.7.2 The three-arm averaging caliper log of a fracture dipping at an angle such that the three arms enter the opening at different depths will indicate three separate anomalies rather than one.

10.8 Borehole-diameter information is essential for calculation of volumetric rate from flowmeter logs.

10.9 Caliper logs provide useful information for borehole completion and testing.

10.9.1 Caliper logs are used to locate the optimum placement of inflatable packers for borehole testing. Inflatable packers can only form an effective seal within a specified range of borehole diameters, and can be damaged if they are set in rough or irregular parts of the borehole.

10.9.2 Caliper logs are used to estimate the volume of borehole completion material (cement, gravel, etc.) needed to fill the annular space between borehole and casing(s) or well screen.

10.10 Caliper logs may be applied to correlate lithology between boreholes based upon enlargements related to lithology.

11. Report

11.1 Consult the Report section, Guide D 5753 for requirements of the report.

11.2 Reports presenting caliper logs shall describe the components of the caliper logging system, the principles of the methods used, and their limits, methods and results of calibration and standardization, and performance verification (for example, diameter of surface casing, correlation with other logs, repeat sections, ASDE, etc.).

11.3 Information on the software and algorithms used should be included in the report.

11.4 Any deviations from this guide should be justified with documentation.

11.5 Presentation of caliper logs should be designed to meet project objectives. At a minimum, depth (y-axis) and units of measurement (x-axis) scales should be clearly marked (see Fig. 3). There may be a difference between presentations of data collected in the field versus in final report. Any scale "wraps" should be clearly marked.

11.5.1 Caliper logs are typically displayed with linear scales in inches, millimetres, or centimetres.

12. Keywords

12.1 borehole correction; borehole diameter; borehole geophysics; borehole volume; caliper log; ground water; single-arm caliper; three-arm caliper; well construction; well logging

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REFERENCES

(1) *Glossary of Terms and Expressions Used in Well Logging*, 2nd Ed., Society of Professional Well Log Analysts, Houston, TX, 1984.

(2) Keys, W. S., *Borehole Geophysics Applied To Ground-Water Investigations. Techniques of Water-Resources Investigations of the United States Geological Survey, Book 2*, Chapter E2, 1990.

(3) Hodges, R. E., Calibration and Standardization of Geophysical Well-Logging Equipment for Hydrologic Applications. *U.S. Geological Survey Water Resources Investigations Report 88-4058*, 1988.

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Designation: D 6274 – 98 (Reapproved 2004)

Standard Guide for Conducting Borehole Geophysical Logging - Gamma[1]

This standard is issued under the fixed designation D 6274; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This guide covers the general procedures necessary to conduct gamma, natural gamma, total count gamma, or gamma ray (hereafter referred to as gamma) logging of boreholes, wells, access tubes, caissons, or shafts (hereafter referred to as boreholes) as commonly applied to geologic, engineering, ground-water, and environmental (hereafter referred to as geotechnical) investigations. Spectral gamma and logging where gamma measurements are made in conjunction with a nuclear source are excluded (for example, neutron activation and gamma-gamma density logs). Gamma logging for minerals or petroleum applications are excluded.

1.2 This guide defines a gamma log as a record of gamma activity of the formation adjacent to a borehole with depth (See Fig. 1).

1.2.1 Gamma logs are commonly used to delineate lithology, correlate measurements made on different logging runs, and define stratigraphic correlation between boreholes (See Fig. 2).

1.3 This guide is restricted to gamma logging with nuclear counters consisting of scintillation detectors (crystals coupled with photomultiplier tubes), which are the most common gamma measurement devices used in geotechnical applications.

1.4 This guide provides an overview of gamma logging including general procedures, specific documentation, calibration and standardization, and log quality and interpretation.

1.5 To obtain additional information on gamma logs, see Section 13.

1.6 This guide is to be used in conjunction with Guide D 5753.

1.7 Gamma logs should be collected by an operator that is trained in geophysical logging procedures. Gamma logs should be interpreted by a professional experienced in log analysis.

1.8 The geotechnical industry uses English or SI units. The gamma log is typically recorded in units of counts per second (cps) or American Petroleum Institute (API) units.

1.9 *This guide does not purport to address all of the safety and liability problems (for example, lost or lodged probes and equipment decontamination) associated with its use.*

1.10 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

1.11 *This guide offers an organized collection of information or a series of options and does not recommend a specific course of action. This document cannot replace education or experience and should be used in conjunction with professional judgment. Not all aspects of this guide may be applicable in all circumstances. This ASTM standard is not intended to represent or replace the standard of care by which the adequacy of a given professional service must be judged, nor should this document be applied without consideration of a project's many unique aspects. The word "Standard" in the title of this document means only that the document has been approved through the ASTM consensus process.*

2. Referenced Documents

2.1 *ASTM Standards:* [2]

D 653 Terminology Relating to Soil, Rock and Contained Fluids

D 5088 Practice for Decontamination of Field Equipment Used at Nonradioactive Waste Sites

D 5608 Practice for Decontamination of Field Equipment Used at Low Level Radioactive Waste Sites

D 5753 Guide for Planning and Conducting Borehole Geophysical Logging

D 6167 Guide for Conducting Borehole Geophysical Logging: Mechanical Caliper

3. Terminology

3.1 *Definitions:*

3.1.1 Definitions shall be in accordance with Terminology D 653, Section 13, Ref **(1)**, or as defined below.

[1] This guide is under the jurisdiction of ASTM Committee D18 on Soil and Rock and is the direct responsibility of Subcommittee D18.01 on Surface and Subsurface Characterization.

Current edition approved July 1, 2004. Published August 2004. Originally approved in 1998. Last previous edition approved in 1998 as D 6274 - 98.

[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

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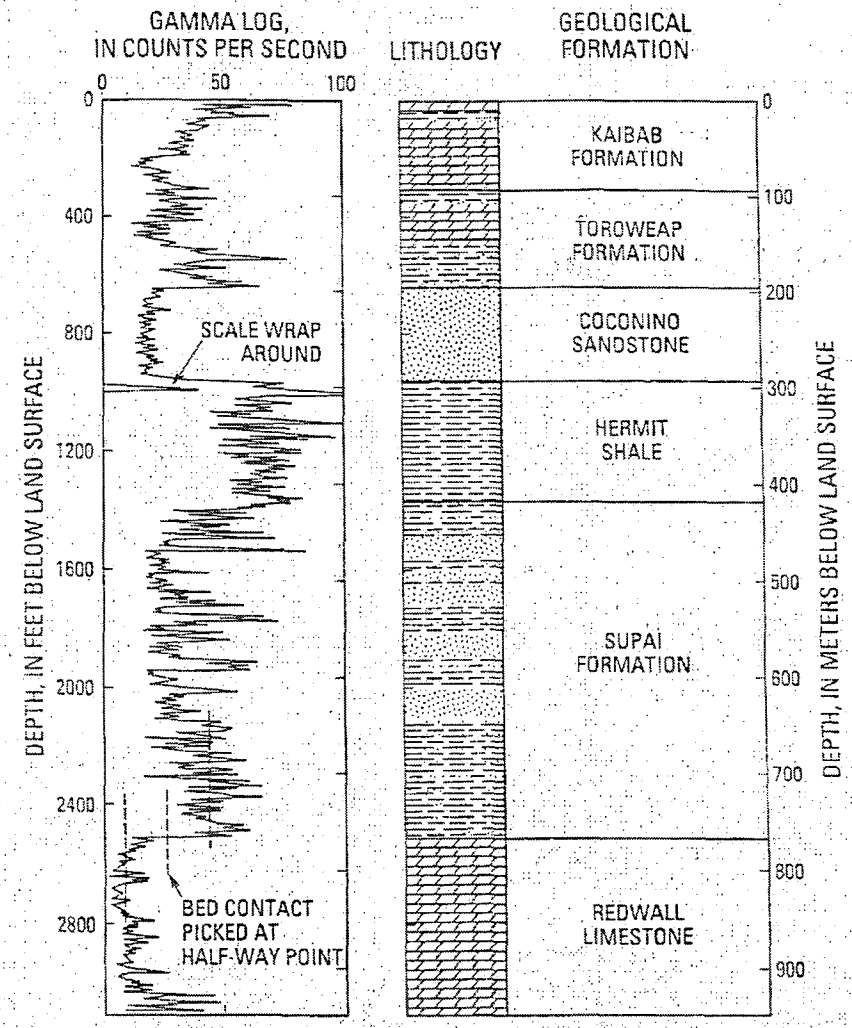

NOTE 1—This figure demonstrates how the log can be used to identify specific formations, illustrating scale wrap-around for a local gamma peak, and showing how the contact between two formations is picked to coincide with the half-way point of the transition between the gamma activities of the two formations.

FIG. 1 Example of a Gamma Log From Near the South Rim of the Grand Canyon

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *accuracy, n*—how close measured log values approach true value. It is determined in a controlled environment. A controlled environment represents a homogeneous sample volume with known properties.

3.2.2 *dead time, n*—the time after each pulse when a second pulse cannot be detected.

3.2.3 *dead time effect, n*—the inability to distinguish closely-spaced nuclear counts leads to a significant underestimation of gamma activity in high radiation environments and is known as the "dead time effect".

3.2.4 *depth of investigation, n*—the radial distance from the measurement point to a point where the predominant measured response may be considered centered, which is not to be confused with borehole depth (for example, distance) measured from the surface.

3.2.5 *measurement resolution, n*—the minimum change in measured value that can be detected.

3.2.6 *repeatability, n*—the difference in magnitude of two measurements with the same equipment and in the same environment.

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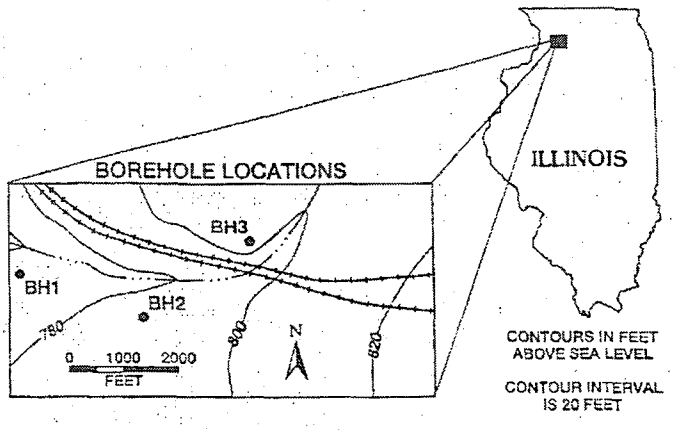

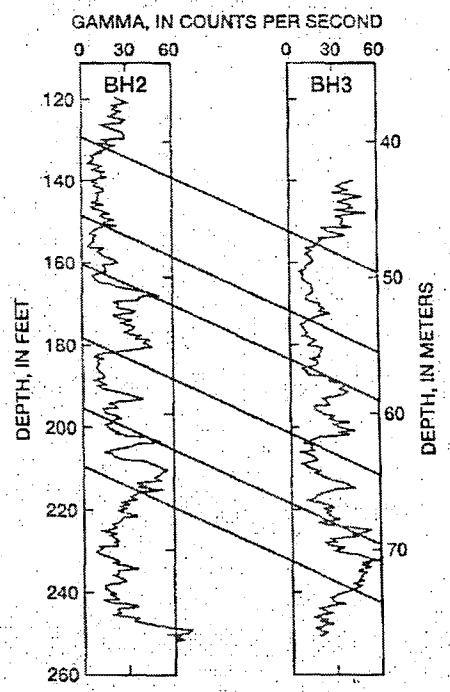

NOTE 1—From a study site showing how the gamma logs can be used to identify where beds intersect each of the individual boreholes, demonstrating lateral continuity of the subsurface geology.

FIG. 2 Example of Gamma Logs From Two Boreholes

3.2.7 *vertical resolution, n*—the minimum thickness that can be separated into distinct units.

3.2.8 *volume of investigation, n*—the volume that contributes 90 % of the measured response. It is determined by a combination of theoretical and empirical modeling. The volume of investigation is non-spherical and has gradational boundaries.

4. Summary of Guide

4.1 This guide applies to borehole gamma logging and is to be used in conjunction with Guide D 5753.

4.2 This guide briefly describes the significance and use, apparatus, calibration and standardization, procedures, and reports for conducting borehole gamma logging.

5. Significance and Use

5.1 An appropriately developed, documented, and executed guide is essential for the proper collection and application of gamma logs. This guide is to be used in conjunction with Guide D 5753.

5.2 The benefits of its use include improving selection of gamma logging methods and equipment, gamma log quality

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and reliability, and usefulness of the gamma log data for subsequent display and interpretation.

5.3 This guide applies to commonly used gamma logging methods for geotechnical applications.

5.4 It is essential that personnel (see the Personnel section of Guide D 5753) consult up-to-date textbooks and reports on the gamma technique, application, and interpretation methods.

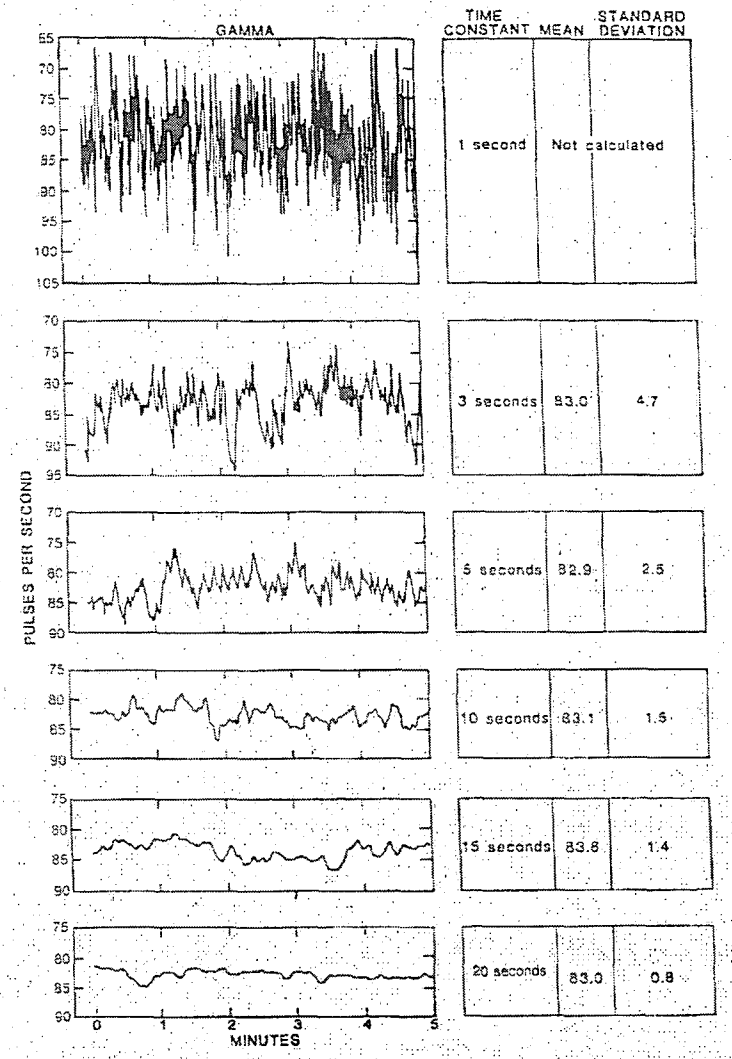
6. Interferences

6.1 Most extraneous effects on gamma logs are caused by logging too fast, instrument problems, borehole conditions, and geologic conditions.

6.2 Logging too fast can significantly degrade the quality of gamma logs. Gamma counts originating at a given depth need to be averaged over a time interval such that the natural statistical variation in the rate of gamma photon emission is negligible (see Fig. 3).

6.3 Instrument problems include electrical leakage of cable and grounding problems, degradation of detector efficiency attributed to loss of crystal transparency (fogging) or fractures or breaks in the crystal, and mechanical damage causing separation of crystal and photomultiplier tube.

6.4 Borehole conditions include changes in borehole diameter (especially in the fluid-filled portion); casing type and number; radioactive elements in drilling fluid in the borehole, or in cement or slurry behind casing; and steel casing or cement in the annulus around casing, and thickness of the annulus.



NOTE 1—The fluctuations in gamma activity in counts per second is shown to vary by progressively smaller amounts as the averaging period (time constant) is increased from 1 to 20 s.

FIG. 3 Example of Natural Statistical Fluctuation of Gamma Counts From a Test Source of Given Strength

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6.5 Geologic conditions include high levels of radiation which can degrade the efficiency of gamma counting through the dead time effect, energy level of emitted gammas, formation density, and lithologic bed geometry.

7. Apparatus

7.1 A geophysical logging system has been described in the general guide (the Apparatus section of Guide D 5753).

7.2 Gamma logs are collected with probes using scintillation detectors.

7.2.1 The most common gamma detectors are sodium iodide (NaI).

7.2.2 Other gamma detectors include cesium iodide (CsI) and bismuth germanate (BGO).

7.3 Gamma probes generate nuclear counts as pulses of voltage that are amplified and clipped to a uniform amplitude.

7.3.1 Gamma probes used for geotechnical applications typically can be logged inside of a 2-in. (5-cm) diameter monitoring well.

7.4 The volume of investigation and depth of investigation are determined by the density of the material near the probe, which controls the average distance a gamma photon can travel before being absorbed.

7.4.1 The volume of investigation for gamma logs is generally considered spherical with a radius of 0.5 to 1.0 ft (15 to 30 cm) from the center of the detector in typical geological formations. The volume becomes elongated when detector length exceeds approximately 0.5 ft (15 cm).

7.4.2 The depth of investigation for gamma logs is generally considered to be 0.5 to 1.0 ft (15 to 30 cm).

7.5 Vertical resolution of gamma logs is determined by the size of the volume from which gammas can reach a nuclear detector suspended in the borehole. In typical geological formations surrounding a fluid-filled borehole, this is a roughly spherical volume about 1 to 2 ft (30 to 60 cm) in diameter. Excessive logging speed can decrease vertical resolution.

7.6 Measurement resolution of gamma probes is determined by the counting efficiency of the nuclear detector being used in the probe. Typical measurement resolution is 1 cps.

7.7 A variety of gamma logging equipment is available for geotechnical investigations. It is not practical to list all of the sources of potentially acceptable equipment.

8. Calibration and Standardization of Gamma Logs

8.1 *General:*

8.1.1 National Institute of Standards and Technology (NIST) calibration and standardization procedures do not exist for gamma logging.

8.1.2 Gamma logs can be used in a qualitative (for example, comparative) or quantitative (for example, estimating radioisotope concentration) manner depending upon the project objectives.

8.1.3 Gamma calibration and standardization methods and frequency shall be sufficient to meet project objectives.

8.1.3.1 Calibration and standardization should be performed each time a gamma probe is suspected to be damaged, modified, repaired, and at periodic intervals.

8.2 Calibration is the process of establishing values for gamma response associated with specific levels of radioisotope concentration in the sampled volume and is accomplished with a representative physical model. Calibration data values related to the physical properties (for example, radioisotope concentration) may be recorded in units (for example, cps), that can be converted to units of radioactive element concentration (for example, ppm Radium-226 or percent Uranium-238 equivalents).

8.2.1 Calibration is performed by recording gamma log response in cps in boreholes centered within volumes containing known homogenous concentrations of radioactivity elements.

8.2.2 Calibration volumes should be designed to contain material as close as possible to that in the environment where the logs are to be obtained to allow for effects such as gamma energy level, formation density, and activity of daughter isotopes on the calibration process.

8.3 Standardization is the process of checking logging response to show evidence of repeatability and consistency, and to ensure that logging probes with different detector efficiencies measure the same amount of gamma activity in the same formation. The response in cps of every gamma detector is different for the same radioactive environment.

8.3.1 Calibration ensures standardization.

8.3.2 The American Petroleum Institute maintains a borehole in Houston, Texas, where two formations have been fabricated to provide homogeneous levels of gamma activity so that probes can be standardized on the basis of the response in these boreholes. 1 API gamma unit is 1/200th of the full scale response in the representative shale model in this borehole (see Guide D 5753).

8.3.3 For geotechnical applications, gamma logs should be presented in API units for standardization.

8.3.4 A representative borehole may be used to periodically check gamma probe response providing the borehole and surrounding environment does not change with time or their effects on gamma response can be documented.

8.3.5 A small radioactive source(s) (thorium-treated lantern mantles, small bottles of potassium chloride, laboratory radioactive test sources, or sleeves containing natural radioisotopes (phosphate sands, etc.)) placed over the gamma detector can be used to check calibration if the sources have been related to a calibration facility.

8.4 Gamma log output needs to be corrected for dead time when logging in formations with unusually large count rates, such as uranium-rich pegmatites or phosphatic sands, and areas contaminated with radioactive waste.

8.4.1 Dead time corrections are usually negligible under typical logging conditions when measured gamma counts are less than a few hundred counts per second.

8.4.2 Dead time corrections are estimated by comparing the gamma log response under the influence of two similar radioactive sources. The measured count rate would approximately double over that with one source when both sources are placed in the sample volume of the logging tool. The dead time causes the count rates to be slightly less than double. Dead time is given by the formula:

$$\text{Dead Time} = t_0 = 2(N_1 + N_2 - N_{12})/(N_{12}(N_1 + N_2)) \quad (1)$$

$$\text{Corrected count rate} = N^* = N/(1 - N\,t_0)$$

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where:

N_1, N_2 = the count rates measured using each of the two similar sources,

N_{12} = the count rate obtained using both of the similar sources in counts per second,

t_0 = the dead time correction in seconds,

N = the measured count rate in a formation in counts per second, and

N^* = the count rate after correction for the dead time effect.

t_0 is usually found to be a few microseconds for most gamma logging equipment.

9. Procedure

9.1 See the Procedure section of Guide D 5753 for planning a logging program, data formats, personnel qualifications, field documentation, and header documentation.

9.1.1 Document gamma specific information (for example, crystal size, type, and location).

9.2 Identify gamma logging objectives. Select appropriate equipment to meet objectives.

9.3 Gamma logs are commonly run with other logging measurements in combination probes for correlation purposes. This is most often done by equipping other classes of logging probes (electric, indication, neutron porosity, etc.) with gamma detectors (see Fig. 4).

9.3.1 Detector location on the probe needs to be appropriate to meet the project objectives. Long combination probe strings with the gamma detector located at a significant distance from the bottom of the probe may be inappropriate. Gamma detection position on the logging probe is especially important in shallow boreholes where over drilling the borehole is not possible.

9.3.2 Gamma probes are usually run free-hanging where the probe lies against one side of the borehole that is, as a mandrel. However, gamma detectors are sometimes included with combination probes that are run centralized or decentralized in the borehole. Gamma response may be somewhat different depending upon the method used (for example, free-hanging or centralized) in a given geologic environment.

9.3.3 Gamma equipment decontamination is addressed according to project specifications (see Practice D 5088 for non-radioactive waste sites and Practice D 5608 for low level radioactive waste sites).

9.4 Select when the gamma probe is to be run in the logging sequence (see 8.2.2.1 of Guide D 5753).

9.4.1 Gamma probes are run after or in combination with any television camera and fluid property probes to insure that there is minimum disturbance to the borehole fluid that can degrade those logs.

9.4.2 Gamma probes are run before any probe utilizing nuclear sources and more expensive centralized probes to ensure borehole stability possible.

9.4.3 Whenever possible, gamma probes should be run open hole or through the least amount of completion material to minimize well construction effects and to provide a base line for comparing subsequent logs.

9.5 Gamma probe operation is typically checked before the start of each run to insure that equipment is operating and that nuclear counters are producing output.

9.5.1 Gamma operation may be checked by placing a small radioactive source over the gamma detector. Common materials, such as thorium-treated lantern mantles, small bottles of potassium chloride, laboratory radioactive test sources, or sleeves containing natural radioisotopes (phosphatic sands, etc.), are frequently used.

9.6 Select and document the depth reference point.

9.6.1 The selected depth reference needs to be stable and accessible (for example, top of borehole casing).

9.7 Determine and document probe zero reference point (for example, top of probe or cablehead) and depth offset to gamma measurement point.

9.7.1 The measurement point of the gamma logging probe is the distance along the probe corresponding with the center of the crystal within the logging tool; this position is not visible unless the position is marked on the outside of the tool or the operator has information specifying that position with respect to a prominent reference point on the probe housing.

9.7.2 Position the probe zero reference point to the depth reference point (ground level, top of casing, etc.) and initialize depth recording/display systems.

9.8 Select horizontal and vertical scales for log display to meet project objectives.

9.8.1 Preferred horizontal scale divisions are multiples of two or five inches, such that the log value is easily determined on the plot (for example, 0 to 100, 0 to 200, 50 to 150, etc.).

9.8.2 Preferred vertical scales are multiples of two or five, such that depth can be easily determined on a log plot (for example, 1/5, 1/10...1/100, etc.).

9.9 Select digitizing interval (or sample rate if applicable) to meet project objectives (see 8.3.1.2 of Guide D 5753).

9.9.1 Digitizing interval needs to be at least as small as the vertical resolution of the gamma probe, that is typically about 1 ft (30 cm).

9.9.2 Typically, this interval is no larger than 0.5 ft (15 cm) to ensure that the optimum vertical resolution is achieved.

9.9.3 Even though field plots may be generated with smoothing, the rawest (non-filtered) form of the data should be recorded.

9.10 The gamma probe is lowered to the bottom of the borehole.

9.10.1 Gamma counts should be monitored as the probe is lowered because knowledge of the average count rates produced by the formation is important in determining proper logging speed. Gamma value range is also needed to determine proper horizontal scale and with some instrumentation, to determine sensitivity/gain settings.

9.10.2 Selection of probe speed while lowering is based on knowledge of borehole depth, stability, and other conditions; tension on the measuring wheel and smoothness of probe descent should be monitored to ensure that depth errors are not being introduced.

9.11 Select logging speed.

9.11.1 Logging speed should be determined by the application of the data acquired to meet project objectives.

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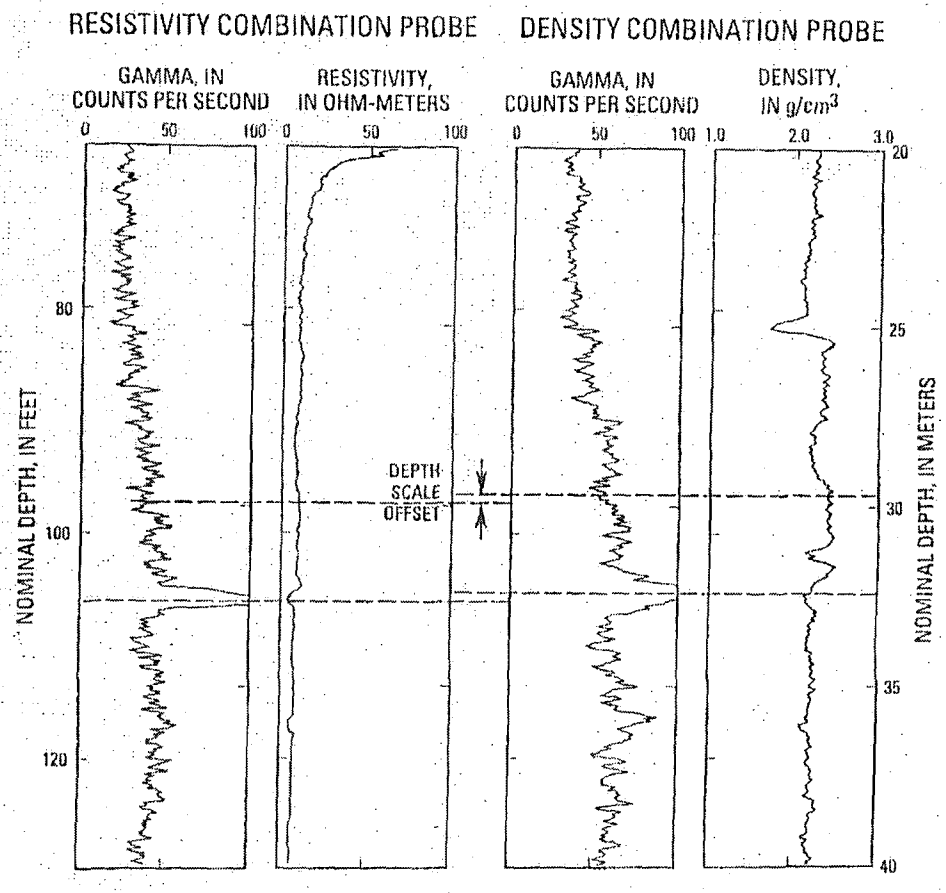

NOTE 1—This figure shows a small depth offset that should be removed by adjusting the depth scale on one of the logs; note that the average count rates for the two different gamma detectors differ as a result of different detector efficiencies.

FIG. 4 Example of Gamma Logs From Gamma Detectors in Two Different Logging Tools (Electrical Resistivity on Density)

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9.11.2 Typical gamma logging speed is approximately 20 ft/min (6 m/min), but slower speeds may be needed if formation gamma activity is low.

9.11.3 Proper logging speed is indicated by gamma logs that show distinct beds, which correlate with other information such as core descriptions or driller's logs, and where there is relatively little random fluctuation within beds (see Fig. 1).

9.11.4 If the operator is concerned about whether logging speed is affecting the quality of the gamma log, the operator should repeat a representative section of the log (representative of the geologic variation in the borehole) using the same speed; if the log reproduces interpreted bed boundaries that agree with other log and geologic data and the initial run, then the logging speed is adequate. If there are significant changes in the interpreted bed boundaries or if bed boundaries (lithologic contacts) are not indicated, the operator should try logging at a reduced speed.

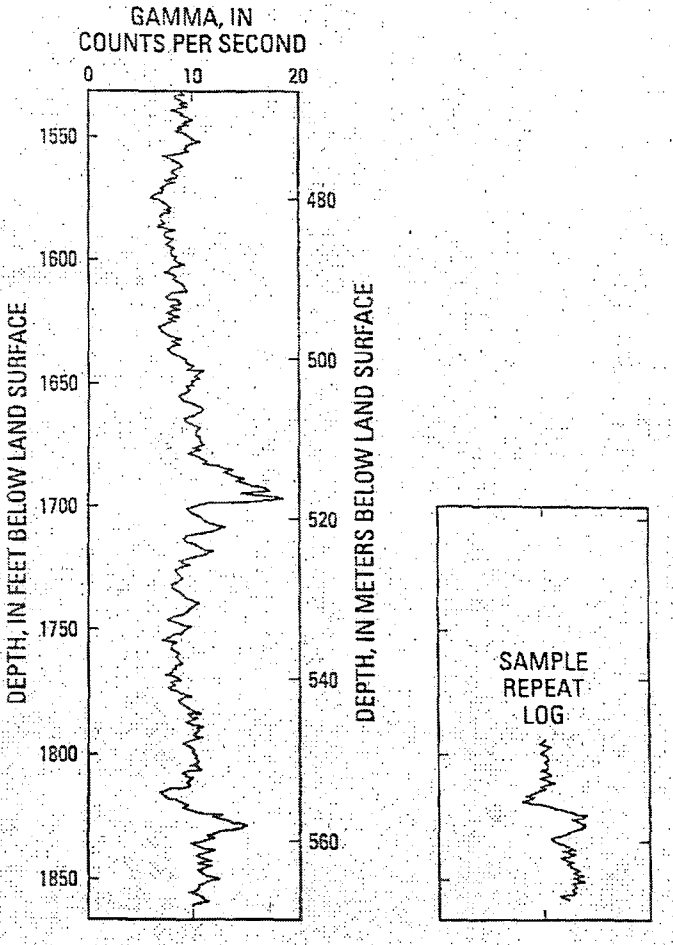
9.11.5 In situations where gamma activity is extremely low, such as in many basalts and some carbonate and quartzite formations, the operator can estimate the maximum logging speed from the formula:

$$S_f < 0.50G \quad \text{or} \quad S_m < 0.15G \qquad (2)$$

where:

S_f = the logging speed in feet per minute,
S_m = the logging speed in metres per minute, and
G = the average measured gamma activity of the interval or intervals of interest in counts per second.

This formula gives the logging speed required to ensure that the standard nuclear statistical error is less than about 5 %. In some situations, the available time and budget and the length of borehole to be logged may indicate that a trade-off be made between statistical errors and log resolution; an effective trade-off for a given situation can be made by experimenting



NOTE 1—In this figure, experimentation with logging speed demonstrates that a 10 ft (m) per minute logging speed generates useful and repeatable gamma logs with statistical errors somewhat greater than 5 %, but where beds can be effectively detected.

FIG. 5 Example of a Gamma Log From a Basalt Formation of Very Low Gamma Activity

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with repeat logging runs over representative intervals containing bed contacts (see Fig. 5).

9.12 Collect gamma log data while the probe is moving up the borehole; data collection while logging upward ensures that the probe is retrieved smoothly and continuously.

9.12.1 In unstable boreholes, it is sometimes advantageous to collect data both while probe is being lowered and being pulled up the borehole.

9.13 When the probe reaches the top of the borehole:

9.13.1 Check depth reference and document after survey depth error (ASDE).

9.13.2 Determine if ASDE meets project objectives.

9.13.3 Typical tolerance for ASDE is ±0.4 per 100-ft interval logged (±0.4 m per 100-m).

9.13.4 Typical depth tolerance for repeat logs is within 0.4 %.

9.14 Selected borehole intervals should be repeated (that is, relogged) under similar logging parameters as the initial log. Repeat logs verify that the gamma electronics are functioning correctly, and that the logging speed (effect of nuclear statistical fluctuations) is adequate for project objectives. The interval repeated should have enough variability, if possible, to check repeatability and resolution; also note that nuclear statistical noise is most likely to affect intervals with relatively low gamma count rates.

9.14.1 Repeat logs should be compared with the original log to ensure correct operation of the probe prior to ending a logging event.

9.14.2 Repeat sections may not repeat exactly because of the statistical nature of nuclear activity that introduces some random fluctuation into the measured count rate. Individual log values should typically repeat within one standard deviation, and the character and shape of the logs should be similar. Note that the importance of high count rates to reduce the statistical variations between log runs.

9.14.3 Repeat sections may not repeat exactly due to a different orientation of the logging probe on the repeat run or changes in the borehole between logging runs (see Section 6, Interferences).

9.15 Evaluate the quality of field logs and compare logs with drilling and completion information.

9.16 Gamma logs are usually smoothed by filtering (in hardware or software) with an N-point averaging window (for example, running average, weighted average, etc.) to minimize the effects of statistical variation caused by radioactive decay. The window width:

$$(N-1)\Delta z \tag{3}$$

where:

N = the number of points, and

Δz = the digitizing interval, which should correspond with the vertical resolution, which is typically about 1 ft (30 cm) in most geological formations.

9.16.1 Larger filters are frequently applied to gamma logs for presentation purposes (compression of the vertical scale); however, this filtering generally results in loss of some log information.

9.16.2 The rawest form of the gamma data and the filtered data should be saved.

9.17 Post-acquisitions calibration checks may be required to meet the objectives of the logging program to verify gamma log standardization and dead time correction.

10. Interpretation of Results

10.1 See the Log Interpretation section of Guide D 5753 for procedures on log interpretation.

10.2 A valid gamma log is important to establish the distribution of lithology and bedding within a borehole for correlation purposes, for different logs run in the same borehole (see Fig. 4), and for the extrapolation of results between boreholes (see Fig. 2).

10.2.1 Except at sites contaminated by radioactive waste, the measured gamma photons originate from the radioactive decay of naturally-occurring isotopes of Potassium-40 and daughter products of Uranium-238 and Thorium-232 (see Fig. 6).

10.2.2 Gamma logs can be analyzed individually (that is, borehole lithology).

10.2.3 Gamma logs can be analyzed as part of a suite to take advantage of the synergistic nature of log data.

10.3 The gamma log should be depth correlated with the other geophysical logs as the first step to interpretation. This is especially important for logs that use the gamma data for depth adjustment.

10.3.1 The gamma log data may be filtered, edited, combined, and merged with other log values.

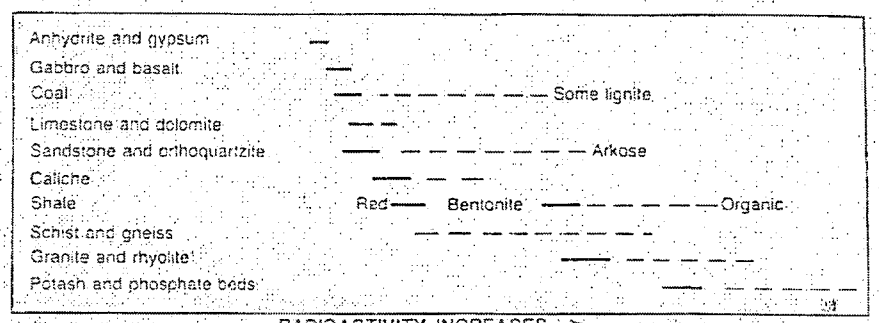

FIG. 6 Range of Relative Gamma Activity of Common Rocks

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10.3.2 Final log headers are filled out and attached to the data.

10.3.3 The gamma log may be plotted at different scales for the purpose of interpreting, summarizing, and presenting the final data.

10.4 Other pertinent information, including borehole construction (casing size), drilling history (hole size, drill method, penetration rate, core loss, fluid loss, etc.), and geologic information should be integrated with the gamma log data.

10.4.1 Many of the borehole effects on the gamma log, such as correction for attenuation of steel casing and borehole fluid, can be normalized with empirical data to facilitate interpretation. This is especially important in comparing gamma logs from boreholes logged with different completion designs.

10.4.2 It is also possible to normalize the gamma log for well construction if it is possible to log a similar borehole prior to completion and again after a similar scheme.

10.5 Gamma logs commonly are the primary indicator of geologic structure and stratigraphy to be used as a guide in installing well screens, positioning cement plugs, bentonite seals or packers, etc.

10.5.1 When gamma logs are used as indicators of bed boundaries, the bed contact is usually identified as the point where the log measures half of the total change in amplitude across the bed contact (see Fig. 5).

10.6 Gamma logs obtained for depth correlation on logging runs using different probes may not produce the same count rates at each depth because of differences in detector efficiencies and probe designs.

10.7 Gamma logs may be applied to correlate lithology between boreholes based upon the characteristic gamma activity of specific beds or formations (See Fig. 6). Gamma logs can be used to determine the continuity of lithology, strike, and dip of beds between boreholes, and to infer the existence of faults and other discontinuities.

10.8 The primary application of gamma logs for geotechnical applications assumes a correlation between gamma activity and the proportion of fine-grained material in the formation. The gamma log may be used to calculate a clay volume or percentage. This assumption is frequently not valid (for example, phosphatic sands, arkosic sands, non-sedimentary environments, areas of natural radioactive mineralization, etc.) and should be tested in the project area. This testing may consist of cross plots, principal component analysis, and other multivariate statistical techniques. The application of gamma log analysis in the estimation of clay fraction may also be complicated by the presence of more than one clay type, each of which has a distinctly different level of gamma activity.

10.9 Gamma logs can be used to detect the presence of radioisotopes in borehole tracer studies, calibrated in units of radioisotope concentration to assess the degree of radioisotope contamination at radioactive waste sites, and used to locate source rocks in natural radium and radon hazard assessment studies.

11. Report

11.1 The Report section of Guide D 5753 should be consulted for requirements of the report.

11.2 Providers of gamma logs shall describe the components of the gamma logging system, the principles of the methods used, methods and results of calibration and standardization, performance verification (repeat sections, ASDE, correlation with other logs and key features such as bottom of steel casing, etc.), and uniqueness of interpretation.

11.3 Information on the software and algorithms used should be documented.

11.4 Any deviations from this guide should be documented.

11.5 Presentation of gamma logs should be designed to meet project objectives. At a minimum, depth (y-axis) and units of measurement (x-axis) scales should be clearly marked. There may be a difference between presentations of data collected in the field versus in the final report. Any scale "wraps" should be clearly marked (see Fig. 1).

11.5.1 Gamma logs are typically displayed with linear scales in counts per second or API units (see Fig. 1).

11.5.2 The digital data should be provided in ASCII format and include depth referenced gamma values and all pertinent header and calibration information; for example, Log ASCII Standard format (LAS).

11.5.3 Field plots typically are generated at the time of logging or immediately upon completion of data acquisition. These plots may be delivered in the field or may be discarded at some point later in the project. They are not typically included in the report.

11.5.4 Final log plots are typically generated post acquisition. They consist of the filtered and edited gamma data combined and merged with logical combinations of other log data. Final log plots are typically plotted in an industry standard format such as API format and may be included in the report.

11.5.5 Summary log plots may be generated (typically at reduced scales) to incorporate other logs, relevant data, and interpretations. These plots are generally included in the report.

12. Keywords

12.1 borehole geophysics; dead time correction; gamma log; natural gamma log; nuclear statistics; radioisotope; well construction; well logging

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REFERENCES

(1) *Glossary of Terms and Expressions Used in Well Logging*, 2nd Ed., Society of Professional Well Log Analysts, Houston, TX, 1984.
(2) Bateman, R. M., *Log Quality Control*, IHRDC Boston, MA, 1985.
(3) Doveton, J. H., *Log Analysis of Subsurface Geology-Concepts and Computer Methods*, John Wiley and Sons, Inc., New York, NY, 1986.
(4) Hallenberg, J. K., *Geophysical Logging for Mineral and Engineering Applications*, Penn Well Books.
(5) Hearst, J. R., and Nelson, P. H., *Well Logging for Physical Properties*, McGraw-Hill Book Co., 1985.
(6) Hilchie, D. W., "Caliper Logging-Theory and Practice," *The Log Analyst*, Vol 9, No. 1, 1968, pp. 3–12.
(7) Hilchie, D. W., *Applied Open Hole Log Interpretation for Geologists and Engineers*, Douglas W. Hilchie Inc., 1978.
(8) Keys, W. S., *Borehole Geophysics Applied To Ground-Water Investigations, Techniques of Water-Resources Investigations of the United States Geological Survey*, Book 2, Chapter E2, 1990.
(9) Pirson, S. J., *Handbook of Well Log Analysis*, Prentice Hall, Englewood Cliffs, NJ, 1963.
(10) Prensky, S. E., "Geological Applications of Well Logs-An Introductory bibliography and Survey of Well Logging Literature Through September 1986, Arranged by Subject and First Author," *The Log Analyst*, Parts A and B, Vol. 28, No. 1, 1987, pp. 71–107; Part C, Vol. 28, No. 2, 1987, pp. 219–248.
(11) Prensky, S. E., "Geological Applications of Well Logs-An Introductory Bibliography and Survey of Well Logging Literature: Annual Update, October 1986 through September 1987, *The Log Analyst*, Vol 28, No. 6, 1987, pp. 558–575. Bibliographic update for October 1987 through September 1988, *The Log Analyst*, Vol 29, No. 6, 1988, pp. 426–443.
(12) Prensky, S. E., "Bibliography of Well Log Applications," October 1988-September 1989, pp. 448–470, October 1989-September 1990, annual update: *The Log Analyst*, Vol 31, No. 6, 1990, pp. 395–424.
(13) Theys, P., *Log Data Acquisition and Quality Control*, Editions Technip, distributed in U.S. by Gulf Publishing Co., Houston, Texas, 1991.
(14) Wahl, J. S., "Gamma-Ray Logging," *Geophysics*, Vol 48, No. 11, 1983, pp. 1536–1550.
(15) Hodges, R. E., "Calibration and Standardization of Geological Well-Logging Equipment for Hydrologic Applications," *U.S. Geological Survey Water Resources Investigation Report 88-4058*, 1988.

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Final Report

Appendix E-2

Field Electrical Resistivity Test Results

GEOVision
geophysical services

February 23, 2007

GEOVision Project Number 6355

Mr. Michael D. Sufnarski
MACTEC Engineering and Consulting
2801 Yorkmont Road, Ste 100
Charlotte, NC 28208

Subject: **Four Electrode Wenner Resistivity Tests**
South Texas Project Energy Generating Station
South Texas COL Project – MACTEC JOB NUMBER 5050-06-0496

Dear Mr. Sufnarksi:

A geophysical survey was conducted January 3, 2007 at the South Texas Project Energy Generating Station near Bay City, Texas. The purpose of the geophysical survey was to measure soil resistivity according to ASTM standard G57-2006. Site conditions consisted of soft clayey soils with heavy (locations ER-901 and ER-902) or minor (locations ER-401 and ER-301) vegetation

METHODOLOGY

Resistivity equipment used during this investigation included a MiniRes HP earth resistivity meter coupled to 1/4- inch stainless steel electrode stakes with 20 gauge insulated copper wire. A test resistor rated at 19.935 ohms (at 72 degrees Fahrenheit) was used to verify the MiniRes HP was operating within calibrated levels. The MiniRes HP operates at two selectable power levels: "Low Power" with a 1 mA output current and 730 V peak to peak, and "High Power" with an output current of 10 mA and 530 V peak to peak. Typically, the "High Power" setting is only used in resistive environments or for very long arrays where soil conditions limit transmission of current through the subsurface. The "High Power" setting increases output current; however with a corresponding decrease in sensitivity to very low measured resistance values.

FIELD PROCEDURES

Before conducting the geophysical survey the battery level was checked on the resistivity meter and found to be within acceptable limits. Ambient temperature and soil conditions were recorded on the field log. Electrode spacing was pre-determined based on information provided by the client.

A test resistor rated at 19.935 ohms was connected to the positive and negative current and potential leads on the MiniRes HP immediately before the first sounding and immediately after the final sounding, at each of the survey locations. The resistance value across the test resistor and the time of the test measurement was recorded on the field log.

Resistivity measurements (soundings) were made at four locations (ER-901, ER-902, ER-401 AND ER-301) at the selected intervals using a surveyor's measuring tape for spatial control. See Attachment A of the MACTEC Geotechnical Data Report for surveyed locations of the four field resistivity test locations.

Resistivity measurements at ten electrode spacings were made on each line. For each resistivity meaurement, four stainless steel electrodes were placed at equal distances (*a* spacing) in a straight line. A current was applied from the outer electrodes, and a potential reading (voltage) was measured across the inner electrodes. The MiniRes HP displays the resistance value, which was recorded along with the *a* spacing on a field data sheet and later transferred to a spreadsheet. Two or more measurements were recorded at each station for quality control. If there was significant variation between the first and second measurements the control leads, electrode cable and electrode coupling were field checked to ensure proper survey conditions. After each measurement, the electrodes were moved to the next *a* spacing and another set of measurements was taken. Due to conductive soil conditions, the instrument was operated at the lower power setting. Measurements were also taken at the higher output power setting, but conductive soil conditions limited the usefulness of data recorded at that power setting. Measurements labeled "NA" on the attached Tables 1-4 indicate readings recorded with the instrument at "High Power", outside the sensitivity range for that power setting.

DATA REDUCTION

Six spreadsheets were generated from the collected resistivity data. Probe spacing (*a*) and resistance reading (ΔV/I), were entered for each resistivity measurement. A generalized form of the four-electrode array is shown in Figure 1.

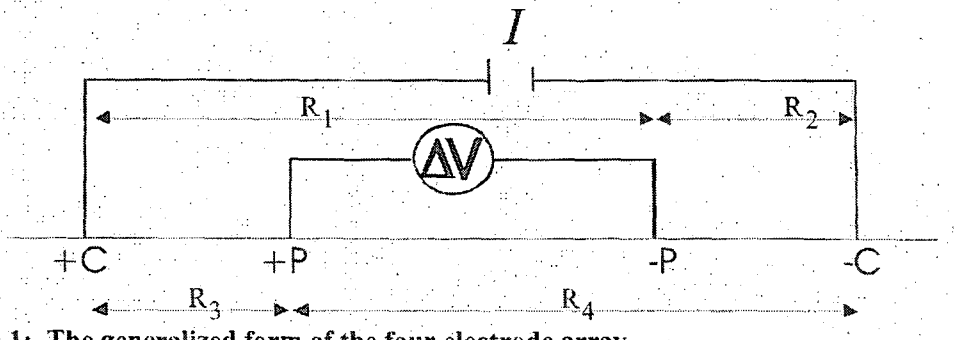

Figure 1: The generalized form of the four electrode array

When the material upon which the current is induced is uniform, the resistivity calculated will be constant independent of electrode configuration. However, in a field investigation where subsurface heterogeneities exist, the calculated resistivity values will vary with electrode array. This calculated resistivity is referred to as apparent resistivity (ρ_a), and can be calculated using the relationship:

$$\rho_a = \frac{2\pi\Delta V}{I\left\{\left(\frac{1}{R_3}-\frac{1}{R_4}\right)-\left(\frac{1}{R_1}-\frac{1}{R_2}\right)\right\}}$$

For the Wenner array, which was used during this investigation, where $R_1 = R_4$; $R_3 = R_2$ and $R_1 = 2R_2 = 2a$, it can be shown that the formula for calculated apparent resistivity can be reduced to the following form:

$$\rho_a = 2\pi a\left(\frac{\Delta V}{I}\right)$$

RESULTS

Data collected from the four Wenner resistivity arrays are attached as Tables 1-4. Electrode *a* spacing was converted to meters in order to provide an average soil resistivity in ohm-meters. According to ASTM Standard G57-2006, data is also presented in the ohm-centimeter unit. Measurements labeled "NA" on the attached Tables 1-4 indicate readings recorded with the instrument at "High Power", outside the sensitivity range for that power setting.

All completed data processing forms are retained in project files. All files generated during the processing sequence were archived on CD-ROM.

SUMMARY

Four-electrode soil resistivity measurements were made at the South Texas Project Energy Generating Station according to ASTM standard G57-2006. Soil and rock resistivity values were made at four locations, using electrode spacings determined by the client. Field measurements and calculated values were consistent and repeatable at all locations, as summarized in Tables 1-4.

If you have any questions concerning this investigation, please call us at 951-549-1234.

Sincerely,
GEO*Vision* Geophysical Services

JB Shawver

Antony J Martin

Submitted by:
JB Shawver
Senior Project Geophysicist

Reviewed and Approved by:
Antony J. Martin
Technical Director

Attachments:

Table 1: Resistivity Soundings ER-901
Table 2: Resistivity Soundings ER-902
Table 3: Resistivity Soundings ER-401
Table 4: Resistivity Soundings ER-301
Applied Technical Services, Incorporated Certificate of Calibration
Applied Technical Services, Incorporated Calibration Data Sheet

TABLE 1 ELECTRICAL RESISTIVITY SOUNDING ER-901

Job Number 6533 Date 3-Jan-07

19.935 ohm Test Resistor Reading

19.95 ohm at 1010 19.931 ohm at 1120

A-Spacing [ft.]	Resistance Reading [Ohm]	Geometric Multiplier [2(pi)A]	Calculated Magnitude [Ohm-ft.]	Converted Magnitude [Ohm-m]	Calculated to Ohm-cm [Ohm-cm]	Repeat Resistance [Ohm]	Repeat Magnitude [Ohm-ft.]	Repeat Conversion [Ohm-m]	Repeat Calculation to Ohm-cm [Ohm-cm]
3.0	1.340	18.850	25.258	7.699	769.876	1.300	24.504	7.469	746.9
5.0	0.671	31.416	21.080	6.425	642.521	0.700	21.991	6.703	670.3
7.5	0.364	47.124	17.153	5.228	522.826	0.400	18.850	5.745	574.5
10.0	0.259	62.832	16.273	4.960	496.015	0.300	18.850	5.745	574.5
15.0	0.177	94.248	16.682	5.085	508.463	0.200	18.850	5.745	574.5
30.0	0.130	188.496	24.504	7.469	746.895	0.100	18.850	5.745	574.5
50.0	0.098	314.159	30.788	9.384	938.406	0.100	31.416	9.576	957.6
100.0	0.060	628.319	37.699	11.491	1149.069	0.100	62.832	19.151	1915.1
200.0	0.034	1256.637	42.726	13.023	1302.278	NA	NA	NA	NA
300.0	0.023	1884.956	43.354	13.214	1321.429	NA	NA	NA	NA

TABLE 2 ELECTRICAL RESISTIVITY SOUNDING ER-902

Job Number 6355 Date 3-Jan-07

19.935 ohm Test Resistor Reading

19.930 ohm at 1240 19.931 ohm at 1316

A-Spacing [ft.]	Resistance Reading [Ohm]	Geometric Multiplier [2(pi)A]	Calculated Magnitude [Ohm-ft.]	Converted Magnitude [Ohm-m]	Calculated to Ohm-cm [Ohm-cm]	Repeat Resistance [Ohm]	Repeat Magnitude [Ohm-ft.]	Repeat Conversion [Ohm-m]	Repeat Calculation to Ohm-cm [Ohm-cm]
3.0	1.130	18.850	21.300	6.492	649.224	1.100	20.735	6.320	632.0
5.0	0.616	31.416	19.352	5.899	589.855	0.600	18.850	5.745	574.5
7.5	0.339	47.124	15.975	4.869	486.918	0.300	14.137	4.309	430.9
10.0	0.258	62.832	16.211	4.941	494.100	0.300	18.850	5.745	574.5
15.0	0.178	94.248	16.776	5.113	511.336	0.200	18.850	5.745	574.5
30.0	0.128	188.496	24.127	7.354	735.404	0.100	18.850	5.745	574.5
50.0	0.096	314.159	30.159	9.193	919.255	0.100	31.416	9.576	957.6
100.0	0.055	628.319	34.558	10.533	1053.313	0.100	62.832	19.151	1915.1
200.0	0.033	1256.637	41.469	12.640	1263.976	NA	NA	NA	NA
300.0	0.022	1884.956	41.469	12.640	1263.976	NA	NA	NA	NA

TABLE 3 ELECTRICAL RESISTIVITY SOUNDING ER-401

Job Number 6533 Date 3-Jan-07

19.935 ohm Test Resistor Reading

19.930 ohm at 1444 19.930 ohm at 1521

A-Spacing [ft.]	Resistance Reading [Ohm]	Geometric Multiplier [2(pi)A]	Calculated Magnitude [Ohm-ft.]	Converted Magnitude [Ohm-m]	Calculated to Ohm-cm [Ohm-cm]	Repeat Resistance [Ohm]	Repeat Magnitude [Ohm-ft.]	Repeat Conversion [Ohm-m]	Repeat Calculation to Ohm-cm [Ohm-cm]
3.0	1.222	18.850	23.034	7.021	702.081	1.200	22.619	6.894	689.4
5.0	0.688	31.416	21.614	6.588	658.800	0.700	21.991	6.703	670.3
7.5	0.423	47.124	19.933	6.076	607.570	0.400	18.850	5.745	574.5
10.0	0.315	62.832	19.792	6.033	603.261	0.300	18.850	5.745	574.5
15.0	0.215	94.248	20.263	6.176	617.625	0.200	18.850	5.745	574.5
30.0	0.137	188.496	25.824	7.871	787.112	0.100	18.850	5.745	574.5
50.0	0.101	314.159	31.730	9.671	967.133	0.100	31.416	9.576	957.6
100.0	0.061	628.319	38.327	11.682	1168.220	0.100	62.832	19.151	1915.1
200.0	0.032	1256.637	40.212	12.257	1225.674	NA	NA	NA	NA
300.0	0.023	1884.956	43.354	13.214	1321.429	NA	NA	NA	NA

TABLE 4 ELECTRICAL RESISTIVITY SOUNDING ER-301

Job Number 6533 Date 3-Jan-07

19.935 ohm Test Resistor Reading

19.93 ohm at 1554 19.93 ohm at 1630

A-Spacing [ft.]	Resistance Reading [Ohm]	Geometric Multiplier [2(pi)A]	Calculated Magnitude [Ohm-ft.]	Converted Magnitude [Ohm-m]	Calculated to Ohm-cm [Ohm-cm]	Repeat Resistance [Ohm]	Repeat Magnitude [Ohm-ft.]	Repeat Conversion [Ohm-m]	Repeat Calculation to Ohm-cm [Ohm-cm]
3.0	2.011	18.850	37.906	11.554	1155.389	2.000	37.699	11.491	1149.1
5.0	1.135	31.416	35.657	10.868	1086.828	1.100	34.558	10.533	1053.3
7.5	0.708	47.124	33.364	10.169	1016.926	0.700	32.987	10.054	1005.4
10.0	0.269	62.832	16.902	5.152	515.166	0.300	18.850	5.745	574.5
15.0	0.178	94.248	16.776	5.113	511.336	0.200	18.850	5.745	574.5
30.0	0.141	188.496	26.578	8.101	810.094	0.100	18.850	5.745	574.5
50.0	0.110	314.159	34.558	10.533	1053.313	0.100	31.416	9.576	957.6
100.0	0.062	628.319	38.956	11.874	1187.371	0.100	62.832	19.151	1915.1
200.0	0.035	1256.637	43.982	13.406	1340.580	NA	NA	NA	NA
300.0	0.024	1884.956	45.239	13.789	1378.883	NA	NA	NA	NA

APPLIED TECHNICAL SERVICES, INCORPORATED
1280 Field Parkway, Marietta, GA 30066 (770) 514-3288

CERTIFICATE OF CALIBRATION

ATS Reference No.: M502064-1 **Date:** October 24, 2006 Page 1 of 2

Purchase Order: 66252

MACTEC Engr. & Consult.
396 Plasters Avenue, N.E.
Atlanta, GA 30324

Test Instrument: Low Resistivity Meter **Manufacturer:** LRI

Model No: Unknown **Asset No.:** 107 **Serial No:** 107

Status When Received: *IN TOLERANCE* **Location:** In-Lab

Calibration Environmental Conditions: Temperature: 70 °F **Relative Humidity:** 40 %

Date of Calibration: July 10, 2006 **Calibration Due:** July 10, 2007

This certificate attests that the calibration was performed in compliance with ANSI/NCSL Z540-1 and ISO/IEC 17025 and is traceable to the National Institute of Standards and Technology. Applied Technical Services, Inc., certifies that the above named instrument has been calibrated by comparison standards traceable to the National Institute of Standards and Technology through the following test numbers and is certified and returned within required tolerance/accuracy.

Master Shunt Box **Due:** February 25, 2007 **Trace:** 02014

Calibrated by: John O'toole
Senior Calibration Technician

ISO 9001

ATS 500, 6-03

This certificate shall not be reproduced, except in full, without written approval of Applied Technical Services, Inc.

ACCREDITED
CERT. # 1888-03

APPLIED TECHNICAL SERVICES, INCORPORATED
1280 Field Parkway, Marietta, Georgia 30066 • (770) 514-3288 Fax (678) 819-1055

CALIBRATION DATA SHEET

Page 2 of 2

Customer: MACTEC Engr. & Consult., Atlanta
Purchase Order No.: 66252
Item Name: Low Resistivity Meter
Asset No.: 107
ATS Reference No.: M502064-1
Manufacturer: LRI
Model No.: Unknown
Proc. No.: 1032
Rev.: 1
Serial No.: 107
Calibration Date: 07-10-06
Calibration Due Date: 07-10-07

Reason For Service: ☒ Initial Calibration ☐ Due For Calibration ☐ Repair and Calibration

Equipment Used: ATS-02014 Due: 02-25-07 Guildline Master Shunt Box
Due:
Due:
Due:
Due:
Due:

Calibrated By: *John O'Toole*

Customer Instrument Under Test

UNCERTAINTY (SEE NOTE)	RANGE	ATS STANDARD	TOLERANCE	AS FOUND READING	AS CALIBRATED READING
± .01	Auto	1.000	.92 to 1.08	1.0	1.0
± .01	Auto	10.000	9.65 to 10.35	10.0	10.0
± .01	Auto	100.000	96.95 to 103.05	100.1	100.1
± .01	Auto	1000.000	965 to 1035	1000.1	1000.1
± .01	Cal resistor	19 Ohms	As Found data only	19.939	19.939

* Indicates out of tolerance readings.

Remarks: Measurement Uncertainty reported at coverage factor K = 2 or 95% confidence level.

LABORATORY TESTING - GEOTECHNICAL

Laboratory testing was performed on disturbed and undisturbed samples during the subsurface investigation. All testing was performed in accordance with ASTM standards or other standards where applicable. Selection of the samples to be tested and the tests to be performed on the samples were done by Bechtel. Bechtel submitted Geotechnical Laboratory Test Assignment Sheets dated November 16, December 7, 14, 19, 20, and 28, 2006, and January 2, 7, and 8, 2007. Revised Geotechnical Laboratory Test Assignment Sheets dated December 18 and 21, 2006, and January 8, 2007 were also submitted.

The laboratory personnel determined that some of the assigned tests on soil samples could not be performed because of insufficient sample volume.

Testing of soil samples, except for chemical tests, distribution coefficient (K_d), and Resonant Column Torsional shear (RCTS) testing, was performed in MACTEC's laboratories in Charlotte, North Carolina, Phoenix, Arizona, and Atlanta, Georgia.

Chemical testing for pH, sulfates and chlorides on selected soil samples as assigned by Bechtel was done by Severn Trent Laboratories, Inc. (STL), a subcontractor to MACTEC.

The distribution coefficient, K_d, will be conducted by the Savannah River National Laboratory, located at the Savannah River Site of the DOE in Aiken, South Carolina and operated by the Washington Savannah River Company. The Washington Savannah River Company LLC, under a Work for Others Agreement with MACTEC, will perform the Kd tests. These test results are not available at the time of this submittal. The K_d test results will be submitted as Attachment H at a later date.

Resonant Column Torsional Shear (RCTS) testing of soil samples as assigned by Bechtel is in progress by the Fugro Consultants laboratory in Houston, Texas, a subcontractor to MACTEC, under the technical overview of Dr. K.H. Stokoe of the University of Texas. The RCTS test results are not available at the time of this submittal. The RCTS test results, as well as the classification test results on the samples will be submitted as Attachment I at a later date.

Excluding the Kd and RCTS tests, the following tests were performed, and the results are presented in this Attachment F:

1.1 IDENTIFICATION TESTS

- Moisture content - ASTM D 2216-05
- Unit weight of soil - ASTM D 5084-03
- Specific gravity of soil - ASTM D 854-06
- Sieve and hydrometer analysis - ASTM D 422-63 (2002)e1 and ASTM D 6913-04e1
- Atterberg limits - ASTM D 4318-05
- Chemical analysis (pH, Chloride, Sulfate) - EPA 846 9045/9056-300.00/8056-300.00 and EPA SW-846 9045

1.2 COMPRESSIBILITY TEST

- Consolidation Tests; one dimensional - ASTM D 2435-04 Method B

1.3 COMPACTION AND STRENGTH TESTS

- Moisture density - ASTM D 1557-02e1
- Unconsolidated; undrained triaxial compression - ASTM D 2850-03a
- Consolidated; undrained triaxial compression- ASTM D 4767-04
- Direct shear; soil - ASTM D 3080-04
- Unconfined Compression - ASTM D-2166-00e1
- California Bearing Ratio - ASTM D 1883-05

1.4 REPORTING

Except for the Kd and RCTS tests, the laboratory test reports, consisting of individual test data and results sheets as required by the testing standard, are contained in this Attachment F. A summary of the test results on can be found in Table F-1 of this attachment.

1.5 QUALITY ASSURANCE

Quality related activities performed by MACTEC and it's subcontractors during the work herein presented were in accordance with the MACTEC Quality Assurance Manual and the MACTEC Quality Assurance Project Document. The MACTEC QA program complies with NQA-1 Subpart 2.2 and the requirements of 10CFR50 Appendix B.

1.6 DESCRIPTIONS

A brief description of the tests performed and reported in this Attachment F is as follows:

Moisture Content - ASTM D 2216-05

A test specimen is dried in an oven at a temperature according to the ASTM standard to a constant weight. The loss of weight due to drying is considered to be water. The water content is calculated by dividing the weight of water by the weight of the dry specimen. The water content is expressed as a percentage value.

Unit Weight of Soil - ASTM D 5084-03 (Sections 5.7 – 5.9. 8.1, 11.3.2)

Sections of the undisturbed samples were extruded from the sampling tubes and trimmed to remove any surface irregularities. Dimensions of the sample were measured and recorded and the weight was determined. Unit weight was calculated by dividing the sample weight by volume. If the moisture content is known, dry unit weight can be calculated by dividing the wet sample unit weight by (1 + moisture content, in decimal format).

Specific Gravity of Soil - ASTM D 854-06

The specific gravity is required in calculation of the soil properties void ratio and degree of saturation. Specific gravity G_s is defined as the ratio of the unit weight (or density) of soil_solids (particles) to the unit weight (or density) of water. The specific gravity of the soil particles is determined according to Method B of the ASTM standard.

Sieve and Hydrometer Analysis - ASTM D 422-63 (2002)e1 and ASTM D 6913-04e1

Sieve Analysis – The dried soil sample is separated into a series of fractions using a standard set of nested sieves. The sieving operation is conducted by means of a lateral and vertical motion of the nest of sieves, accompanied by jarring action to keep the sample moving continuously over the surface of the sieves. The weights retained on each of the set of nested sieves are used to calculate the percent of the sample passing each sieve size.

Hydrometer Analysis – The portion of the soil sample passing the No. 10 (2.0 mm) sieve is soaked in water and dispersed using a dispersing agent. The solution is placed in a cylinder and stirred, and the density of the solution is monitored over time with a hydrometer to observe the settling out of suspended soil particles. Diameters corresponding to the readings of the hydrometer are then calculated using Stoke's law.

ASTM D 6913-04 is the current specification for grain size analysis, but does not include hydrometer testing. Where hydrometer testing was required, Section 1.4 of the specification allows that ASTM D 422-63 (2002) be used.

Section 5.1.1 of ASTM D 422-63 (2002) and Table 1 of ASTM D 6913-04 give minimum sample weight requirements (the minimum depends on the maximum particle size present) for each test. In cases where there was not enough sample to meet the appropriate recommended weight, the test was completed using the available sample and it was noted in the Remarks section of the Particle Size Distribution Report.

Atterberg Limits - ASTM D 4318-05

The specimen is processed to remove material retained on the No. 40 (425-μm) sieve. The liquid limit is determined by performing trials in which a portion of the specimen is spread in a brass cup, divided in two by a grooving tool, and then allowed to flow together from the shocks caused by repeatedly dropping the cup in a standard mechanical device. The multipoint liquid limit, Method A, requires three or more trials over a range of water contents to be performed and the data from the trials plotted or calculated to make a relationship from which the liquid limit is determined. The one-point liquid limit, Method B, uses the data from two trials at one water content multiplied by a correction factor to determine the liquid limit.

The plastic limit is determined by alternately pressing together and rolling into 1/8-inch (3.2-μm) diameter thread a small portion of plastic soil until its water content is reduced to a point at which the thread crumbles and can no longer be pressed together and re-rolled. The water content of the soil at this point is reported as the plastic limit.

The plasticity index is calculated as the difference between the liquid limit and the plastic limit.

Chemical Analysis (pH, Chloride, Sulfate) - EPA 846 9045/9056-300.00/8056-300.00 and EPA SW-846 9045

A small quantity of soil was placed in a jar and sent to the laboratory for chemical analysis. Chemical analyses consisted of soil pH, and chloride and sulfate ion concentration. Soil pH is measured using a pH meter with results reported to 0.1 pH units. The concentration of chloride and sulfate ions is measured using an ion chromatograph with results reported in units of milligrams per kilogram.

Consolidation Tests - ASTM D 2435-04 Method B

Sections of the undisturbed samples were extruded from the sampling tube for consolidation testing. The specimen was then trimmed into a disc 2.5 inches in diameter and 1-inch thick. The disc was confined in a stainless steel ring and sandwiched between porous plates. It was then subjected to incrementally increasing vertical loads and the resulting changes in specimen height with respect to time were measured with a micrometer dial gauge. The load increments were doubled each time, and deformation (consolidation) under each load increment was considered complete when the deformation, versus time plot became asymptotic using the log-time method. The test results are presented in the form of pressure versus percent strain, and pressure versus void ratio curves.

Moisture-Density Modified Proctor Test - ASTM D 1557-02e1

Two buckets of soil were obtained in the field for each bulk sample assigned by Bechtel. In the laboratory these buckets were thoroughly mixed to assure uniformity of test specimens for all testing assigned on the bulk samples.

For the moisture-density relationship, the samples were tested in accordance with the ASTM standard for the modified Proctor test. The test yielded the optimum moisture content and corresponding maximum dry density for the bulk sample.

Unconsolidated – Undrained Triaxial Compression Test - ASTM D 2850-03a

The undisturbed samples assigned for testing were cut into sections which were extruded vertically from the sampling tubes for triaxial shear testing. The specimens thus formed consisted of cylinders with nominal diameter 2.9 inches and a height to diameter ratio of between 2 and 2.5 as required by the ASTM standard. The specimens were encased in rubber membranes. Each was then placed into a compression chamber and confined by an all-around fluid pressure. The samples were then loaded axially without any special effort to saturate them, or otherwise change their moisture content, and without allowing any drainage to occur during the testing. Failure was assumed to have occurred when the specimens had undergone the maximum load they would support.

Consolidated – Undrained Triaxial Compression Test - ASTM D 4767-04

The specimens, encased in the rubber membranes, were saturated by back-pressure prior to shearing. Section 8.2.3.1 of the ASTM standard describes how to determine when the specimen is saturated. Drainage was allowed from the specimen during the consolidation phase, thus allowing equilibrium under the confining stress, but no drainage was allowed during the loading phase. Failure was assumed to have occurred when the specimens had reached the maximum deviator stress or an axial strain of 17 percent.

Pore pressures generated during the loading phase were measured. The test is termed consolidated-undrained and total stresses result if no pore pressure corrections are included. When the pore pressures generated during the loading phase are subtracted from the total stresses, effective stresses result.

Direct shear for Soil - ASTM D 3080-04

A soil specimen with a nominal diameter of 2.5 inches and a height of 1 inch is placed in a loading device and is held under constant normal (vertical) load while the loading device deforms the specimen at a controlled strain rate on or near a single shear plane determined by the configuration of the device. One vertical stress was assigned for each test, and shear stresses versus horizontal displacements are taken whereby peak shear stress is obtained. For each test, the vertical stress is constant throughout the test. The direct shear test, thus assigned, provides an estimate of the shear strength at the assigned normal (vertical) stress.

Unconfined Compression - ASTM D-2166-00e1

This test determines the unconfined compressive strength of cohesive soil in the undisturbed, remolded, or compacted condition, using strain-controlled application of the axial load. This test provides an approximate value of the strength of cohesive soils in terms of total stresses. This test is applicable only to cohesive materials which will not expel or bleed water (water expelled from the soil due to deformation or compaction) during the loading portion of the test and which will retain intrinsic strength after removal of confining pressures, such as clays or cemented soils.

California Bearing Ratio Test - ASTM D 1883-05

The California Bearing Ratio (CBR) test is used to compare the bearing capacity of a material to that of a well-graded crushed stone. Thus, a well-graded crushed stone material should have a CBR ≈ 100%. The test uses a loading device to advance a piston at 0.05 in/min into the compacted test material. The load required for advancing the piston is measured and recorded at specific penetration intervals and used to generate a stress versus penetration curve.

Each material tested had two specimens prepared at the optimum moisture content and compacted to 95% of the maximum dry density in a cylindrical mold. Surcharge weights were placed on top of the specimens to simulate the overburden stresses expected in the field. One of the specimens was then placed in a water bath to soak for 96 hours, while monitoring swelling that occurred. The other test specimen proceeded to penetration testing without soaking. Upon completion of the penetration test, the CBR of each specimen tested was computed using stress measurements corresponding to 0.1 and 0.2 inches penetration and the corresponding values for well-graded crushed stone—1,000 and 1,500 psi, respectively.

Section 7.1.2 of the ASTM standard was modified per Bechtel request as described in the previous paragraph.

Reviewed by: HWS
4-3-07

TABLE F-1

LABORATORY TESTING SUMMARY

STP COL PROJECT

MACTEC ENGINEERING AND CONSULTING, INC.

PROJECT # 5050-06-0496

SAMPLE INFORMATION						PHYSICAL PROPERTIES																																														
						Grain Size (Passing %)					Natural Moisture Content (%) at e_o						Atterberg Limits				Dry Density (pcf) at e_o						Void Ratio				Triaxial Tests						Consolidation					Direct Shear			Chemical Analysis			Compaction		
Boring Number	Sample Number	Sample Top Depth, feet	Sample Bottom Depth, feet	USCS Symbol	USCS Material Description	Gravel	Sand	Silt	Clay	Fines	Physical Properties	Triaxial, Direct Shear, or Unconfined 1	2	3	Consolidation	Average	Liquid Limit, LL	Plastic Limit, PL	Plasticity Index, PI	Specific Gravity, Gs	Triaxial, Direct Shear, or Unconfined 1	2	3	Consolidation	Average	Wet Density (pcf)	Triaxial, Direct Shear, or Unconfined 1	2	3	Consolidation	Average	Test Type (1)	σ_3 (ksf)	C' (ksf)	φ' (degree)	C (ksf)	φ (degree)	P_c (ksf)	P_c (ksf)	OCR	C_c	C_r	τ (psi) max.	σ (psi)	Relative Displacement at Max Shear (%)	pH	Chloride (mg/kg)	Sulfide (mg/kg)	Optimum Moisture (%)	Maximum Density (pcf)	CBR (%)
B-301	SS-34	168.5	170	ML	Silt with Sand	0.0	23.3			76.7	20.8						NV	NP	NP																																	
B-302-DH	SS-13	28.5	30	SM	Silty Sand	0.4	59.7			39.9	21.5																																								
B-303	UD-1	83	85	SM	Silty Sand	0.0	81.7	15.6	2.7	18.3		25.5			22.4	24.0	NV	NP	NP	2.70	102.4			102.7	102.6	127.1	0.648			0.640	0.643	UU	1.1			0.8	0.0	4.450	13.4	3.0	0.083	0.020								
B-303	UD-2	88	90	CH	Fat Clay	0.0	0.8	39.0	60.4	99.4		24.7			28.6	28.6	57	18	39	2.75	107.2			94.7	101.0	127.9	0.602			0.810	0.706	UU	6.9			3.5	0.0	6.010	13.4	2.2	0.249	0.040								
B-303	UD-3	108	110								9.7	15.1				15.1					120.0				120.0	138.1	0.404				0.404	UU	5.0			2.5	0.0														
B-303	UD-4	133	135	CH	Fat Clay with Sand	0.0	28.5	39.9	31.6	71.5		29.5				29.5	65	26	39	2.69	93.7				93.7	121.3	0.799				0.799	UU	8.3			0.1	0.0														
B-303	UD-4	133	135									19.9	18.0	18.3		18.7					108.4	111.5	111.4		110.4	131.1	0.556	0.506	0.508		0.523	CU		2.4	11.0	3.1	3.2														
B-303	UD-5	168	170	SM	Silty Sand	0.0	62.9			37.1		32.0				32.0	NV	NP	NP	2.67	96.4				96.4		0.749				0.748	UU	30.8			15.4	0.0														
B-305-DH	SS-2	1.5	3																																											9.2					
B-305-DH	UD-1	3	5	CH	Fat Clay	0.0	10.4	41.8	47.8	89.6		22.5			25.0	23.8	62	19	43	2.72	100.9			96.3	98.6	122.0	0.670			0.750	0.710	UNC	1.9			1.0		0.580	3.2	5.5	0.269	0.023								
B-305-DH	SS-3	6	7.5																																											9.0					
B-305-DH	SS-8	13.5	15	CL	Lean Clay with Gravel						18.9					18.9	30	16	14																																	
B-305-DH	SS-9	18.5	20	ML	Silt with Sand	0.0	22.5			77.5	22.7					22.7	NV	NP	NP																																	
B-305-DH	SS-11	27	28.5								24.9					24.0																																			
B-305-DH	UD-4	53	55	CL	Sandy Lean Clay	0.0	48.1	28.1	23.8	51.9		22.4			26.7	24.8	45	20	25	2.68	102.2			98.8	100.5	125.2	0.650			0.710	0.680	UNC	4.9			2.5		3.820	14.3	3.7	0.252	0.017								
B-305-DH	SS-18	58.5	60	CH	Fat Clay						20.9					20.9	58	20	38																																	
B-305-DH	SS-19	73.5	75	SP-SM	Poorly Graded Sand w/ Silt	0.0	88.4			11.6	23.1					23.1																																				
B-305-DH	UD-5	78	80	SP-SM	Poorly Graded Sand w/ Silt	0.0	93.5	0.7	5.8	6.5			22.4	22.0	22.8	22.1	NV	NP	NP	2.64	100.8			104.9	102.4	125.1	0.673			0.820	0.847	UNC	0.4			0.2		5.320	12.8	2.4	0.093	0.017								
B-305-DH	SS-20	83.5	85																																											6.9	20.60	14.50			
B-305-DH	SS-21	88.5	90	CH	Fat Clay	0.0	1.5	37.4	61.1	98.5	21.1					21.1	55	19	36																																	
B-305-DH	SS-22	93.5	95	CH	Fat Clay						22.5					22.5	50	17	33																																	
B-305-DH	UD-6	103	105	CH	Fat Clay	0.0	5.2			94.8																																										
B-305-DH	SS-24	108.5	110	SP-SM	Poorly Graded Sand w/ Silt	0.0	91.1			8.9	19.8					19.8																																				
B-305-DH	SS-25	118.5	120	CL	Lean Clay						21.8					21.8	43	15	28																																	
B-305-DH	UD-7	123	125								16.5	18.4			21.6	18.8					111.2			106.2	108.7	129.2	0.516			0.590	0.553	UNC	2.4			1.2		8.140	18.9	2.3	0.186	0.030								
B-305-DH	UD-7	123	125									20.1				20.1					106.9				106.9	128.4	0.577				0.577	UU	8.0			3.0	0.0														
B-305-DH	UD-8	138	140	CL	Lean Clay with Sand	0.0	15.9	59.9	24.2	84.1		18.1			19.9	18.8	32	14	18	2.70	109.7			108.7	109.2	129.5	0.539			0.550	0.545	UU	9.1			4.5	0.0	9.140	16.2	1.8	0.173	0.023								
B-305-DH	UD-9	158	160	CH	Fat Clay	0.0	9.2	23.7	65.1	91.8		16.4				16.4	56	20	36	2.70	89.1				89.1	103.7	0.892				0.892													14.03	25.00	60						
B-305-DH	SS-29	170	171.5	ML	Silt with Sand	0.0	22.7	67.8	9.5	77.3	23.9					23.9	NV	NP	NP																																	
B-305-DH	SS-30	178.5	180	CL	Lean Clay						21.7					21.7	48	15	33																																	
B-305-DH	UD-10	193	195			IP-RCTS	IP-RCTS	IP-RCTS	IP-RCTS	IP-RCTS							IP-RCTS	IP-RCTS	IP-RCTS	IP-RCTS																																	

TABLE F-1

LABORATORY TESTING SUMMARY

STP COL PROJECT

MACTEC ENGINEERING AND CONSULTING, INC.

PROJECT # 5050-06-0498

SAMPLE INFORMATION						PHYSICAL PROPERTIES																																											
						Grain Size (Passing %)					Natural Moisture Content (%) at e_o						Atterberg Limits				Dry Density (pcf) at e_o						Void Ratio					Triaxial Tests						Consolidation					Direct Shear			Chemical Analysis			Compaction		
Boring Number	Sample Number	Sample Top Depth, feet	Sample Bottom Depth, feet	USCS Symbol	USCS Material Description	Gravel	Sand	Silt	Clay	Fines	Physical Properties	Triaxial, Direct Shear, or Unconfined 1	2	3	Consolidation	Average	Liquid Limit, LL	Plastic Limit, PL	Plasticity Index, PI	Specific Gravity, Gs	Triaxial, Direct Shear, or Unconfined 1	2	3	Consolidation	Average	Wet Density (pcf)	Triaxial, Direct Shear, or Unconfined 1	2	3	Consolidation	Average	Test Type (1)	σ_3 (ksf)	C' (ksf)	φ' (degree)	C (ksf)	φ (degree)	P_c (ksf)	P_v (ksf)	OCR	C_c	C_r	τ (psi) max.	σ (psi)	Relative Displacement at Max Shear (%)	pH	Chloride (mg/kg)	Sulfide (mg/kg)	Optimum Moisture (%)	Maximum Density (pcf)	CBR (%)
B-305-DH	SS-32	198.5	200	CH	Fat Clay						26.1					26.1	57	17	40																																
B-305-DH	UD-11	213	215	CL	Lean Clay with Sand	0.0	25.2	28.7	46.1	74.8		20.9			22.6	21.8	45	14	31	2.71	102.9			105.1	104.0	126.8	0.643			0.610	0.627	UNC	5.5			2.8		13.780	27.9	2.0	0.249	0.023								
B-305-DH	SS-33	218.5	220	CL	Lean Clay						19.6					19.6	33	15	18																																
B-305-DH	UD-12	228	230	SM	Silty Sand	0.0	73.0	24.4	2.6	27.0		21.5				21.5	NV	NP	NP	2.67	104.4				104.4	126.8	0.596				0.596													15.75	25.00	63						
B-305-DH	SS-35	258.5	260	CH	Fat Clay						29.6					29.6	74	22	52																																
B-305-DH	UD-13	283	285			IP-RCTS	IP-RCTS	IP-RCTS	IP-RCTS	IP-RCTS							IP-RCTS	IP-RCTS	IP-RCTS	IP-RCTS																																
B-305-DH	SS-36	278.5	280	CH	Fat Clay						30.4					30.4	80	27	53																																
B-305-DH	UD-14	288	291	CH	Fat Clay	0.0	8.2	8.8	82.0	90.8		40.2	35.1			37.7	84	26	58	2.72	77.4	86.7			82.1	112.9	1.190	0.958			1.074	UU	0.4			0.2	0.0						11.46	25.00	63						
B-305-DH	UD-15A	316	318.5									31.1			29.7	30.4				2.70	89.7			93.9	91.8	119.7	0.879			0.790	0.835	UNC	2.7			1.4		20.320	18.9	0.9	0.379	0.088								
B-305-DH	UD-16	338	340			IP-RCTS	IP-RCTS	IP-RCTS	IP-RCTS	IP-RCTS							IP-RCTS	IP-RCTS	IP-RCTS	IP-RCTS																																
B-305-DH	UD-17A	353.5	356			IP-RCTS	IP-RCTS	IP-RCTS	IP-RCTS	IP-RCTS							IP-RCTS	IP-RCTS	IP-RCTS	IP-RCTS																																
B-305-DH	SS-40	378.5	380	SP-SM	Poorly Graded Sand w/ Silt	0.0	89.8			10.2	25.7					25.7																																			
B-305-DH	UD-18	385	387			IP-RCTS	IP-RCTS	IP-RCTS	IP-RCTS	IP-RCTS							IP-RCTS	IP-RCTS	IP-RCTS	IP-RCTS																																
B-305-DH	SS-41	396.5	400	SP	Poorly Graded Sand	6.1	88.5			5.4	23.3																																								
B-305-DH	UD-20	418	420			IP-RCTS	IP-RCTS	IP-RCTS	IP-RCTS	IP-RCTS							IP-RCTS	IP-RCTS	IP-RCTS	IP-RCTS																																
B-305-DH	SS-42	438.5	440	CH	Fat Clay						29.7					29.7	85	27	58																																
B-305-DH	UD-21A	453.25	455.75	SP-SM	Poorly Graded Sand w/ Silt	0.0	88.2	2.4	9.4	11.8		22.0				22.0	NV	NP	NP	2.67	103.1				103.1		0.634				0.634	UU	56.8			28.4	0.0														
B-305-DH	SS-43	458.5	460	SM	Silty Sand	0.0	71.4			28.6	23.3					23.3																																			
B-305-DH	SS-44	478.5	480	CH	Fat Clay						24.3					24.3	81	23	58																																
B-305-DHa	UD-21	453	455.5			IP-RCTS	IP-RCTS	IP-RCTS	IP-RCTS	IP-RCTS							IP-RCTS	IP-RCTS	IP-RCTS	IP-RCTS																																
B-305-DHa	UD-25	588	590			IP-RCTS	IP-RCTS	IP-RCTS	IP-RCTS	IP-RCTS							IP-RCTS	IP-RCTS	IP-RCTS	IP-RCTS																																
B-306	UD-2	63	65	SM	Silty Sand	0.0	50.5	39.1	10.4	49.5		22.9	20.8	22.0		21.9	20	18	2	2.66	103.8	104.5	104.2		104.2	127.0	0.624	0.613	0.618		0.618	CU		0.0	36.0	1.5	13.5														
B-306	UD-2	63	65									25.6				25.6					96.4				96.4		0.749				0.749	UU	2.7			1.4	0.0														
B-306	UD-3	73	75			IP-RCTS	IP-RCTS	IP-RCTS	IP-RCTS	IP-RCTS							IP-RCTS	IP-RCTS	IP-RCTS	IP-RCTS																																
B-306	UD-4	88	90	CH	Fat Clay	0.0	1.4	35.4	63.2	98.6	22.9	21.8	22.5	23.7		22.7	57	19	38	2.72	104.1	101.7	102.2		102.7	125.9	0.632	0.669	0.651		0.654	CU		3.0	6.5	3.0	3.1														
B-306	UD-5	98	100	SP-SM	Poorly Graded Sand w/ Silt	0.0	94.0	2.3	3.7	6.0		24.4				24.4	NV	NP	NP	2.68	97.8				97.8	121.7	0.697				0.697												12.70	20.00	55						
B-306	UD-6	103	105			IP-RCTS	IP-RCTS	IP-RCTS	IP-RCTS	IP-RCTS							IP-RCTS	IP-RCTS	IP-RCTS	IP-RCTS																																
B-306	UD-7	118	120	CH	Fat Clay	0.0	0.8	15.0	84.4	99.4	25.2					25.2	54	22	32	2.74																																
B-307	UD-3	188	190	CL	Lean Clay							22.3	22.9	20.4		21.9	49	19	30		101.2	99.8	107.4		102.8		0.665	0.590	0.569		0.641	CU		3.4	2.0	3.4	1.0														
B-309	SS-2	1.5	3	CH	Fat Clay	0.0	4.6			95.4	28.0					28.0	61	17	44																																
B-309	SS-3	3	4.5																																											7.8				

TABLE F-1

LABORATORY TESTING SUMMARY

STP COL PROJECT

MACTEC ENGINEERING AND CONSULTING, INC.

PROJECT # 5050-08-0496

SAMPLE INFORMATION						PHYSICAL PROPERTIES																																											
						Grain Size (Passing %)					Natural Moisture Content (%) at e_o					Atterberg Limits				Dry Density (pcf) at e_o						Void Ratio				Triaxial Tests						Consolidation				Direct Shear			Chemical Analysis			Compaction		
Boring Number	Sample Number	Sample Top Depth, feet	Sample Bottom Depth, feet	USCS Symbol	USCS Material Description	Gravel	Sand	Silt	Clay	Fines	Physical Properties	Triaxial, Direct Shear, or Unconfined 1	2	3	Consolidation	Average	Liquid Limit, LL	Plastic Limit, PL	Plasticity Index, PI	Specific Gravity, Gs	Triaxial, Direct Shear, or Unconfined 1	2	3	Consolidation	Average	Wet Density (pcf)	Triaxial, Direct Shear, or Unconfined 1	2	3	Consolidation	Average	Test Type (1)	q_u (ksf)	C' (ksf)	φ' (degree)	C (ksf)	φ (degree)	P_c (ksf)	P_o (ksf)	OCR	C_c	C_r	τ (psi) max.	σ (psi)	Relative Displacement at Max Shear (%)	pH	Chloride (mg/kg)	Sulfide (mg/kg)	Optimum Moisture (%)	Maximum Density (pcf)	CBR (%)
B-309	SS-6	6	7.5	CL	Lean Clay	0.0	2.7			97.3	27.2					27.2	43	17	26																															
B-309	SS-7	9	10.5																																									8.4					
B-309	SS-8	10.5	12	CH	Fat Clay	0.0	0.2			99.8	27.0					27.0	75	22	53																														
B-309	SS-10	13.5	15	ML	Silt with Sand	0.0	28.4			71.6	23.6					23.6																																	
B-309	SS-11	18.5	20	SM	Silty Sand	1.2	74.5			24.3	22.6					22.6																																	
B-309	SS-12	23.5	25																																									8.7					
B-309	SS-13	28.5	30	SP-SM	Poorly Graded Sand w/ Silt	0.0	91.4			8.6	24.8					24.8																																	
B-309	SS-14	33.5	35																																									8.7					
B-309	SS-15	38.5	40	SP-SM	Poorly Graded Sand w/ Silt	0.0	91.4			8.6	23.3					23.3																																	
B-309	SS-16	43.5	45	SP-SM	Poorly Graded Sand w/ Silt	0.0	91.1			8.9	24.8					24.8																																	
B-309	SS-18	53.5	55	CH	Fat Clay	0.5	8.1	35.5	55.9	91.4	20.7					20.7	55	14	41																															
B-309	SS-19	58.5	60																																									8.6					
B-309	SS-20	63.5	65	SM	Silty Sand	0.0	60.8			39.2	23.4					23.4																																	
B-309	SS-21	68.5	70																																									8.9					
B-309	SS-22	73.5	75	SM	Silty Sand	0.0	87.9			12.1	24.2					24.2																																	
B-309	SS-23	78.5	80	SP-SM	Poorly Graded Sand w/ Silt	0.0	91.9			8.1	20.8					20.8																																	
B-309	SS-24	83.5	85																																									8.8	46.00	31.80			
B-309	SS-25	88.5	90	SM	Silty Sand	0.0	79.4			20.6	21.5					21.5																																	
B-309	SS-26	93.5	95																																									8.5					
B-309	SS-27	98.5	100	SP-SM	Poorly Graded Sand w/ Silt	0.0	91.2			8.8	23.6					23.6																																	
B-309	SS-28	108.5	110	SP-SM	Poorly Graded Sand w/ Silt	1.3	91.4			7.3	17.6					17.6																																	
B-309	SS-29	118.5	120	CH	Fat Clay	0.0	1.0			99.0	27.1					27.1	80	22	58																														
B-309	SS-30	128.5	130								27.0					27.0																																	
B-309	SS-31	138.5	140	CL	Lean Clay						21.7					21.7	47	17	30																														
B-309	SS-32	148.5	150	CH	Fat Clay						23.3					23.3	86	20	46																														
B-309	SS-33	158.5	160	CL	Lean Clay	0.9	2.2	59.7	37.2	96.9	23.9					23.9	37	16	21																														
B-309	SS-34	168.5	170								25.7					25.7																																	
B-309	SS-35	178.5	180	CH	Fat Clay	0.0	1.0			99.0	24.6					24.6	64	21	43																														
B-309	SS-36	188.5	190	CH	Fat Clay						28.1					28.1	72	22	50																														
B-309	SS-37	198.5	200	CH	Fat Clay						31.8					31.8	69	20	49																														
B-314	UD-1	83	85	SP	Poorly Graded Sand	0.0	95.6	1.6	2.8	4.4		20.9				20.9	NV	NP	NP	2.70	101.5				101.5	122.7	0.660				0.660													13.78	29.00	50						

TABLE F-1

LABORATORY TESTING SUMMARY

STP COL PROJECT

MACTEC ENGINEERING AND CONSULTING, INC.

PROJECT # 5050-06-0496

SAMPLE INFORMATION						PHYSICAL PROPERTIES																																														
						Grain Size (Passing %)					Natural Moisture Content (%) at e_o					Attarberg Limits					Dry Density (pcf) at e_o						Void Ratio					Triaxial Tests						Consolidation					Direct Shear			Chemical Analysis			Compaction		
Boring Number	Sample Number	Sample Top Depth, feet	Sample Bottom Depth, feet	USCS Symbol	USCS Material Description	Gravel	Sand	Silt	Clay	Fines	Physical Properties	Triaxial, Direct Shear, or Unconfined 1	2	3	Consolidation	Average	Liquid Limit, LL	Plastic Limit, PL	Plasticity Index, PI	Specific Gravity, Gs	Triaxial, Direct Shear, or Unconfined 1	2	3	Consolidation	Average	Wet Density (pcf)	Triaxial, Direct Shear, or Unconfined 1	2	3	Consolidation	Average	Test Type (1)	q_u (ksf)	C' (ksf)	φ' (degree)	C (ksf)	φ (degree)	P_c (ksf)	P_o (ksf)	OCR	C_r	C_c	τ (psf) max.	σ (psi)	Relative Displacement at Max Shear (%)	pH	Chlorides (mg/kg)	Sulfide (mg/kg)	Optimum Moisture (%)	Maximum Density (pcf)	CBR (%)
B-314	UD-2	113	115	CL	Lean Clay	0.0	3.1	33.0	53.9	96.9		20.0				20.0	38	13	25	2.72	108.6				108.6		0.581				0.581	UU	9.7			4.8	0.0														
B-314	UD-3	121	123								16.1	19.5				19.5					109.1				109.1		0.544				0.544	UU	6.1			3.0	0.0														
B-314	UD-4	141	143	CL	Lean Clay	0.0	12.5	51.2	36.3	87.5		24.2				24.2	46	15	31	2.74	96.9				96.9	120.3	0.767				0.767	UU	1.4			0.7	0.0														
B-314	UD-4	141	143																													CU		1.2	20.0	2.3	9.0														
B-314	UD-5A	183	185	CH	Fat Clay	0.0	1.3	11.8	86.9	98.7		20.3				20.3	72	24	48	2.75	101.8				101.8	122.5	0.684				0.684	UU	10.5			5.3	0.0														
B-314	UD-5A	183	185																													CU		1.9	7.3	0.9	11.0														
B-314	UD-6	191	193	CH	Fat Clay	0.0	8.8	11.8	81.5	93.4		26.5				26.5	64	24	40	2.70	94.0				94.0		0.793				0.793	UU	3.9			1.9	0.0														
B-319-DH	UD-1	128	130	CH	Fat Clay	0.0	2.6	24.0	73.4	97.4		21.0			17.6	19.3	70	25	45	2.72	103.5			106.0	104.8	125.0	0.640			0.600	0.620	UU	6.8			3.4	0.0	6.520	14.1	1.7	0.130	0.013								
B-319-DH	UD-2	143	145	ML	Sandy Silt	0.8	39.7			59.5	18.7						NV	NP	NP	2.72																															
B-319-DH	UD-4	173	175	CH	Fat Clay	0.0	0.3	9.4	90.3	99.7					26.9	28.9	65	22	43	2.72				98.0	98.0					0.730	0.730							11.330	19.3	1.7	0.173	0.040								
B-319-DH	UD-5	188	190	CH	Fat Clay	0.0	1.7	26.5	71.8	98.3		23.9			29.1	26.5	62	21	41	2.72	99.6			94.5	97.0	122.7	0.706			0.790	0.748	UU	7.5			3.8	0.0	12.270	27.9	2.3	0.472	0.060								
B-321	UD-3	138	140	CL	Lean Clay							20.0				20.0	46	21	25		106.2				106.2		0.587				0.587	UU	9.8			4.9	0.0														
B-323	SS-1	0	1.5								5.1					5.1																																		
B-323	SS-4	4.5	6	CH	Fat Clay						21.2					21.2	50	17	33																																
B-323	SS-12	23.5	25	ML	Sandy Silt	0.0	30.1	54.9	15.0	69.9	22.5					22.5	NV	NP	NP																																	
B-323	SS-14	33.5	35								21.6					21.6																																		
B-323	SS-15	43.5	45	CL	Lean Clay						20.5					20.5	29	19	10																																
B-323	SS-17	48.5	50								32.1					32.1																																		
B-323	SS-18	53.5	55	CL	Lean Clay						18.1					18.1	47	16	31																																
B-323	SS-19	58.5	60								19.5					19.5																																		
B-323	SS-21	68.5	70	ML	Sandy Silt						23.2					23.2	NV	NP	NP																																
B-323	SS-22	73.5	75	SP-SM	Poorly Graded Sand w/ Silt	0.0	88.1			11.9	20.0					20.0																																			
B-323	SS-23	78.5	80								20.4					20.4																																		
B-323	SS-24	83.5	85	SP-SM	Poorly Graded Sand w/ Silt	0.2	91.9			7.9	18.3					18.3																																			
B-323	SS-25	88.5	90	SP-SM	Poorly Graded Sand w/ Silt	0.0	89.6			10.4	22.0					22.0																																			
B-323	SS-26	93.5	95	SM	Silty Sand	0.1	79.9			20.0	17.8					17.8																																			
B-323	SS-27	98.5	100	SC	Clayey Sand	0.0	50.5			49.5	22.4					22.4																																			
B-326	SS 8	10.5	12								22.2																																								
B-326 repl B 323 SS-11	SS 11	18.5	20	ML	Silt	0.2	10.3			89.5	24.5																																								
B-326 repl B 323 SS-13	SS 13	28.5	30	SM	Silty Sand	0.0	62.8			37.2	21.3																																								
B-326 repl B 323 SS-15	SS-15	38.5	40	SP-SM	Poor Graded Sand w/ Silt	0.0	92.3			7.7	23.2																																								

TABLE F-1

LABORATORY TESTING SUMMARY

STP COL PROJECT

MACTEC ENGINEERING AND CONSULTING, INC.

PROJECT # 6050-08-0496

SAMPLE INFORMATION						PHYSICAL PROPERTIES																																											
						Grain Size (Passing %)					Natural Moisture Content (%) at e_o						Atterberg Limits				Dry Density (pcf) at e_o						Void Ratio					Triaxial Tests						Consolidation					Direct Shear			Chemical Analysis			Compaction		
Boring Number	Sample Number	Sample Top Depth, feet	Sample Bottom Depth, feet	USCS Symbol	USCS Material Description	Gravel	Sand	Silt	Clay	Fines	Physical Properties	Triaxial, Direct Shear, or Unconfined 1	2	3	Consolidation	Average	Liquid Limit, LL	Plastic Limit, PL	Plasticity Index, PI	Specific Gravity, Gs	Triaxial, Direct Shear, or Unconfined 1	2	3	Consolidation	Average	Wet Density (pcf)	Triaxial, Direct Shear, or Unconfined 1	2	3	Consolidation	Average	Test Type (1)	q_u (ksf)	C' (ksf)	φ' (degree)	C (ksf)	φ (degree)	P_c (ksf)	P_c (ksf)	OCR	C_c	C_r	τ (psi) max.	σ (psi)	Relative Displacement at Max Shear (%)	pH	Chloride (mg/kg)	Sulfide (mg/kg)	Optimum Moisture (%)	Maximum Density (pcf)	CBR (%)
B-328 repl B323 SS-20	SS-20	63.5	65								26.5																																								
B-329-DH	SS-2	1.5	3																																											8.6	35.90	34.70			
B-329-DH	SS-4	4.5	6	CH	Fat Clay						22.2					22.2	53	17	36																																
B-329-DH	SS-6	7.5	9																																											7.7	94.00	71.10			
B-329-DH	SS-8	10.5	12	CL	Lean Clay						24.1					24.1	32	18	14																																
B-329-DH	SS-9	18.5	20	ML	Sandy Silt						25.0					25.0	NV	NP	NP																																
B-329-DH	SS-10	23.5	25	ML	Silt with Sand	0.0	21.8			78.2	22.1					22.1																																			
B-329-DH	SS-11	28.5	30																																											8.5	92.20	35.50			
B-329-DH	SS-12	38.5	40	SP-SM	Poorly Graded Sand w/ Silt	0.0	93.5			6.5	23.2					23.2																																			
B-329-DH	SS-13	43.5	45	CH	Fat Clay						26.8					26.8	74	23	51																																
B-329-DH	SS-15	58.5	60	CH	Fat Clay						25.6					25.6	76	25	51																																
B-329-DH	UD-4	73	73.8	SM	Silty Sand	0.0	82.7			17.3		25.8				25.8				2.68	94.5				94.5	118.9	0.783				0.783	UU	0.8			0.3	0.0														
B-329-DH	SS-18	78.5	80	SP-SM	Poorly Graded Sand w/ Silt	0.0	88.6			11.4	21.4					21.4																																			
B-329-DH	SS-19	88.5	90	SP-SM	Poorly Graded Sand w/ Silt	0.0	93.1			6.8	21.0					21.0																																			
B-329-DH	SS-21	98.5	100	SM	Silty Sand	1.1	86.3			12.6	21.0					21.0																																			
B-329-DH	SS-22	108.5	110	SP-SM	Poorly Graded Sand w/ Silt	8.6	83.9			7.5	14.6					14.6																																			
B-329-DH	SS-23	118.5	120	CL	Lean Clay	0.0	5.9			94.1	22.0					22.0	34	16	18																																
B-329-DH	SS-24	128.5	130	CL	Sandy Lean Clay	0.0	48.7			51.3	21.0					21.0																																			
B-329-DH	SS-25	138.5	140	CH	Fat Clay						18.3					18.3	50	16	34																																
B-329-DH	SS-26	148.5	150	SM	Silty Sand	1.1	73.6			25.3	21.3					21.3																																			
B-329-DH	SS-27	159	160	CL	Lean Clay with Sand						25.4					25.4	31	19	12																																
B-329-DH	SS-29	178.5	180	CH	Fat Clay						23.8					23.8	62	20	42																																
B-329-DH	SS-30	188.5	190								26.5					26.5																																			
B-330	UD-2	53	55									14.1	14.7	20.0		16.3					113.3	111.7	107.3		110.8		0.488	0.509	0.571		0.523	CU		2.2	0.0	2.2	0.0														
B-330	UD-3	63	65	SP	Poorly Graded Sand	0.0	96.5			3.5		25.2				25.2	NV	NP	NP	2.67	96.2				96.2		0.732				0.732	UU	0.3			0.1	0.0														
B-330	UD-4B	123	125									19.5				18.5					107.7				107.7		0.565				0.565	UU	2.2			1.1	0.0														
B-332	UD-1	3	5	CH	Fat Clay	0.0	6.5	39.7	53.7	93.4		23.1				23.1	70	25	45	2.74	96.4				96.4	118.7	0.692				0.692	UNC	3.9			1.9															
B-333	UD-1	8	10	CL	Lean Clay	0.0	3.5	58.8	37.7	96.5		23.7			24.8	24.3	43	16	27	2.67	99.6			99.4	99.8	123.8	0.671			0.680	0.676	UNC	2.6			1.3		1.005	9.2	9.2	0.282	0.020									
D-333	UD-2	19	20	CL	Lean Clay	0.0	3.7	71.5	24.8	96.3		23.0			23.8	23.4	30	19	11	2.70	91.7			101.4	96.6	119.1	0.838			0.680	0.748	UU	1.0			0.5	0.0	1.630	5.2	3.2	0.050	0.000									
B-338	UD-1	28	30	SM	Silty Sand	0.0	81.8	15.2	3.0	18.2		24.1			23.8	23.9	NV	NP	NP	2.65	101.6			98.7	100.2	124.2	0.625			0.680	0.653	UU	3.3			1.8	0.0	2.250	17.2	7.8	0.100	0.007									
B-338	UD-2	48	50	CL	Lean Clay	0.0	1.8	48.8	49.4	98.2		26.1			27.4	26.8	44	18	26	2.71	96.6			96.3	96.5	122.3	0.752			0.780	0.766	UU	4.5			2.2	0.0	3.510	13.9	4.0	0.256	0.030									

TABLE F-1

LABORATORY TESTING SUMMARY

STP COL PROJECT

MACTEC ENGINEERING AND CONSULTING, INC.

PROJECT # 6050-06-0496

SAMPLE INFORMATION						PHYSICAL PROPERTIES																																											
						Grain Size (Passing %)					Natural Moisture Content (%) at e_o					Atterberg Limits				Dry Density (pcf) at e_o						Void Ratio				Triaxial Tests						Consolidation					Direct Shear			Chemical Analysis			Compaction		
Boring Number	Sample Number	Sample Top Depth, feet	Sample Bottom Depth, feet	USCS Symbol	USCS Material Description	Gravel	Sand	Silt	Clay	Fines	Physical Properties	Triaxial, Direct Shear, or Unconfined 1	2	3	Consolidation	Average	Liquid Limit, LL	Plastic Limit, PL	Plasticity Index, PI	Specific Gravity, Gs	Triaxial, Direct Shear, or Unconfined 1	2	3	Consolidation	Average	Wet Density (pcf)	Triaxial, Direct Shear, or Unconfined 1	2	3	Consolidation	Average	Test Type (1)	q_u (ksf)	C' (ksf)	φ' (degrees)	C (ksf)	φ (degrees)	P_o (ksf)	P_c (ksf)	OCR	C_c	C_r	τ (psi) max.	σ (psi)	Relative Displacement at Max Shear (%)	pH	Chloride (mg/kg)	Sulfide (mg/kg)	Optimum Moisture (%)	Maximum Density (pcf)	CBR (%)
B-343	UD-3	58	60									18.4				18.4					106.9						0.576				UU	0.9			0.5	0.0													
B-343	UD-4A	70	72	CH	Fat Clay	0.0	3.6	10.0	86.2	96.2		23.6				23.6				2.78	100.4						0.729				UU	0.2			0.1	0.0													
B-343	UD-7	173	175	CL	Lean Clay						15.6	18.1				16.9	31	14	17	2.64	107.0				107.0		0.576				0.576	UU	2.7			1.4	0.0													
B-343	UD-8	198	200	CH	Fat Clay	0.0	29.6	19.5	50.9	81.4		22.1				22.1				2.73	100.4				100.4		0.598				0.598	UU	2.2			1.1	0.0													
B-344	SS-3	3	4.5	CH	Fat Clay						24.0					24.0	60	19	41																															
B-344	SS-7	9	10.5	CL	Lean Clay						24.6					24.6	33	20	13																															
B-344	SS-12	23.5	25	SM	Silty Sand	0.0	86.0			14.0	25.9					25.9																																		
B-344	SS-15	38.5	40	SP-SM	Poorly Graded Sand w/ Silt	0.0	92.6			7.4	21.8					21.8																																		
B-344	SS-17	48.5	50	CL	Lean Clay	1.1	10.1			88.8	27.7					27.7	38	15	23																															
B-344	SS-19	58.5	60	CL	Sandy Lean Clay	2.2	43.0	31.5	23.3	54.8	18.6					18.6	30	15	15																															
B-344	SS-21	68.5	70	SP-SM	Poorly Graded Sand w/ Silt	0.0	90.5			9.5	21.9					21.9																																		
B-344	SS-23	78.5	80	SP-SM	Poorly Graded Sand w/ Silt	0.0	92.6			7.4	20.3					20.3																																		
B-344	SS-24	83.5	85																																											8.9	32.80	27.80			
B-344	SS-25	88.5	90	CH	Fat Clay						22.7					22.7	53	17	36																															
B-344	SS-26	93.5	95	CL	Lean Clay						20.7					20.7	44	15	29																															
B-344	SS-27	98.5	100	CH	Fat Clay						29.3					29.3	62	20	42																															
B-401	UD-2	88	90	CH	Fat Clay							23.9	22.6	23.8		23.4	57	21	36	2.69	101.6	102.9	101.1		103.0		0.655	0.632	0.661		0.631	CU		2.1	5.1	2.4	0.8													
B-401	UD-3	118	120	CL	Lean Clay							19.8				19.8	47	22	25	2.68	108.3				108.3		0.575				0.575	UU	4.0			2.0	0.0													
B-401	UD-4	153	155	SM	Silty Sand	0.0	81.8	15.7	2.5	18.2		24.6				24.6	NV	NP	NP	2.63	99.8				100.4		0.645				0.658	UU	0.4			0.2	0.0													
B-401	UD-5A	184	186									24.1				24.1					100.8						0.671					UU	7.2			3.8	0.0													
B-404	UD-1	88	90								22.8	21.0				21.8					104.0				101.5		0.620				0.672	UU	7.0			3.5	0.0													
B-404	UD-2	98	100	CH	Fat Clay	0.0	4.9	20.5	74.6	95.1		25.3				25.3	50	20	30	2.73	98.9				100.1		0.723				0.723	UU	7.0			3.5	0.0													
B-404	UD-3	121	123	CH	Fat Clay	0.0	0.7	13.7	85.6	99.3	23.4	27.7	20.9	22.6		23.8	62	23	39	2.77	94.4	105.5	101.4		100.9	124.7	0.829	0.636	0.703		0.714	CU		2.2	9.0	2.3	3.5													
B-404	UD-3	121	123									23.4				23.4					102.2				102.2	126.1	0.689				0.689	UU	7.0			3.5	0.0													
B-404	UD-3	121	123									27.7	20.8	22.6		22.0					94.4	105.5	101.4		100.4	122.5	0.829	0.636	0.703		0.723	CU		2.2	9.0	2.3	3.5													
B-404	UD-4	131	133	CH	Fat Clay	0.0	5.9	11.7	82.4	94.1		20.8				20.8	52	22	30	2.67	102.9				102.9		0.620				0.620	UU	6.9			3.5	0.0													
B-404	UD-5	141	143	CL	Sandy Lean Clay	0.0	33.4	43.0	23.6	66.6		18.0				18.0	30	18	12	2.67	109.3				109.3		0.525				0.525	UU	6.3			4.1	0.0													
B-404	UD-6	161	163	CL	Lean Clay	0.0	3.3	59.2	37.5	96.7		20.2	19.4			19.8	30	15	15	2.71	109.4	110.9			110.2	132.0	0.546	0.528			0.536	CU		8.9	6.0	7.7	2.6													
B-405-DH	SS-3	3	4.5	CH	Fat Clay						25.0					25.0	55	17	38																															
B-405-DH	SS-4	4.5	6																																											8.5					
B-405-DH	SS-6	7.5	9								29.0					29.0																																		

TABLE F-1

LABORATORY TESTING SUMMARY

STP COL PROJECT

MACTEC ENGINEERING AND CONSULTING, INC.

PROJECT # 6050-08-0496

SAMPLE INFORMATION						PHYSICAL PROPERTIES																																											
						Grain Size (Passing %)					Natural Moisture Content (%) at α_o					Atterberg Limits				Dry Density (pcf) at α_o						Void Ratio				Triaxial Tests						Consolidation					Direct Shear			Chemical Analysis			Compaction		
Boring Number	Sample Number	Sample Top Depth, feet	Sample Bottom Depth, feet	USCS Symbol	USCS Material Description	Gravel	Sand	Silt	Clay	Fines	Physical Properties	Triaxial, Direct Shear, or Unconfined 1	Triaxial, Direct Shear, or Unconfined 2	Triaxial, Direct Shear, or Unconfined 3	Consolidation	Average	Liquid Limit, LL	Plastic Limit, PL	Plasticity Index, PI	Specific Gravity, Gs	Triaxial, Direct Shear, or Unconfined 1	Triaxial, Direct Shear, or Unconfined 2	Triaxial, Direct Shear, or Unconfined 3	Consolidation	Average	Wet Density (pcf)	Triaxial, Direct Shear, or Unconfined 1	Triaxial, Direct Shear, or Unconfined 2	Triaxial, Direct Shear, or Unconfined 3	Consolidation	Average	Test Type (1)	q_u (ksf)	C' (ksf)	φ' (degree)	C (ksf)	φ (degree)	P_c (ksf)	P_o (ksf)	OCR	C_c	C_r	τ (psf) max.	σ (psf)	Relative Displacement at Max Shear (%)	pH	Chloride (mg/kg)	Sulfide (mg/kg)	Optimum Moisture (%)	Maximum Density (pcf)	CBR (%)
B-405-DH	UD-1	10	12			IP-RCTS	IP-RCTS	IP-RCTS	IP-RCTS	IP-RCTS							IP-RCTS	IP-RCTS	IP-RCTS	IP-RCTS																														
B-405-DH	SS-8	13.5	15								19.8					19.8																																	
B-405-DH	SS-9	18.5	20																																										8.4					
B-405-DH	SS-10	23.5	25								27.6					27.6																																	
B-405-DH	SS-11	33.5	35	SM	Silty Sand	0.0	76.9			23.1	25.0					25.0																																	
B-405-DH	SS-12	38.5	40																																										8.1					
B-405-DH	SS-13	43.5	45	CL	Lean Clay	0.0	4.1			95.9	26.3					26.3																																	
B-405-DH	SS-15	53.5	55	CH	Fat Clay						27.8					27.9	68	23	45																															
B-405-DH	SS-16	58.5	60																																										8.6					
B-405-DH	SS-17	68.5	70	SM	Silty Sand	0.0	85.2			14.8	20.9					20.9																																	
B-405-DH	SS-18	73.5	75																																										8.7					
B-405-DH	SS-19	78.5	80	SP-SM	Poorly Graded Sand w/ Silt	0.0	92.1			7.9	21.0					21.0																																	
B-405-DH	UD-4	83	85			IP-RCTS	IP-RCTS	IP-RCTS	IP-RCTS	IP-RCTS							IP-RCTS	IP-RCTS	IP-RCTS	IP-RCTS																														
B-405-DH	SS-20	88.5	90																																										8.5	33.50	44.80			
B-405-DH	SS-22	98.5	100	CH	Fat Clay						27.3					27.3	69	19	50																															
B-405-DH	SS-23	108.5	110	SP-SM	Poorly Graded Sand w/ Silt	0.0	91.0			9.0	19.7					19.7																																	
B-405-DH	UD-5	113	115	CH	Fat Clay							25.8				25.8	73	23	50	2.71	97.5				97.5	122.7	0.729					0.729	UU	4.4			2.2	0.0												
B-405-DH	SS-24	118.5	120	CL	Lean Clay	0.0	9.2			90.8	22.3					22.3																																	
B-405-DH	UD-6	125	127			IP-RCTS	IP-RCTS	IP-RCTS	IP-RCTS	IP-RCTS							IP-RCTS	IP-RCTS	IP-RCTS	IP-RCTS																														
B-405-DH	SS-26	138.5	140	CL	Sandy Lean Clay						17.7					17.7	42	15	27																															
B-405-DH	UD-7	148	150	SM	Silty Sand	0.0	82.3	17.7	0.0	17.7		24.0				24.0	NV	NP	NP	2.68	98.1				98.1	121.8	0.692					0.692												19.79	25.00	85						
B-405-DH	SS-27	158.5	160	CH	Fat Clay						23.7					23.7	55	17	38																															
B-405-DH	UD-8	168	170			IP-RCTS	IP-RCTS	IP-RCTS	IP-RCTS	IP-RCTS							IP-RCTS	IP-RCTS	IP-RCTS	IP-RCTS																														
B-405-DH	SS-28	178.5	180	CL	Sandy Lean Clay						22.6					22.6	34	16	18																															
B-405-DH	SS-29	188.5	190	CL	Sandy Lean Clay						16.7					16.7	38	14	24																															
B-405-DH	UD 9	193	195	CL	Sandy Lean Clay	0.0	34.0			66.0	38.0									2.69																														
B-405-DH	SS-30	198.5	200	CH	Fat Clay						24.0					24.0	61	19	42																															
B-405-DH	UD-10a	222	224			IP-RCTS	IP-RCTS	IP-RCTS	IP-RCTS	IP-RCTS							IP-RCTS	IP-RCTS	IP-RCTS	IP-RCTS																														
B-405-DH	UD-11	233	235									15.4			18.3	16.8				2.76	113.4			111.7			0.521			0.510		UU	7.9			4.0	0.0	15090	20.2	0.9	0.103	0.010							
B-405-DH	SS-32	238.5	240	ML	Sandy Silt	1.6	34.8			63.6	20.1					20.1																																	
B-405-DH	SS-33	258.5	260	CH	Fat Clay						27.3					27.3	72	21	51																															

TABLE F-1

LABORATORY TESTING SUMMARY

STP COL PROJECT

MACTEC ENGINEERING AND CONSULTING, INC.

PROJECT # 5050-06-0496

SAMPLE INFORMATION						PHYSICAL PROPERTIES																																									
						Grain Size (Passing %)					Natural Moisture Content (%) at e_o						Atterberg Limits				Dry Density (pcf) at e_o						Void Ratio					Triaxial Tests						Consolidation					Direct Shear			Chemical Analysis			Compaction		
Boring Number	Sample Number	Sample Top Depth, feet	Sample Bottom Depth, feet	USCS Symbol	USCS Material Description	Gravel	Sand	Silt	Clay	Fines	Physical Properties	Triaxial, Direct Shear, or Unconfined 1	2	3	Consolidation	Average	Liquid Limit, LL	Plastic Limit, PL	Plasticity Index, PI	Specific Gravity, Gs	Triaxial, Direct Shear, or Unconfined 1	2	3	Consolidation	Average	Wet Density (pcf)	Triaxial, Direct Shear, or Unconfined 1	2	3	Consolidation	Average	Test Type (1)	q_u (ksf)	C' (ksf)	φ' (degree)	C (ksf)	φ (degree)	P_c (ksf)	P_o (ksf)	OCR	C_c	C_r	τ (psi) max.	σ (psi)	Relative Displacement at Max Shear (%)	pH	Chloride (mg/kg)	Sulfide (mg/kg)	Optimum Moisture (%)	Maximum Density (pcf)	CBR (%)
B-405-DH	UD-13	293	295			IP-RCTS	IP-RCTS	IP-RCTS	IP-RCTS	IP-RCTS							IP-RCTS	IP-RCTS	IP-RCTS	IP-RCTS																															
B-405-DH	UD-14	318	320	SC	Clayey Sand	0.0	78.3	21.1	0.6	21.7							50	25	25	2.67																															
B-405-DH	SS-37	338.5	340	SM	Silty Sand	0.7	50.1			49.2	16.7					16.7																																		
B-405-DH	UD-15	343	345	SP	Poorly Graded Sand	0.0	95.3	0.0	4.7	4.7		20.9				20.9	NV	NP	NP	2.65	107.7				107.7	130.2	0.565				0.565	UU	5.7			2.9	0.0														
B-405-DH	UD-16	358	360			IP-RCTS	IP-RCTS	IP-RCTS	IP-RCTS	IP-RCTS							IP-RCTS	IP-RCTS	IP-RCTS	IP-RCTS																															
B-405-DH	UD-17	389	390	SC	Clayey Sand	1.8	72.3			25.9	28.0					28.0																																			
B-405-DH	SS-40	398.5	400	CL	Sandy Lean Clay						17.1					17.1	46	15	31																																
B-405-DH	UD-18	418	418.4	SM	Silty Sand	1.1	82.6			16.3										2.69																															
B-405-DH	SS-41	423.5	425	CH	Fat Clay						25.3					25.3	77	23	54																																
B-405-DH	UD-19	438.5	440.5			IP-RCTS	IP-RCTS	IP-RCTS	IP-RCTS	IP-RCTS							IP-RCTS	IP-RCTS	IP-RCTS	IP-RCTS																															
B-405-DH	UD-20	458.5	460.5									17.6			30.0	23.8					106.2			93.7	99.9	123.7	0.587			0.870	0.729	UU	9.0			4.5	0.0	29.140	17.9	0.6	0.292	0.033								
B-405-DH	UD-21	489	490			IP-RCTS	IP-RCTS	IP-RCTS	IP-RCTS	IP-RCTS							IP-RCTS	IP-RCTS	IP-RCTS	IP-RCTS																															
B-405-DH	SS-45	498.5	500	CH	Sandy Fat Clay						21.8					21.8	59	19	40																																
B-405-DH	UD-22	518	519	SM	Silty sand	0.0	79.3	4.1	16.6	20.7	25.4						NV	NP	NP	2.68																															
B-405-DH	SS-46	523.5	525	SM	Silty Sand	0.4	62.4			37.2	21.6					21.6																																		
B-405-DH	SS-47	538.5	540	SM	Silty Sand	2.0	70.6			27.4	20.8					20.8																																		
B-405-DH	UD-24	568	570			IP-RCTS	IP-RCTS	IP-RCTS	IP-RCTS	IP-RCTS							IP-RCTS	IP-RCTS	IP-RCTS	IP-RCTS																															
B-405-DH	SS-49	578.5	580	CL	Lean Clay with Sand	0.7	19.0	38.6	41.7	80.3	19.9					19.9	47	16	31																																
B-405-DH	UD-25	598	599	CL	Lean Clay	0.0	16.2	63.1	26.1	89.2		18.4				18.4	45	16	29	2.69	107.5				107.5	127.3	0.567				0.567	UNC	1.8			0.9														
B-405-DH repl B305DH UD15A	SS 36	320	321.5	CH	Fat Clay	0.0	5.1	44.1	50.8	94.9	19.7					19.7	53	19	34																																
B-407	SS-12	23.5	25	CL	Lean clay with sand	0.0	23.1			76.9	22.8					22.8	26	18	8																																
B-409	UD-1	68	70	SM	Silty Sand	0.0	85.4	2.6	12.0	14.6	14.9	16.9				16.9	NV	NP	NP	2.65	90.9	103.0			97.0	113.3	0.820	0.606			0.713	UU	9.4			4.7	0.0							9.81	15.00	40						
B-409	UD-4A	160	162	CH	Fat Clay							19.6				19.6	62	27	35	2.68	103.3						0.632					UU	1.0			0.5	0.0														
B-409	UD-5	188	190	SP-SM	Poorly Graded Sand w/ Silt	0.0	90.2	9.2	0.6	9.8		26.1				26.1	NV	NP	NP	2.67	101.5						0.642					UU	29.6			14.8	0.0														
B-409	UD-6	198	200									25.3				25.3					96.9						0.739					UU	5.8			2.9	0.0														
B-415	UD-1	88	90	CH	Fat Clay	0.0	6.8	24.2	69.2	93.4		23.9				23.9	61	17	44	2.76	99.9						0.716					UU	2.3			1.2	0.0														
B-415	UD-3	124	126	CH	Fat Clay	0.0	18.5	16.0	65.5	81.5		34.0				34.0	51	16	35	2.71	85.0						0.984					UU	0.3			0.1	0.0														
B-419-DH	SS-2	1.5	3																																											8.4	98.80	82.80			
B-419-DH	SS-3	3	4.5	CH	Fat Clay						25.3					25.3	62	17	45																																
B-419-DH	SS-6	7.5	9																																											8.2	513.00	380.00			
B-419-DH	SS-7	9	10.5	CH	Fat Clay						22.8					22.8	53	17	41																																

TABLE F-1

LABORATORY TESTING SUMMARY

STP COL PROJECT

MACTEC ENGINEERING AND CONSULTING, INC.

PROJECT # 6050-06-0496

SAMPLE INFORMATION						PHYSICAL PROPERTIES																																											
						Grain Size (Passing %)					Natural Moisture Content (%) at e_o					Atterberg Limits				Dry Density (pcf) at e_o							Void Ratio					Triaxial Tests						Consolidation					Direct Shear			Chemical Analysis			Compaction		
Boring Number	Sample Number	Sample Top Depth, feet	Sample Bottom Depth, feet	USCS Symbol	USCS Material Description	Gravel	Sand	Silt	Clay	Fines	Physical Properties	Triaxial, Direct Shear, or Unconfined 1	2	3	Consolidation	Average	Liquid Limit, LL	Plastic Limit, PL	Plasticity Index, PI	Specific Gravity, Gs	Triaxial, Direct Shear, or Unconfined 1	2	3	Consolidation	Average	Wet Density (pcf)	Triaxial, Direct Shear, or Unconfined 1	2	3	Consolidation	Average	Test Type (1)	q_u (ksf)	C' (ksf)	φ' (degree)	C (ksf)	φ (degree)	P_c (ksf)	P_o (ksf)	OCR	C_c	C_r	τ (psi) max.	σ (psi)	Relative Displacement at Max Shear (%)	pH	Chloride (mg/kg)	Sulfide (mg/kg)	Optimum Moisture (%)	Maximum Density (pcf)	CBR (%)
B-419-DH	SS-9	12	13.5																																												8.6	184.00	45.10			
B-419-DH	SS-10	13.5	15	CH	Fat Clay						21.2					21.2	51	16	35																																
B-419-DH	SS-11	18.5	20																																												8.7	84.20	17.80			
B-419-DH	SS-12	23.5	25								21.7					21.7																																			
B-419-DH	SS-14	33.5	35	SM	Silty Sand	0.0	76.1			23.9	26.7					26.7																																			
B-419-DH	SS-15	38.5	40																																												9.8	63.80	11.00			
B-419-DH	SS-16	43.5	45	CH	Fat Clay						29.0					29.0	73	24	49																																
B-419-DH	SS-18	53.5	55	CH	Fat Clay						18.0					18.0	53	17	36																																
B-419-DH	SS-19	58.5	60																																												9.0	55.30	10.20			
B-419-DH	SS-20	63.5	65	SM	Silty Sand	1.5	59.0			39.5	20.5					20.5																																			
B-419-DH	SS-21	68.5	70																																												8.4	42.10	11.60			
B-419-DH	SS-22	73.5	75	SP-SM	Poorly Graded Sand w/ Silt	0.0	90.3			9.7	21.1					21.1																																			
B-419-DH	UD-1	78	80	CL	Lean Clay	0.0	0.6	31.3	68.1	99.4		21.3			23.4	22.3	47	24	23	2.77	105.4			103.5	104.5		0.541			0.630	0.636	UU	7.4			3.7	0.0	5.385	18.0	3.3	0.243	0.037								
B-419-DH	SS-23	83.5	85																																												8.6	40.00	47.80			
B-419-DH	SS-24	88.5	90	CH	Fat Clay						25.5					25.5	68	22	44																																
B-419-DH	UD-2	98	100	CH	Fat Clay	0.0	4.9			95.1		27.0				27.0	61	24	37	2.78	94.1						0.844					UU	1.5			0.7	0.0														
B-419-DH	SS-26	108.5	110	SP-SM	Poorly Graded Sand w/ Silt	0.0	92.8			7.2	20.4					20.4																																			
B-419-DH	UD-3	118	120	CH	Fat Clay	0.0	4.9	24.9	70.2	95.1		19.3			24.4	21.8	56	17	39	2.71	108.5			100.9	104.7	127.8	0.557			0.680	0.619	UU	6.3			3.2	0.0	7.890	21.4	2.7	0.276	0.036								
B-419-DH	SS-27	128.5	130	CH	Fat Clay						25.0					25.0	72	23	49																																
B-419-DH	UD-4	138	140	CL	Lean Clay with Sand	0.0	21.3	45.2	33.5	78.7		14.9			17.3	16.1	40	15	25	2.65	111.5			111.3	111.4	129.3	0.484			0.520	0.502	UU	13.2			6.6	0.0	9.140	15.5	1.7	0.289	0.066								
B-419-DH	SS-28	148.5	150	SM	Silty Sand	0.0	85.2			14.8	21.8					21.8																																			
B-419-DH	UD-5	158	160	CL	Lean Clay	0.0	1.9	39.4	58.7	98.1		19.3			21.3	20.3	47	17	30	2.73	108.7			106.2	107.5	129.2	0.569			0.600	0.585	UU	12.8			6.3	0.0	10.400	19.3	1.9	0.199	0.047								
B-419-DH	SS-29	168.5	170	CH	Fat Clay						24.8					24.8	67	21	46																																
B-419-DH	UD-6	178	180	CH	Fat Clay	0.0	0.2	24.9	74.9	99.8		20.6			23.3	22.0	53	20	33	2.74	109.9			102.9	106.0	129.2	0.557			0.660	0.614	UU	12.5			6.2	0.0	11.650	19.4	1.6	0.233	0.043								
B-419-DH	SS-30	188.5	190	CH	Fat Clay						31.6					31.6	85	23	62																																
B-419-DH	UD-7	198	200	CH	Fat Clay	0.0	6.6	39.6	53.8	93.4	22.5	27.5			19.4	23.1	56	20	36	2.72	91.6			109.0	100.3	123.5	0.653			0.560	0.767	UU	7.7			3.8	0.0	12.900	15.4	1.2	0.149	0.027								
B-421	SS-2	1.5	3																																												8.9					
B-421	SS-4	4.5	6	CH	Fat Clay						18.9					18.9	54	19	35																																
B-421	SS-6	7.5	9																																												8.4					
B-421	SS-9	12	13.5	CH	Fat Clay						20.4					20.4	63	21	42																																
B-421	SS-11	18.5	20	CH	Fat Clay						22.5					22.5	65	22	43																																

TABLE F-1

LABORATORY TESTING SUMMARY

STP COL PROJECT

MACTEC ENGINEERING AND CONSULTING, INC.

PROJECT # 5050-06-0496

SAMPLE INFORMATION						PHYSICAL PROPERTIES																																										
						Grain Size (Passing %)					Natural Moisture Content (%) at e_o						Atterberg Limits				Dry Density (pcf) at e_o						Void Ratio				Triaxial Tests						Consolidation					Direct Shear			Chemical Analysis			Compaction		
Boring Number	Sample Number	Sample Top Depth, feet	Sample Bottom Depth, feet	USCS Symbol	USCS Material Description	Gravel	Sand	Silt	Clay	Fines	Physical Properties	Triaxial, Direct Shear, or Unconfined 1	2	3	Consolidation	Average	Liquid Limit, LL	Plastic Limit, PL	Plasticity Index, PI	Specific Gravity, Gs	Triaxial, Direct Shear, or Unconfined 1	2	3	Consolidation	Average	Wet Density (pcf)	Triaxial, Direct Shear, or Unconfined 1	2	3	Consolidation	Average	Test Type (1)	q_u (tsf)	C' (tsf)	φ' (degree)	C (tsf)	φ (degree)	P_c (tsf)	P_o (tsf)	OCR	C_c	C_r	τ (psi) max.	σ (psi)	Relative Displacement at Max Shear (%)	pH	Chlorids (mg/kg)	Sulfide (mg/kg)	Optimum Moisture (%)	Maximum Density (pcf)	CBR (%)
B-421	SS-12	23.5	25	CL	Lean Clay						25.5					25.5	38	14	24																															
B-421	SS-13	28.5	30	SM	Silty Sand	0.0	75.2			24.8	23.6					23.6																																		
B-421	UD-1A	33.5	35.5	SP-SM	Poorly Graded Sand w/ Silt	0.0	94.5			5.5		23.0				23.0				2.67	97.2				97.2	119.8	0.715				0.715													8.15	10.00	100						
B-421	SS-14	38.5	40																																											8.1					
B-421	SS-15	43.5	45	SP-SM	Poorly Graded Sand w/ Silt	0.0	91.4			8.6	22.8					22.8																																		
B-421	SS-16	48.5	50								35.3					35.3																																		
B-421	UD-2	53	55	CH	Fat Clay	0.0	10.0	28.3	61.7	90.0					28.1	28.1	83	21	62	2.74				94.2						0.810							3.820	6.1	1.6	0.213	0.033									
B-421	SS-17	58	60	ML	Sandy Silt						19.0					19.0	NV	NP	NP																															
B-421	SS-18	63.5	65																																											8.8					
B-421	SS-19	68.5	70	ML	Silt						20.1					20.1	NV	NP	NP																															
B-421	SS-20	73.5	75	SP-SM	Poorly Graded Sand w/ Silt	0.0	92.2			7.8	20.3					20.3																																		
B-421	SS-21	78.5	80																																											8.3	25.80	18.10			
B-421	UD-3	83	85	CH	Fat Clay	0.0	2.0	29.4	68.6	98.0		21.2			24.6	22.9	56	20	36	2.73	104.8			100.1	102.5	125.9	0.625			0.700	0.663	UU	6.2			3.1	0.0	5.700	18.0	3.2	0.229	0.040								
B-421	SS-22	88.5	90								23.6					23.6																																		
B-421	SS-23	93.5	95	CH	Fat Clay						21.5					21.5	65	20	45																																
B-421	SS-24	98.5	100	SM	Silty Sand	0.0	87.7			12.3	19.3					19.3																																		
B-422C	SS 14	23.5	25	SC	Clayey Sand	0.0	58.7			41.3	27.0					27.0																																		
B-427	SS-3	3	4.5	CH	Fat Clay						23.5					23.5	58	19	39																															
B-427	SS-4	4.5	6																																											7.7					
B-427	SS-7	9	10.5	CH	Fat Clay						24.0					24.0	68	21	47																																
B-427	SS-8	10.5	12																																											8.1					
B-427	SS-12	23.5	25	SM	Silty Sand	0.0	59.4			40.6	23.8					23.8																																		
B-427	SS-14	33.5	35	SP-SM	Poorly Graded Sand w/ Silt	0.0	92.2			7.8	24.8					24.8																																		
B-427	SS-17	48.5	50	CH	Fat Clay						43.0					43.0	74	22	52																															
B-427	SS-19	58.5	60	CL	Lean Clay						18.8					18.8	39	16	23																															
B-427	SS-21	68.5	70	SP-SM	Poorly Graded Sand w/ Silt	0.0	90.9			9.1	20.3					20.3																																		
B-427	SS-24	83.5	85	CL	Lean Clay						18.9					18.9	37	13	24																															
B-427	SS-26	93.5	95	SM	Silty Sand	0.0	86.9			13.1	21.5					21.5																																		
B-427	SS-28	108.5	110								16.7					16.7																																		
B-427	SS-29	118.5	120	CH	Fat Clay						21.0					21.0	59	21	38																															
B-427	SS-30	128.5	130	CH	Fat Clay						20.8					20.8	63	20	43																															

TABLE F-1

LABORATORY TESTING SUMMARY

STP COL PROJECT

MACTEC ENGINEERING AND CONSULTING, INC.

PROJECT # 6050-06-8496

SAMPLE INFORMATION						PHYSICAL PROPERTIES																																										
						Grain Size (Passing %)					Natural Moisture Content (%) at e_o						Atterberg Limits				Dry Density (pcf) at e_o						Void Ratio					Triaxial Tests						Consolidation					Direct Shear			Chemical Analysis			Compaction		
Boring Number	Sample Number	Sample Top Depth, feet	Sample Bottom Depth, feet	USCS Symbol	USCS Material Description	Gravel	Sand	Silt	Clay	Fines	Physical Properties	Triaxial, Direct Shear, or Unconfined 1	2	3	Consolidation	Average	Liquid Limit, LL	Plastic Limit, PL	Plasticity Index, PI	Specific Gravity, Gs	Triaxial, Direct Shear, or Unconfined 1	2	3	Consolidation	Average	Wet Density (pcf)	Triaxial, Direct Shear, or Unconfined 1	2	3	Consolidation	Average	Test Type (1)	$\bar{\sigma}_c$ (ksf)	C' (ksf)	φ' (degrees)	C (ksf)	φ (degrees)	P_c (ksf)	P_o (ksf)	OCR	C_c	C_r	τ (psi) max.	σ (psi)	Relative Displacement at Max Shear (%)	pH	Chloride (mg/kg)	Sulfate (mg/kg)	Optimum Moisture (%)	Maximum Density (pcf)	CBR (%)
B-427	SS-31	138.5	140	CL	Lean Clay						15.7					15.7	45	18	27																															
B-427	SS-32	148.5	150	ML	Sandy Silt	0.0	46.5			53.5	22.3					22.3																																		
B-428-DH	UD-6	113	115	CH	Fat Clay	0.0	8.6	22.8	68.8	91.4		27.3				27.3	62	21	41	2.80	96.3						0.815					UNC	4.2			2.1	0.0													
B-428-DH	SS-23	108.5	110	SP-SM	Poorly Graded Sand w/ Silt	4.8	87.5			7.7	13.5																																							
B-430	UD-3	133	135									32.8	24.1			28.5					91.0	94.4			92.7		0.852	0.786			0.819	CU		0.5	0.0	0.5	0.0													
B-432	SS-2	1.5	3																																											6.4	220.00	78.30			
B-432	UD-1	3	5	CH	Fat Clay	0.0	9.6	42.2	48.2	90.4		20.7			22.8	21.8	65	23	42	2.74	101.7			100.4	101.1	123.0	0.657			0.580	0.569	UNC	4.6			2.3		0.580	10.0	17.2	0.316	0.020								
B-432	SS-4	6.5	8																																											7.8	1230.00	822.60			
B-432	SS-5	8	9.5								22.3					22.3																																		
B-432	SS-7	11	12.5																																											8.7	168.00	32.40			
B-432	SS-8	12.5	14	CL	Lean Clay						21.4					21.4	44	18	26																																
B-432	UD-2	15	17	CL	Lean Clay	0.0	0.4	80.1	19.5	99.6		23.2			24.8	24.0	31	20	11	2.70	99.0			96.7	97.9	121.4	0.702			0.740	0.721	UNC	1.8			0.9		1.440	5.7	4.0	0.258	0.020								
B-432	SS-9	18.5	20																																											8.9	82.40	20.00			
B-432	SS-10	23.5	25	SM	Silty Sand	0.0	63.9			36.1	25.8					25.8																																		
B-432	UD-3	25	27	SM	Silty Sand						17.8						NV	NP	NP													UNC																			
B-432	SS-11	28.5	30																																											8.9	99.40	13.20			
B-432	SS-12	33.5	35	SM	Silty Sand	0.0	80.0			20.0	24.2					24.2																																		
B-432	SS-15	48.5	50	CH	Fat Clay						29.8					29.8	60	21	39																																
B-432	SS-16	53.5	55								23.4					23.4																																		
B-432	SS-17	58.5	60								21.2					21.2																																		
B-432	SS-18	63.5	65	CH	Fat Clay						26.2					26.2	84	27	57																																
B-432	SS-19	68.5	70								28.1					28.1																																		
B-432	SS-20	73.5	75								20.3					20.3																																		
B-432	SS-21	78.5	80	SP-SM	Poorly Graded Sand w/ Silt	0.0	91.4			8.6	20.8					20.8																																		
B-432	SS-23	88.5	90	SM	Silty Sand	0.0	57.7			42.3	21.8					21.8																																		
B-432	SS-25	98.5	100	SM	Silty Sand	0.0	87.3			12.7	22.8					22.8																																		
B-432	SS 27	118.5	120	CH	Fat Clay						24.7					24.7	70	23	47																																
B-432	SS-28	128.5	130	CH	Fat Clay						21.2					21.2	66	19	47																																
B-432	SS-30	148.5	150	SM	Silty Sand	0.0	82.5			17.5	19.8					19.8																																		
B-902	UD-1	5	7	CH	Fat Clay							21.3				21.3	65	22	43		102.8				102.8	124.7	0.639				0.639	UNC	2.8			1.3															
B-902	SS-7	11.5	13	CH	Fat Clay						19.5					19.5	56	20	36																																

TABLE F-1

LABORATORY TESTING SUMMARY

STP COL PROJECT

MACTEC ENGINEERING AND CONSULTING, INC.

PROJECT # 5050-06-8496

SAMPLE INFORMATION						PHYSICAL PROPERTIES																																											
						Grain Size (Passing %)					Natural Moisture Content (%) at e_o					Atterberg Limits				Dry Density (pcf) at e_o						Void Ratio					Triaxial Tests						Consolidation					Direct Shear			Chemical Analysis			Compaction		
Boring Number	Sample Number	Sample Top Depth, feet	Sample Bottom Depth, feet	USCS Symbol	USCS Material Description	Gravel	Sand	Silt	Clay	Fines	Physical Properties	Triaxial, Direct Shear, or Unconfined 1	2	3	Consolidation	Average	Liquid Limit, LL	Plastic Limit, PL	Plasticity Index, PI	Specific Gravity, Gs	Triaxial, Direct Shear, or Unconfined 1	2	3	Consolidation	Average	Wet Density (pcf)	Triaxial, Direct Shear, or Unconfined 1	2	3	Consolidation	Average	Test Type (1)	q_u (ksf)	C' (ksf)	φ' (degrees)	C (ksf)	φ (degrees)	P_c (ksf)	P_o (ksf)	OCR	C_c	C_r	τ (psi) max.	σ (psi)	Relative Displacement at Max Shear (%)	pH	Chloride (mg/kg)	Sulfate (mg/kg)	Optimum Moisture (%)	Maximum Density (pcf)	CBR (%)
B-902	UD-2	15	17	CH	Fat Clay	0.0	0.6	19.5	80.8	99.4		24.3				24.3	59	20	39	2.73	100.2						0.701					UU	1.8			0.9	0.0													
B-902	SS-9	18.5	20	ML	Silt with Sand	0.0	28.0			72.0	26.8					26.8	NV	NP	NP																																
B-902	UD-3	23	25	SM	Silty Sand	0.0	53.8	30.0	16.4	46.4		24.8	24.9			24.9	NV	NP	NP	2.65	95.9	96.5			97.2	121.3	0.727	0.679			0.703	UU	6.7			3.4	0.0						7.12	10.00	40						
B-902	SS-10	28.5	30	SM	Silty Sand	0.0	81.4			18.6	24.0					24.0																																			
B-902	SS-11	33.5	35	SP-SM	Poorly Graded Sand w/ Silt	0.0	89.8			10.2	22.5					22.5																																			
B-902	SS-12	38.5	40	SP-SM	Poorly Graded Sand w/ Silt	0.0	93.5			6.5	22.5					22.5																																			
B-902	SS-14	48.5	50	CH	Fat Clay						31.4					31.4	67	18	49																																
B-902	SS-16	58.5	60	ML	Silt with Sand	0.0	19.9	62.6	17.5	80.1	24.9					24.9	NV	NP	NP																																
B-902	SS-18	68.5	70	CH	Fat Clay						25.7					25.7	73	25	48																																
B-902	SS-20	78.5	80	CH	Fat Clay						23.2					23.2	61	19	42																																
B-902	SS-22	88.5	90	CH	Fat Clay						23.8					23.8	66	22	44																																
B-902	SS-24	98.5	100	CH	Fat Clay						28.0					28.0	71	20	51																																
B-904	SS-3	3	4.5																																											8.3	92.60	232.00			
B-904	UD-1	5	7	CH	Fat Clay							22.3				22.3	68	22	46		99.7				99.7	122.0	0.691				0.691	UNC	2.3			1.2														
B-904	SS-6	10.5	12																																											8.5	169.00	36.00			
B-904	UD-2	18	20	CH	Fat Clay							21.1				21.1	63	22	41		101.3				101.3	122.7	0.664				0.664	UNC	3.9			2.0														
B-904	SS-8	23.5	25																																											6.7	124.00	12.30			
B-904	UD-3	28	30	ML	Sandy Silt	0.0	34.3			65.7		25.2	26.1	24.4		25.2	NV	NP	NP	2.71	96.7	96.6	97.3		96.9	121.3	0.743	0.744	0.733		0.740	CU		2.0	28.0	5.1	23.0														
B-904	UD-3	28	30									25.0									93.7						0.806					UU	0.3			0.1	0.0														
B-904	SS-10	33.5	35																																											8.8	106.00	23.20			
B-904	SS-11	38.5	40	SM	Silty Sand	0.0	83.4			16.6	22.4					22.4																																			
B-904	SS-12A/B	44	45																																											8.7	33.40	6.70			
B-904	SS-13	48.5	50																																											8.5	66.90	143.00			
B-904	UD-4	53	55	SC	Clayey Sand	0.0	78.3	4.8	16.9	23.7		32.5				32.5	64	24	40	2.66	87.4				87.4		0.929				0.929	UU	0.7			0.3	0.0														
B-904	SS-15	63.5	65	CH	Fat Clay						23.1					23.1	64	21	43																																
B-904	SS-17	73.5	75	CH	Fat Clay						22.4					22.4	65	23	42																																
B-904	UD-5	83	85	CH	Fat Clay							24.0				24.0	62	21	41	2.71	98.6				98.6		0.716				0.716	UU	3.3			1.6	0.0														
B-904	SS-20	93.5	95	CH	Fat Clay						25.0					25.0	64	21	43																																
B-908	SS-3	3	4.5	CH	Fat Clay						27.0					27.0	53	21	32																																
B-908	SS-9	12	13.5	CH	Fat Clay						24.8					24.8	72	25	47																																
B-908	SS-12	23.5	25	SM	Silty Sand	0.0	66.2			33.8	24.0					24.0																																			

TABLE F-1

LABORATORY TESTING SUMMARY

STP COL PROJECT

MACTEC ENGINEERING AND CONSULTING, INC.

PROJECT # 5050-06-0456

SAMPLE INFORMATION						PHYSICAL PROPERTIES																																															
						Grain Size (Passing %)					Natural Moisture Content (%) at e_o					Atterberg Limits				Dry Density (pcf) at e_o						Void Ratio					Trialxial Tests						Consolidation					Direct Shear			Chemical Analysis			Compaction		
Boring Number	Sample Number	Sample Top Depth, feet	Sample Bottom Depth, feet	USCS Symbol	USCS Material Description	Gravel	Sand	Silt	Clay	Fines	Physical Properties	Triaxial, Direct Shear, or Unconfined 1	Triaxial, Direct Shear, or Unconfined 2	Triaxial, Direct Shear, or Unconfined 3	Consolidation	Average	Liquid Limit, LL	Plastic Limit, PL	Plasticity Index, PI	Specific Gravity, Gs	Triaxial, Direct Shear, or Unconfined 1	Triaxial, Direct Shear, or Unconfined 2	Triaxial, Direct Shear, or Unconfined 3	Consolidation	Average	Wet Density (pcf)	Triaxial, Direct Shear, or Unconfined 1	Triaxial, Direct Shear, or Unconfined 2	Triaxial, Direct Shear, or Unconfined 3	Consolidation	Average	Test Type (1)	q_u (ksf)	C' (ksf)	φ' (degrees)	C (ksf)	φ (degrees)	P_c (ksf)	P_o (ksf)	OCR	C_c	C_r	τ (psi) max.	σ (psi)	Relative Displacement at Max Shear (%)	pH	Chloride (mg/kg)	Sulfide (mg/kg)	Optimum Moisture (%)	Maximum Density (pcf)	CSR (%)
B-908	SS-13	28.5	30	SM	Silty Sand	0.8	65.1			34.3	24.3					24.3																																					
B-908	SS-14	33.5	35	SM	Silty Sand	1.4	84.0			14.6	23.0					23.0																																					
B-908	SS-15	38.5	40	SM	Silty Sand	5.9	81.8			12.3	20.2					20.2																																					
B-908	SS-16	43.5	45	SM	Silty Sand	0.0	57.1			42.9	22.4					22.4																																					
B-908	SS-18	53.5	55	CH	Fat Clay						30.6					30.6	83	24	59																																		
B-908	SS-21	68.5	70	CH	Fat Clay						28.1					28.1	71	31	40																																		
B-908	SS-23	78.5	80	CH	Fat Clay						21.8					21.8	59	17	42																																		
B-908	SS-24	83.5	85	CL-ML	Silty Clay						20.5					20.5	27	21	6																																		
B-908	SS-26	93.5	95	CH	Fat Clay						19.1					19.1	52	18	34																																		
B-909	SS-2	1.5	3	CH	Fat Clay						27.0					27.0	63	19	44																																		
B-909	SS-6	7.5	9	CH	Fat Clay						26.5					26.5	77	24	53																																		
B-909	SS-10	13.5	15	CH	Fat Clay						21.1					21.1	64	28	36																																		
B-909	SS-12	23.5	25	CL	Lean Clay						21.6					21.6	30	20	10																																		
B-909	SS-13	28.5	30	ML	Sandy Silt	2.1	38.3			59.6	26.0					26.0																																					
B-909	UD-1	33	35	SM	Silty Sand	0.0	75.9			24.1		23.8	22.6			23.2				2.73	101.8	98.1			99.9	123.0	0.679	0.737			0.708	UU	11.3			5.7	0.0						7.74	10.00	100						
B-909	SS-14	38.5	40																																										8.9	96.30	10.29			
B-909	UD-2	43	45	CH	Fat Clay	0.0	0.0	12.7	87.3	100.0		25.0			25.7	25.4	82	24	58	2.76	96.5			96.8	96.6	121.1	0.785			0.780	0.783	UU	4.4			2.2	0.0	3.195	11.3	3.5	0.086	0.007									
B-909	UD-3	48	50	CH	Fat Clay							30.6			34.9	32.8	74	21	53	2.65	88.8			86.0	87.3	115.9	0.969			0.920	0.895	UU	4.8			2.4	0.0	3.505	16.9	4.8	0.468	0.030									
B-909	UD-4	53	55	CH	Fat Clay	0.0	4.3	24.4	71.3	95.7		30.0				30.0	66	26	40	2.77	95.2				95.2		1.030				1.039	UU	9.9			0.4	0.0															
B-909	SS-16	63.5	65	CH	Fat Clay						23.5					23.5	68	21	47																																		
B-909	SS-18	73.5	75	CH	Fat Clay						23.7					23.7	71	21	50																																		
B-909	UD-5	85	87	CL	Lean Clay	0.0	3.8	26.5	69.7	96.2		27.6	19.3	18.7		21.9	49	23	26	2.75	94.8	106.8	107.1				0.811	0.581	0.603			CU		1.0	12.0	0.8	6.0															
B-909	UD-6	93	95	CH	Fat Clay							17.9				17.9	55	21	34	2.71	109.7				109.7		0.542				0.542	UU	7.1			3.6	0.0															
B-909	UD-7	98	100									21.5				21.5					99.7				99.7		0.691				0.691	UU	5.0			2.5	0.0															
B-911	SS-12	23.5	25	ML	Silt	0.0	5.7			94.3	28.4					28.4	NV	NP	NP																																		
B-912	SS-4	4.5	6																																										8.5	258.00	141.00			
B-912	SS-6	7.5	9	CH	Fat Clay						28.5					28.5	80	22	58																																		
B-912	SS-9	12	13.5																																										6.6	46.80	6.10			
B-912	SS-10	13.5	15	CH	Fat Clay						17.2					17.2	58	17	41																																		
B-912	SS-11	18.5	20																																										8.4	119.00	25.90			
B-912	SS-12	23.5	25								23.8					23.8																																				

TABLE F-1

LABORATORY TESTING SUMMARY

STP COL PROJECT

MACTEC ENGINEERING AND CONSULTING, INC.

PROJECT # 5060-06-0496

SAMPLE INFORMATION						PHYSICAL PROPERTIES																																													
						Grain Size (Passing %)					Natural Moisture Content (%) at e_o						Atterberg Limits				Dry Density (pcf) at e_o						Void Ratio				Triaxial Tests						Consolidation					Direct Shear			Chemical Analysis			Compaction		
Boring Number	Sample Number	Sample Top Depth, feet	Sample Bottom Depth, feet	USCS Symbol	USCS Material Description	Gravel	Sand	Silt	Clay	Fines	Physical Properties	Triaxial, Direct Shear, or Unconfined 1	2	3	Consolidation	Average	Liquid Limit, LL	Plastic Limit, PL	Plasticity Index, PI	Specific Gravity, Gs	Triaxial, Direct Shear, or Unconfined 1	2	3	Consolidation	Average	Wet Density (pcf)	Triaxial, Direct Shear, or Unconfined 1	2	3	Consolidation	Average	Test Type (1)	σ_{3c} (ksf)	C' (ksf)	φ' (degrees)	C (ksf)	φ (degrees)	P_c (ksf)	P_o (ksf)	OCR	C_c	C_r	τ (psi) max.	σ (psi)	Relative Displacement at Max Shear (%)	pH	Chloride (mg/kg)	Sulfide (mg/kg)	Optimum Moisture (%)	Maximum Density (pcf)	CBR (%)
B-912	SS-13	28.5	30																																																
B-912	SS-14	33.5	35	ML	Sandy Silt	4.0	36.8			59.2	26.5					26.5																													8.6	90.10	13.50			
B-912	SS-15	38.5	40																																																
B-912	SS-16	43.5	45	ML	Silt with Sand	0.8	17.9			81.5	18.8					18.8																													9.0	92.10	9.80			
B-912	SS-17A	48.5	50								26.2					26.2																																		
B-912	SS-18	53.5	55								34.3					34.3																																		
B-912	SS-19	58.5	60	CH	Fat Clay						25.9					25.9	72	22	50																																
B-912	SS-20	63.5	65								20.8					20.8																																		
B-912	SS-21	68.5	70	CL	Lean Clay						19.2					19.2	46	18	28																																
B-912	SS-22	73.5	75								24.8					24.8																																		
B-912	SS-23	78.5	80								24.5					24.5																																		
B-912	SS-24	83.5	85	CH	Fat Clay						25.0					25.9	74	21	53																																
B-912	SS-25	88.5	90								26.2					26.2																																		
B-912	SS-26	93.5	95								29.2					29.2																																		
B-912	SS-27	98.5	100								26.4					26.4																																		
B-914	SS-4	4.5	6	CL	Lean Clay						16.5					16.5	44	12	32																																
B-914	SS-6	7.5	9								28.0					28.0																																		
B-914	SS-8	10.5	12								26.0					26.0																																		
B-914	SS-10	13.5	15								21.5					21.5																																		
B-914	SS-11	18.5	20	CH	Fat Clay						24.4					24.4	65	19	46																																
B-914	SS-12	23.5	25	ML	Sandy Silt	0.0	30.2			69.8	26.9					26.9																																			
B-914	SS-13	28.5	30	SM	Silty Sand	0.0	66.3			33.7	25.4					25.4																																			
B-914	SS-14	33.5	35	ML	Sandy Silt	0.0	47.0			53.0	25.5					25.5																																			
B-914	SS-15	38.5	40	SM	Silty Sand	0.0	79.0			21.0	25.0					25.0																																			
B-914	SS-16	43.5	45	CH	Fat Clay						28.1					28.1	72	20	52																																
B-914	SS-17	48.5	50								38.8					38.8																																		
B-914	SS-18	53.5	55								24.7					24.7																																		
B-914	SS-19	58.5	60								20.5					20.5																																		
B-914	SS-20	63.5	65	ML	Sandy Silt	0.2	42.5			57.3	22.9					22.9																																			
B-914	SS-21	68.5	70	ML	Sandy Silt	0.0	48.0			52.0	19.2					19.2																																			
B-914	SS-22	73.5	75	SM	Silty Sand	0.0	81.3			18.7	19.8					19.8																																			

TABLE F-1

LABORATORY TESTING SUMMARY

STP COL PROJECT

MACTEC ENGINEERING AND CONSULTING, INC.

PROJECT # 5050-08-0494

SAMPLE INFORMATION						PHYSICAL PROPERTIES																																											
						Grain Size (Passing %)					Natural Moisture Content (%) at e_o					Atterberg Limits				Dry Density (pcf) at e_o						Void Ratio					Triaxial Tests						Consolidation					Direct Shear			Chemical Analysis			Compaction		
Boring Number	Sample Number	Sample Top Depth, feet	Sample Bottom Depth, feet	USCS Symbol	USCS Material Description	Gravel	Sand	Silt	Clay	Fines	Physical Properties	Triaxial, Direct Shear, or Unconfined 1	2	3	Consolidation	Average	Liquid Limit, LL	Plastic Limit, PL	Plasticity Index, PI	Specific Gravity, Gs	Triaxial, Direct Shear, or Unconfined 1	2	3	Consolidation	Average	Wet Density (pcf)	Triaxial, Direct Shear, or Unconfined 1	2	3	Consolidation	Average	Test Type (1)	q_u (ksf)	C' (ksf)	φ' (degree)	C (ksf)	φ (degree)	P_c (ksf)	P_o (ksf)	OCR	C_c	C_r	τ (psi) max.	σ (psi)	Relative Displacement at Max Shear (%)	pH	Chloride (mg/kg)	Sulfide (mg/kg)	Optimum Moisture (%)	Maximum Density (pcf)	CBR (%)
B-914	SS-23	78.5	80	SM	Silty Sand	0.2	85.6			14.2	18.6					18.6																																			
B-914	SS-24	83.5	85	CH	Fat Clay						22.3					22.3	68	19	49																																
B-914	SS-25	88.5	90								24.5					24.5																																		
B-914	SS-26	93.5	95								23.3					23.3																																		
B-914	SS-27	98.5	100								28.1					28.1																																		
B-918	UD-1	13	15	CH	Fat Clay							21.3	21.9	23.8			58	24	34		108.6	107.2	100.7				0.581	0.573	0.673																						
B-918	UD-3	48	50	CH	Fat Clay						22.5	17.4	22.4			20.8	59	24	35		92.9	101.7			97.3		0.814	0.858			0.736	CU		0.3	31.7	1.4	8.7														
B-918	UD-1	3	5									15.7				15.7					114.9				114.9	133.0	0.467				0.467	UNC	4.3			2.1															
B-918	UD-2	18	20	CL	Lean Clay							23.4				23.4	46	20	26		100.2						0.682					UU	3.7			1.9	0.0														
B-918	UD-4	58	60	CL-ML	Silty Clay with sand							17.7				17.7	22	16	6		107.7				107.7	126.8	0.565				0.565	UNC	0.5			0.3															
B-918 rept B919 UD-4	SS-19	83.5	85	SP	Poorly Graded Sand	0.0	97.0			3.0	19.3					19.3	NV	NP	NP																																
B-919	SS-2	1.5	3																																												8.0	25.10	22.80			
B-919	SS-3	3	4.5								22.2					22.2																																		
B-919	SS-5	6	7.5																																												8.0	1130.00	311.00			
B-919	UD-1	8	10	CH	Fat Clay						23.3	23.6				23.5	68	21	47	2.65	101.0				101.0		0.668				0.668	UU	2.4			1.2	0.0														
B-919	SS-8	10.5	12																																												8.5	253.00	39.10			
B-919	SS-9	18.5	20																																												8.5	191.00	74.40			
B-919	UD-2	23	25	ML	Sandy Silt							20.4	21.9	22.6		21.8	NV	NP	NP	2.69	98.0	93.3	86.9		96.1	116.8	0.721	0.808	0.740		0.756	CU		0.0	31.0	0.4	47.0														
B-919	SS-10	28.5	30																																												8.7	86.70	10.50			
B-919	SS-11	33.5	35	SP-SM	Poorly Graded Sand w/ Silt	0.0	88.2			11.8	27.0					27.0																																			
B-919	UD-3	43	45	CH	Fat Clay							26.5				26.5	66	24	42		94.5				94.5		0.784				0.784	UU	3.5			1.7	0.0														
B-919	SS-13	48.5	50	CH	Fat Clay						23.1					23.1	65	20	45																																	
B-919	SS-16	63.5	65	SM	Silty Sand	0.0	80.1			19.9	18.9					18.9																																			
B-919	SS-18	73.5	75	SP-SM	Poorly Graded Sand w/ Silt	0.0	90.7			9.3	19.4					19.4																																			
B-919	UD-4	83	85																	2.82																															
B-919	SS-21	93.5	95	SM	Silty Sand	0.0	56.3			43.7	25.2					25.2																																			
B-927	SS-3	3	4.5																																												8.4	244.00	165.00			
B-927	SS-4	4.5	6								17.0					17.0																																			
B-927	SS-6	6	7.5	CL	Lean Clay with Sand	1.7	19.9			78.4	19.2					19.2	34	16	18																																	
B-927	SS-7	9	10.5																																												8.5	8.50	9.30			
B-927	SS-8	10.5	12	ML	Sandy Silt	3.7	28.2	56.0	12.1	68.1	22.3					22.3	NV	NP	NP																																	

TABLE F-1

LABORATORY TESTING SUMMARY

STP COL PROJECT

MACTEC ENGINEERING AND CONSULTING, INC.

PROJECT # 6050-06-0496

SAMPLE INFORMATION						PHYSICAL PROPERTIES																																									
						Grain Size (Passing %)					Natural Moisture Content (%) at e_o					Atterberg Limits				Dry Density (pcf) at e_o						Void Ratio				Triaxial Tests						Consolidation							Direct Shear		Chemical Analysis			Compaction		
Boring Number	Sample Number	Sample Top Depth, feet	Sample Bottom Depth, feet	USCS Symbol	USCS Material Description	Gravel	Sand	Silt	Clay	Fines	Physical Properties	Triaxial, Direct Shear, or Unconfined 1	Triaxial, Direct Shear, or Unconfined 2	Triaxial, Direct Shear, or Unconfined 3	Consolidation	Average	Liquid Limit, LL	Plastic Limit, PL	Plasticity Index, PI	Specific Gravity, Gs	Triaxial, Direct Shear, or Unconfined 1	Triaxial, Direct Shear, or Unconfined 2	Triaxial, Direct Shear, or Unconfined 3	Consolidation	Average	Wet Density (pcf)	Triaxial, Direct Shear, or Unconfined 1	Triaxial, Direct Shear, or Unconfined 2	Triaxial, Direct Shear, or Unconfined 3	Consolidation	Average	Test Type (1)	q_u (ksf)	C' (ksf)	φ' (degree)	C (ksf)	φ (degree)	P_c (ksf)	P_v (ksf)	OCR	C_c	C_r	τ (psi) max.	σ (psi)	Relative Displacement at Max Shear (%)	pH	Chloride (mg/kg)	Sulfate (mg/kg)	Optimum Moisture (%)	Maximum Density (pcf)	CBR (%)
B-927	SS-10	23.5	25	CL	Lean Clay						25.5					25.5	29	19	10																														
B-927	UD-2	28	30									21.3				21.3					105.3				105.3	127.7	0.600				0.600	UNC	1.7			0.9												
B-927	UD-3	48	50	CH	Fat Clay							28.2				28.2	54	21	33		95.1				95.1	121.9	0.772				0.772	UNC	3.6			1.9												
TP1-B919	1	0.5	6	CH	Fat Clay	0.0	11.0	45.1	43.9	89.0	20.2					20.2	50	17	33																												12.40	115.6	
TP1-B927	1	0.5	4	CL	Lean Clay	0.0	11.4	41.6	47.0	88.6	24.1					24.1	45	15	30																												13.60	118.4	3
TP1-C304	1	3	6.75	CH	Fat Clay	0.0	9.5	44.0	46.5	90.5	21.7					21.7	51	15	36																												11.20	112.2	
TP1-C404	1	2.25	7	CH	Fat Clay	0.9	12.1	28.7	58.3	87.0	24.3					24.3	62	18	44																												13.80	116.6	3
TP2-B919	2	6	8.5	CH	Fat Clay	0.0	0.8	7.6	91.6	99.2	25.9					25.9	74	22	52																												18.20	109.1	
TP2-B927	2	5.5	8.5	CL	Lean Clay	0.2	8.8	48.1	42.9	91.0	22.0					22.0	41	15	28																												11.30	117.6	
TP2-C304	2	6.75	9	CL	Lean Clay	0.4	9.2	52.9	27.5	80.4	25.5					25.5	40	17	23																												9.50	121.8	2
TP2-C404	2	7	9	CH	Fat Clay	1.0	1.9	7.2	89.9	97.1	28.4					28.4	77	21	56																												9.40	121.7	3

Notes: (1) UNC = Unconfined Compression Test, UU = Unconsolidated - Undrained, CU = Consolidated - Undrained

(2) IP = Test in Progress

Prepared By/Date: Sm 4/3/07
Checked By/Date: AM 4/3/07

Table F-2 **LABORATORY EQUIPMENT**

Laboratory equipment used for the testing included the following:

Serial or Lab ID Number(s)	MACTEC Office	Equipment Identification
1 thru 11, 472046	Charlotte	Hydrometer Cylinder
1 thru 4, A, B, and C	Charlotte	Soil/Solids Specific Flask/Pycnometer
100	Charlotte	Ruler
936-2	Charlotte	Mixer
H-4265	Charlotte	Mixing Cup
02105539	Charlotte	Caliper/Micrometer
1512	Charlotte	Balance/Scale (GT 4100)
N5	Charlotte	#200 Sieve
N4	Charlotte	#140 Sieve
28	Charlotte	#100 Sieve
N3	Charlotte	#60 Sieve
15	Charlotte	#40 Sieve
23	Charlotte	#20 Sieve
N2	Charlotte	#10 Sieve
7	Charlotte	#4 Sieve
10	Charlotte	3/8" Sieve
1	Charlotte	½" Sieve
12	Charlotte	¾" Sieve
4	Charlotte	1" Sieve
6	Charlotte	1-½" Sieve
3	Charlotte	2" Sieve
47	Charlotte	3" Sieve
0130869	Charlotte	Caliper
VAC-1	Charlotte	Vacuum System
H-1748	Charlotte	Absolute Pressure Gauge
98054228	Charlotte	Liquid Limit Device
5635726	Charlotte	Digital Immersion Thermometer
4085	Charlotte	Thermometer
154054	Charlotte	Caliper/Micrometer (Dial)
H-3250-943439720	Charlotte	Caliper/Micrometer (Length Comparator)
099472	Charlotte	Gage Blocks
9048	Charlotte	Balance
0002007	Charlotte	Caliper
4048	Charlotte	Scale
F9-1	Charlotte	Feeler Gage Set
622	Charlotte	Compression/Tension Loading Device
625	Charlotte	Digital Stopwatch
G-1	Charlotte	Weights
380645, 548966	Charlotte	Balance/Scale
O9HC, D ,E, F, G, H, 1290, CA8433	Charlotte	Weights
10190	Charlotte	Proving Ring

Serial or Lab ID (LID) Number(s)	MACTEC Office	Equipment Identification
RPA-6866	Charlotte	Drying Oven
05969	Charlotte	Digital Indicator (Mitutoyo)
H-4229-2	Charlotte	Calibration Block
144, 109, 500, 508, 503	Atlanta	Drying Ovens
2052	Atlanta	Flask #1
2053	Atlanta	Flask #2
2054	Atlanta	Flask #3
2055	Atlanta	Flask #4
2056	Atlanta	Flask #5
2057	Atlanta	Flask #6
2196	Atlanta	Flask #7
2197	Atlanta	Flask #8
2198	Atlanta	Flask #12
2180	Atlanta	Flask #16
2181	Atlanta	Flask #22
2182	Atlanta	Flask #25
2183	Atlanta	Flask #26
2184	Atlanta	Flask #27
2185	Atlanta	Flask #28
2186	Atlanta	Flask #29
2187	Atlanta	Flask #31
2188	Atlanta	Flask SP-2
2189	Atlanta	Flask SP-3
2190	Atlanta	Flask SP-4
2191	Atlanta	Flask SP-5
2192	Atlanta	Flask SP-7
2193	Atlanta	Flask SP-8
2194	Atlanta	Flask SP-9
2195	Atlanta	Flask SP-10
149	Atlanta	Thermometer
2126	Atlanta	Standard Thermometer
514	Atlanta	Glass Thermometer
418, 412, 411, 143, 416	Atlanta	Balance/Scale
448, 1150, 1260, 674, 444	Atlanta	#4 Sieve
1142, 568, 650, 443, 1143	Atlanta	#10 Sieve
569, 1141, 1140	Atlanta	#20 Sieve
1186, 1264, 1991, 1187	Atlanta	#40 Sieve
319, 1181	Atlanta	#60 Sieve
1918, 1138	Atlanta	#140 Sieve
1915, 1876, 2531	Atlanta	#200 Sieve

Serial or Lab ID (LID) Number(s)	MACTEC Office	Equipment Identification
310	Atlanta	3" Sieve
438	Atlanta	2-½" Sieve
743	Atlanta	2" Sieve
309, 671	Atlanta	1-½" Sieve
436, 672	Atlanta	1" Sieve
437, 669	Atlanta	¾" Sieve
457, 1145	Atlanta	½" Sieve
445, 314, 673	Atlanta	3/8" Sieve
785	Atlanta	#100 Sieve
2446	Atlanta	7/16" Sieve
449	Atlanta	¼" Sieve
486	Atlanta	Optical Scope
2151/52042	Atlanta	Hydrometer – 152H
1152, 1153, 1155 thru 1159	Atlanta	Hydrometer Cylinder
244, 242, 245, 246, 249, 270, 256, 265, 257, 264, 261	Atlanta	Sedimentation Cylinder
1165	Atlanta	Mixer Cup
2354	Atlanta	Mixer
485	Atlanta	Caliper Master
526	Atlanta	Calipers, 8" Digital
2424	Atlanta	8" Caliper
2563, 2376	Atlanta	Digital Calipers
2545 thru 2547	Atlanta	Digital Load Cell
2575 thru 2583	Atlanta	Digital Load Cell
Node 66	Atlanta	Pressure Transducer/Pressure Gauge
Node 67	Atlanta	Pressure Transducer/Pressure Gauge
Node 69	Atlanta	Pressure Transducer/Pressure Gauge
Node 70	Atlanta	Pressure Transducer/Pressure Gauge
Node 73	Atlanta	Pressure Transducer/Pressure Gauge
Node 72	Atlanta	Pressure Transducer/Pressure Gauge
Node 91	Atlanta	Pressure Transducer/Pressure Gauge
Node 92	Atlanta	Pressure Transducer/Pressure Gauge
Node 98	Atlanta	Pressure Transducer/Pressure Gauge
Node 94	Atlanta	Pressure Transducer/Pressure Gauge
Node 95	Atlanta	Pressure Transducer/Pressure Gauge
Node 97	Atlanta	Pressure Transducer/Pressure Gauge
OKET	Atlanta	Standard Weights
77675	Atlanta	Dead Weight Pressure Tester
485	Atlanta	Pressure Transducer with Readout
1449	Atlanta	Steel Grooving Tool
2255, 1644	Atlanta	Liquid Limit Device
526	Atlanta	Gauge Blocks

Serial or Lab ID (LID) Number(s)	MACTEC Office	Equipment Identification
IN7274, 241161	Phoenix	Thermometer
1345	Phoenix	Stop Watch
13012969, 14705863, 14705877, 897126	Phoenix	Digital Balance
1610 thru 1620	Phoenix	Soil/Solids Specific Gravity Flask/Pycnometer
2004-26, 2004-31	Phoenix	Straight Edge
ATS-4197	Phoenix	Function Generator
ATS-4005	Phoenix	Universal Counter
1079, 1400, 1158, 1399	Phoenix	Balance
1366,1633	Phoenix	Caliper
1633	Phoenix	24-inch Steel Rule
1608	Phoenix	Modified Rammer, Manual
1552, 1553	Phoenix	Standard Rammer, Mechanical
777, 1506, 1507, 1510	Phoenix	4" Proctor Mold
762, 1644	Phoenix	Liquid Limit Device
1366	Phoenix	Feeler Gauge
762 Block	Phoenix	Caliper/Steel Ruler
1640	Phoenix	5/16" Steel Ball w/ 9.84" Acrylic Tube
1301, 1302	Phoenix	Sieve Shaker (including timer)
1345	Phoenix	Timing Device
1638, G249, 1235, 1239, 1240, 1580	Phoenix	Sieve Nest
1642	Phoenix	#60 Sieve
1641/06339483	Phoenix	#140 Sieve
684, 91-15607	Phoenix	ASTM 152H Soil Test Soil Hydrometer
1621 thru 1632	Phoenix	Hydrometer Cylinder
1639	Phoenix	Hydrometer Water Bath
639, 1378, 1647/0900297	Phoenix	Drying Oven
1438 thru 1443, 1303 thru 1305	Phoenix	CBR Mold
1306	Phoenix	Surcharge Weights
1307	Phoenix	CBR Penetration Piston
JW49705	Phoenix	Digital Balance
1646	Phoenix	#40 Sieve
1645	Phoenix	#10 Sieve
1447, 1449, 1453	Phoenix	#200 Sieve
1394-1, 1395-1	Phoenix	Grooving Tool

MACTEC

Moisture Content Report
ASTM D2216-05

Project No.	5050-06-0496
Project Name	Bechtel / STP / COL
MACTEC Lab Location	Phoenix

Boring No.	Sample No.	Depth (Ft)	Moisture Content (%)
B-309	SS-2	1.5-3	28.0
B-309	SS-5	6-7.5	27.2
B-309	SS-8	10.5-12	27.0
B-309	SS-10	13.5-15	23.6
B-309	SS-11	18.5-20	22.6
B-309	SS-13	28.5-30	24.8
B-309	SS-15	38.5-40	23.3
B-309	SS-16	43.5-45	24.8
B-309	SS-18	53.5-55	20.7
B-309	SS-20	63.5-65	23.4
B-309	SS-22	73.5-75	24.2

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2-17-07

MACTEC

Moisture Content Report
ASTM D2216-05

Project No.	5050-06-0496
Project Name	Bechtel / STP / COL
MACTEC Lab Location	Phoenix

Boring No.	Sample No.	Depth (Ft)	Moisture Content (%)
B-309	SS-23	78.5-80	20.8
B-309	SS-25	88.5-90	21.5
B-309	SS-27	98.5-100	23.6
B-309	SS-28	108.5-110	17.6
B-309	SS-29	118.5-120	27.1
B-309	SS-30	128.5-130	27.0
B-309	SS-31	138.5-140	21.7
B-309	SS-32	148.5-150	23.3
B-309	SS-33	158.5-160	23.9
B-309	SS-34	168.5-170	25.7
B-309	SS-35	178.5-180	24.6

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MACTEC

Moisture Content Report
ASTM D2216-05

Project No.	5050-06-0496
Project Name	Bechtel / STP / COL
MACTEC Lab Location	Phoenix

Boring No.	Sample No.	Depth (Ft)	Moisture Content (%)
B-309	SS-36	188.5-190	28.1
B-309	SS-37	198.5-200	31.8
B-328	SS-4	4.5-6	22.2
B-328	SS-8	10.5-12	24.1
B-328	SS-9	18.5-20	25.0
B-328	SS-10	23.5-25	22.1
B-328	SS-12	38.5-40	23.2
B-328	SS-13	43.5-45	26.6
B-328	SS-15	58.5-60	25.6
B-328	SS-18	78.5-80	21.4
B-328	SS-19	88.5-90	21.0

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MACTEC

Moisture Content Report
ASTM D2216-05

Project No.	5050-06-0496
Project Name	Bechtel / STP / COL
MACTEC Lab Location	Phoenix

Boring No.	Sample No.	Depth (Ft)	Moisture Content (%)
B-328	SS-21	98.5-100	21.0
B-328	SS-22	108.5-110	14.6
B-328	SS-23	118.5-120	22.0
B-328	SS-24	128.5-130	21.0
B-328	SS-25	138.5-140	18.3
B-328	SS-26	148.5-150	21.3
B-328	SS-27	159-160	25.4
B-328	SS-29	178.5-180	23.6
B-328	SS-30	188.5-190	26.5
B-344	SS-3	3-4.5	24.0
B-344	SS-7	9-10.5	24.6

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MACTEC

Moisture Content Report
ASTM D2216-05

Project No.	5050-06-0496
Project Name	Bechtel / STP / COL
MACTEC Lab Location	Phoenix

Boring No.	Sample No.	Depth (Ft)	Moisture Content (%)
B-344	SS-12	23.5-25	25.9
B-344	SS-15	38.5-40	21.8
B-344	SS-17	48.5-50	27.7
B-344	SS-19	58.5-60	18.6
B-344	SS-21	68.5-70	21.9
B-344	SS-23	78.5-80	20.3
B-344	SS-25	88.5-90	22.7
B-344	SS-26	93.5-95	20.7
B-344	SS-27	98.5-100	29.3
B-405 DH	SS-3	3-4.5	25.0
B-405 DH	SS-6	7.5-9	29.0

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2-17-07

MACTEC

Moisture Content Report
ASTM D2216-05

Project No.	5050-06-0496
Project Name	Bechtel / STP / COL
MACTEC Lab Location	Phoenix

Boring No.	Sample No.	Depth (Ft)	Moisture Content (%)
B-405 DH	SS-8	13.5-15	19.8
B-405 DH	SS-10	23.5-25	27.6
B-405 DH	SS-11	33.5-35	25.0
B-405 DH	SS-13	43.5-45	26.3
B-405 DH	SS-15	53.5-55	27.9
B-405 DH	SS-17	68.5-70	20.9
B-405 DH	SS-19	78.5-80	21.0
B-405 DH	SS-22	98.5-100	27.3
B-405 DH	SS-23	108.5-110	19.7
B-405 DH	SS-24	118.5-120	22.3
B-405 DH	SS-26	138.5-140	17.7

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2-17-07

MACTEC

Moisture Content Report
ASTM D2216-05

Project No. 5050-06-0496
Project Name Bechtel / STP / COL
MACTEC Lab Location Phoenix

Boring No.	Sample No.	Depth (Ft)	Moisture Content (%)
B-405 DH	SS-27	158.5-160	23.7
B-405 DH	SS-28	178.5-180	22.6
B-405 DH	SS-29	188.5-190	16.7
B-405 DH	SS-30	198.5-200	24.0
B-405 DH	SS-32	238.5-240	20.1
B-405 DH	SS-33	258.5-260	27.3
B-405 DH	SS-37	338.5-340	16.7
B-405 DH	UD-17	388-390	28.0
B-405 DH	SS-40	398.5-400	17.1
B-405 DH	SS-41	423.5-425	25.3
B-405 DH	SS-45	498.5-500	21.8

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2-17-07

MACTEC

Moisture Content Report
ASTM D2216-05

Project No.	5050-06-0496
Project Name	Bechtel / STP / COL
MACTEC Lab Location	Phoenix

Boring No.	Sample No.	Depth (Ft)	Moisture Content (%)
B-405 DH	SS-46	523.5-525	21.6
B-405 DH	SS-47	538.5-540	20.8
B-405 DH	SS-49	578.5-580	19.9
B-432	SS-5	8-9.5	22.3
B-432	SS-8	12.5-14	21.4
B-432	SS-10	23.5-25	25.6
B-432	SS-12	33.5-35	24.2
B-432	SS-15	48.5-50	29.8
B-432	SS-16	53.5-55	23.4
B-432	SS-17	58.5-60	21.2
B-432	SS-18	63.5-65	26.2

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2-17-07

MACTEC

Moisture Content Report
ASTM D2216-05

Project No.	5050-06-0496
Project Name	Bechtel / STP / COL
MACTEC Lab Location	Phoenix

Boring No.	Sample No.	Depth (Ft)	Moisture Content (%)
B-432	SS-19	68.5-70	28.1
B-432	SS-21	78.5-80	20.8
B-432	SS-23	88.5-90	21.6
B-432	SS-25	98.5-100	22.8
B-432	SS-27	118.5-120	24.7
B-432	SS-28	128.5-130	21.2
B-432	SS-30	148.5-150	19.8
B-305 DH	SS-8	13.5-15	19.9
B-305 DH	SS-9	18.5-20	22.7
B-305 DH	SS-11	27-28.5	24.0
B-305 DH	SS-16	58.5-60	20.9

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MACTEC

Moisture Content Report
ASTM D2216-05

Project No.	5050-06-0496
Project Name	Bechtel / STP / COL
MACTEC Lab Location	Phoenix

Boring No.	Sample No.	Depth (Ft)	Moisture Content (%)
B-305 DH	SS-19	73.5-75	23.1
B-305 DH	SS-21	88.5-90	21.1
B-305 DH	SS-22	93.5-95	22.5
B-305 DH	SS-24	108.5-110	19.8
B-305 DH	SS-25	118.5-120	21.8
B-305 DH	SS-29	170-171.5	23.9
B-305 DH	SS-30	178.5-180	21.7
B-305 DH	SS-32	198.5-200	26.1
B-305 DH	SS-33	218.5-220	19.8
B-305 DH	SS-35	258.5-260	29.6
B-305 DH	SS-36	278.5-280	30.4

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2-17-07

MACTEC

Moisture Content Report
ASTM D2216-05

Project No.	5050-06-0496
Project Name	Bechtel / STP / COL
MACTEC Lab Location	Phoenix

Boring No.	Sample No.	Depth (Ft)	Moisture Content (%)
B-305 DH	SS-40	378.5-380	25.7
B-305 DH	SS-42	438.5-440	29.7
B-305 DH	SS-43	458.5-460	23.3
B-305 DH	SS-44	478.5-480	24.3
B-323	SS-1	0-1.5	5.1
B-323	SS-4	4.5-6	21.2
B-323	SS-12	23.5-25	22.5
B-323	SS-14	33.5-35	21.6
B-323	SS-16	43.5-45	20.5
B-323	SS-17	48.5-50	32.1
B-323	SS-18	53.5-55	18.1

MH
2-7-07

MACTEC

Moisture Content Report
ASTM D2216-05

Project No.	5050-06-0496
Project Name	Bechtel / STP / COL
MACTEC Lab Location	Phoenix

Boring No.	Sample No.	Depth (Ft)	Moisture Content (%)
B-323	SS-19	58.5-60	19.5
B-323	SS-21	68.5-70	23.2
B-323	SS-22	73.5-75	20.0
B-323	SS-23	78.5-80	20.4
B-323	SS-24	83.5-85	18.3
B-323	SS-25	88.5-90	22.0
B-323	SS-26	93.5-95	17.8
B-323	SS-27	98.5-100	22.4
B-421	SS-4	4.5-6	18.9
B-421	SS-9	12-13.5	20.4
B-421	SS-11	18.5-20	22.5

MH
2-17-07

MACTEC

Moisture Content Report
ASTM D2216-05

Project No.	5050-06-0496
Project Name	Bechtel / STP / COL
MACTEC Lab Location	Phoenix

Boring No.	Sample No.	Depth (Ft)	Moisture Content (%)
B-421	SS-13	28.5-30	23.6
B-421	SS-15	43.5-45	22.8
B-421	SS-16	48.5-50	35.3
B-421	SS-19	68.5-70	20.1
B-421	SS-20	73.5-75	20.3
B-421	SS-22	88.5-90	23.6
B-421	SS-23	93.5-95	21.5
B-421	SS-24	98.5-100	19.3
B-419	SS-3	3-4.5	25.3
B-419	SS-7	9-10.5	22.8
B-419	SS-10	13.5-15	21.2

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2-17-07

MACTEC

Moisture Content Report
ASTM D2216-05

Project No. 5050-06-0496
Project Name Bechtel / STP / COL
MACTEC Lab Location Phoenix

Boring No.	Sample No.	Depth (Ft)	Moisture Content (%)
B-419	SS-12	23.5-25	21.7
B-419	SS-14	33.5-35	26.7
B-419	SS-16	43.5-45	29.0
B-419	SS-18	53.5-55	18.0
B-419	SS-20	63.5-65	20.5
B-419	SS-22	73.5-75	21.1
B-419	SS-24	88.5-90	25.5
B-419	SS-26	108.5-110	20.4
B-419	SS-27	128.5-130	25.0
B-419	SS-28	148.5-150	21.8
B-419	SS-29	168.5-170	24.8

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2-17-07

MACTEC

Moisture Content Report
ASTM D2216-05

Project No. 5050-06-0496
Project Name Bechtel / STP / COL
MACTEC Lab Location Phoenix

Boring No.	Sample No.	Depth (Ft)	Moisture Content (%)
B-419	SS-30	188.5-190	31.6
B-427	SS-3	3-4.5	23.5
B-427	SS-7	9-10.5	24.0
B-427	SS-12	23.5-25	23.8
B-427	SS-14	33.5-35	24.6
B-427	SS-17	48.5-50	43.0
B-427	SS-19	58.5-60	18.9
B-427	SS-21	68.5-70	20.3
B-427	SS-24	83.5-85	18.9
B-427	SS-26	93.5-95	21.5
B-427	SS-28	108.5-110	16.7

MH
2-17-07

MACTEC

Moisture Content Report
ASTM D2216-05

Project No.	5050-06-0496
Project Name	Bechtel / STP / COL
MACTEC Lab Location	Phoenix

Boring No.	Sample No.	Depth (Ft)	Moisture Content (%)
B-427	SS-29	118.5-120	21.0
B-427	SS-30	128.5-130	20.6
B-427	SS-31	138.5-140	15.7
B-427	SS-32	148.5-150	22.3
B-902	SS-7	11.5-13	19.5
B-902	SS-9	18.5-20	26.8
B-902	SS-10	28.5-30	24.0
B-902	SS-11	33.5-35	22.5
B-902	SS-12	38.5-40	22.5
B-902	SS-14	48.5-50	31.4
B-902	SS-16	58.5-60	24.9

MH
2-7-07

MACTEC

Moisture Content Report
ASTM D2216-05

Project No.	5050-06-0496
Project Name	Bechtel / STP / COL
MACTEC Lab Location	Phoenix

Boring No.	Sample No.	Depth (Ft)	Moisture Content (%)
B-902	SS-18	68.5-70	25.7
B-902	SS-20	78.5-80	23.2
B-902	SS-22	88.5-90	23.8
B-902	SS-24	98.5-100	28.0
B-904	SS-11	38.5-40	22.4
B-904	SS-15	63.5-65	23.1
B-904	SS-17	73.5-75	22.4
B-904	SS-20	93.5-95	25.0
B-908	SS-3	3-4.5	27.0
B-908	SS-9	12-13.5	24.8
B-908	SS-12	23.5-25	24.0

MH
2-17-07

MACTEC

Moisture Content Report
ASTM D2216-05

Project No.	5050-06-0496
Project Name	Bechtel / STP / COL
MACTEC Lab Location	Phoenix

Boring No.	Sample No.	Depth (Ft)	Moisture Content (%)
B-908	SS-13	28.5-30	24.3
B-908	SS-14	33.5-35	23.0
B-908	SS-15	38.5-40	20.2
B-908	SS-16	43.5-45	22.4
B-908	SS-18	53.5-55	30.6
B-908	SS-21	68.5-70	26.1
B-908	SS-23	78.5-80	21.8
B-908	SS-24	83.5-85	20.5
B-908	SS-26	93.5-95	19.1
B-909	SS-2	1.5-3	27.0
B-909	SS-6	7.5-9	26.5

MH
2-17-07

MACTEC

Moisture Content Report
ASTM D2216-05

Project No.	5050-06-0496
Project Name	Bechtel / STP / COL
MACTEC Lab Location	Phoenix

Boring No.	Sample No.	Depth (Ft)	Moisture Content (%)
B-909	SS-10	13.5-15	21.1
B-909	SS-12	23.5-25	21.6
B-909	SS-13	28.5-30	26.0
B-909	SS-16	63.5-65	23.5
B-909	SS-18	73.5-75	23.7
B-912	SS-6	7.5-9	28.5
B-912	SS-10	13.5-15	17.2
B-912	SS-12	23.5-25	23.8
B-912	SS-14	33.5-35	26.5
B-912	SS-16	43.5-45	18.8
B-912	SS-18	53.5-55	34.3

MA
2-17-07

MACTEC

Moisture Content Report
ASTM D2216-05

Project No. 5050-06-0496
Project Name Bechtel / STP / COL
MACTEC Lab Location Phoenix

Boring No.	Sample No.	Depth (Ft)	Moisture Content (%)
B-912	SS-19	58.5-60	25.9
B-912	SS-20	63.5-65	20.6
B-912	SS-21	68.5-70	19.2
B-912	SS-22	73.5-75	24.8
B-912	SS-23	78.5-80	24.5
B-912	SS-24	83.5-85	25.0
B-912	SS-25	88.5-90	26.2
B-912	SS-26	93.5-95	29.2
B-912	SS-27	98.5-100	26.4
B-914	SS-4	4.5-6	16.5
B-914	SS-6	7.5-9	28.0

MH
2-17-07

MACTEC

Moisture Content Report
ASTM D2216-05

Project No. 5050-06-0496
Project Name Bechtel / STP / COL
MACTEC Lab Location Phoenix

Boring No.	Sample No.	Depth (Ft)	Moisture Content (%)
B-914	SS-8	10.5-12	26.0
B-914	SS-10	13.5-15	21.5
B-914	SS-11	18.5-20	24.4
B-914	SS-12	23.5-25	26.9
B-914	SS-13	28.5-30	25.4
B-914	SS-14	33.5-35	25.5
B-914	SS-16	43.5-45	28.1
B-914	SS-17	48.5-50	38.8
B-914	SS-18	53.5-55	24.7
B-914	SS-19	58.5-60	20.5
B-914	SS-20	63.5-65	22.9

MH
2-17-07

MACTEC

Moisture Content Report
ASTM D2216-05

Project No.	5050-06-0496
Project Name	Bechtel / STP / COL
MACTEC Lab Location	Phoenix

Boring No.	Sample No.	Depth (Ft)	Moisture Content (%)
B-914	SS-21	68.5-70	19.2
B-914	SS-22	73.5-75	19.8
B-914	SS-25	88.5-90	24.5
B-914	SS-26	93.5-95	23.3
B-914	SS-27	98.5-100	28.1
B-919	SS-3	3-4.5	22.2
B-919	SS-11	33.5-35	27.0
B-919	SS-13	48.5-50	23.1
B-919	SS-16	63.5-65	18.9
B-919	SS-18	73.5-75	19.4
B-919	SS-21	93.5-95	25.2

MH
2-17-07

MACTEC

Moisture Content Report
ASTM D2216-05

Project No.	5050-06-0496
Project Name	Bechtel / STP / COL
MACTEC Lab Location	Phoenix

Boring No.	Sample No.	Depth (Ft)	Moisture Content (%)
TP1-C304	1	3-6.75	21.7
TP2-C304	2	6.57-9	25.5
TP1-C404	1	2.25-7	24.3
TP2-C404	2	7-9	28.4
TP1-B919	1	0.5-6	20.2
TP2-B919	2	6-8.5	25.9
TP1-B927	1	0.5-4	24.1
TP2-B927	2	5.5-8.5	22.0
B-927	SS-4	4.5-6	17.0
B-927	SS-8	10.5-12	22.3

MH
2-21-07

MACTEC

Moisture Content Report
ASTM D2216-05

Project No.	5050-06-0496
Project Name	Bechtel / STP / COL
MACTEC Lab Location	Phoenix

Boring No.	Sample No.	Depth (Ft)	Moisture Content (%)
B-303	UD-3	108'- 110'	9.7
B-305	UD-7	123'- 125'	16.5
B-305DH	SS-41	398.5'- 400'	23.3
B-314	UD-3	121'- 123'	16.1
B-326	SS-8	10.5'- 12.0'	24.5
B-326	SS-11	18.5'- 20.0'	22.2
B-326	SS-13	28.5'- 30.0'	21.3
B-326	SS-15	38.5'- 40.0'	23.2
B-326	SS-20	63.5'- 65.0'	26.5
B-343	UD-7	173'- 175'	15.6
B-404	UD-1	88.0'- 90.0'	22.6

RF
3/5/07

MACTEC

Moisture Content Report
ASTM D2216-05

Project No.	5050-06-0496
Project Name	Bechtel / STP / COL
MACTEC Lab Location	Phoenix

Boring No.	Sample No.	Depth (Ft)	Moisture Content (%)
B-405	UD-11	233'- 235'	15.2
B-405	UD-20	458.5'- 460.5'	19.5
B-409	UD-6	198'- 200'	27.0
B-422	SS-14	23.5'- 25.0'	27.0
B-428	SS-23	108.5'-110'	13.5
B-909	UD-7	98.0'-100'	26.1
B-918	UD-1	3.0'- 5.0'	13.6
B-919	UD-1	8.0'- 10.0'	23.3
B-919	UD-3	43.0'- 45.0'	28.1
B-927	UD-2	28.0'- 30.0'	17.2

RF
3/5/07

MACTEC

Moisture Content Report
ASTM D2216-05

Project No.	5050-06-0496
Project Name	Bechtel / STP / COL
MACTEC Lab Location	Phoenix

RF 3/30/07

Boring No.	Sample No.	Depth (Ft)	Moisture Content (%)
B-407	SS-12	23.5'-25.0'	22.8
B-302	SS-13	28.5'-30.0'	21.5
B-301	SS-34	168.5'-170.0'	20.8
B-911	SS-12	23.5'-25.0'	28.4
B-927	SS-10	23.5'-25.0'	25.5
B-927	SS-5	6.0'-7.5'	19.2

MACTEC

Moisture Content Report
ASTM D2216-05

Project No.	5050-06-0496
Project Name	Bechtel / STP / COL
MACTEC Lab Location	Phoenix

RF 3/30/07

Boring No.	Sample No.	Depth (Ft)	Moisture Content (%)
B-303	UD-3	108'- 110'	9.7
B-305DH	UD-7	123'- 125'	16.5
B-305DH	SS-41	398.5'- 400'	23.3
B-314	UD-3	121'- 123'	16.1
B-326	SS-8	10.5'- 12.0'	24.5
B-326	SS-11	18.5'- 20.0'	22.2
B-326	SS-13	28.5'- 30.0'	21.3
B-326	SS-15	38.5'- 40.0'	23.2
B-326	SS-20	63.5'- 65.0'	26.5
B-343	UD-7	173'- 175'	15.6
B-404	UD-1	88.0'- 90.0'	22.6

MACTEC

Moisture Content Report
ASTM D2216-05

Project No.	5050-06-0496
Project Name	Bechtel / STP / COL
MACTEC Lab Location	Phoenix

RF 3/30/07

Boring No.	Sample No.	Depth (Ft)	Moisture Content (%)
B-432	SS-20	73.5'-75.0'	20.3
B-421	SS-12	23.5'-24.5'	25.5
B-421	SS-17	59.0'-60.0'	19.0
B-912	SS-17	49.5'-50.0'	26.2
B-914	SS-15	38.0'-40.0'	25.0
B-914	SS-23	78.5'-80.0'	18.8
B-914	SS-24	83.5'-85.0'	22.3

MACTEC

Moisture Content Report
ASTM D2216-05

Project No.	5050-06-0496
Project Name	Bechtel / STP / COL
MACTEC Lab Location	Phoenix

RF 3/30/07

Boring No.	Sample No.	Depth (Ft)	Moisture Content (%)
B-432	SS-20	73.5'-75.0'	20.3
B-421	SS-12	23.5'-24.5'	25.5
B-421	SS-17	59.0'-60.0'	19.0
B-912	SS-17	49.5'-50.0'	26.2
B-914	SS-15	38.0'-40.0'	25.0
B-914	SS-23	78.5'-80.0'	18.8
B-914	SS-24	83.5'-85.0'	22.3

MACTEC

Moisture Content Report
ASTM D2216-05

Project No.	5050-06-0496
Project Name	Bechtel / STP / COL
MACTEC Lab Location	Phoenix

RF 3/30/07

Boring No.	Sample No.	Depth (Ft)	Moisture Content (%)
B-303	UD-3	108'- 110'	9.7
B-305DH	UD-7	123'- 125'	16.5
B-305DH	SS-41	398.5'- 400'	23.3
B-314	UD-3	121'- 123'	16.1
B-326	SS-8	10.5'- 12.0'	24.5
B-326	SS-11	18.5'- 20.0'	22.2
B-326	SS-13	28.5'- 30.0'	21.3
B-326	SS-15	38.5'- 40.0'	23.2
B-326	SS-20	63.5'- 65.0'	26.5
B-343	UD-7	173'- 175'	15.6
B-404	UD-1	88.0'- 90.0'	22.6

MACTEC

Moisture Content Report
ASTM D2216-05

Project No.	5050-06-0496
Project Name	Bechtel / STP / COL
MACTEC Lab Location	Phoenix

RF 3/30/07

Boring No.	Sample No.	Depth (Ft)	Moisture Content (%)
B-432	SS-20	73.5'-75.0'	20.3
B-421	SS-12	23.5'-24.5'	25.5
B-421	SS-17	59.0'-60.0'	19.0
B-912	SS-17	49.5'-50.0'	26.2
B-914	SS-15	38.0'-40.0'	25.0
B-914	SS-23	78.5'-80.0'	18.8
B-914	SS-24	83.5'-85.0'	22.3

MACTEC

Moisture Content Report
ASTM D2216-05

Project No.	5050-06-0496
Project Name	Bechtel / STP / COL
MACTEC Lab Location	Phoenix

RF 3/30/07

Boring No.	Sample No.	Depth (Ft)	Moisture Content (%)
B-407	SS-12	23.5'-25.0'	22.8
B-302	SS-13	28.5'-30.0'	21.5
B-301	SS-34	168.5'-170.0'	20.8
B-911	SS-12	23.5'-25.0'	28.4
B-927	SS-10	23.5'-25.0'	25.5
B-927	SS-5	6.0'-7.5'	19.2

MACTEC

Data Testing Sheet For The Standard Test Method For Laboratory Determination of Water Content of Soil and Rock by Mass
ASTM D2216-05

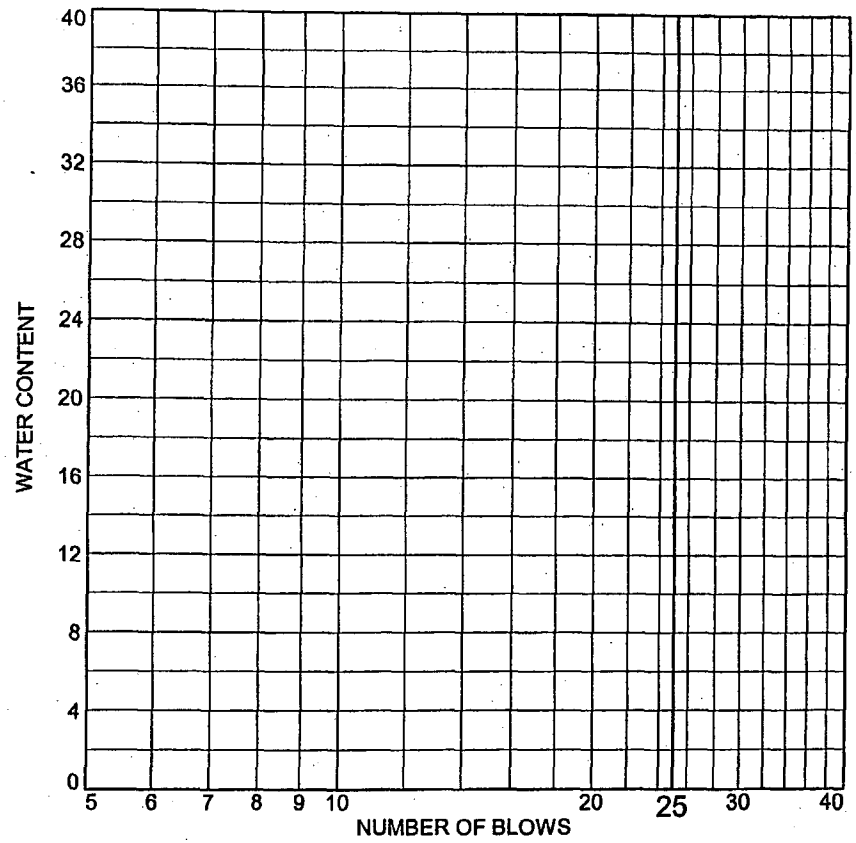
Project No.	5050-06-0496	Tested By	BM
Project Name	Bechtel/STP/COL	Test Date	4/4/07
Boring No.	N/A	Reviewed By	[illegible]
Sample Depth	N/A	Review Date	4/5/07
Sample No.	N/A	MACTEC Lab Location	ATL
Assignment Sheet Date			

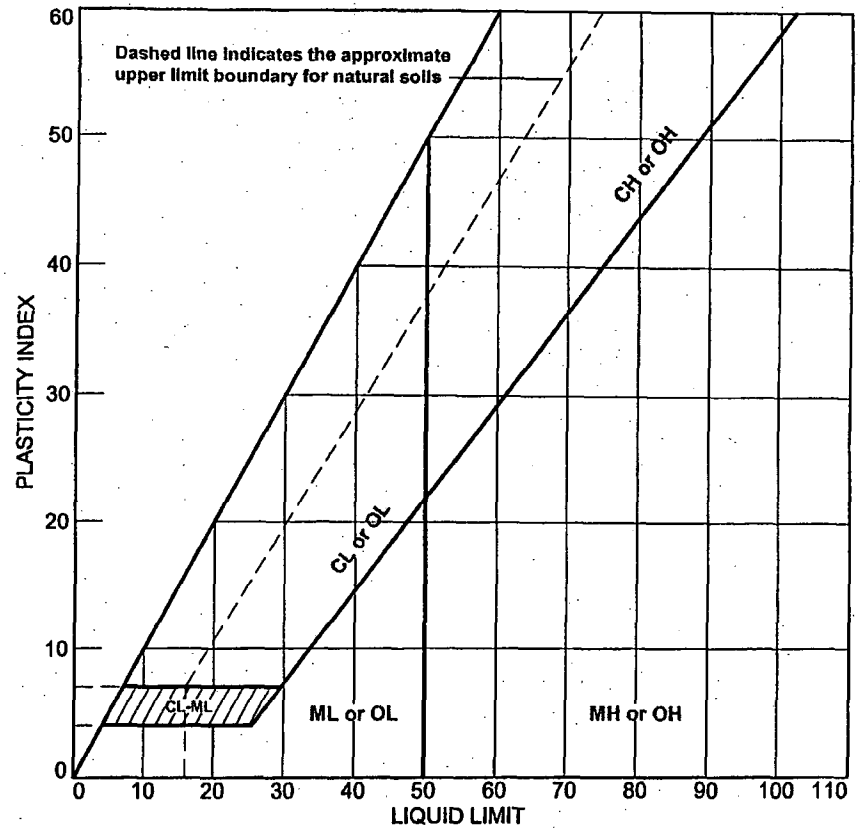
Boring No.	Sample No.	Depth (Ft)	Lab ID No.	Tare No.	Tare Wt. (grams)	Wet Soil + Tare (grams)	Dry Soil + Tare (grams)	Water Wt (grams)	Dry Soil Wt (grams)	Moisture Content (%)
B405	UD-9	193-195'	6923	C-15	15.95	62.30	49.54	12.76	33.59	38.0
B-432	UD-3	25-27'		V-13	15.45	101.40	88.57	12.83	73.10	17.6
B-405	UD-22	518-519'	6928	R-38	16.23	104.43	86.54	17.89	70.31	25.4

Equipment used	Equipment ID #
BALANCE: Sartorius	416
OVEN: Humboldt	109

KAW 4/5/07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 301	STP-310	168.5'-170.0'	11/18/2006	ML	Silt with Sand	20.8	NV	NP
		(SS-34)							

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC Reviewed By:RF

ASTM D4318-05

MH 4-3-07

KAW 4/3/07

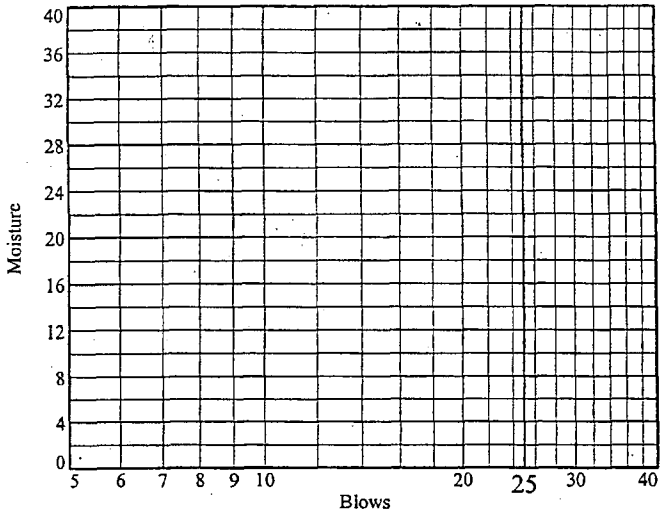
LIQUID AND PLASTIC LIMIT TEST DATA

4/1/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 301
Depth: 168.5'-170.0'
Sample Number: STP-310 (SS-34)
Material Description: Silt with Sand
Date: 11/18/2006
USCS Class.: ML
AASHTO Class.: A-4(0)
Testing Remarks: Tested By:AC Reviewed By:RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare						
Dry+Tare						
Tare						
# Blows						
Moisture						



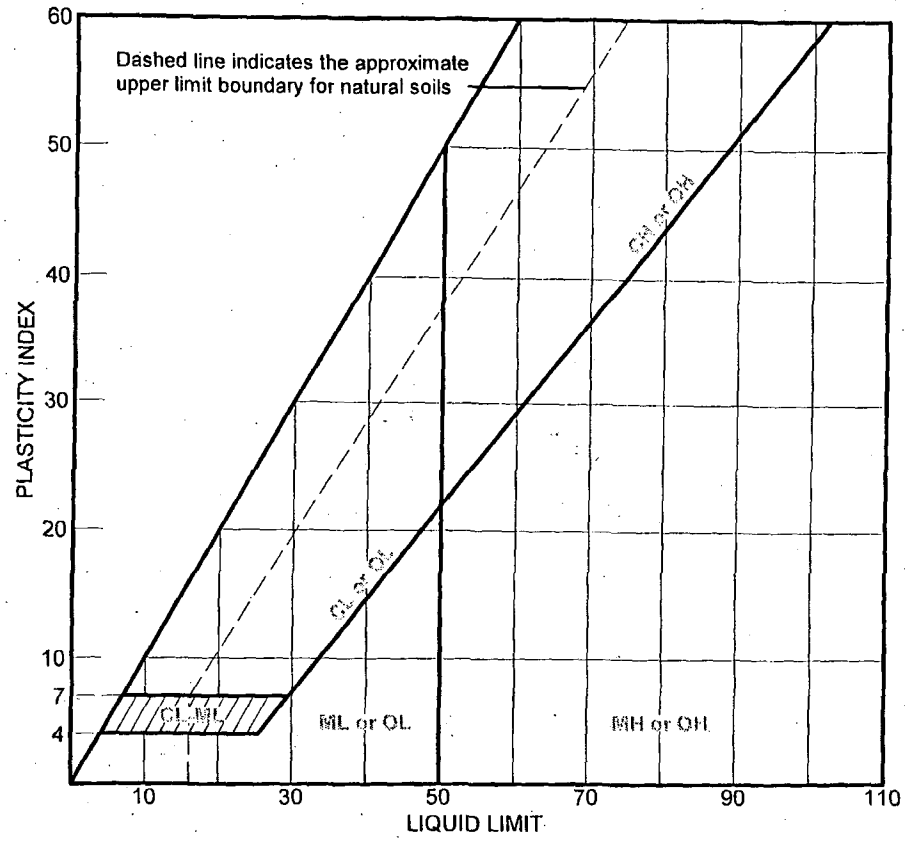
Liquid Limit= NV
Plastic Limit= NP
Plasticity Index= NP
Natural Moisture= 20.8

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare					
Dry+Tare					
Tare					
Moisture					

MH 11-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT



	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-303	UD-1	63' to 65'	2-19-07	SM	Silty sand	25.5	NV	NP

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496 | Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reviewed by: SS
ASTM D4318-05

SS 2/25/2007

KAW 4/3/07

LIQUID AND PLASTIC LIMIT TEST DATA

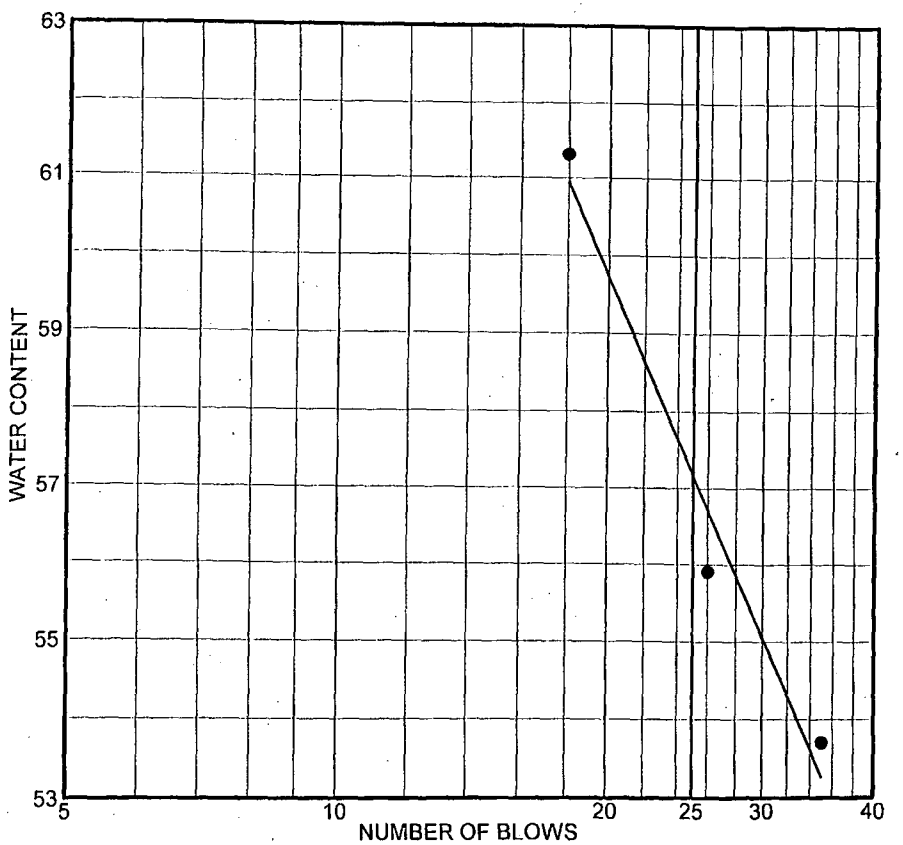
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496

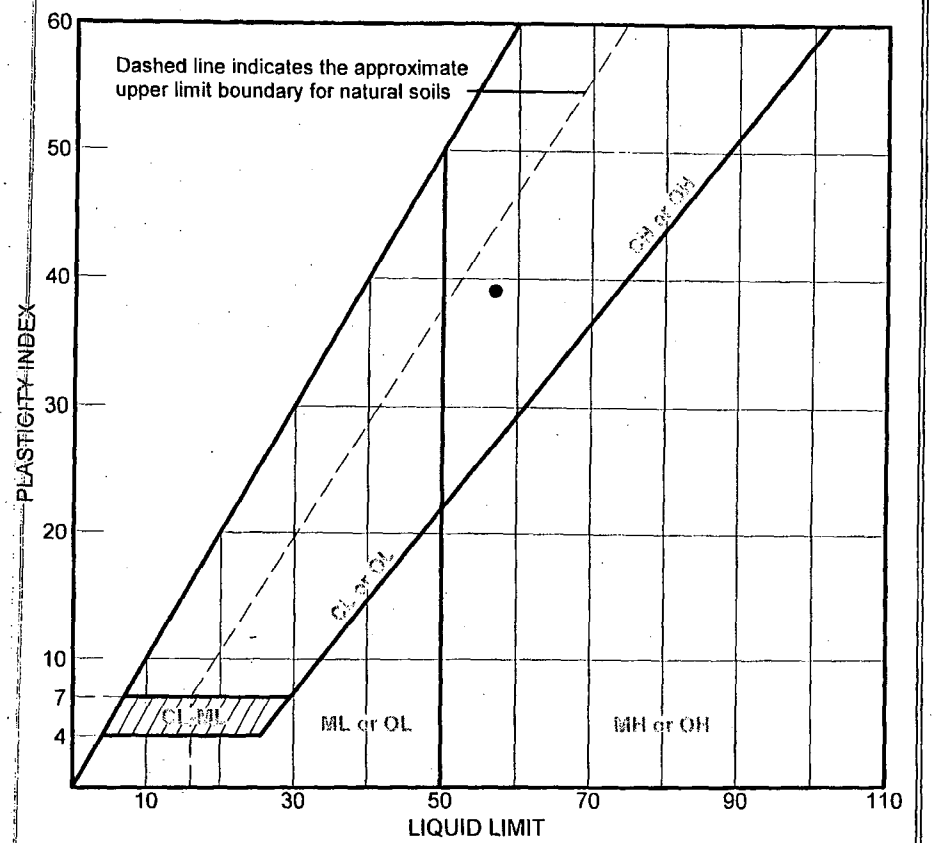
Sample Data

Source: B-303
Sample No.: UD-1
Elev. or Depth: 63' to 65' **Sample Length(in./cm.):**
Location: B-303
Description: Silty sand
Date: 2-19-07 **Natural Moisture:** 25.5
USCS Class.: SM **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed by: SS
ASTM D4318-05

Liquid Limit= NV
Plastic Limit= NP
Plasticity Index= NP

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-303	UD-2	88' to 90'	2-19-07	CH	Fat clay	24.7	57	39

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496 | Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reviewed by: SS
ASTM D4318-05

SS 2/25/2007

KAW 4/3/07

LIQUID AND PLASTIC LIMIT TEST DATA

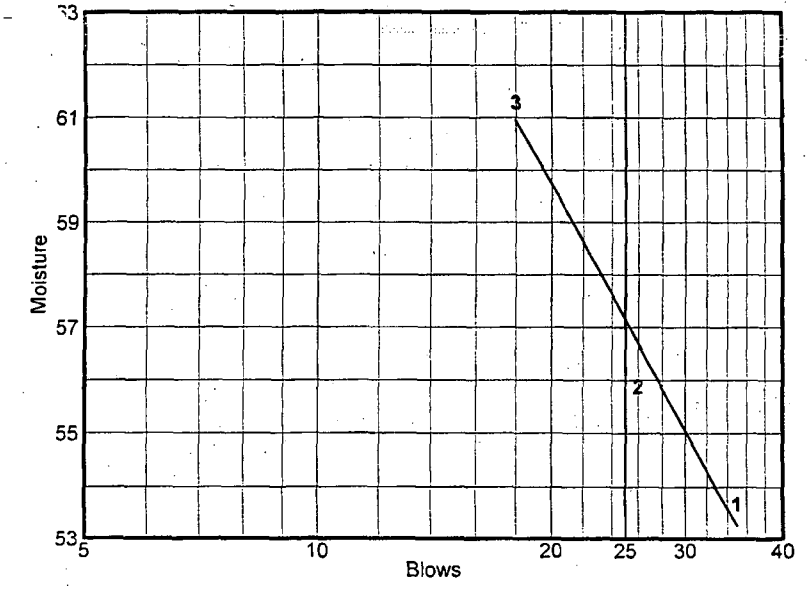
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496

Sample Data

Source: B-303
Sample No.: UD-2
Elev. or Depth: 88' to 90' **Sample Length(in./cm.):**
Location: B-303
Description: Fat clay
Date: 2-19-07 **Natural Moisture:** 24.7
USCS Class.: CH **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed by: SS
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	23.70	22.17	22.39			
Dry+Tare	19.42	18.28	18.02			
Tare	11.45	11.32	10.89			
# Blows	35	26	18			
Moisture	53.7	55.9	61.3			

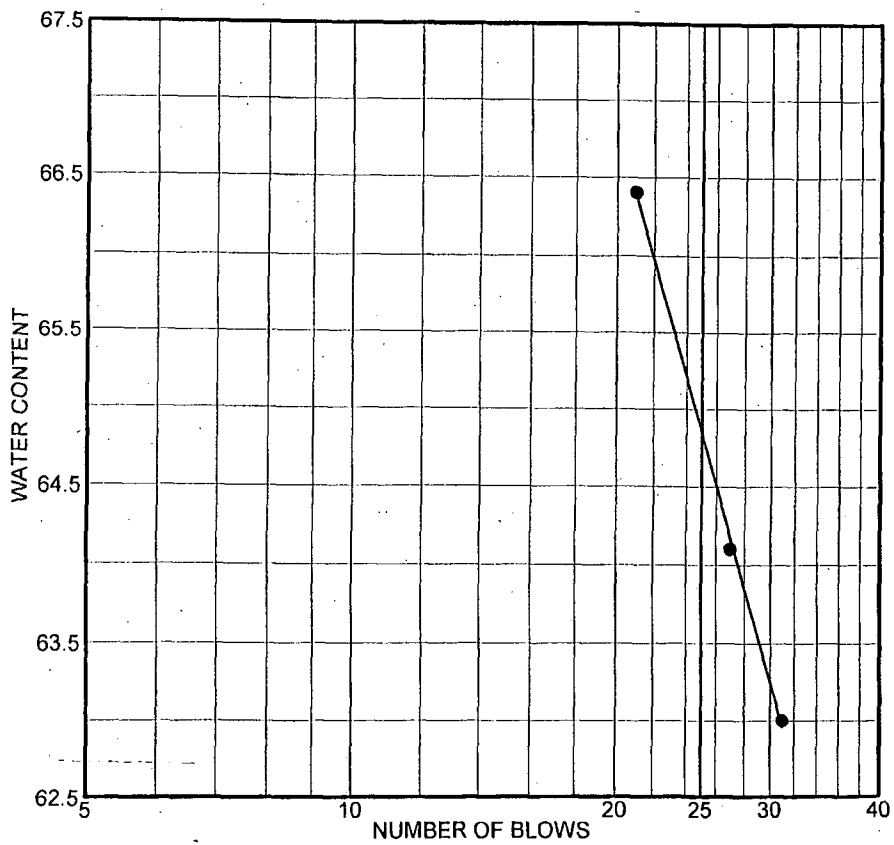


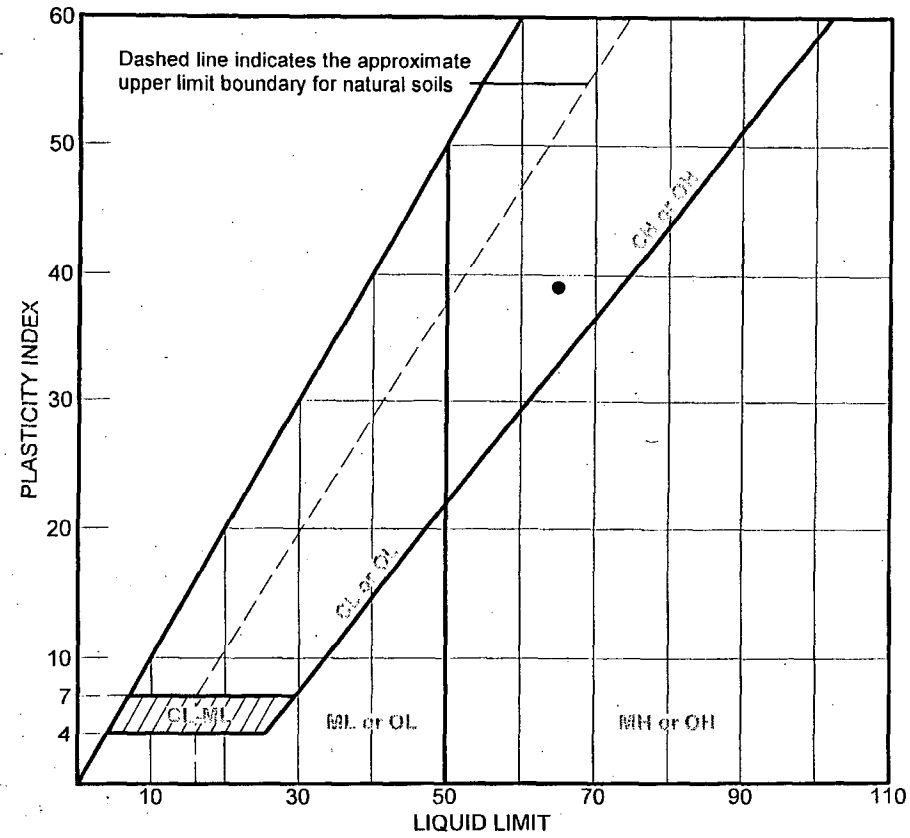
Liquid Limit= 57
Plastic Limit= 18
Plasticity Index= 39

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	19.83	19.84			
Dry+Tare	18.43	18.46			
Tare	10.93	10.70			
Moisture	18.7	17.8			

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-303	UD-4	133' to 135'	2-23-07	CH	Fat clay with sand	29.5	65	39

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496 | Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reviewed by: MH
ASTM D4318-05

KAW 4/3/07

LIQUID AND PLASTIC LIMIT TEST DATA

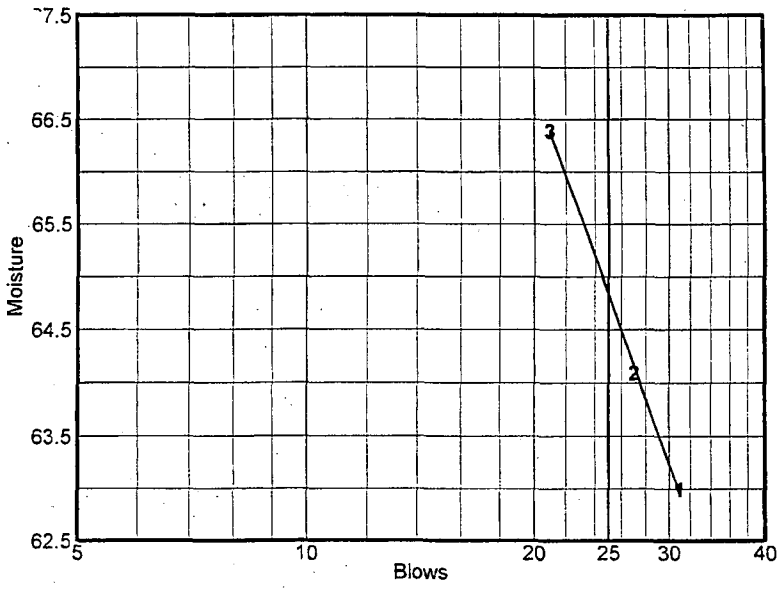
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
ject Number: 5050-06-0496

Sample Data

Source: B-303
Sample No.: UD-4
Elev. or Depth: 133' to 135' **Sample Length(in./cm.):**
Location: B-303
Description: Fat clay with sand
Date: 2-23-07 **Natural Moisture:** 29.5
USCS Class.: CH **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed by: MH
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	21.05	23.25	20.44			
Dry+Tare	17.12	18.46	16.68			
Tare	10.88	10.99	11.02			
# Blows	31	27	21			
Moisture	63.0	64.1	66.4			

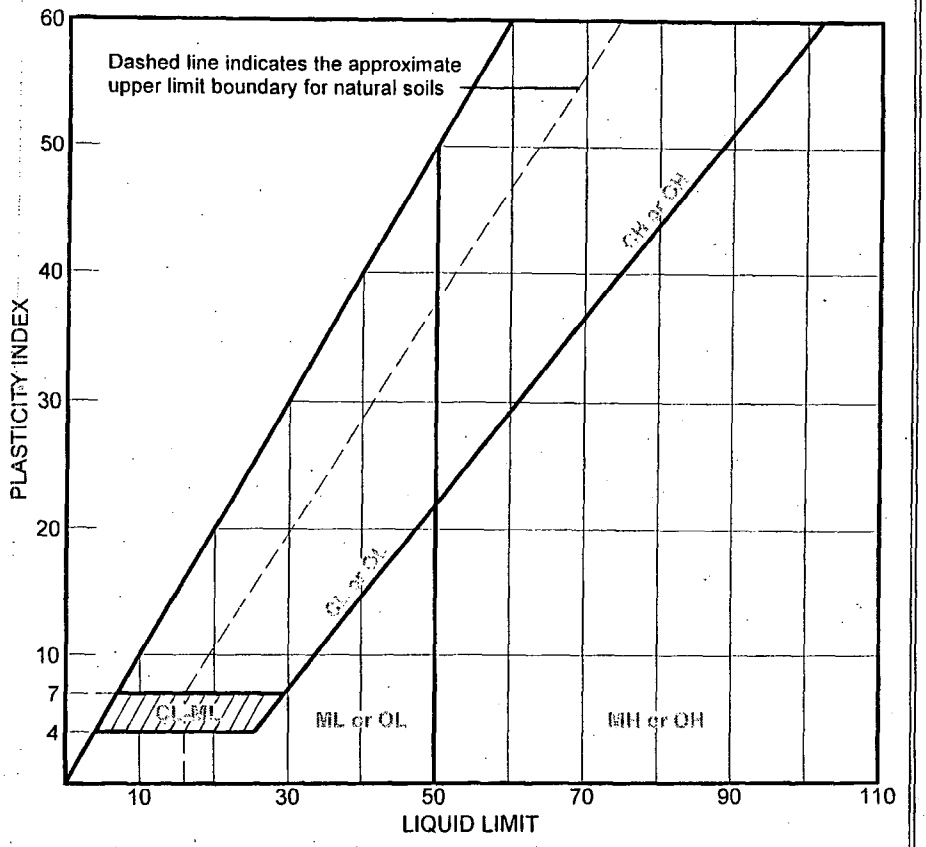


Liquid Limit= 65
Plastic Limit= 26
Plasticity Index= 39

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	10.96	12.27			
Dry+Tare	9.58	10.58			
Tare	4.21	4.35			
Moisture	25.7	27.1			

LIQUID AND PLASTIC LIMITS TEST REPORT



	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-303	UD-5	168' to 170'	2-25-07	SM	Silty sand	32.0	NV	NP

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496 | Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reviewed by: MH KAW 4/3/07
ASTM D4318-05

KAW 4/3/07

LIQUID AND PLASTIC LIMIT TEST DATA

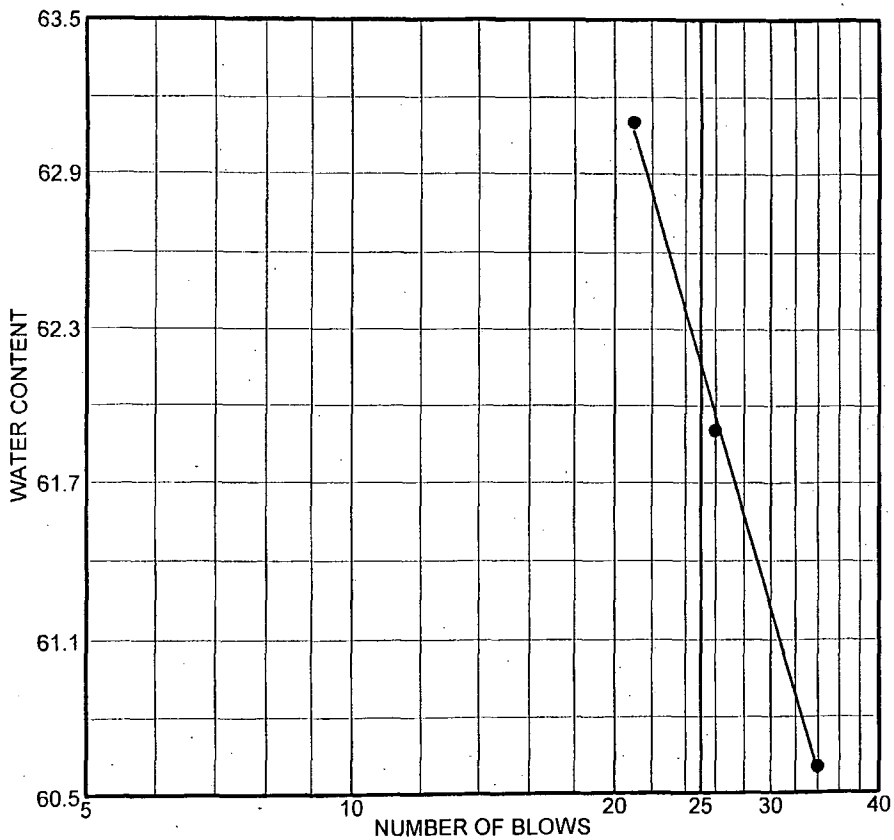
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
ject Number: 5050-06-0496

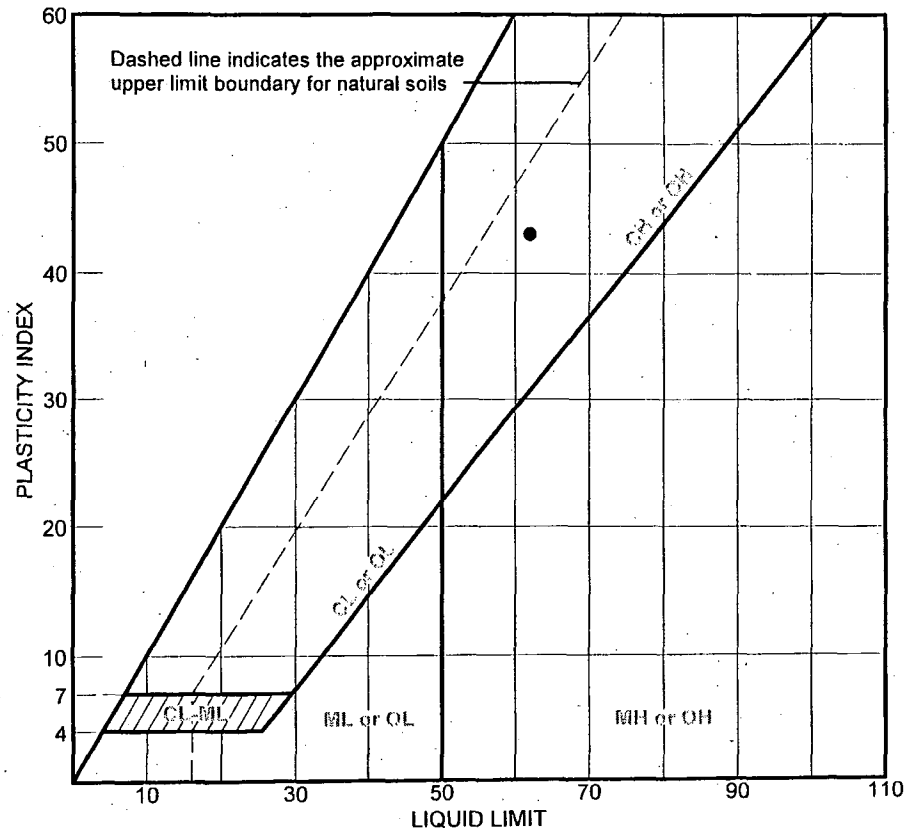
Sample Data

Source: B-303
Sample No.: UD-5
Elev. or Depth: 168' to 170' **Sample Length(in./cm.):**
Location: B-303
Description: Silty sand
Date: 2-25-07 **Natural Moisture:** 32.0
USCS Class.: SM **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed by: MH
ASTM D4318-05

Liquid Limit= NV
Plastic Limit= NP
Plasticity Index= NP

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-305-DH	UD-1	3' to 5'	2-22-07	CH	Fat clay	22.5	62	43

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496 | Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reviewed: MH KAW 4/13/07
ASTM D4318-05

KAW 4/13/07

LIQUID AND PLASTIC LIMIT TEST DATA

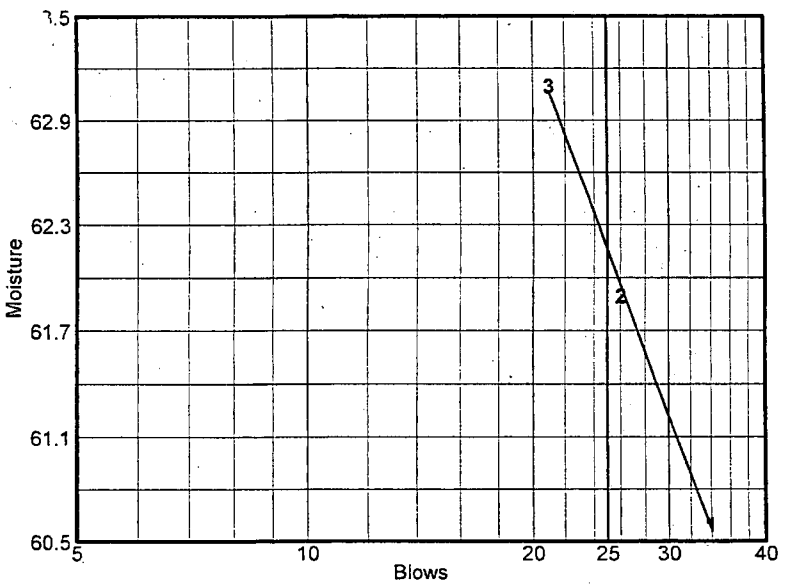
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496

Sample Data

Source: B-305-DH
Sample No.: UD-1
Elev. or Depth: 3' to 5' **Sample Length(in./cm.):**
Location: B-305-DH
Description: Fat clay
Date: 2-22-07 **Natural Moisture:** 22.5
USCS Class.: CH **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed: MH
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	23.05	22.60	26.07			
Dry+Tare	18.42	18.39	20.11			
Tare	10.78	11.59	10.67			
# Blows	34	26	21			
Moisture	60.6	61.9	63.1			

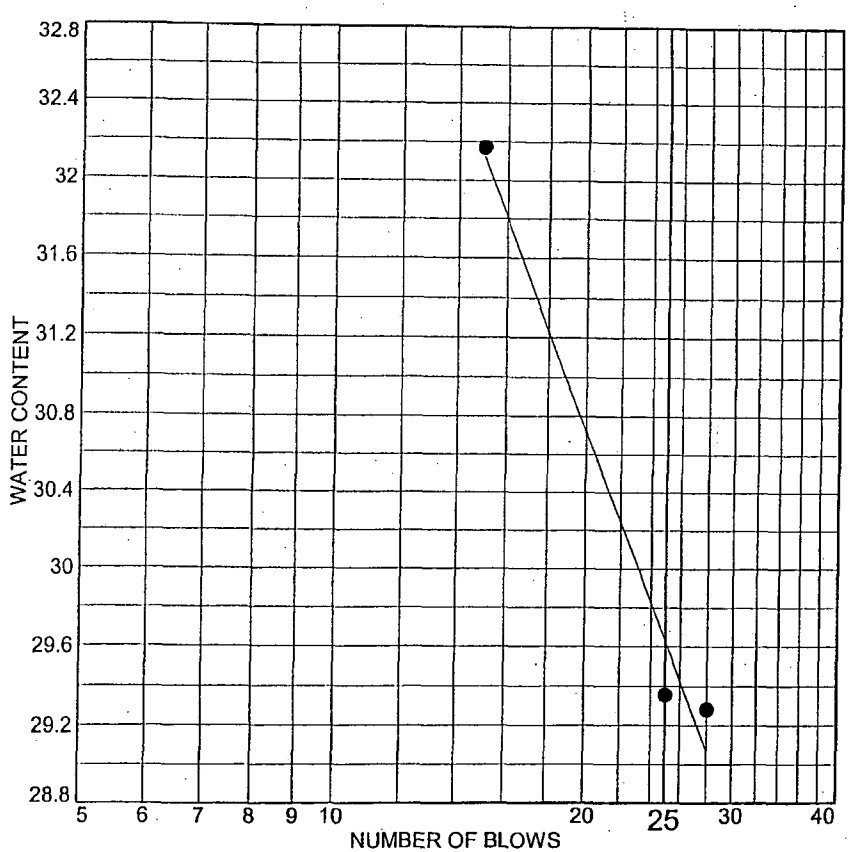


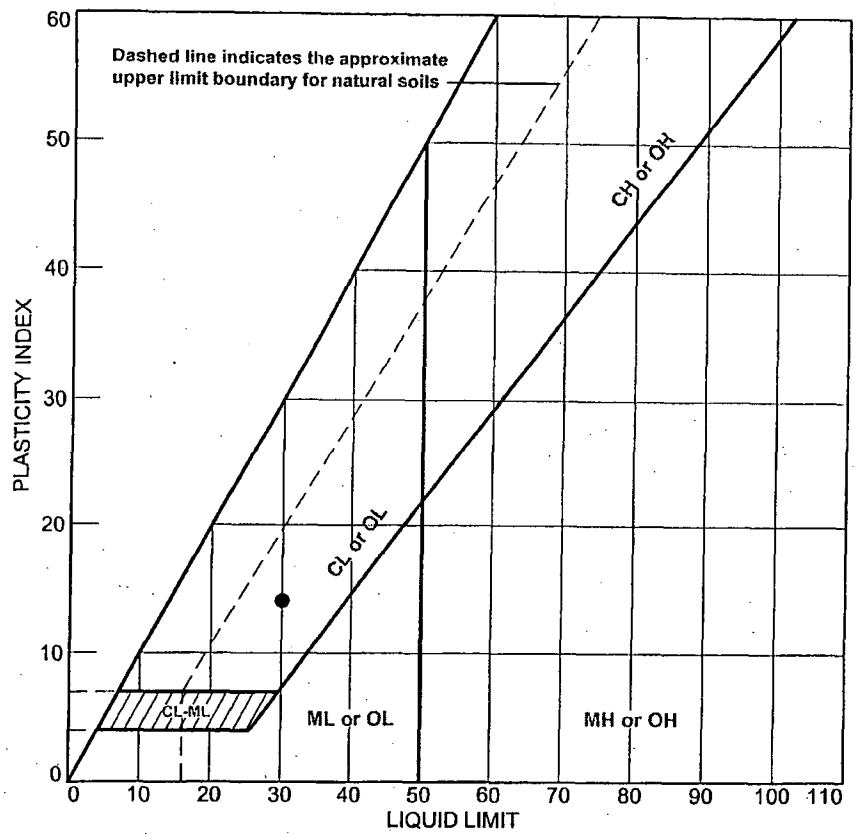
Liquid Limit= 62
Plastic Limit= 19
Plasticity Index= 43

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	17.05	16.38			
Dry+Tare	16.04	15.59			
Tare	10.63	11.31			
Moisture	18.7	18.5			

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 305-DH	STP-097 (SS-8)	13.5'-15.0'	11/19/2006	CL	Lean Clay with Gravel	19.9	30	14

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:TH Reviewed By:ST

ASTM D4318-05

MA 4-3-07

KAW 4/3/07

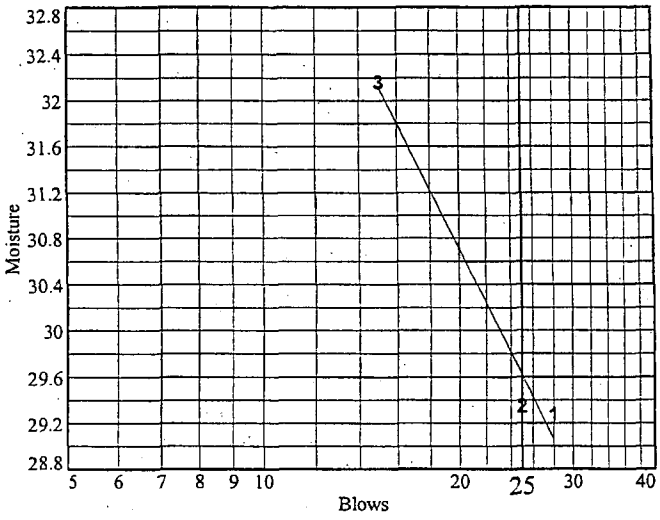
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 305-DH
Depth: 13.5'-15.0' **Sample Number:** STP-097 (SS-8)
Material Description: Lean Clay with Gravel
Date: 11/19/2006 **USCS Class.:** CL
Testing Remarks: Tested By:TH Reviewed By:ST
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	39.45	39.16	38.77			
Dry+Tare	36.92	36.43	36.19			
Tare	28.28	27.13	28.17			
# Blows	28	25	15			
Moisture	29.3	29.4	32.2			



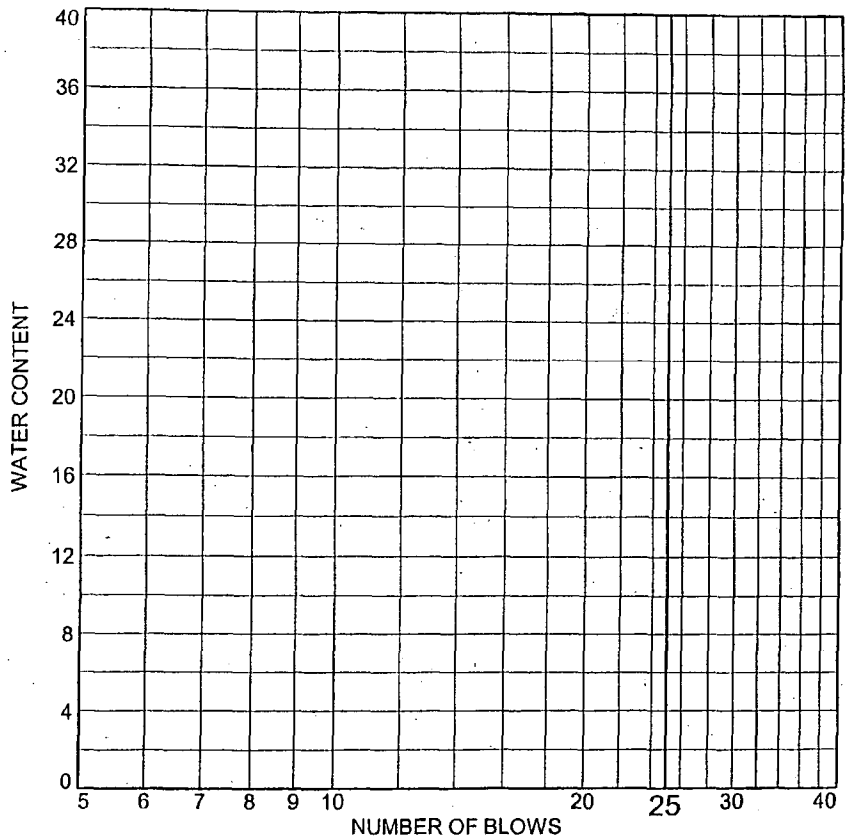
Liquid Limit= 30
Plastic Limit= 16
Plasticity Index= 14
Natural Moisture= 19.9
Liquidity Index= 0.3

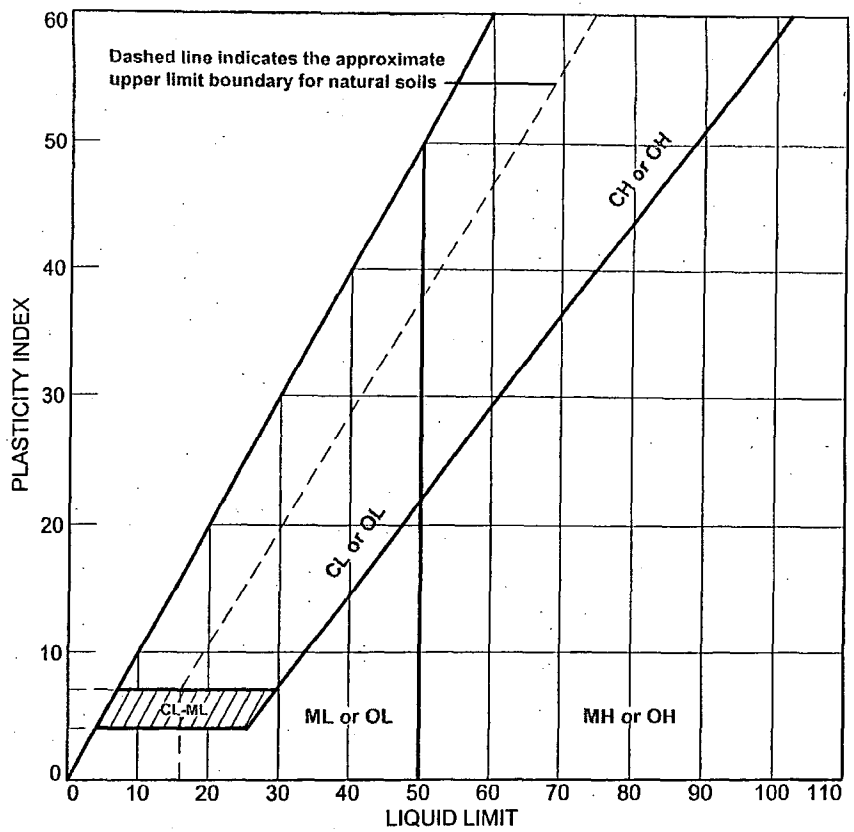
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	36.20	36.30			
Dry+Tare	35.09	35.17			
Tare	28.08	28.21			
Moisture	15.8	16.2			

MH 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 305-DH	STP-098 (SS-9)	18.5'-20.0'	11/19/2006	ML	Silt with Sand	22.7	NV	NP

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC/TH
ASTM D4318-05

Reviewed By:ST

MAK 4-3-07

KAW 4/3/07

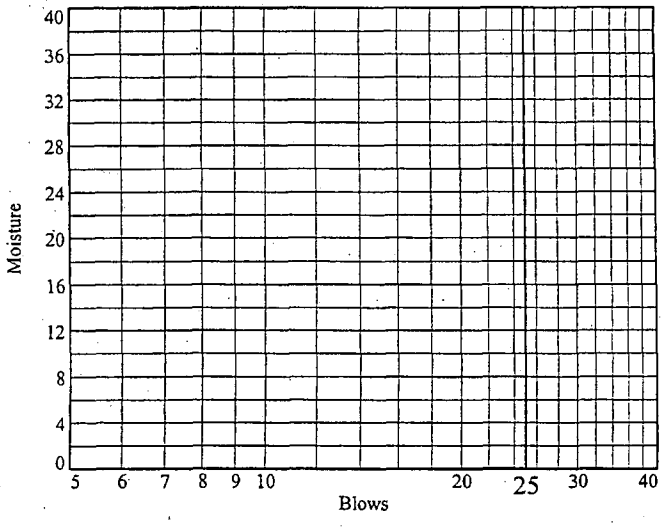
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 305-DH
Depth: 18.5'-20.0'
Sample Number: STP-098 (SS-9)
Material Description: Silt with Sand
Date: 11/19/2006
USCS Class.: ML
AASHTO Class.: A-4(0)
Testing Remarks: Tested By:AC/TH Reviewed By:ST
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare						
Dry+Tare						
Tare						
# Blows						
Moisture						



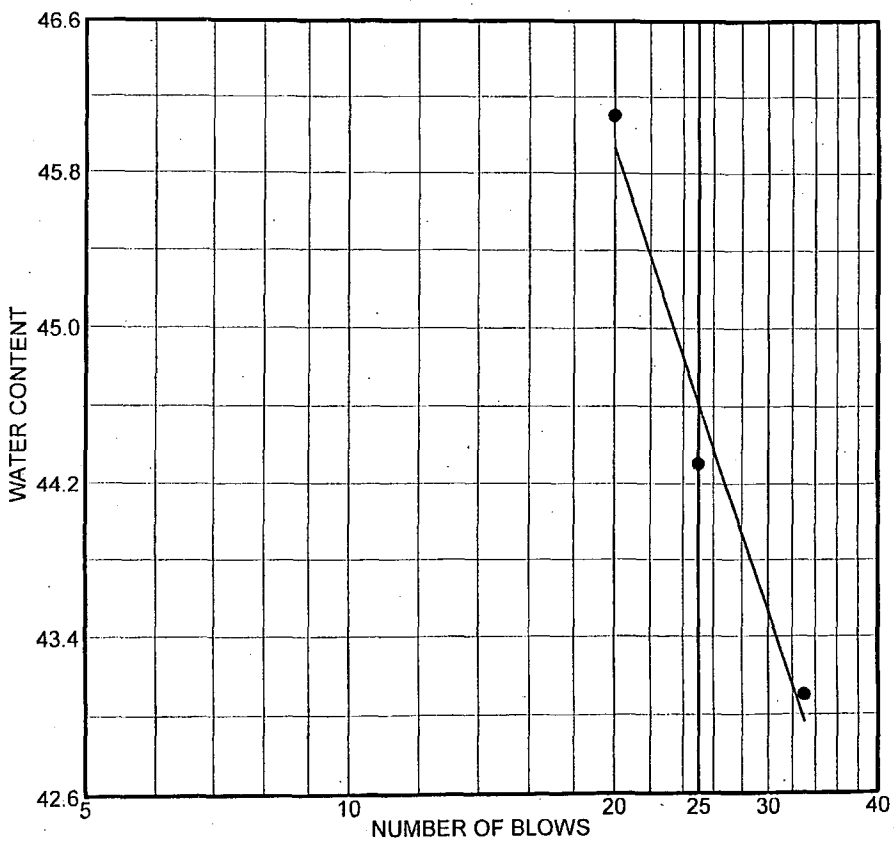
Liquid Limit= NV
Plastic Limit= NP
Plasticity Index= NP
Natural Moisture= 22.7

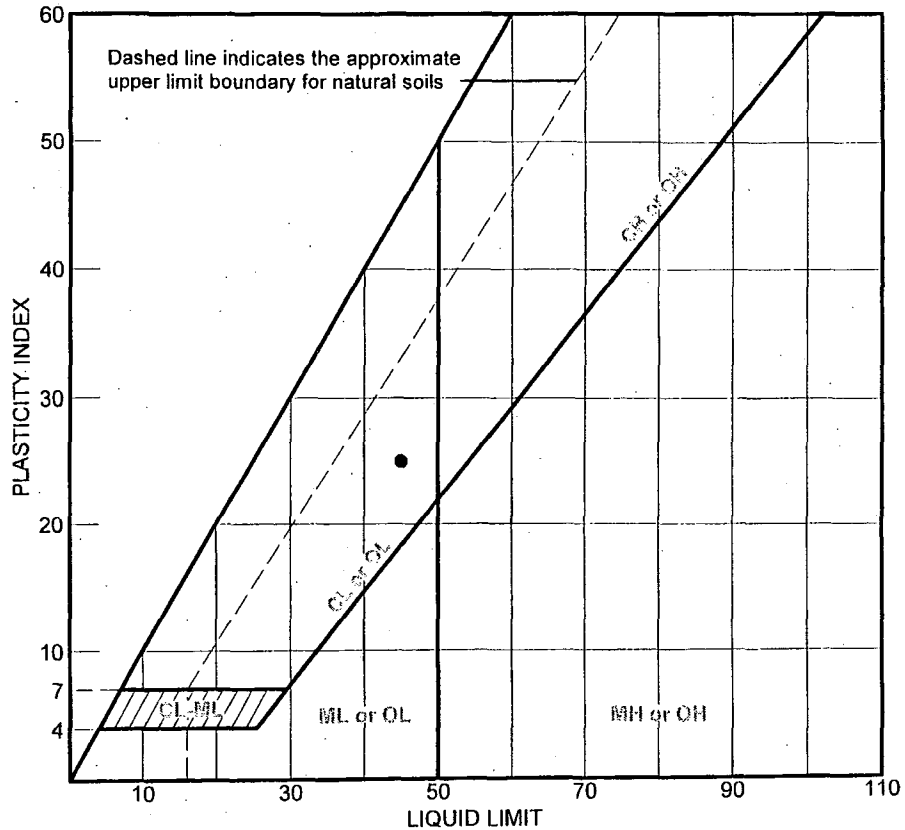
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare					
Dry+Tare					
Tare					
Moisture					

MAT 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-305-DH	UD-4	53' to 55'	2-23-07	CL	Sandy lean clay	22.4	45	25

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496 | Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reviewed by: MH KAW 4/13/07
ASTM D4318-05

KAW 4/13/07

LIQUID AND PLASTIC LIMIT TEST DATA

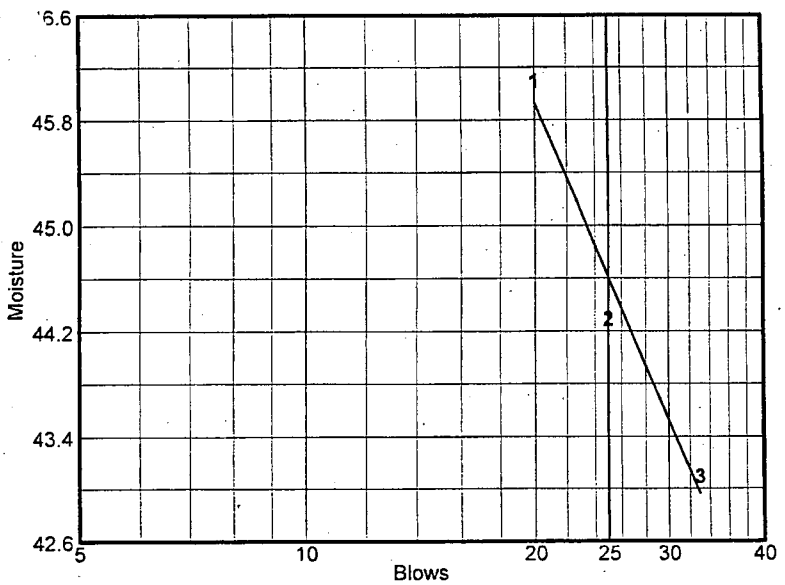
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496

Sample Data

Source: B-305-DH
Sample No.: UD-4
Elev. or Depth: 53' to 55' **Sample Length(in./cm.):**
Location: B-305-DH
Description: Sandy lean clay
Date: 2-23-07 **Natural Moisture:** 22.4
USCS Class.: CL **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed by: MH
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	24.17	22.51	22.07			
Dry+Tare	20.01	19.00	18.78			
Tare	10.98	11.08	11.15			
# Blows	20	25	33			
Moisture	46.1	44.3	43.1			

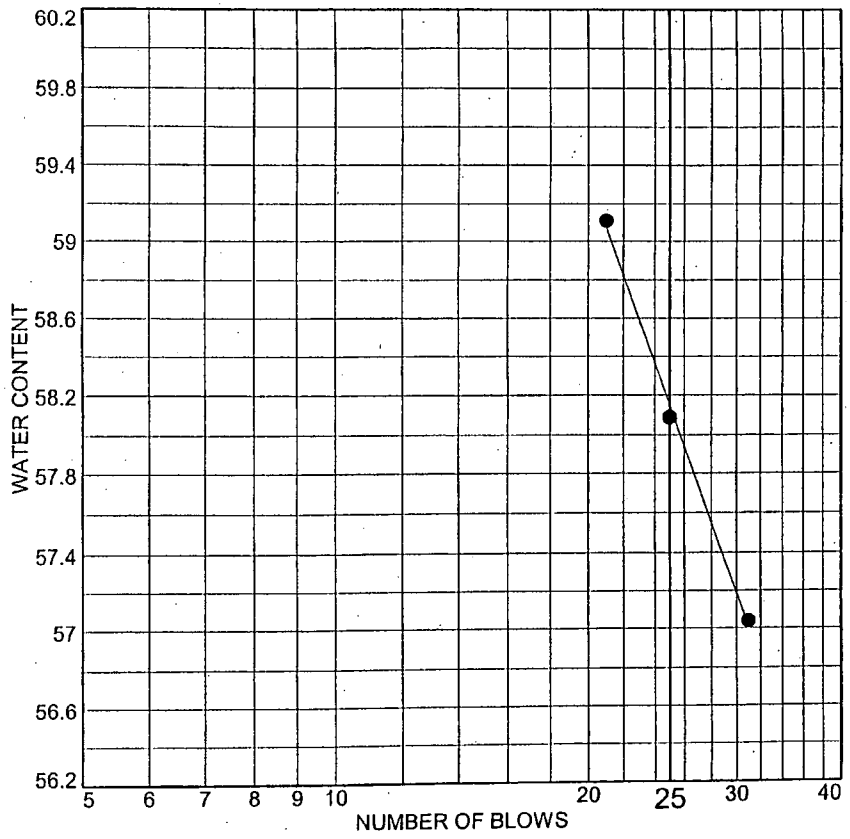


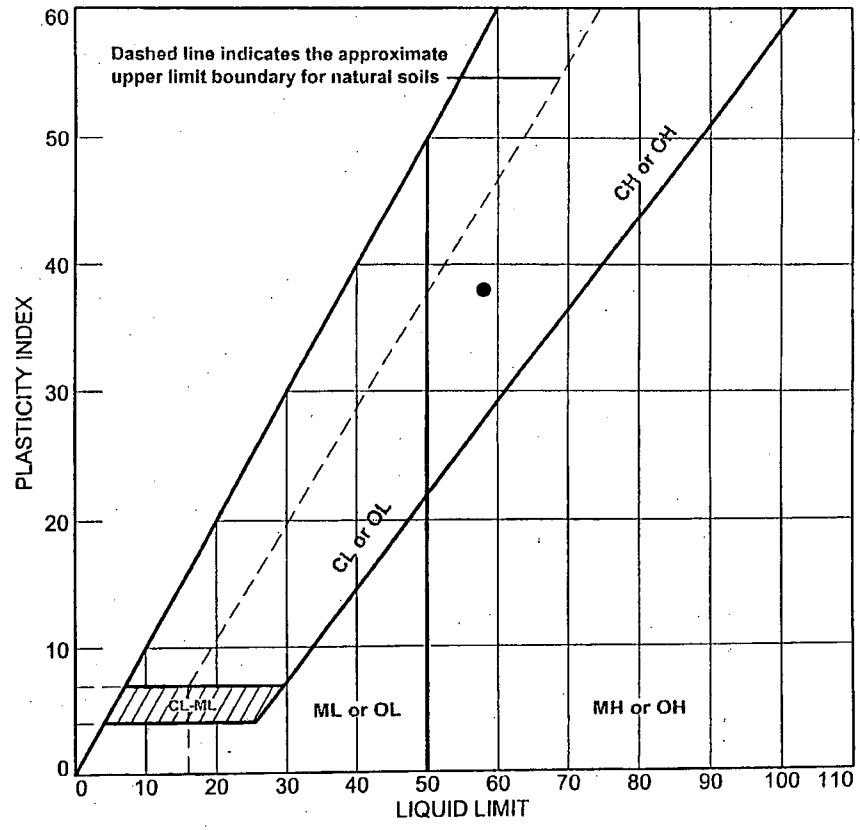
Liquid Limit= 45
Plastic Limit= 20
Plasticity Index= 25

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	15.45	11.95			
Dry+Tare	14.03	10.68			
Tare	6.56	4.39			
Moisture	19.0	20.2			

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 305-DH	STP-100 (SS-16)	58.5'-60.0'	11/20/2006	CH	Fat Clay	20.9	58	38

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:TH Reviewed By:ST

ASTM D4318-05

MA 4-3-07

KAW 4/13/07

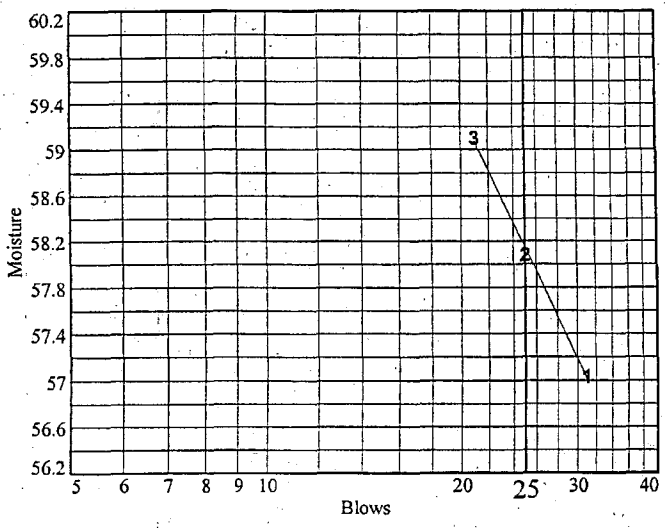
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 305-DH
Depth: 58.5'-60.0' **Sample Number:** STP-100 (SS-16)
Material Description: Fat Clay
Date: 11/20/2006 **USCS Class.:** CH
Testing Remarks: Tested By:TH Reviewed By:ST
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	37.31	30.74	37.36			
Dry+Tare	34.15	27.40	33.92			
Tare	28.61	21.65	28.10			
# Blows	31	25	21			
Moisture	57.0	58.1	59.1			



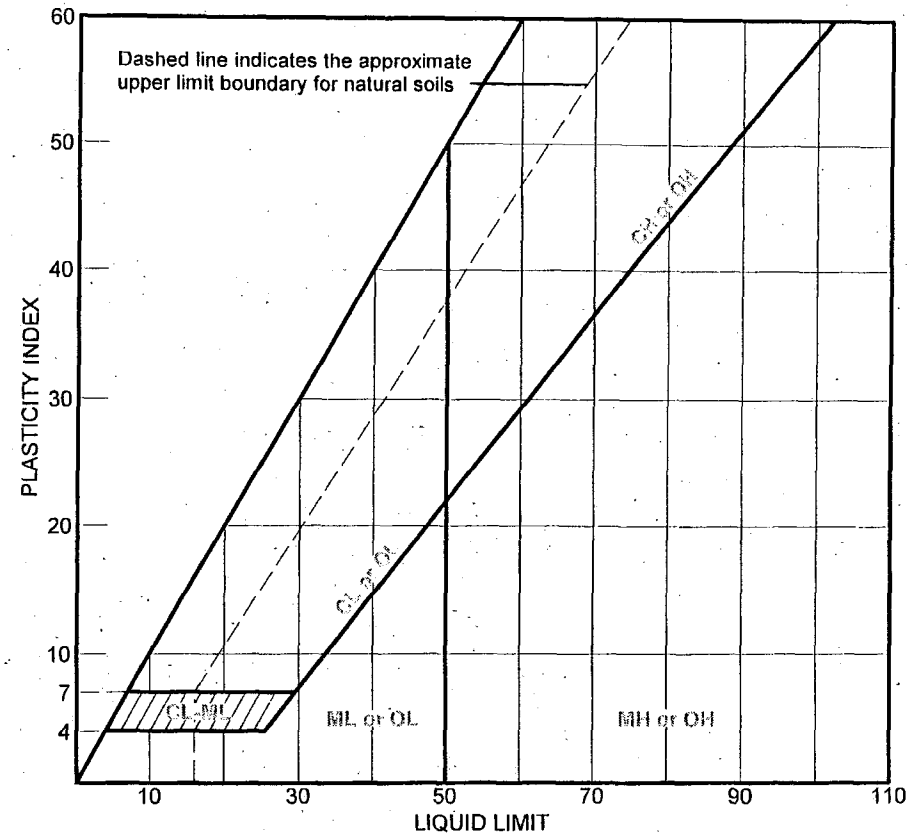
Liquid Limit= 58
Plastic Limit= 20
Plasticity Index= 38
Natural Moisture= 20.9
Liquidity Index= 0.0

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	36.14	35.22			
Dry+Tare	34.86	33.96			
Tare	28.44	27.59			
Moisture	19.9	19.8			

MAK 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT



	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-305-DH	UD-5	78' to 80'	2-25-07	SP-SM	Poorly graded sand with silt	22.1	NV	NP

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496 Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reviewed by: MH
ASTM D4318-05

KAW 413107

LIQUID AND PLASTIC LIMIT TEST DATA

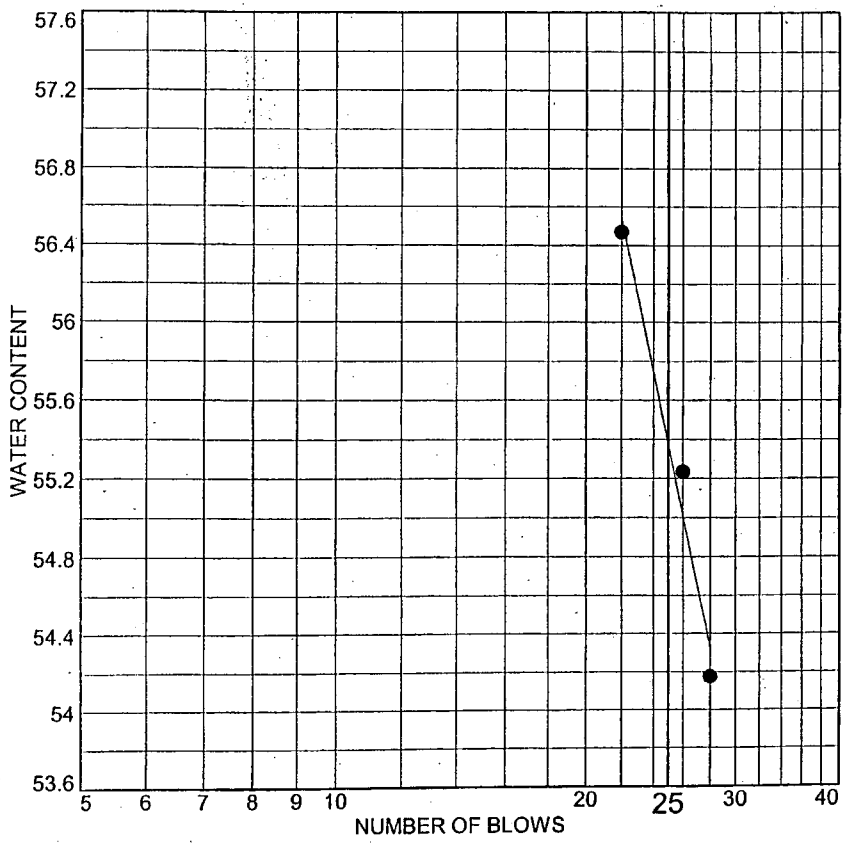
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496

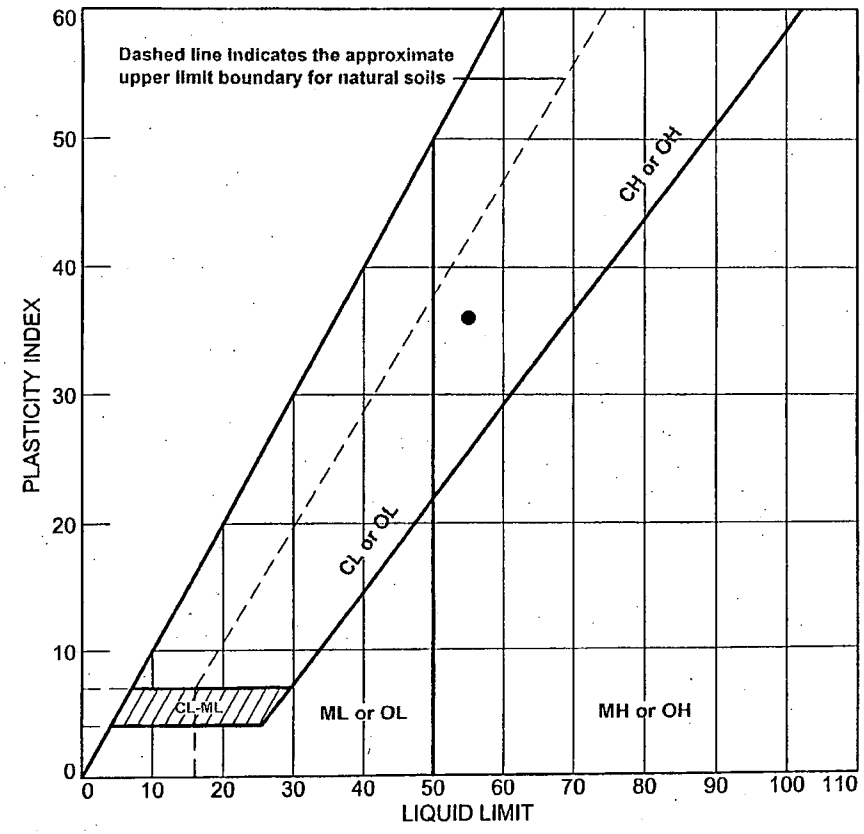
Sample Data

Source: B-305-DH
Sample No.: UD-5
Elev. or Depth: 78' to 80' **Sample Length(in./cm.):**
Location: B-305-DH
Description: Poorly graded sand with silt
Date: 2-25-07 **Natural Moisture:** 22.1
USCS Class.: SP-SM **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed by: MH
ASTM D4318-05

Liquid Limit= NV
Plastic Limit= NP
Plasticity Index= NP

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 305-DH	STP-102	88.5'-90.0'	11/20/2006	CH	Fat Clay	21.1	55	36
		(SS-21)							

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:TH
ASTM D4318-05

Reviewed By:ST

MA
4-3-07

KAW 4/3/07

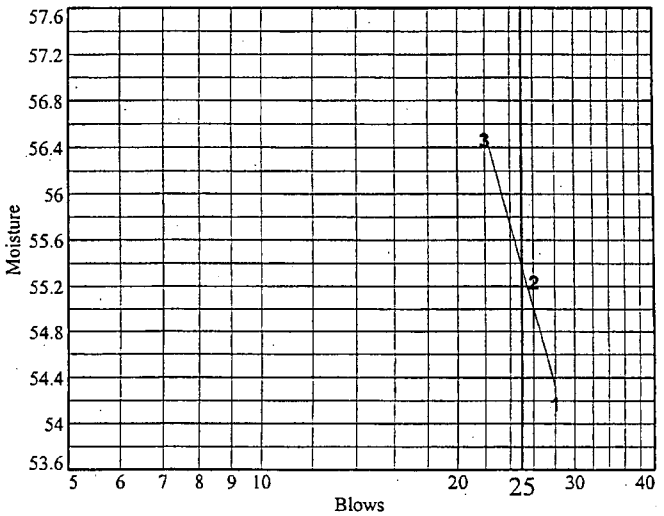
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 305-DH
Depth: 88.5'-90.0' **Sample Number:** STP-102 (SS-21)
Material Description: Fat Clay
Date: 11/20/2006 **USCS Class.:** CH **AASHTO Class.:** A-7-6(39)
Testing Remarks: Tested By:TH Reviewed By:ST
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	34.15	31.29	37.23			
Dry+Tare	30.71	28.23	34			
Tare	24.36	22.69	28.28			
# Blows	28	26	22			
Moisture	54.2	55.2	56.5			



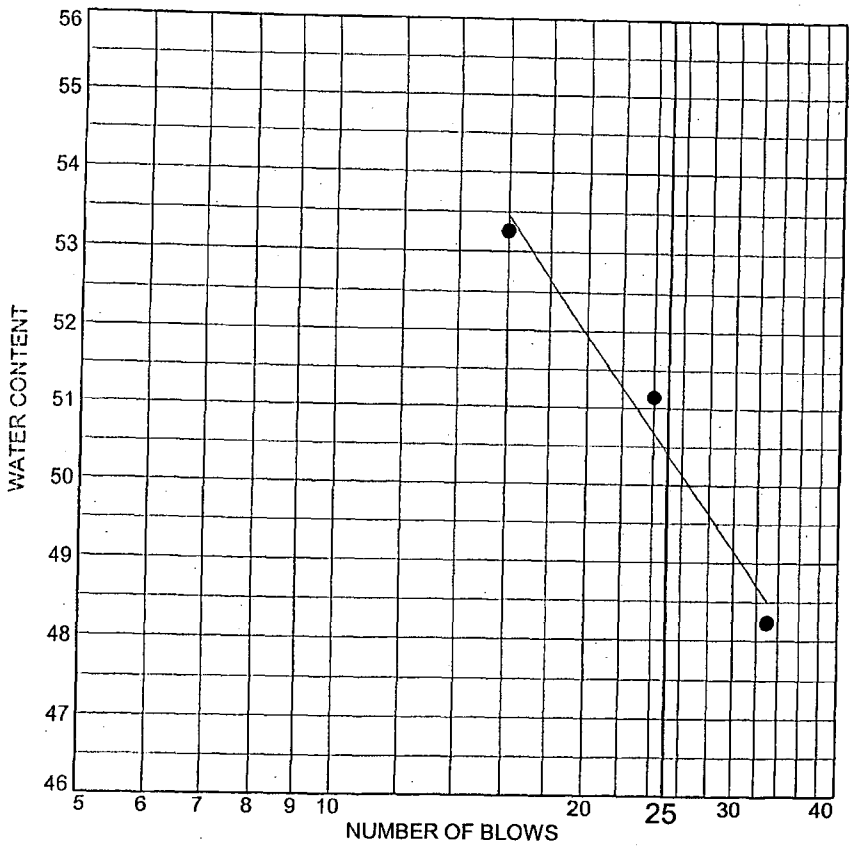
Liquid Limit= 55
Plastic Limit= 19
Plasticity Index= 36
Natural Moisture= 21.1
Liquidity Index= 0.1

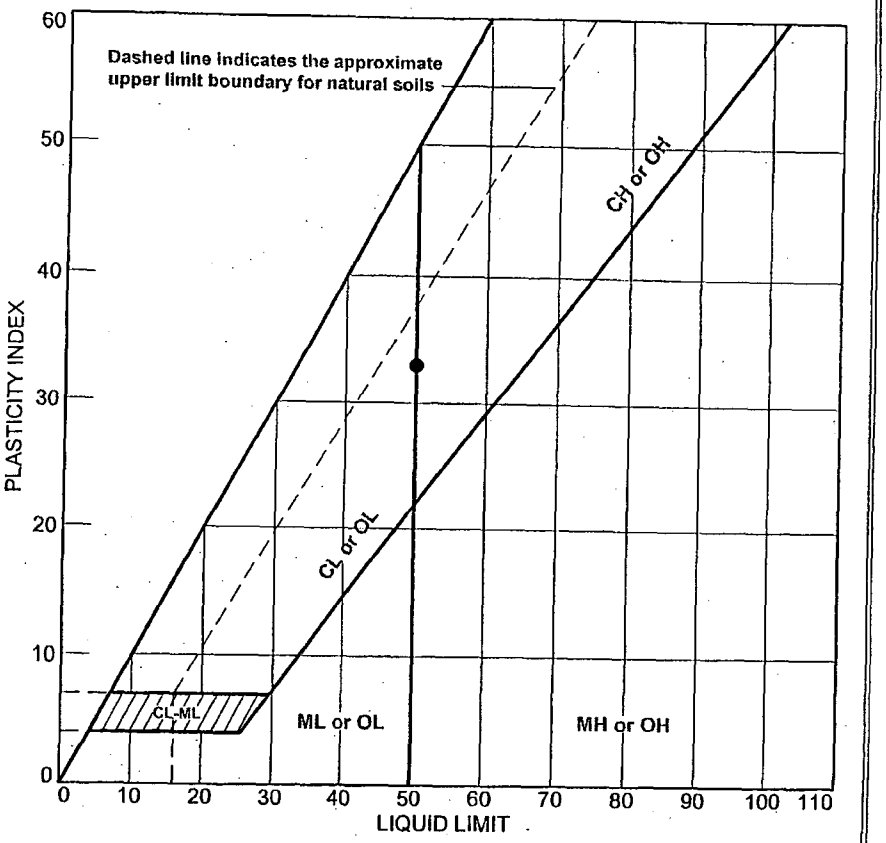
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	35.40	34.64			
Dry+Tare	34.23	33.44			
Tare	27.92	27.08			
Moisture	18.5	18.9			

MA 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 305-DH	STP-103 (SS-22)	93.5'-95.0'	11/20/2006	CH	Fat Clay	22.5	50	33

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:TH Reviewed By:ST

ASTM D4318-05

MM 4-3-07

KAW 4/3/07

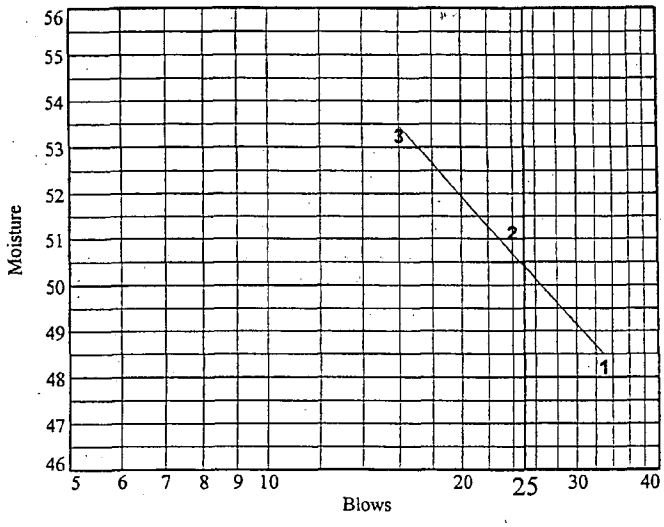
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 305-DH
Depth: 93.5'-95.0' **Sample Number:** STP-103 (SS-22)
Material Description: Fat Clay
Date: 11/20/2006 **USCS Class.:** CH
Testing Remarks: Tested By:TH Reviewed By:ST
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	29.96	37.47	37.42			
Dry+Tare	27.23	34.57	34.23			
Tare	21.57	28.90	28.24			
# Blows	33	24	16			
Moisture	48.2	51.1	53.3			



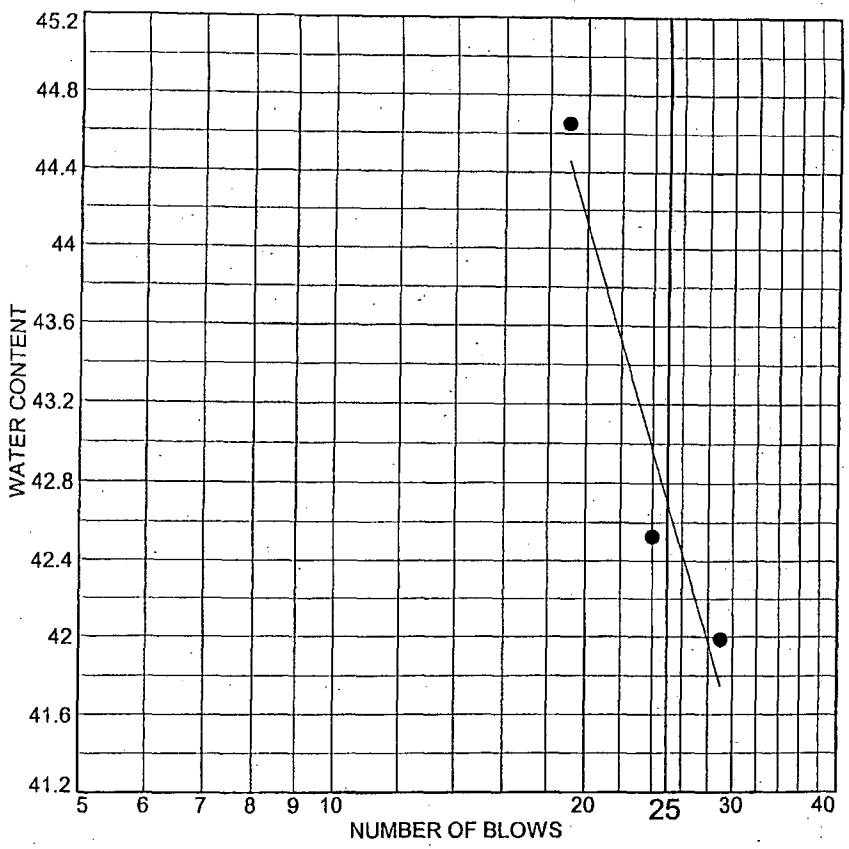
Liquid Limit= 50
Plastic Limit= 17
Plasticity Index= 33
Natural Moisture= 22.5
Liquidity Index= 0.2

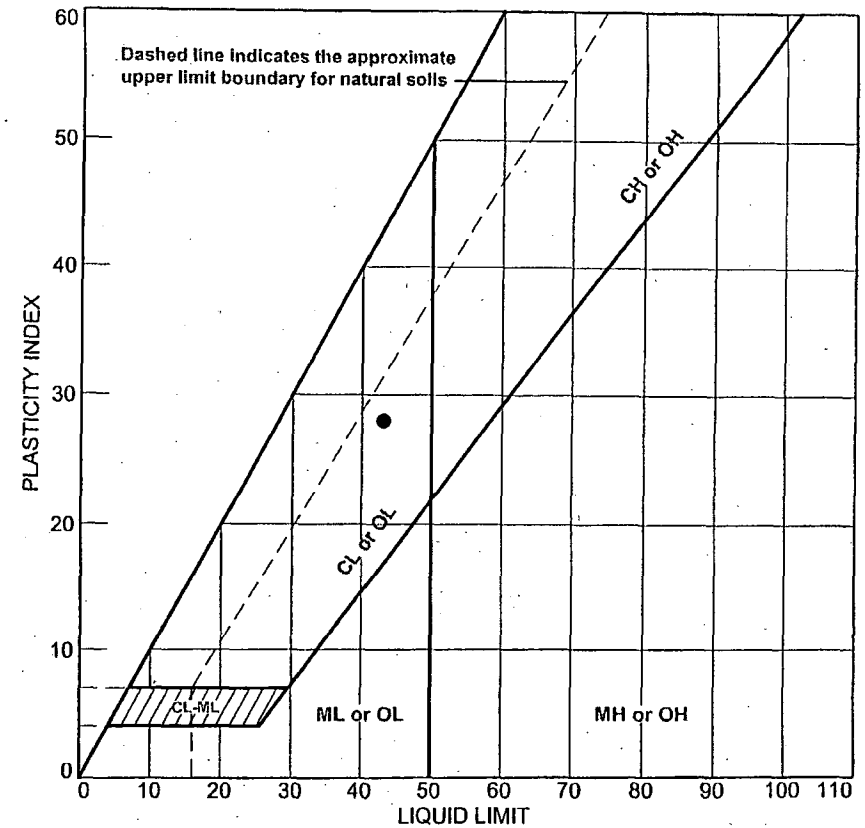
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	33.35	33.29			
Dry+Tare	32.24	32.17			
Tare	25.57	25.41			
Moisture	16.6	16.6			

MAP 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 305-DH	STP-105	118.5'-120'	11/20/2006	CL	Lean Clay	21.8	43	28
		(SS-25)							

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:TH Reviewed By:ST

ASTM D4318-05

4-3-07

KAW 4/3/07

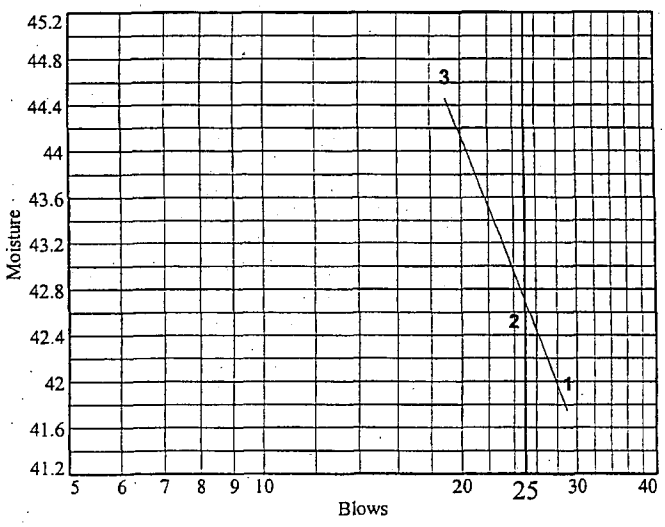
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 305-DH
Depth: 118.5'-120'
Sample Number: STP-105 (SS-25)
Material Description: Lean Clay
Date: 11/20/2006
USCS Class.: CL
Testing Remarks: Tested By:TH Reviewed By:ST
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	39.63	36.33	33.5			
Dry+Tare	36.46	33.57	30.16			
Tare	28.91	27.08	22.68			
# Blows	29	24	19			
Moisture	42.0	42.5	44.7			



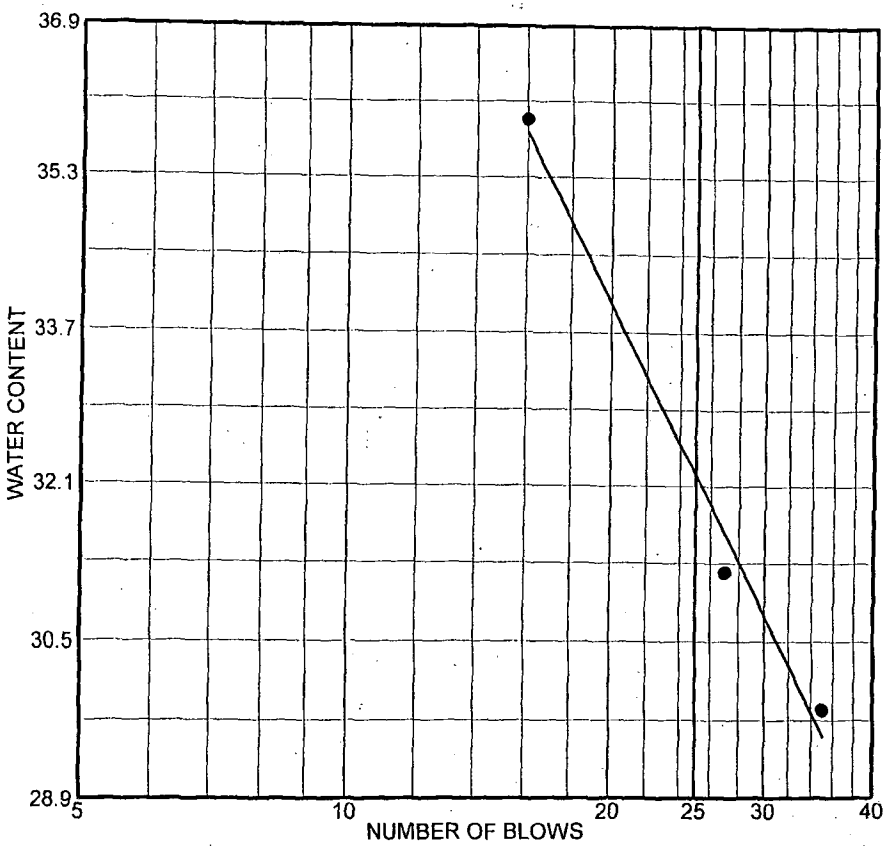
Liquid Limit= 43
Plastic Limit= 15
Plasticity Index= 28
Natural Moisture= 21.8
Liquidity Index= 0.2

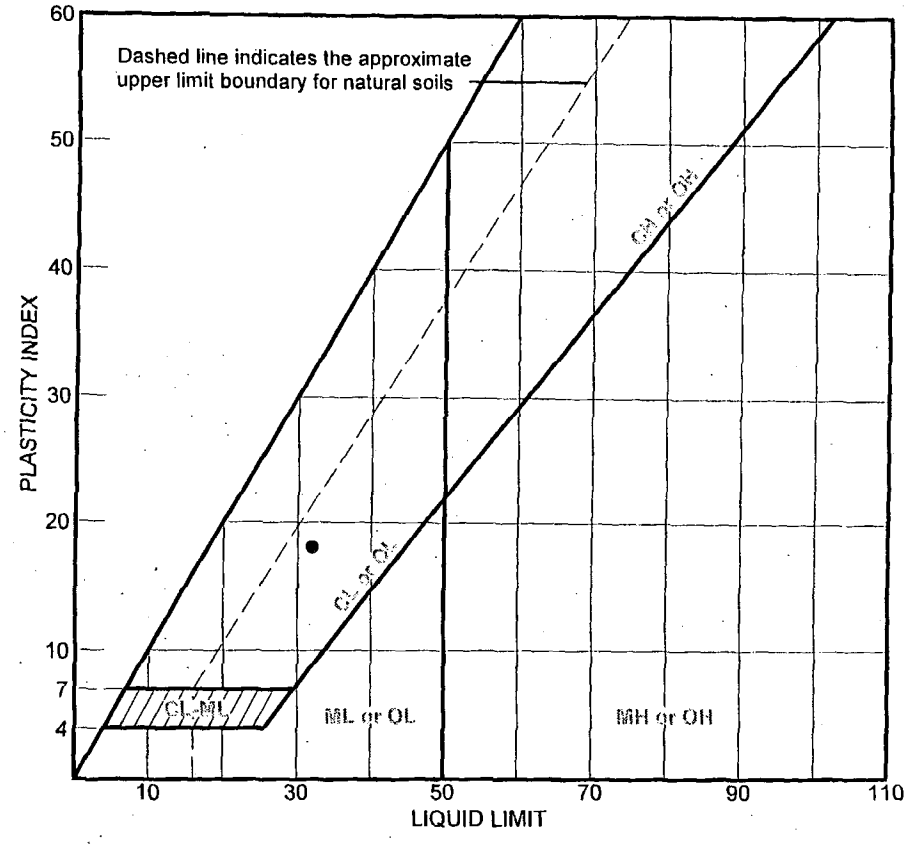
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	32.87	35.95			
Dry+Tare	31.73	34.94			
Tare	24.36	28.25			
Moisture	15.5	15.1			

MM 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-305-DH	UD-8	138' to 140'	2-19-17	CL	Lean clay with sand	18.1	32	18

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496 | Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reviewed by: SS
ASTM D4318-05

SS 2/25/2007

KAW 4/3/07

LIQUID AND PLASTIC LIMIT TEST DATA

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496

Sample Data

Source: B-305-DH
Sample No.: UD-8
Elev. or Depth: 138' to 140' **Sample Length(in./cm.):**
Location: B-305 DH
Description: Lean clay with sand
Date: 2-19-17 **Natural Moisture:** 18.1
USCS Class.: CL **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed by: SS
ASTM D4318-05

Liquid Limit Data

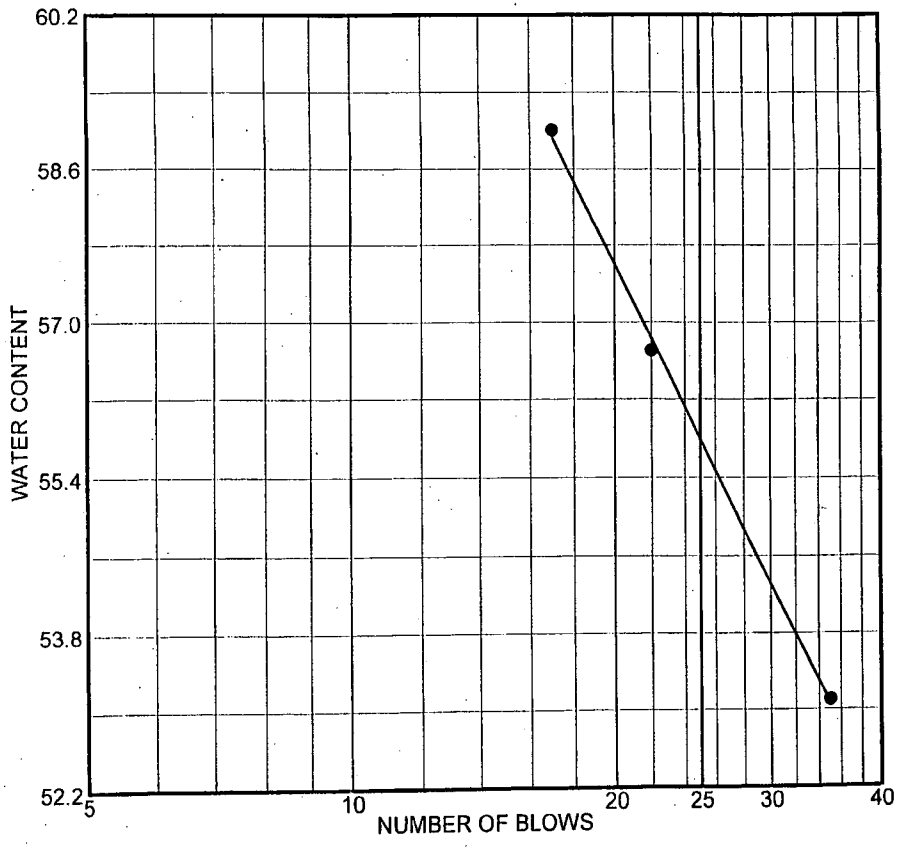
Run No.	1	2	3	4	5	6
Wet+Tare	26.68	25.92	27.06			
Dry+Tare	23.06	22.31	22.72			
Tare	10.92	10.75	10.63			
# Blows	35	27	16			
Moisture	29.8	31.2	35.9			

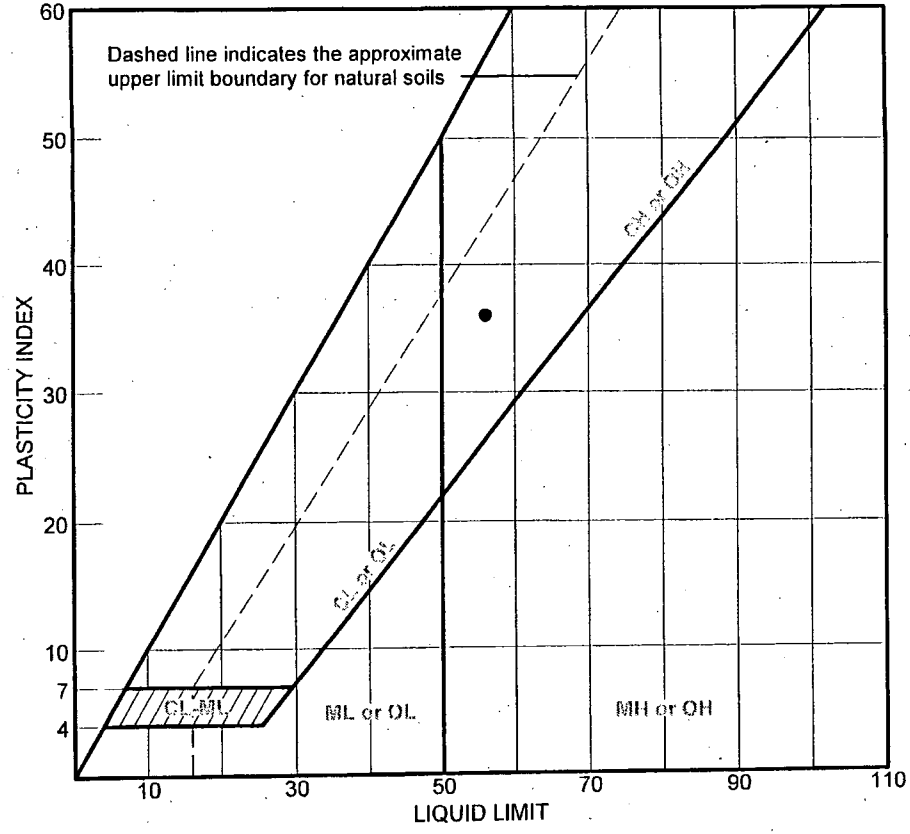
Liquid Limit= 32
Plastic Limit= 14
Plasticity Index= 18

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	19.91	20.91			
Dry+Tare	18.89	19.73			
Tare	11.45	11.02			
Moisture	13.7	13.5			

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-305-DH	UD-9	158' to 160'	2-14-07	CH	Fat clay	16.4	56	36

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496 | Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reviewed by: SS
ASTM D4318-05

SS 2/25/2007

KAW 4/3/07

LIQUID AND PLASTIC LIMIT TEST DATA

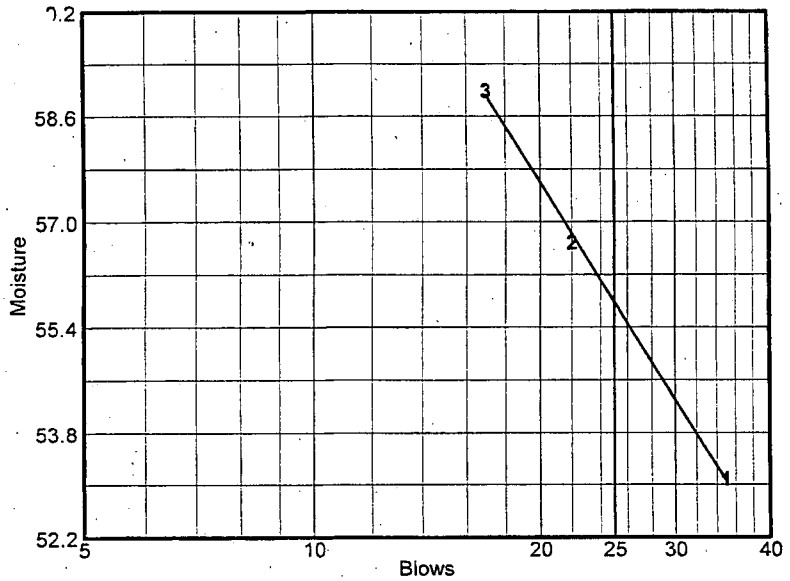
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496

Sample Data

Source: B-305-DH
Sample No.: UD-9
Elev. or Depth: 158' to 160' **Sample Length(in./cm.):**
Location: B-305-DH
Description: Fat clay
Date: 2-14-07 **Natural Moisture:** 16.4
USCS Class.: CH **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed by: SS
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	29.21	30.69	29.17			
Dry+Tare	22.88	23.52	22.43			
Tare	10.95	10.88	11.01			
# Blows	35	22	17			
Moisture	53.1	56.7	59.0			

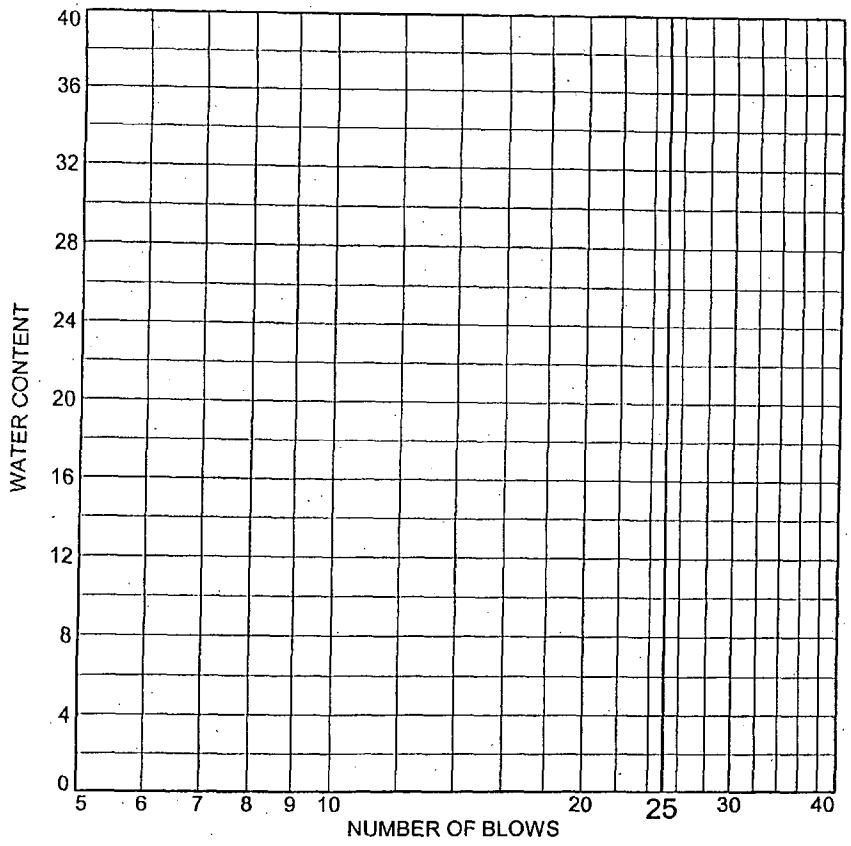


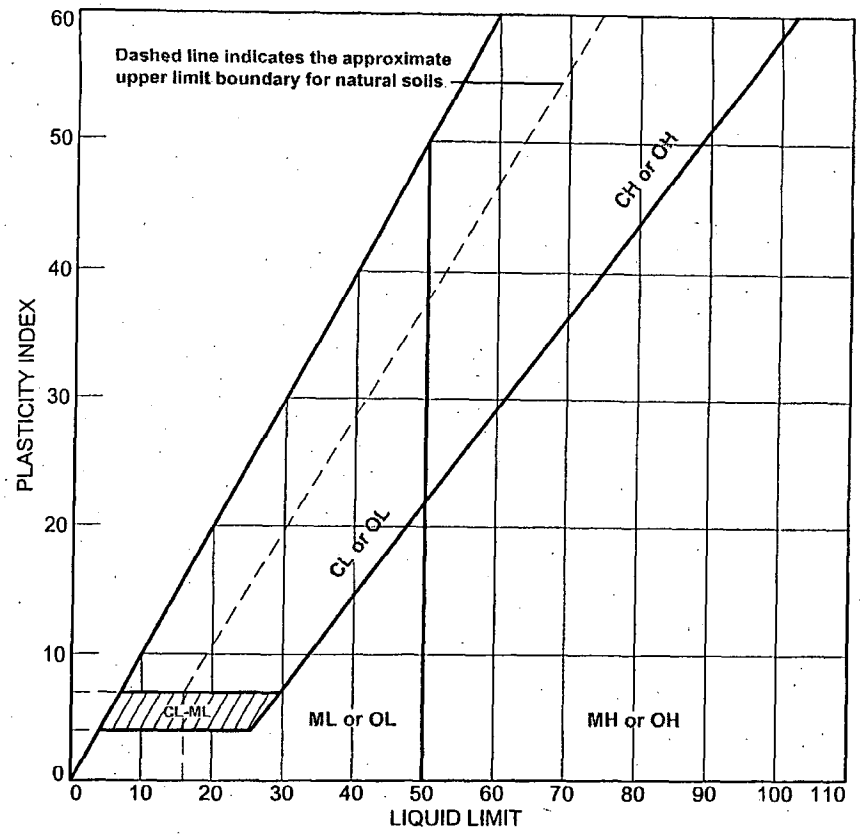
Liquid Limit= 56
Plastic Limit= 20
Plasticity Index= 36

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	24.82	24.04			
y+Tare	22.43	21.99			
Tare	11.01	10.79			
Moisture	20.9	18.3			

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 305-DH	STP-106	170.0'-171.5'	11/21/2006	ML	Silt with Sand	23.9	NV	NP
		(SS-29)							

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC Reviewed By:RF

ASTM D4318-05

NAA 4-3-07

KAW 4/3/07

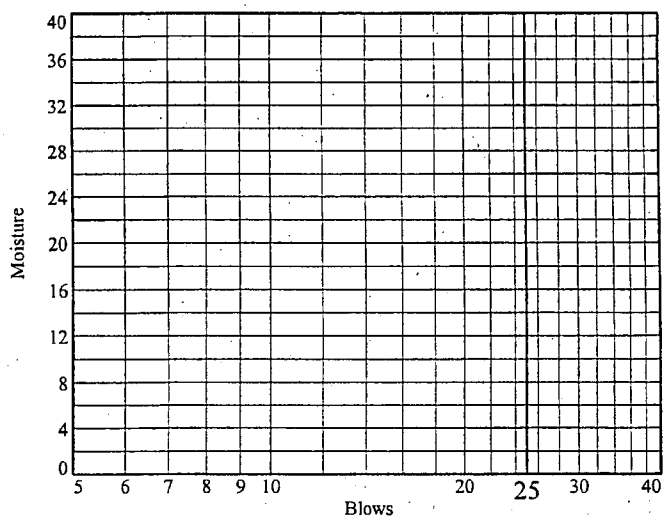
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 305-DH
Depth: 170.0'-171.5' **Sample Number:** STP-106 (SS-29)
Material Description: Silt with Sand
Date: 11/21/2006 **USCS Class.:** ML **AASHTO Class.:** A-4(0)
Testing Remarks: Tested By:AC Reviewed By:RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare						
Dry+Tare						
Tare						
# Blows						
Moisture						



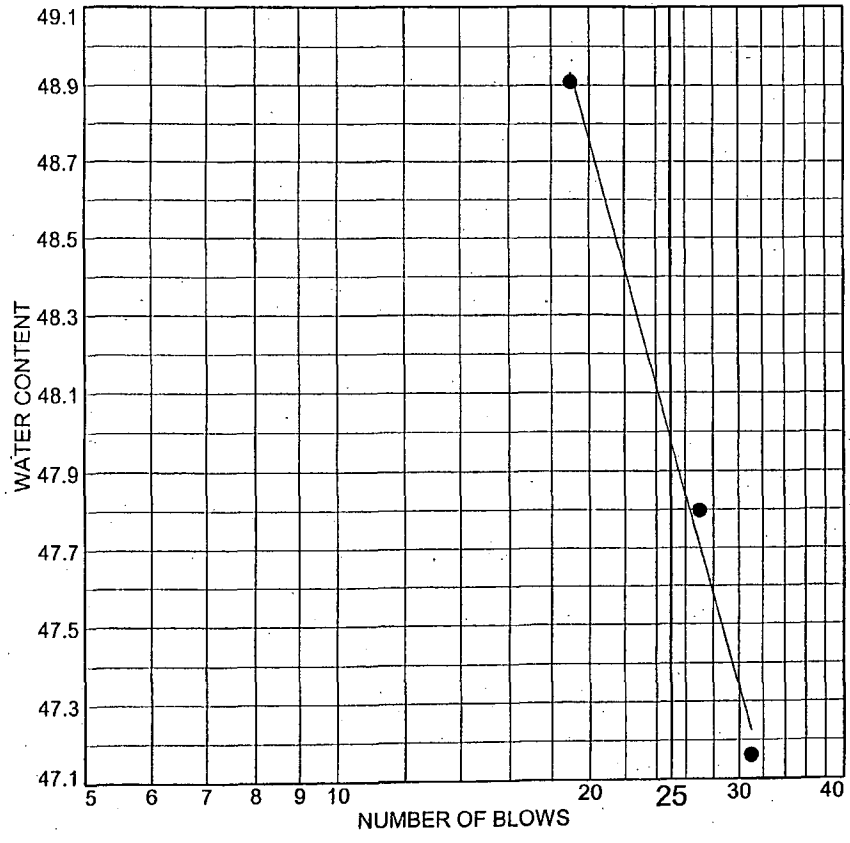
Liquid Limit= NV
Plastic Limit= NP
Plasticity Index= NP
Natural Moisture= 23.9

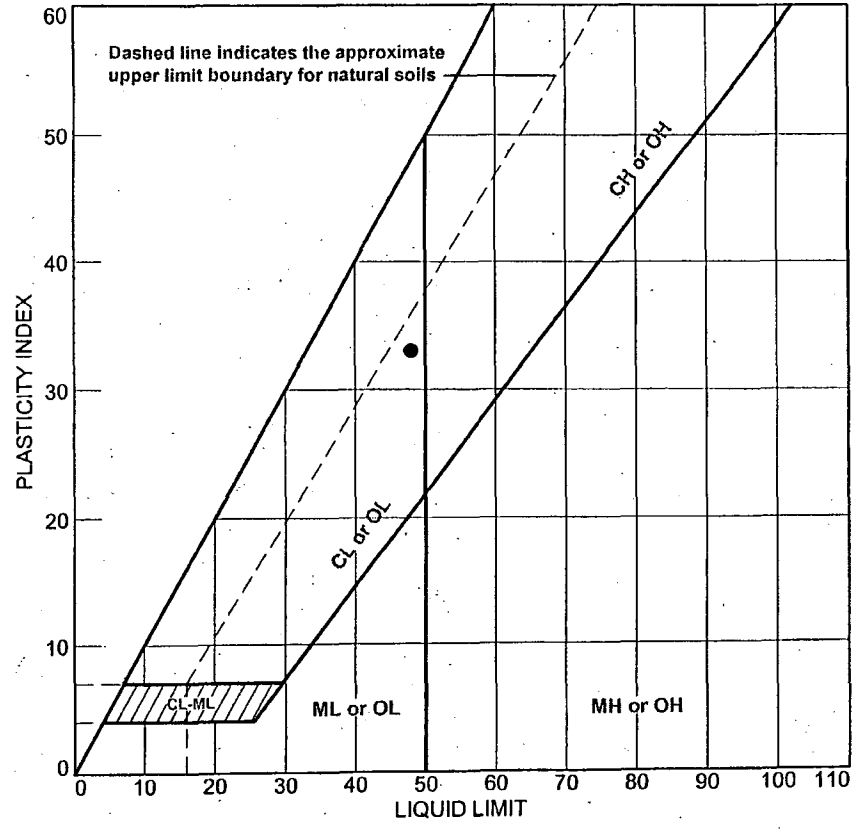
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare					
Dry+Tare					
Tare					
Moisture					

MM 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 305-DH	STP-107 (SS-30)	178.5'-180'	11/21/2006	CL	Lean Clay	21.7	48	33

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC/TH Reviewed By:ST

ASTM D4318-05

MA 4-3-07

KAW 4/3/07

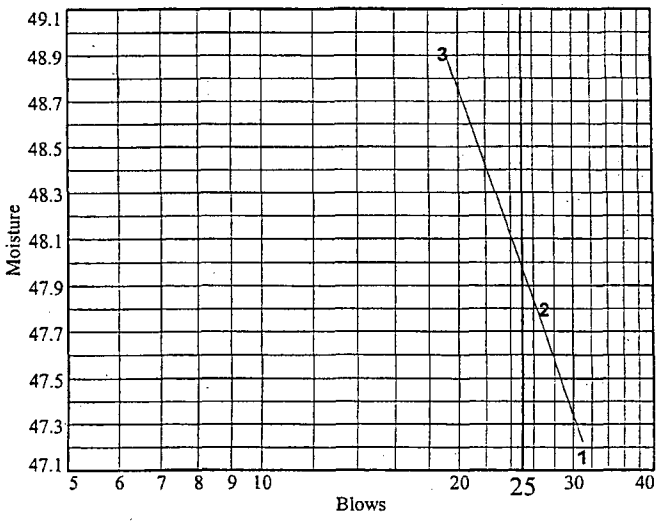
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 305-DH
Depth: 178.5'-180'
Sample Number: STP-107 (SS-30)
Material Description: Lean Clay
Date: 11/21/2006
USCS Class.: CL
Testing Remarks: Tested By:AC/TH Reviewed By:ST
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	37.76	39.36	38.61			
Dry+Tare	34.77	35.78	35.25			
Tare	28.43	28.29	28.38			
# Blows	31	27	19			
Moisture	47.2	47.8	48.9			



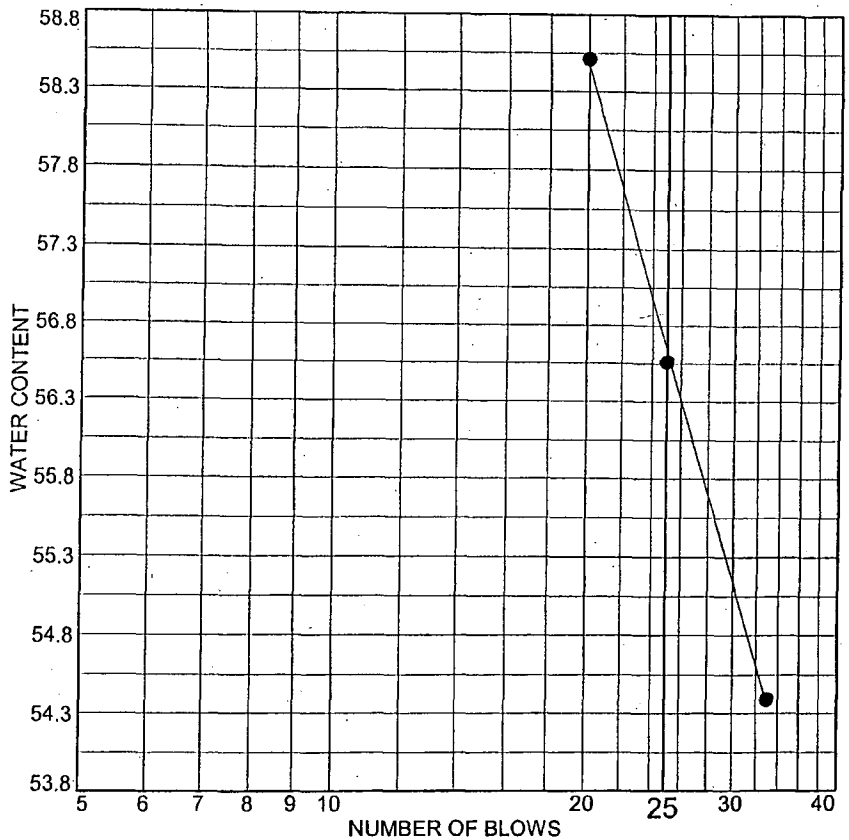
Liquid Limit= 48
Plastic Limit= 15
Plasticity Index= 33
Natural Moisture= 21.7
Liquidity Index= 0.2

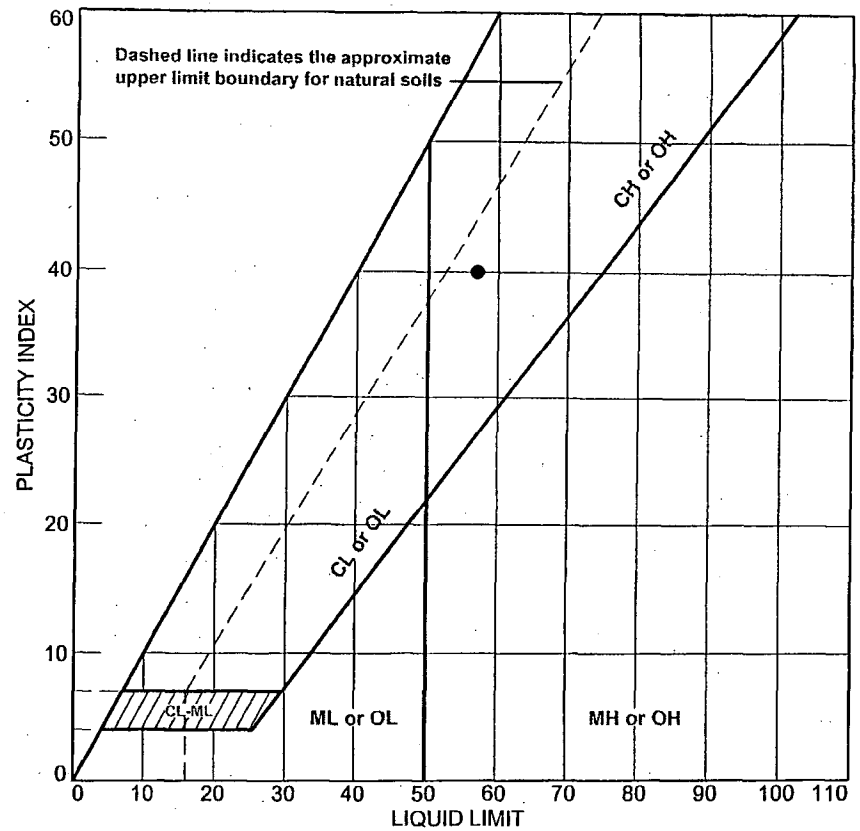
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	28.32	36.40			
Dry+Tare	27.44	35.37			
Tare	21.64	28.63			
Moisture	15.2	15.3			

MAK 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 305-DH	STP-108 (SS-32)	198.5'-200'	11/21/2006	CH	Fat Clay	26.1	57	40

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC/TH Reviewed By:ST
ASTM D4318-05

MA 4-3-07

KAW 4/3/07

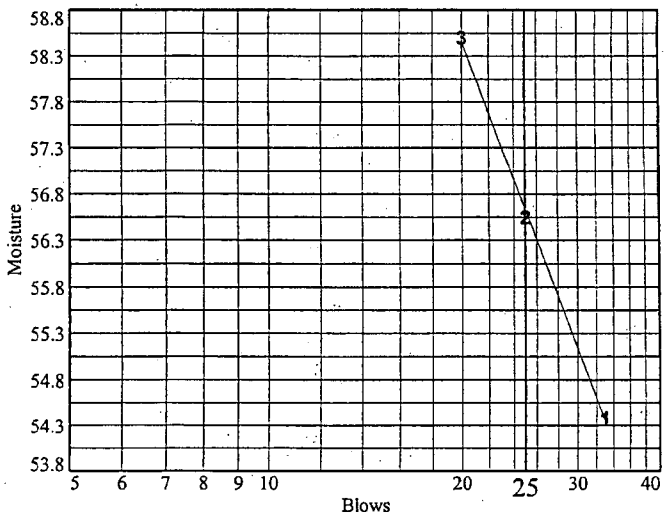
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 305-DH
Depth: 198.5'-200'
Sample Number: STP-108 (SS-32)
Material Description: Fat Clay
Date: 11/21/2006
USCS Class.: CH
Testing Remarks: Tested By:AC/TH Reviewed By:ST
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	39.06	37.53	36.06			
Dry+Tare	35.22	34.08	32.76			
Tare	28.16	27.98	27.12			
# Blows	33	25	20			
Moisture	54.4	56.6	58.5			



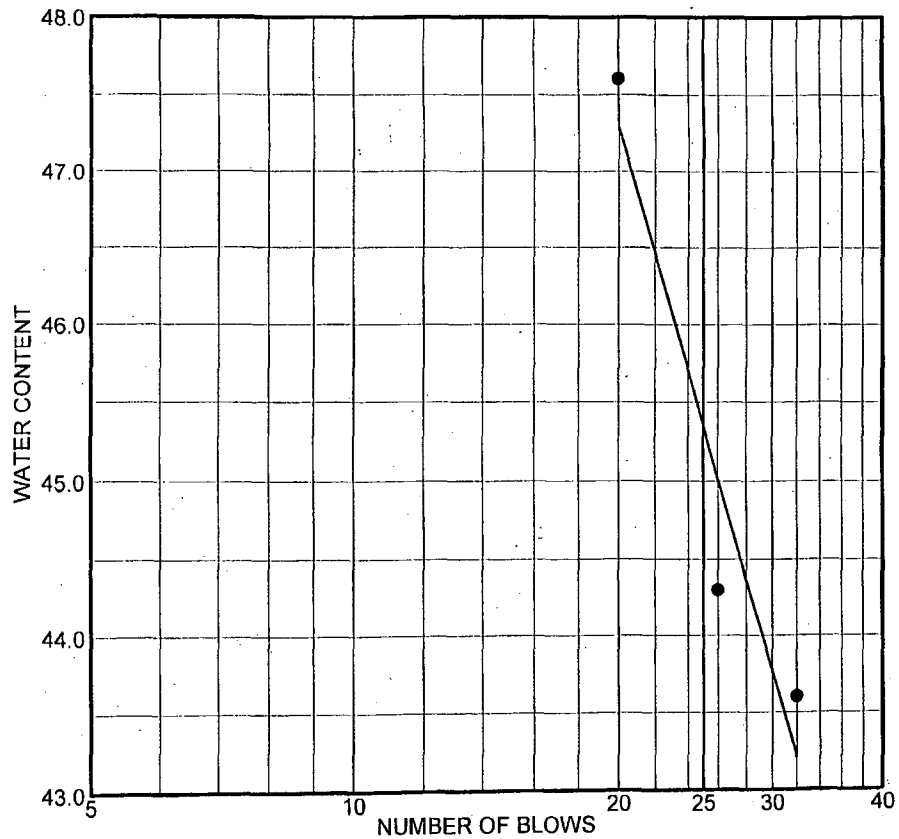
Liquid Limit= 57
Plastic Limit= 17
Plasticity Index= 40
Natural Moisture= 26.1
Liquidity Index= 0.2

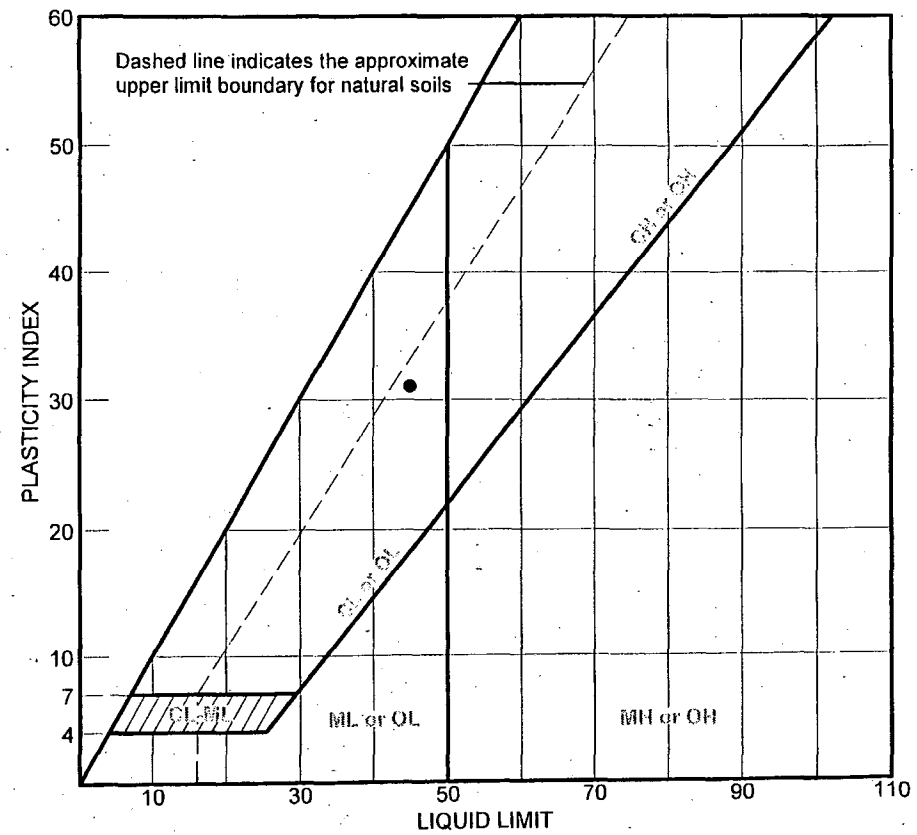
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	35.94	36			
Dry+Tare	34.81	34.84			
Tare	28.10	28.21			
Moisture	16.8	17.5			

NM 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-305-DH	UD-11	213' to 215'	2-19-07	CL	Lean clay with sand	20.9	45	31

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496 | Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reviewed by: SS KAW 4/3/07
ASTM D4318-05

KAW 4/3/07

LIQUID AND PLASTIC LIMIT TEST DATA

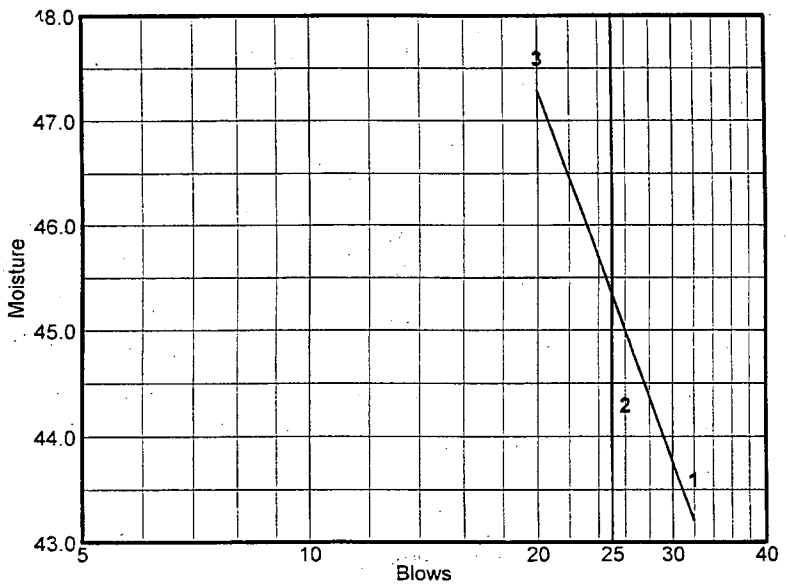
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496

Sample Data

Source: B-305-DH
Sample No.: UD-11
Elev. or Depth: 213' to 215' **Sample Length(in./cm.):**
Location: B-305 DH
Description: Lean clay with sand
Date: 2-19-07 **Natural Moisture:** 20.9
USCS Class.: CL **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed by: SS
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	33.15	26.15	24.00			
Dry+Tare	26.42	21.68	19.75			
Tare	10.98	11.59	10.82			
# Blows	32	26	20			
Moisture	43.6	44.3	47.6			

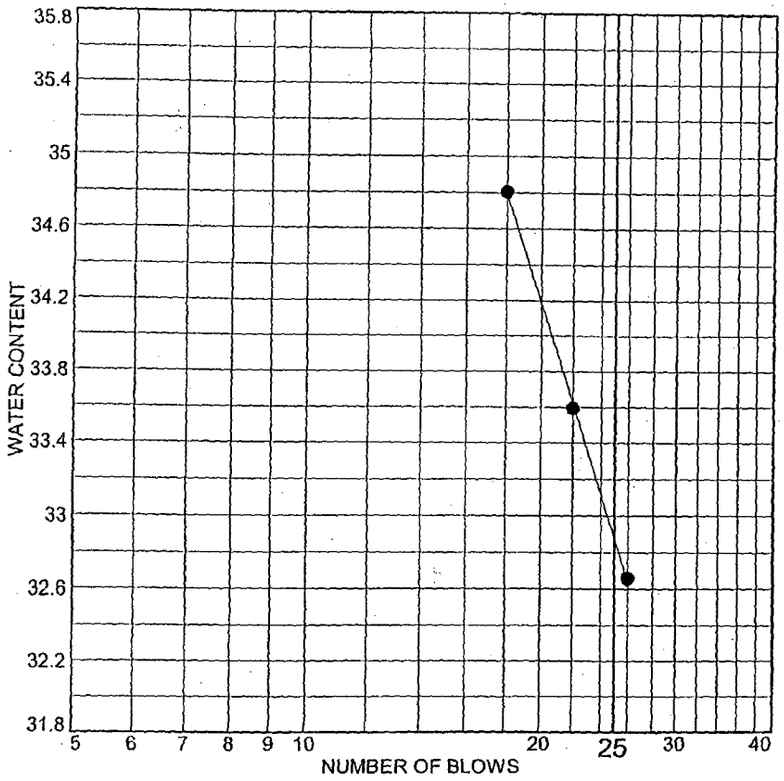


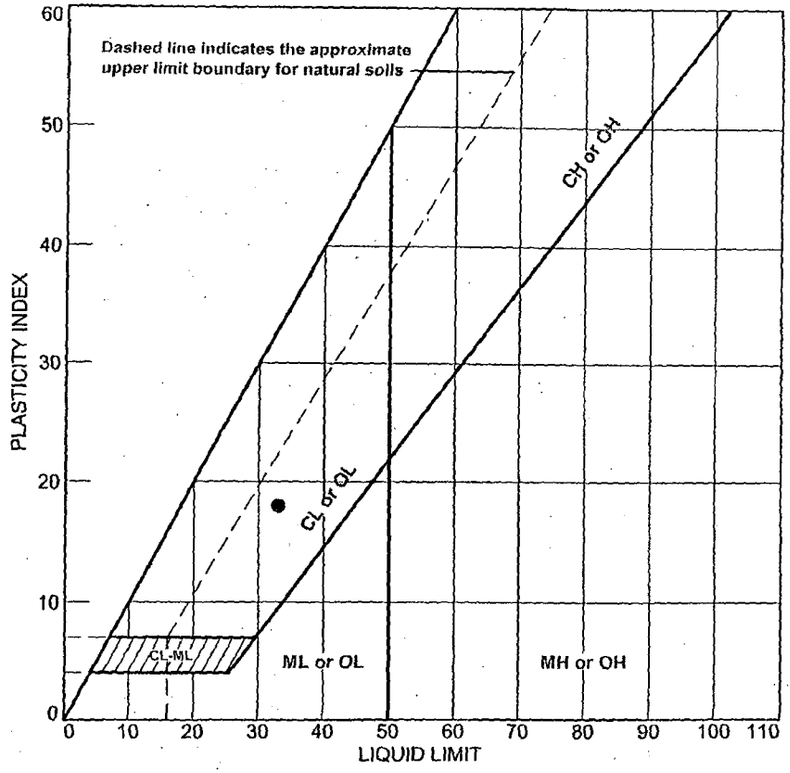
Liquid Limit= 45
Plastic Limit= 14
Plasticity Index= 31

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	18.76	17.44			
Dry+Tare	17.78	16.62			
Tare	10.90	11.00			
Moisture	14.2	14.6			

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 305-DH	STP-109 (SS-33)	218.5'-220'	11/22/2006	CL	Lean Clay	19.8	33	18

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC/TH Reviewed By:ST

ASTM D4318-05

MM 4-3-07

KAW 4/3/07

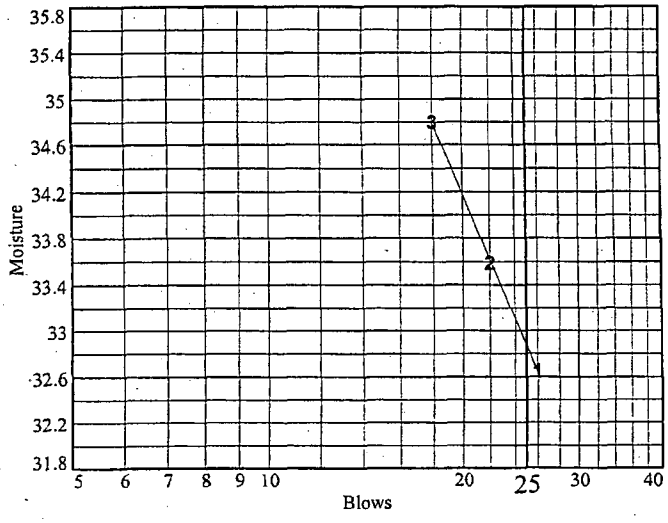
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 305-DH
Depth: 218.5'-220'
Sample Number: STP-109 (SS-33)
Material Description: Lean Clay
Date: 11/22/2006
USCS Class.: CL
Testing Remarks: Tested By:AC/TH Reviewed By:ST
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	38.75	38.53	38.72			
Dry+Tare	36.17	35.95	36.04			
Tare	28.27	28.27	28.34			
# Blows	26	22	18			
Moisture	32.7	33.6	34.8			



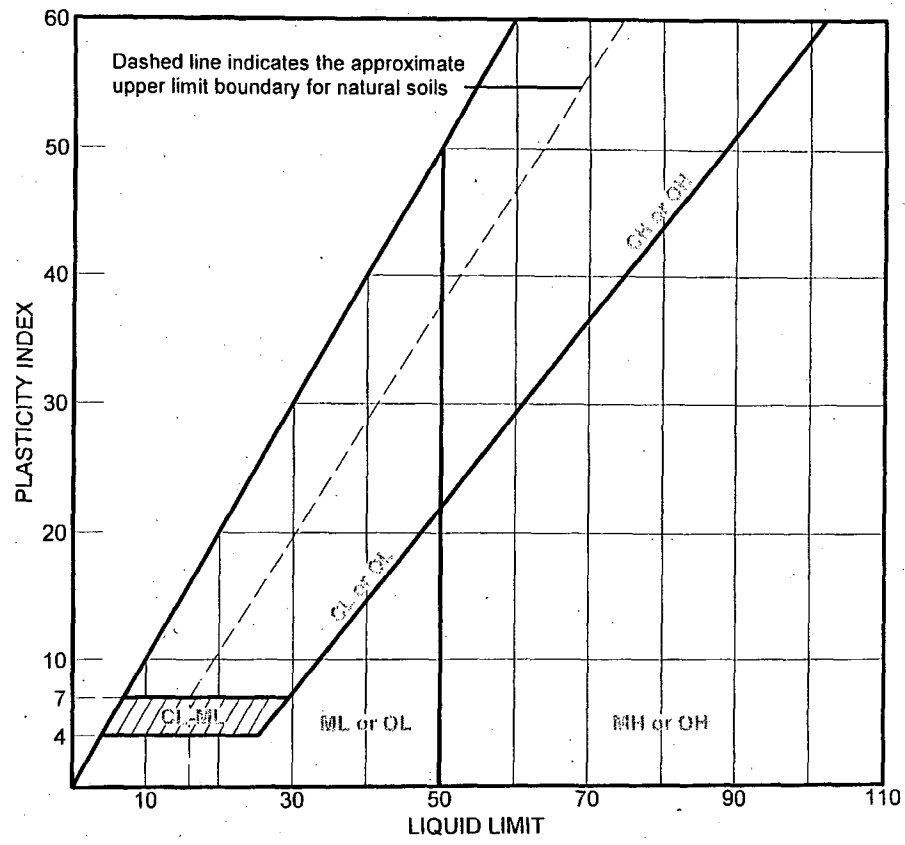
Liquid Limit= 33
Plastic Limit= 15
Plasticity Index= 18
Natural Moisture= 19.8
Liquidity Index= 0.3

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	36.13	35.98			
Dry+Tare	35.07	34.92			
Tare	28.16	28.10			
Moisture	15.3	15.5			

MAA 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT



	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-305-DH	UD-12	228' to 230'	2-14-07	SM	Silty sand	21.5	NV	NP

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496 | Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reviewed by: SS
ASTM D4318-05

SS 2/25/2007

KAW 4/3/07

LIQUID AND PLASTIC LIMIT TEST DATA

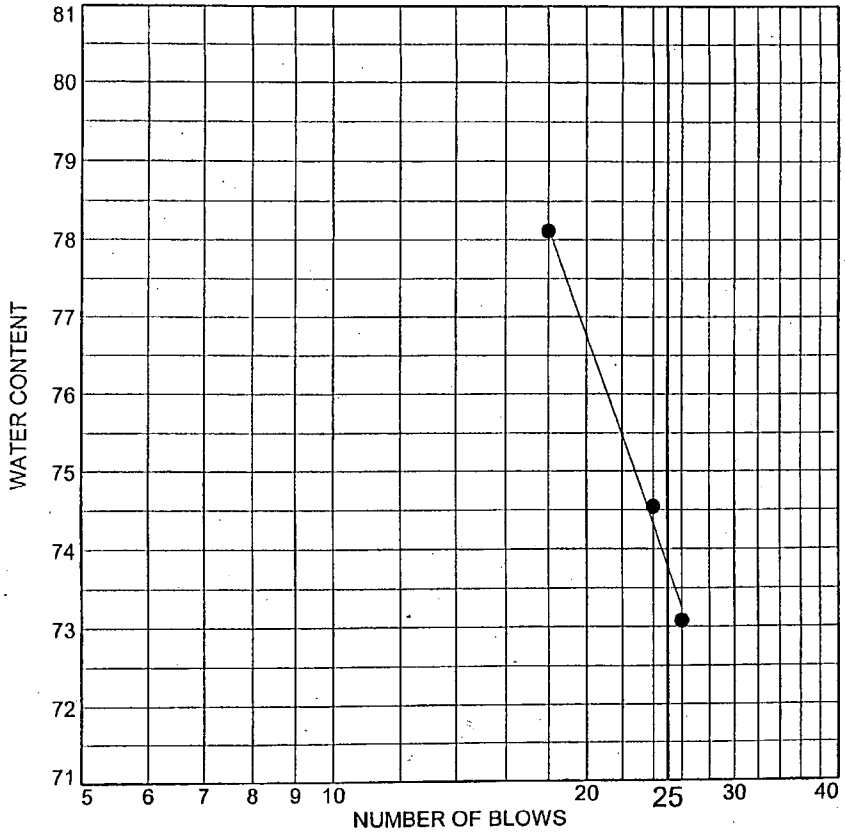
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
ject Number: 5050-06-0496

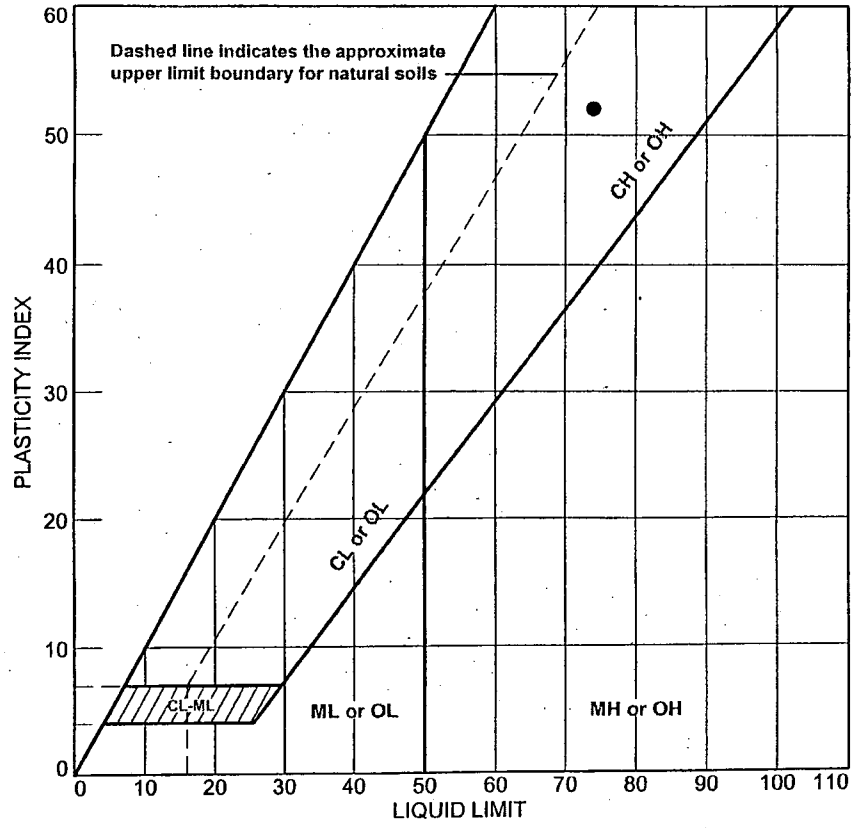
Sample Data

Source: B-305-DH
Sample No.: UD-12
Elev. or Depth: 228' to 230' **Sample Length(in./cm.):**
Location: B-305-DH
Description: Silty sand
Date: 2-14-07 **Natural Moisture:** 21.5
USCS Class.: SM **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed by: SS
ASTM D4318-05

Liquid Limit= NV
Plastic Limit= NP
Plasticity Index= NP

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 305-DH	STP-110	258.5'-260'	11/28/2006	CH	Fat Clay	29.6	74	52
		(SS-35)							

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC/TH Reviewed By:ST

ASTM D4318-05

MA 4-3-07

KAW 4/3/07

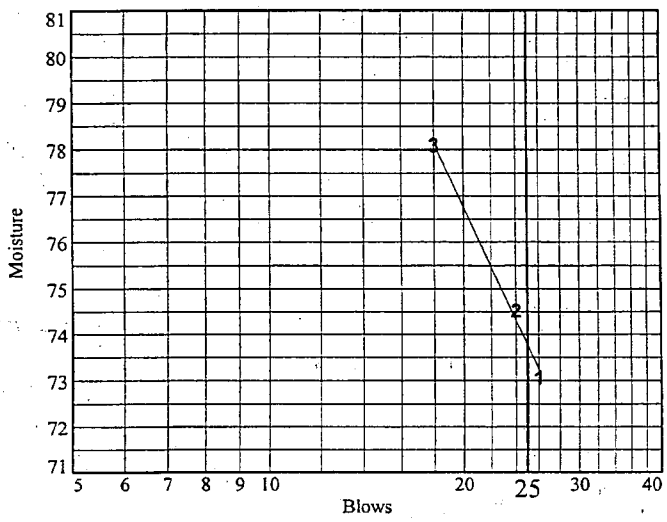
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 305-DH
Depth: 258.5'-260'
Sample Number: STP-110 (SS-35)
Material Description: Fat Clay
Date: 11/28/2006
USCS Class.: CH
Testing Remarks: Tested By:AC/TH Reviewed By:ST
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	31.47	37.06	36.78			
Dry+Tare	27.29	33.02	32.89			
Tare	21.57	27.60	27.91			
# Blows	26	24	18			
Moisture	73.1	74.5	78.1			



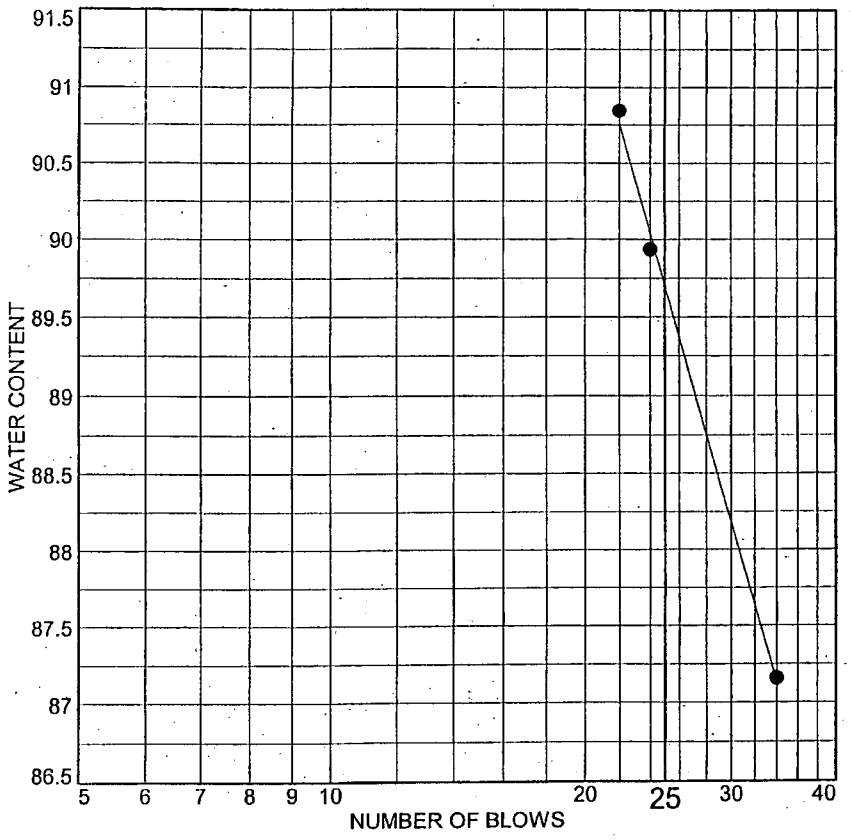
Liquid Limit= 74
Plastic Limit= 22
Plasticity Index= 52
Natural Moisture= 29.6
Liquidity Index= 0.1

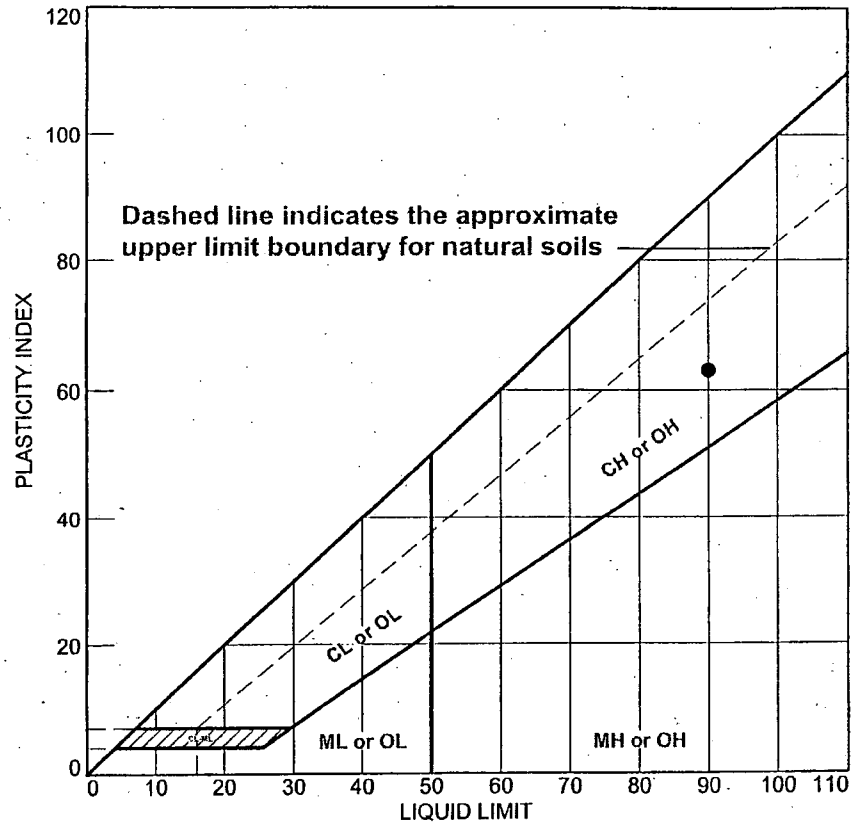
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	33.18	33.42			
Dry+Tare	31.77	32.01			
Tare	25.41	25.56			
Moisture	22.2	21.9			

MWA 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 305-DH	STP-111 (SS-36)	278.5'-280'	11/29/2006	CH	Fat Clay	30.4	90	63

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC Reviewed By:RF

ASTM D4318-05

NMA 4-3-07

KAW 4/3/07

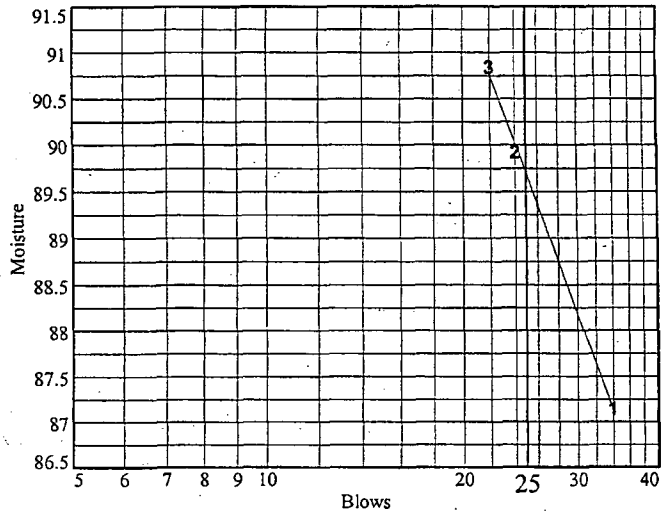
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 305-DH
Depth: 278.5'-280'
Sample Number: STP-111 (SS-36)
Material Description: Fat Clay
Date: 11/29/2006
USCS Class.: CH
Testing Remarks: Tested By:AC Reviewed By:RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	33.57	37.30	36.5			
Dry+Tare	29.77	33.19	32.63			
Tare	25.41	28.62	28.37			
# Blows	34	24	22			
Moisture	87.2	89.9	90.8			



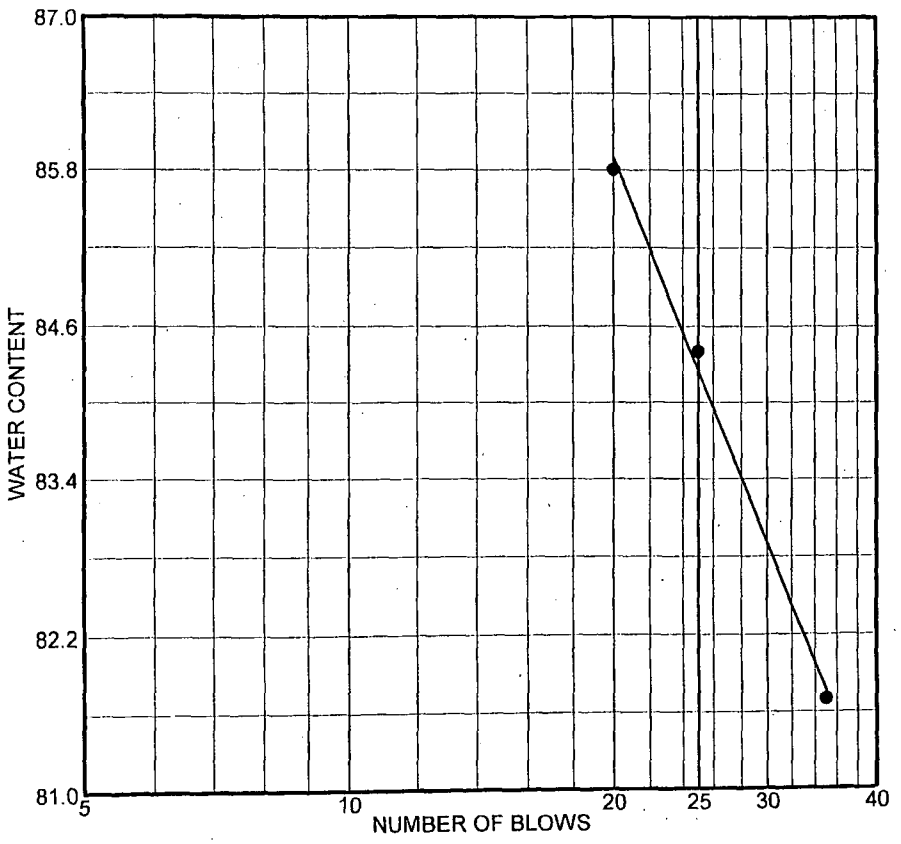
Liquid Limit= 90
Plastic Limit= 27
Plasticity Index= 63
Natural Moisture= 30.4
Liquidity Index= 0.1

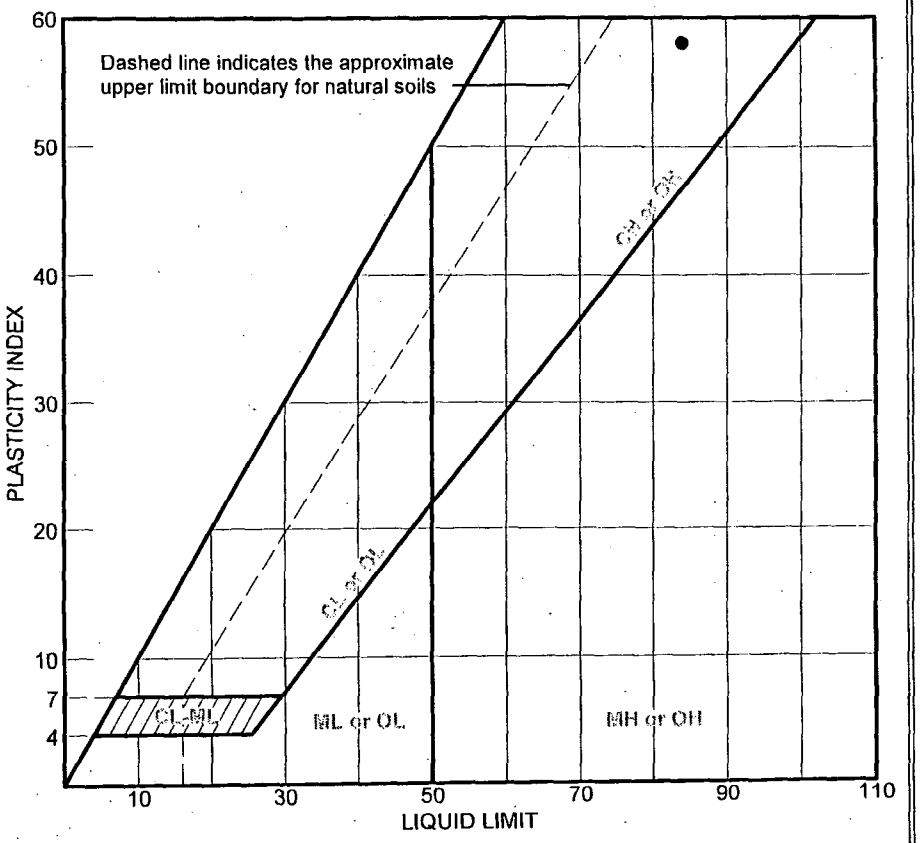
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	28.91	35.52			
Dry+Tare	27.37	33.91			
Tare	21.58	27.92			
Moisture	26.6	26.9			

MA 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-305-DH	UD-14	288' to 291'	2-14-07	CH	Fat clay	40.2	84	58

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496 | Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reviewed by: SS
ASTM D4318-05

SS 2/25/2007

KAW 4/3/07

LIQUID AND PLASTIC LIMIT TEST DATA

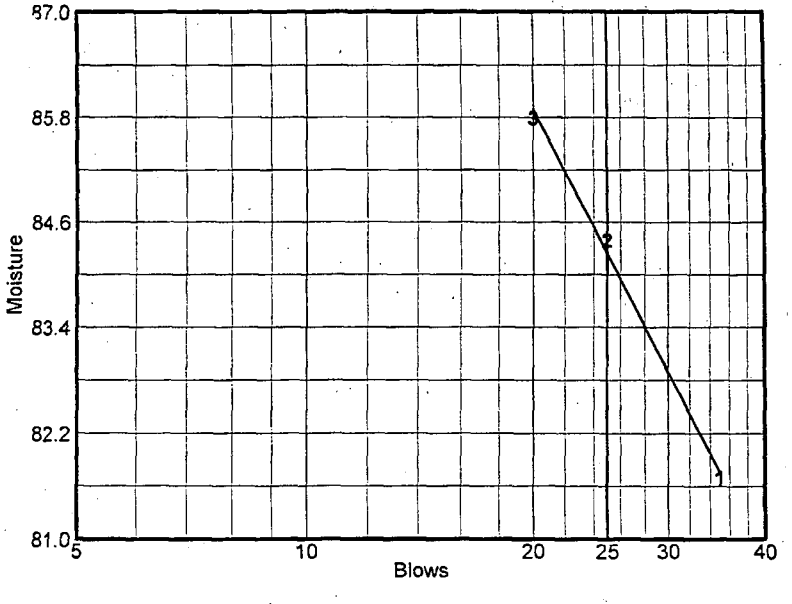
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496

Sample Data

Source: B-305-DH
Sample No.: UD-14
Elev. or Depth: 288' to 291' **Sample Length(in./cm.):**
Location: B-305-DH
Description: Fat clay
Date: 2-14-07 **Natural Moisture:** 40.2
USCS Class.: CH **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed by: SS
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	23.45	23.72	25.99			
Dry+Tare	17.71	18.04	19.27			
Tare	10.68	11.31	11.44			
# Blows	35	25	20			
Moisture	81.7	84.4	85.8			

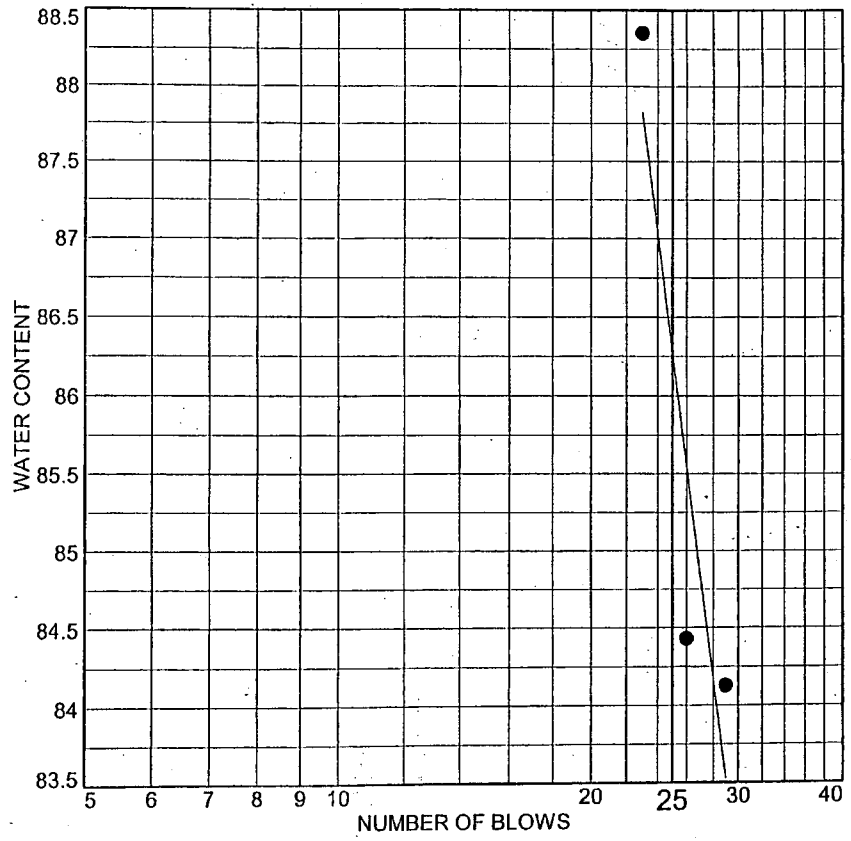


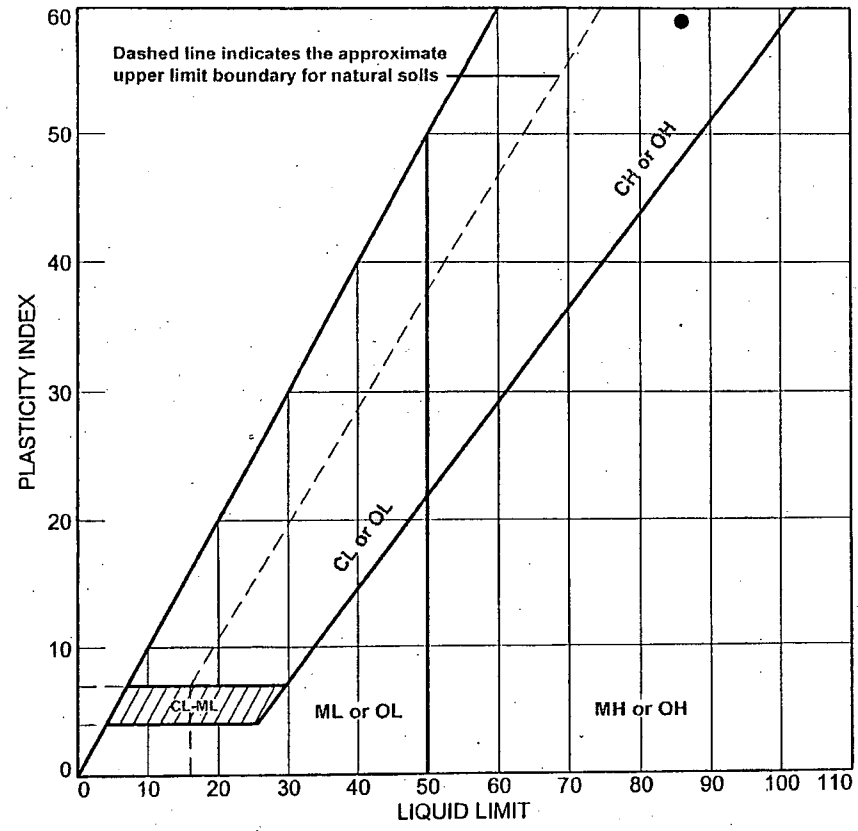
Liquid Limit= 84
Plastic Limit= 26
Plasticity Index= 58

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	20.87	22.60			
Dry+Tare	18.78	20.41			
Tare	10.98	11.59			
Moisture	26.8	24.8			

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 305-DH	STP-114	438.5'-440'	12/3/2006	CH	Fat Clay	29.7	86	59
		(SS-42)							

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC/TH Reviewed By:RF

ASTM D4318-05

MA 4-3-07

KAW 4/3/07

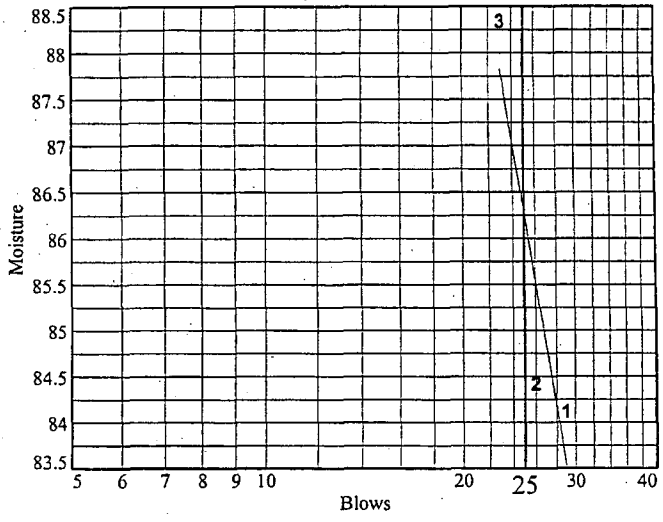
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 305-DH
Depth: 438.5'-440'
Sample Number: STP-114 (SS-42)
Material Description: Fat Clay
Date: 12/3/2006
USCS Class.: CH
Testing Remarks: Tested By:AC/TH Reviewed By:RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	35.73	37.31	37.01			
Dry+Tare	32.02	33.46	32.99			
Tare	27.61	28.90	28.44			
# Blows	29	26	23			
Moisture	84.1	84.4	88.4			



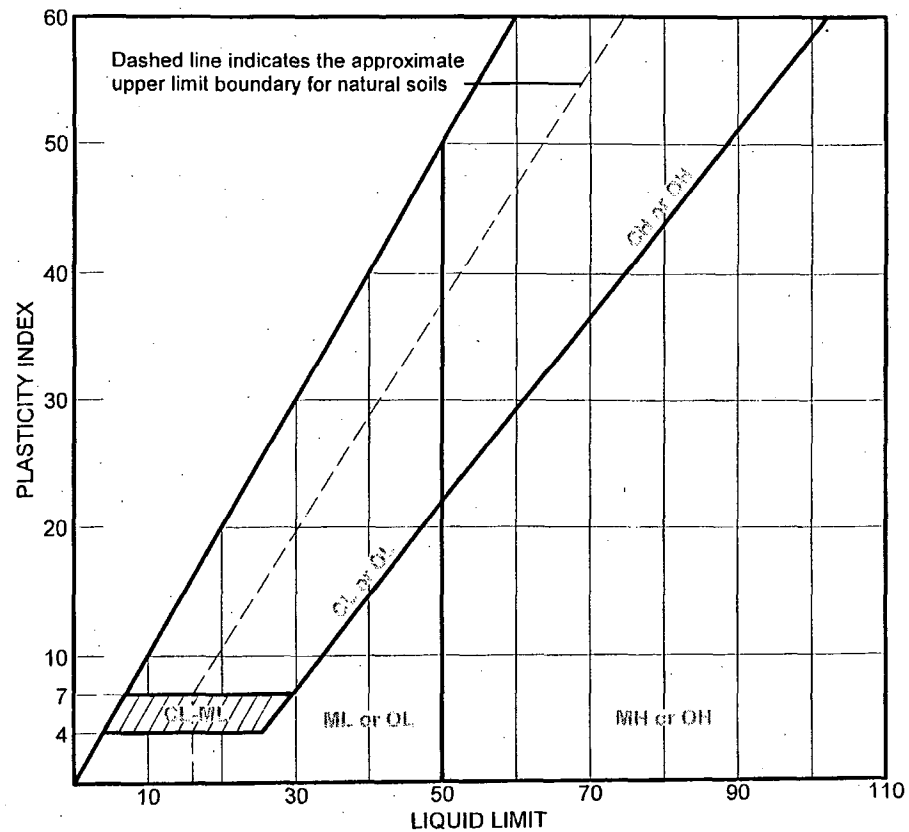
Liquid Limit= 86
Plastic Limit= 27
Plasticity Index= 59
Natural Moisture= 29.7
Liquidity Index= 0.0

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	34.24	35.78			
Dry+Tare	32.69	34.19			
Tare	27.09	28.30			
Moisture	27.7	27.0			

MA 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT



	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-305-DH	UD-21A	453.75' to 455.75'	2-25-07	SP-SM	Poorly graded sand with silt	22.0	NV	NP

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496 | Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reviewed by: MH
ASTM D4318-05

KAW 4/3/07

LIQUID AND PLASTIC LIMIT TEST DATA

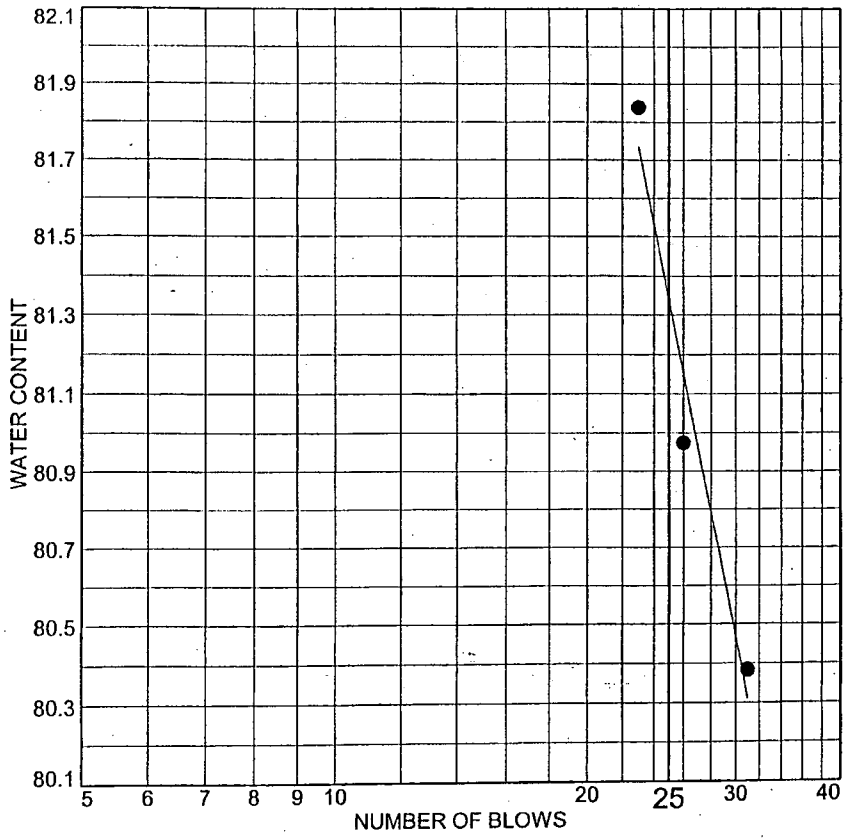
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
ject Number: 5050-06-0496

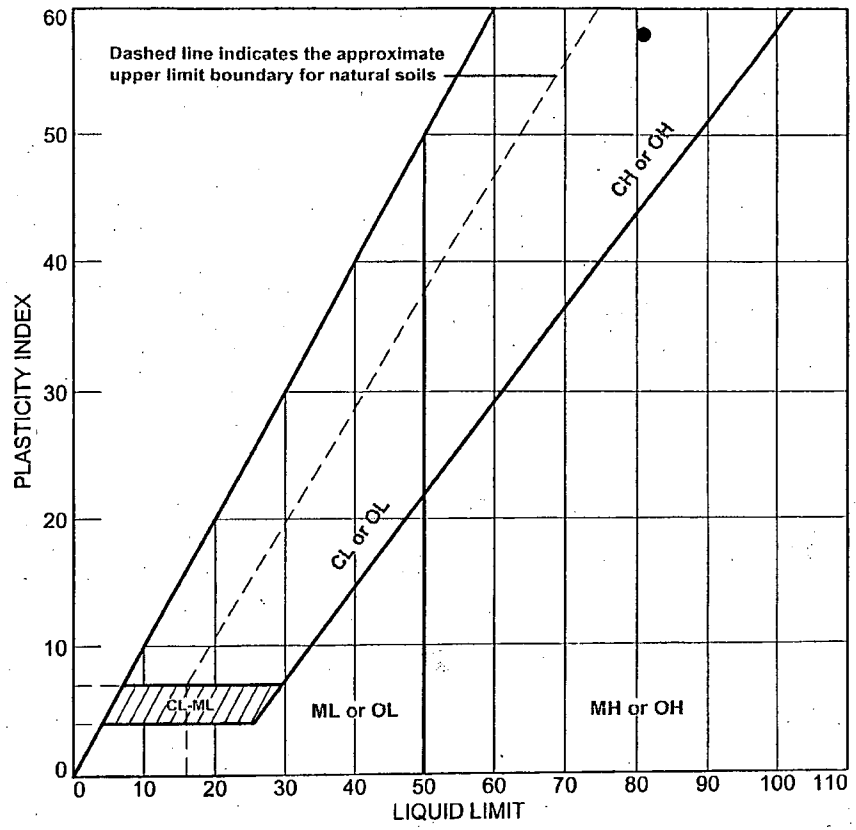
Sample Data

Source: B-305-DH
Sample No.: UD-21A
Elev. or Depth: 453.75' to 455.75' **Sample Length(in./cm.):**
Location: B-305-DH
Description: Poorly graded sand with silt
Date: 2-25-07 **Natural Moisture:** 22.0
USCS Class.: SP-SM **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed by: MH
ASTM D4318-05

Liquid Limit= NV
Plastic Limit= NP
Plasticity Index= NP

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 305-DH	STP-116	478.5'-480.0'	12/4/2006	CH	Fat Clay	24.3	81	58
		(SS-44)							

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC/TH Reviewed By:RF

ASTM D4318-05

MA 4-3-07

KAW 4/3/07

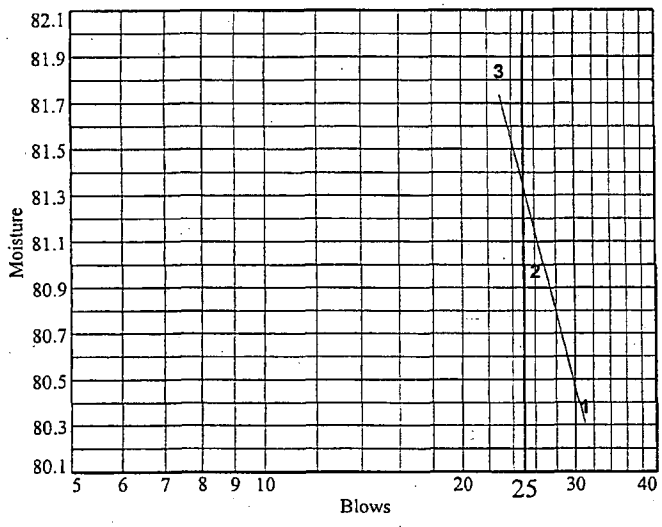
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 305-DH
Depth: 478.5'-480.0'
Sample Number: STP-116 (SS-44)
Material Description: Fat Clay
Date: 12/4/2006
USCS Class.: CH
Testing Remarks: Tested By:AC/TH Reviewed By:RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	35.85	36.45	35.60			
Dry+Tare	32.49	32.79	31.86			
Tare	28.31	28.27	27.29			
# Blows	31	26	23			
Moisture	80.4	81.0	81.8			



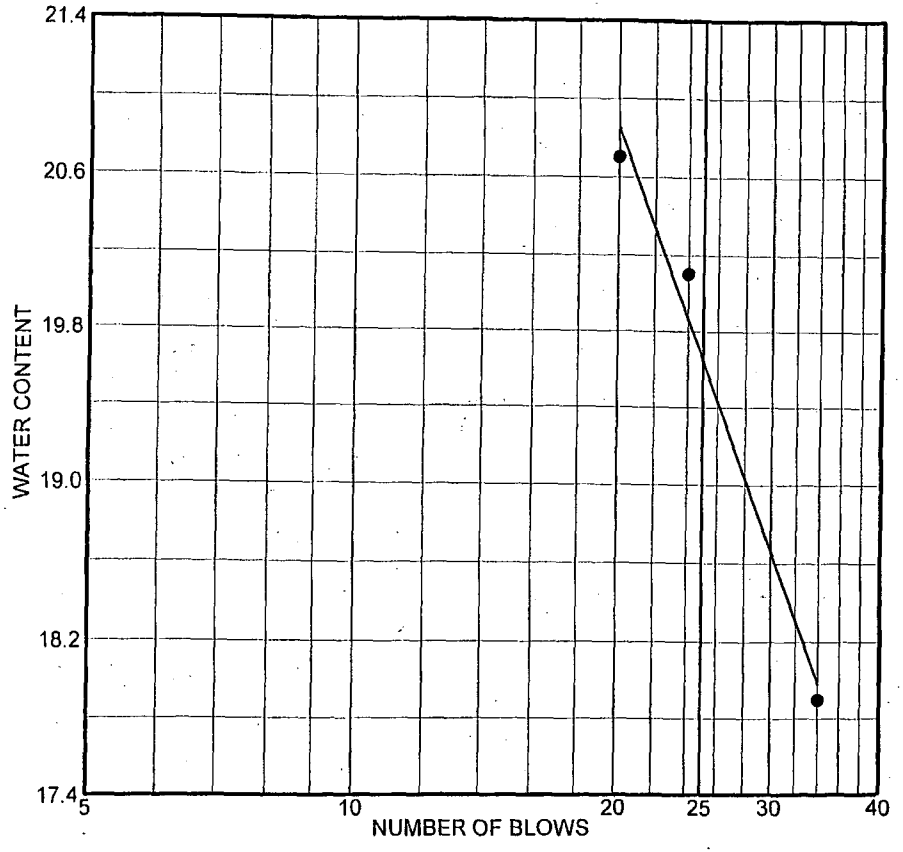
Liquid Limit= 81
Plastic Limit= 23
Plasticity Index= 58
Natural Moisture= 24.3
Liquidity Index= 0.0

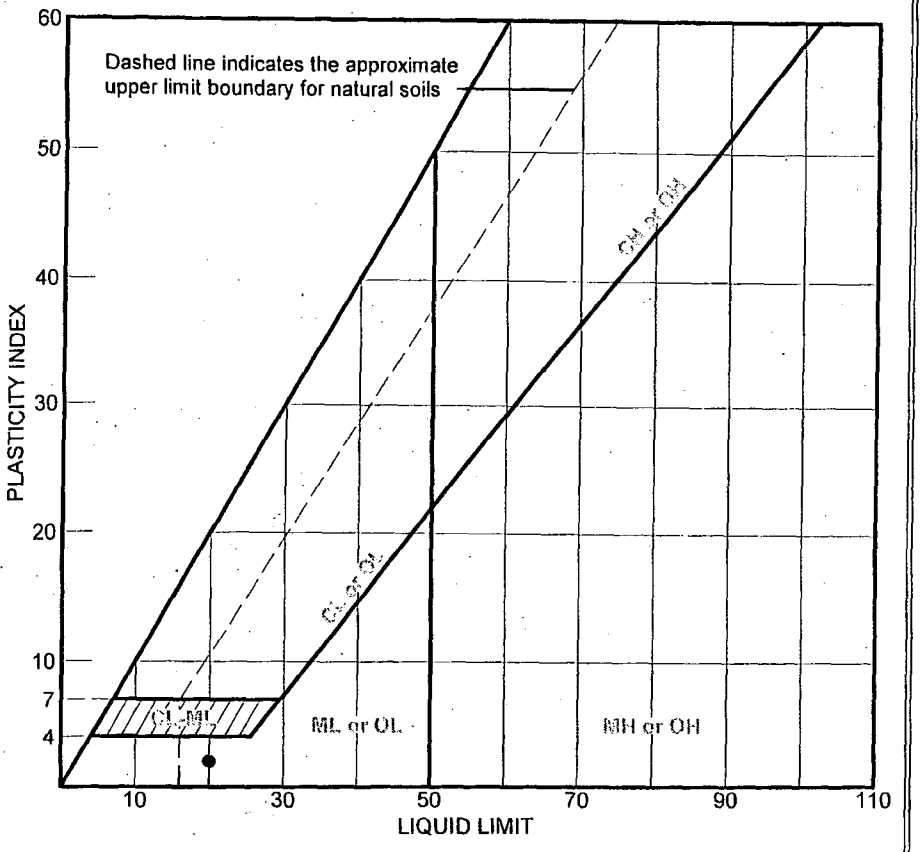
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	37.24	39.34			
Dry+Tare	35.55	37.27			
Tare	28.33	28.27			
Moisture	23.4	23.0			

MAA 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-306	UD-2	63' to 65'	2-23-07	SM	Silty sand	22.9	20	2

Client Bechtel Power Corporation
Project Bechtel/STP/COL
Project No. 5050-06-0496 Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reviewed by: MH KAW 4/13/07
ASTM D4318-05

KAW 4/3/07

LIQUID AND PLASTIC LIMIT TEST DATA

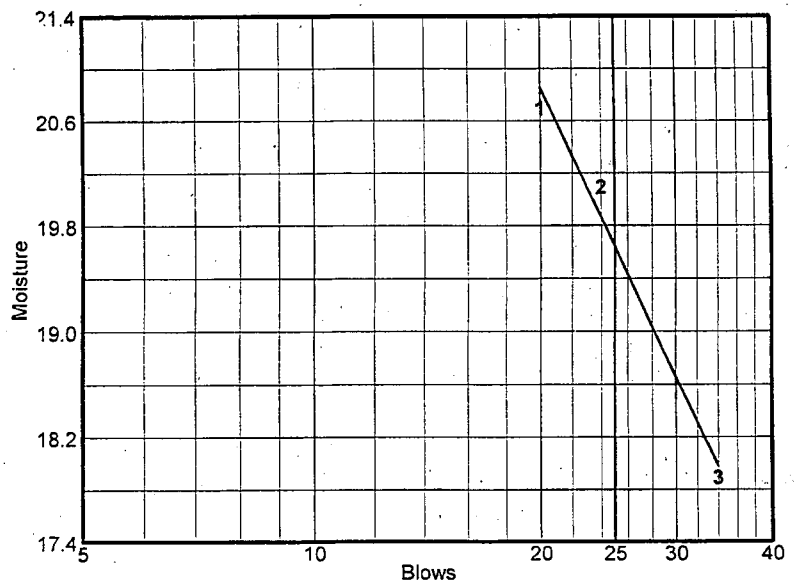
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496

Sample Data

Source: B-306
Sample No.: UD-2
Elev. or Depth: 63' to 65' **Sample Length(in./cm.):**
Location: B-306
Description: Silty sand
Date: 2-23-07 **Natural Moisture:** 22.9
USCS Class.: SM **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed by: MH
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	27.62	33.05	29.21			
Dry+Tare	24.77	29.34	26.40			
Tare	11.00	10.92	10.66			
# Blows	20	24	34			
Moisture	20.7	20.1	17.9			

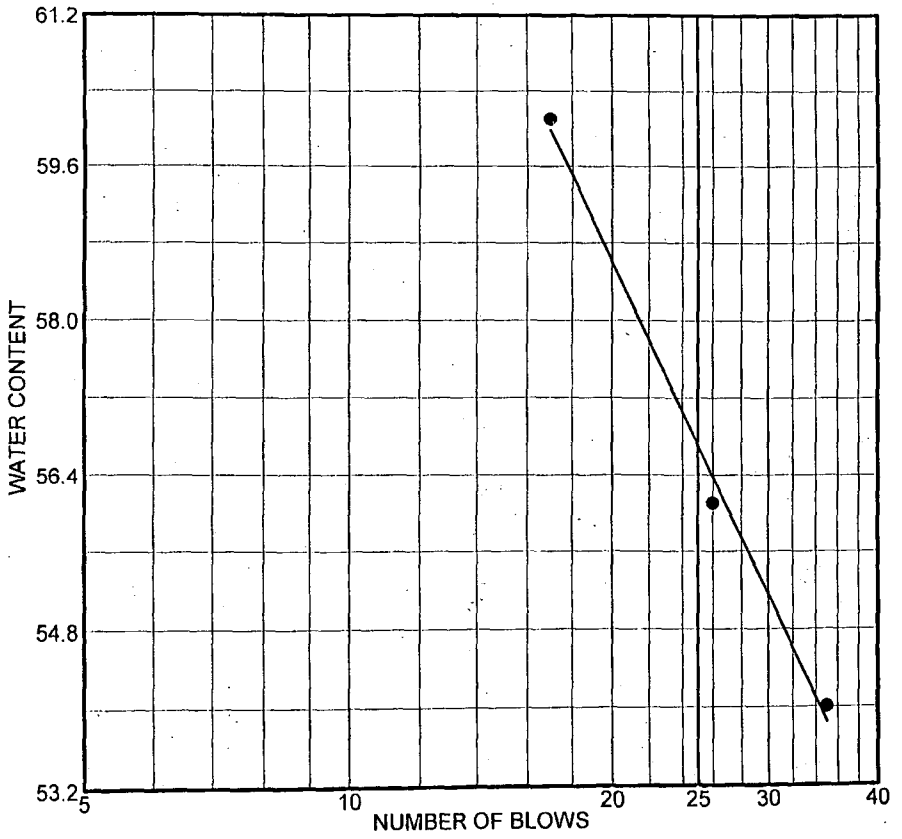


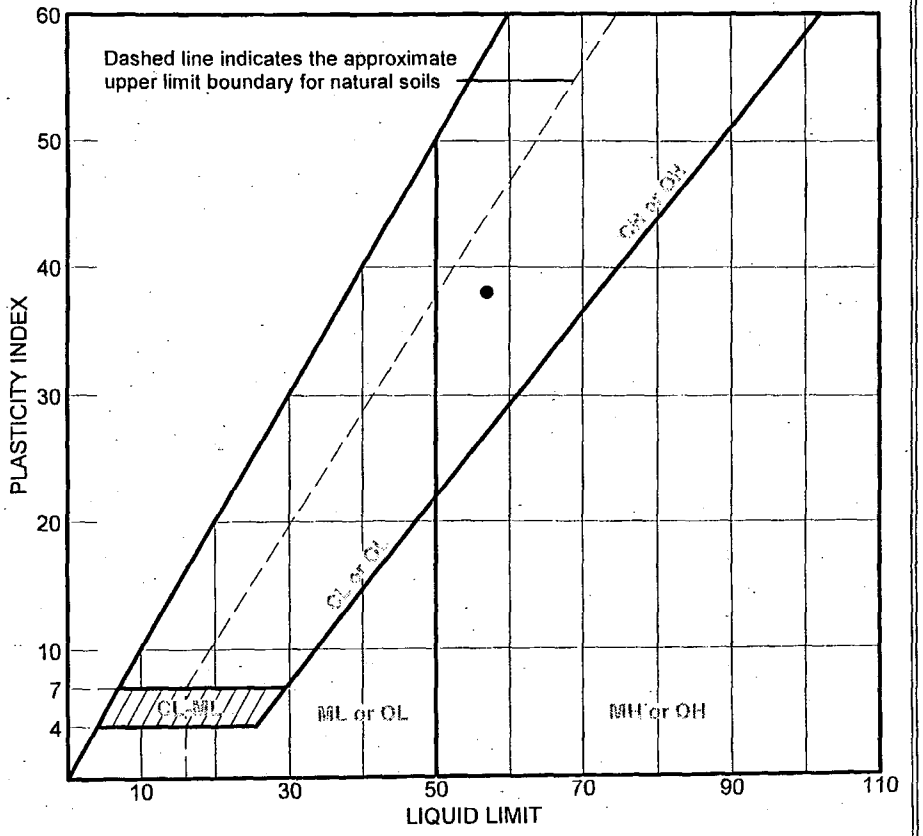
Liquid Limit= 20
Plastic Limit= 18
Plasticity Index= 2

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	13.51	14.28			
Dry+Tare	12.10	12.85			
Tare	4.33	4.46			
Moisture	18.1	17.0			

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-306	UD-4	88' to 90'	2-20-07	CH	Fat clay	22.9	57	38

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496 | Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reviewed by: SS
ASTM D4318-05

SS 2/25/2007

KAW 4/3/07

LIQUID AND PLASTIC LIMIT TEST DATA

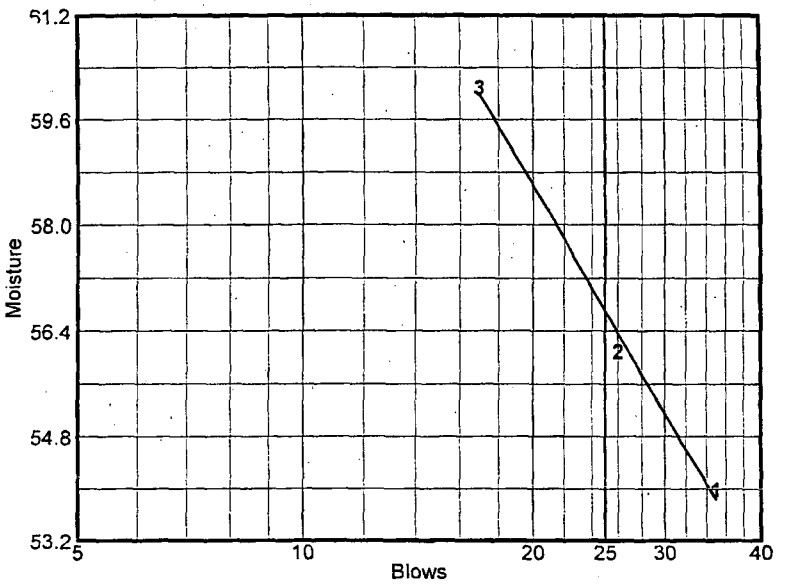
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496

Sample Data

Source: B-306
Sample No.: UD-4
Elev. or Depth: 88' to 90' **Sample Length(in./cm.):**
Location: B-306
Description: Fat clay
Date: 2-20-07 **Natural Moisture:** 22.9
USCS Class.: CH **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed by: SS
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	25.83	30.13	26.68			
Dry+Tare	20.61	23.49	20.70			
Tare	10.95	11.66	10.75			
# Blows	35	26	17			
Moisture	54.0	56.1	60.1			

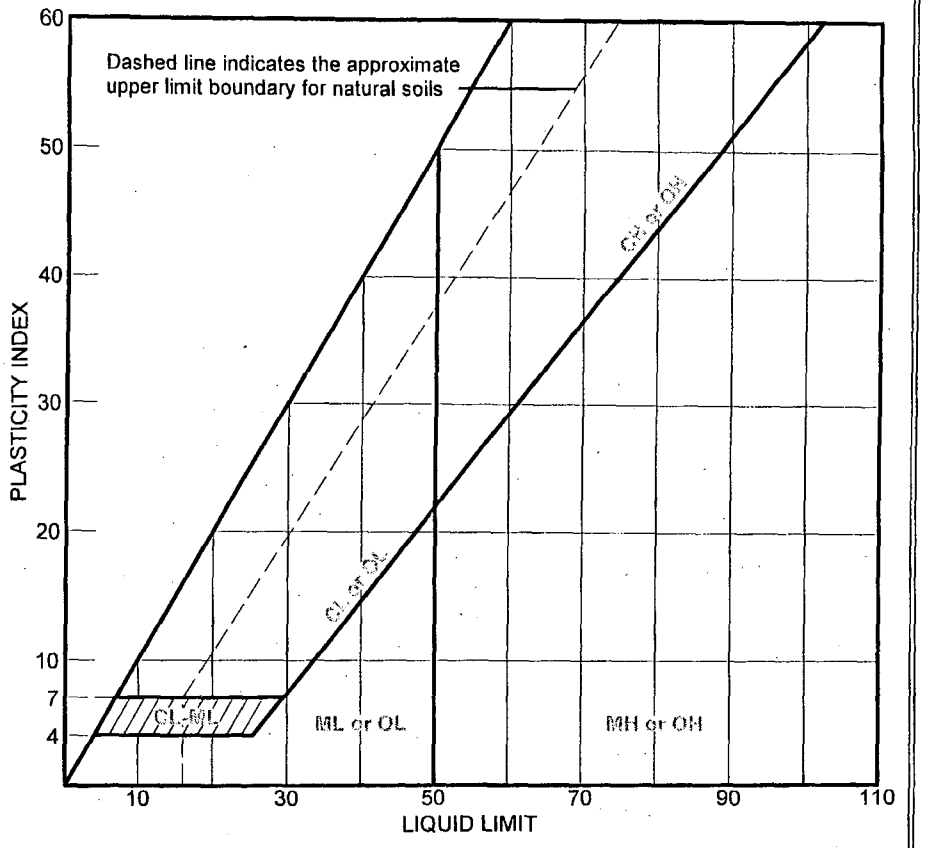


Liquid Limit= 57
Plastic Limit= 19
Plasticity Index= 38

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	33.47	34.82			
Dry+Tare	31.83	32.84			
Tare	23.33	22.45			
Moisture	19.3	19.1			

LIQUID AND PLASTIC LIMITS TEST REPORT



	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-306	UD-5	98'to 100'	2-16-07	SP-SM	Poorly graded sand with silt	24.4	NV	NP

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496 | Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reviewed by: SS
ASTM D4318-05

SS 2/25/2007

KAW 4/3/07

LIQUID AND PLASTIC LIMIT TEST DATA

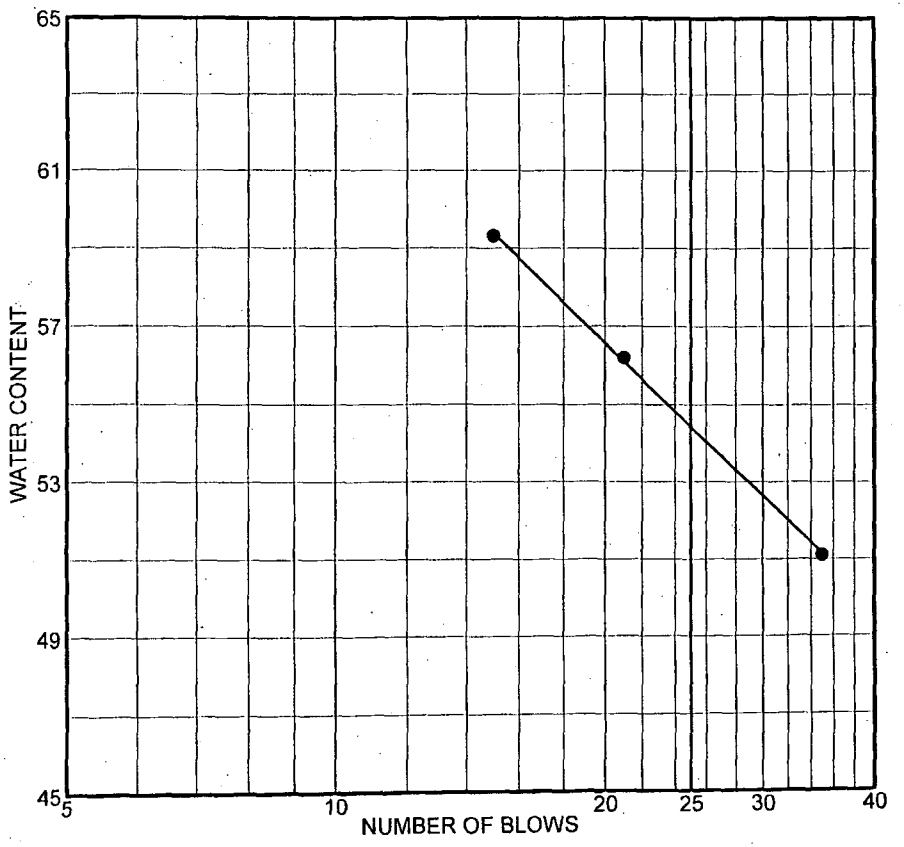
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496

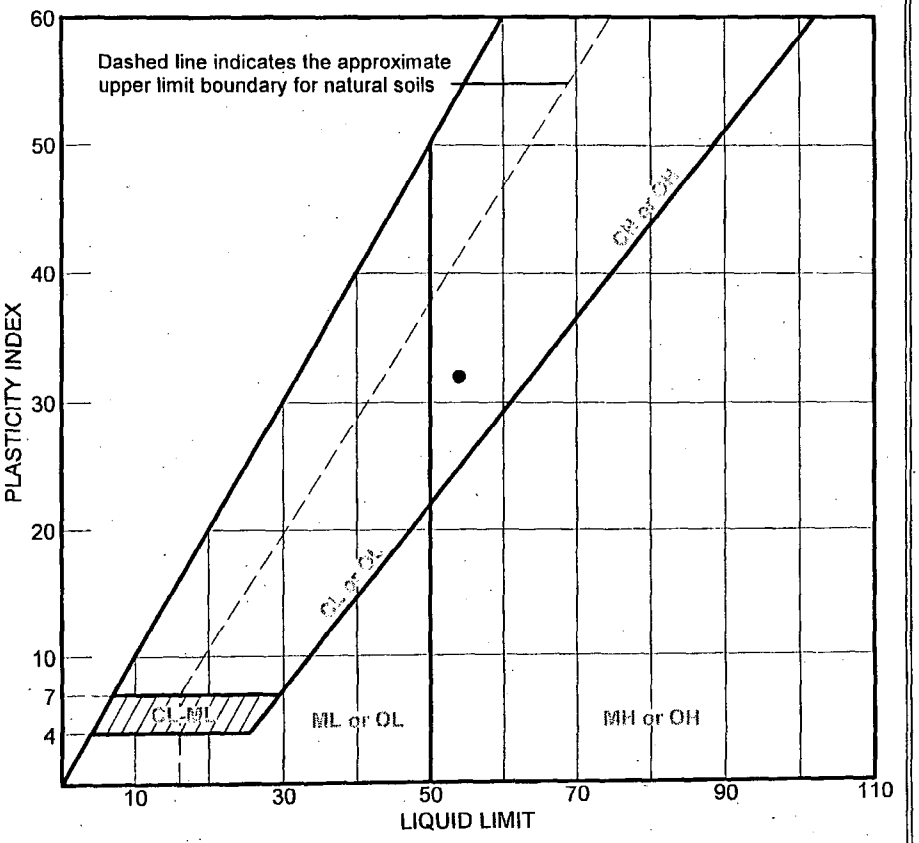
Sample Data

Source: B-306
Sample No.: UD-5
Elev. or Depth: 98'to 100' **Sample Length(in./cm.):**
Location: B-306
Description: Poorly graded sand with silt
Date: 2-16-07 **Natural Moisture:** 24.4
USCS Class.: SP-SM **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed by: SS
ASTM D4318-05

Liquid Limit= NV
Plastic Limit= NP
Plasticity Index= NP

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-306	UD-7	118' to 120'	2-20-07	CH	Fat clay	25.2	54	32

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496 | Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reviewed by: SS
ASTM D4318-05

SS 2/25/2007

KAW 4/3/07

LIQUID AND PLASTIC LIMIT TEST DATA

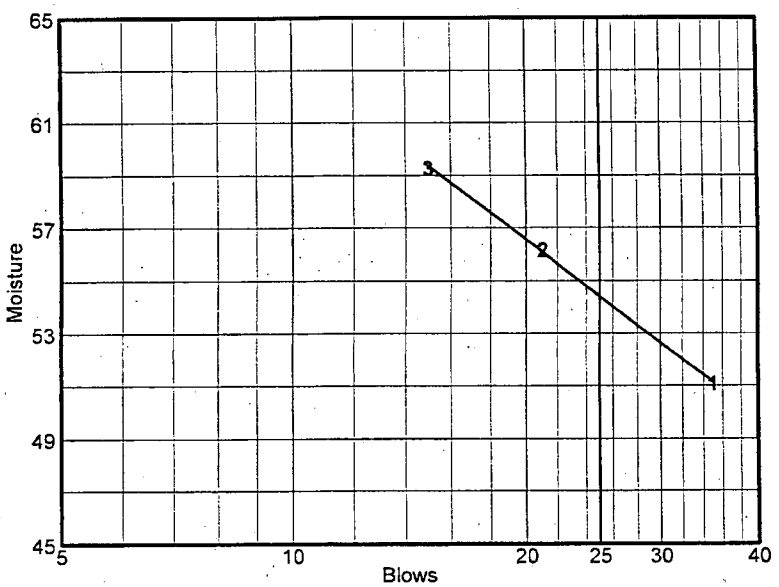
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
ject Number: 5050-06-0496

Sample Data

Source: B-306
Sample No.: UD-7
Elev. or Depth: 118' to 120' **Sample Length(in./cm.):**
Location: B-306
Description: Fat clay
Date: 2-20-07 **Natural Moisture:** 25.2
USCS Class.: CH **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed by: SS
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	28.80	26.19	31.52			
Dry+Tare	22.91	20.89	23.87			
Tare	11.39	11.46	10.98			
# Blows	35	21	15			
Moisture	51.1	56.2	59.3			

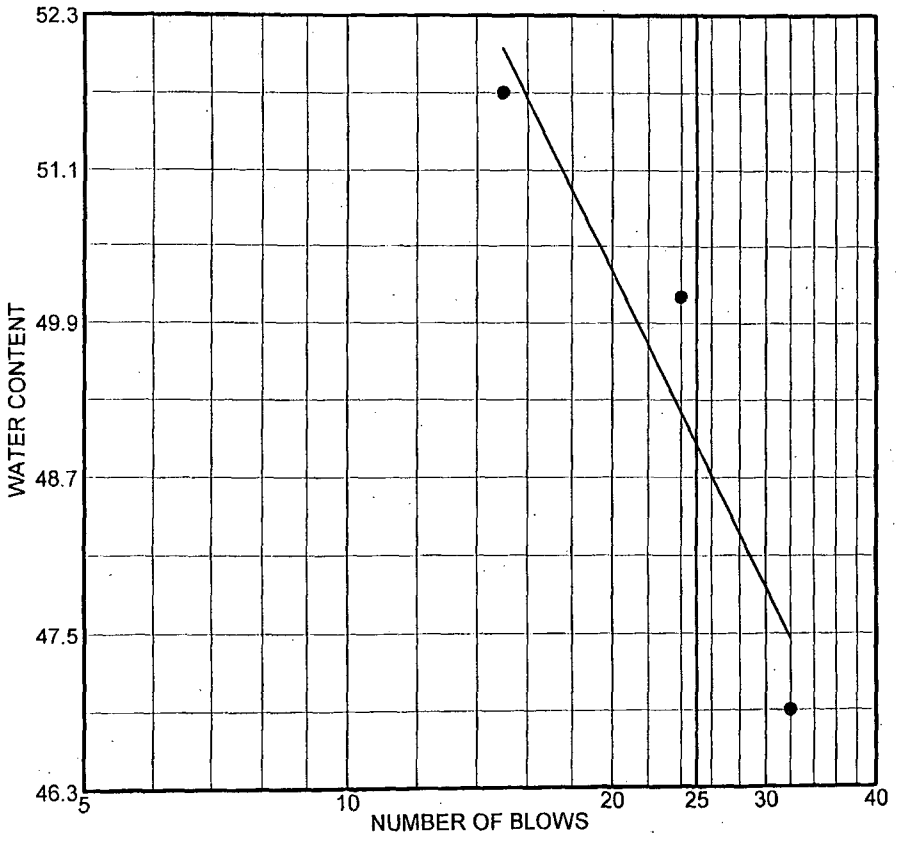


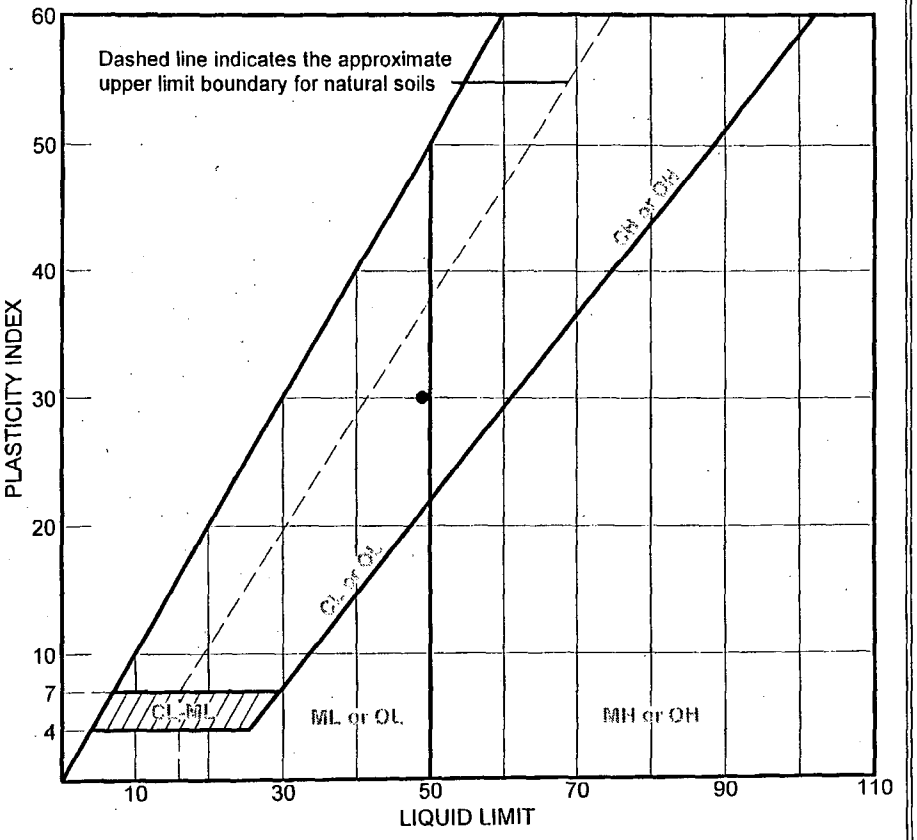
Liquid Limit= 54
Plastic Limit= 22
Plasticity Index= 32

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	18.51	19.15			
Dry+Tare	17.26	17.78			
Tare	11.45	11.57			
Moisture	21.5	22.1			

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-307	UD-3	188' to 190'	3-22-07	CL	Lean Clay	21.9	49	30

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496 | Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reviewed by: MH
ASTM D4318-05

KAW 4/3/07

LIQUID AND PLASTIC LIMIT TEST DATA

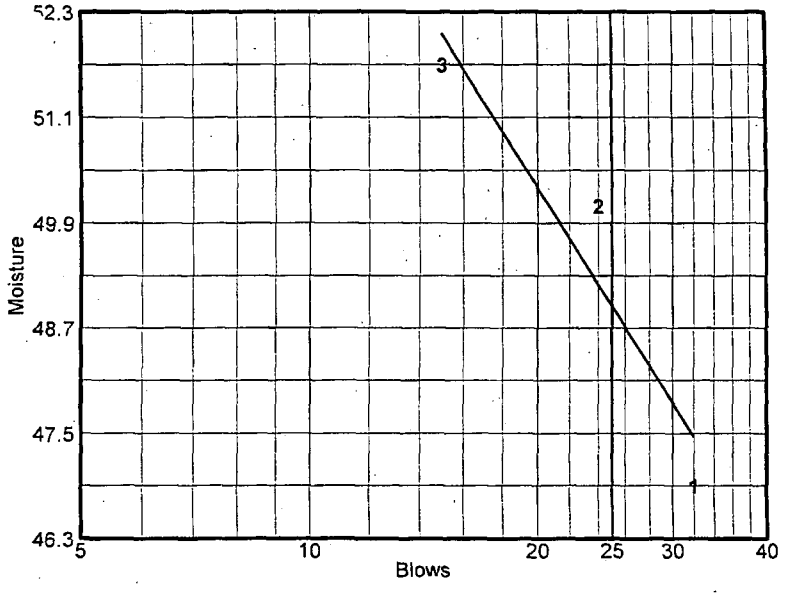
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496

Sample Data

Source: B-307
Sample No.: UD-3
Elev. or Depth: 188' to 190' **Sample Length(in./cm.):**
Location: B-307
Description: Lean Clay
Date: 3-22-07 **Natural Moisture:** 21.9
USCS Class.: CL **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed by: MH
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	27.33	25.45	27.90			
Dry+Tare	22.04	20.58	22.35			
Tare	10.77	10.85	11.62			
# Blows	32	24	15			
Moisture	46.9	50.1	51.7			

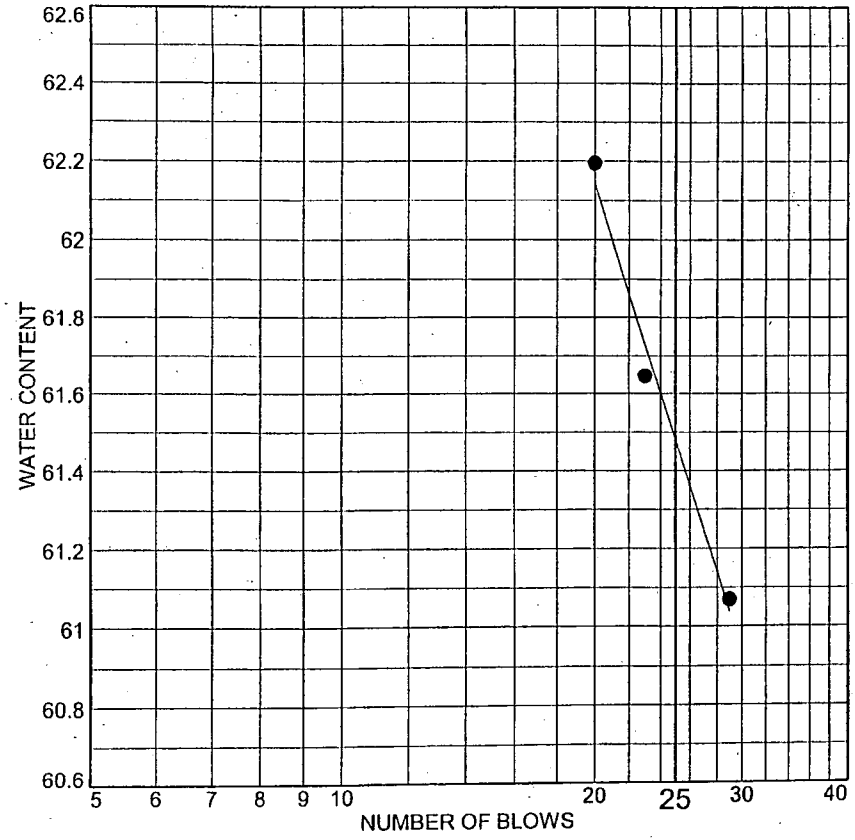


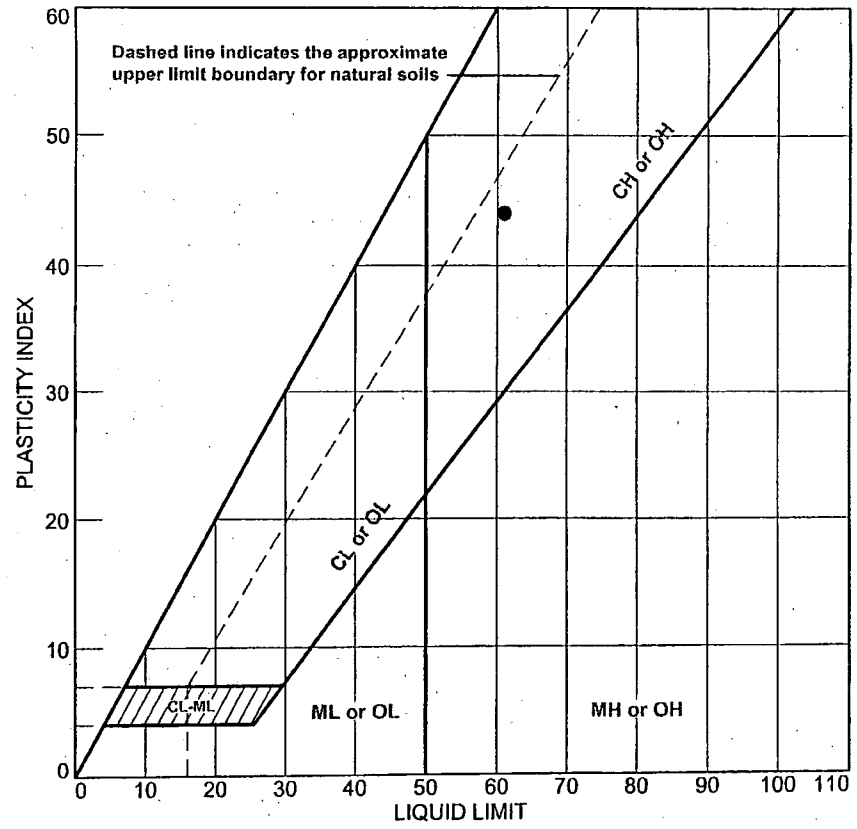
Liquid Limit= 49
Plastic Limit= 19
Plasticity Index= 30

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	19.27	18.67			
Dry+Tare	17.96	17.41			
Tare	10.88	10.77			
Moisture	18.5	19.0			

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 309	STP-001	1.5'-3.0'	11/13/2006	CH	Fat Clay	28.0	61	44
		(SS-2)							

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:TH Reviewed By:ST

ASTM D4318-05

MA 4-3-07

KAW 4/3/07

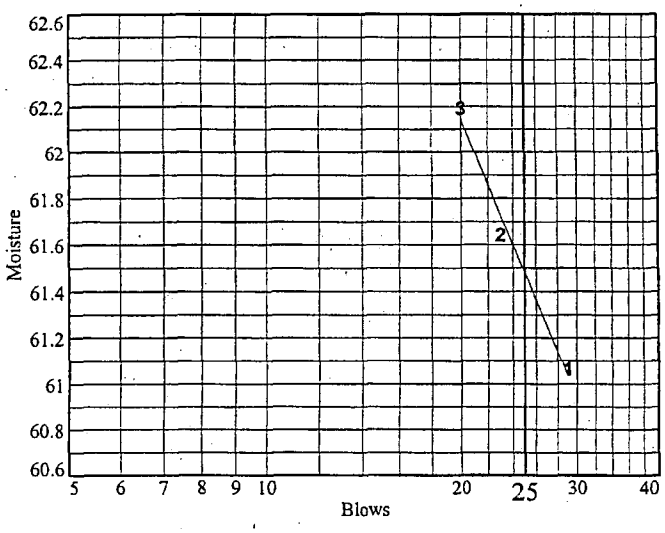
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 309
Depth: 1.5'-3.0'
Sample Number: STP-001 (SS-2)
Material Description: Fat Clay
Date: 11/13/2006
USCS Class.: CH
Testing Remarks: Tested By:TH
Reviewed By:ST
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	35.56	37.5	35.88			
Dry+Tare	32.36	33.98	32.82			
Tare	27.12	28.27	27.9			
# Blows	29	23	20			
Moisture	61.1	61.6	62.2			



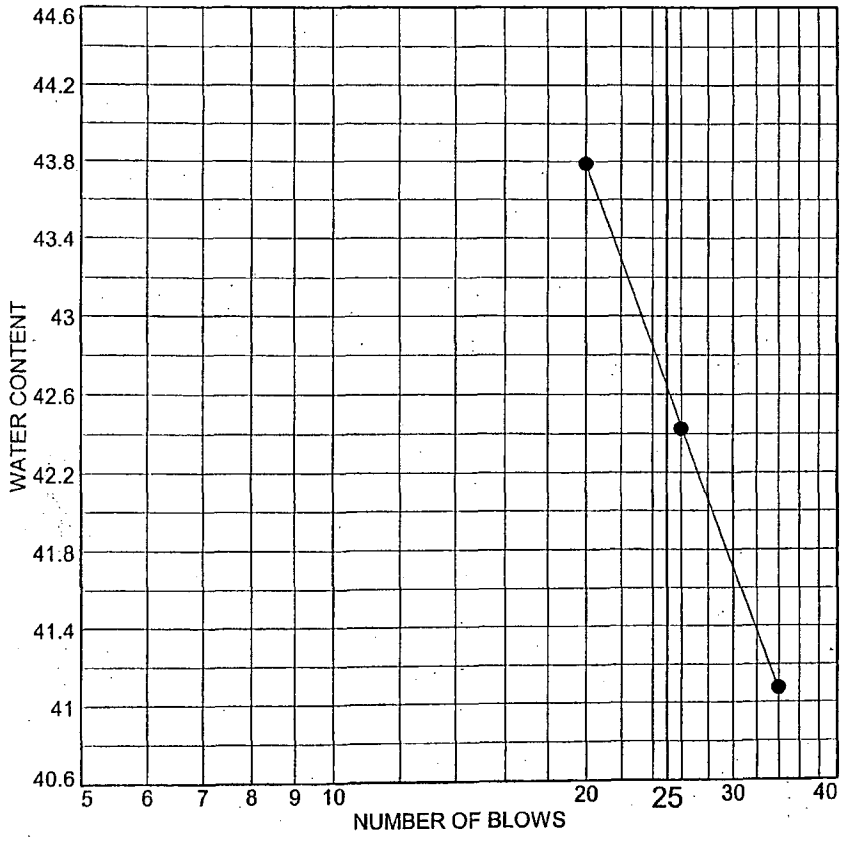
Liquid Limit= 61
Plastic Limit= 17
Plasticity Index= 44
Natural Moisture= 28.0
Liquidity Index= 0.2

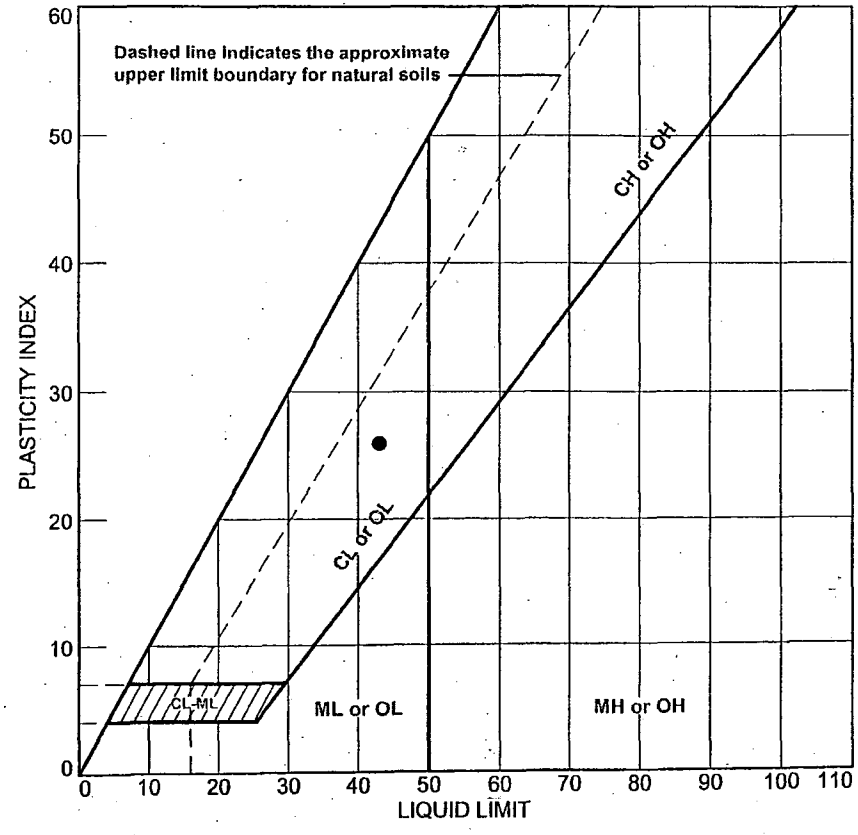
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	35.99	35.63			
Dry+Tare	34.88	34.51			
Tare	28.27	27.98			
Moisture	16.8	17.2			

MAA 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 309	STP-002 (SS-5)	6.0'-7.5'	11/13/2006	CL	Lean Clay	27.2	43	26

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:TH Reviewed By:ST

ASTM D4318-05

MH 4-3-07

KAW 4/3/07

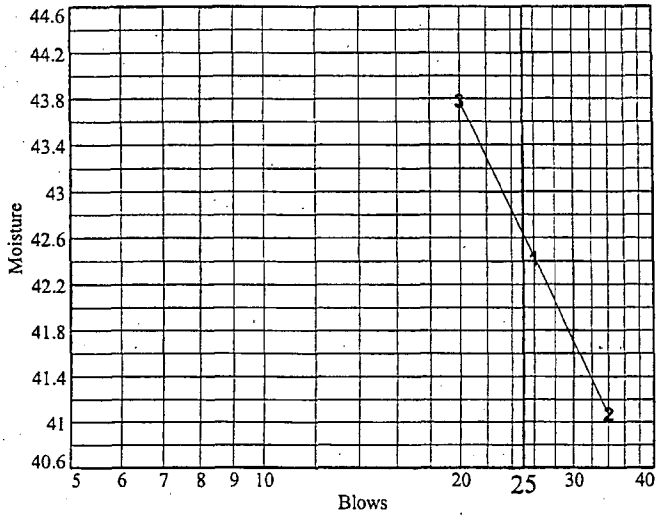
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 309
Depth: 6.0'-7.5' **Sample Number:** STP-002 (SS-5)
Material Description: Lean Clay
Date: 11/13/2006 **USCS Class.:** CL
Testing Remarks: Tested By:TH Reviewed By:ST
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	37.56	37.12	36.61			
Dry+Tare	34.76	34.52	33.72			
Tare	28.16	28.19	27.12			
# Blows	26	34	20			
Moisture	42.4	41.1	43.8			



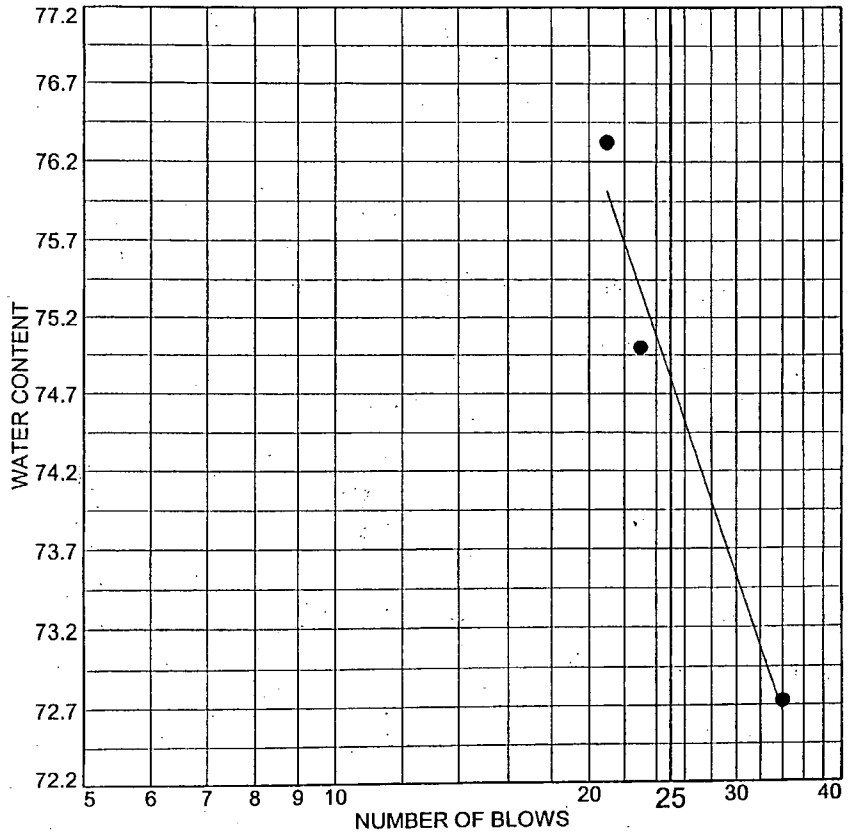
Liquid Limit= 43
Plastic Limit= 17
Plasticity Index= 26
Natural Moisture= 27.2
Liquidity Index= 0.4

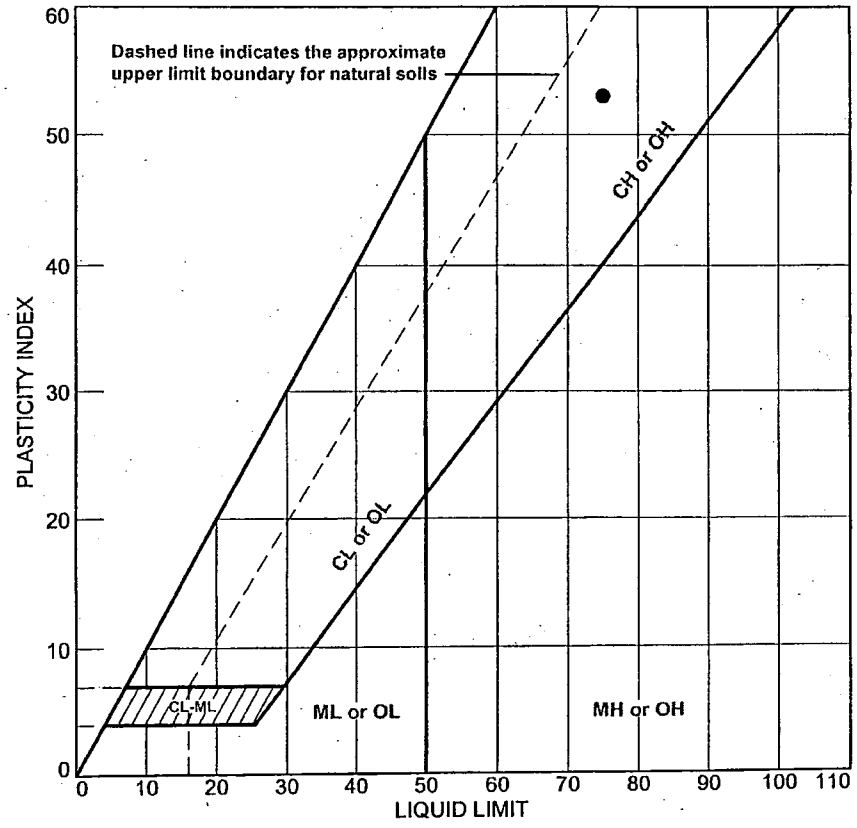
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	35.34	34.13			
Dry+Tare	34.29	33.13			
Tare	28.07	27.07			
Moisture	16.9	16.5			

MAA 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 309	STP-003 (SS-8)	10.5'-12.0'	11/13/2006	CH	Fat Clay	27.0	75	53

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:TH Reviewed By:ST

ASTM D4318-05

MA 4-3-07

KAW 4/3/07

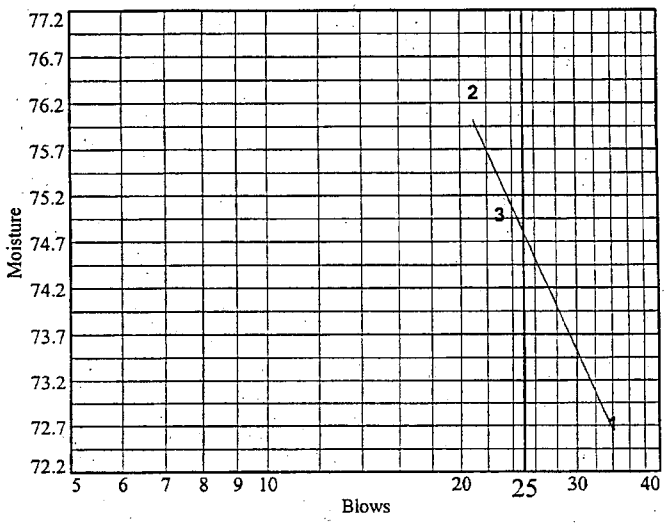
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 309
Depth: 10.5'-12.0'
Sample Number: STP-003 (SS-8)
Material Description: Fat Clay
Date: 11/13/2006
USCS Class.: CH
Testing Remarks: Tested By:TH Reviewed By:ST
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	35.2	36	29.57			
Dry+Tare	32	32.68	26.15			
Tare	27.6	28.33	21.59			
# Blows	34	21	23			
Moisture	72.7	76.3	75.0			



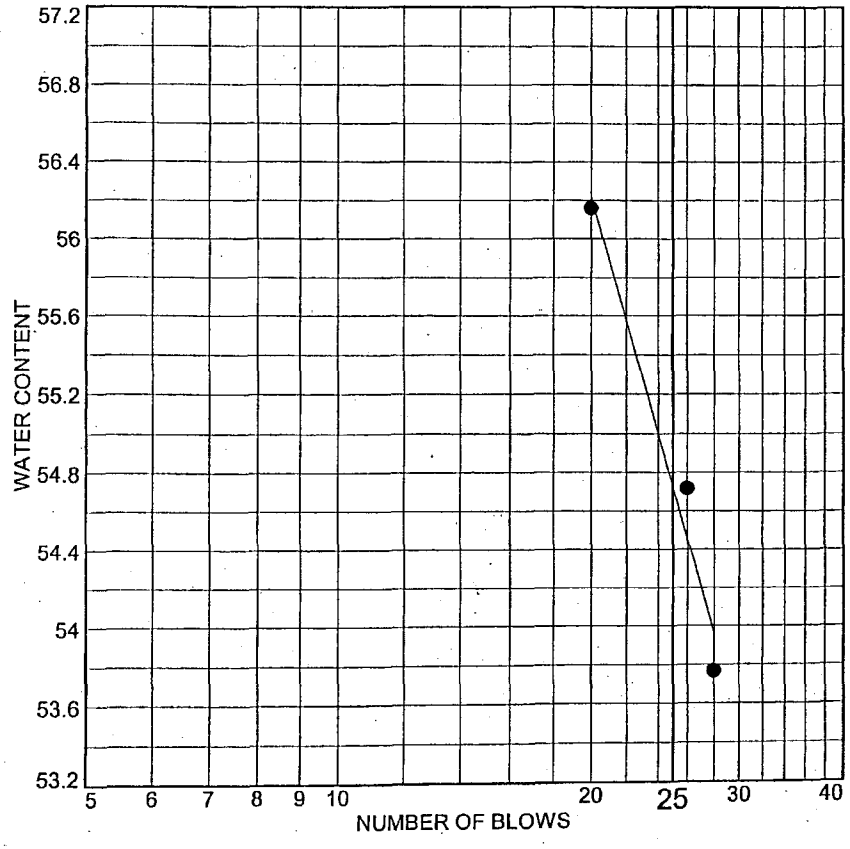
Liquid Limit= 75
Plastic Limit= 22
Plasticity Index= 53
Natural Moisture= 27.0
Liquidity Index= 0.1

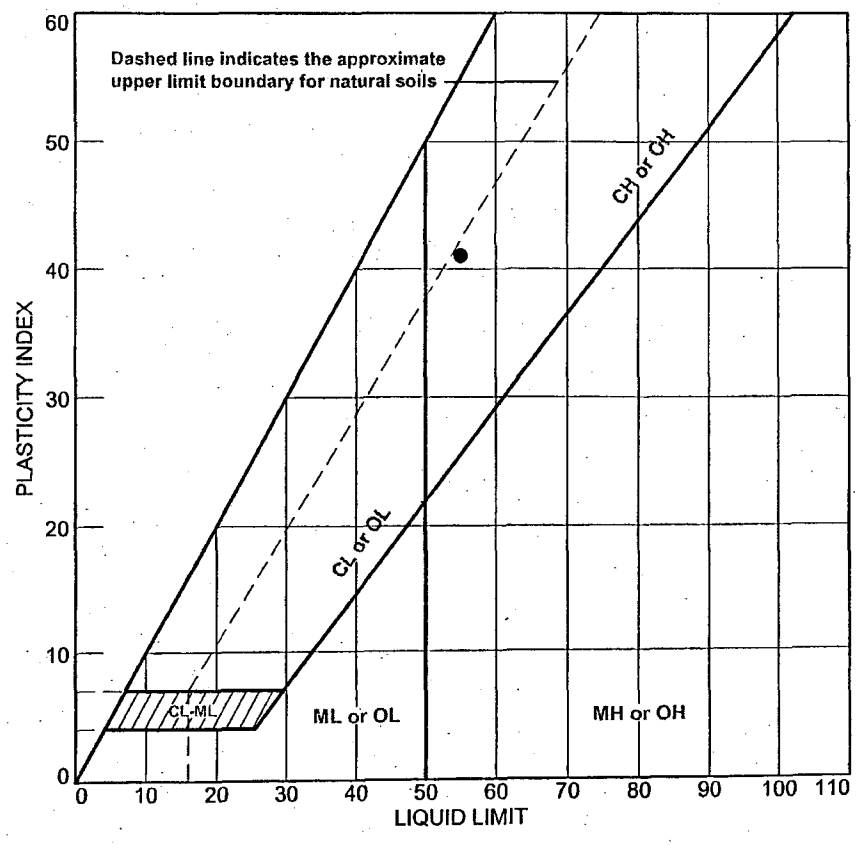
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	35.15	28			
Dry+Tare	33.96	26.84			
Tare	28.43	21.64			
Moisture	21.5	22.3			

AMK 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 309	STP-009	53.5'-55.0'	11/13/2006	CH	Fat clay	20.7	55	41
		(SS-18)							

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:TH Reviewed By:ST

ASTM D4318-05

4-3-07

KAW 4/3/07

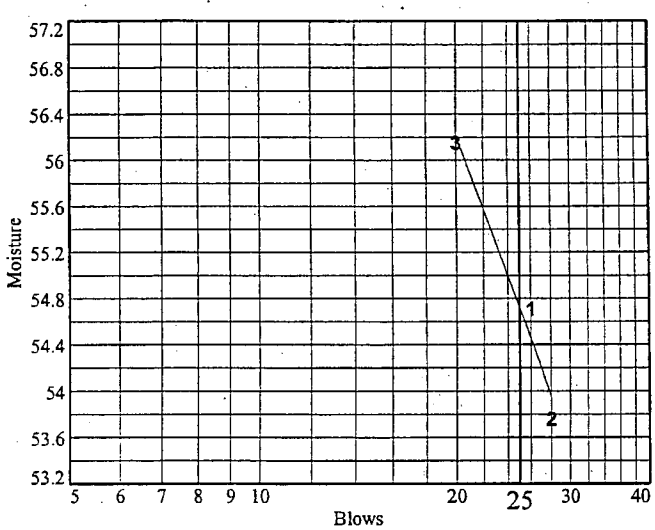
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 309
Depth: 53.5'-55.0' **Sample Number:** STP-009 (SS-18)
Material Description: Fat clay
Date: 11/13/2006 **USCS Class.:** CH
Testing Remarks: Tested By:TH Reviewed By:ST
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	34.65	31.45	36.37			
Dry+Tare	32.33	28.38	33.68			
Tare	28.09	22.67	28.89			
# Blows	26	28	20			
Moisture	54.7	53.8	56.2			



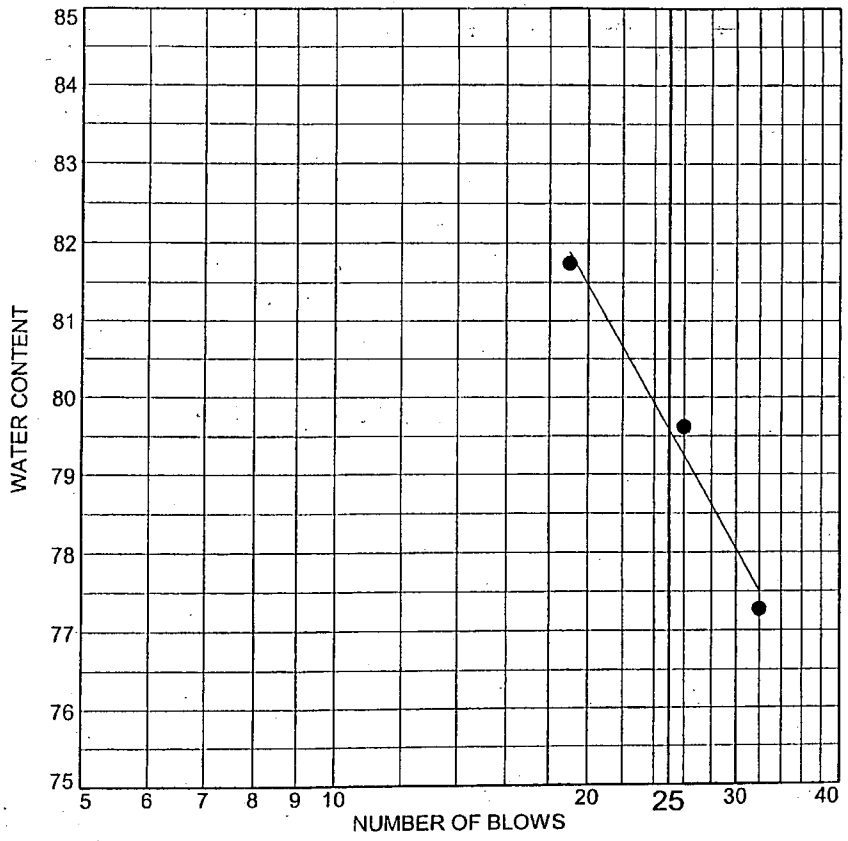
Liquid Limit= 55
Plastic Limit= 14
Plasticity Index= 41
Natural Moisture= 20.7
Liquidity Index= 0.2

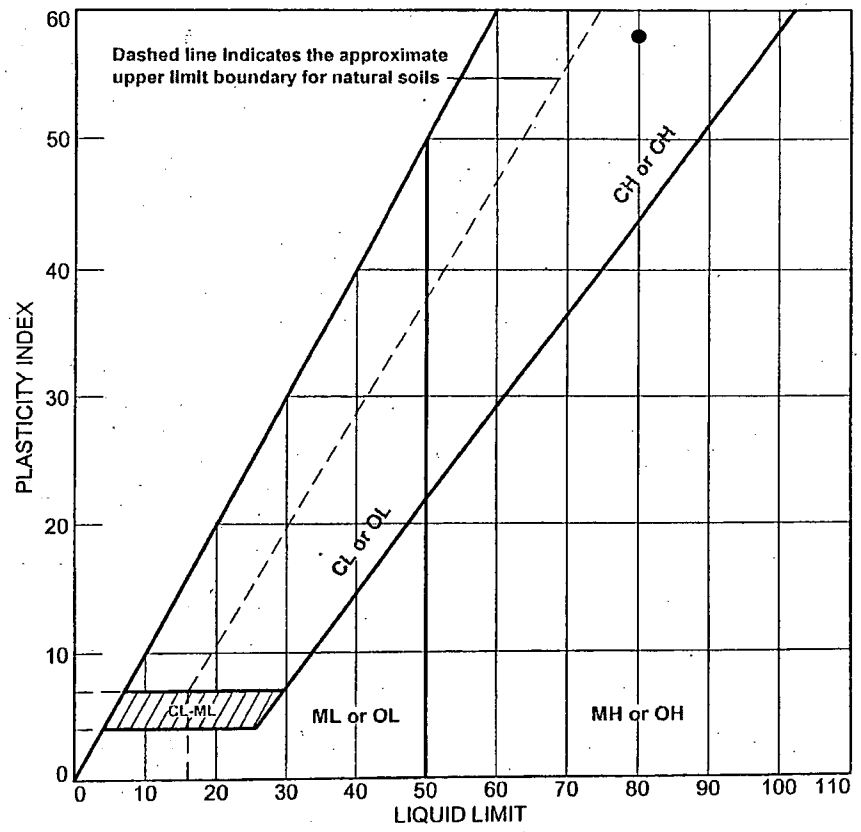
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	31.86	32.22			
Dry+Tare	30.91	31.38			
Tare	24.35	25.47			
Moisture	14.5	14.2			

MAC 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 309	STP-016	118.5'-120'	11/14/2006	CH	Fat clay	27.1	80	58
		(SS-29)							

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:TH Reviewed By:ST

ASTM D4318-05

MA

4-3-07

KAW 4/3/07

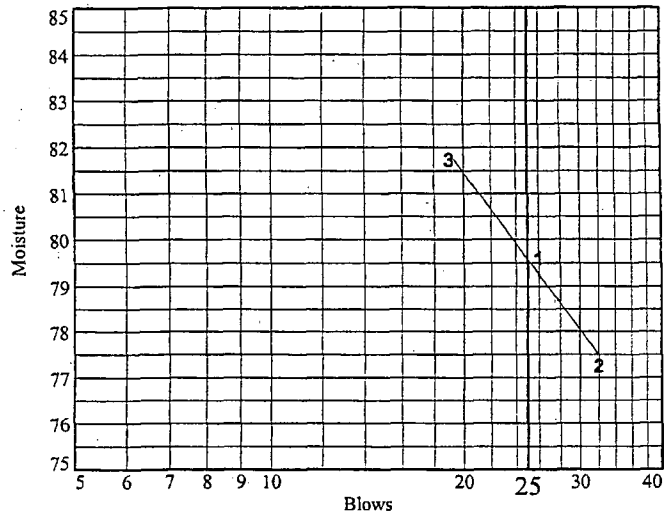
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 309
Depth: 118.5'-120' **Sample Number:** STP-016 (SS-29)
Material Description: Fat clay
Date: 11/14/2006 **USCS Class.:** CH
Testing Remarks: Tested By:TH Reviewed By:ST
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	36.42	36.85	36.64			
Dry+Tare	32.71	33.11	32.79			
Tare	28.05	28.27	28.08			
# Blows	26	32	19			
Moisture	79.6	77.3	81.7			



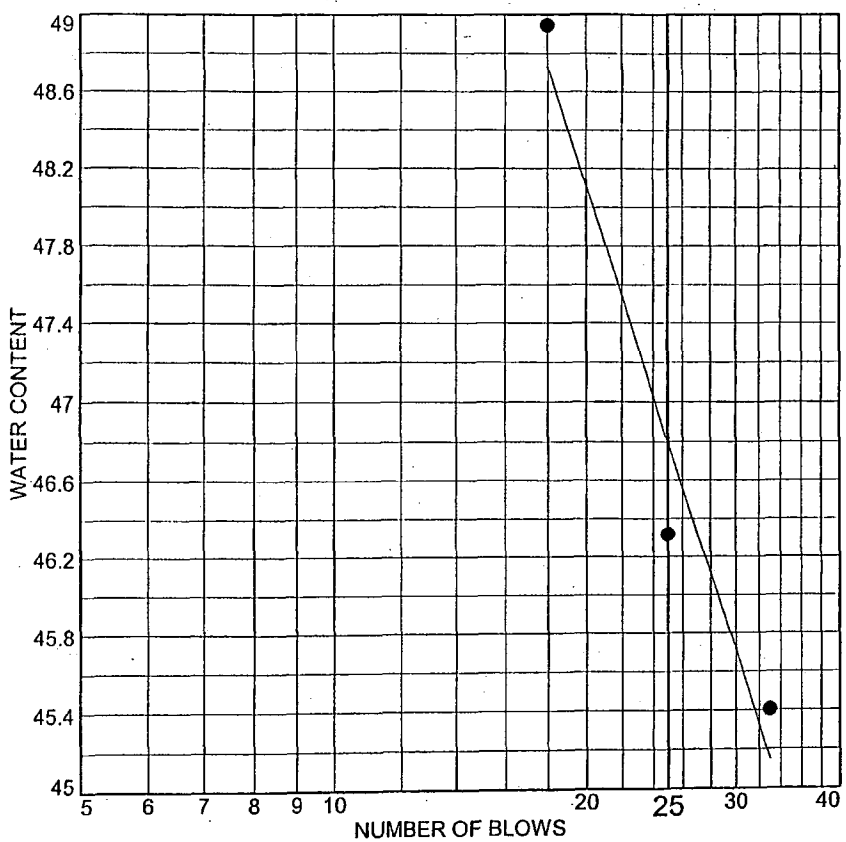
Liquid Limit= 80
Plastic Limit= 22
Plasticity Index= 58
Natural Moisture= 27.1
Liquidity Index= 0.1

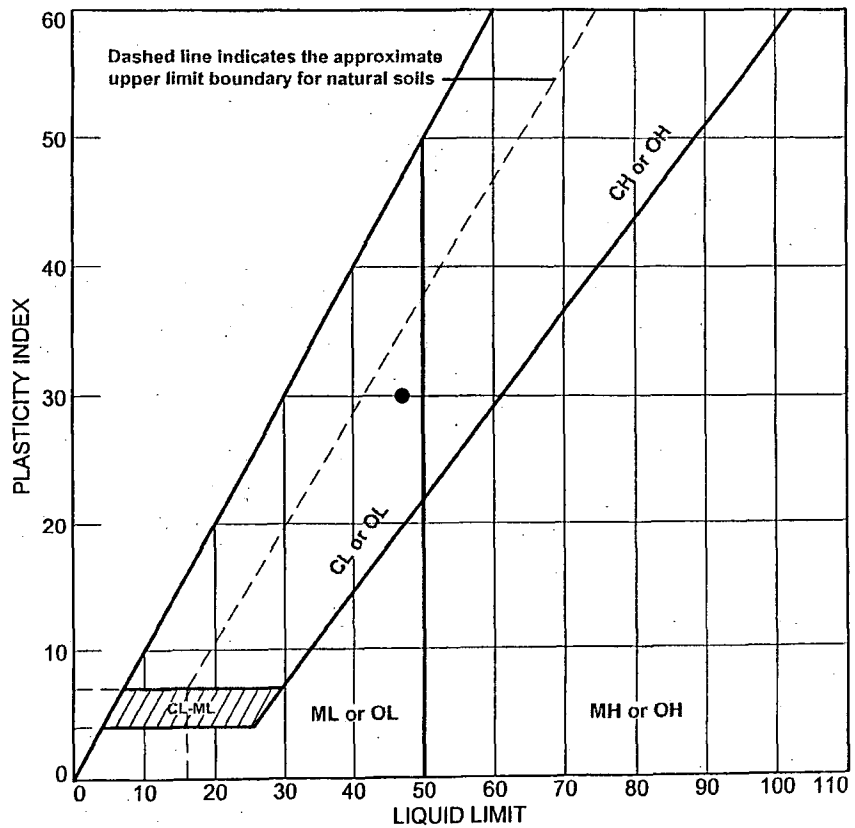
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	35.6	35.514			
Dry+Tare	34.28	34.17			
Tare	28.16	27.98			
Moisture	21.6	21.7			

MK 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 309	STP-018 (SS-31)	138.5'-140'	11/14/2006	CL	Lean Clay	21.7	47	30

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:TH Reviewed By:ST

ASTM D4318-05

MA 4-3-07

KAW 4/3/07

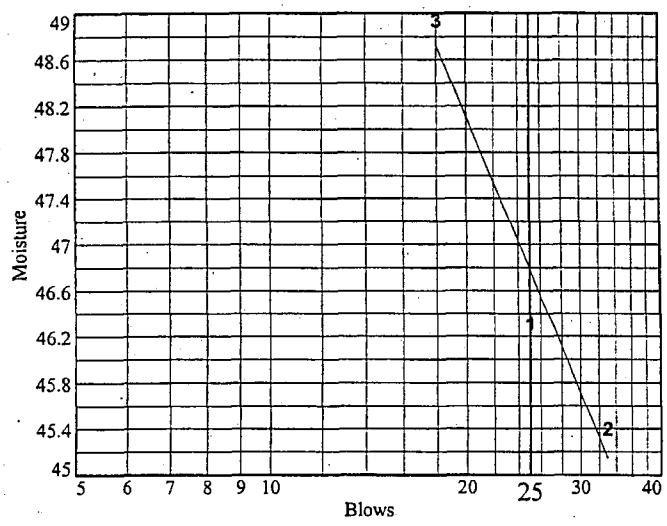
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 309
Depth: 138.5'-140'
Sample Number: STP-018 (SS-31)
Material Description: Lean Clay
Date: 11/14/2006
USCS Class.: CL
Testing Remarks: Tested By:TH Reviewed By:ST
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	35.94	29.33	37.08			
Dry+Tare	33.3	26.91	34.06			
Tare	27.6	21.58	27.89			
# Blows	25	33	18			
Moisture	46.3	45.4	48.9			



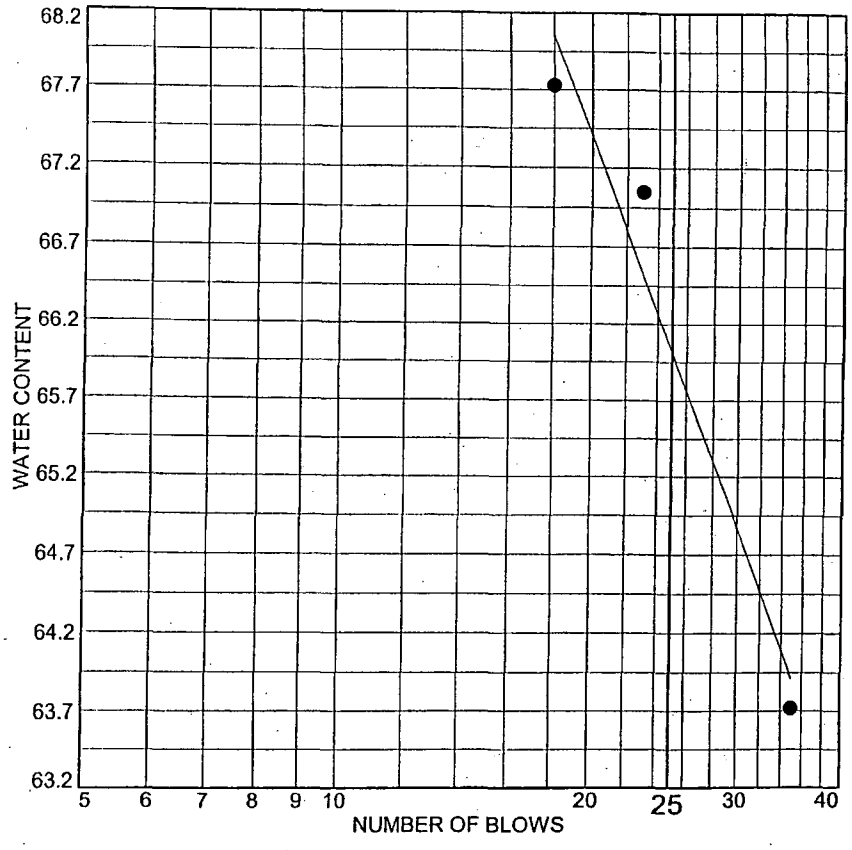
Liquid Limit= 47
Plastic Limit= 17
Plasticity Index= 30
Natural Moisture= 21.7
Liquidity Index= 0.2

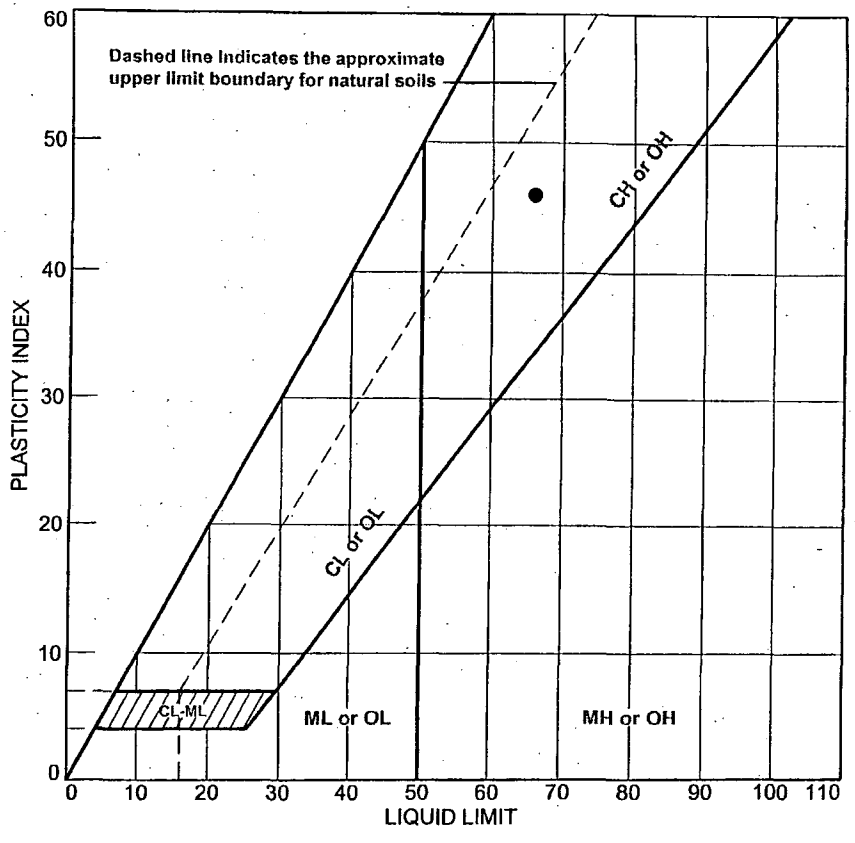
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	35.83	34.74			
Dry+Tare	34.75	33.65			
Tare	28.38	27.12			
Moisture	17.0	16.7			

MAT 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 309	STP-019	148.5'-150'	11/14/06	CH	Fat Clay	23.3	66	46
		(SS-32)							

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:TH Reviewed By:ST

ASTM D4318-05

MH 4-3-07

KAW 4/3/07

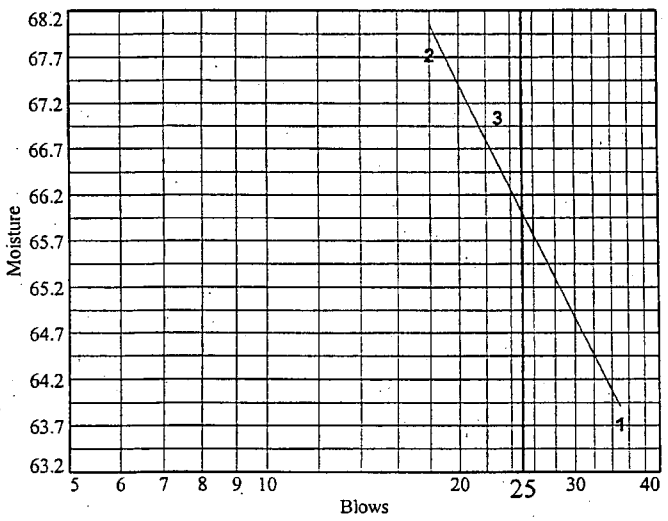
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 309
Depth: 148.5'-150'
Sample Number: STP-019 (SS-32)
Material Description: Fat Clay
Date: 11/14/06
USCS Class.: CH
Testing Remarks: Tested By:TH Reviewed By:ST
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	37.21	36.22	37.16			
Dry+Tare	33.68	33.03	33.64			
Tare	28.14	28.32	28.39			
# Blows	35	18	23			
Moisture	63.7	67.7	67.0			



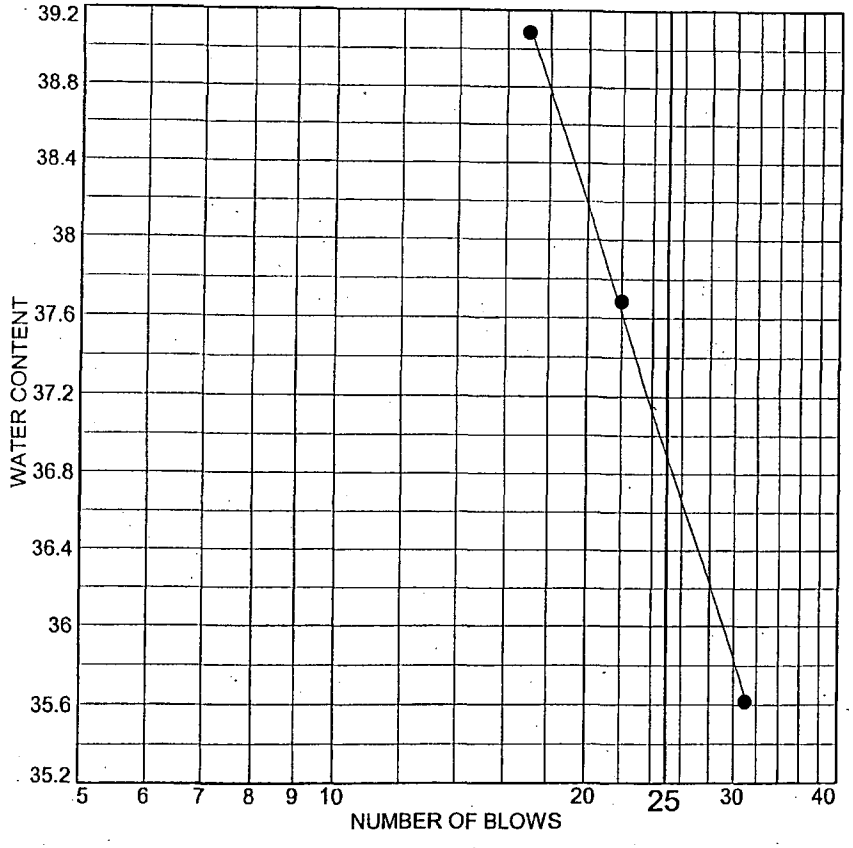
Liquid Limit= 66
Plastic Limit= 20
Plasticity Index= 46
Natural Moisture= 23.3
Liquidity Index= 0.1

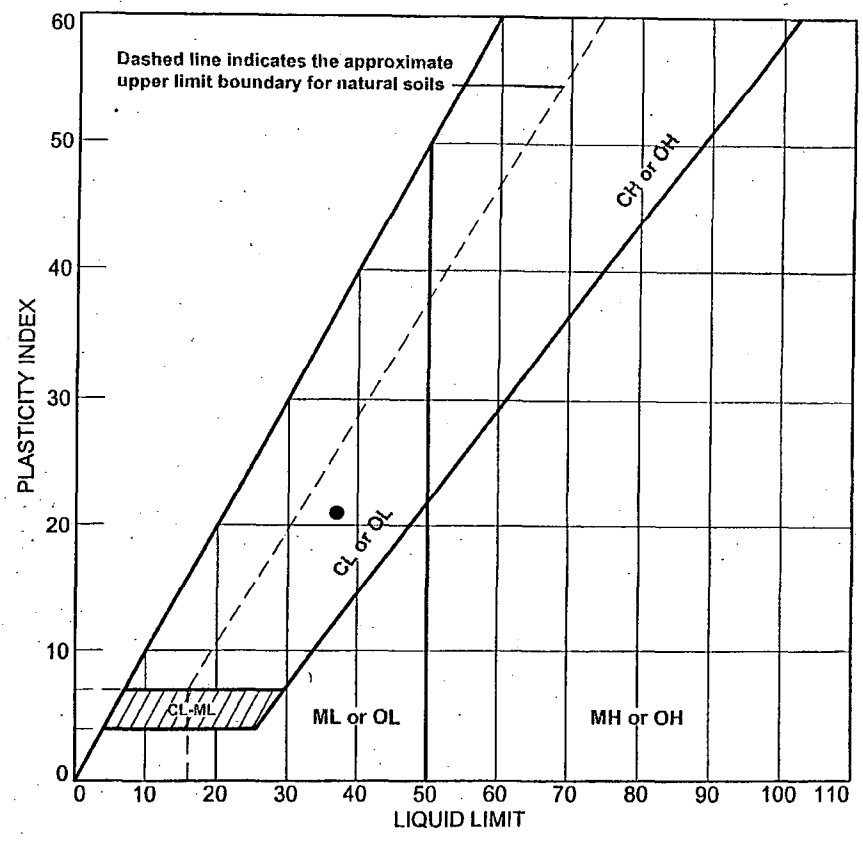
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	35.86	35.62			
Dry+Tare	34.57	34.42			
Tare	28.26	28.23			
Moisture	20.4	19.4			

MA 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 309	STP-020 (SS-33)	158.5'-160'	11/13/2006	CL	Lean clay	23.9	37	21

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:TH Reviewed By:ST
ASTM D 4318-05

MH 4-3-07

KAW 4/3/07

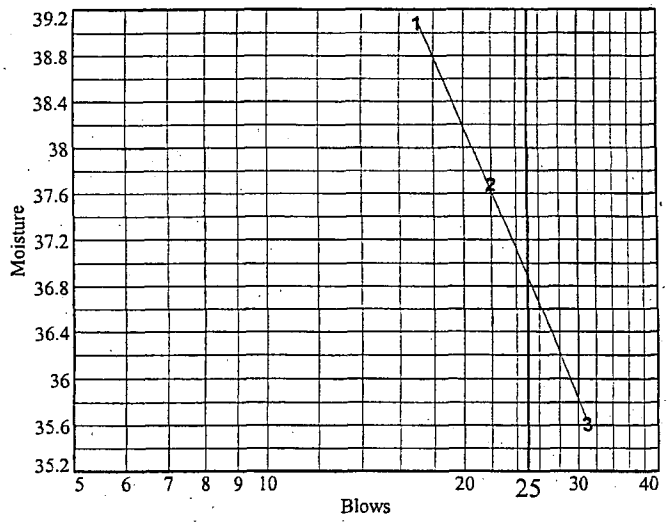
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 309
Depth: 158.5'-160'
Sample Number: STP-020 (SS-33)
Material Description: Lean clay
Date: 11/13/2006
USCS Class.: CL
Testing Remarks: Tested By:TH Reviewed By:ST
ASTM D 4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	36.87	36.35	36.81			
Dry+Tare	34.13	33.81	34.47			
Tare	27.12	27.07	27.90			
# Blows	17	22	31			
Moisture	39.1	37.7	35.6			



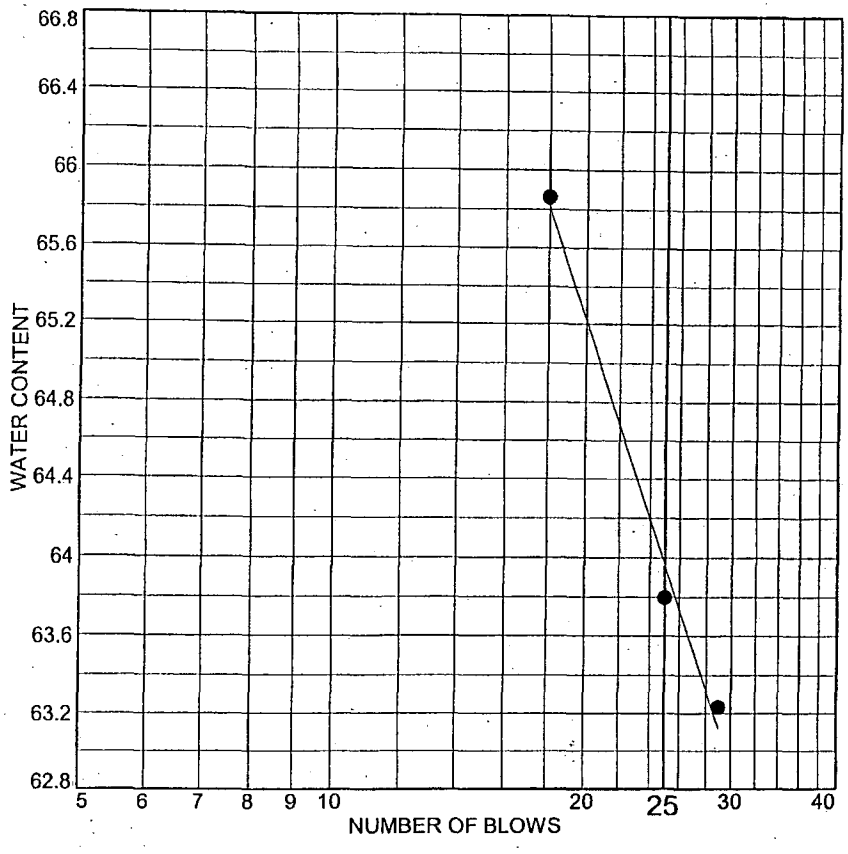
Liquid Limit= 37
Plastic Limit= 16
Plasticity Index= 21
Natural Moisture= 23.9
Liquidity Index= 0.4

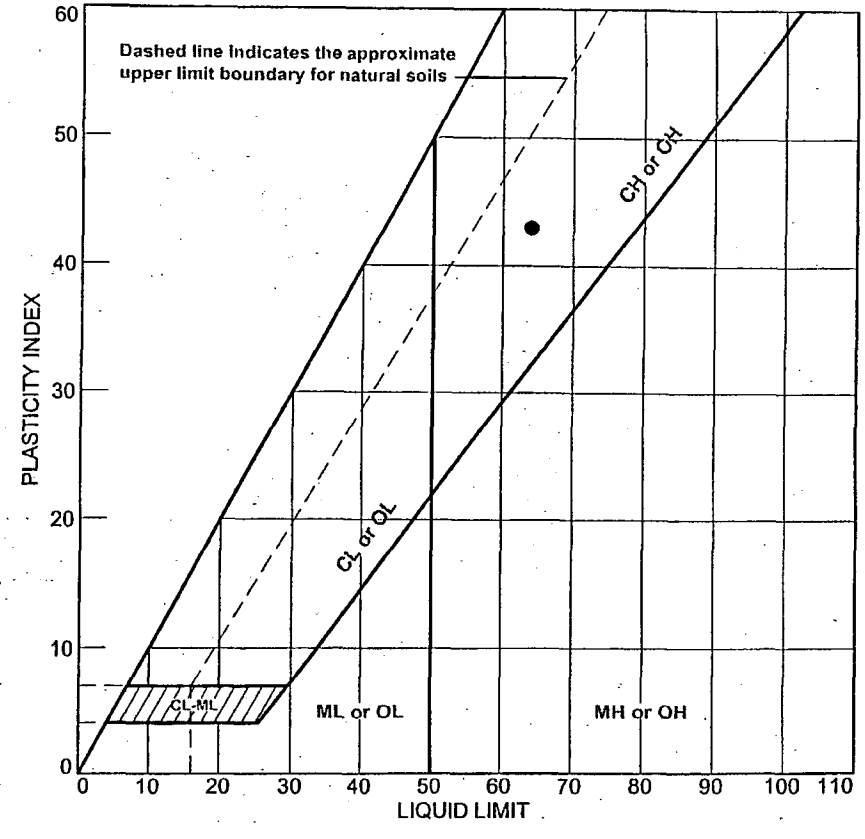
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	29.40	35.37			
Dry+Tare	28.31	34.32			
Tare	21.57	27.60			
Moisture	16.2	15.6			

MA
4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 309	STP-022	178.5'-180'	11/15/2006	CH	Fat clay	24.6	64	43
		(SS-35)							

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:TH Reviewed By:ST
ASTM D4318-05

MW 4-3-07

KAW 4/3/07

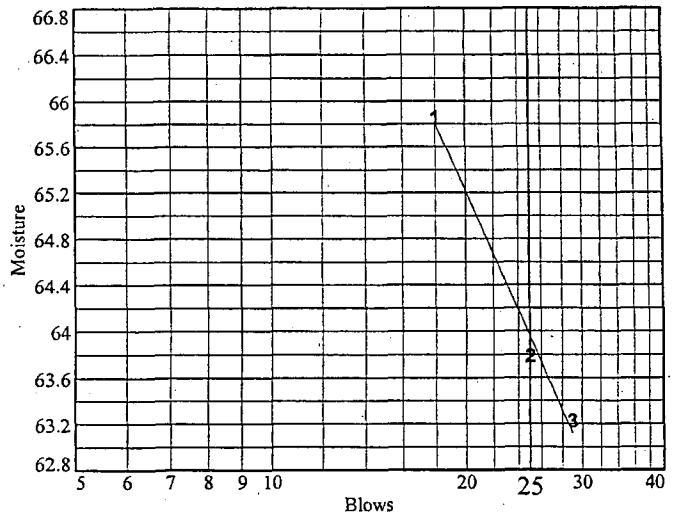
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 309
Depth: 178.5'-180'
Sample Number: STP-022 (SS-35)
Material Description: Fat clay
Date: 11/15/2006
USCS Class.: CH
Testing Remarks: Tested By:TH Reviewed By:ST
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	37.86	36.64	35.15			
Dry+Tare	34.04	33.38	32.02			
Tare	28.24	28.27	27.07			
# Blows	18	25	29			
Moisture	65.9	63.8	63.2			



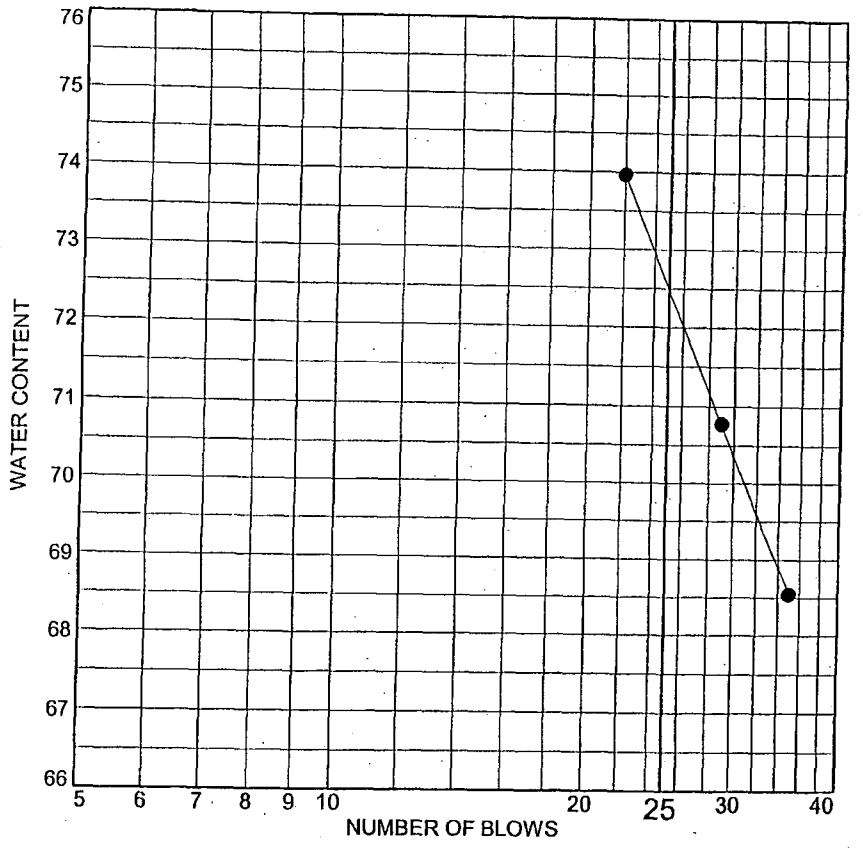
Liquid Limit= 64
Plastic Limit= 21
Plasticity Index= 43
Natural Moisture= 24.6
Liquidity Index= 0.1

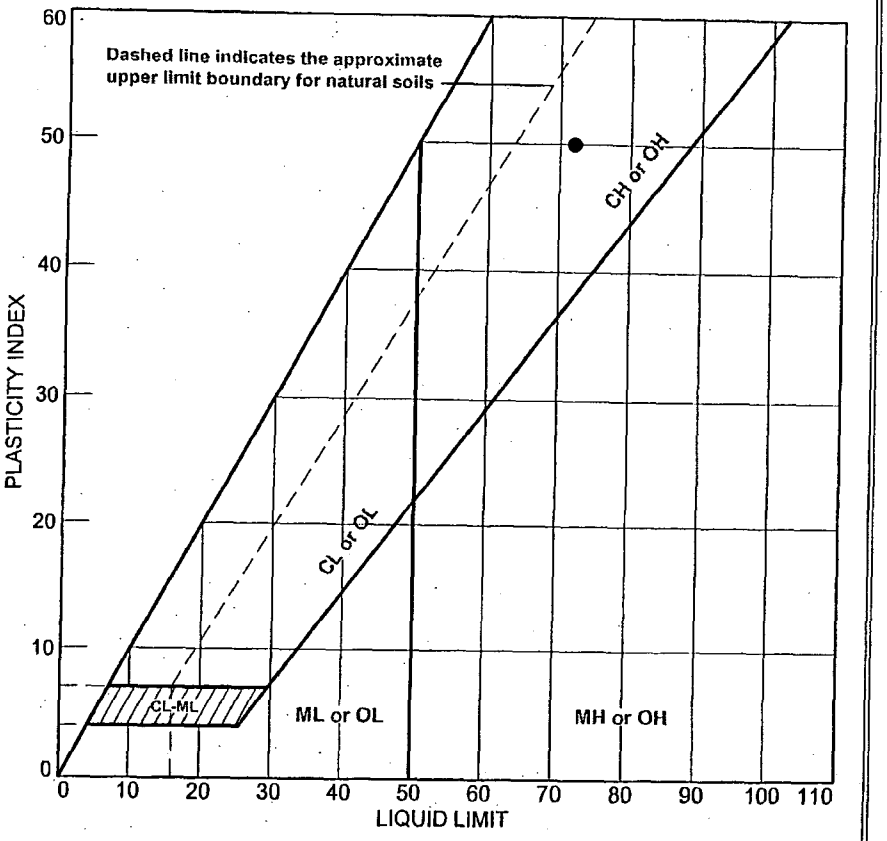
Plastic Limit Data

Run No.	1	2	3	4
Wet+Tare	35.93	36.07		
Dry+Tare	34.58	34.68		
Tare	28.14	28.33		
Moisture	21.0	21.9		

MA 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 309	STP-023 (SS-36)	188.5'-190'	11/15/2006	CH	Fat Clay	28.1	72	50

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:TH Reviewed By:ST

ASTM D4318-05

NM 4-3-07

KAW 4/3/07

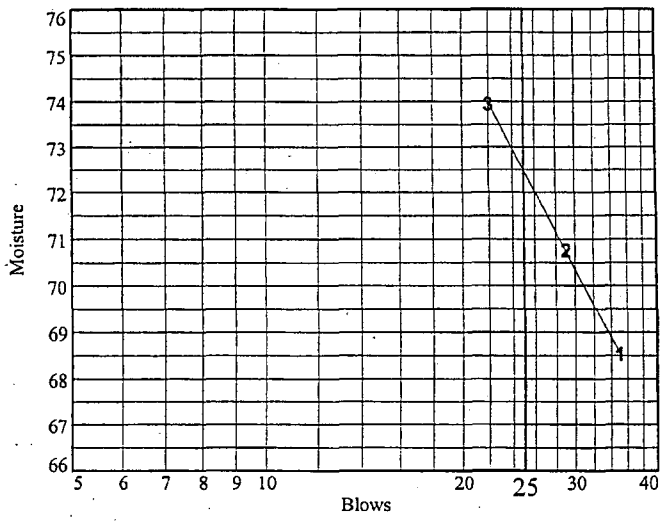
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 309
Depth: 188.5'-190'
Sample Number: STP-023 (SS-36)
Material Description: Fat Clay
Date: 11/15/2006
USCS Class.: CH
Testing Remarks: Tested By:TH Reviewed By:ST
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	35.91	32.47	29.19			
Dry+Tare	32.86	29.54	25.98			
Tare	28.41	25.40	21.64			
# Blows	35	29	22			
Moisture	68.5	70.8	74.0			



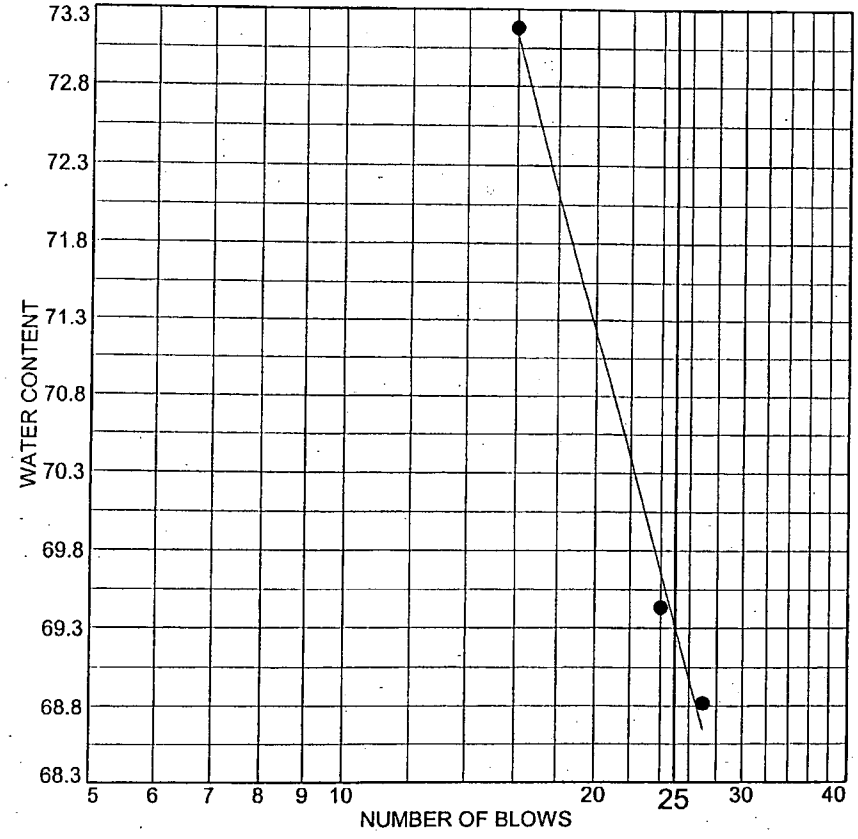
Liquid Limit= 72
Plastic Limit= 22
Plasticity Index= 50
Natural Moisture= 28.1
Liquidity Index= 0.1

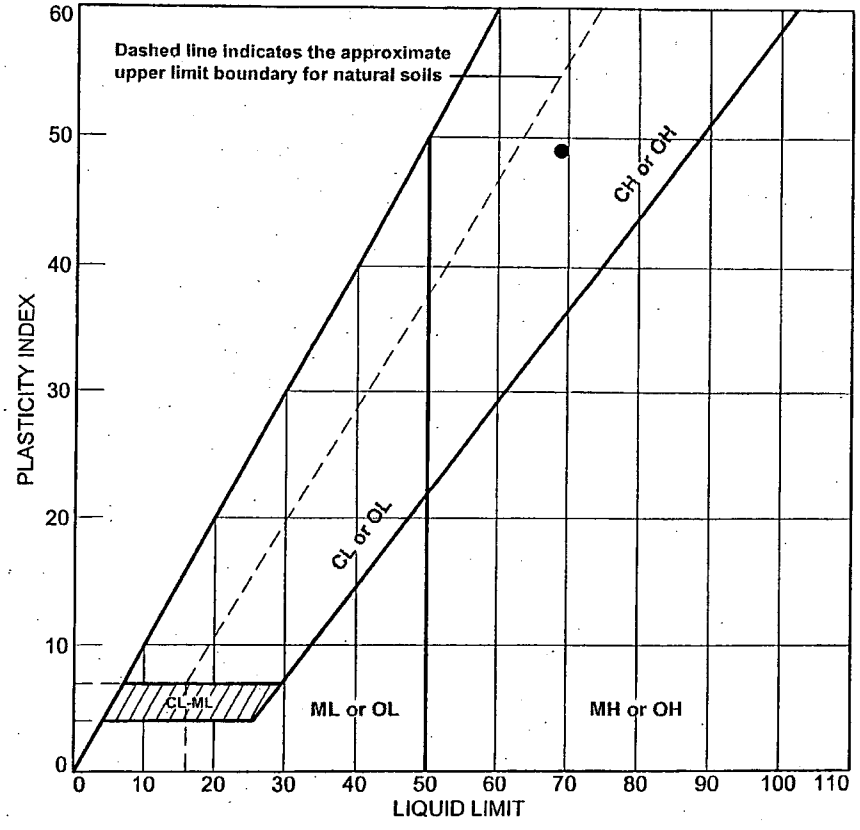
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	33.02	35.59			
Dry+Tare	31.63	34.23			
Tare	25.53	28.09			
Moisture	22.8	22.1			

MAC 4-7-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 309	STP-024	198.5'-200'	11/15/2006	CH	Fat Clay	31.8	69	49
		(SS-37)							

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:TH Reviewed By:ST

ASTM D4318-05

MA 4-3-07

KAW 4/3/07

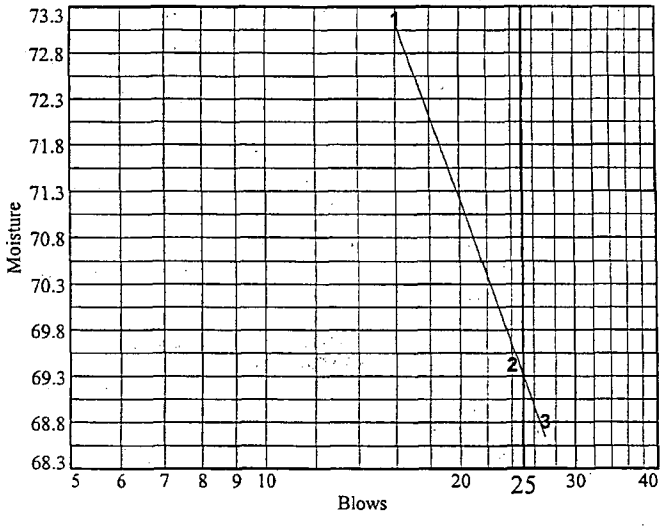
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 309
Depth: 198.5'-200'
Sample Number: STP-024 (SS-37)
Material Description: Fat Clay
Date: 11/15/2006
USCS Class.: CH
Testing Remarks: Tested By:TH Reviewed By:ST
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	31.00	37.57	37.77			
Dry+Tare	27.48	33.89	33.93			
Tare	22.67	28.59	28.35			
# Blows	16	24	27			
Moisture	73.2	69.4	68.8			



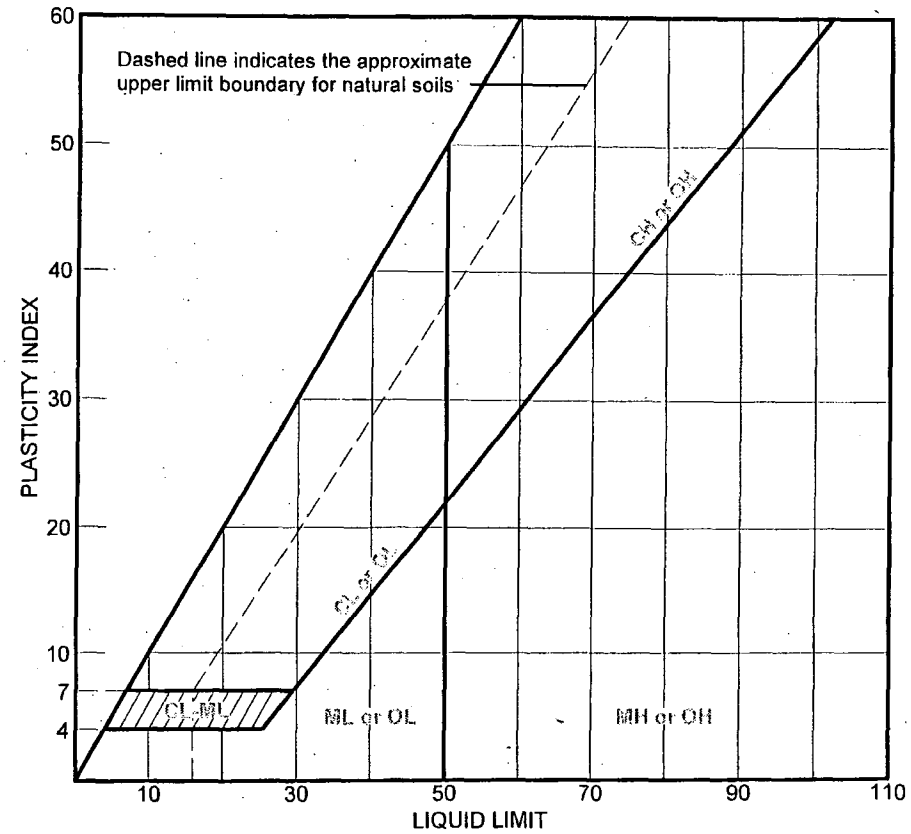
Liquid Limit= 69
Plastic Limit= 20
Plasticity Index= 49
Natural Moisture= 31.8
Liquidity Index= 0.2

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	36.42	31.51			
Dry+Tare	35.16	30.28			
Tare	28.88	24.35			
Moisture	20.1	20.7			

NW 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT



	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-314	UD-1	83' to 85'	2-16-07	SP	Poorly graded sand	20.9	NV	NP

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496 | Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reviewed by: SS
ASTM D4318-05

SS 2/25/2007

KAW 4/3/07

LIQUID AND PLASTIC LIMIT TEST DATA

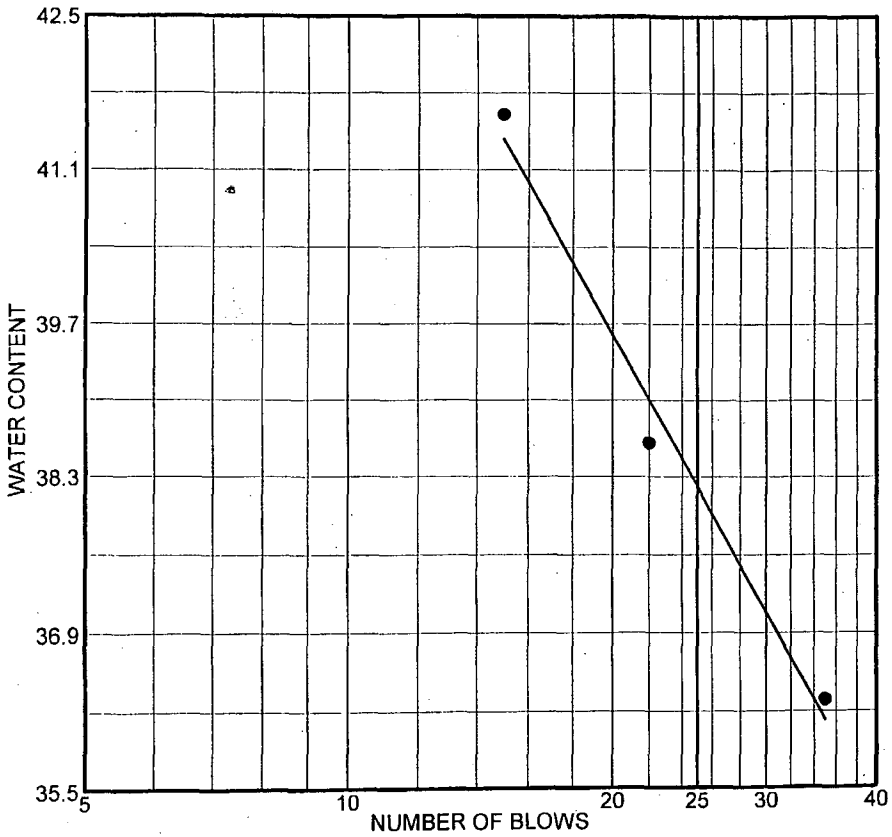
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496

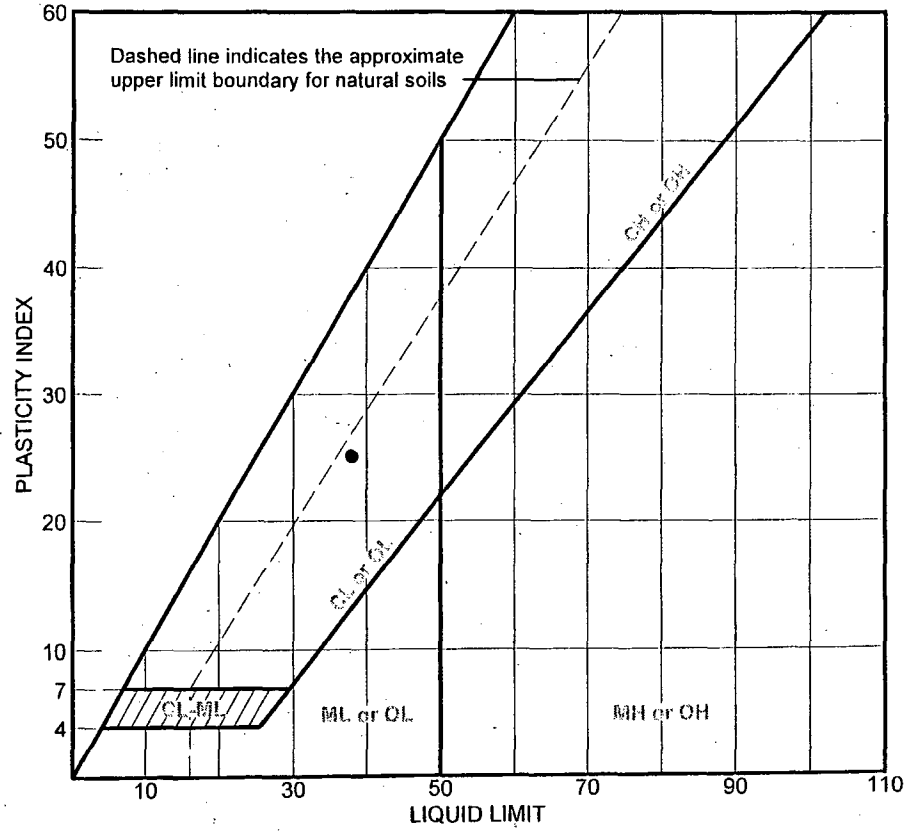
Sample Data

Source: B-314
Sample No.: UD-1
Elev. or Depth: 83' to 85' **Sample Length(in./cm.):**
Location: B-314
Description: Poorly graded sand
Date: 2-16-07 **Natural Moisture:** 20.9
USCS Class.: SP **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed by: SS
ASTM D4318-05

Liquid Limit= NV
Plastic Limit= NP
Plasticity Index= NP

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-314	UD-2	113' to 115'	2-20-07	CL	Lean clay	20.0	38	25

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496 | Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reviewed by: SS KAW 4/3/07

ASTM 4318-05

KAW 4/3/07

LIQUID AND PLASTIC LIMIT TEST DATA

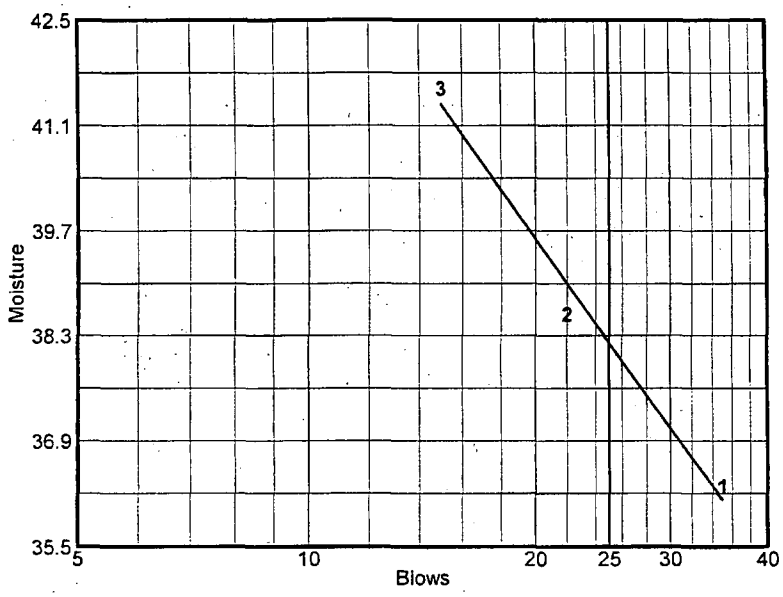
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496

Sample Data

Source: B-314
Sample No.: UD-2
Elev. or Depth: 113' to 115' **Sample Length(in./cm.):**
Location: B-314
Description: Lean clay
Date: 2-20-07 **Natural Moisture:** 20.0
USCS Class.: CL **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed by: SS
ASTM 4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	30.02	33.60	33.11			
Dry+Tare	24.90	27.42	26.79			
Tare	10.78	11.39	11.58			
# Blows	35	22	15			
Moisture	36.3	38.6	41.6			

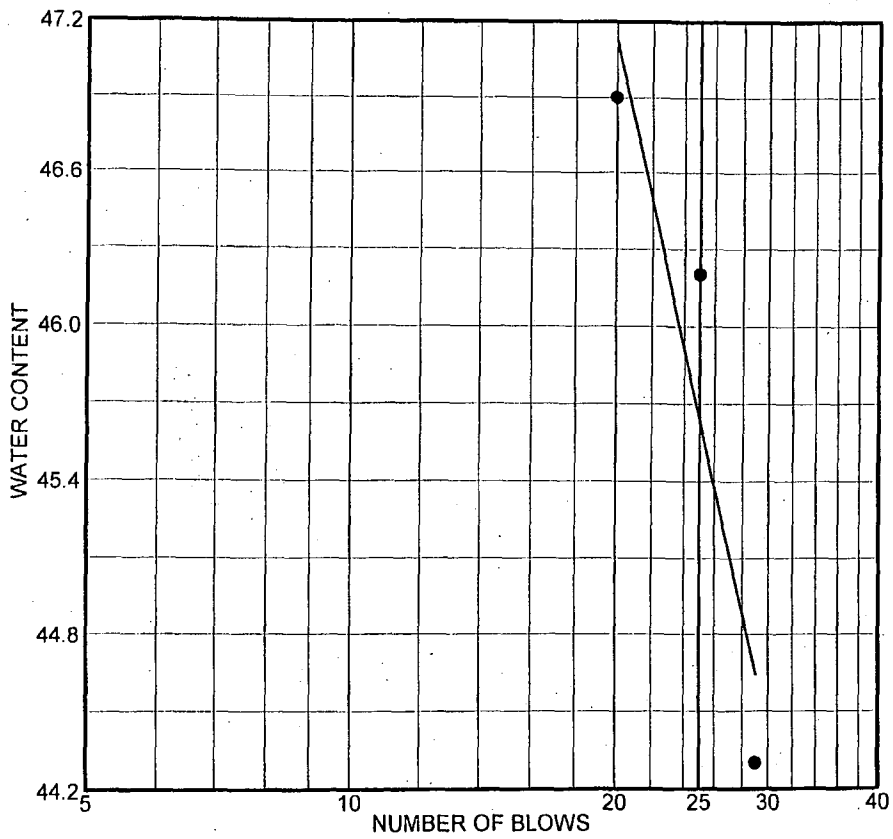


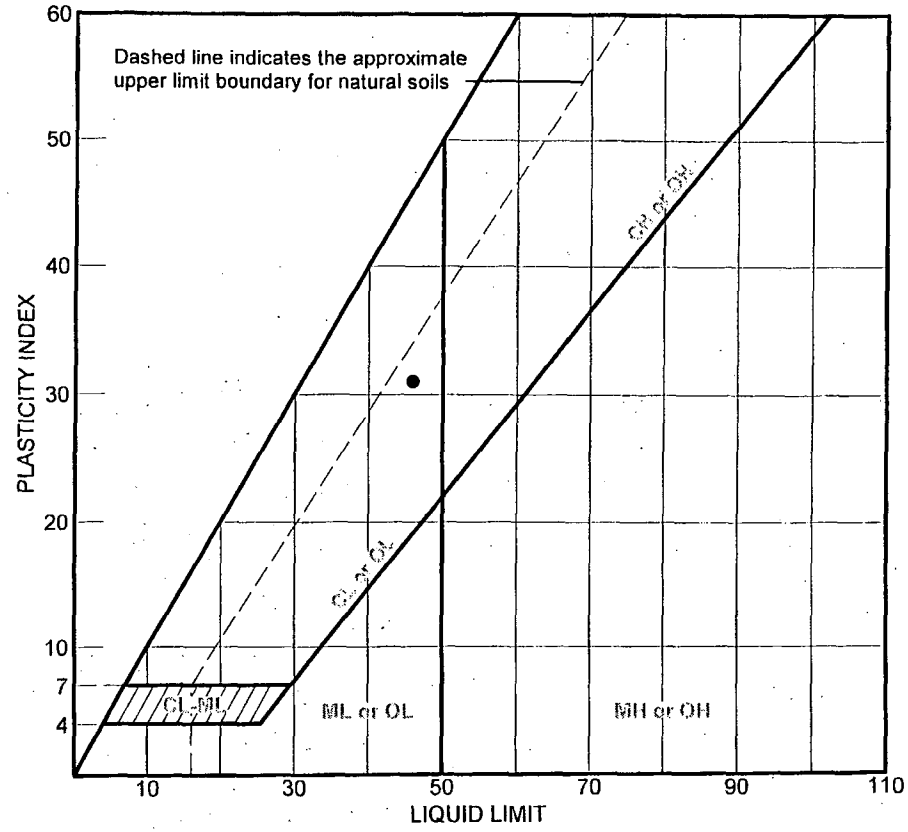
Liquid Limit= 38
Plastic Limit= 13
Plasticity Index= 25

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	19.74	20.01			
Dry+Tare	18.72	18.92			
Tare	11.00	10.67			
Moisture	13.2	13.2			

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-314	UD-4	141' to 143'	2-20-07	CL	Lean clay	24.2	46	31

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496 | Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reviewed by: SS
ASTM D4318-05 KAW 4/3/07

LIQUID AND PLASTIC LIMIT TEST DATA

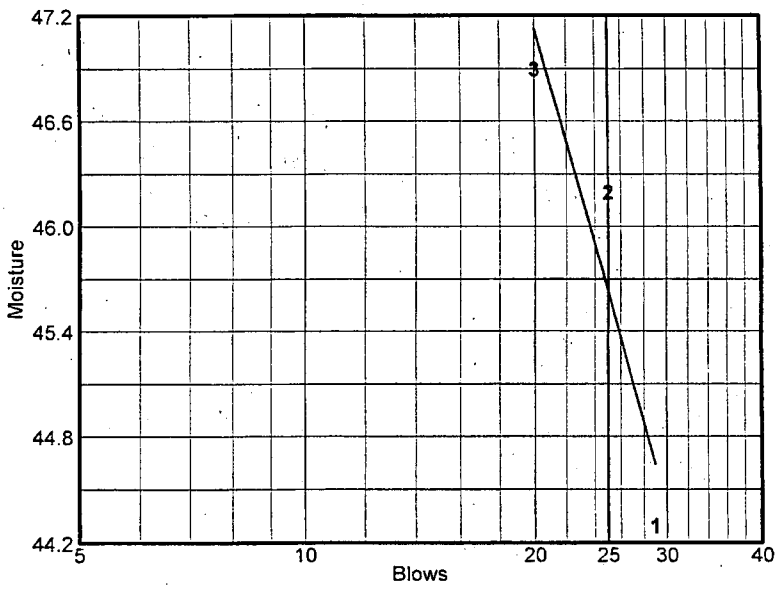
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496

Sample Data

Source: B-314
Sample No.: UD-4
Elev. or Depth: 141' to 143' **Sample Length(in./cm.):**
Location: B-314
Description: Lean clay
Date: 2-20-07 **Natural Moisture:** 24.2
USCS Class.: CL **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed by: SS
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	31.60	27.51	31.50			
Dry+Tare	25.18	22.27	24.95			
Tare	10.70	10.93	10.99			
# Blows	29	25	20			
Moisture	44.3	46.2	46.9			

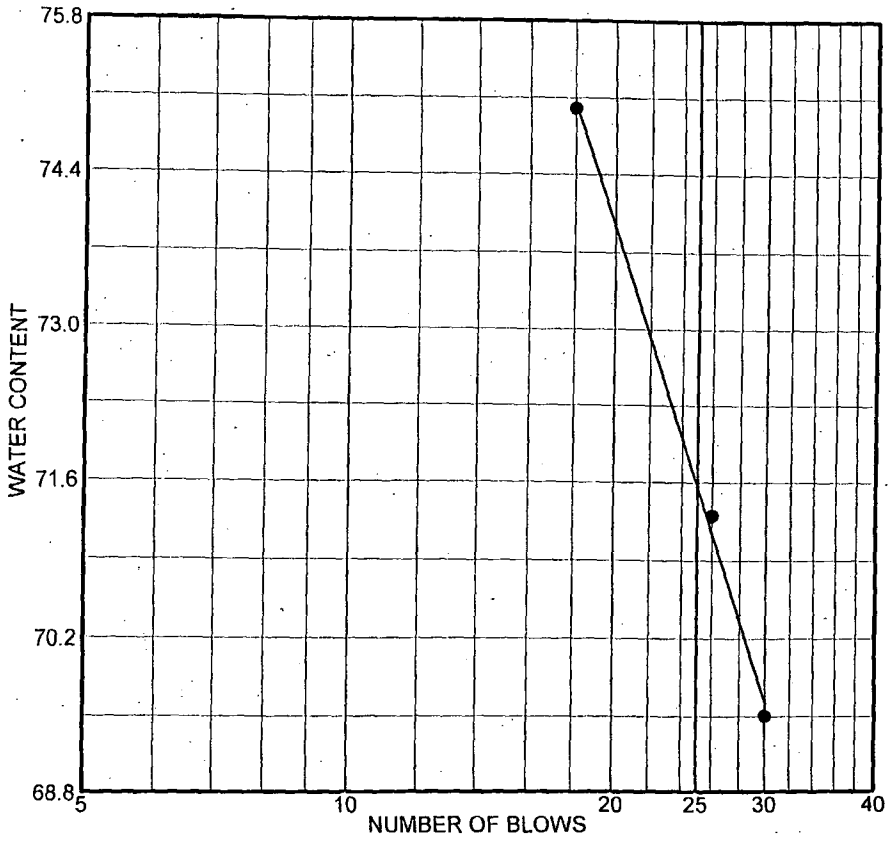


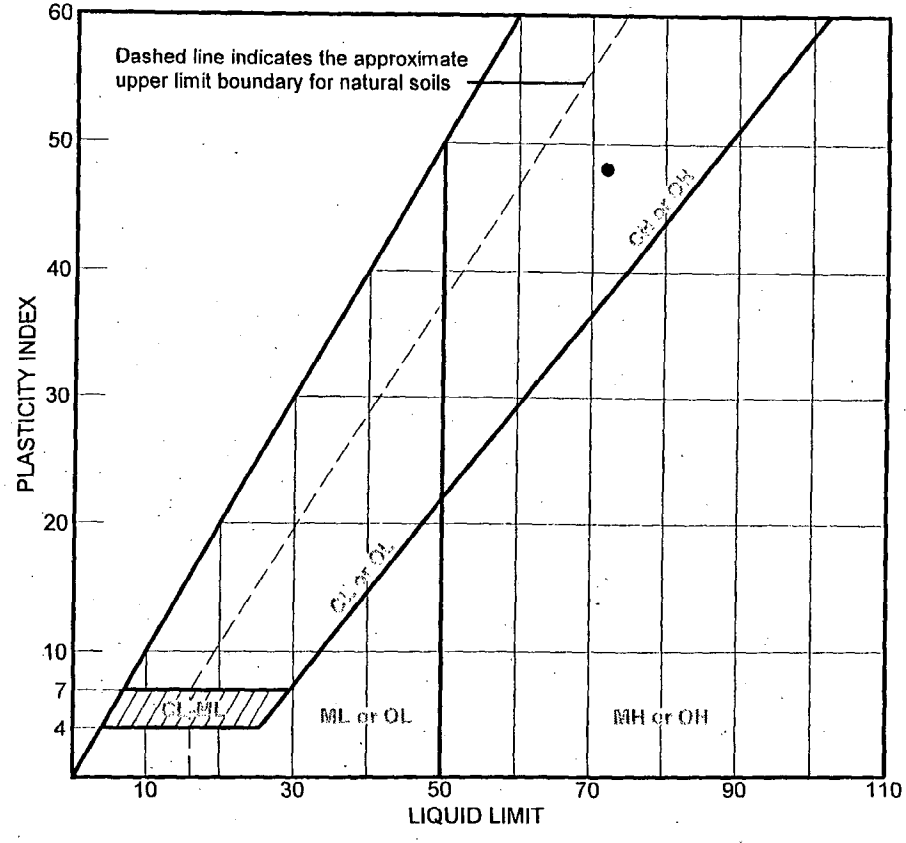
Liquid Limit= 46
Plastic Limit= 15
Plasticity Index= 31

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	26.68	23.95			
Dry+Tare	24.63	22.42			
Tare	11.45	11.60			
Moisture	15.6	14.1			

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-314	UD-5A	183' to 185'	2-20-07	CH	Fat clay	20.3	72	48

Client Bechtel Power Corporation
Project Bechtel/STP/COL

Project No. 5050-06-0496 | Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reviewed by: SS
ASTM D4318-05

SS 2/25/2007

KAW 4/3/07

LIQUID AND PLASTIC LIMIT TEST DATA

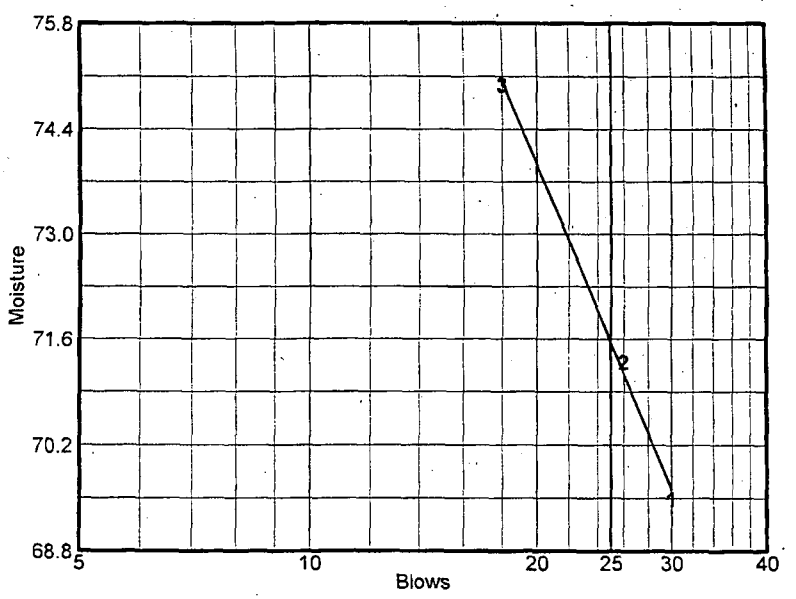
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496

Sample Data

Source: B-314
Sample No.: UD-5A
Elev. or Depth: 183' to 185' **Sample Length(in./cm.):**
Location: B-314
Description: Fat clay
Date: 2-20-07 **Natural Moisture:** 20.3
USCS Class.: CH **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed by: SS
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	22.22	26.20	22.06			
Dry+Tare	17.65	20.12	17.24			
Tare	11.07	11.59	10.81			
# Blows	30	26	18			
Moisture	69.5	71.3	75.0			

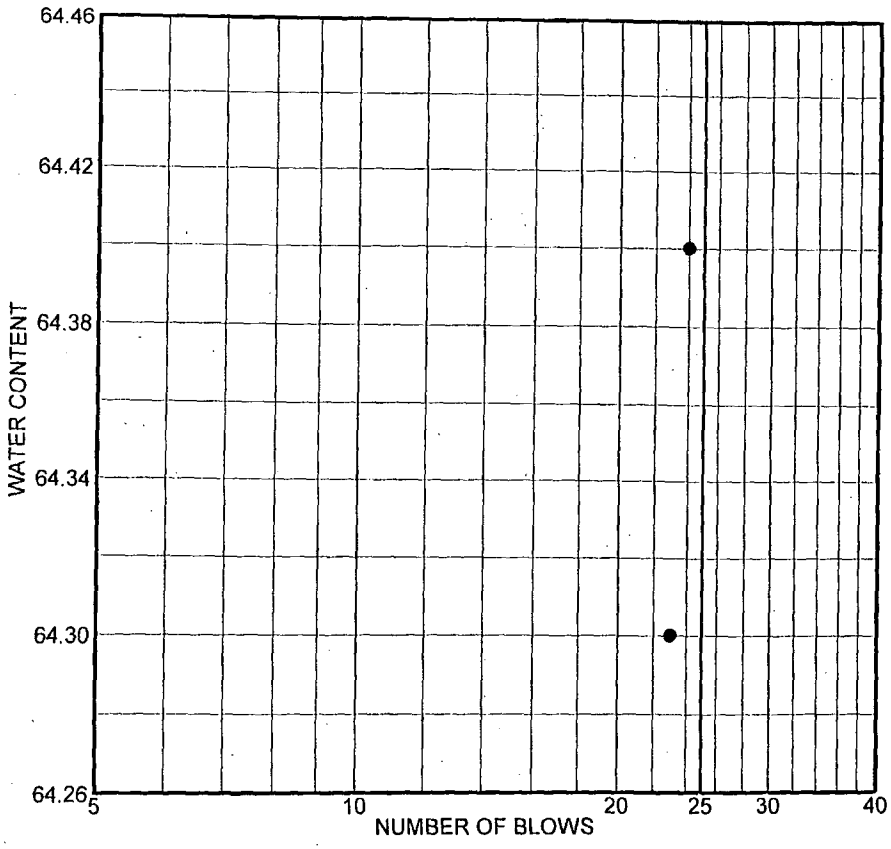


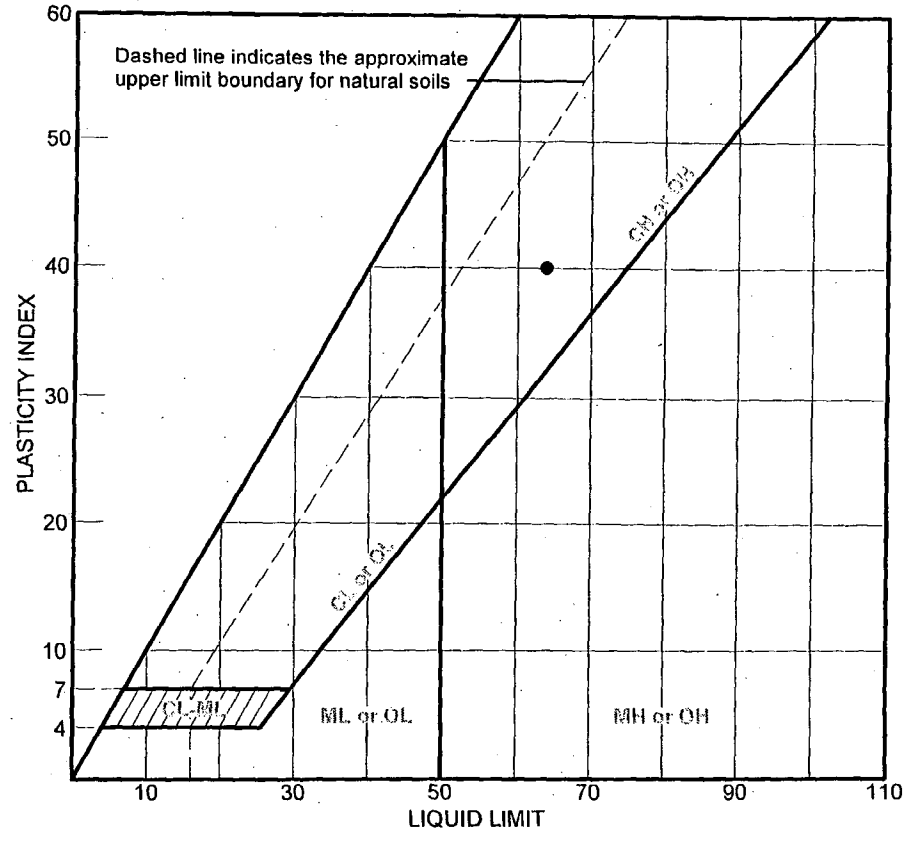
Liquid Limit= 72
Plastic Limit= 24
Plasticity Index= 48

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	19.67	19.08			
Dry+Tare	17.96	17.60			
Tare	11.03	11.48			
Moisture	24.7	24.2			

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-314	UD-6	191' to 193'	3-16-07	CH	Fat clay	26.5	64	40

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496 | Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reviewed by: MH
ASTM D4318-05

KAW 4/3/07

LIQUID AND PLASTIC LIMIT TEST DATA

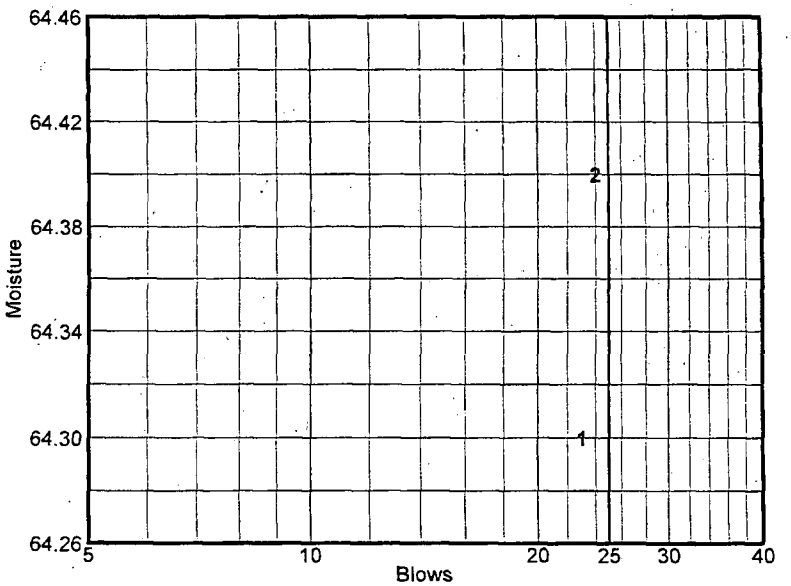
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496

Sample Data

Source: B-314
Sample No.: UD-6
Elev. or Depth: 191' to 193' **Sample Length(in./cm.):**
Location: B-314
Description: Fat clay
Date: 3-16-07 **Natural Moisture:** 26.5
USCS Class.: CH **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed by: MH
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	25.13	25.50				
Dry+Tare	19.59	19.74				
Tare	10.98	10.80				
# Blows	23	24				
Moisture	64.3	64.4				

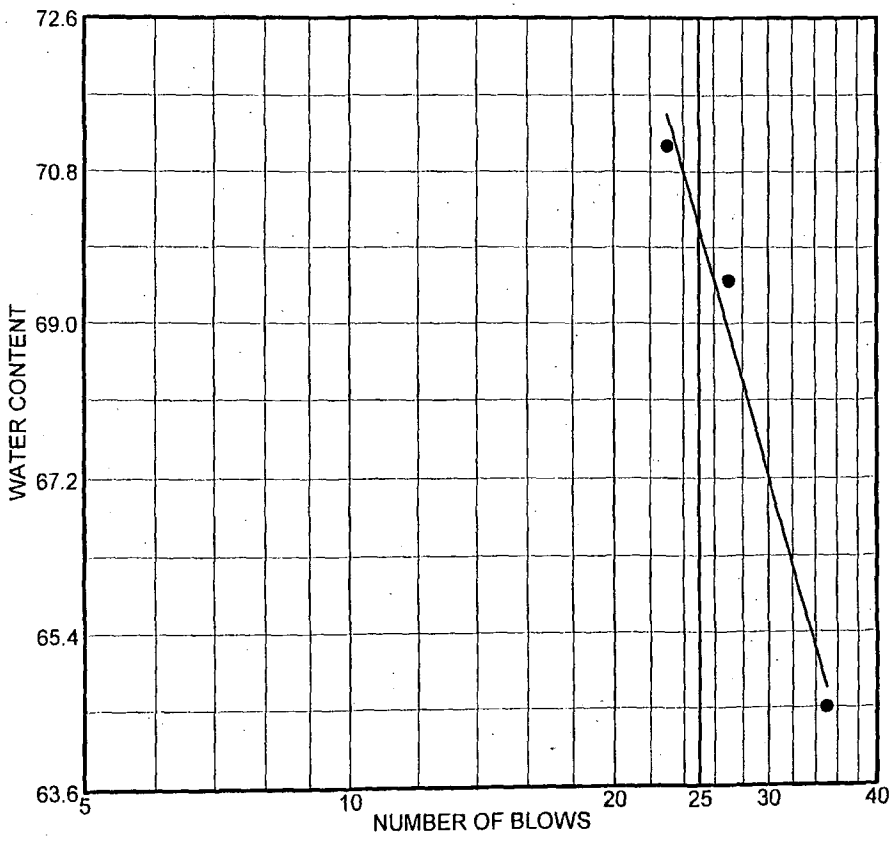


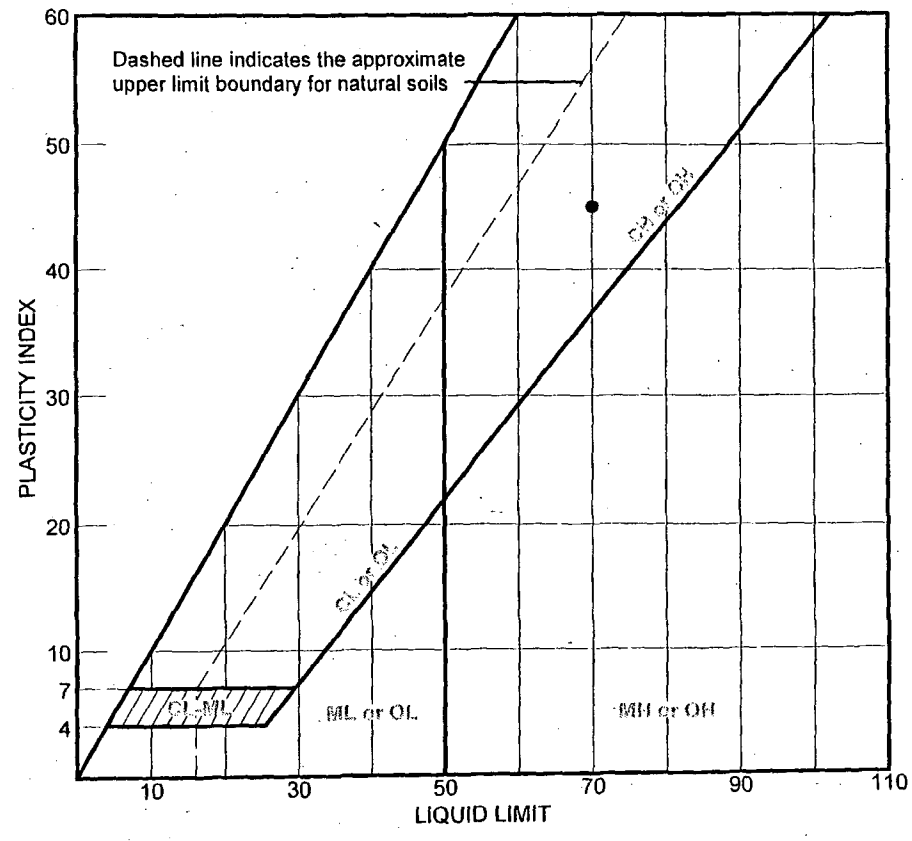
Liquid Limit= 64
Plastic Limit= 24
Plasticity Index= 40

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	23.52	22.73			
Dry+Tare	21.05	20.58			
Tare	10.88	11.65			
Moisture	24.3	24.1			

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-319	UD-1	128' to 130'	2-19-07	CH	Fat clay	21.0	70	45

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496 | Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reviewed by: SS
ASTM D4318-05

SS 2/25/2007

KAW 4/3/07

LIQUID AND PLASTIC LIMIT TEST DATA

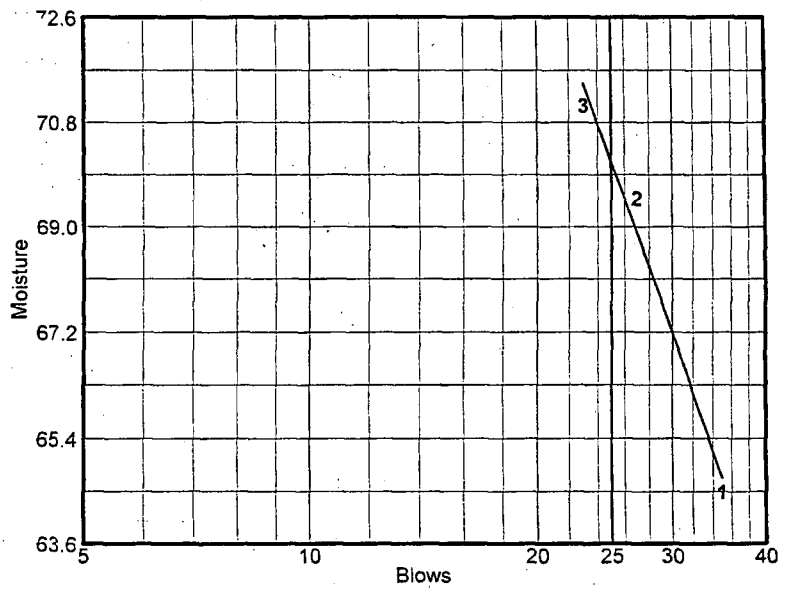
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496

Sample Data

Source: B-319
Sample No.: UD-1
Elev. or Depth: 128' to 130' **Sample Length(in./cm.):**
Location: B-319
Description: Fat clay
Date: 2-19-07 **Natural Moisture:** 21.0
USCS Class.: CH **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed by: SS
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	25.64	27.40	27.06			
Dry+Tare	19.91	20.60	20.63			
Tare	11.03	10.82	11.59			
# Blows	35	27	23			
Moisture	64.5	69.5	71.1			

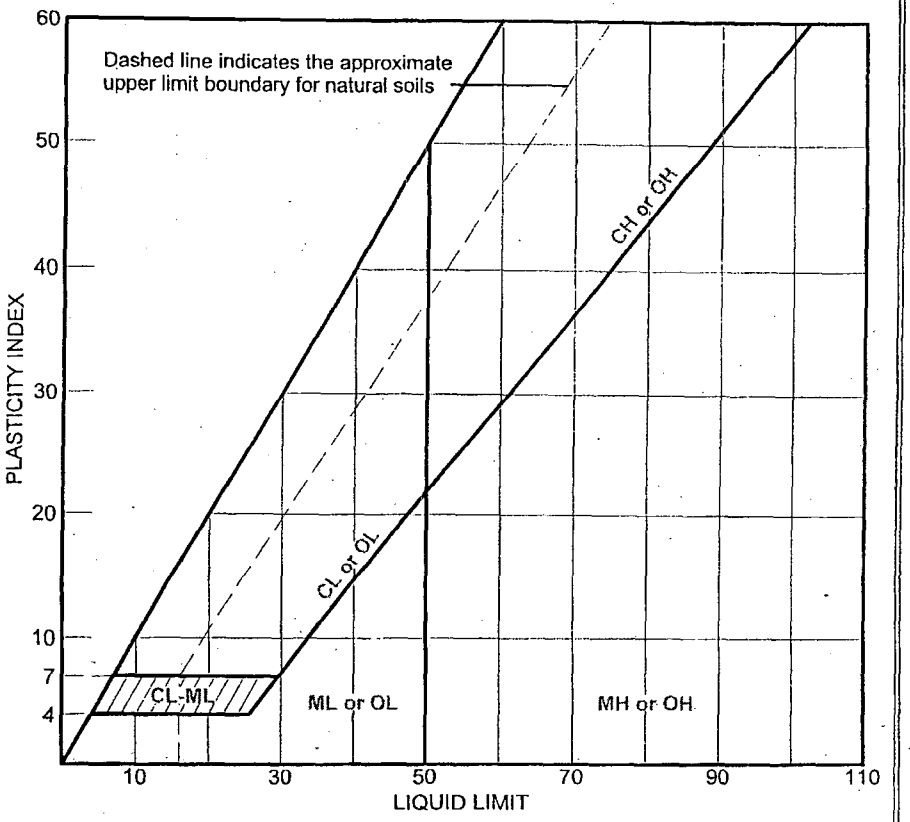


Liquid Limit= 70
Plastic Limit= 25
Plasticity Index= 45

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	24.77	23.3			
Dry+Tare	22.09	20.78			
Tare	10.95	10.75			
Moisture	24.1	25.1			

LIQUID AND PLASTIC LIMITS TEST REPORT ASTM D 4318-04



	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
•	B-319	UD-2	143-145 ft.	4/4/07	ML	Tan Sandy silt	18.7	NV	NP

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050060486 | Lab no. 6917

MACTEC ENGINEERING AND CONSULTING, INC.

• Tested by: BM Reviewed by: HJ

HJ 4/05/07

LIQUID AND PLASTIC LIMIT TEST DATA

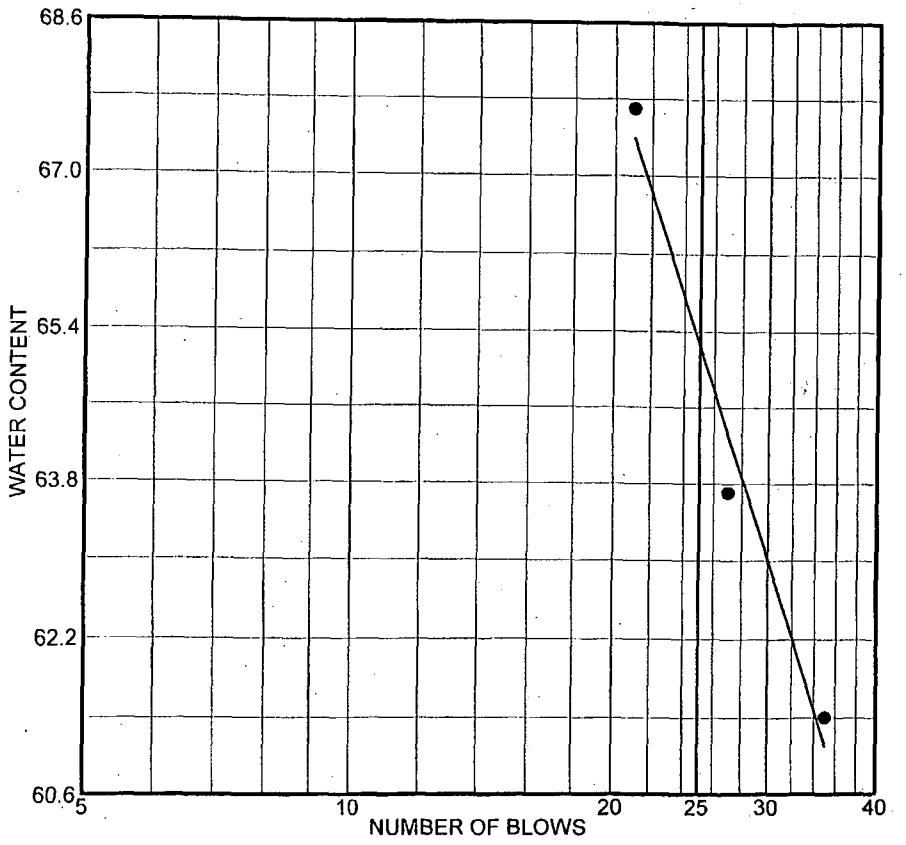
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050060486

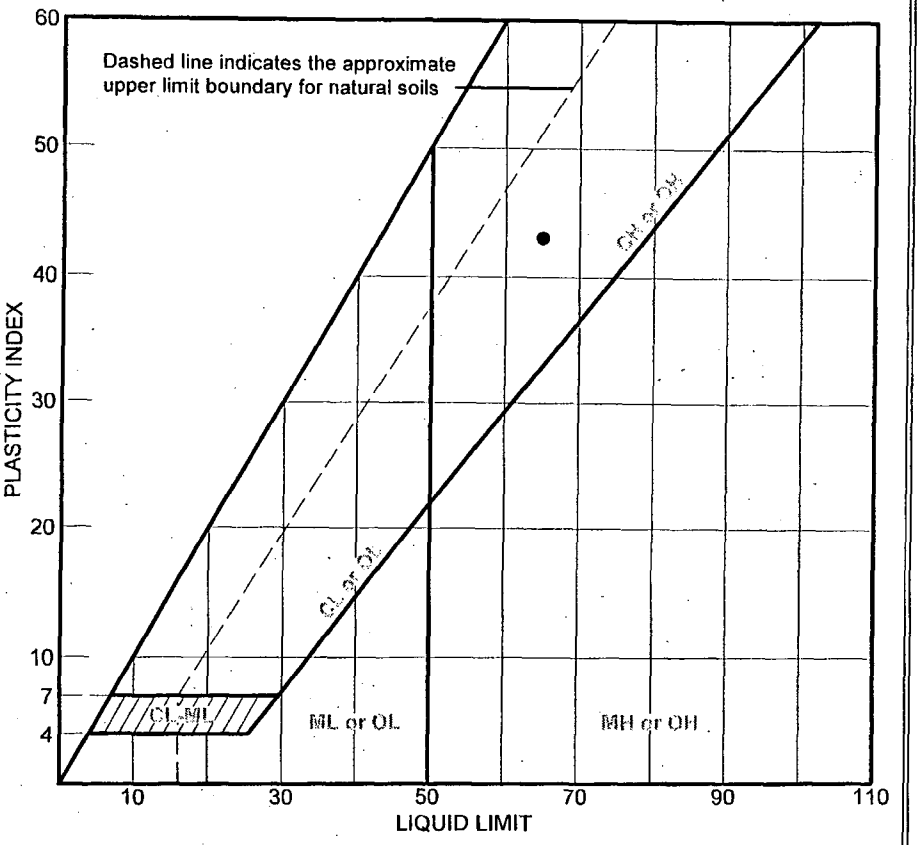
Sample Data

Source: B-319
Sample No.: UD-2
Elev. or Depth: 143-145 ft. **Sample Length(in./cm.):** 6917
Location: B-319
Description: Tan Sandy silt
Date: 4/4/07 **Natural Moisture:** 18.7
USCS Class.: ML **AASHTO Class.:**
Testing Remarks: Tested by: BM Reviewed by: HJ HJ 4/5/07

Liquid Limit= NV
Plastic Limit= NP
Plasticity Index= NP

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-319	UD-4	173' to 175'	2-19-07	CH	Fat clay	26.9	65	43

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496 | Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reviewed by: SS KAW 4/3/07
ASTM D4318-05

KAW 4/3/07

LIQUID AND PLASTIC LIMIT TEST DATA

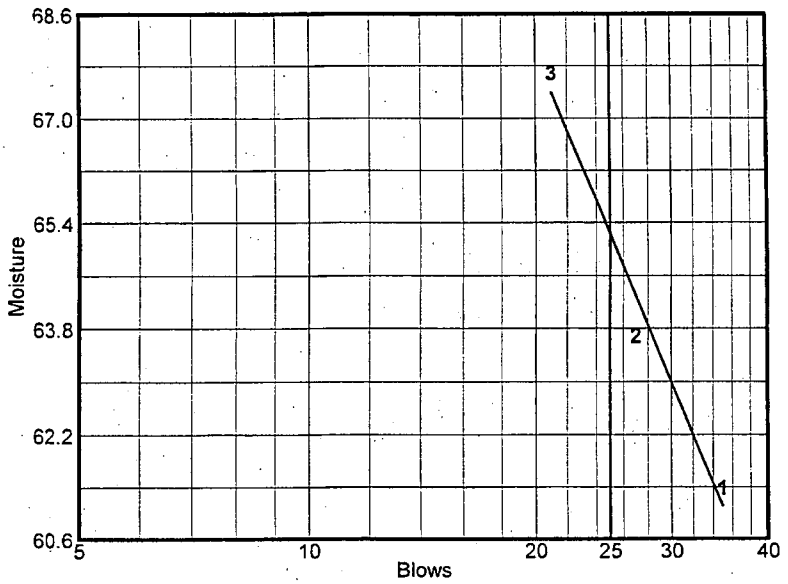
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496

Sample Data

Source: B-319
Sample No.: UD-4
Elev. or Depth: 173' to 175' **Sample Length(in./cm.):**
Location: B-319
Description: Fat clay
Date: 2-19-07 **Natural Moisture:** 26.9
USCS Class.: CH **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed by: SS
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	28.77	30.33	31.07			
Dry+Tare	21.97	22.97	23.16			
Tare	10.90	11.42	11.48			
# Blows	35	27	21			
Moisture	61.4	63.7	67.7			

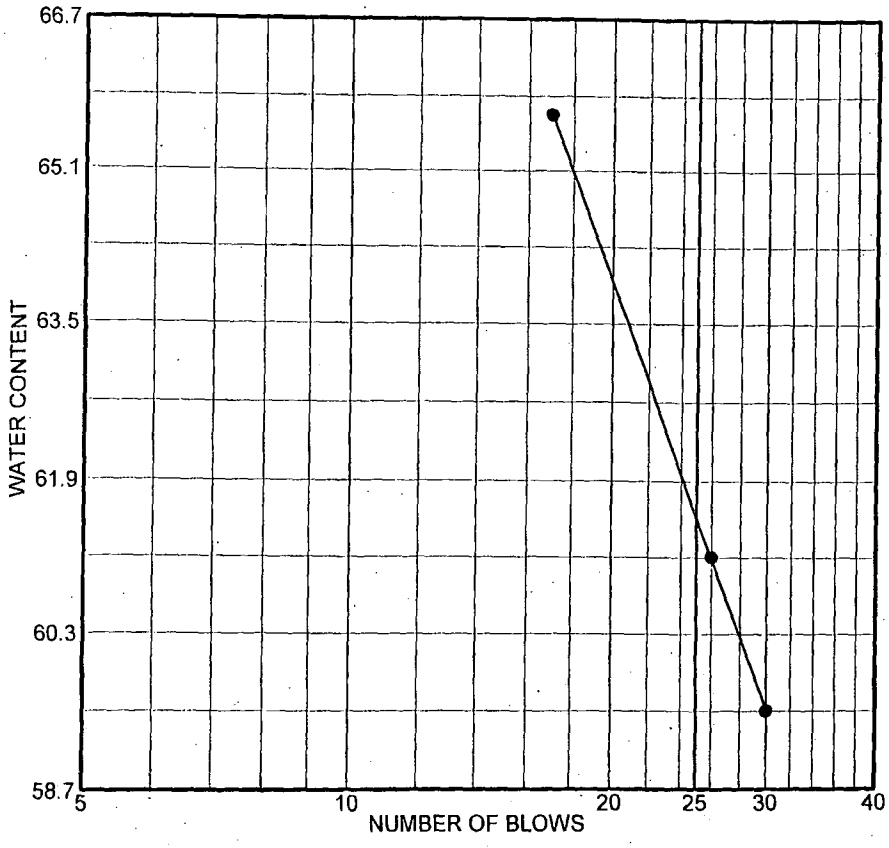


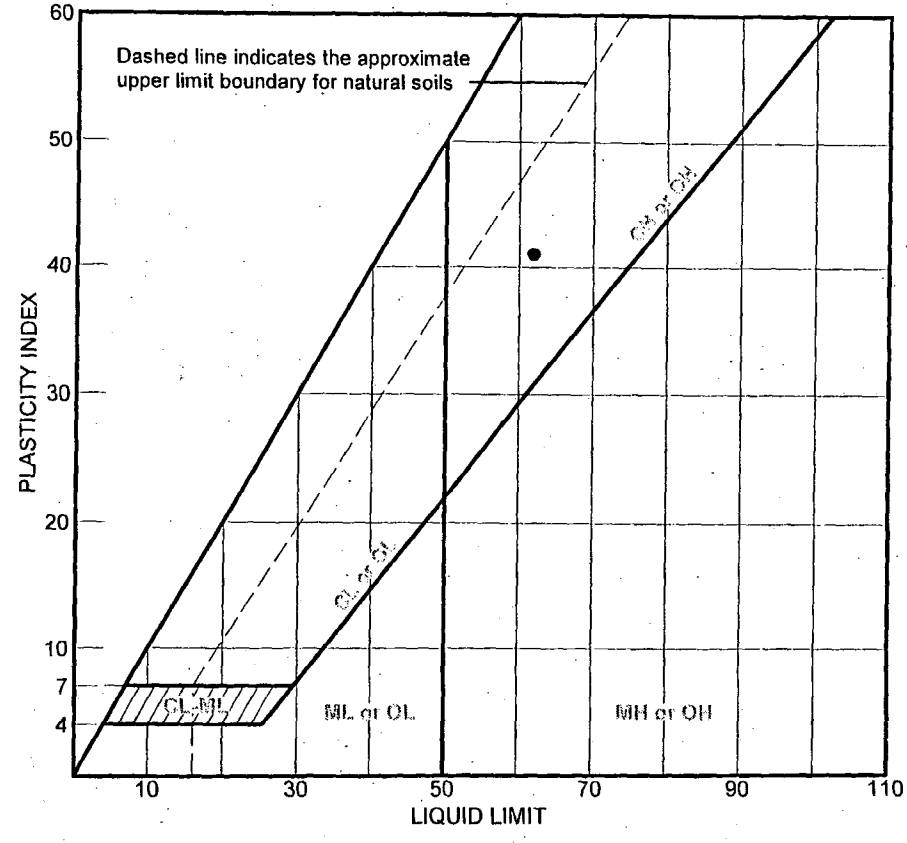
Liquid Limit= 65
Plastic Limit= 22
Plasticity Index= 43

Plastic Limit Data

Run No.	1	2	3	4
Wet+Tare	18.61	25.13		
Dry+Tare	17.27	22.80		
Tare	11.57	11.60		
Moisture	23.5	20.8		

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-319	UD-5	188' to 190'	2-19-07	CH	Fat clay	23.9	62	41

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496 | Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reviewed by: SS
ASTM D4318-05

SS 2/25/2007

KAW 4/3/07

LIQUID AND PLASTIC LIMIT TEST DATA

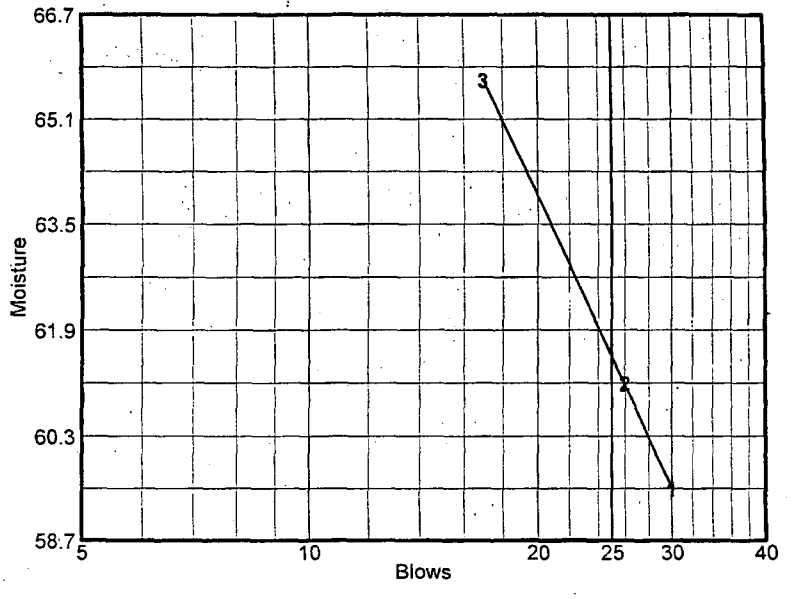
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496

Sample Data

Source: B-319
Sample No.: UD-5
Elev. or Depth: 188' to 190' **Sample Length(in./cm.):**
Location: B-319
Description: Fat clay
Date: 2-19-07 **Natural Moisture:** 23.9
USCS Class.: CH **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed by: SS
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	25.50	25.55	30.16			
Dry+Tare	20.24	20.04	22.51			
Tare	11.40	11.02	10.87			
# Blows	30	26	17			
Moisture	59.5	61.1	65.7			

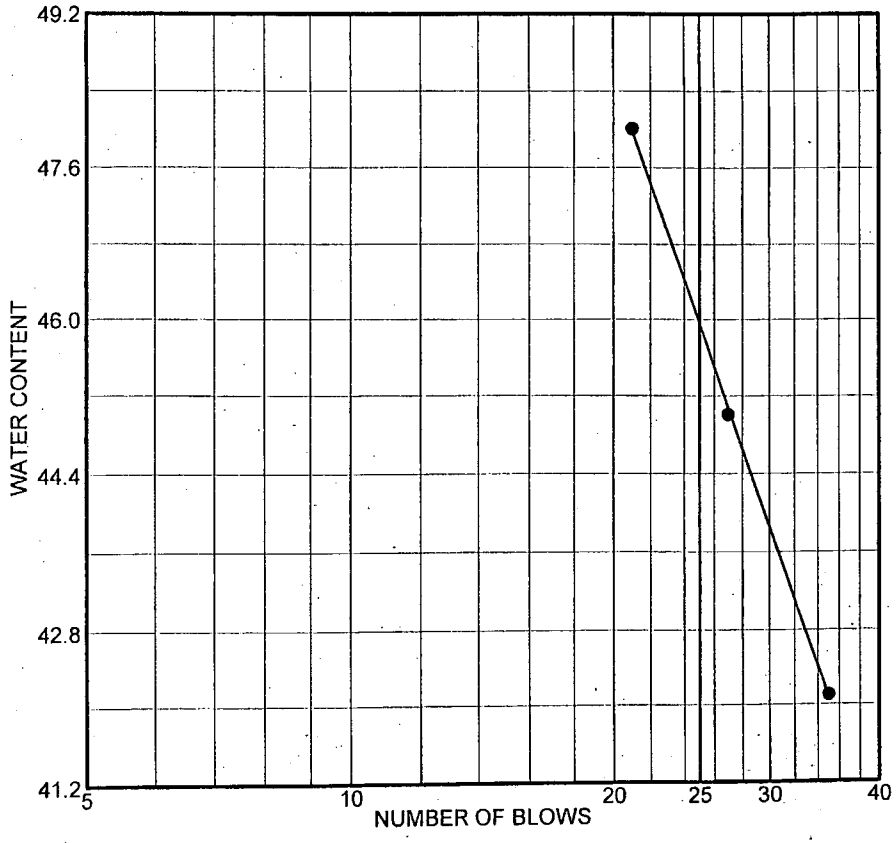


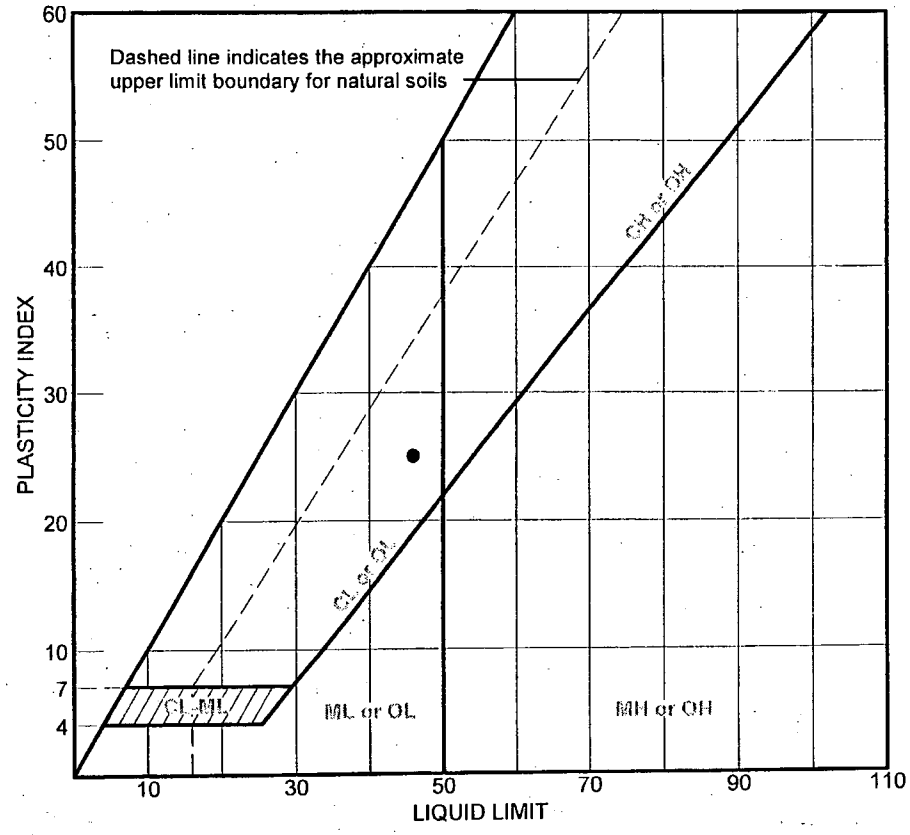
Liquid Limit= 62
Plastic Limit= 21
Plasticity Index= 41

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	20.60	21.17			
Dry+Tare	18.96	19.42			
Tare	11.21	10.96			
Moisture	21.2	20.7			

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-321	UD-3	138' to 140'	3-12-07	CL	Lean Clay	20.0	46	25

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496 | Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reviewed by: MH
ASTM 4318-05 KAW 4/3/07

KAW 4/3/07

LIQUID AND PLASTIC LIMIT TEST DATA

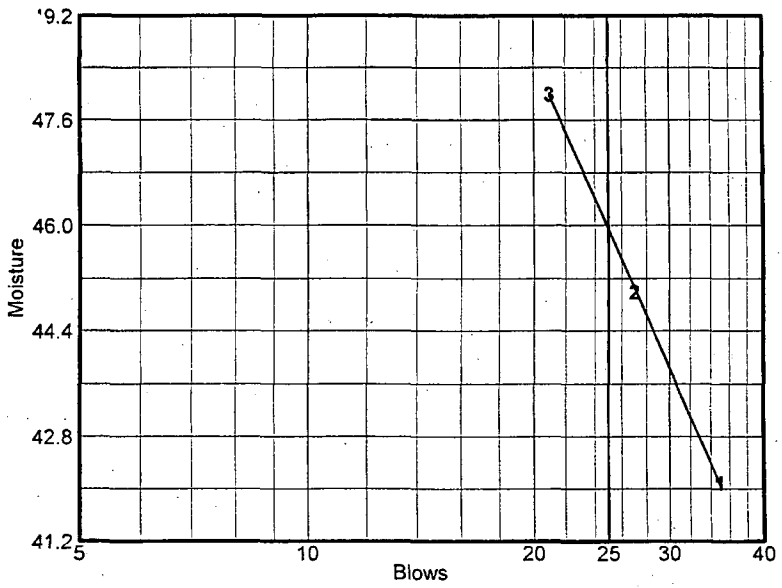
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496

Sample Data

Source: B-321
Sample No.: UD-3
Elev. or Depth: 138' to 140' **Sample Length(in./cm.):**
Location: B-321
Description: Lean Clay
Date: 3-12-07 **Natural Moisture:** 20.0
USCS Class.: CL **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed by: MH
ASTM 4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	27.96	23.16	24.98			
Dry+Tare	22.90	19.51	20.55			
Tare	10.87	11.40	11.33			
# Blows	35	27	21			
Moisture	42.1	45.0	48.0			

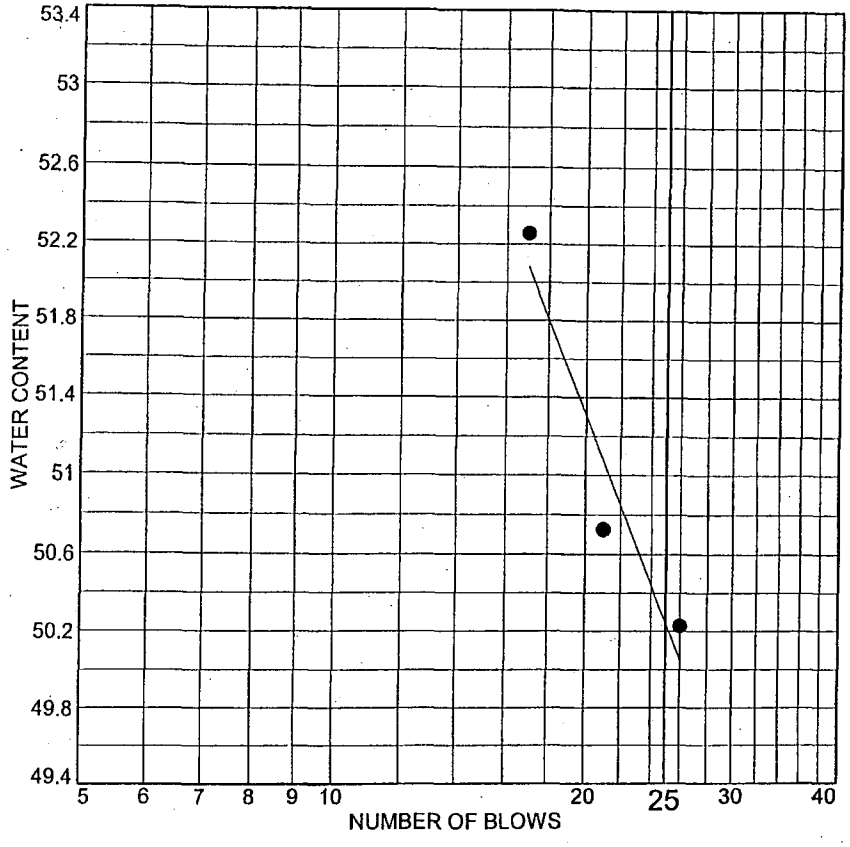


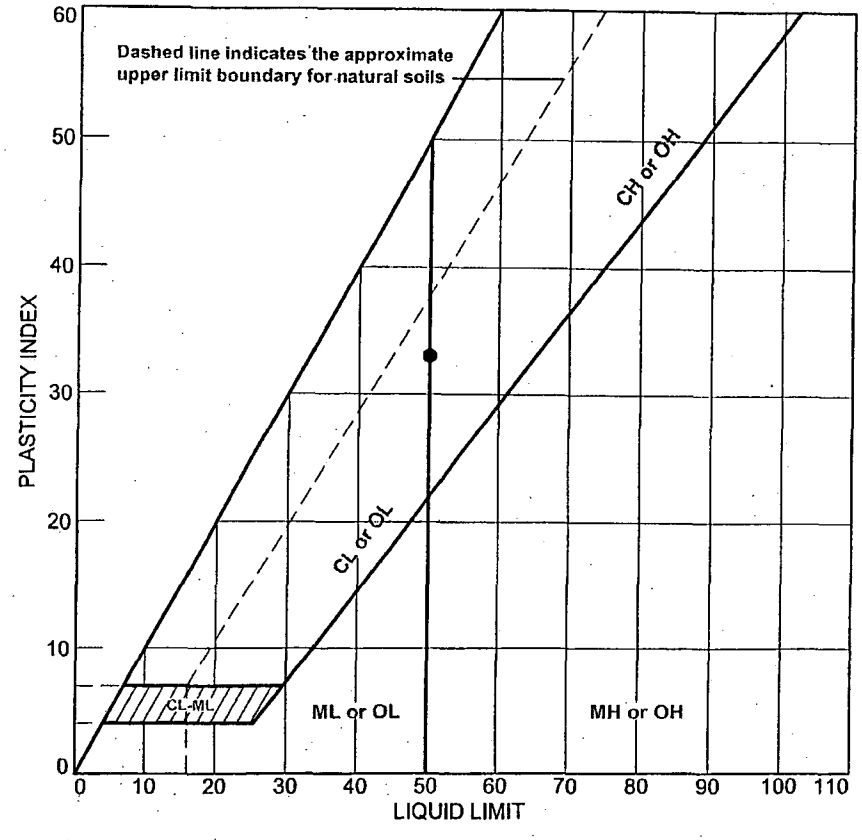
Liquid Limit= 46
Plastic Limit= 21
Plasticity Index= 25

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	20.72	20.84			
Dry+Tare	19.08	19.14			
Tare	11.59	10.92			
Moisture	21.9	20.7			

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 323	STP-118	4.5'-6.0'	12/3/2006	CH	Fat Clay	21.2	50	33
		(SS-4)							

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC/TH Reviewed By:RF

ASTM D4318-05

MM 4-3-07

KAW 4/3/07

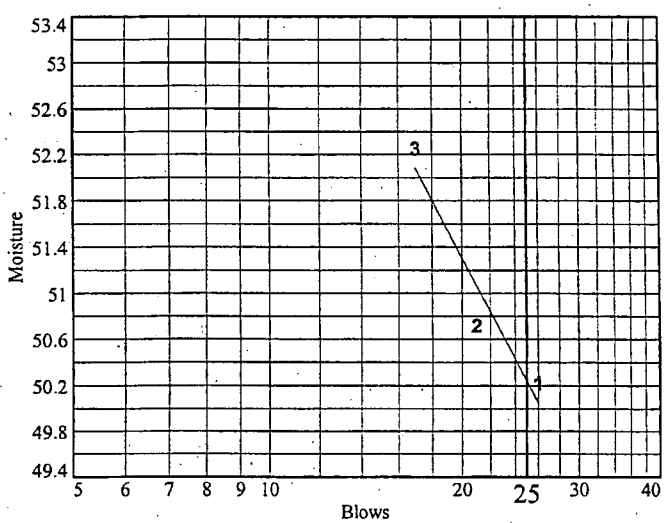
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 323
Depth: 4.5'-6.0'
Sample Number: STP-118 (SS-4)
Material Description: Fat Clay
Date: 12/3/2006
USCS Class.: CH
Testing Remarks: Tested By:AC/TH Reviewed By:RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	34.32	31.01	36.7			
Dry+Tare	30.99	27.86	32.88			
Tare	24.36	21.65	25.57			
# Blows	26	21	17			
Moisture	50.2	50.7	52.3			



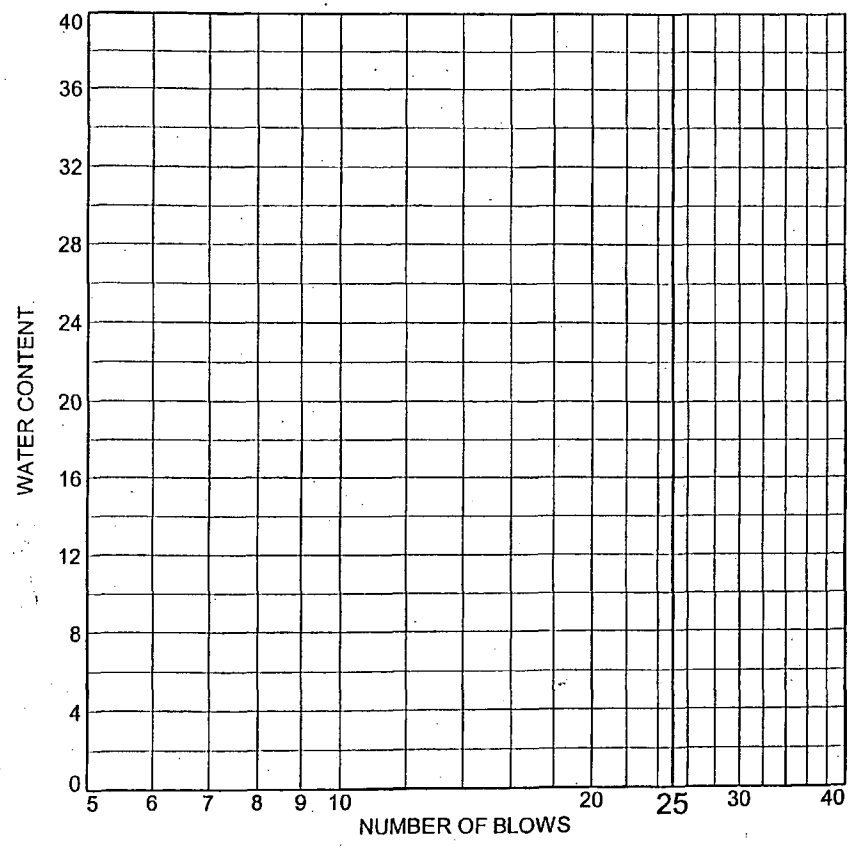
Liquid Limit= 50
Plastic Limit= 17
Plasticity Index= 33
Natural Moisture= 21.2
Liquidity Index= 0.1

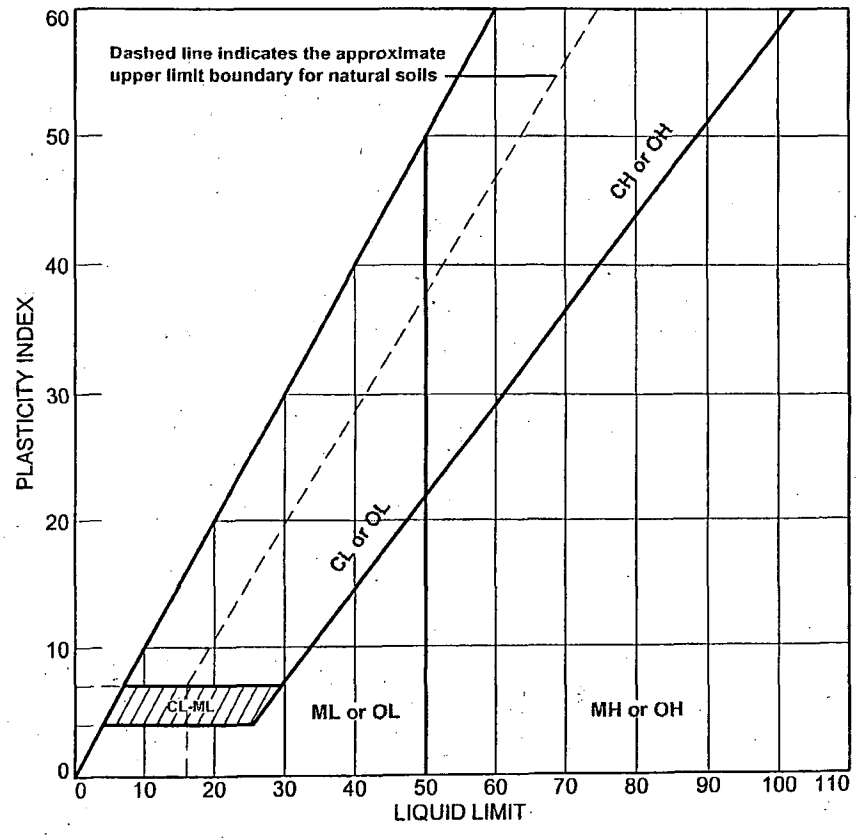
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	29.94	35.72			
Dry+Tare	28.9	34.63			
Tare	22.69	28.24			
Moisture	16.7	17.1			

MAK 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 323	STP-121	23.5'-25.0'	12/3/2006	ML	Sandy Silt	22.5	NV	NP
		(SS-12)							

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC/TH Reviewed By:RF
ASTM D4318-05

4-3-07

KAW 4/03/07

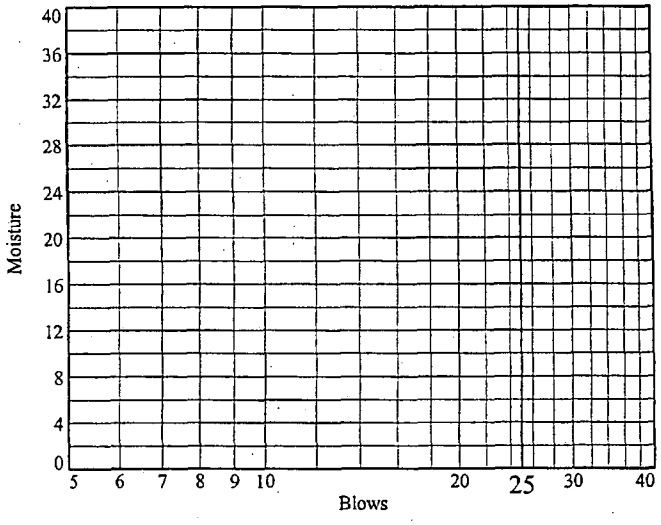
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 323
Depth: 23.5'-25.0'
Sample Number: STP-121 (SS-12)
Material Description: Sandy Silt
Date: 12/3/2006
USCS Class.: ML
AASHTO Class.: A-4(0)
Testing Remarks: Tested By:AC/TH Reviewed By:RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare						
Dry+Tare						
Tare						
# Blows						
Moisture						



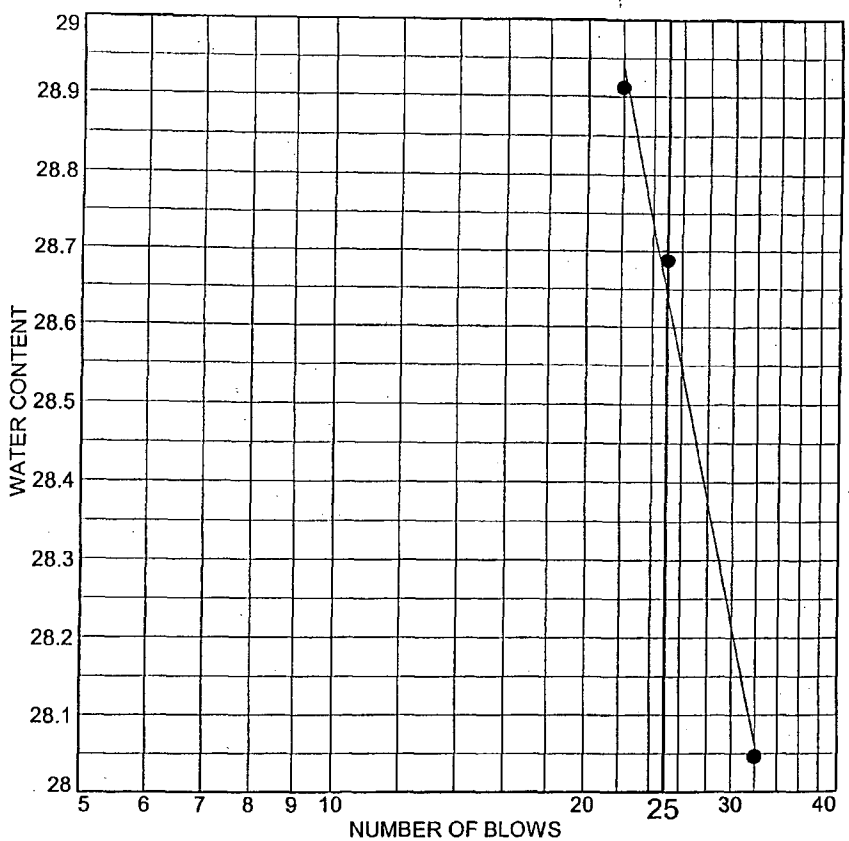
Liquid Limit= NV
Plastic Limit= NP
Plasticity Index= NP
Natural Moisture= 22.5

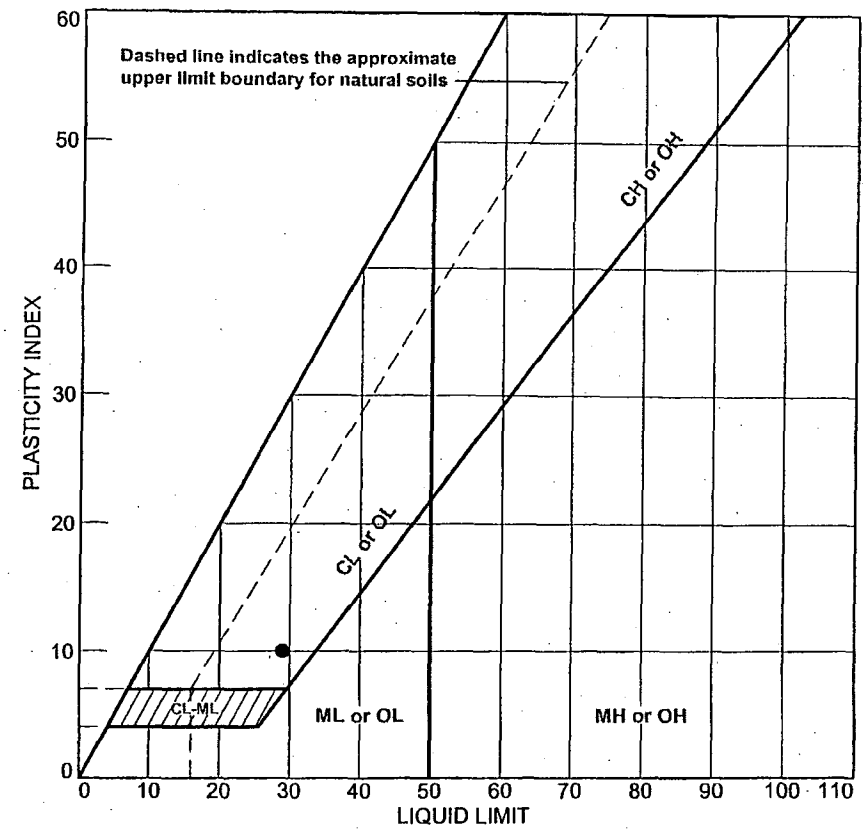
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare					
Dry+Tare					
Tare					
Moisture					

MAK 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 323	STP-125 (SS-16)	43.5'-45.0'	12/3/2006	CL	Lean Clay	20.5	29	10

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC/TH Reviewed By:RF
ASTM D4318-05

MH
4-3-07

KAW 4/3/07

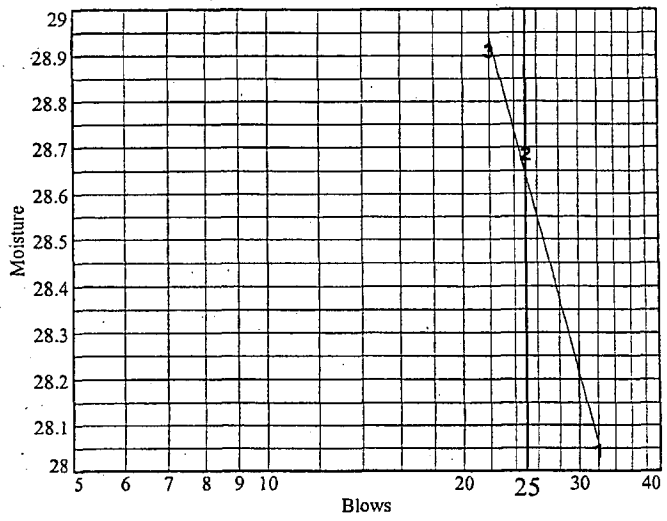
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 323
Depth: 43.5'-45.0'
Sample Number: STP-125 (SS-16)
Material Description: Lean Clay
Date: 12/3/2006
USCS Class.: CL
Testing Remarks: Tested By:AC/TH Reviewed By:RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	37.22	37.65	39.55			
Dry+Tare	35.01	35.53	37.00			
Tare	27.13	28.14	28.18			
# Blows	32	25	22			
Moisture	28.0	28.7	28.9			



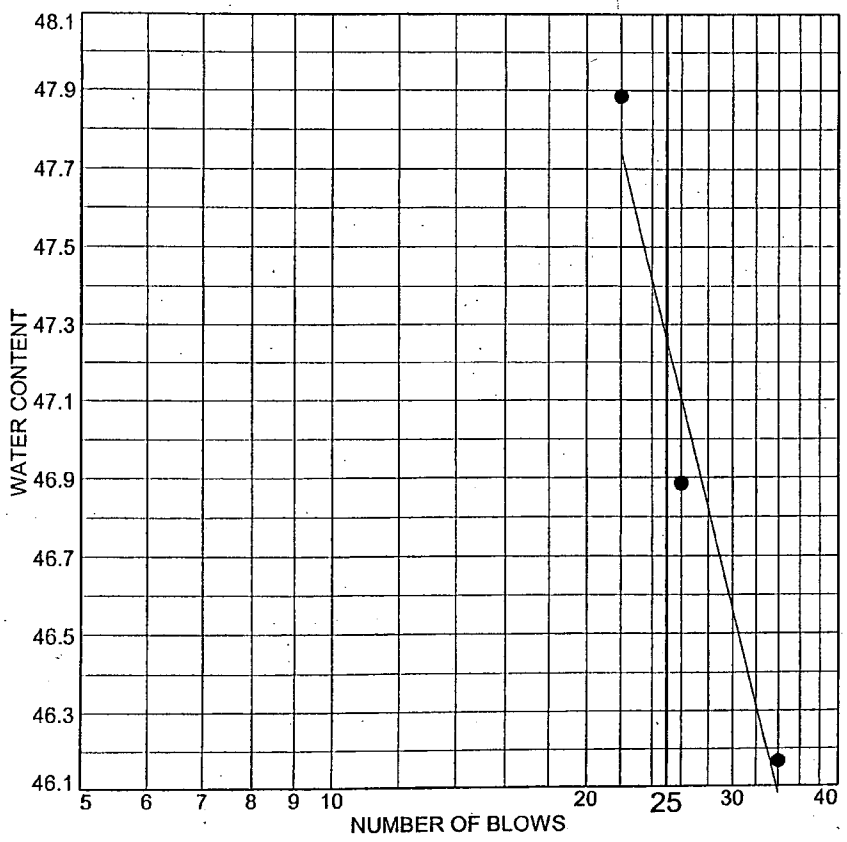
Liquid Limit= 29
Plastic Limit= 19
Plasticity Index= 10
Natural Moisture= 20.5
Liquidity Index= 0.2

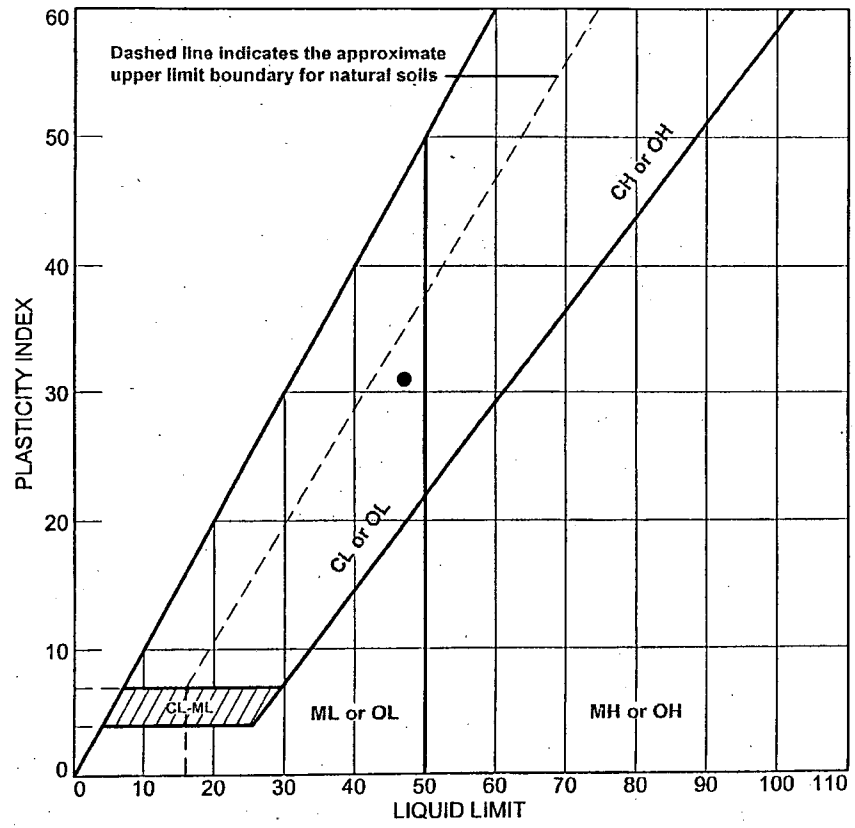
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	34.89	35.77			
Dry+Tare	33.63	34.59			
Tare	27.10	28.25			
Moisture	19.3	18.6			

MA 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 323	STP-127	53.5'-55.0'	12/3/2006	CL	Lean Clay	18.1	47	31
		(SS-18)							

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC/TH Reviewed By:RF

ASTM D4318-05

4-3-07

KAW 4/3/07

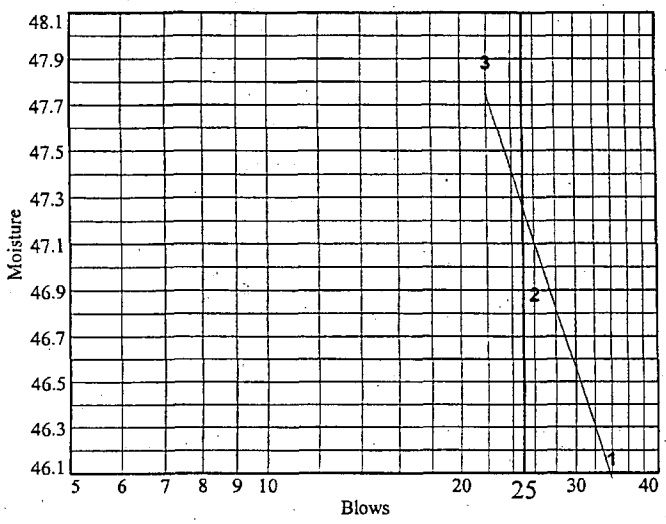
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 323
Depth: 53.5'-55.0'
Sample Number: STP-127 (SS-18)
Material Description: Lean Clay
Date: 12/3/2006
USCS Class.: CL
Testing Remarks: Tested By:AC/TH Reviewed By:RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	38.19	36.56	36.85			
Dry+Tare	35.06	33.85	34.02			
Tare	28.28	28.07	28.11			
# Blows	34	26	22			
Moisture	46.2	46.9	47.9			



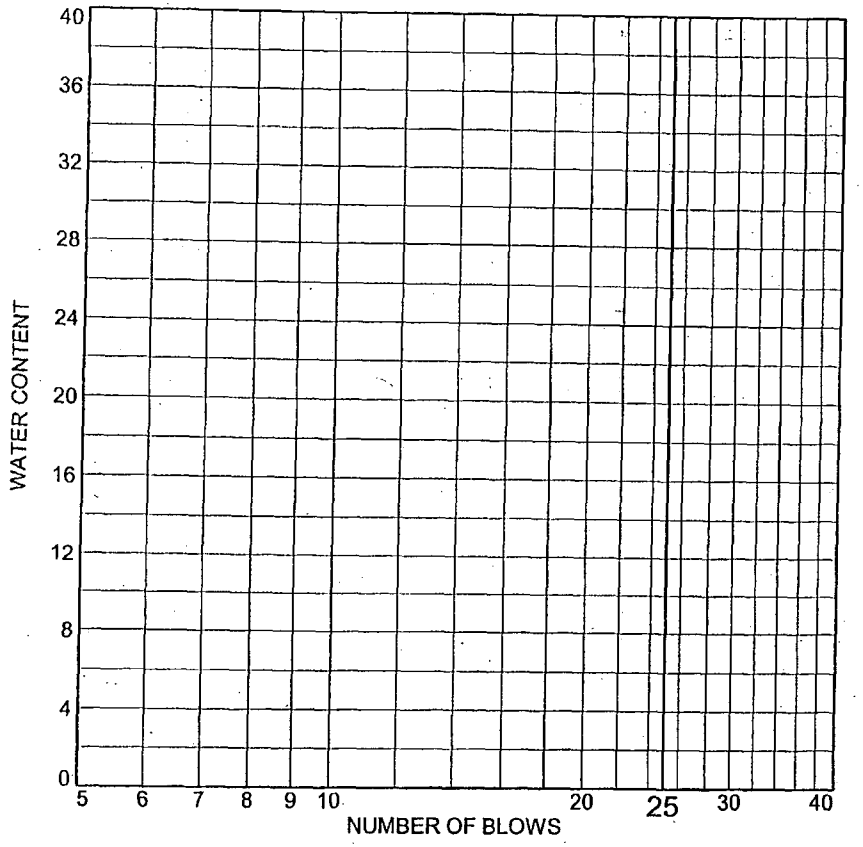
Liquid Limit= 47
Plastic Limit= 16
Plasticity Index= 31
Natural Moisture= 18.1
Liquidity Index= 0.1

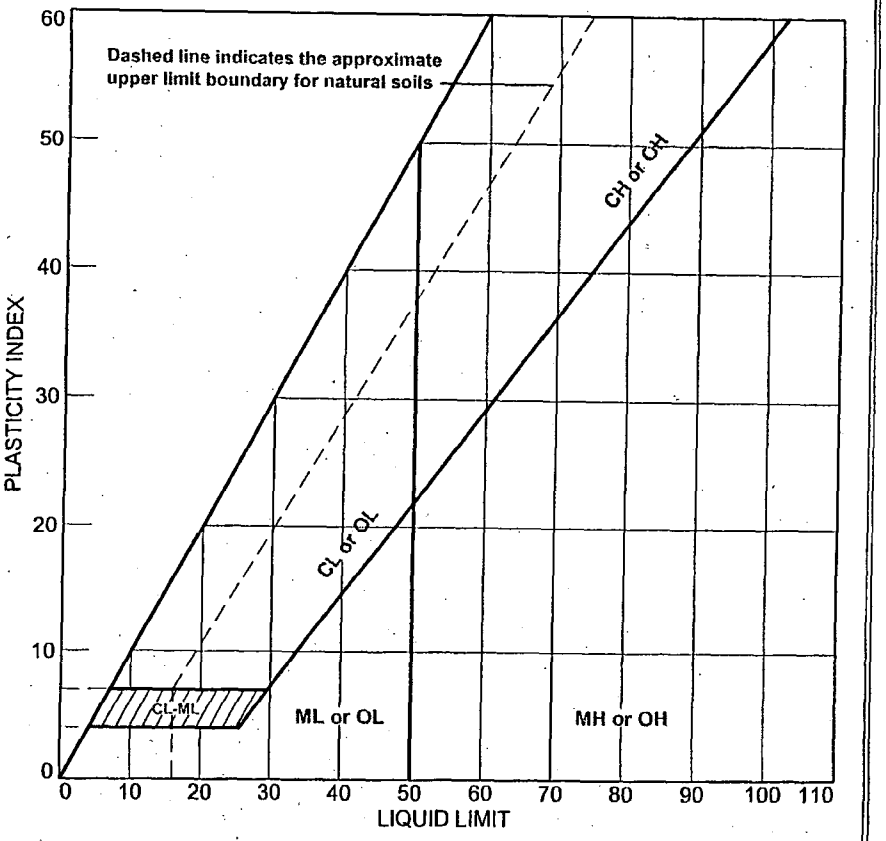
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	36.12	35.78			
Dry+Tare	35	34.72			
Tare	28	28.17			
Moisture	16.0	16.2			

MAA 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 323	STP-130 (SS-21)	68.5'-70.0'	12/3/2006	ML	Sandy Silt	23.2	NV	NP

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC/TH Reviewed By:RF

ASTM D4318-05

mt

4-3-07

KAW 4/3/07

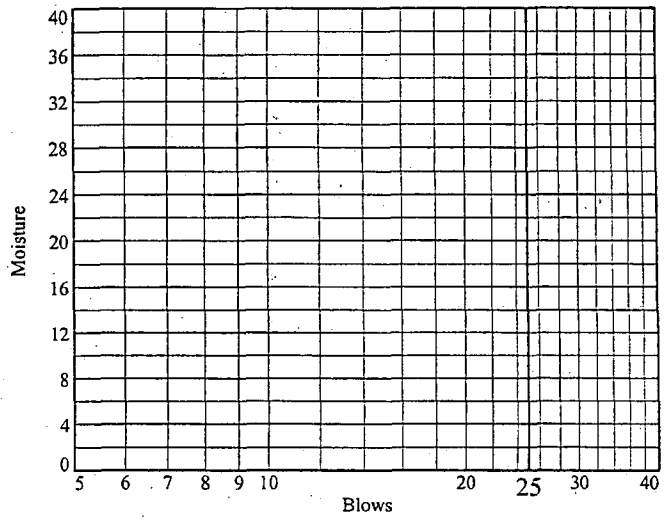
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 323
Depth: 68.5'-70.0'
Sample Number: STP-130 (SS-21)
Material Description: Sandy Silt
Date: 12/3/2006
USCS Class.: ML
Testing Remarks: Tested By:AC/TH
Reviewed By:RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare						
Dry+Tare						
Tare						
# Blows						
Moisture						



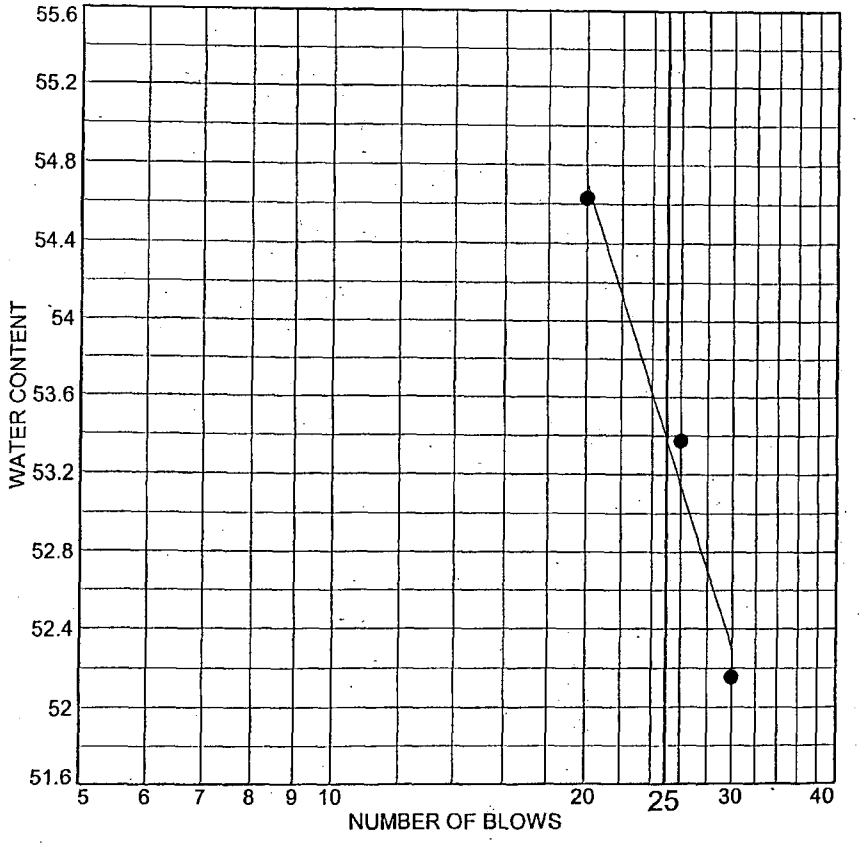
Liquid Limit= NV
Plastic Limit= NP
Plasticity Index= NP
Natural Moisture= 23.2

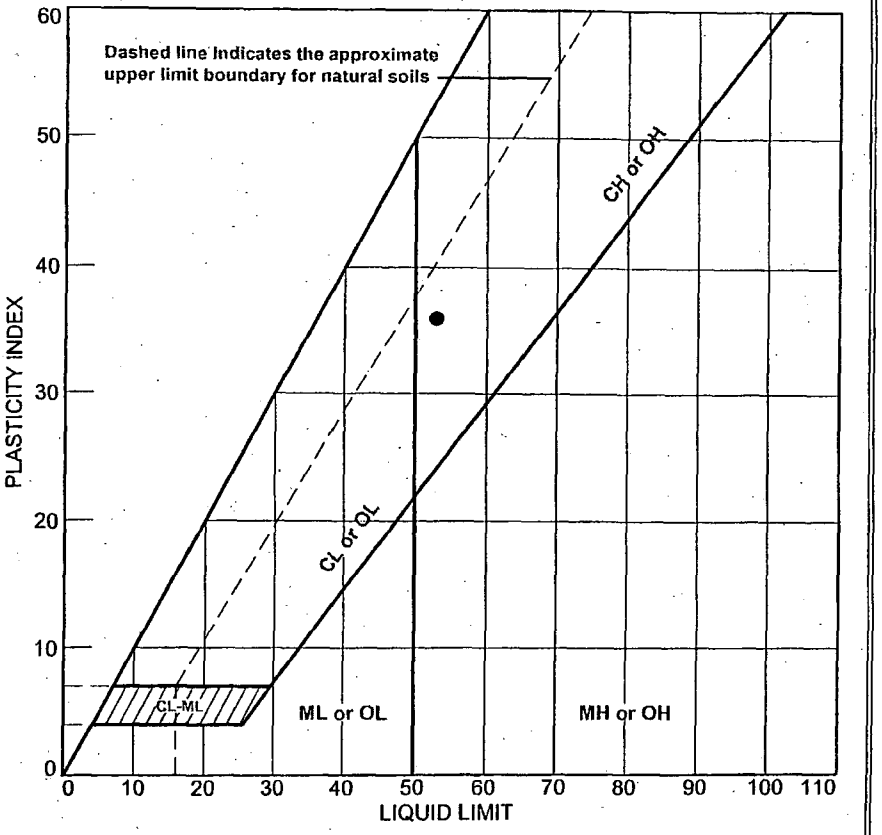
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare					
Dry+Tare					
Tare					
Moisture					

MA 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 328	STP-025 (SS-4)	4.5'-6.0'	10/25/2006	CH	Fat Clay	22.2	53	36

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:TH Reveiwed By:ST

ASTM D4318-05

MA 4-3-07

KAW 4/3/07

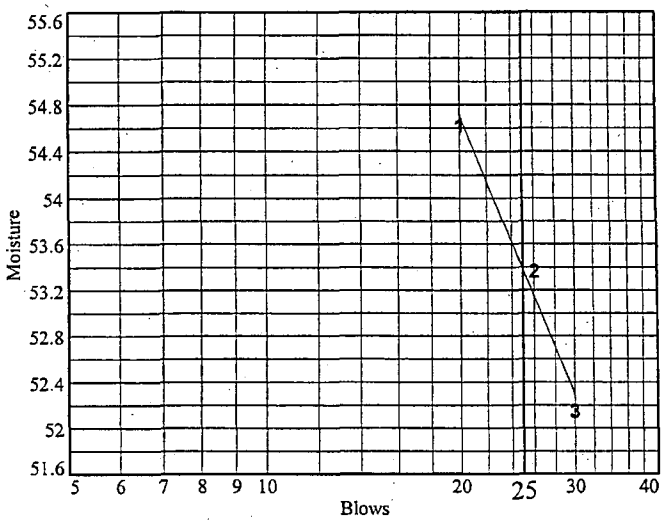
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 328
Depth: 4.5'-6.0' **Sample Number:** STP-025 (SS-4)
Material Description: Fat Clay
Date: 10/25/2006 **USCS Class.:** CH
Testing Remarks: Tested By:TH Reveiwed By:ST
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	37.63	35.09	37.45			
Dry+Tare	34.09	32.32	34.18			
Tare	27.61	27.13	27.91			
# Blows	20	26	30			
Moisture	54.6	53.4	52.2			



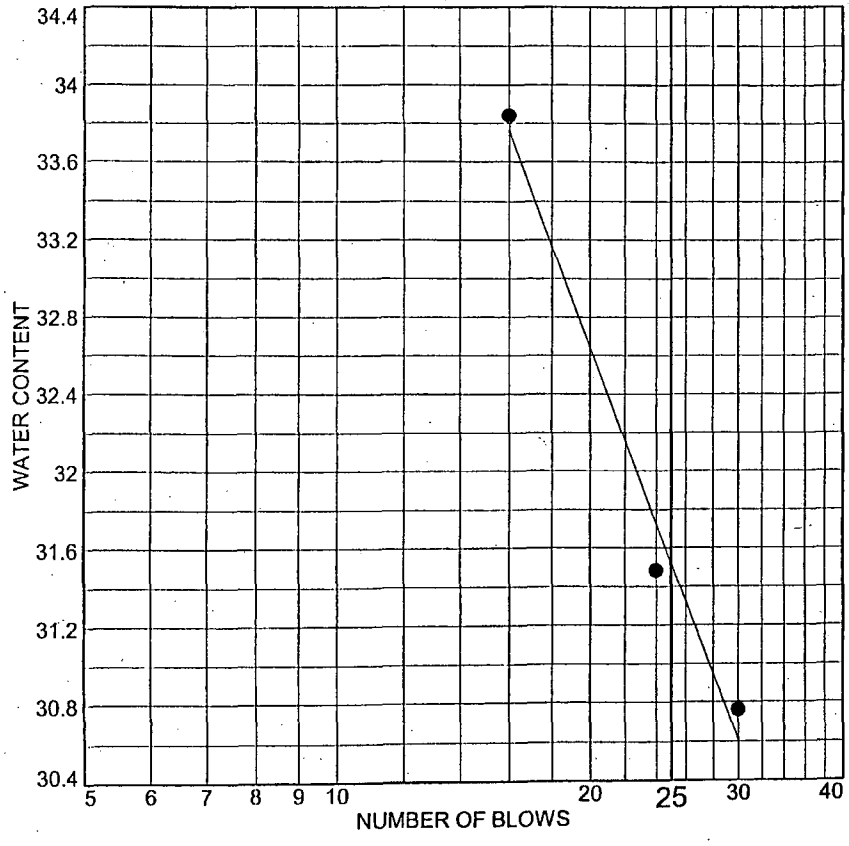
Liquid Limit= 53
Plastic Limit= 17
Plasticity Index= 36
Natural Moisture= 22.2
Liquidity Index= 0.1

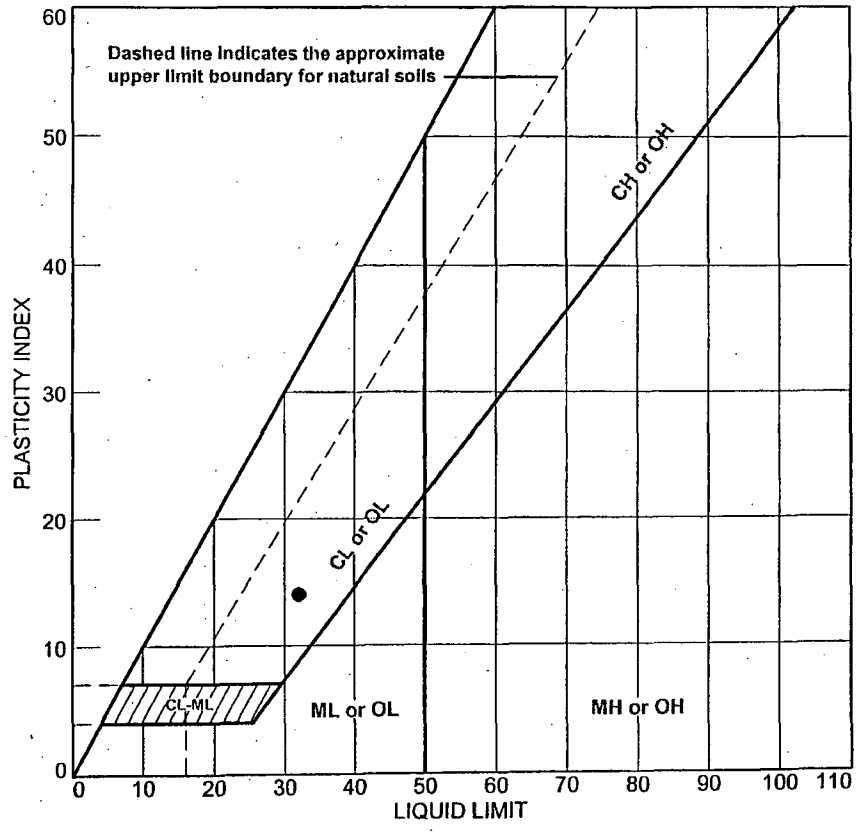
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	35.72	35.17			
Dry+Tare	34.64	34.13			
Tare	28.26	28.09			
Moisture	16.9	17.2			

MAA 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 328	STP-026	10.5'-12.0'	10/25/2006	CL	Lean Clay	24.1	32	14
		(SS-8)							

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:TH Reviewed By:ST

ASTM D4318-05

MA 4-3-07

KAW 4/3/07

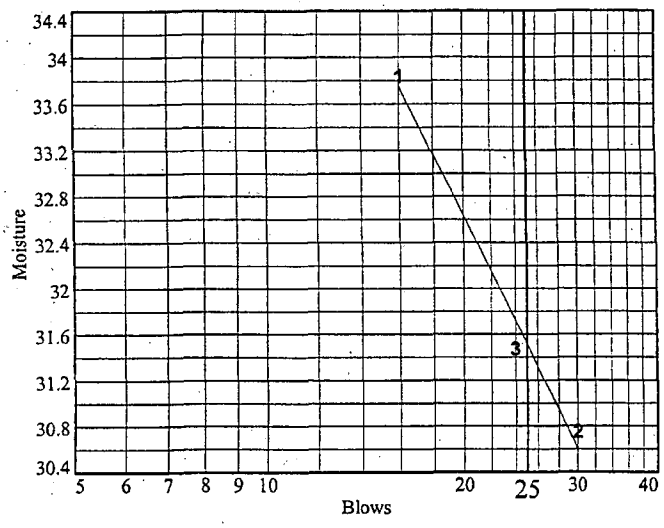
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 328
Depth: 10.5'-12.0'
Sample Number: STP-026 (SS-8)
Material Description: Lean Clay
Date: 10/25/2006
USCS Class.: CL
Testing Remarks: Tested By:TH Reviewed By:ST
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	36.11	37.4	37.28			
Dry+Tare	33.44	35.29	35.07			
Tare	25.55	28.43	28.05			
# Blows	16	30	24			
Moisture	33.8	30.8	31.5			



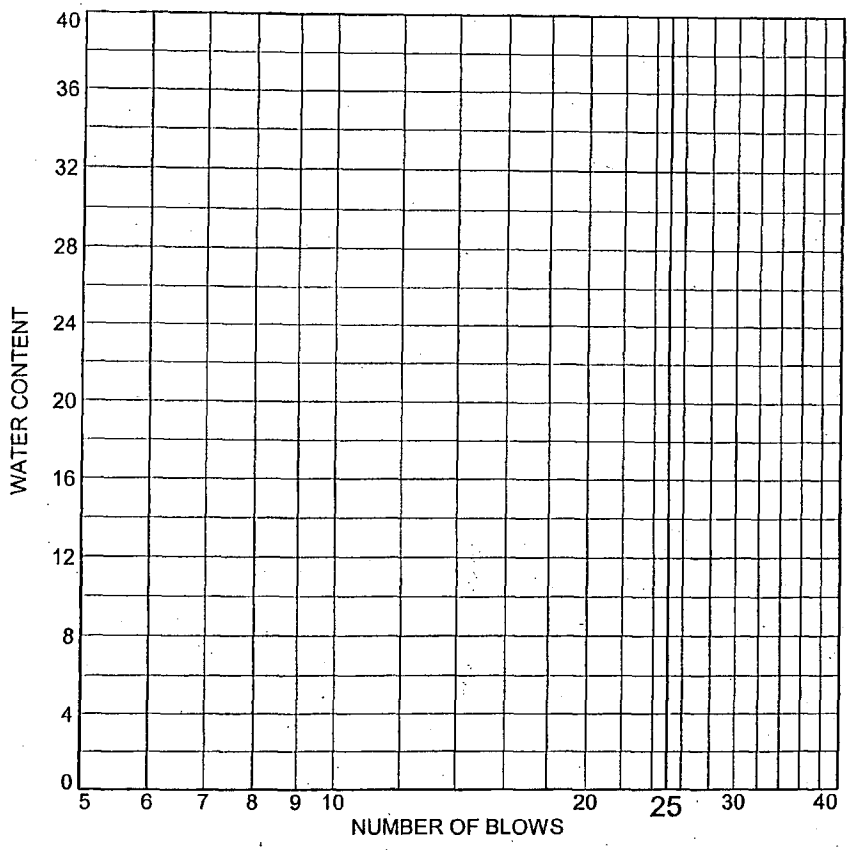
Liquid Limit= 32
Plastic Limit= 18
Plasticity Index= 14
Natural Moisture= 24.1
Liquidity Index= 0.4

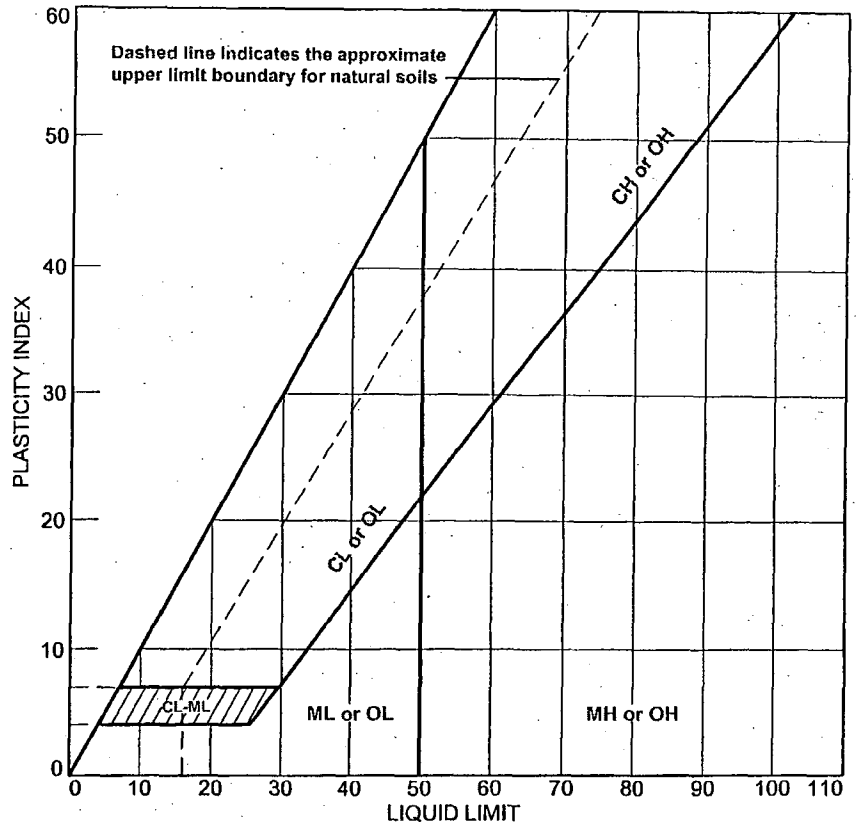
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	35.8	29.03			
Dry+Tare	34.67	27.92			
Tare	28.35	21.64			
Moisture	17.9	17.7			

MAT 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 328	STP-027	18.5'-20.0'	11/04/2006	ML	Sandy Silt	25.0	NV	NP
		(SS-9)							

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:TH Reviewed By:ST

ASTM D4318-05

MH 4-3-07

KAW 4/3/07

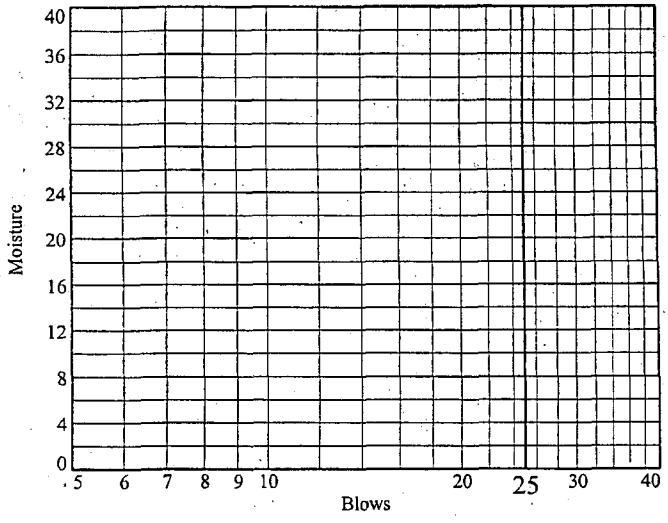
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 328
Depth: 18.5'-20.0'
Sample Number: STP-027 (SS-9)
Material Description: Sandy Silt
Date: 11/04/2006
USCS Class.: ML
Testing Remarks: Tested By:TH Reviewed By:ST
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare						
Dry+Tare						
Tare						
# Blows						
Moisture						



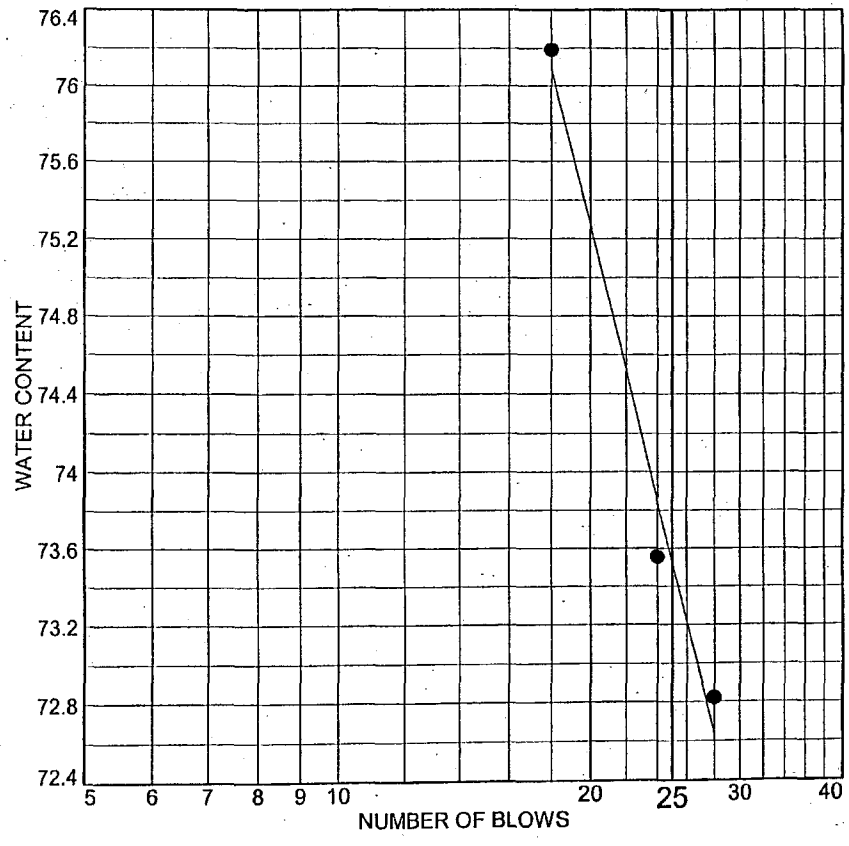
Liquid Limit= NV
Plastic Limit= NP
Plasticity Index= NP
Natural Moisture= 25.0

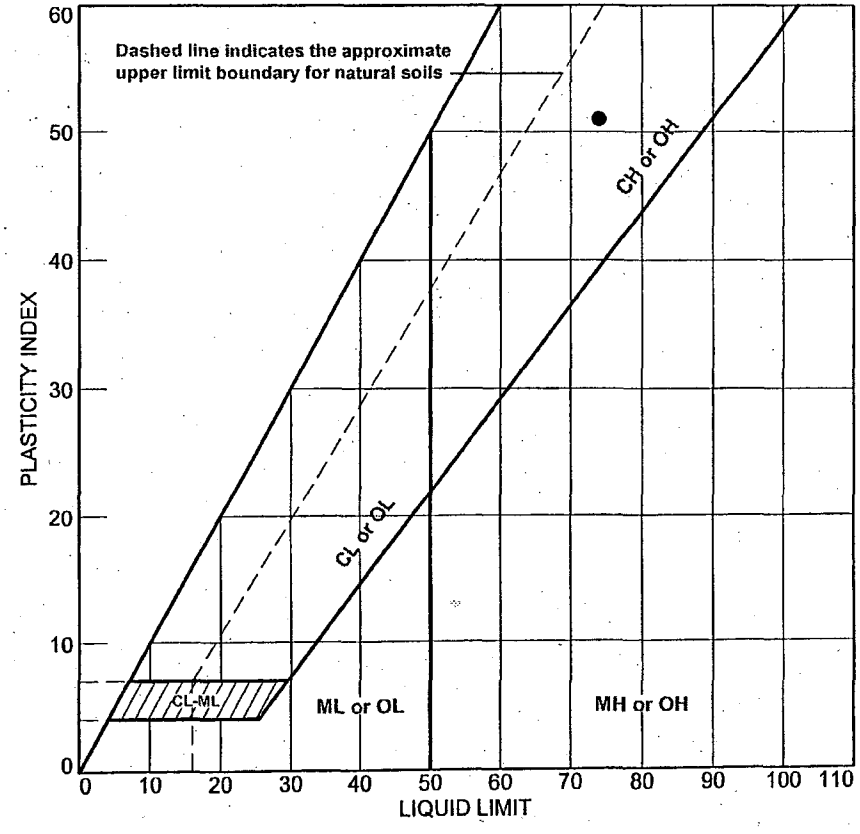
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare					
Dry+Tare					
Tare					
Moisture					

MAT 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 328	STP-030 (SS-13)	43.5'-45.0'	11/4/2006	CH	Fat Clay	26.6	74	51

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:TH Reviewed By:ST

ASTM D4318-05

4-3-07

KAW 4/3/07

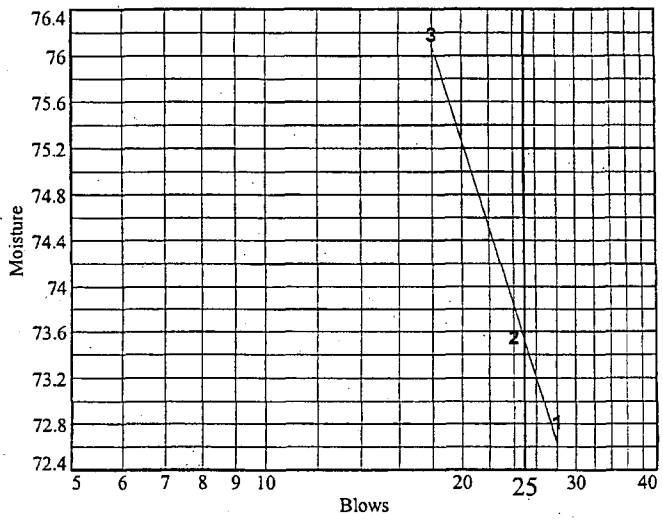
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 328
Depth: 43.5'-45.0'
Sample Number: STP-030 (SS-13)
Material Description: Fat Clay
Date: 11/4/2006
USCS Class.: CH
Testing Remarks: Tested By:TH Reviewed By:ST
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	35.02	36.47	38.71			
Dry+Tare	32.18	32.91	34.23			
Tare	28.28	28.07	28.35			
# Blows	28	24	18			
Moisture	72.8	73.6	76.2			



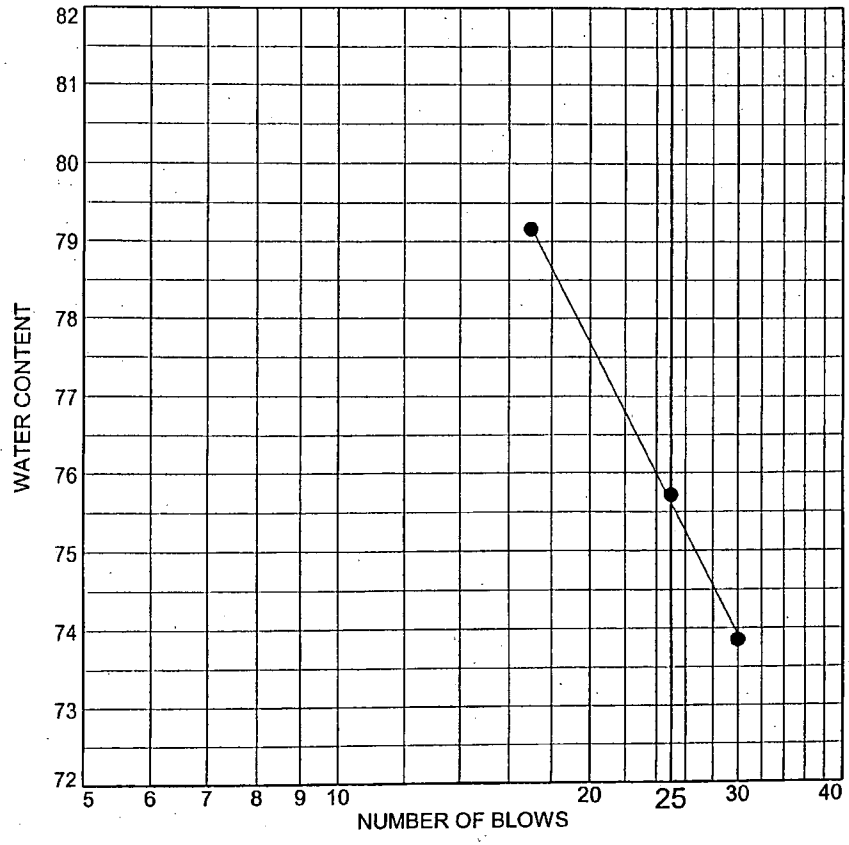
Liquid Limit= 74
Plastic Limit= 23
Plasticity Index= 51
Natural Moisture= 26.6
Liquidity Index= 0.1

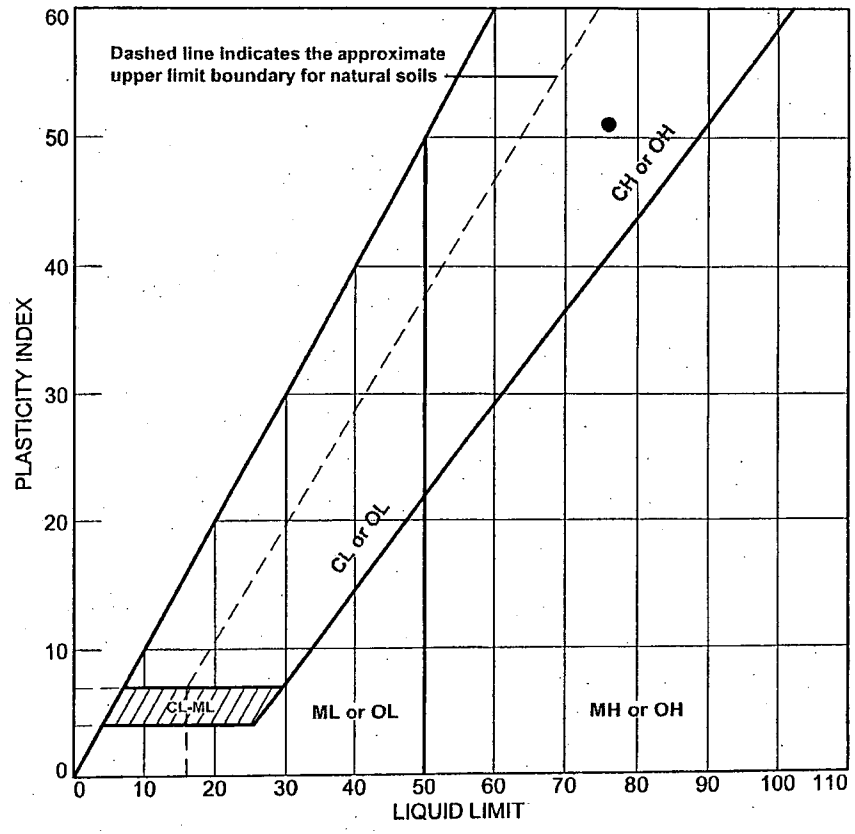
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	36.29	35.66			
Dry+Tare	34.87	34.26			
Tare	28.6	28.09			
Moisture	22.6	22.7			

MAC 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 328	STP-031	58.5'-60.0	1/4/2006	CH	Fat Clay	25.6	76	51
		(SS-15)							

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:TH Reviewed By:ST

ASTM D4318-05

MA 4-3-07

KAW 4/3/07

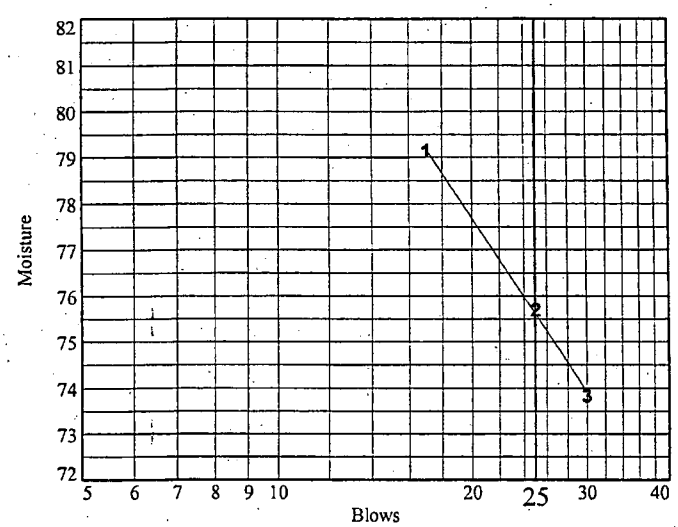
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 328
Depth: 58.5'-60.0 **Sample Number:** STP-031 (SS-15)
Material Description: Fat Clay
Date: 1/4/2006 **USCS Class.:** CH
Testing Remarks: Tested By:TH Reviewed By:ST
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	37.57	34.02	34.27			
Dry+Tare	33.43	30.31	30.57			
Tare	28.20	25.41	25.56			
# Blows	17	25	30			
Moisture	79.2	75.7	73.9			



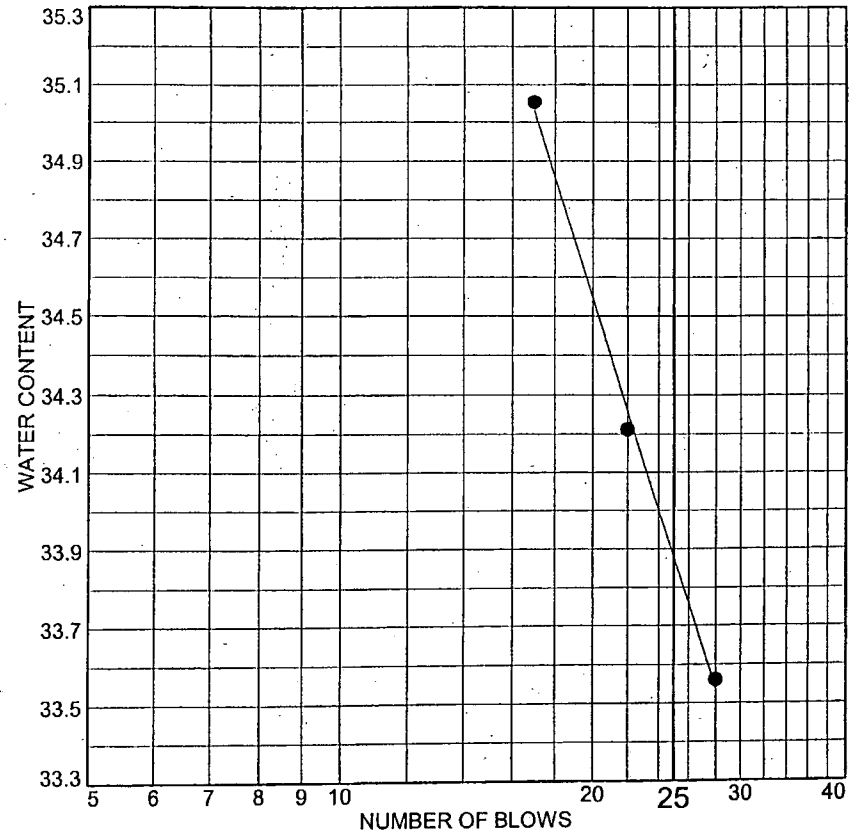
Liquid Limit= 76
Plastic Limit= 25
Plasticity Index= 51
Natural Moisture= 25.6
Liquidity Index= 0.0

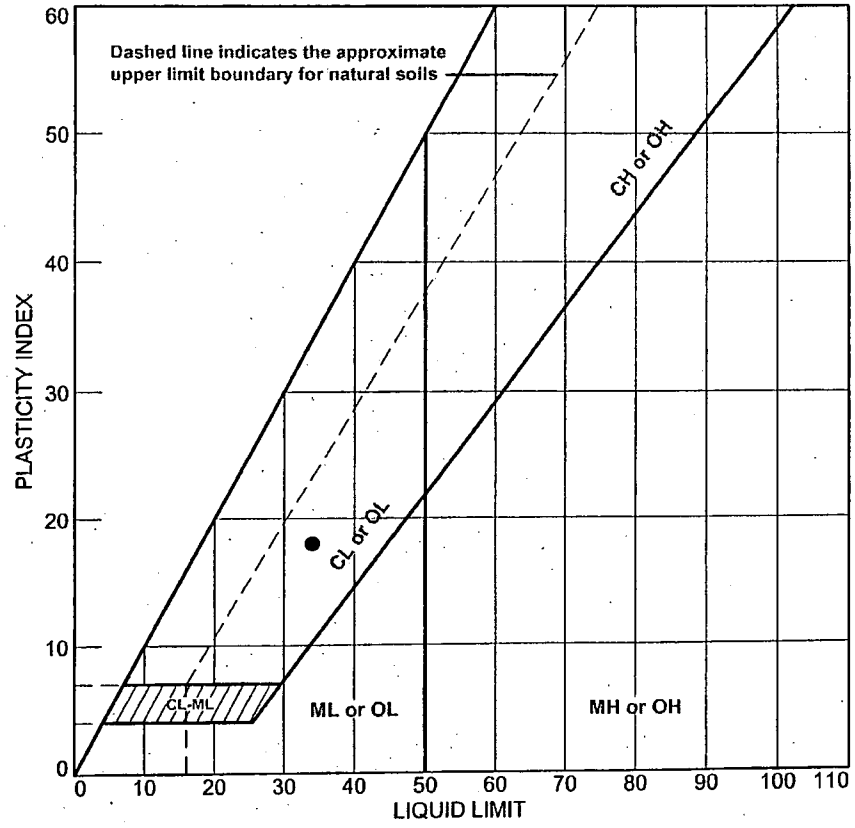
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	36.00	35.31			
Dry+Tare	34.46	33.83			
Tare	28.16	27.98			
Moisture	24.4	25.3			

MK 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 328	STP-036 (SS-23)	118.5'-120.0'	11/5/2006	CL	Lean Clay	22.0	34	18

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC/TH Reviewed By:RF

ASTM D4318-05

4-3-07

KAW 4/3/07

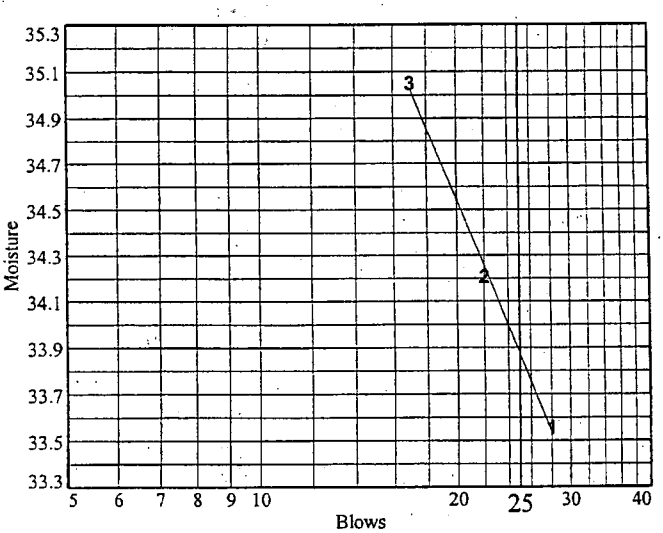
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 328
Depth: 118.5'-120.0'
Sample Number: STP-036 (SS-23)
Material Description: Lean Clay
Date: 11/5/2006
USCS Class.: CL
AASHTO Class.: A-6(16)
Testing Remarks: Tested By:AC/TH Reviewed By:RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	38.14	37.51	36.31			
Dry+Tare	35.68	35.17	34			
Tare	28.35	28.33	27.41			
# Blows	28	22	17			
Moisture	33.6	34.2	35.1			



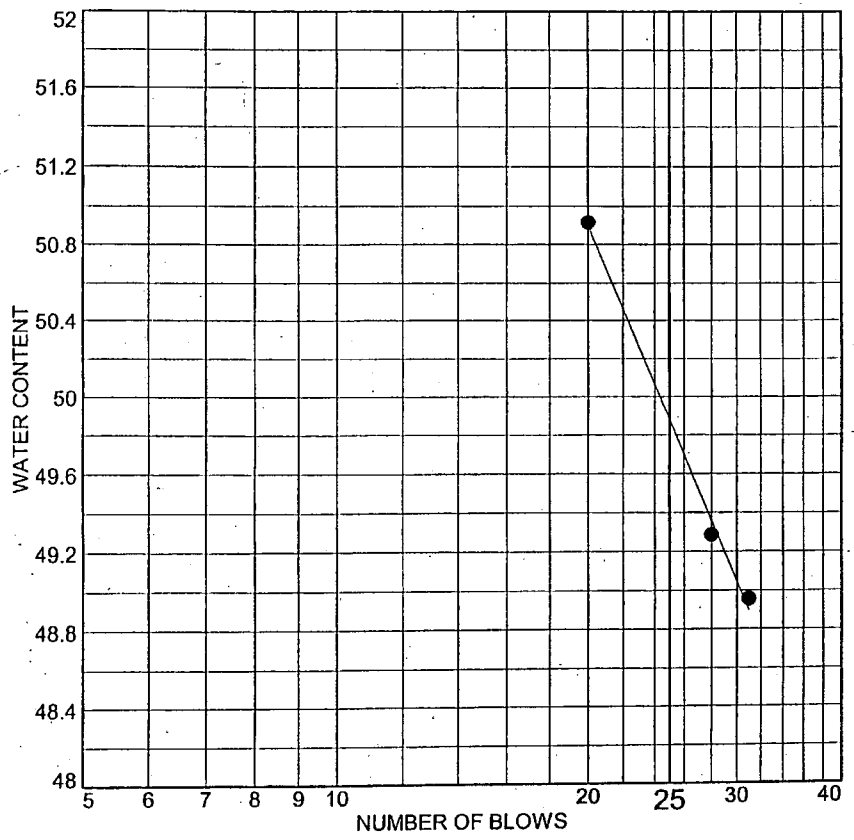
Liquid Limit= 34
Plastic Limit= 16
Plasticity Index= 18
Natural Moisture= 22.0
Liquidity Index= 0.3

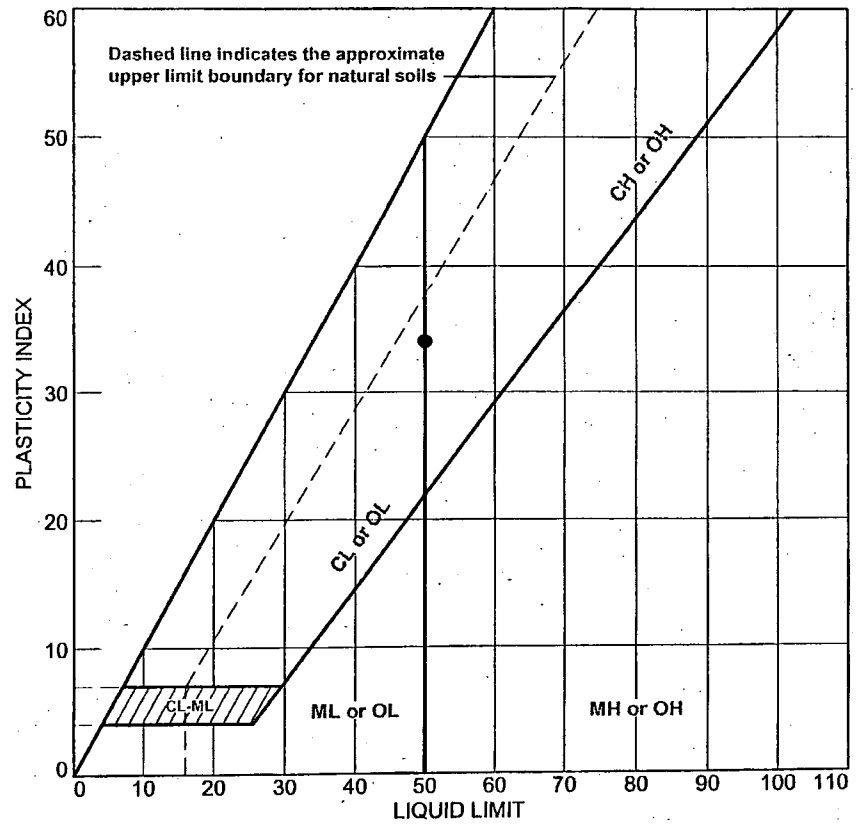
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	38.37	36.78			
Dry+Tare	36.99	35.59			
Tare	28.13	27.93			
Moisture	15.6	15.5			

MAT 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 328	STP-038	138.5'-140.0'	11/6/2006	CH	Fat Clay	18.3	50	34
		(SS-25)							

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC Reviewed By:MH/RF
ASTM D4318-05

MH 4.3.07

KAW 4/3/07

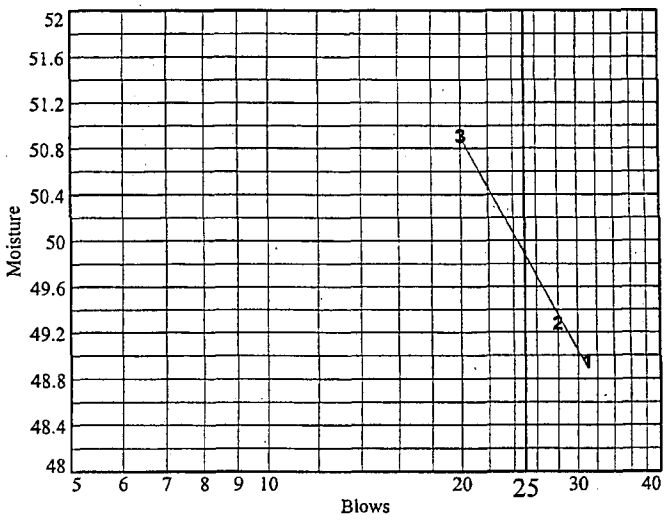
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 328
Depth: 138.5'-140.0' **Sample Number:** STP-038 (SS-25)
Material Description: Fat Clay
Date: 11/6/2006 **USCS Class.:** CH
Testing Remarks: Tested By:AC Reviewed By:MH/RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	37.49	36.54	37.11			
Dry+Tare	34.44	33.78	33.77			
Tare	28.21	28.18	27.21			
# Blows	31	28	20			
Moisture	49.0	49.3	50.9			



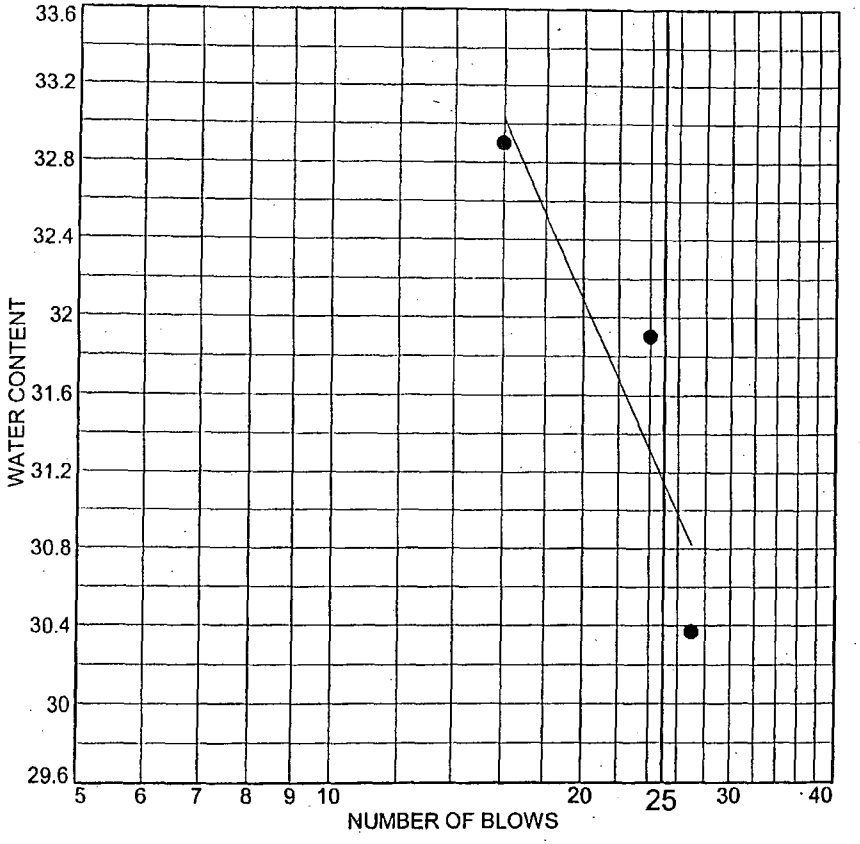
Liquid Limit= 50
Plastic Limit= 16
Plasticity Index= 34
Natural Moisture= 18.3
Liquidity Index= 0.1

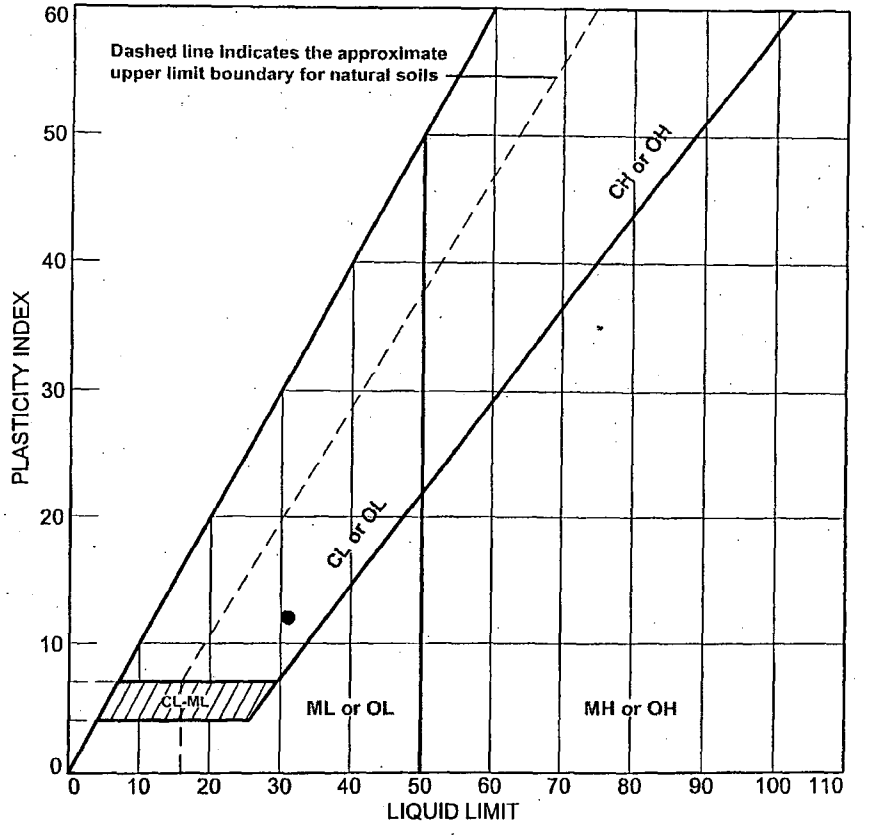
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	37.01	37.50			
Dry+Tare	35.83	36.29			
Tare	28.34	28.38			
Moisture	15.8	15.3			

MH 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 328	STP-040	159'-160'	11/6/2006	CL	Lean Clay with Sand	25.4	31	12
		(SS-27)							

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:TH Reviewed By:RF

ASTM D4318-05

4-3-07

KAW 4/3/07

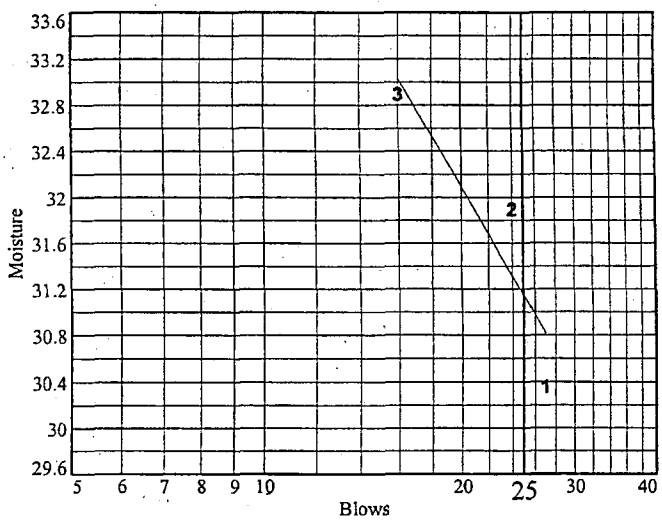
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 328
Depth: 159'-160' **Sample Number:** STP-040 (SS-27)
Material Description: Lean Clay with Sand
Date: 11/6/2006 **USCS Class.:** CL
Testing Remarks: Tested By:TH Reviewed By:RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	40.34	39.15	38.47			
Dry+Tare	37.54	36.55	35.94			
Tare	28.32	28.40	28.25			
# Blows	27	24	16			
Moisture	30.4	31.9	32.9			



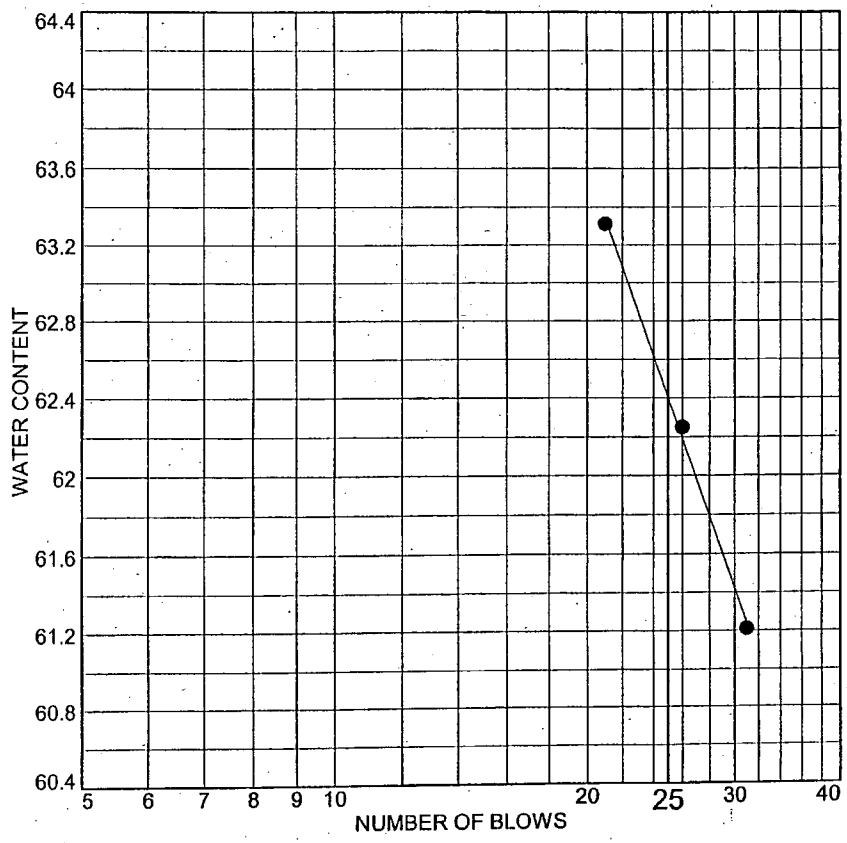
Liquid Limit= 31
Plastic Limit= 19
Plasticity Index= 12
Natural Moisture= 25.4
Liquidity Index= 0.5

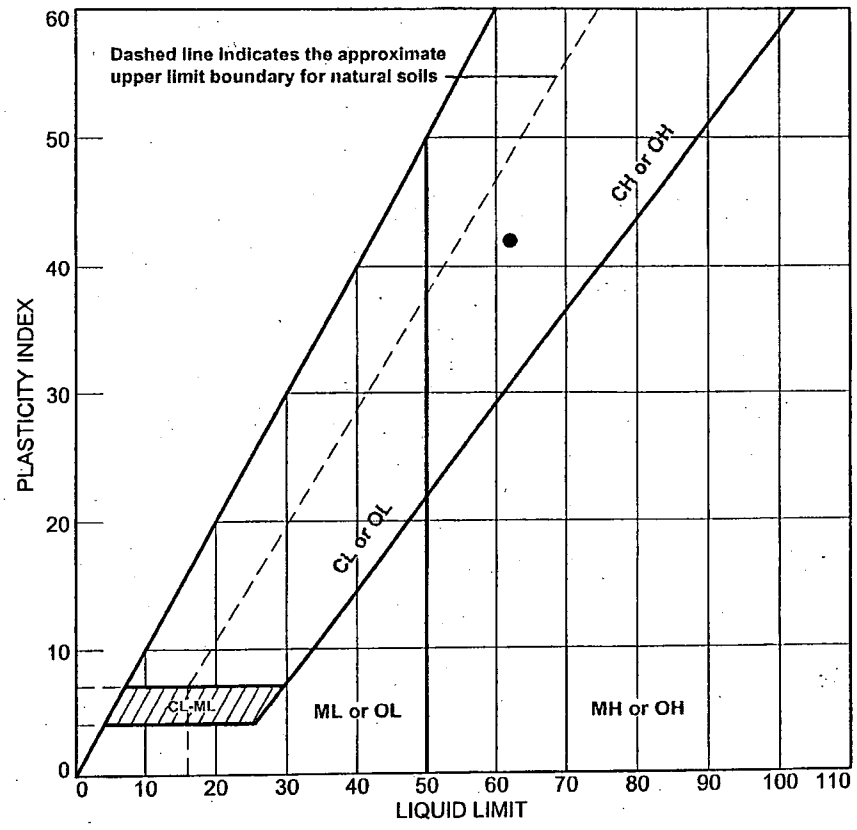
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	37.01	35.62			
Dry+Tare	35.43	34.36			
Tare	27.21	27.61			
Moisture	19.2	18.7			

MAK 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 328	STP-041	178.5'-180'	11/7/2006	CH	Fat Clay	23.6	62	42
		(SS-29)							

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:TH Reviewed By:RF

ASTM D4318-05

4-3-07

KAW 4/3/07

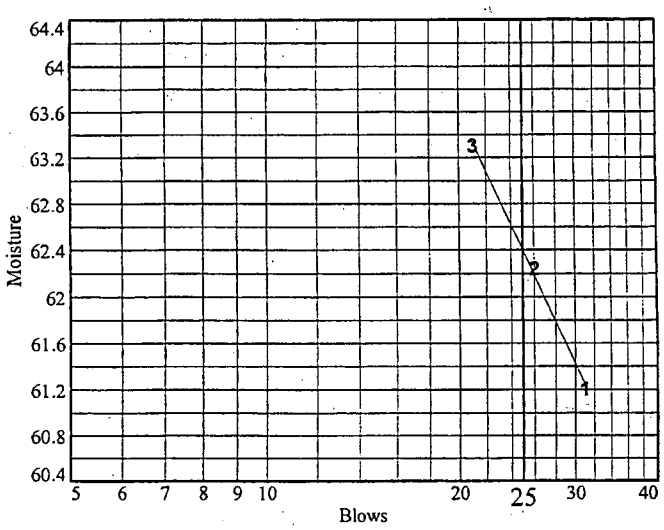
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 328
Depth: 178.5'-180'
Sample Number: STP-041 (SS-29)
Material Description: Fat Clay
Date: 11/7/2006
USCS Class.: CH
Testing Remarks: Tested By:TH Reviewed By:RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	35.09	35.99	37.19			
Dry+Tare	32.06	32.89	33.29			
Tare	27.11	27.91	27.13			
# Blows	31	26	21			
Moisture	61.2	62.2	63.3			



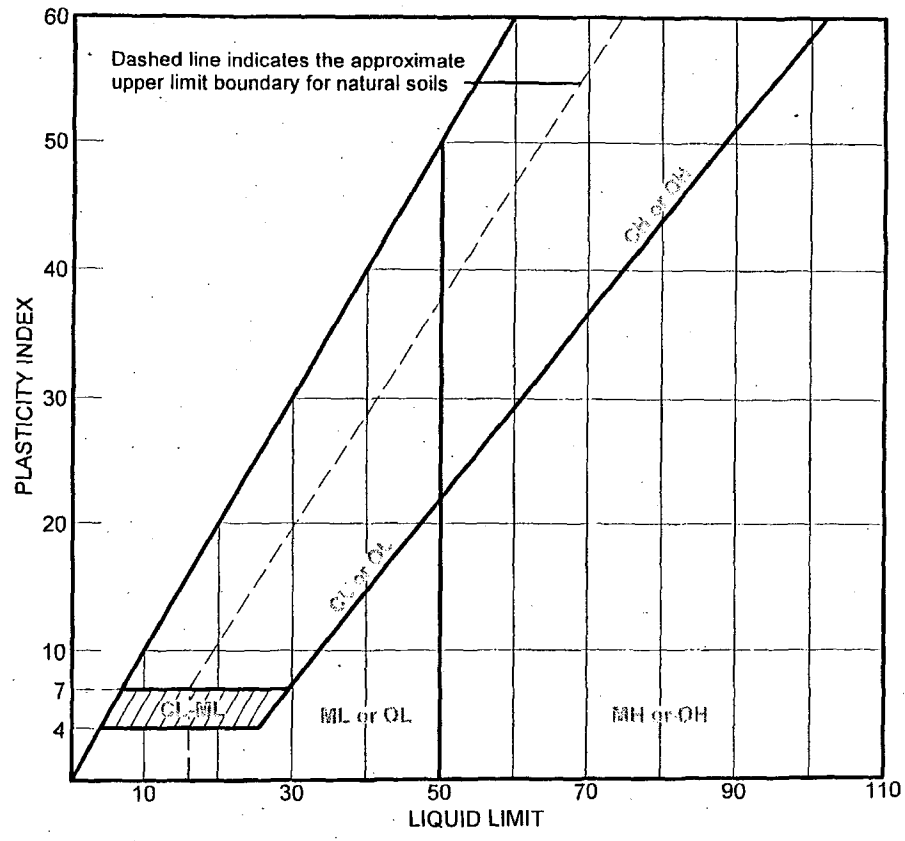
Liquid Limit= 62
Plastic Limit= 20
Plasticity Index= 42
Natural Moisture= 23.6
Liquidity Index= 0.1

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	35.63	35.94			
Dry+Tare	34.36	34.63			
Tare	28.09	28.27			
Moisture	20.3	20.6			

MAT 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT



	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-330	UD-3	63' to 65'	3-13-07	SP	Poorly graded sand	25.2	NV	NP

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496 | Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reviewed by: MH KAW 4/13/07
ASTM D4318-05

KAW 4/13/07

LIQUID AND PLASTIC LIMIT TEST DATA

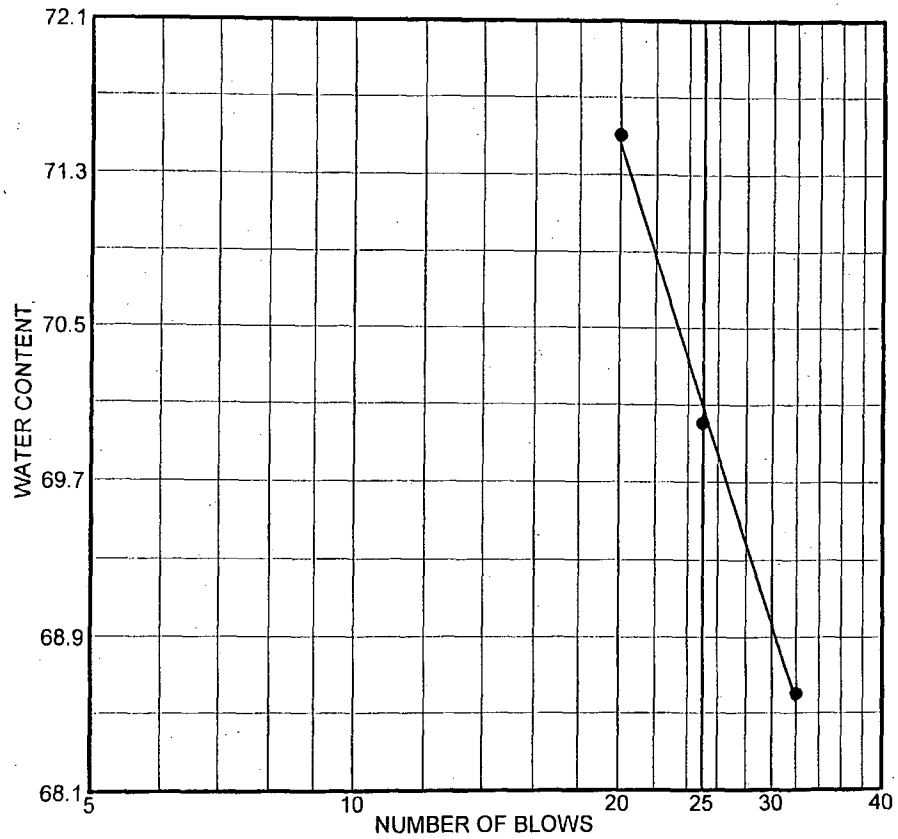
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496

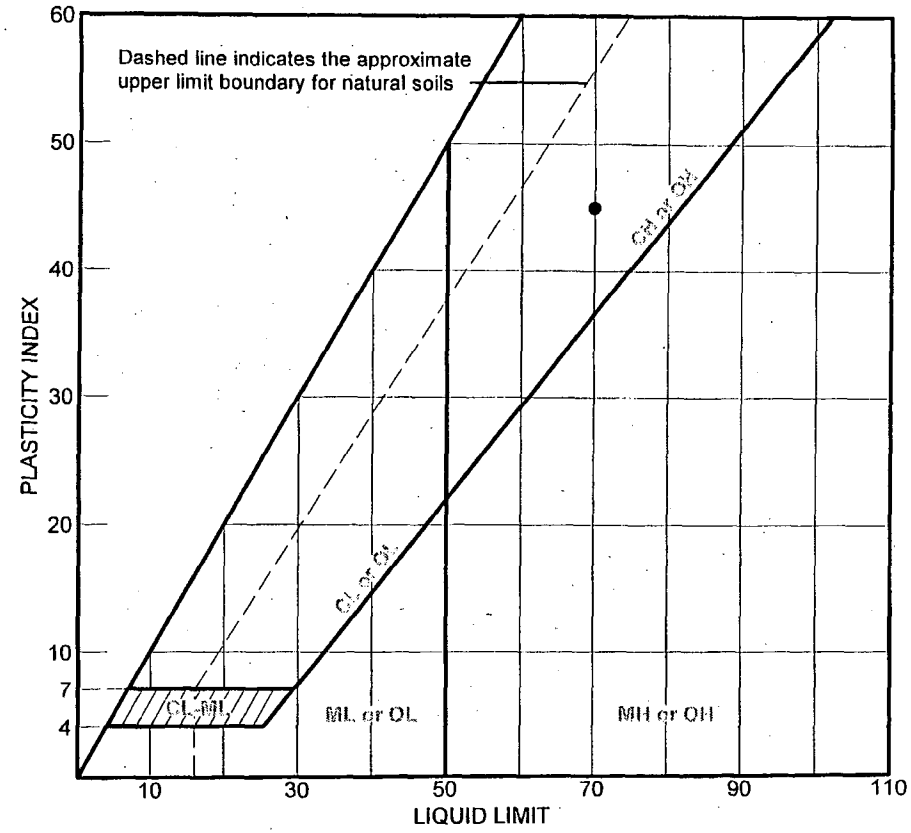
Sample Data

Source: B-330
Sample No.: UD-3
Elev. or Depth: 63' to 65' **Sample Length(in./cm.):**
Location: B-330
Description: Poorly graded sand
Date: 3-13-07 **Natural Moisture:** 25.2
USCS Class.: SP **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed by: MH
ASTM D4318-05

Liquid Limit= NV
Plastic Limit= NP
Plasticity Index= NP

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-332	UD-1	3' to 5'	2-22-07	CH	Fat clay	23.1	70	45

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496 | Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reviewed by: MH
ASTM D4318-05 KAW 4/3/07

KAW 4/3/07

LIQUID AND PLASTIC LIMIT TEST DATA

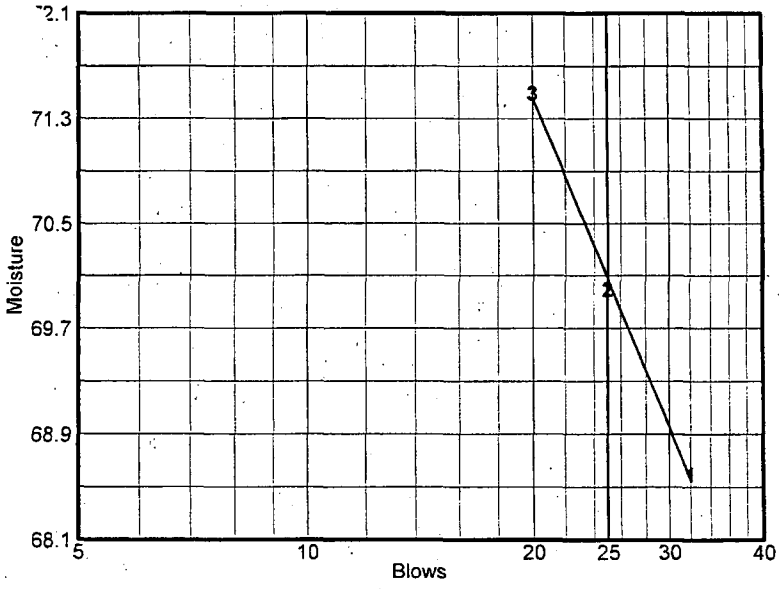
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496

Sample Data

Source: B-332
Sample No.: UD-1
Elev. or Depth: 3' to 5' **Sample Length(in./cm.):**
Location: B-332
Description: Fat clay
Date: 2-22-07 **Natural Moisture:** 23.1
USCS Class.: CH **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed by: MH
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	12.79	15.81	16.32			
Dry+Tare	9.38	11.12	11.31			
Tare	4.41	4.42	4.30			
# Blows	32	25	20			
Moisture	68.6	70.0	71.5			

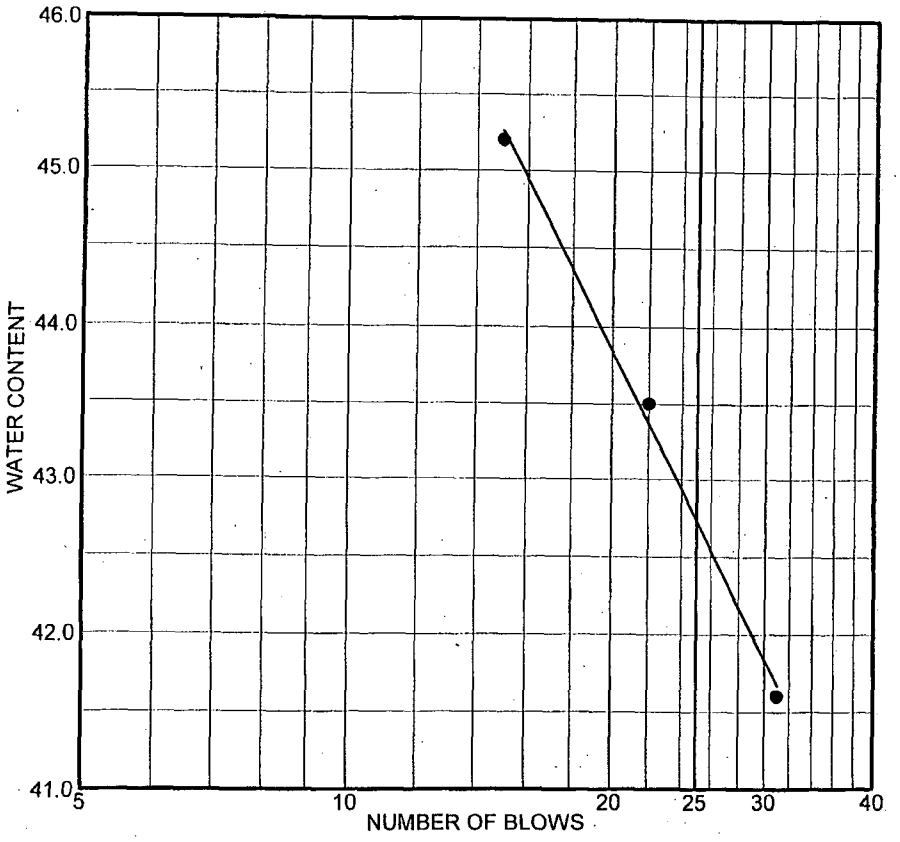


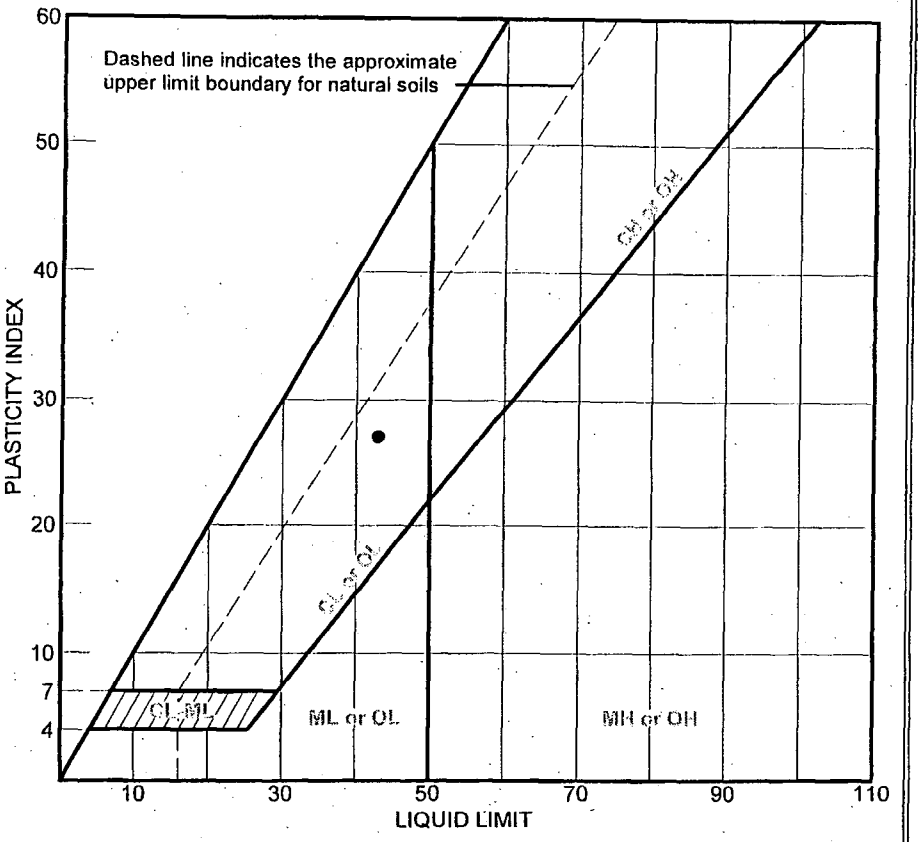
Liquid Limit= 70
Plastic Limit= 25
Plasticity Index= 45

Plastic Limit Data

Run No.	1	2	3	4
Wet+Tare	14.43	13.03		
Dry+Tare	13.39	12.39		
Tare	9.08	9.90		
Moisture	24.1	25.7		

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-333	UD-1	8' to 10'	2-19-07	CL	Lean clay	23.7	43	27

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496 | Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reviewed by: SS
ASTM D4318-05

KAW 4/3/07

LIQUID AND PLASTIC LIMIT TEST DATA

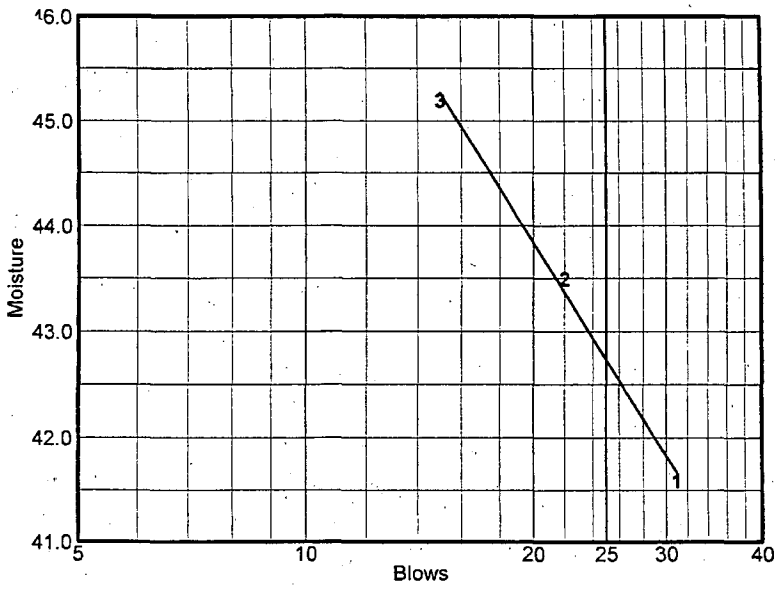
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
ject Number: 5050-06-0496

Sample Data

Source: B-333
Sample No.: UD-1
Elev. or Depth: 8' to 10' **Sample Length(in./cm.):**
Location: B-333
Description: Lean clay
Date: 2-19-07 **Natural Moisture:** 23.7
USCS Class.: CL **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed by: SS
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	29.41	30.83	30.09			
Dry+Tare	23.92	24.75	24.16			
Tare	10.73	10.76	11.04			
# Blows	31	22	15			
Moisture	41.6	43.5	45.2			

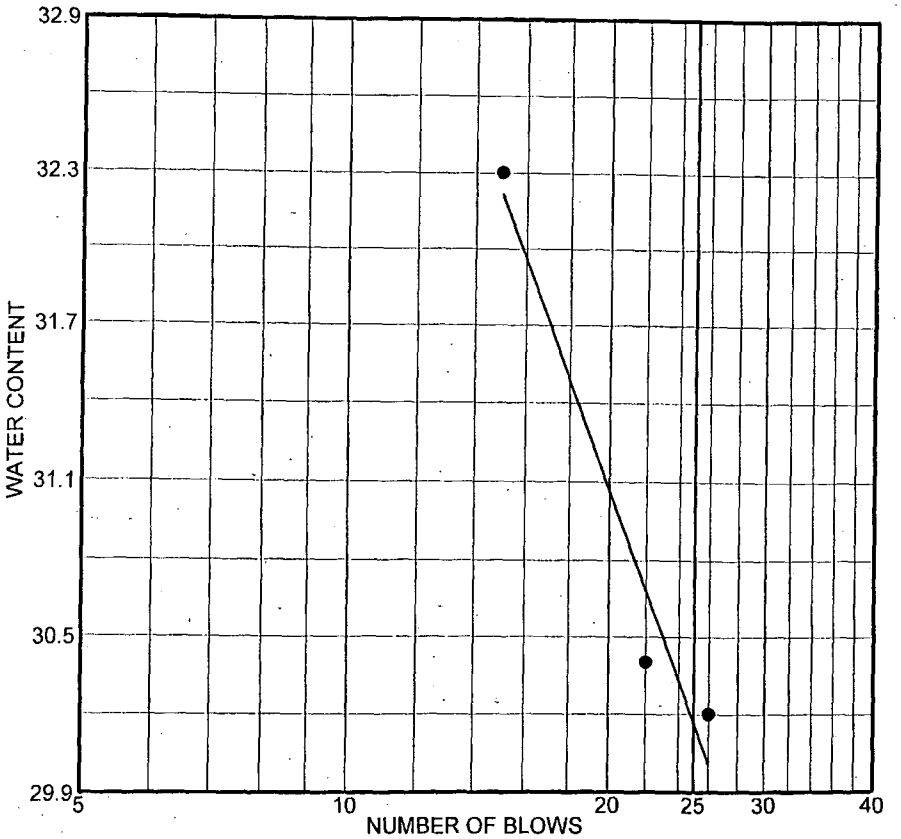


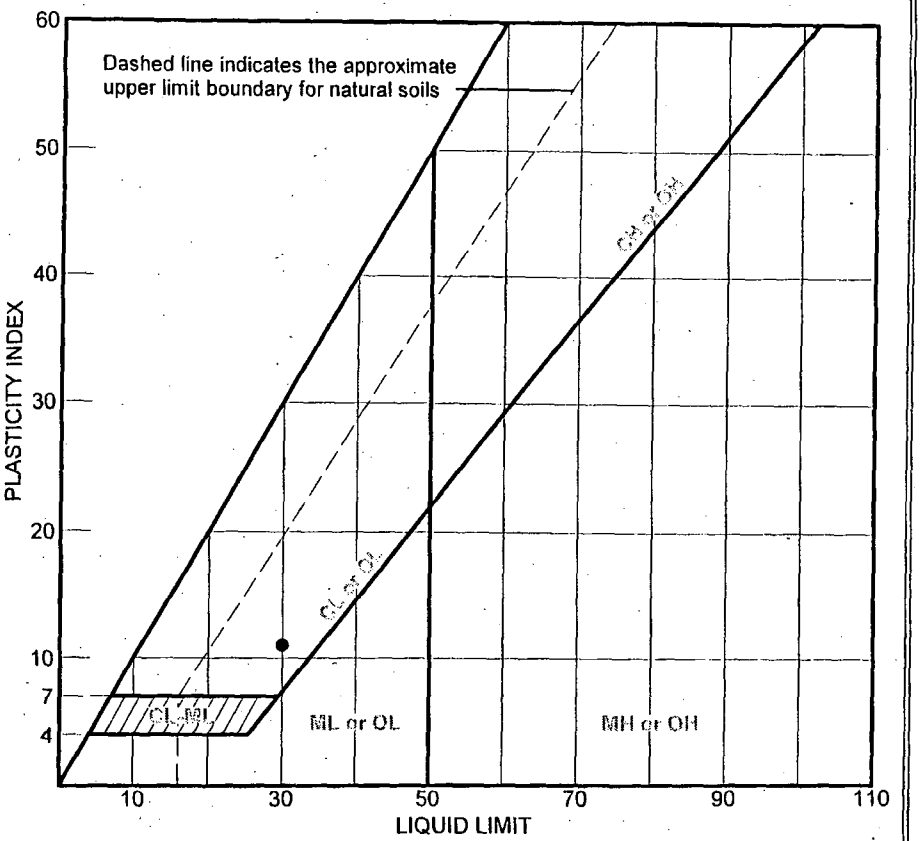
Liquid Limit= 43
Plastic Limit= 16
Plasticity Index= 27

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	24.70	23.68			
Dry+Tare	22.86	22.00			
Tare	10.83	11.51			
Moisture	15.3	16.0			

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-333	UD-2	18' to 20'	2-19-07	CL	Lean clay	23.0	30	11

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496 | Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reviewed by: SS KAW 4/13/07
ASTM D4318-05

KAW 4/13/07

LIQUID AND PLASTIC LIMIT TEST DATA

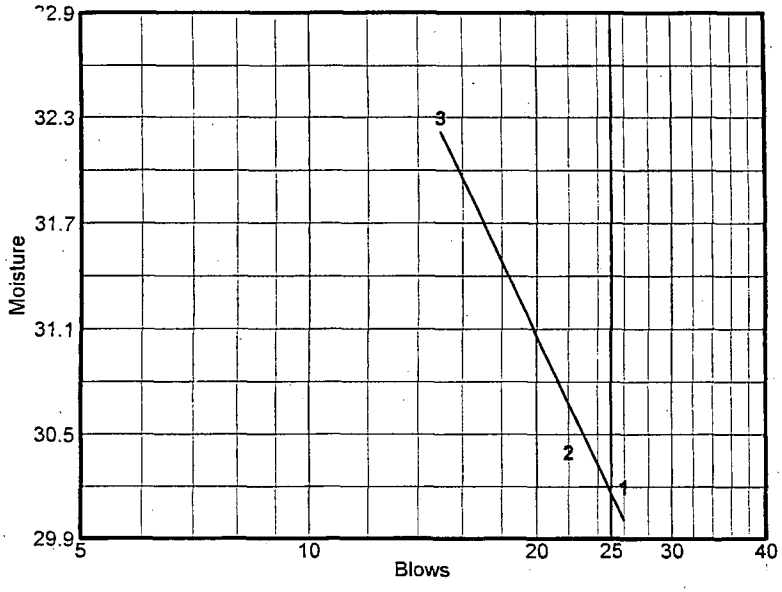
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496

Sample Data

Source: B-333
Sample No.: UD-2
Elev. or Depth: 18' to 20' **Sample Length(in./cm.):**
Location: B-333
Description: Lean clay
Date: 2-19-07 **Natural Moisture:** 23.0
USCS Class.: CL **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed by: SS
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	34.77	34.23	35.32			
Dry+Tare	29.30	28.78	29.53			
Tare	11.18	10.85	11.58			
# Blows	26	22	15			
Moisture	30.2	30.4	32.3			

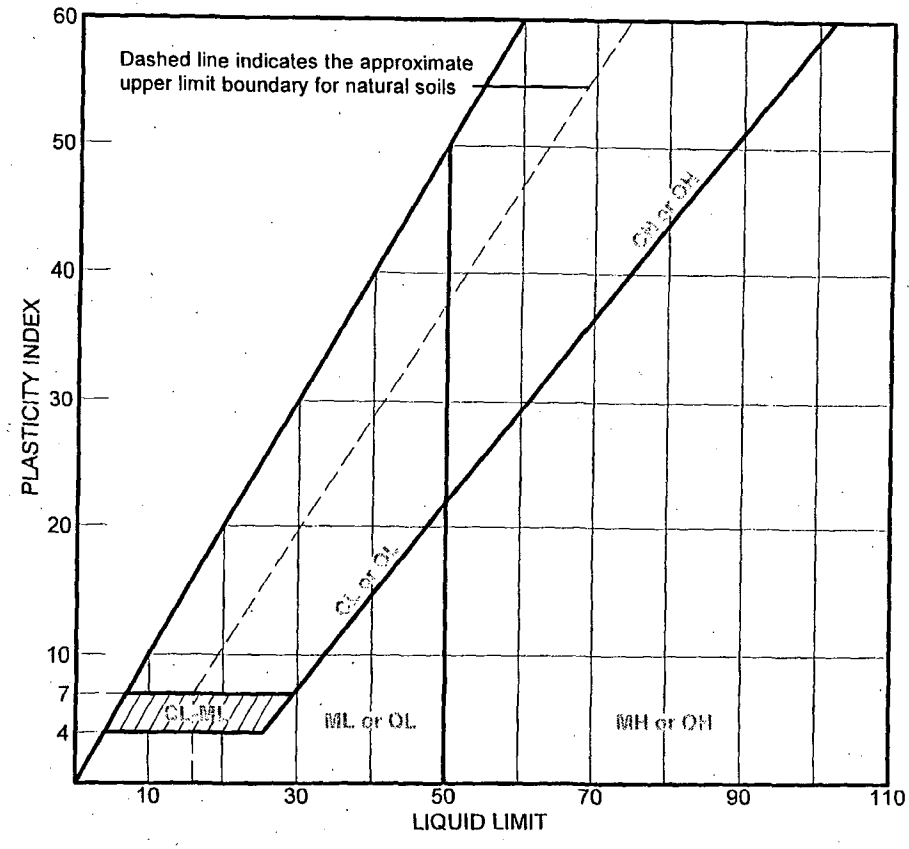


Liquid Limit= 30
Plastic Limit= 19
Plasticity Index= 11

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	26.42	26.67			
Dry+Tare	23.96	24.34			
Tare	11.01	11.67			
Moisture	19.0	18.4			

LIQUID AND PLASTIC LIMITS TEST REPORT



	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-338	UD-1	28' to 30'	2-19-07	SM	Silty sand	24.1	NV	NP

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496 | Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reviewed by: SS
ASTM D4318-05

SS 2/25/2007

KAW 4/3/07

LIQUID AND PLASTIC LIMIT TEST DATA

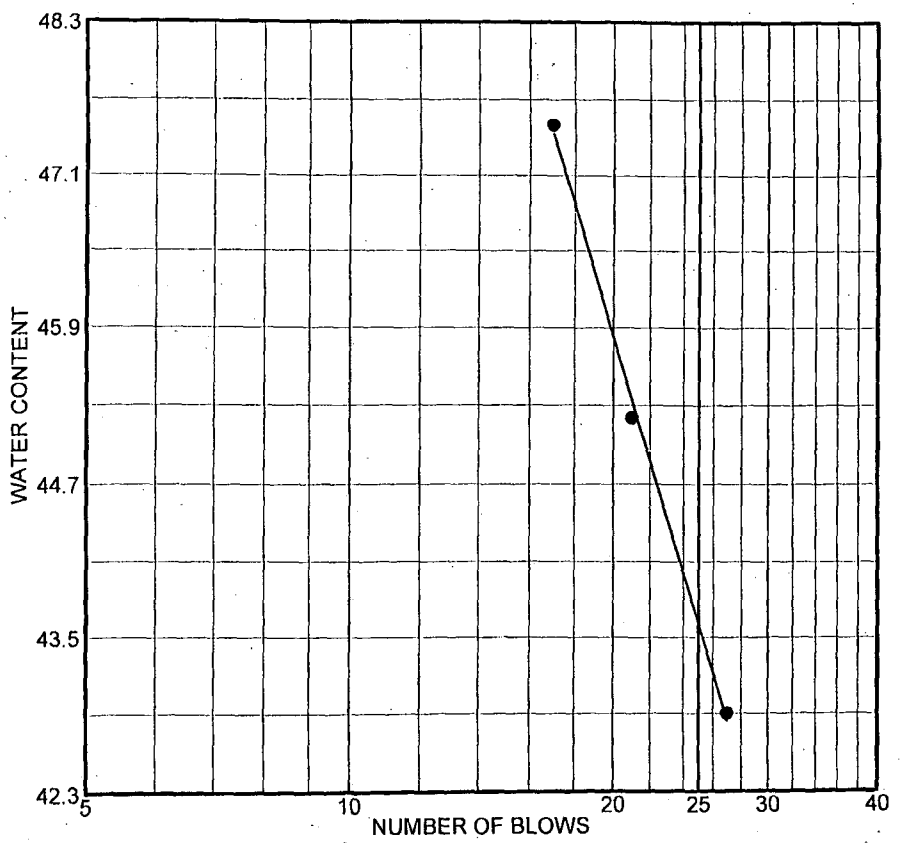
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496

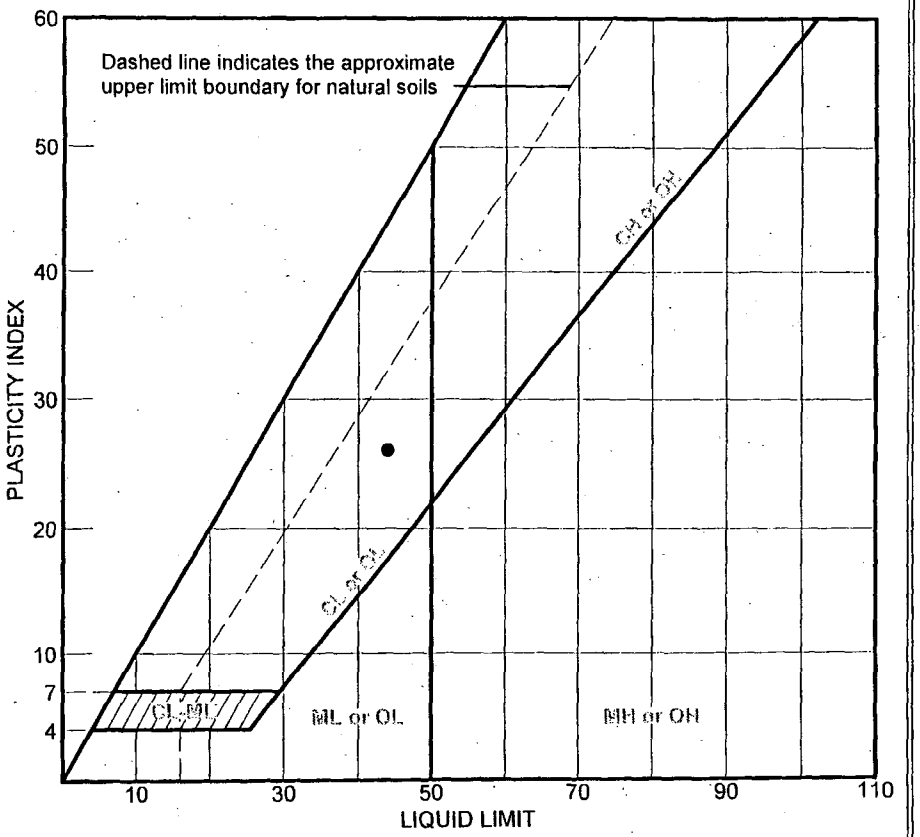
Sample Data

Source: B-338
Sample No.: UD-1
Elev. or Depth: 28' to 30' **Sample Length(in./cm.):**
Location: B-338
Description: Silty sand
Date: 2-19-07 **Natural Moisture:** 24.1
USCS Class.: SM **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed by: SS
ASTM D4318-05

Liquid Limit= NV
Plastic Limit= NP
Plasticity Index= NP

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-338	UD-2	48' to 50'	2-19-07	CL	Lean clay	26.1	44	26

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496 | Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reviewed by: SS
ASTM 4318-05

SS 2/25/2007

KAW 4/3/07

LIQUID AND PLASTIC LIMIT TEST DATA

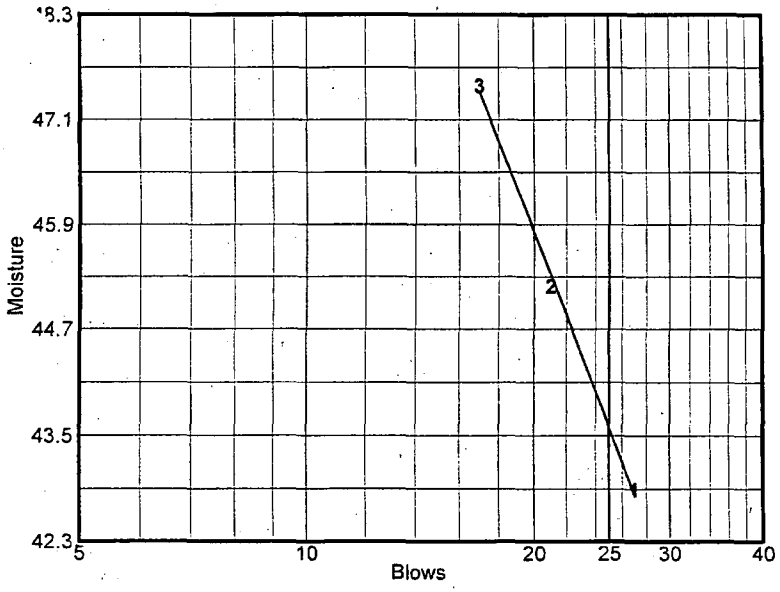
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496

Sample Data

Source: B-338
Sample No.: UD-2
Elev. or Depth: 48' to 50' **Sample Length(in./cm.):**
Location: B-338
Description: Lean clay
Date: 2-19-07 **Natural Moisture:** 26.1
USCS Class.: CL **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed by: SS
ASTM 4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	26.85	27.90	27.32			
Dry+Tare	22.06	22.56	22.08			
Tare	10.89	10.74	11.06			
# Blows	27	21	17			
Moisture	42.9	45.2	47.5			

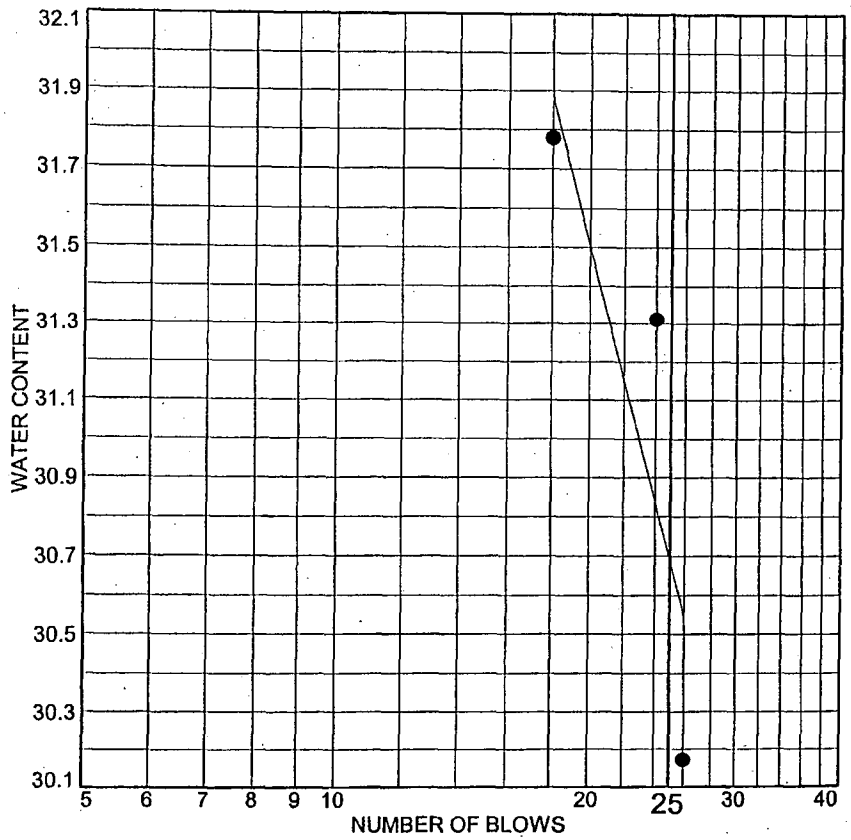


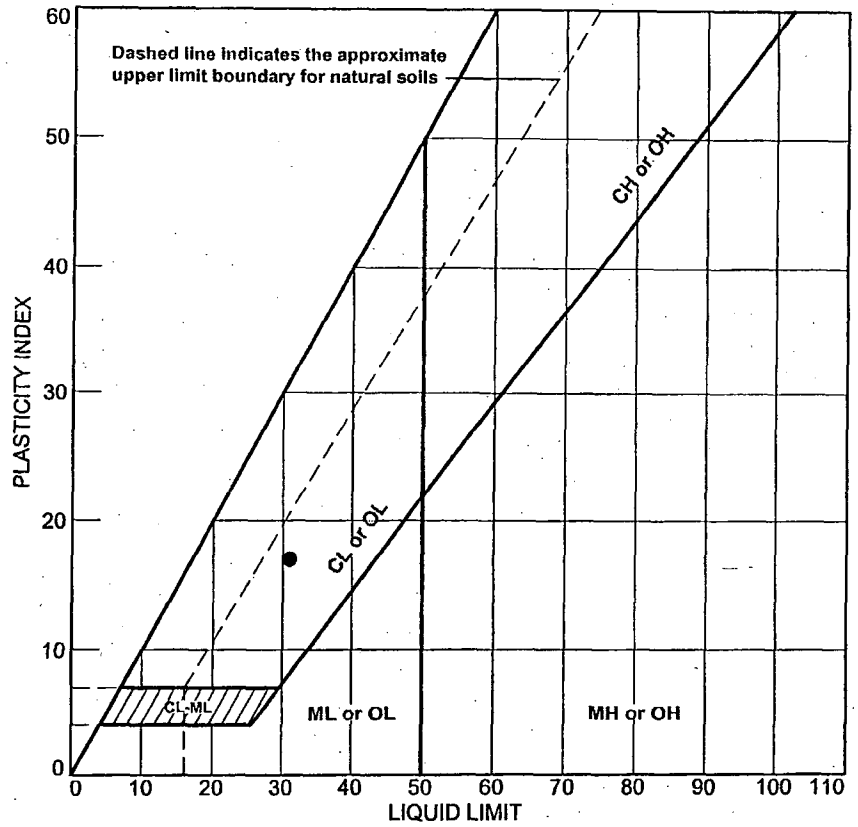
Liquid Limit= 44
Plastic Limit= 18
Plasticity Index= 26

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	18.12	19.64			
Dry+Tare	16.99	18.34			
Tare	10.80	11.20			
Moisture	18.3	18.2			

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 343	STP-275	173'-175'	12/19/2006	CL	Lean Clay	15.6	31	17
		(UD-7)							

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC Reviewed By:RF

ASTM D4318-05

4/3/07

KAW 4/3/07

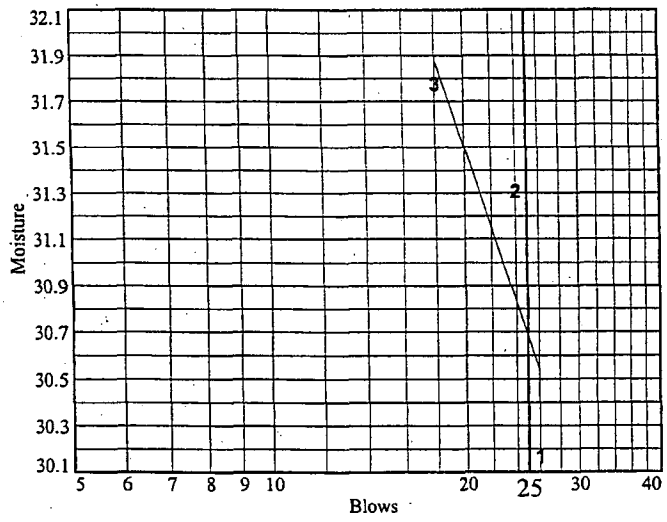
LIQUID AND PLASTIC LIMIT TEST DATA

4/3/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 343
Depth: 173'-175'
Sample Number: STP-275 (UD-7)
Material Description: Lean Clay
Date: 12/19/2006
USCS Class.: CL
Testing Remarks: Tested By:AC Reviewed By:RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	38.05	37.36	37.31			
Dry+Tare	35.76	35.14	35.13			
Tare	28.17	28.05	28.27			
# Blows	26	24	18			
Moisture	30.2	31.3	31.8			



Liquid Limit= 31
Plastic Limit= 14
Plasticity Index= 17
Natural Moisture= 15.6
Liquidity Index= 0.1

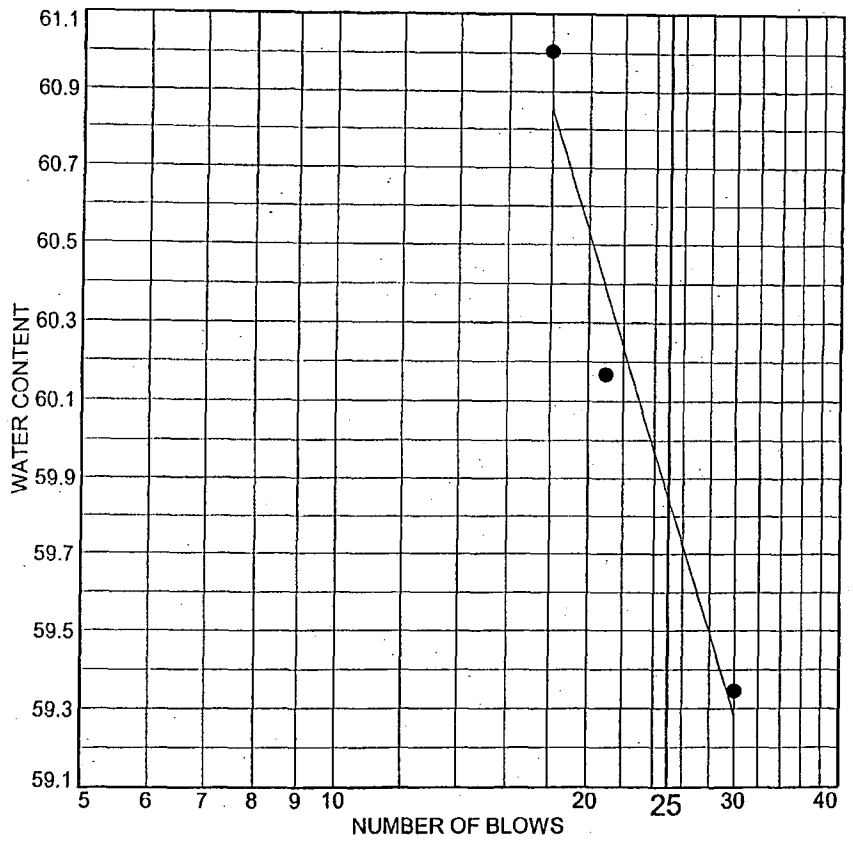
Plastic Limit Data

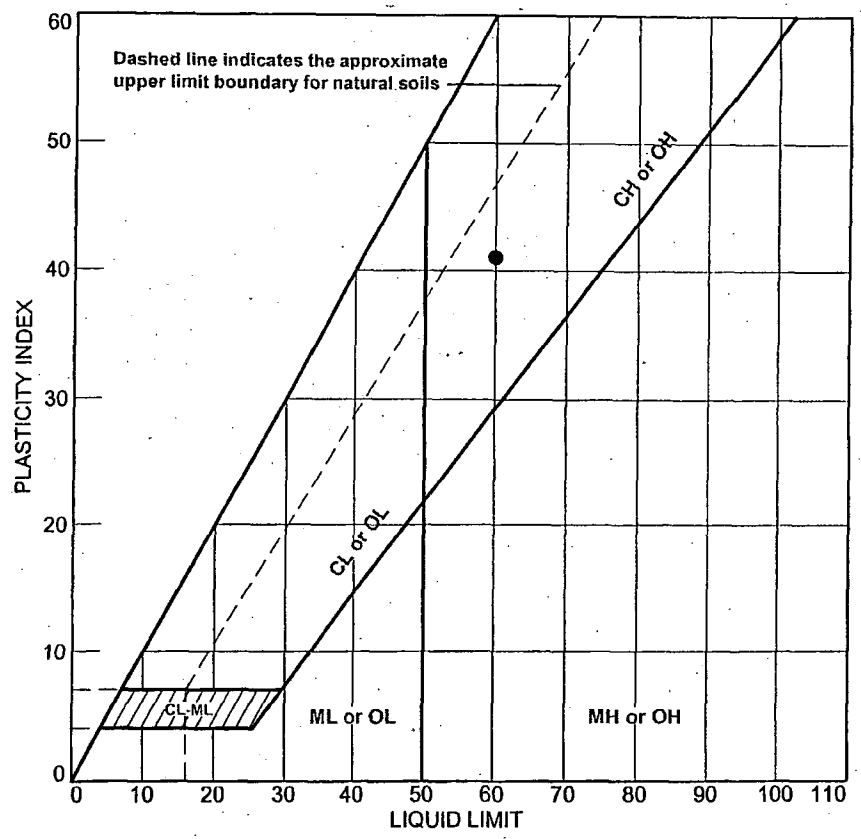
Run No.	1	2	3	4	
Wet+Tare	36.19	37.96			
Dry+Tare	35.19	36.73			
Tare	28.24	28.28			
Moisture	14.4	14.6			

Natural Moisture Data

Wet+Tare	Dry+Tare	Tare	Moisture
398.4	368.5	176.5	15.6

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 344	STP-043 (SS-3)	3.0'-4.5'	11/15/2006	CH	Fat Clay	24.0	60	41

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC/TH
ASTM D4318-05

Reviewed By:ST

MA 4-3-07

KAW 4/3/07

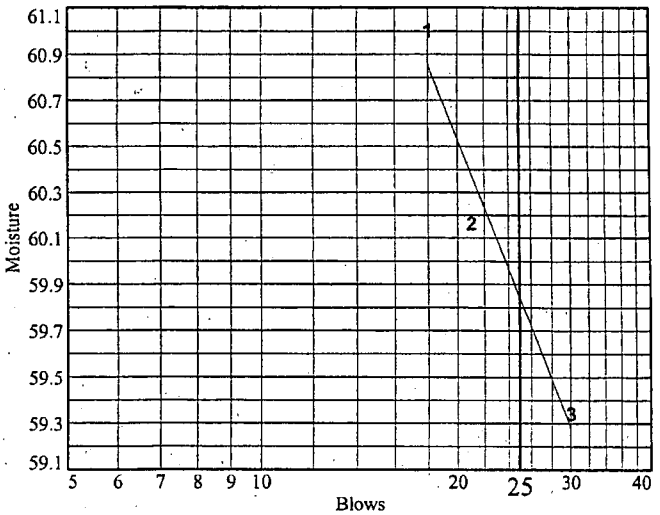
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 344
Depth: 3.0'-4.5'
Sample Number: STP-043 (SS-3)
Material Description: Fat Clay
Date: 11/15/2006
USCS Class.: CH
Testing Remarks: Tested By:AC/TH
Reviewed By:ST
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	37.72	37.79	36.48			
Dry+Tare	34.2	34.21	33.4			
Tare	28.43	28.26	28.21			
# Blows	18	21	30			
Moisture	61.0	60.2	59.3			



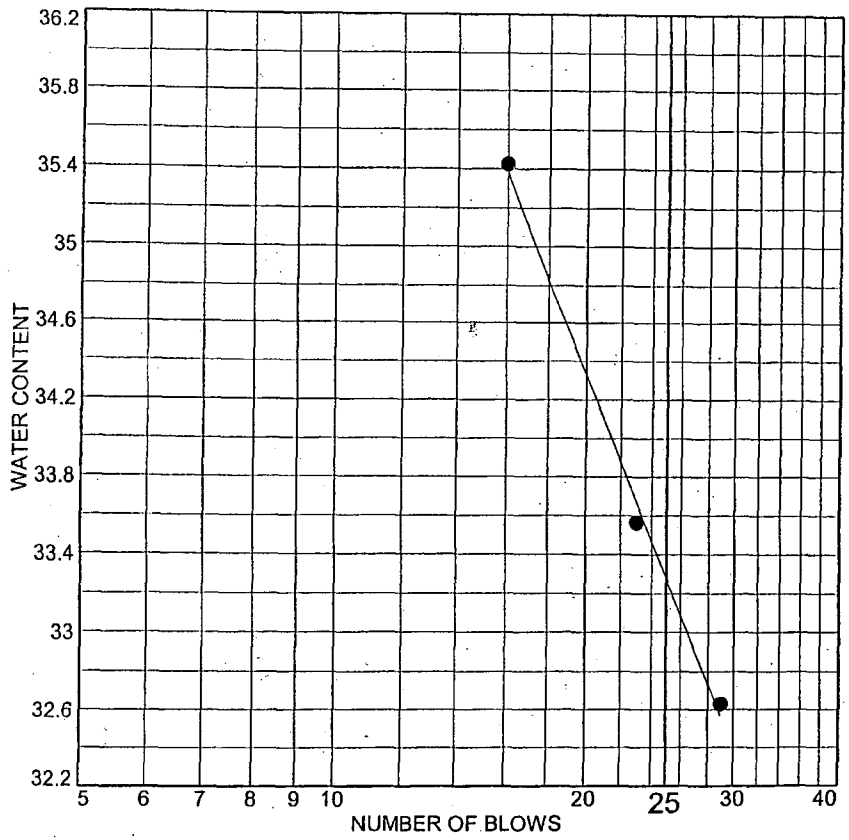
Liquid Limit= 60
Plastic Limit= 19
Plasticity Index= 41
Natural Moisture= 24.0
Liquidity Index= 0.1

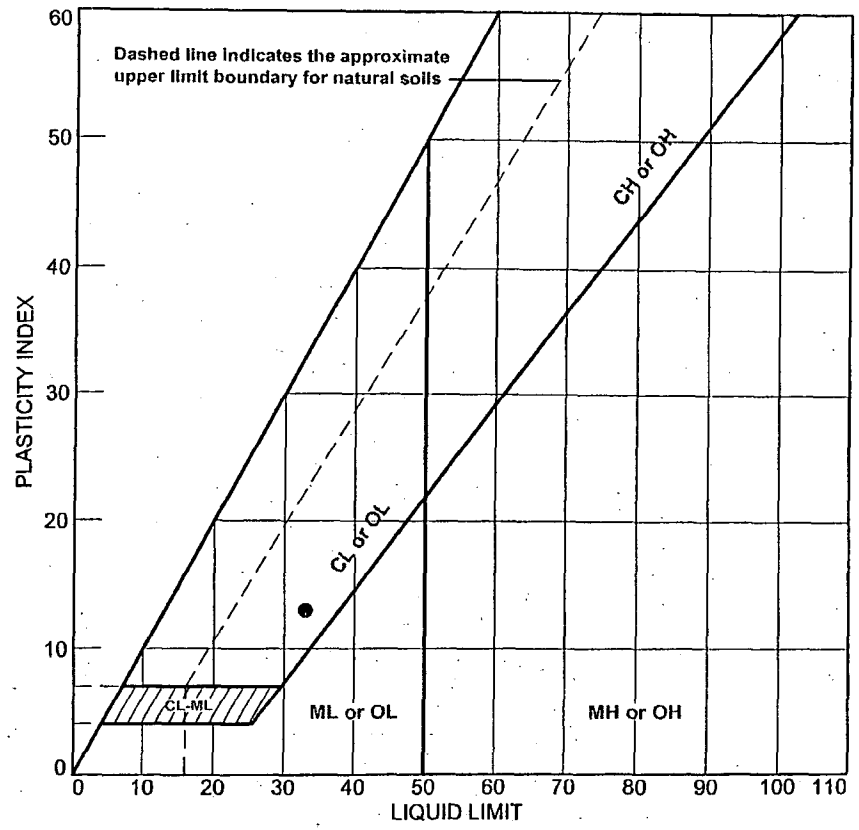
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	35.64	35.82			
Dry+Tare	34.4	34.61			
Tare	28.07	28.36			
Moisture	19.6	19.4			

MA 4.3.07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 344	STP-044 (SS-7)	9.0'-10.5'	11/15/2006	CL	Lean Clay	24.6	33	13

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:TH/AC Reviewed By:ST

ASTM D4318-05

MA 4-3-07

KAW 4/3/07

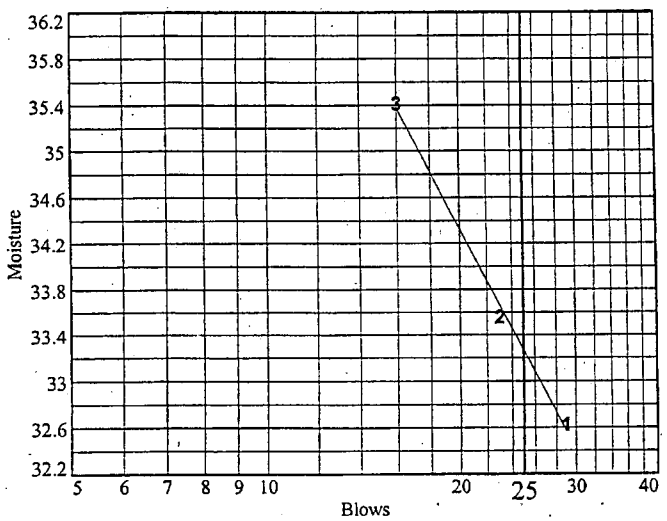
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 344
Depth: 9.0'-10.5'
Sample Number: STP-044 (SS-7)
Material Description: Lean Clay
Date: 11/15/2006
USCS Class.: CL
Testing Remarks: Tested By:TH/AC Reviewed By:ST
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	37.71	35.71	36.15			
Dry+Tare	35.39	33.77	33.38			
Tare	28.28	27.99	25.56			
# Blows	29	23	16			
Moisture	32.6	33.6	35.4			



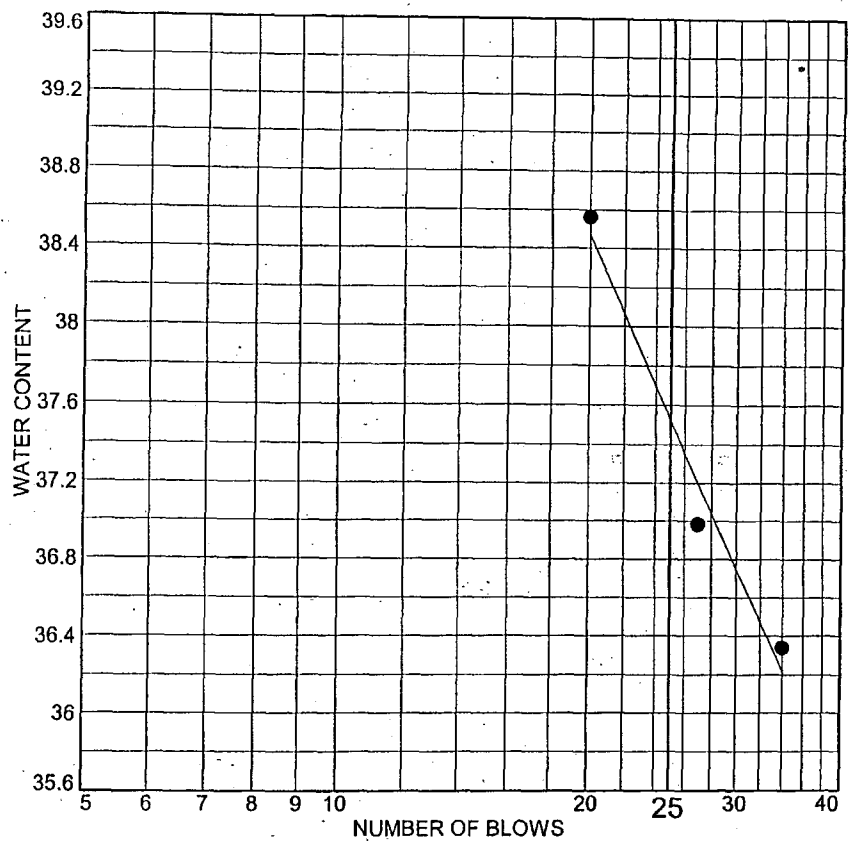
Liquid Limit= 33
Plastic Limit= 20
Plasticity Index= 13
Natural Moisture= 24.6
Liquidity Index= 0.4

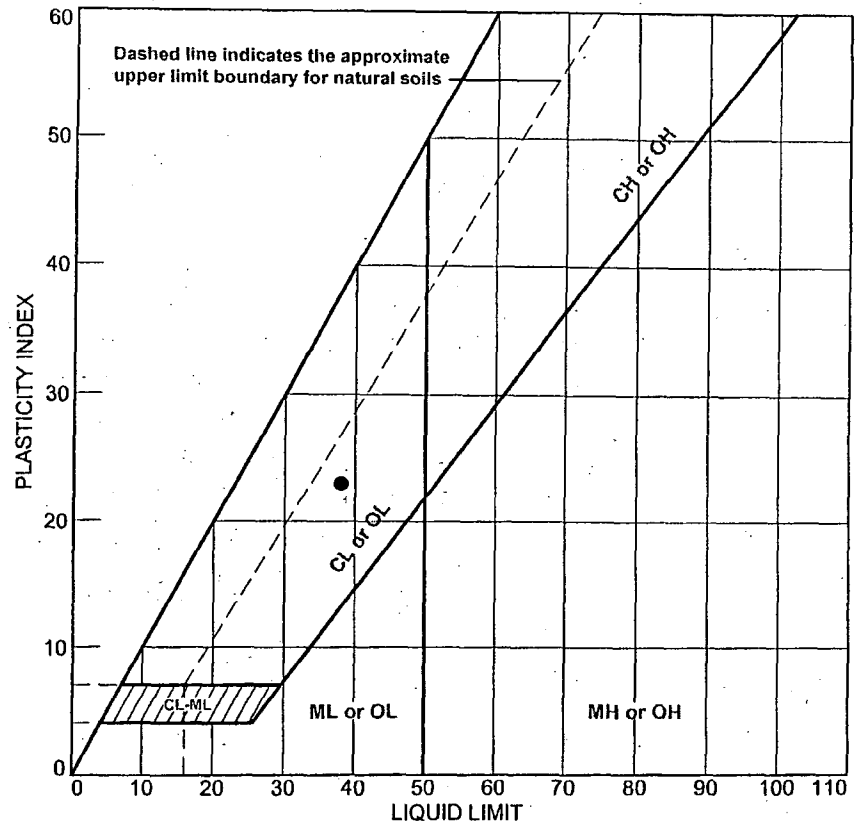
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	29.39	32.20			
Dry+Tare	28.09	30.89			
Tare	21.58	24.36			
Moisture	20.0	20.1			

MA 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 344	STP-047	48.5'-50.0'	11/15/2006	CL	Lean Clay	27.7	38	23
		(SS-17)							

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC Reviewed By:RF

ASTM D4318-05

MA 4-3-07

KAW 4/3/07

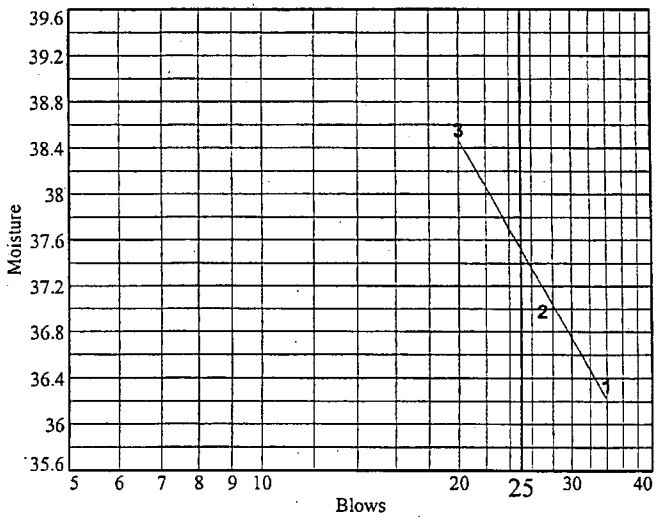
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 344
Depth: 48.5'-50.0' **Sample Number:** STP-047 (SS-17)
Material Description: Lean Clay
Date: 11/15/2006 **USCS Class.:** CL **AASHTO Class.:** A-6(20)
Testing Remarks: Tested By:AC Reviewed By:RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	38.17	37.69	38.02			
Dry+Tare	35.55	35.09	35.34			
Tare	28.34	28.06	28.39			
# Blows	34	27	20			
Moisture	36.3	37.0	38.6			



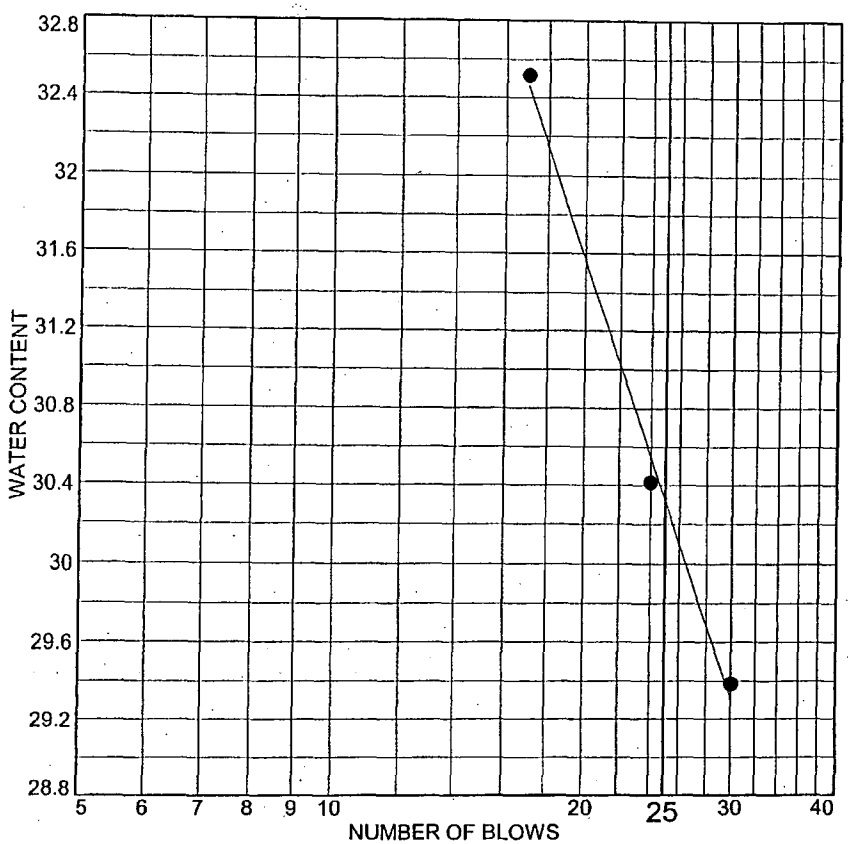
Liquid Limit= 38
Plastic Limit= 15
Plasticity Index= 23
Natural Moisture= 27.7
Liquidity Index= 0.6

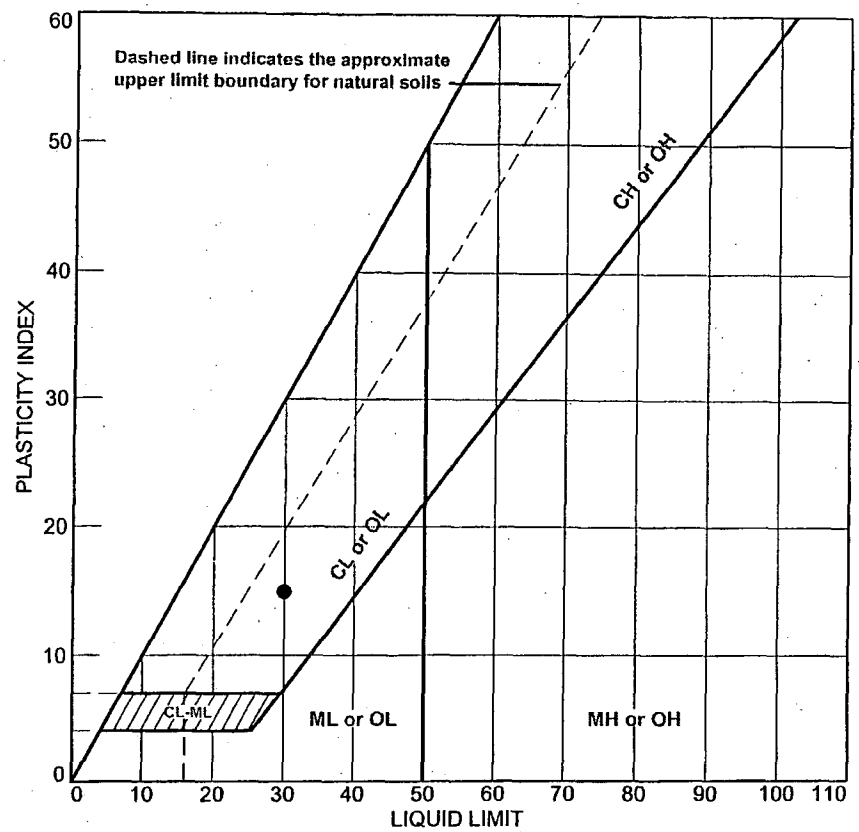
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	34.01	37.45			
Dry+Tare	32.75	36.18			
Tare	24.36	27.96			
Moisture	15.0	15.5			

MAK 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 344	STP-048	58.5'-60.0'	11/15/2006	CL	Sandy Lean Clay	18.6	30	15
		(SS-19)							

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC/TH Reviewed By:ST

ASTM D4318-05

MA 4-3-07

KAW 4/3/07

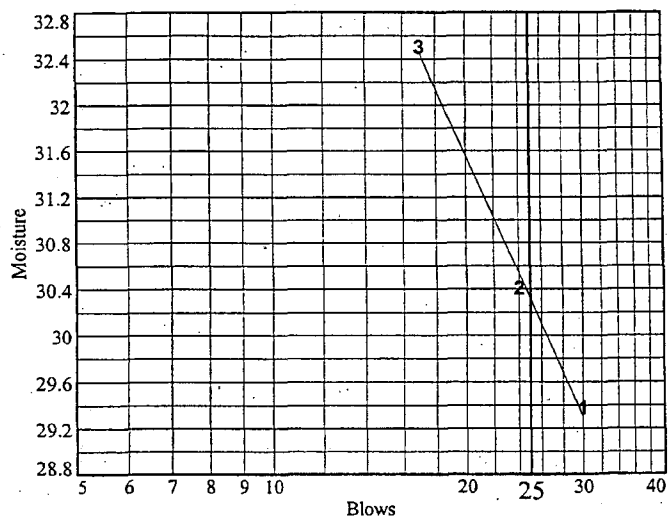
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 344
Depth: 58.5'-60.0'
Sample Number: STP-048 (SS-19)
Material Description: Sandy Lean Clay
Date: 11/15/2006
USCS Class.: CL
AASHTO Class.: A-6(5)
Testing Remarks: Tested By:AC/TH
Reviewed By:ST
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	32.56	38.60	40.00			
Dry+Tare	30.08	36.03	37.09			
Tare	21.64	27.58	28.14			
# Blows	30	24	17			
Moisture	29.4	30.4	32.5			



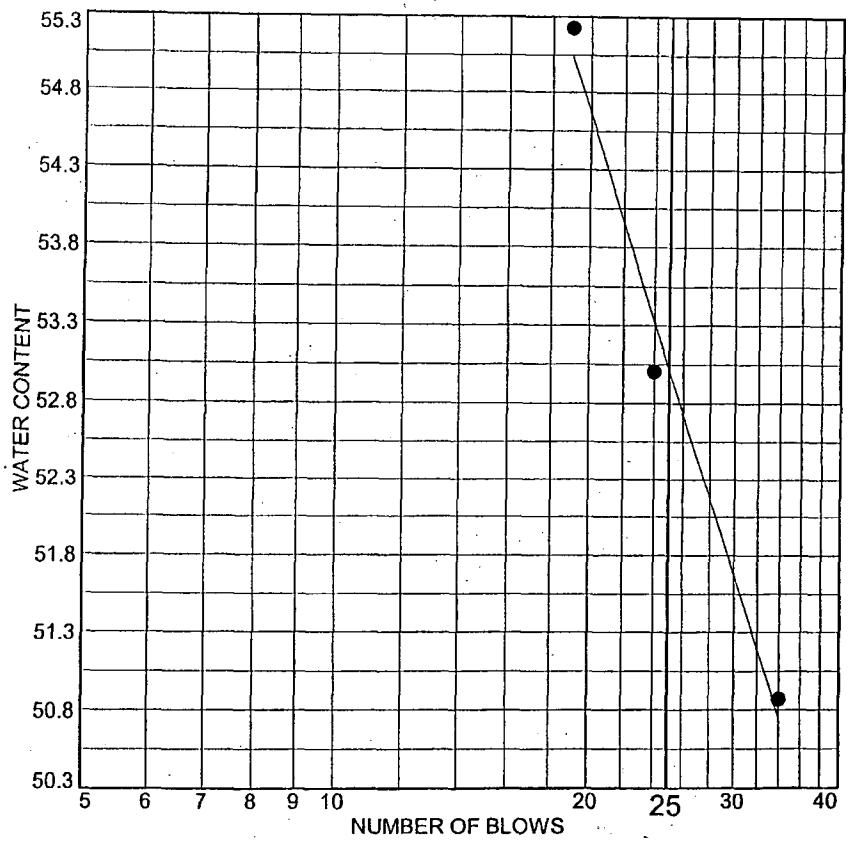
Liquid Limit= 30
Plastic Limit= 15
Plasticity Index= 15
Natural Moisture= 18.6
Liquidity Index= 0.2

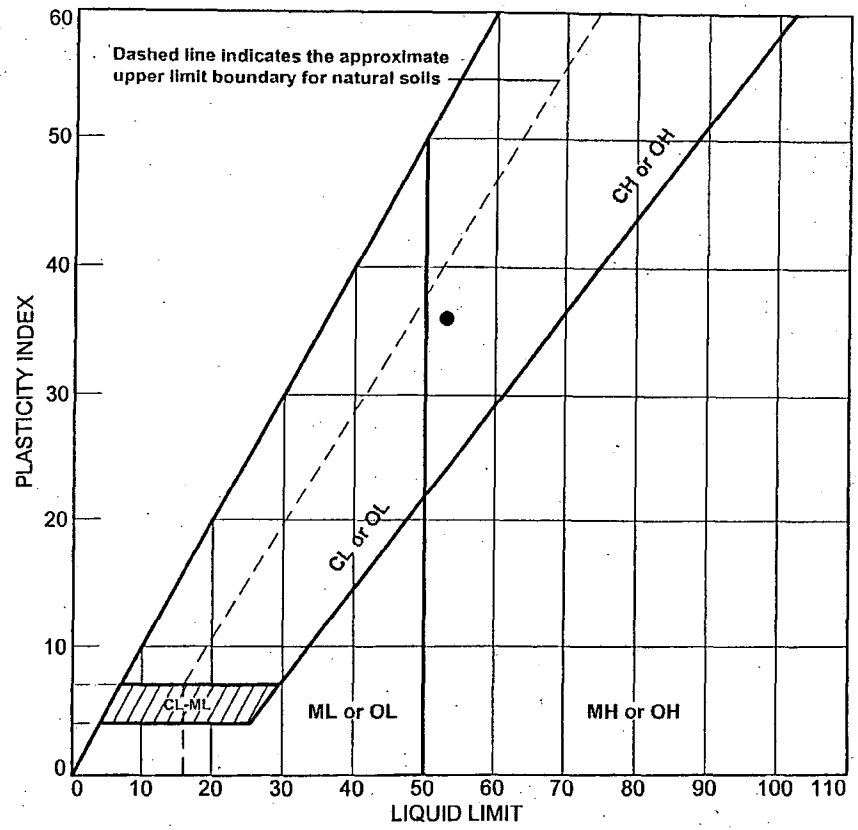
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	34.92	34.18			
Dry+Tare	34.01	33.24			
Tare	27.97	27.07			
Moisture	15.1	15.2			

MA 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 344	STP-051	88.5'-90.0'	11/15/2006	CH	Fat Clay	22.7	53	36
		(SS-25)							

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC/TH Reviewed By:ST

ASTM D4318-05

4-3-07

KAW 4/3/07

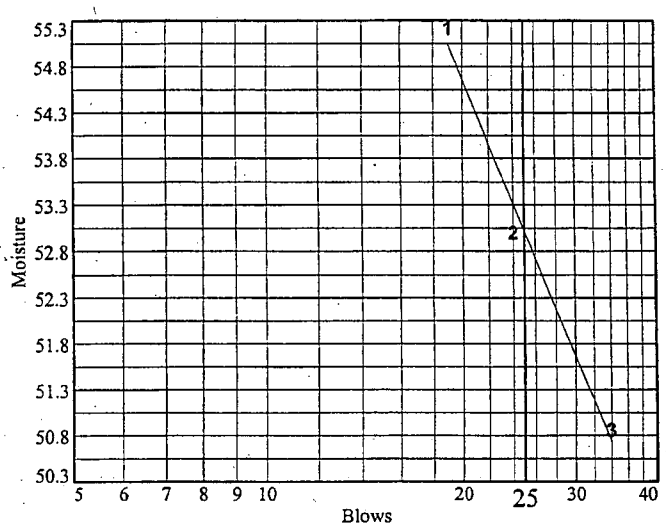
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 344
Depth: 88.5'-90.0'
Sample Number: STP-051 (SS-25)
Material Description: Fat Clay
Date: 11/15/2006
USCS Class.: CH
Testing Remarks: Tested By:AC/TH Reviewed By:ST
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	34.32	37.56	31.37			
Dry+Tare	31.15	34.56	28.44			
Tare	25.41	28.90	22.68			
# Blows	19	24	34			
Moisture	55.2	53.0	50.9			



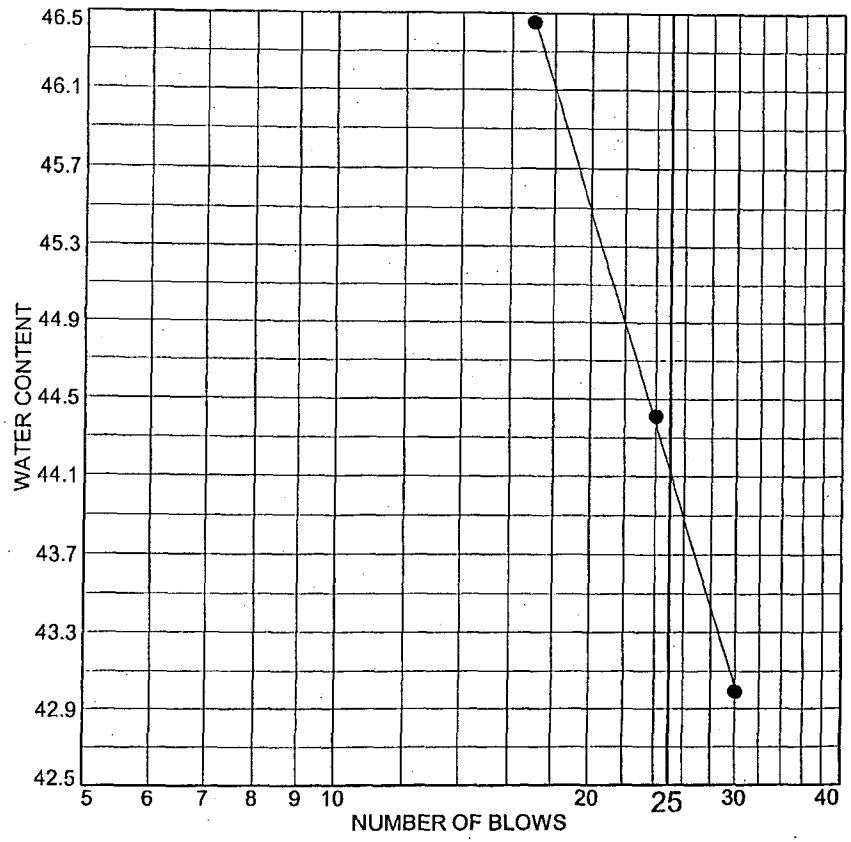
Liquid Limit= 53
Plastic Limit= 17
Plasticity Index= 36
Natural Moisture= 22.7
Liquidity Index= 0.2

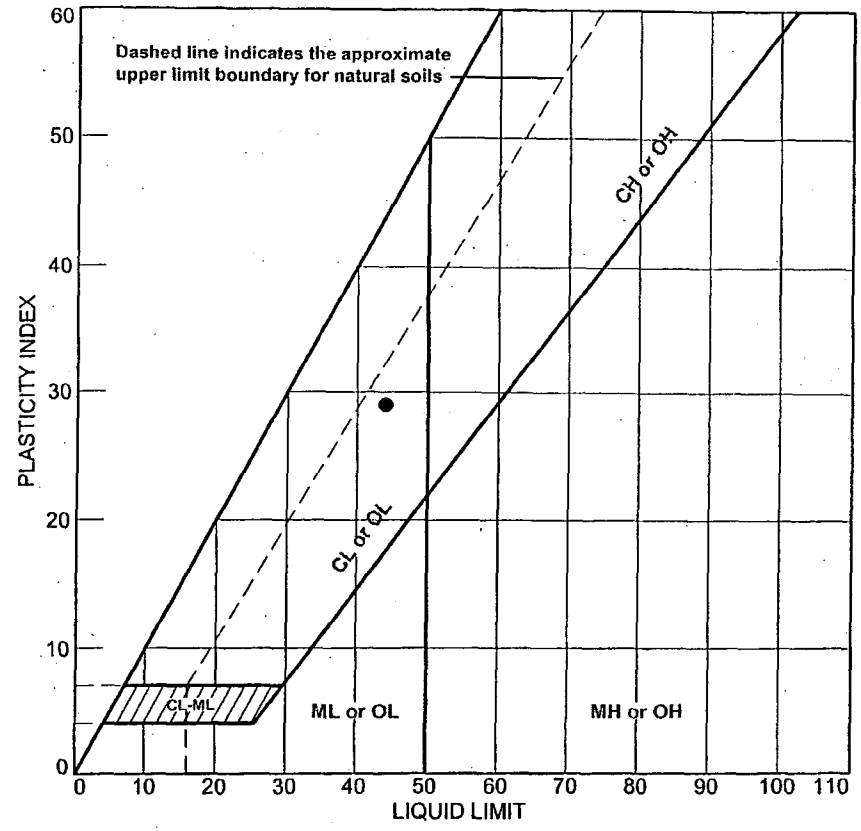
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	36.08	36.20			
Dry+Tare	34.92	35.07			
Tare	28.33	28.39			
Moisture	17.6	16.9			

MA
4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 344	STP-052	93.5'-95.0'	11/15/2006	CL	Lean Clay	20.7	44	29
		(SS-26)							

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC/TH Reviewed By:ST

ASTM D4318-05

4-3-07

KAW 4/3/07

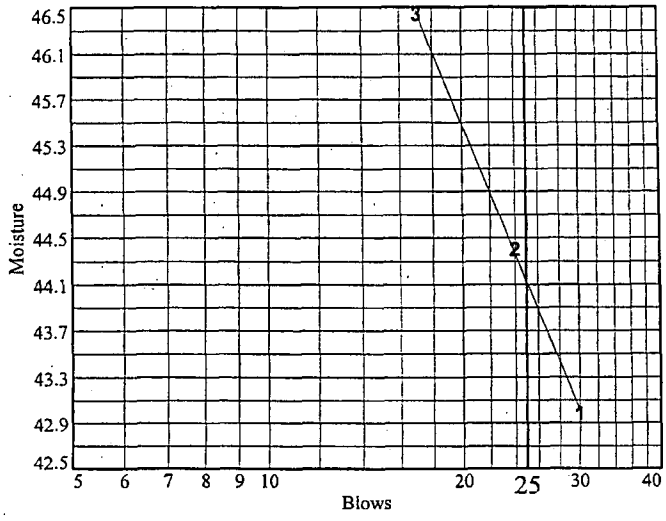
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 344
Depth: 93.5'-95.0'
Sample Number: STP-052 (SS-26)
Material Description: Lean Clay
Date: 11/15/2006
USCS Class.: CL
Testing Remarks: Tested By:AC/TH Reviewed By:ST
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	36.36	36.82	37.45			
Dry+Tare	33.57	33.84	34.57			
Tare	27.08	27.13	28.37			
# Blows	30	24	17			
Moisture	43.0	44.4	46.5			



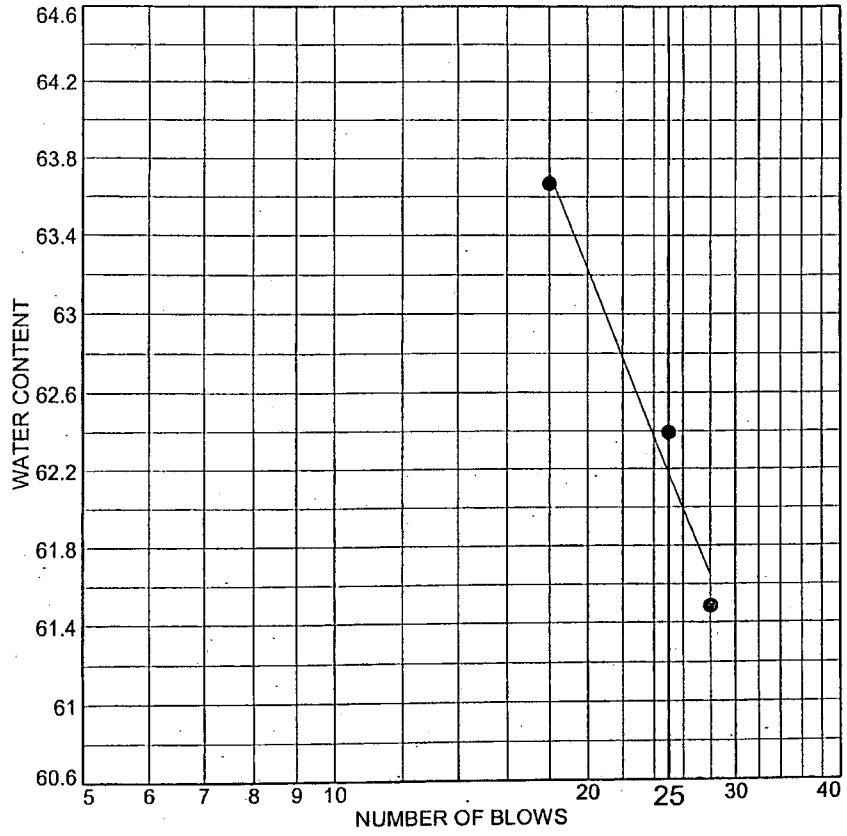
Liquid Limit= 44
Plastic Limit= 15
Plasticity Index= 29
Natural Moisture= 20.7
Liquidity Index= 0.2

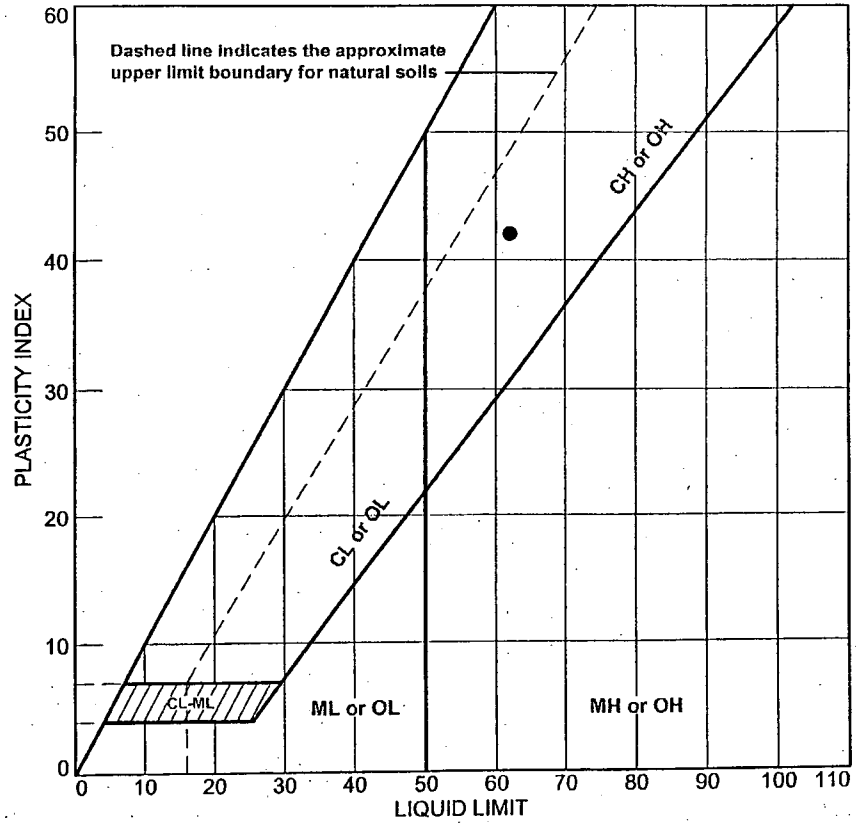
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	35.90	35.53			
Dry+Tare	34.95	34.54			
Tare	28.44	27.92			
Moisture	14.6	15.0			

MWA 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 344	STP-053	98.5'-100.0	11/15/2006	CH	Fat Clay	29.3	62	42
		(SS-27)							

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC/TH Reviewed By:ST

ASTM D4318-05

4-3-07

KAW 4/3/07

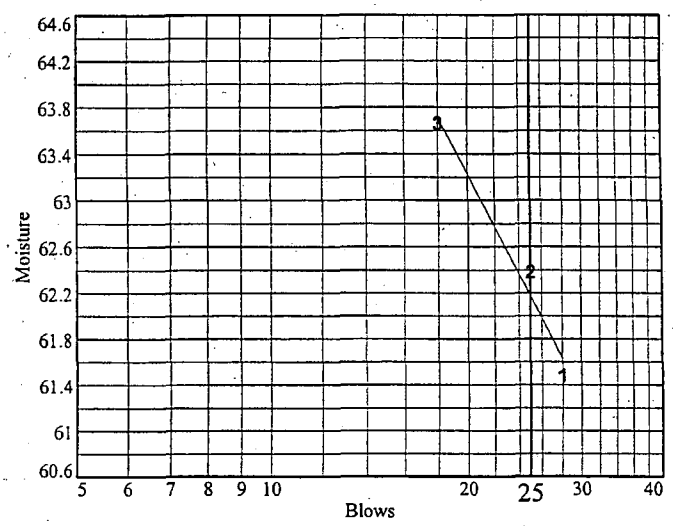
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 344
Depth: 98.5'-100.0 **Sample Number:** STP-053 (SS-27)
Material Description: Fat Clay
Date: 11/15/2006 **USCS Class.:** CH
Testing Remarks: Tested By:AC/TH Reviewed By:ST
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	36.26	37.22	37.72			
Dry+Tare	32.78	33.67	33.97			
Tare	27.12	27.98	28.08			
# Blows	28	25	18			
Moisture	61.5	62.4	63.7			



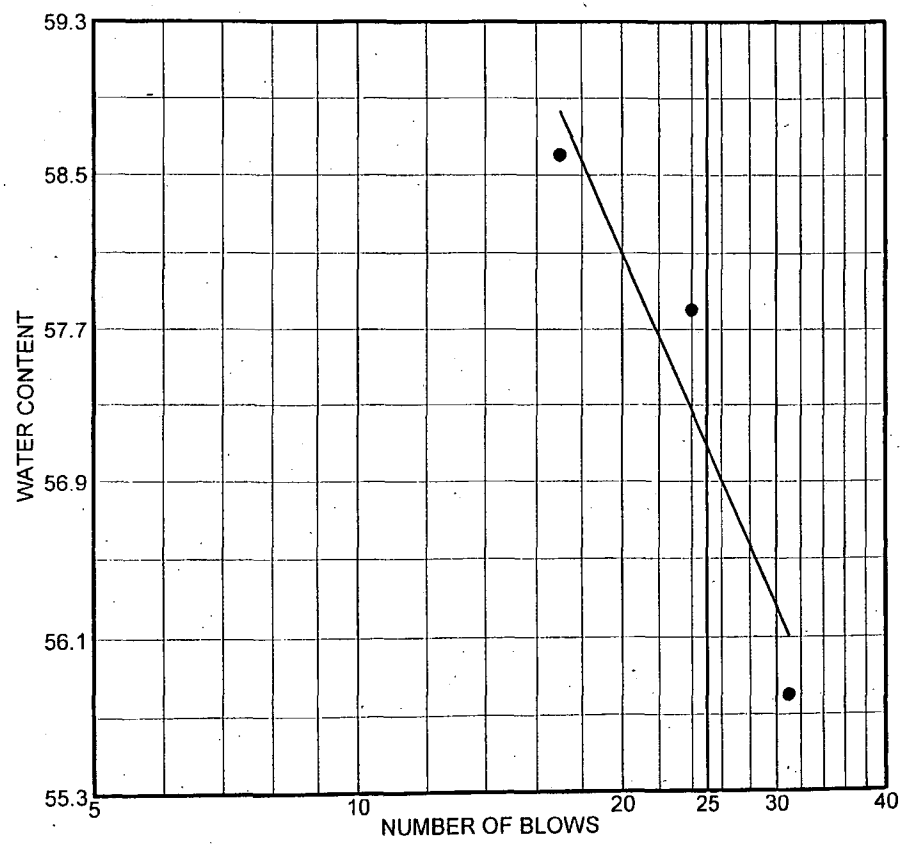
Liquid Limit= 62
Plastic Limit= 20
Plasticity Index= 42
Natural Moisture= 29.3
Liquidity Index= 0.2

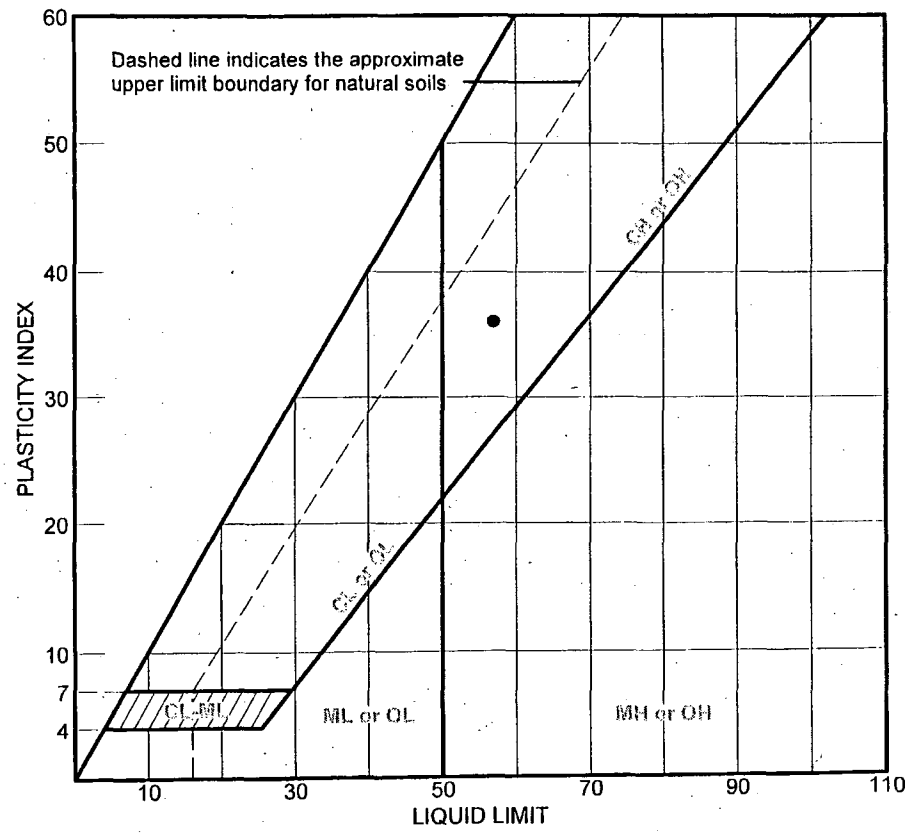
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	35.84	35.65			
Dry+Tare	34.56	34.43			
Tare	28.26	28.27			
Moisture	20.3	19.8			

MA 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-401	UD-2	88' to 90'	3-12-07	CH	Fat Clay	23.9	57	36

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496 | Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reviewed by: MH
ASTM D4318-05 KAW 4/13/07

KAW 4/13/07

LIQUID AND PLASTIC LIMIT TEST DATA

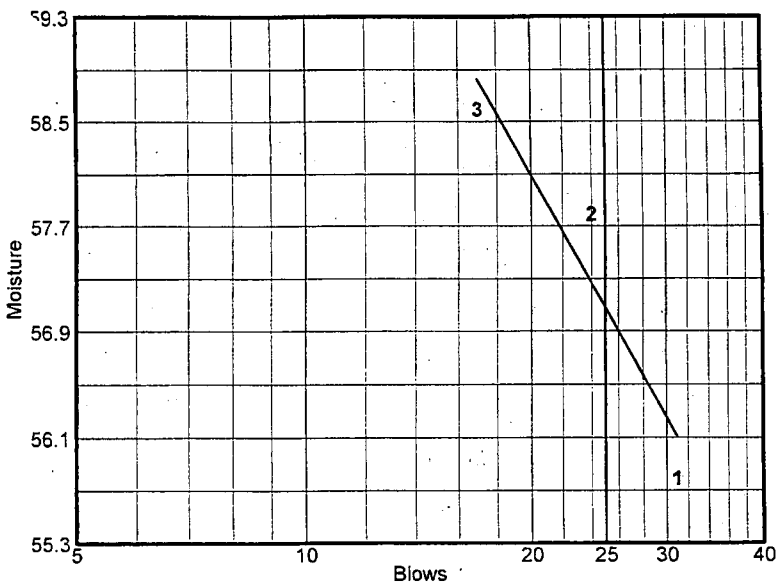
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
ject Number: 5050-06-0496

Sample Data

Source: B-401
Sample No.: UD-2
Elev. or Depth: 88' to 90' **Sample Length(in./cm.):**
Location: B-401
Description: Fat Clay
Date: 3-12-07 **Natural Moisture:** 23.9
USCS Class.: CH **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed by: MH
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	25.16	25.34	24.89			
Dry+Tare	20.02	20.31	19.70			
Tare	10.81	11.61	10.84			
# Blows	31	24	17			
Moisture	55.8	57.8	58.6			

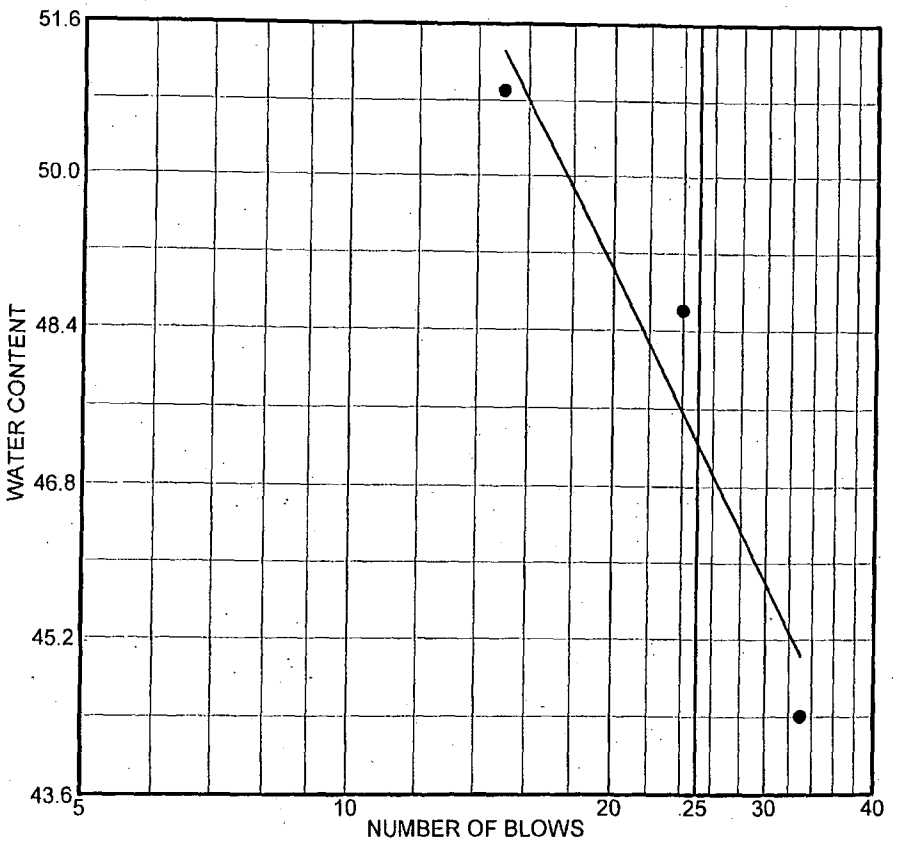


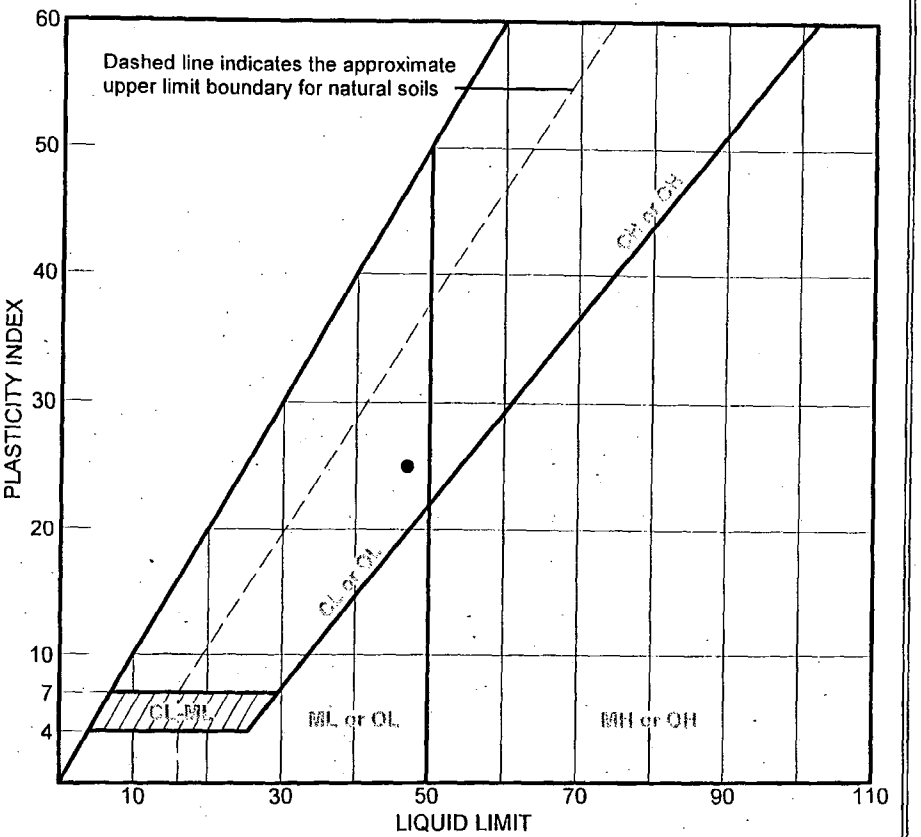
Liquid Limit= 57
Plastic Limit= 21
Plasticity Index= 36

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	17.06	18.49			
ry+Tare	15.97	17.22			
Tare	11.00	10.91			
Moisture	21.9	20.1			

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-401	UD-3	118' to 120'	3-13-07			19.8	47	25

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496 | Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reviewed by: MH
ASTM D4318-05

KAW 4/3/07

KAW 4/3/07

LIQUID AND PLASTIC LIMIT TEST DATA

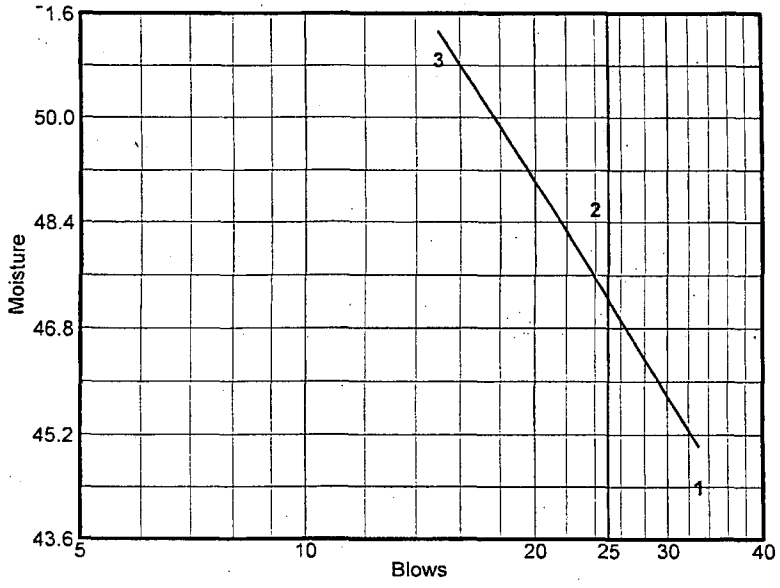
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496

Sample Data

Source: B-401
Sample No.: UD-3
Elev. or Depth: 118' to 120' **Sample Length(in./cm.):**
Location: B-401
Description:
Date: 3-13-07 **Natural Moisture:** 19.8
USCS Class.: **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed by: MH
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	24.08	23.91	22.74			
Dry+Tare	20.01	19.65	18.93			
Tare	10.85	10.89	11.45			
# Blows	33	24	15			
Moisture	44.4	48.6	50.9			

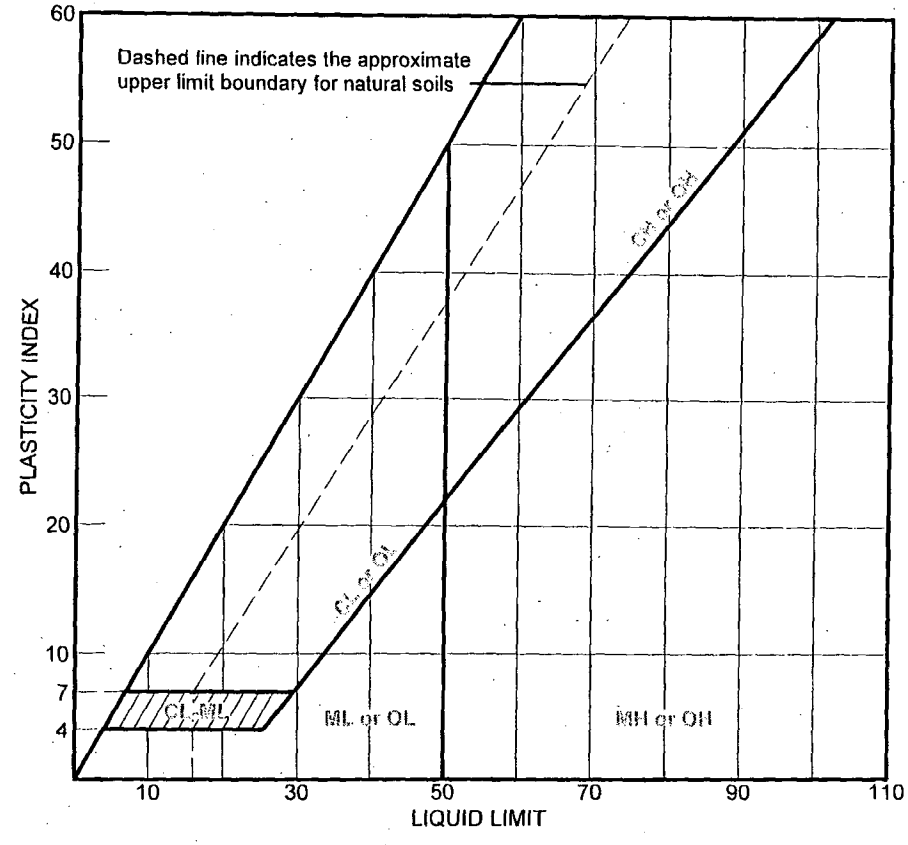


Liquid Limit= 47
Plastic Limit= 22
Plasticity Index= 25

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	21.76	21.42			
Dry+Tare	19.91	19.62			
Tare	11.33	11.56			
Moisture	21.6	22.3			

LIQUID AND PLASTIC LIMITS TEST REPORT



	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-401	UD-4	153' to 154'	3-13-07	SM	Silty sand	24.6	NV	NP

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496 | Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reviewed by: MH
ASTM D4318-05

KAW 4/3/07

KAW 4/3/07

LIQUID AND PLASTIC LIMIT TEST DATA

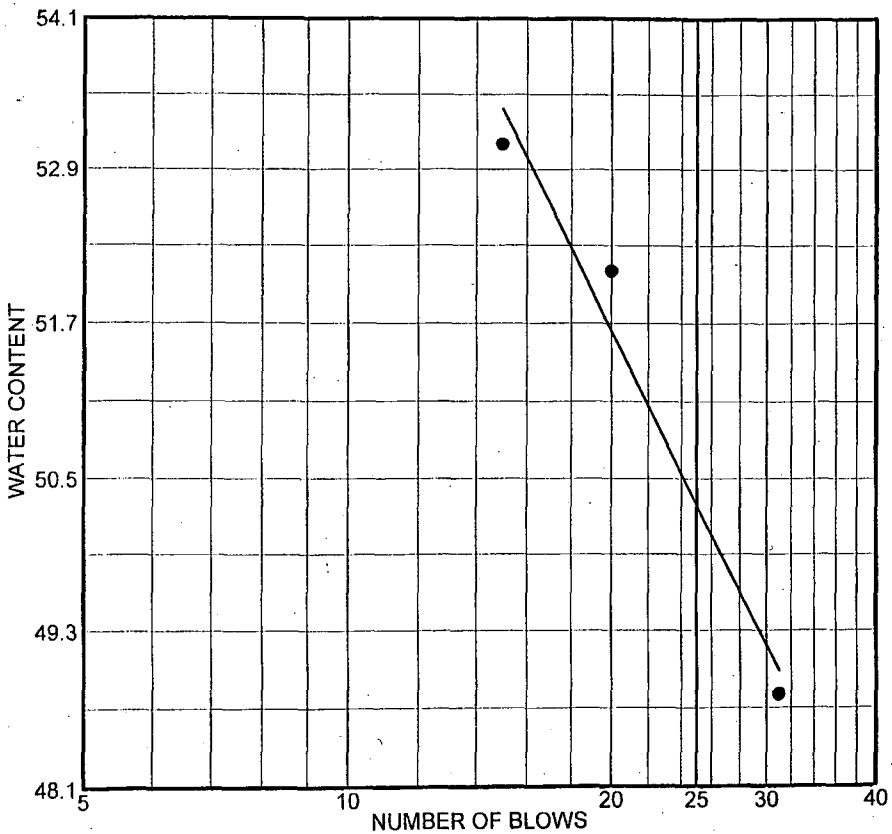
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496

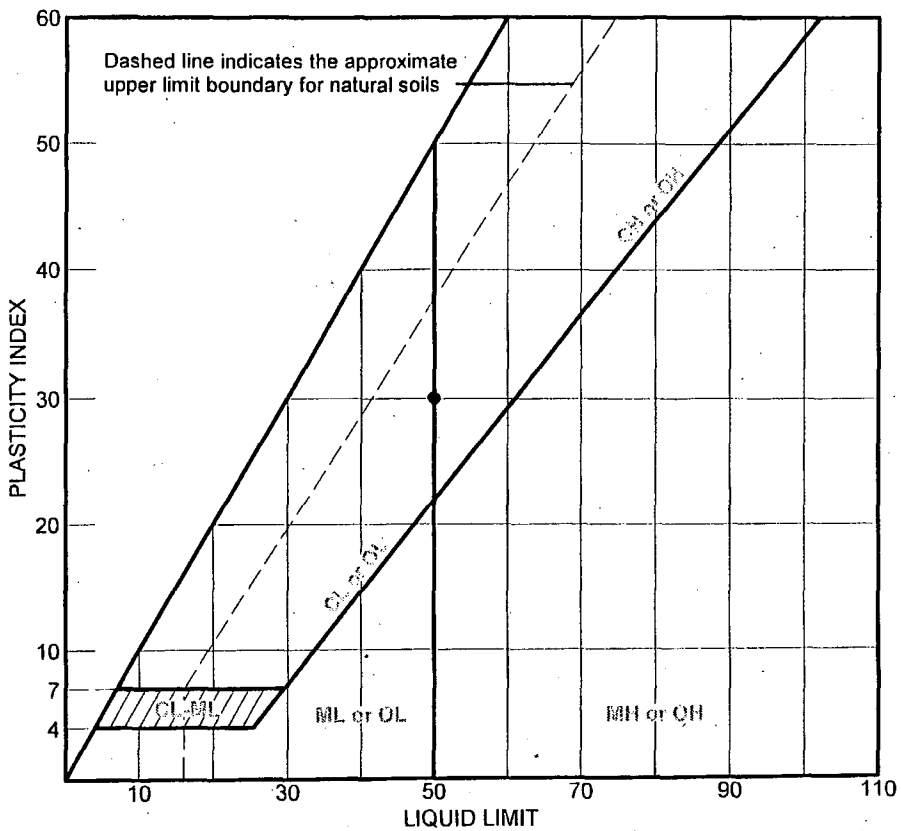
Sample Data

Source: B-401
Sample No.: UD-4
Elev. or Depth: 153' to 154' **Sample Length(in./cm.):**
Location: B-401
Description: Silty sand
Date: 3-13-07 **Natural Moisture:** 24.6
USCS Class.: SM **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed by: MH
ASTM D4318-05

Liquid Limit= NV
Plastic Limit= NP
Plasticity Index= NP

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-404	UD-2	98' to 100'	2-20-07	CH	Fat clay	25.3	50	30

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496 | Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reviewed by: SS KAW 4/13/07
ASTM D4318-05

KAW 4/13/07

LIQUID AND PLASTIC LIMIT TEST DATA

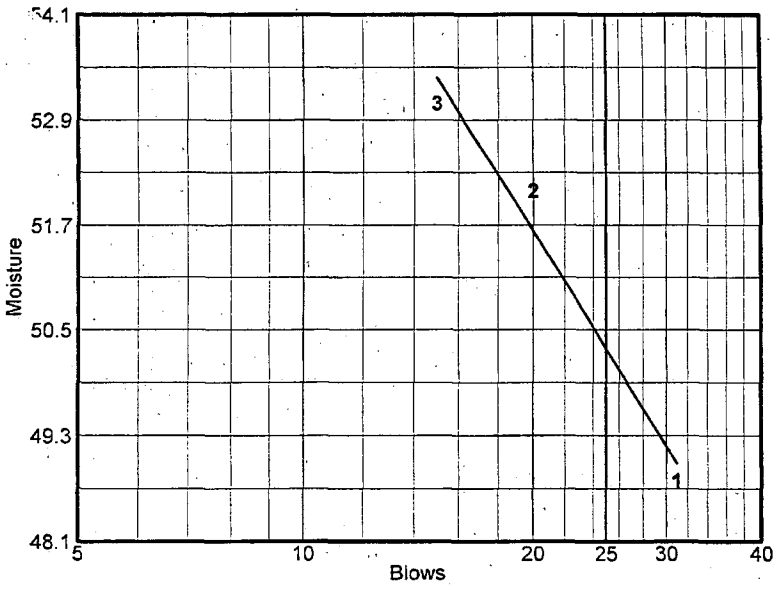
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
ject Number: 5050-06-0496

Sample Data

Source: B-404
Sample No.: UD-2
Elev. or Depth: 98' to 100' **Sample Length(in./cm.):**
Location: B-404
Description: Fat clay
Date: 2-20-07 **Natural Moisture:** 25.3
USCS Class.: CH **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed by: SS
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	34.03	35.08	36.54			
Dry+Tare	26.53	26.98	27.70			
Tare	11.15	11.44	11.05			
# Blows	31	20	15			
Moisture	48.8	52.1	53.1			

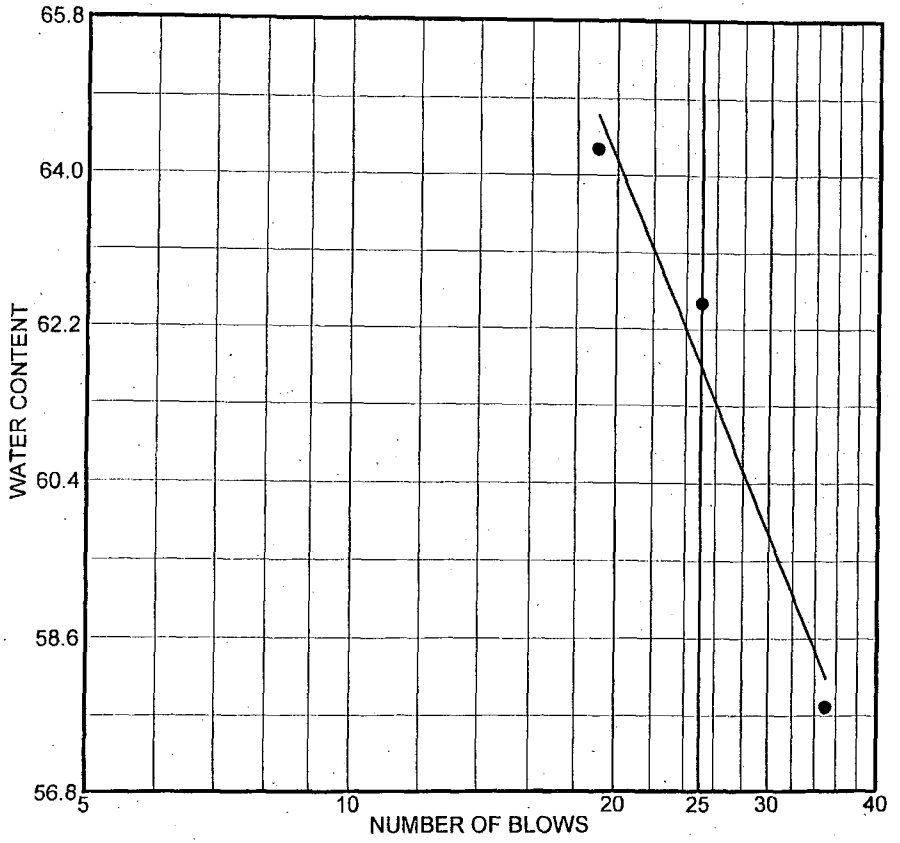


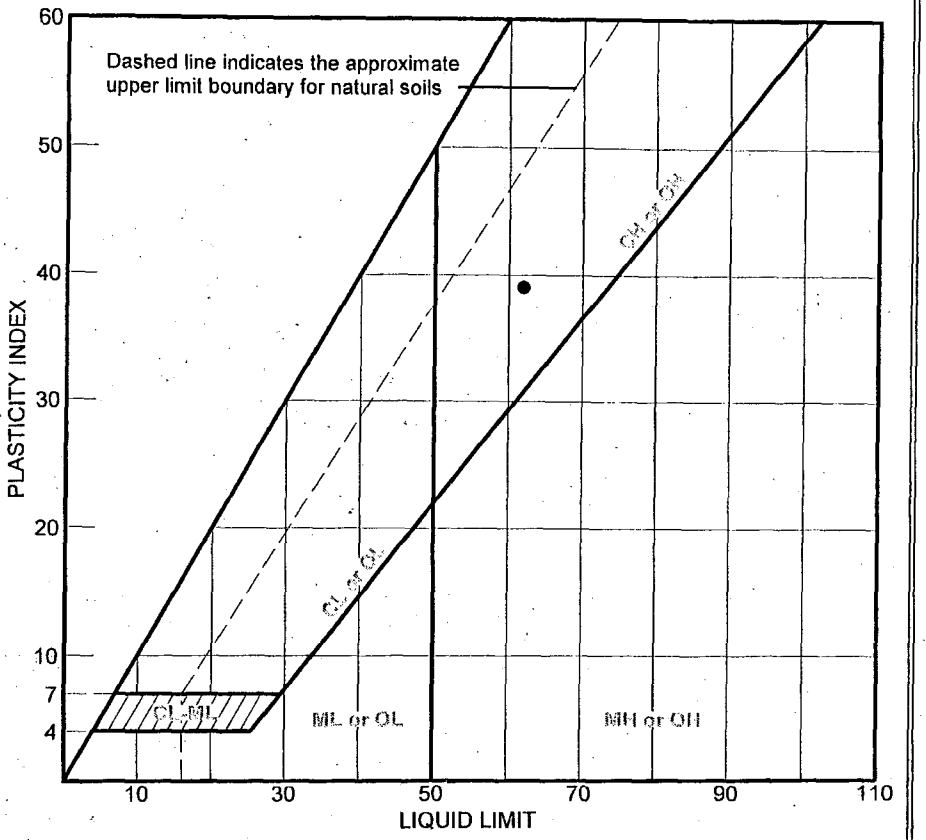
Liquid Limit= 50
Plastic Limit= 20
Plasticity Index= 30

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	20.27	21.07			
Dry+Tare	18.72	19.33			
Tare	10.95	10.88			
Moisture	19.9	20.6			

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-404	UD-3	121' to 123'	2-20-07	CH	Fat clay	23.4	62	39

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496 | Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reviewed by: SS KAW 4/13/07
ASTM D4318-05

KAW 4/13/07

LIQUID AND PLASTIC LIMIT TEST DATA

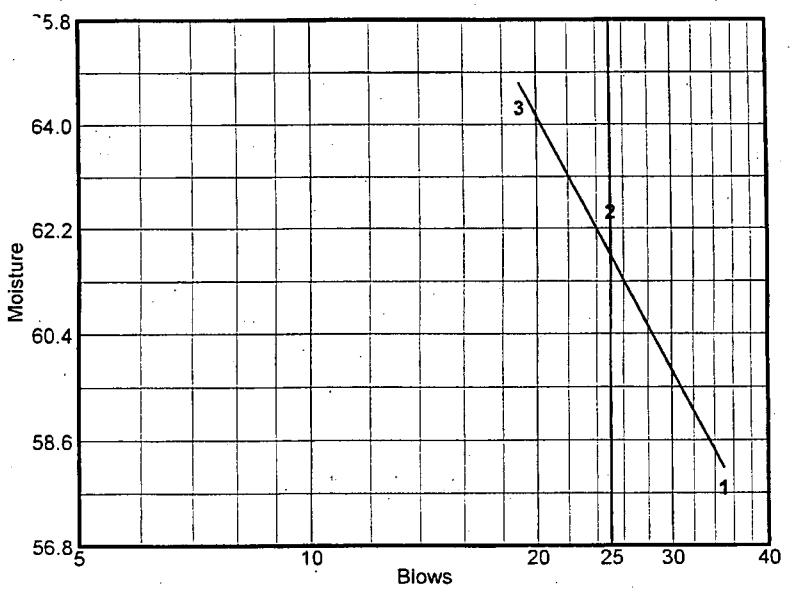
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496

Sample Data

Source: B-404
Sample No.: UD-3
Elev. or Depth: 121' to 123' **Sample Length(in./cm.):**
Location: B-404
Description: Fat clay
Date: 2-20-07 **Natural Moisture:** 23.4
USCS Class.: CH **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed by: SS
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	22.44	25.48	26.81			
Dry+Tare	18.21	20.17	20.59			
Tare	10.89	11.67	10.91			
# Blows	35	25	19			
Moisture	57.8	62.5	64.3			

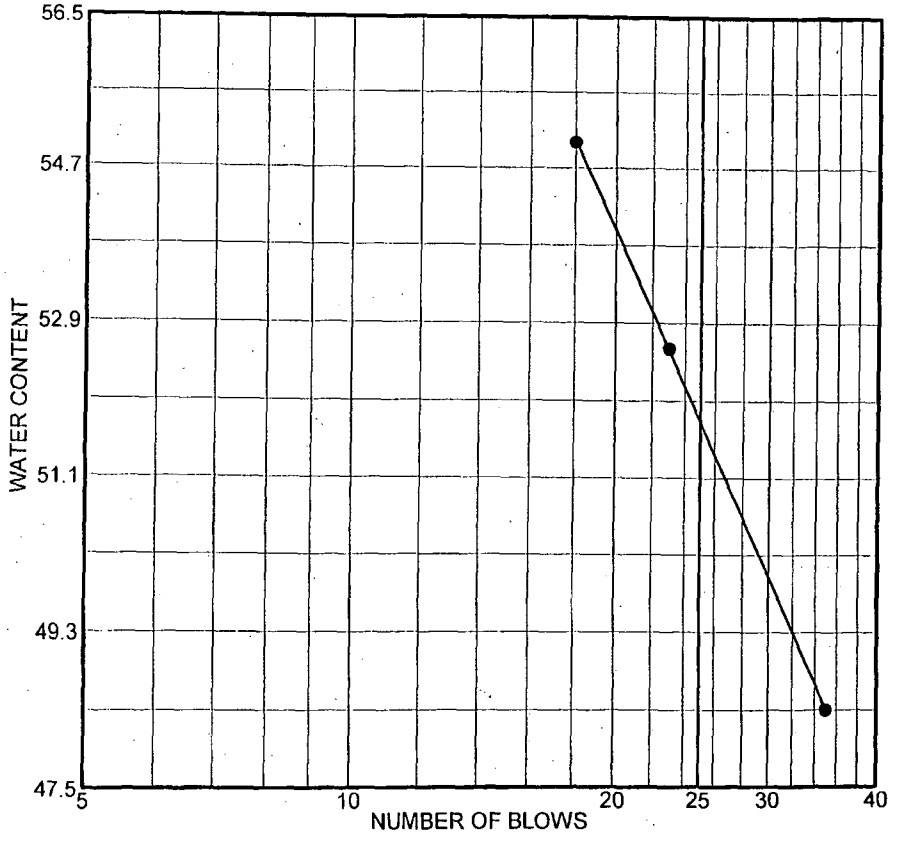


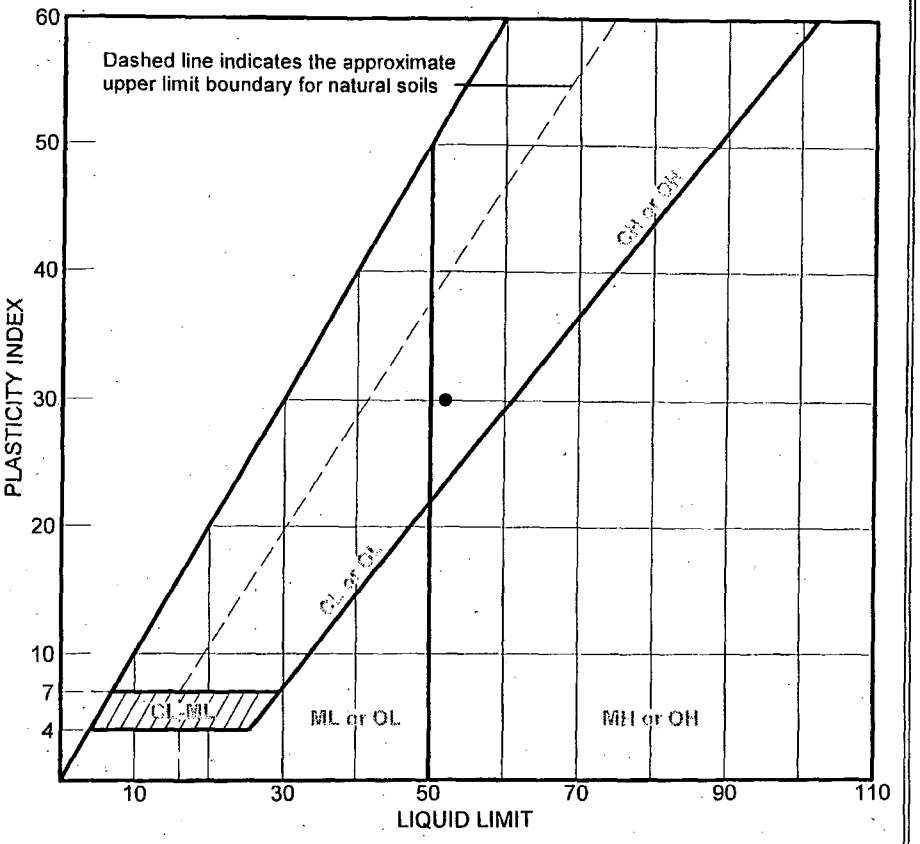
Liquid Limit= 62
Plastic Limit= 23
Plasticity Index= 39

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	22.99	17.21			
Dry+Tare	20.85	16.08			
Tare	11.58	10.99			
Moisture	23.1	22.2			

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-404	UD-4	131' to 133'	2-20-07	CH	Fat clay	20.8	52	30

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496 Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reviewed by: SS
ASTM D4318-05 KAW 4/3/07

KAW 4/3/07

LIQUID AND PLASTIC LIMIT TEST DATA

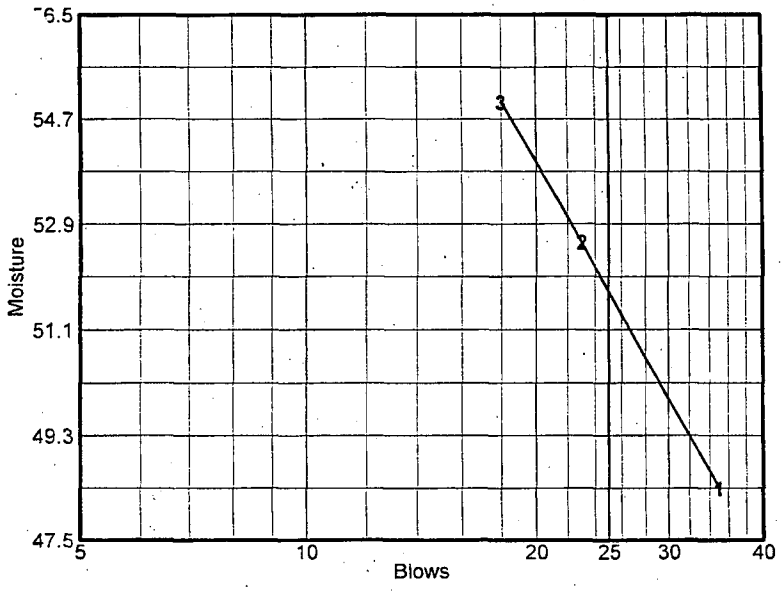
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496

Sample Data

Source: B-404
Sample No.: UD-4
Elev. or Depth: 131' to 133' **Sample Length(in./cm.):**
Location: B-404
Description: Fat clay
Date: 2-20-07 **Natural Moisture:** 20.8
USCS Class.: CH **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed by: SS
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	30.10	26.07	34.45			
Dry+Tare	24.05	20.88	26.35			
Tare	11.55	11.02	11.63			
# Blows	35	23	18			
Moisture	48.4	52.6	55.0			

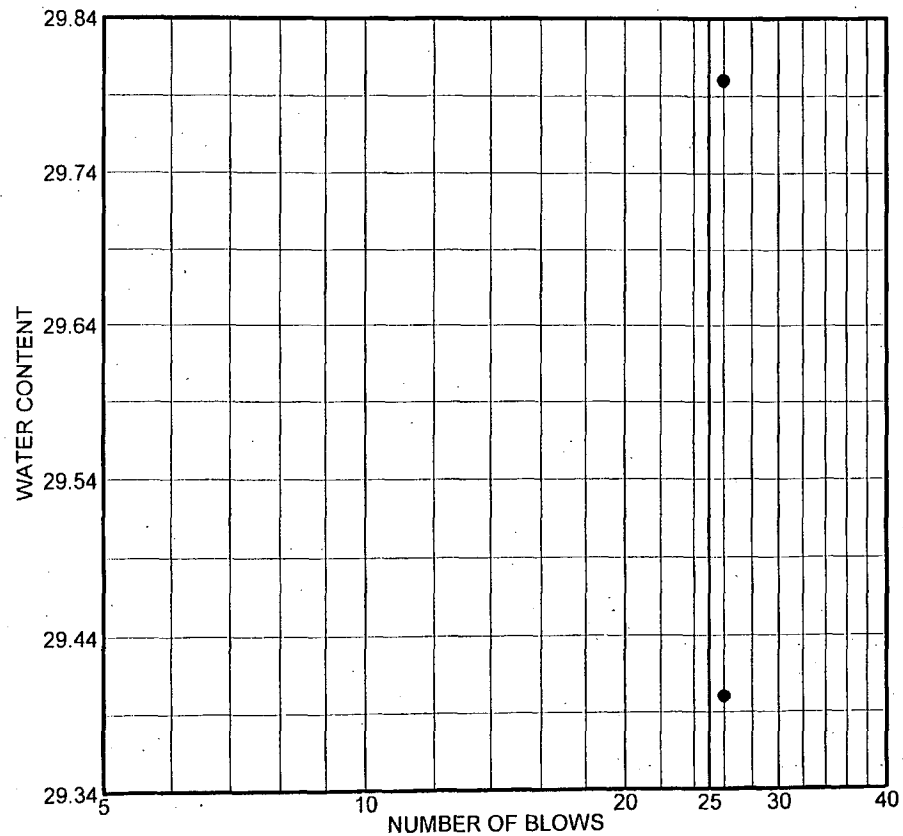


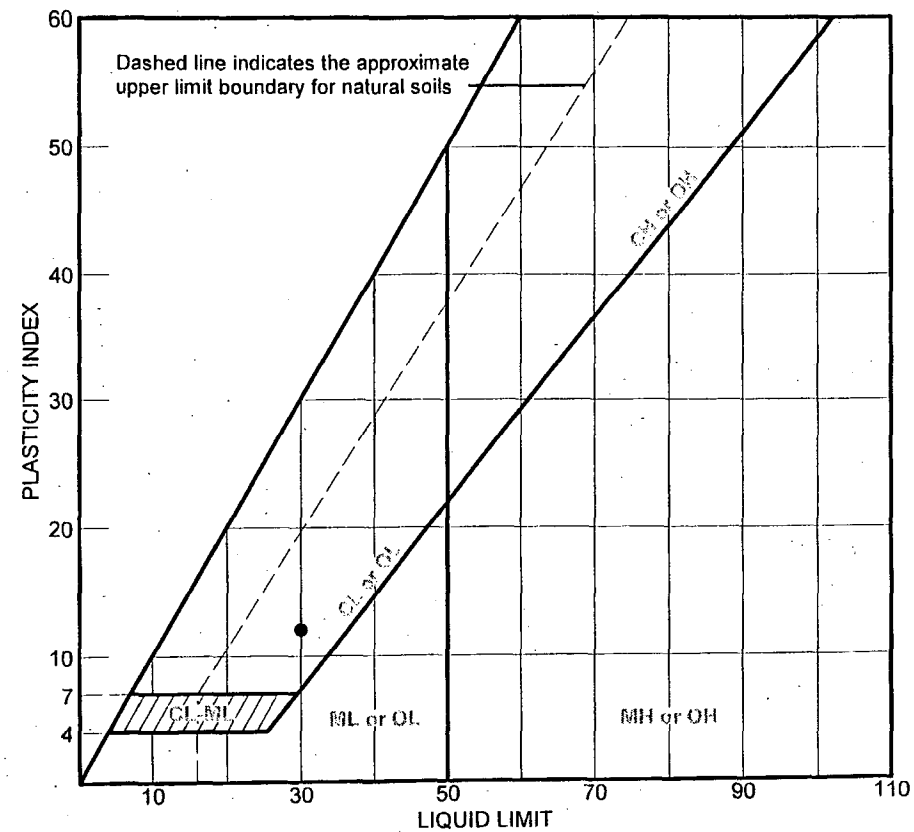
Liquid Limit= 52
Plastic Limit= 22
Plasticity Index= 30

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	18.74	18.11			
Dry+Tare	17.34	16.79			
Tare	10.93	10.88			
Moisture	21.8	22.3			

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-404	UD-5	141' to 143'	3-16-07	CL	Sandy lean clay	18.0	30	12

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496 Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reviewed by: MH
ASTM D4318-05 KAW 4/3/07

KAW 4/3/07

LIQUID AND PLASTIC LIMIT TEST DATA

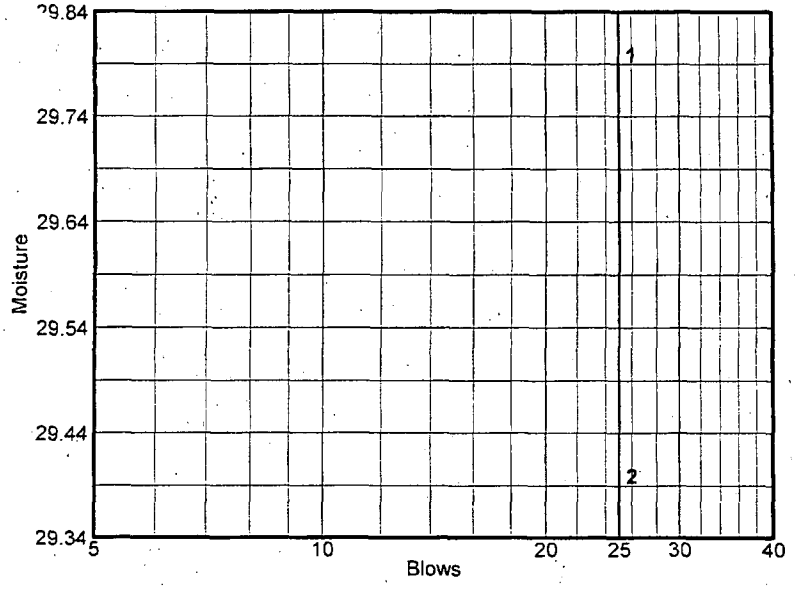
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496

Sample Data

Source: B-404
Sample No.: UD-5
Elev. or Depth: 141' to 143' **Sample Length(in./cm.):**
Location: B-404
Description: Sandy lean clay
Date: 3-16-07 **Natural Moisture:** 18.0
USCS Class.: CL **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed by: MH
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	24.86	26.28				
Dry+Tare	21.65	22.80				
Tare	10.88	10.98				
# Blows	26	26				
Moisture	29.8	29.4				

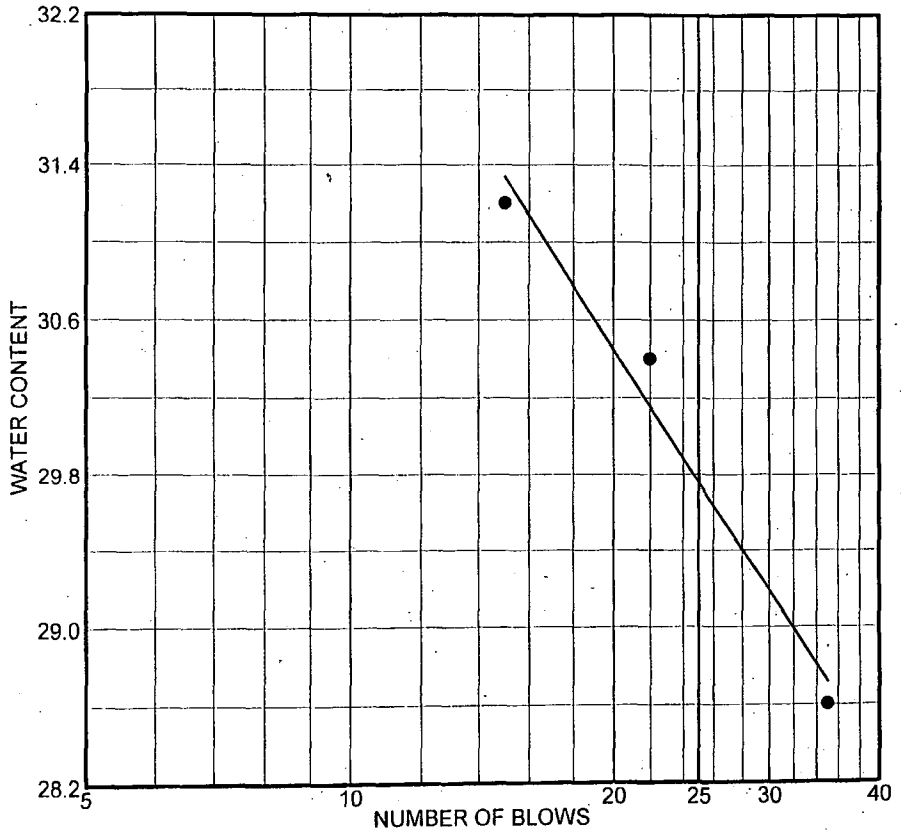


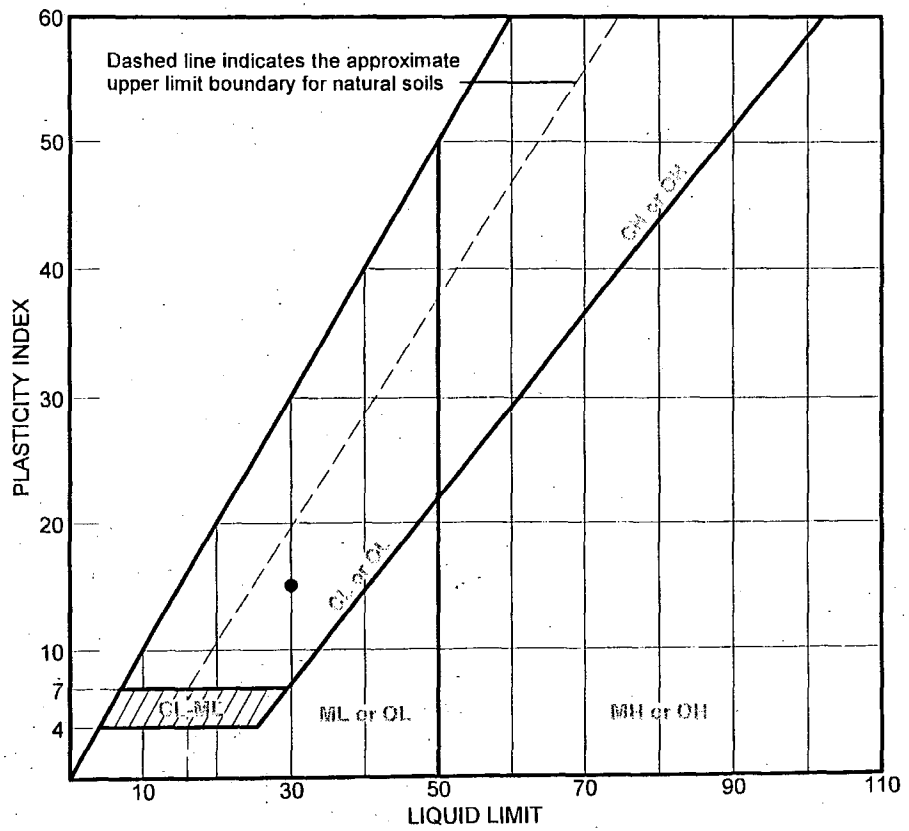
Liquid Limit= 30
Plastic Limit= 18
Plasticity Index= 12

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	17.94	18.97			
Dry+Tare	16.86	17.82			
Tare	10.78	11.54			
Moisture	17.8	18.3			

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-404	UD-6	161' to 163'	2-20-07	CL	Lean clay	20.2	30	15

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496 | Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reviewed by: SS
ASTM D4318-05 KAW 4/3/07

KAW 4/3/07

LIQUID AND PLASTIC LIMIT TEST DATA

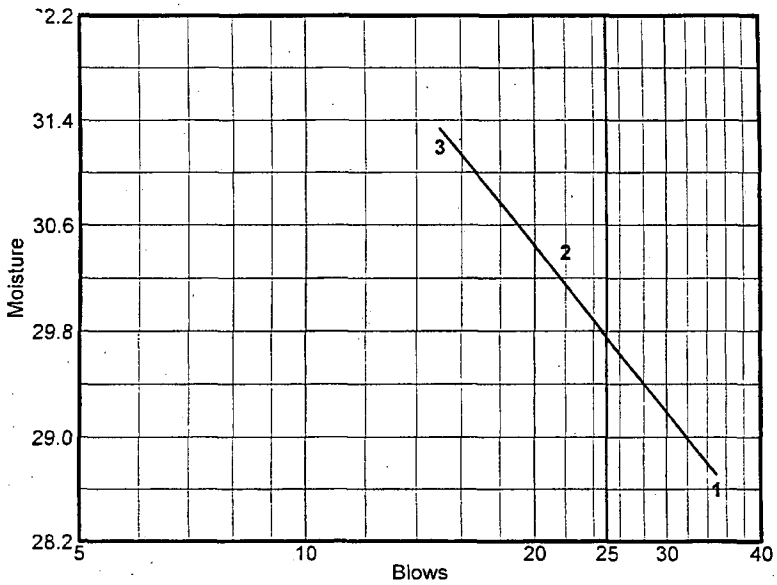
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496

Sample Data

Source: B-404
Sample No.: UD-6
Elev. or Depth: 161' to 163' **Sample Length(in./cm.):**
Location: B-404
Description: Lean clay
Date: 2-20-07 **Natural Moisture:** 20.2
USCS Class.: CL **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed by: SS
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	27.90	27.04	30.54			
Dry+Tare	24.11	23.28	25.87			
Tare	10.84	10.93	10.88			
# Blows	35	22	15			
Moisture	28.6	30.4	31.2			

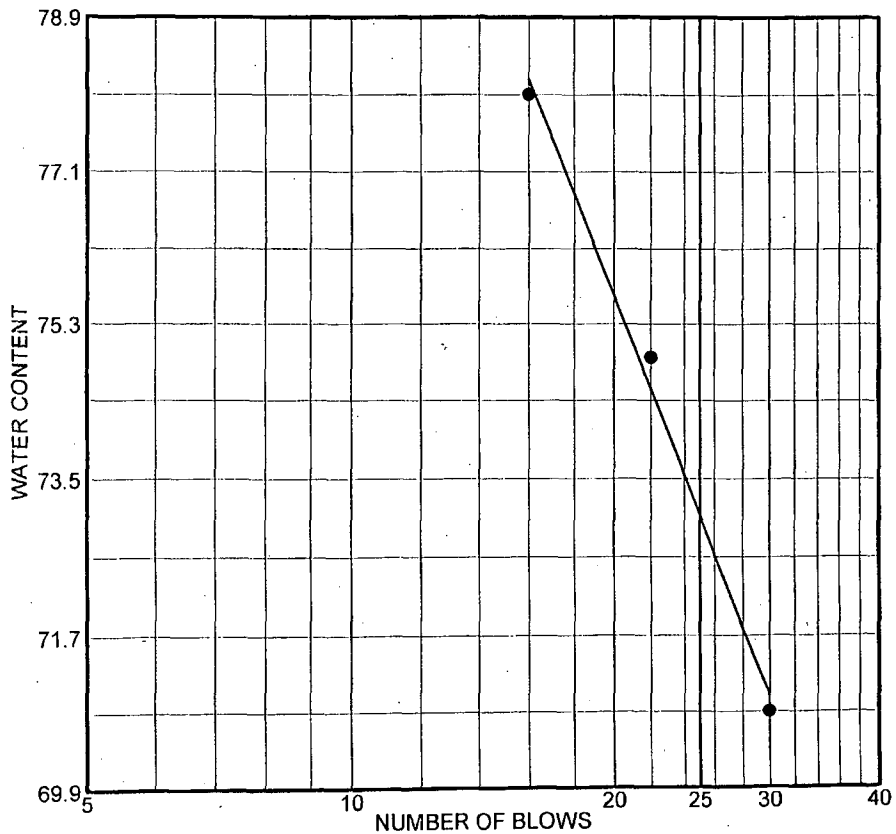


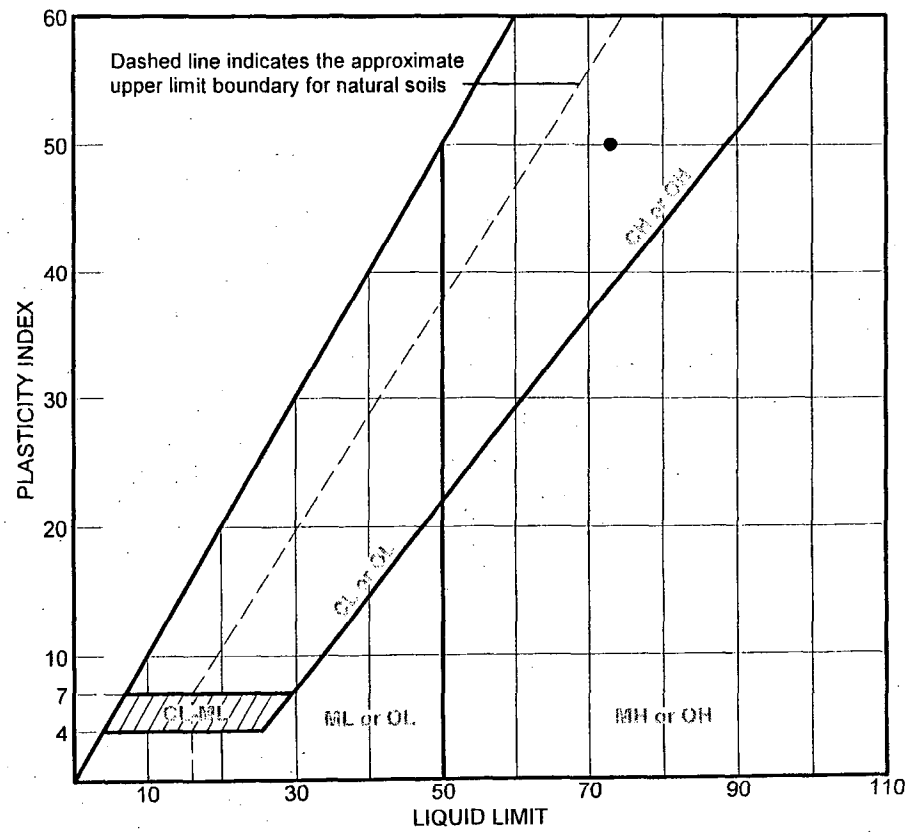
Liquid Limit= 30
Plastic Limit= 15
Plasticity Index= 15

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	20.16	17.27			
Dry+Tare	19.06	16.45			
Tare	11.60	10.98			
Moisture	14.7	15.0			

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-405-DH	UD-5	113' TO 115'	2-22-07	CH	Fat clay	25.8	73	50

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496 | Figure

MACTEC, INC.

Charlotte, North Carolina

● Insufficient material for 2 PL determinations and particle size analysis.
Tested by: JA Reviewed by: SS
ASTM 4318-05

KAW 4/3/07

KAW 4/3/07

LIQUID AND PLASTIC LIMIT TEST DATA

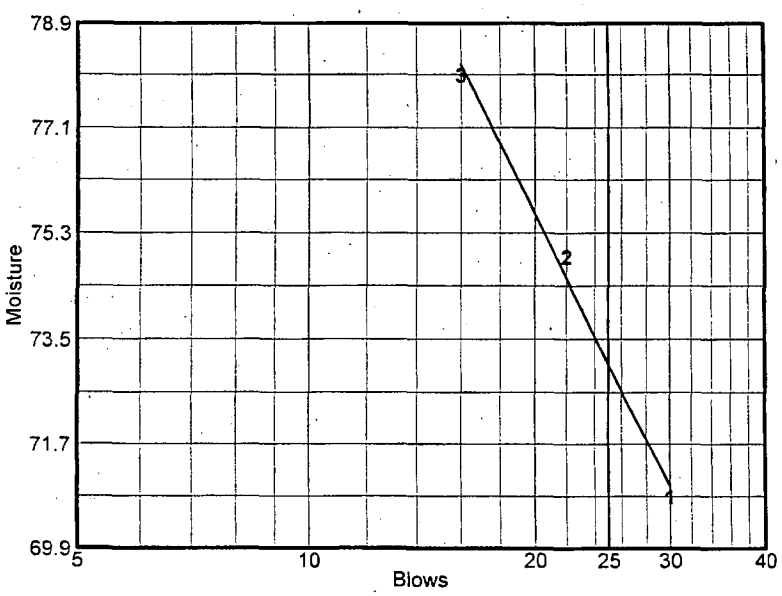
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496

Sample Data

Source: B-405-DH
Sample No.: UD-5
Elev. or Depth: 113' TO 115' **Sample Length(in./cm.):**
Location: B-405-DH
Description: Fat clay
Date: 2-22-07 **Natural Moisture:** 25.8
USCS Class.: CH **AASHTO Class.:**
Testing Remarks: Insufficient material for 2 PL determinations and particle size analysis.
Tested by: JA Reviewed by: SS
ASTM 4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	19.05	21.15	23.62			
Dry+Tare	15.65	16.79	18.36			
Tare	10.85	10.97	11.62			
# Blows	30	22	16			
Moisture	70.8	74.9	78.0			



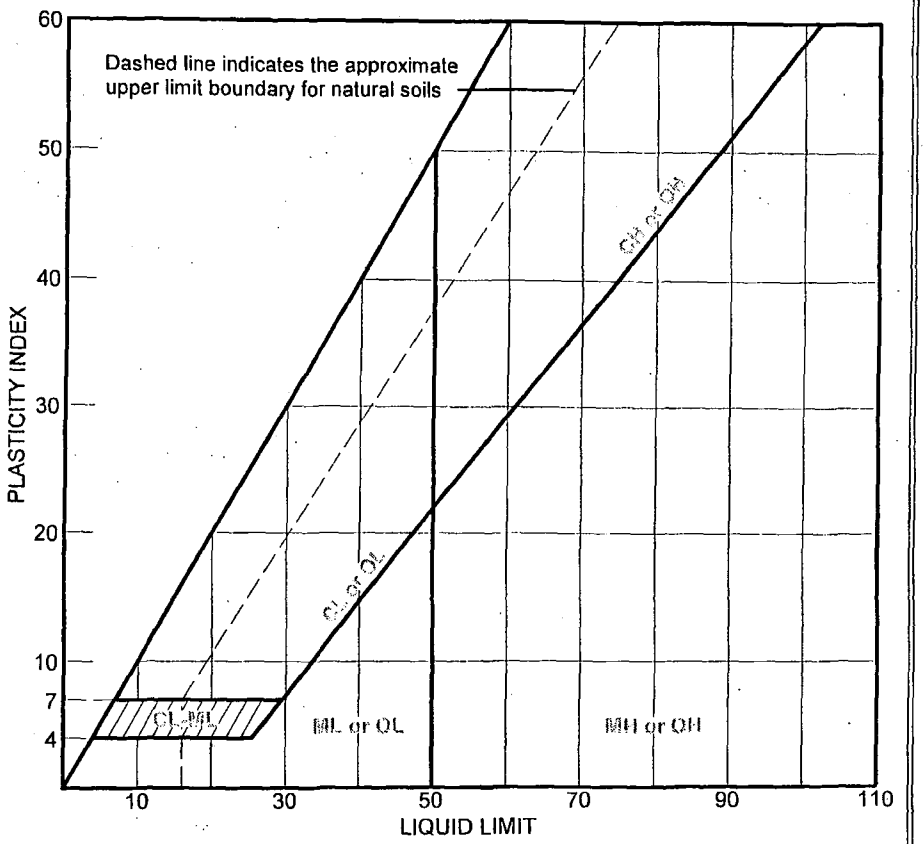
Liquid Limit= 73
Plastic Limit= 23
Plasticity Index= 50

LIQUID AND PLASTIC LIMIT TEST DATA

Plastic Limit Data

.un No.	1	2	3	4	
Wet+Tare	11.13				
Dry+Tare	9.87				
Tare	4.45				
Moisture	23.2				

LIQUID AND PLASTIC LIMITS TEST REPORT



	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-405	UD-7	148' to 150'	2-14-07	SM	Silty sand	24.0	NV	NP

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496 | Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reviewed by: SS
ASTM D4318-05

SS 2/25/2007

KAW 4/3/07

LIQUID AND PLASTIC LIMIT TEST DATA

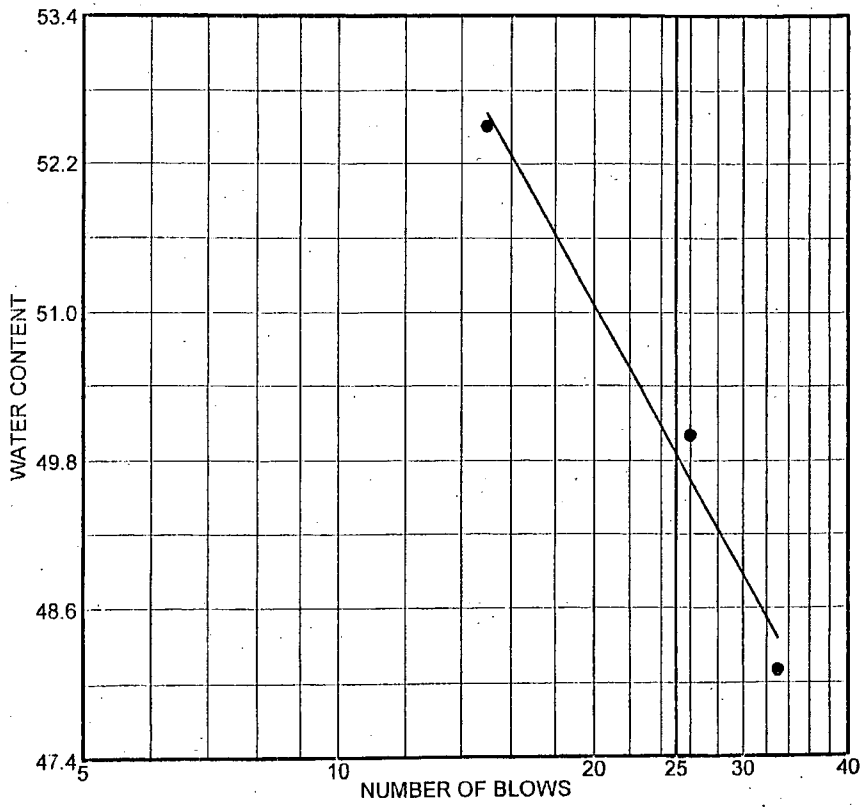
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496

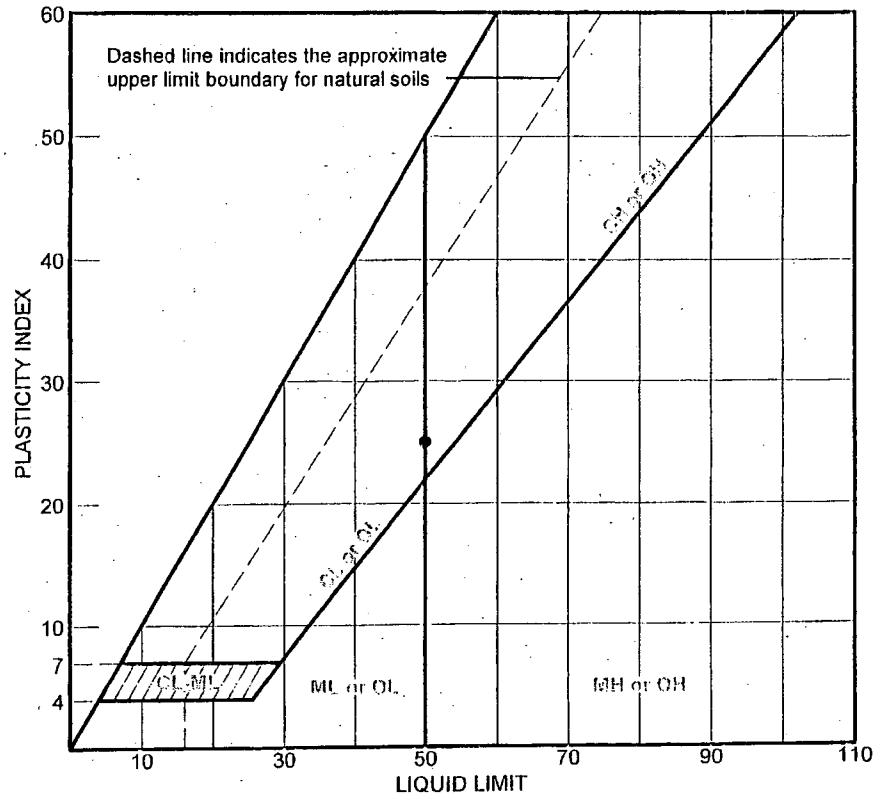
Sample Data

Source: B-405
Sample No.: UD-7
Elev. or Depth: 148' to 150' **Sample Length(in./cm.):**
Location: B-405
Description: Silty sand
Date: 2-14-07 **Natural Moisture:** 24.0
USCS Class.: SM **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed by: SS
ASTM D4318-05

Liquid Limit= NV
Plastic Limit= NP
Plasticity Index= NP

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-405	UD-14	318' to 320'	2-23-07	SC	Clayey sand		50	25

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496 | Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reviewed by: MH
ASTM D4318-05

KAW 3/29/07

LIQUID AND PLASTIC LIMIT TEST DATA

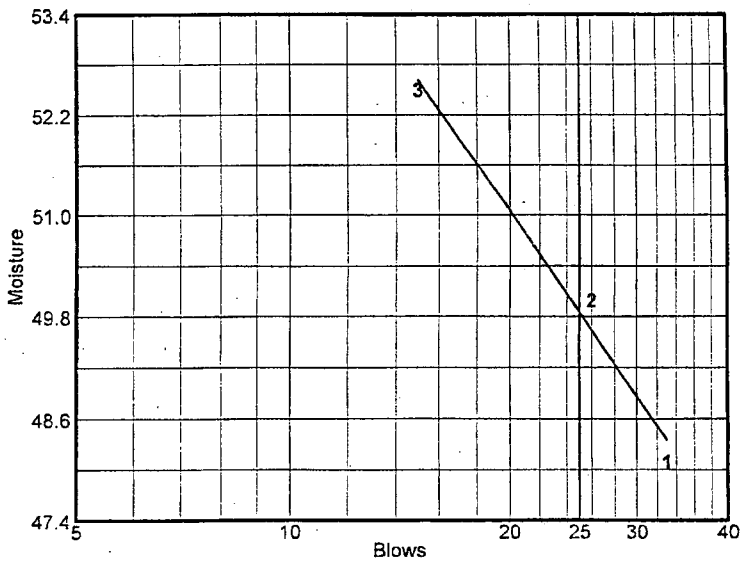
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496

Sample Data

Source: B-405
Sample No.: UD-14
Elev. or Depth: 318' to 320' **Sample Length(in./cm.):**
Location: B-405
Description: Clayey sand
Date: 2-23-07 **Natural Moisture:** **USCS Class.:** SC **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed by: MH
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	25.75	30.62	22.31			
Dry+Tare	20.92	24.23	18.29			
Tare	10.87	11.46	10.63			
# Blows	33	26	15			
Moisture	48.1	50.0	52.5			

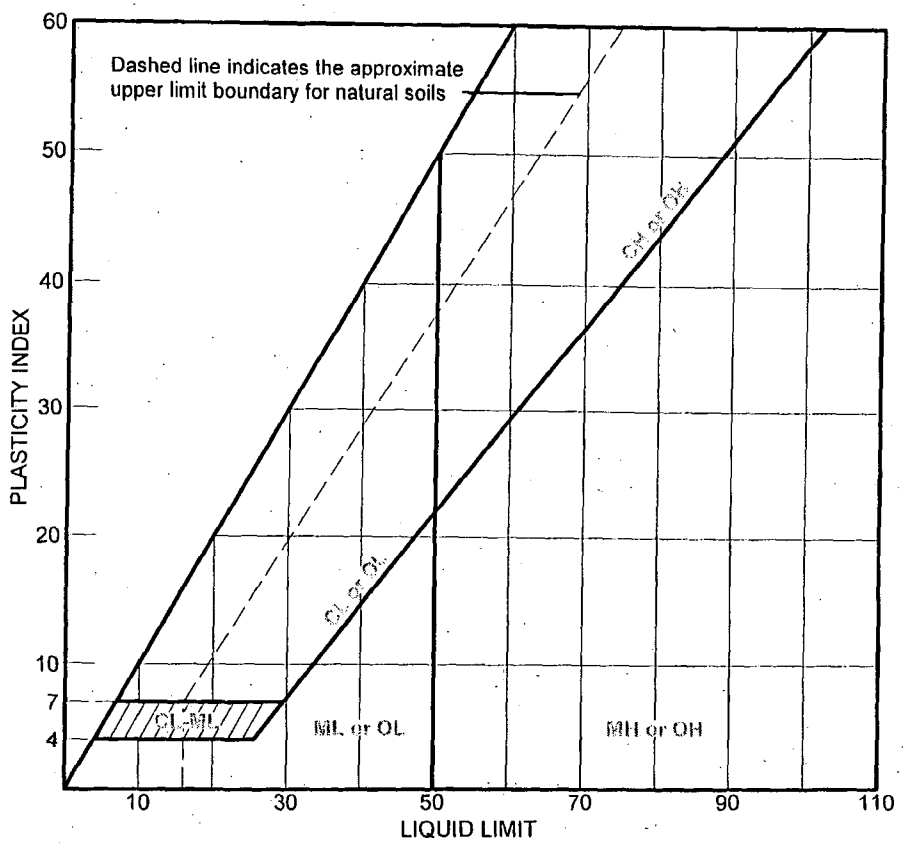


Liquid Limit= 50
Plastic Limit= 25
Plasticity Index= 25

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	22.96	19.27			
Dry+Tare	20.66	17.62			
Tare	11.57	10.94			
Moisture	25.3	24.7			

LIQUID AND PLASTIC LIMITS TEST REPORT



	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-405-DH	UD-15	343' to 345'	2-25-07	SP	Poorly graded sand	20.9	NV	NP

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496 | Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reviewed by: MH
ASTM D4318-05 KAW 4/13/07

KAW 4/13/07

LIQUID AND PLASTIC LIMIT TEST DATA

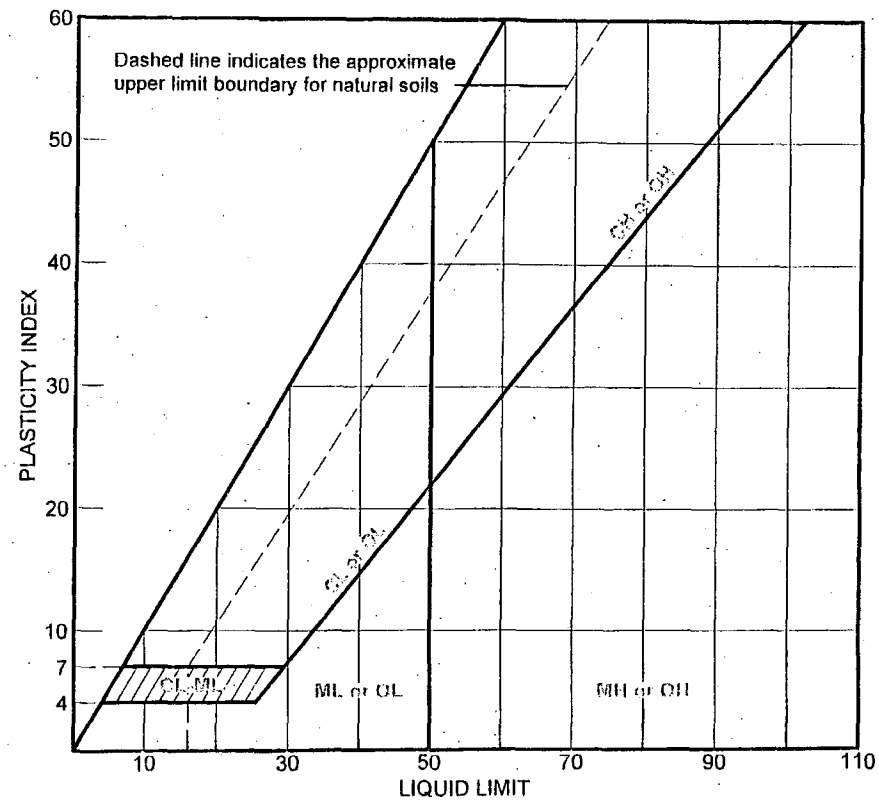
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496

Sample Data

Source: B-405-DH
Sample No.: UD-15
Elev. or Depth: 343' to 345' **Sample Length(in./cm.):**
Location: B-405-DH
Description: Poorly graded sand
Date: 2-25-07 **Natural Moisture:** 20.9
USCS Class.: SP **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed by: MH
ASTM D4318-05

Liquid Limit= NV
Plastic Limit= NP
Plasticity Index= NP

LIQUID AND PLASTIC LIMITS TEST REPORT



	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-405	UD-22	518' to 520'	2-25-07	SM	Silty sand		NV	NP

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496 | Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reviewed by: MH
ASTM D4318-05

KAW 3/29/07

LIQUID AND PLASTIC LIMIT TEST DATA

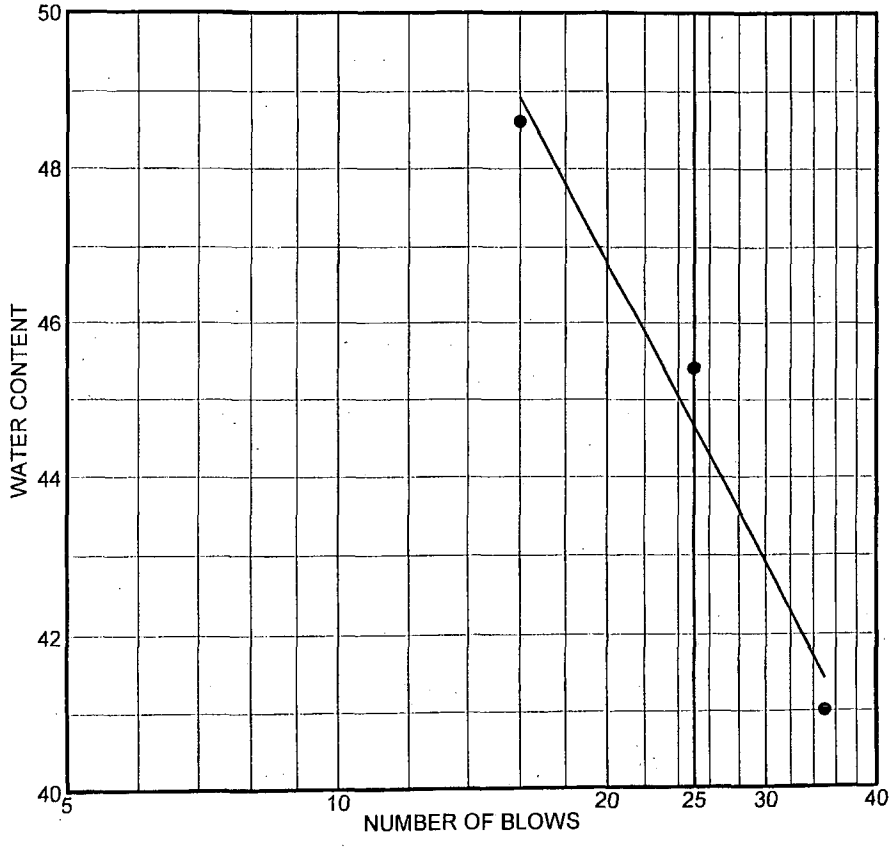
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496

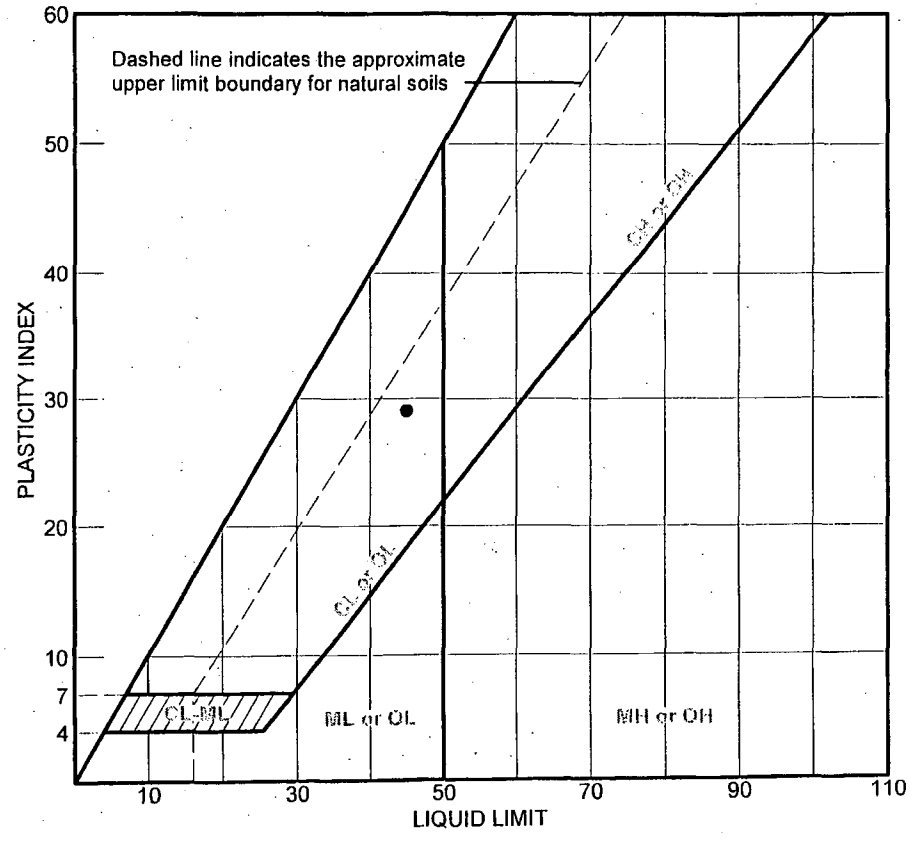
Sample Data

Source: B-405
Sample No.: UD-22
Elev. or Depth: 518' to 520' **Sample Length(in./cm.):**
Location: B-405
Description: Silty sand
Date: 2-25-07 **Natural Moisture:** **USCS Class.:** SM **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed by: MH
ASTM D4318-05

Liquid Limit= NV
Plastic Limit= NP
Plasticity Index= NP

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-405-DH	UD-25	598' to 599'	2-22-07	CL	Lean clay	18.4	45	29

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496 | Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reviewed by: MH
ASTM D4318-05 KAW 4/3/07

KAW 4/3/07

LIQUID AND PLASTIC LIMIT TEST DATA

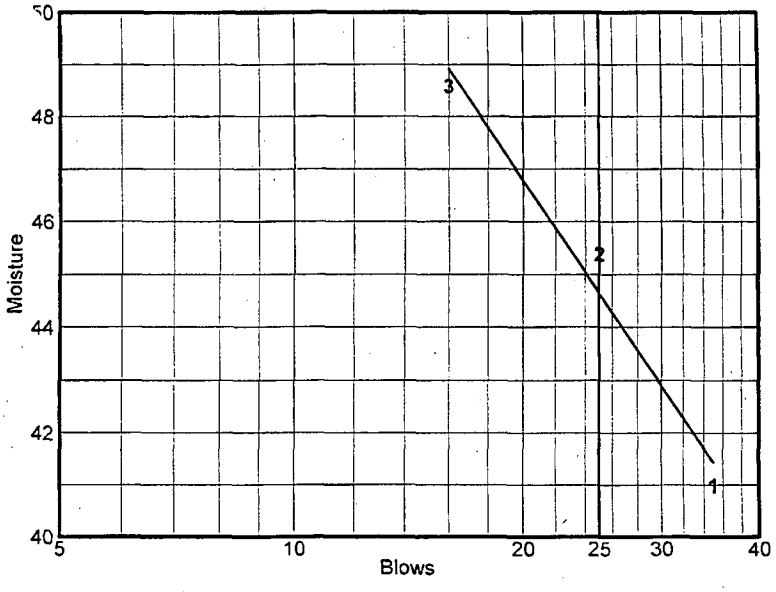
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496

Sample Data

Source: B-405-DH
Sample No.: UD-25
Elev. or Depth: 598' to 599' **Sample Length(in./cm.):**
Location: B-405-DH
Description: Lean clay
Date: 2-22-07 **Natural Moisture:** 18.4
USCS Class.: CL **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed by: MH
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	26.84	25.80	25.80			
Dry+Tare	22.20	21.09	20.95			
Tare	10.88	10.72	10.98			
# Blows	35	25	16			
Moisture	41.0	45.4	48.6			

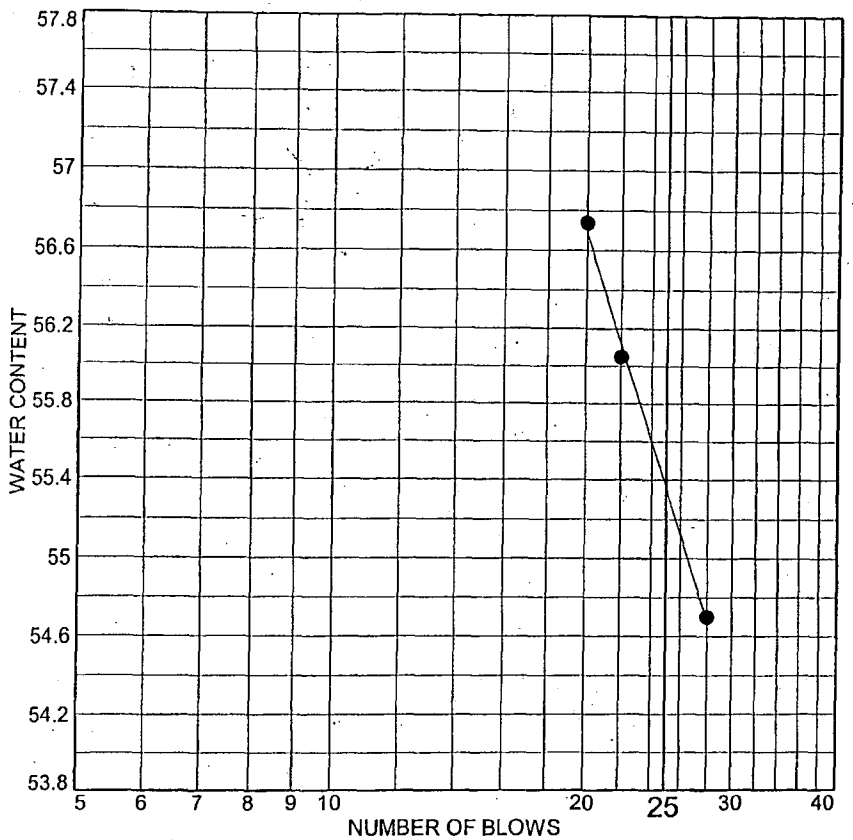


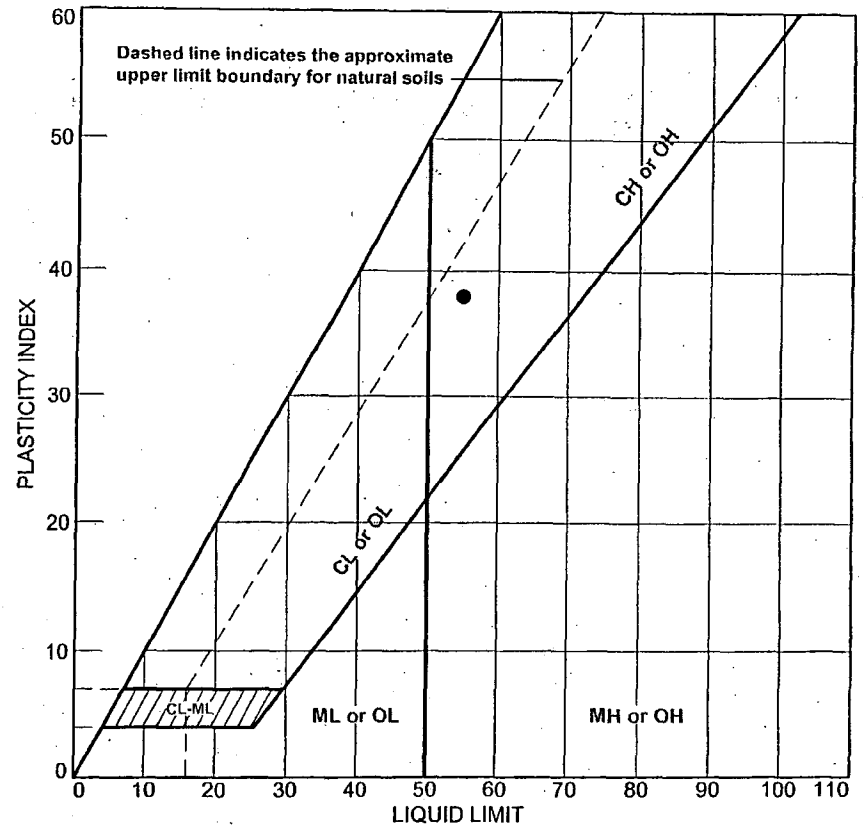
Liquid Limit= 45
Plastic Limit= 16
Plasticity Index= 29

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	19.84	25.07			
Dry+Tare	18.63	23.10			
Tare	10.99	10.97			
Moisture	15.8	16.2			

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 405-DH	STP-054	3.0'-4.5'	10/18/2006	CH	Fat Clay	25.0	55	38
		(SS-3)							

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC/TH Reviewed By:ST

ASTM D4318-05

MH 4-3-07

KAW 4/3/07

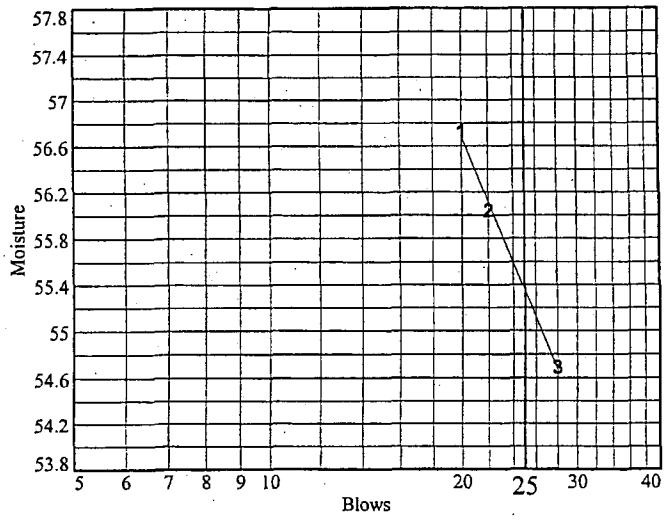
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 405-DH
Depth: 3.0'-4.5'
Sample Number: STP-054 (SS-3)
Material Description: Fat Clay
Date: 10/18/2006
USCS Class.: CH
Testing Remarks: Tested By:AC/TH
Reviewed By:ST
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	37.62	36.76	37.82			
Dry+Tare	34.21	33.47	34.56			
Tare	28.20	27.60	28.60			
# Blows	20	22	28			
Moisture	56.7	56.0	54.7			



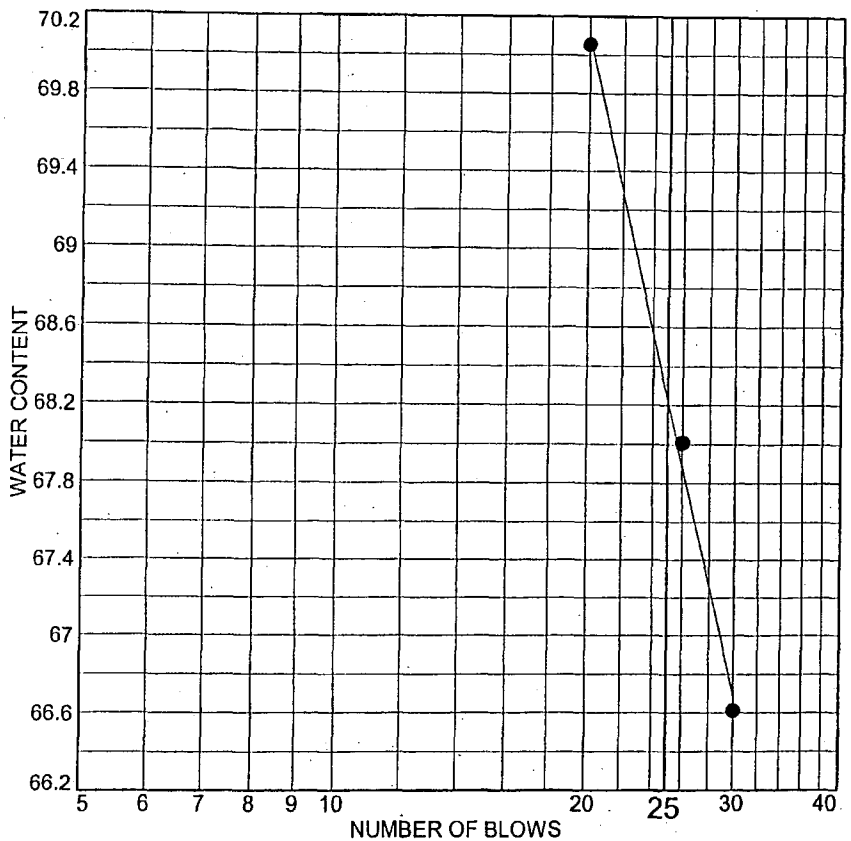
Liquid Limit= 55
Plastic Limit= 17
Plasticity Index= 38
Natural Moisture= 25.0
Liquidity Index= 0.2

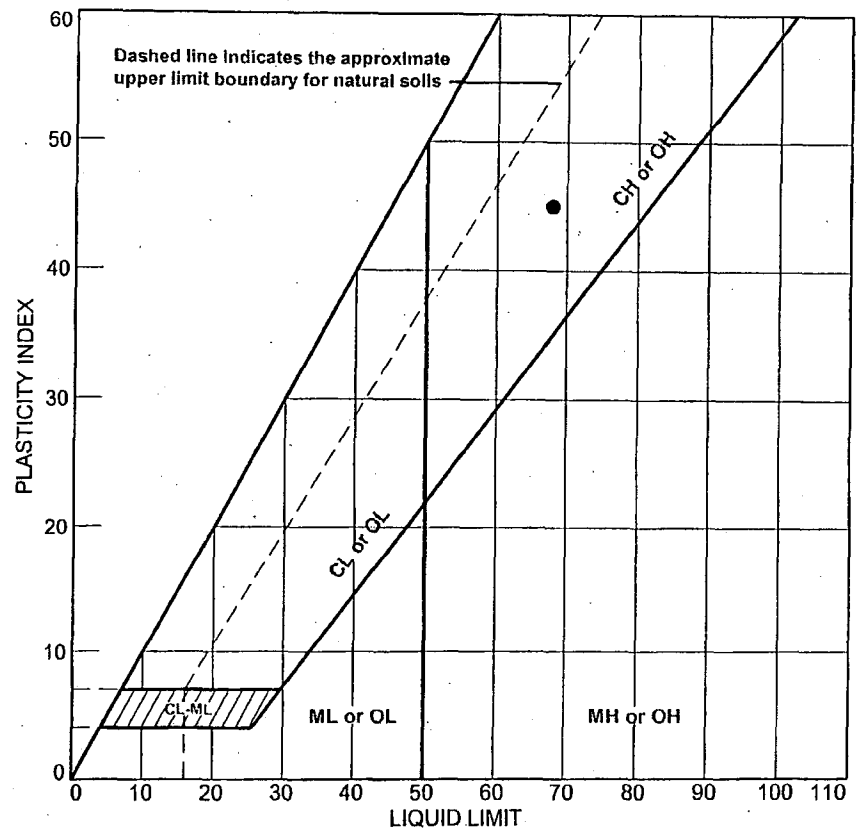
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	28.52	28.24			
Dry+Tare	27.51	27.24			
Tare	21.64	21.57			
Moisture	17.2	17.6			

MK 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 405-DH	STP-060 (SS-15)	53.5'-55.0'	10/19/2006	CH	Fat Clay	27.9	68	45

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC/TH Reviewed By:ST
ASTM D4318-05

MK 4-3-07

KAW 4/3/07

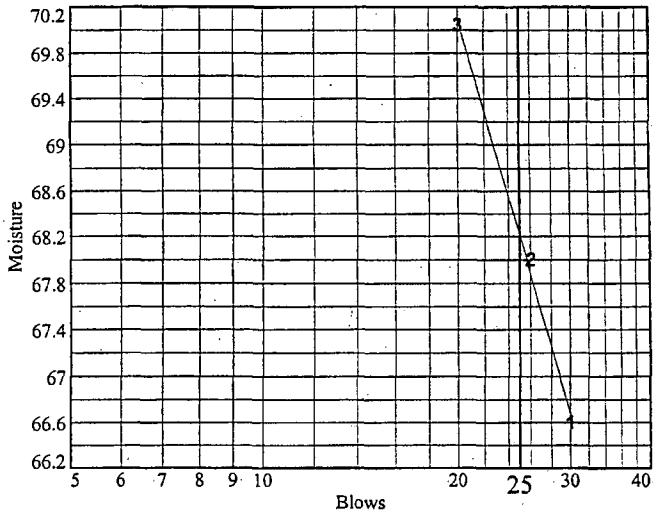
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 405-DH
Depth: 53.5'-55.0' **Sample Number:** STP-060 (SS-15)
Material Description: Fat Clay
Date: 10/19/2006 **USCS Class.:** CH
Testing Remarks: Tested By:AC/TH Reviewed By:ST
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	37.97	36.49	37.47			
Dry+Tare	34.08	33.11	33.68			
Tare	28.24	28.14	28.27			
# Blows	30	26	20			
Moisture	66.6	68.0	70.1			



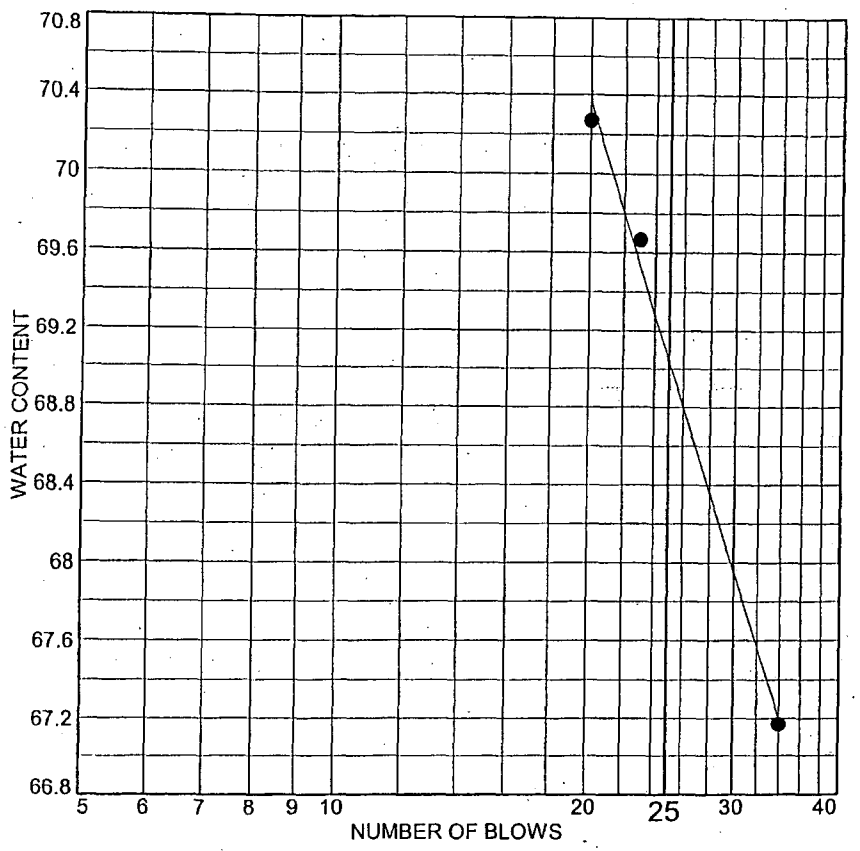
Liquid Limit= 68
Plastic Limit= 23
Plasticity Index= 45
Natural Moisture= 27.9
Liquidity Index= 0.1

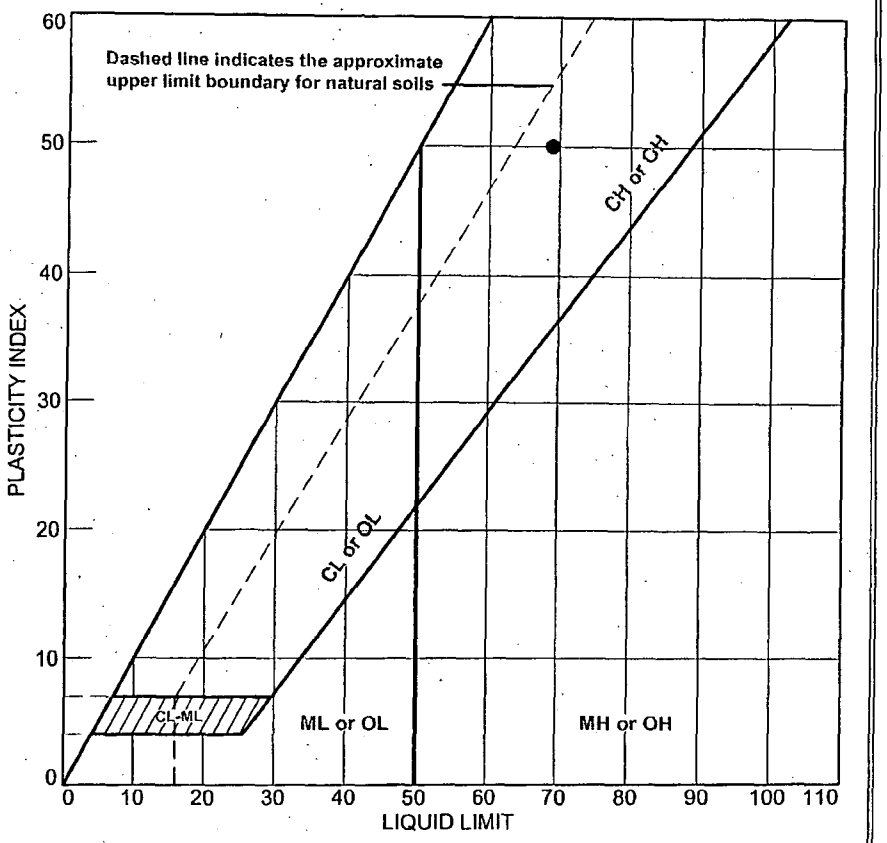
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	35.37	35.81			
Dry+Tare	33.95	34.43			
Tare	27.91	28.43			
Moisture	23.5	23.0			

MAK 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 405-DH	STP-063	98.5'-100.0'	10/20/2006	CH	Fat Clay	27.3	69	50
		(SS-22)							

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC Reviewed By:MH

ASTM D4318-05

MH 4-3-07

KAW 413107

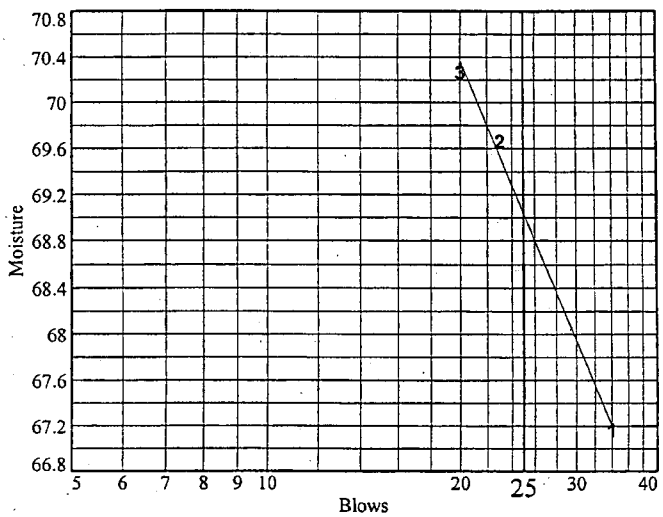
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 405-DH
Depth: 98.5'-100.0' **Sample Number:** STP-063 (SS-22)
Material Description: Fat Clay
Date: 10/20/2006 **USCS Class.:** CH
Testing Remarks: Tested By:AC Reviewed By:MH
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	35.92	36.32	36.26			
Dry+Tare	32.36	32.99	32.88			
Tare	27.06	28.21	28.07			
# Blows	34	23	20			
Moisture	67.2	69.7	70.3			



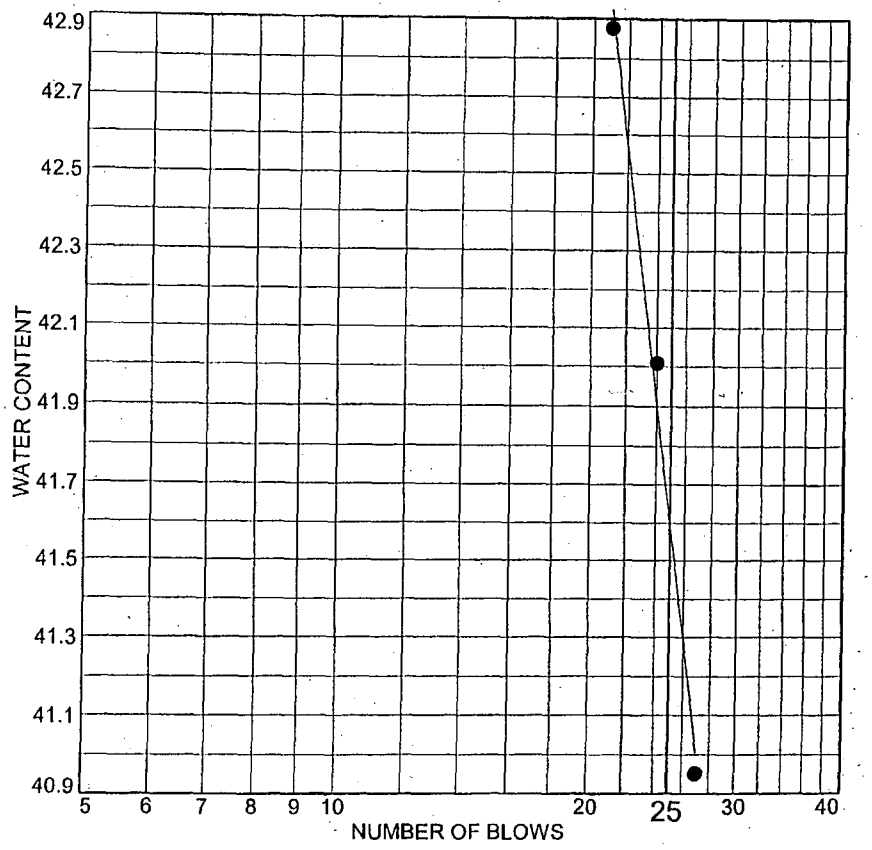
Liquid Limit= 69
Plastic Limit= 19
Plasticity Index= 50
Natural Moisture= 27.3
Liquidity Index= 0.2

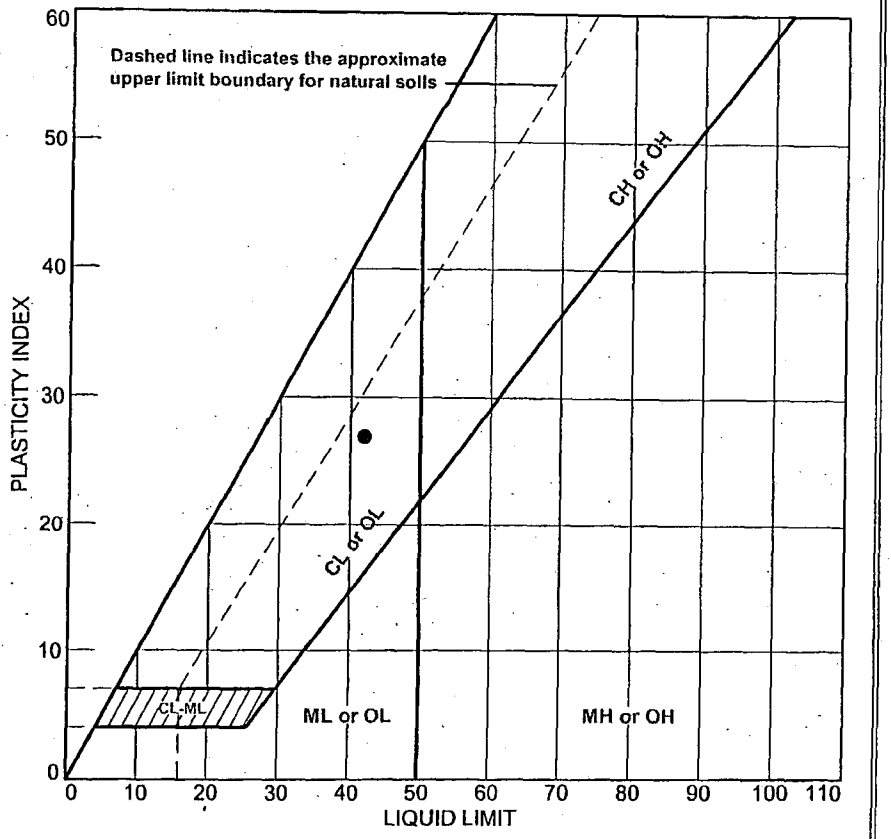
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	37.38	36.34			
Dry+Tare	35.89	35.03			
Tare	27.99	28.06			
Moisture	18.9	18.8			

MAK 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 405-DH	STP-066 (SS-26)	138.5'-140.0'	10/20/2006	CL	Sandy Lean Clay	17.7	42	27

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC Reviewed By:RF
ASTM D4318-05

MH
4-3-07

KAW 4/3/07

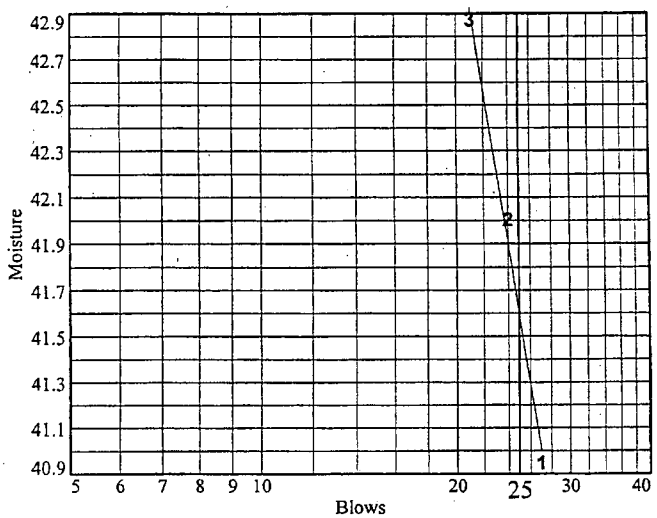
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 405-DH
Depth: 138.5'-140.0' **Sample Number:** STP-066 (SS-26)
Material Description: Sandy Lean Clay
Date: 10/20/2006 **USCS Class.:** CL
Testing Remarks: Tested By:AC Reviewed By:RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	39.01	38.35	38.21			
Dry+Tare	35.91	35.38	35.20			
Tare	28.34	28.31	28.18			
# Blows	27	24	21			
Moisture	41.0	42.0	42.9			



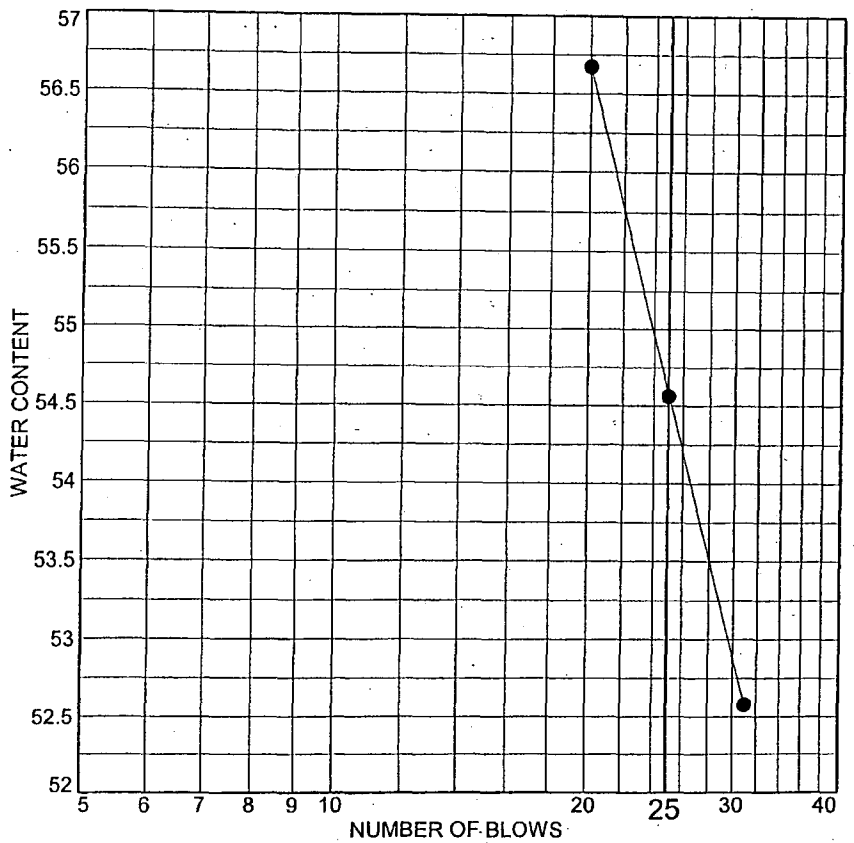
Liquid Limit= 42
Plastic Limit= 15
Plasticity Index= 27
Natural Moisture= 17.7
Liquidity Index= 0.1

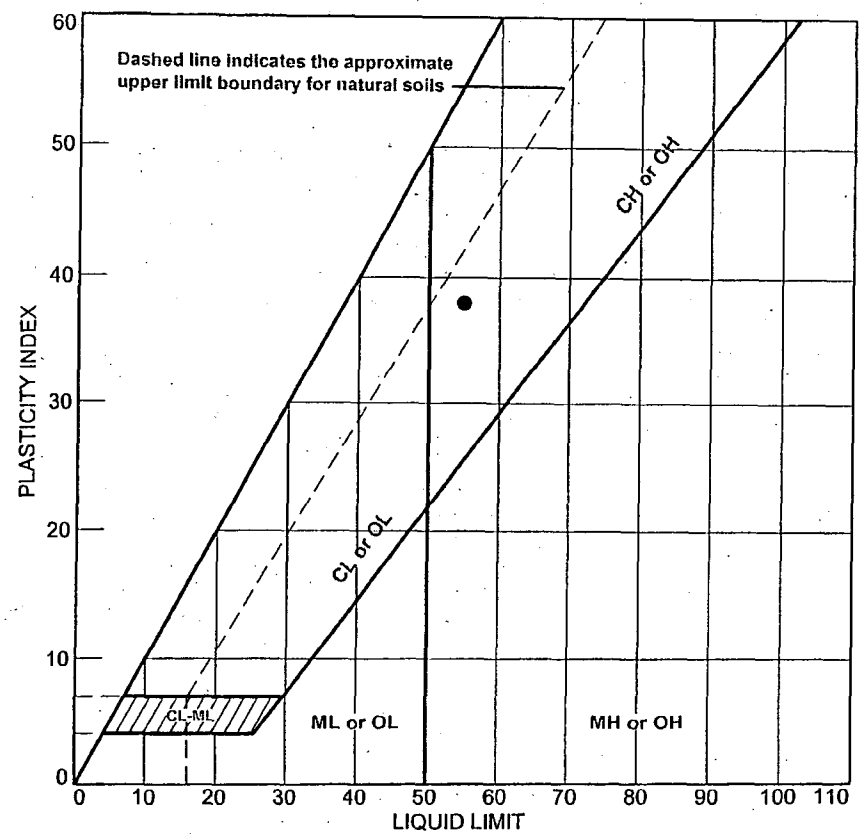
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	36.96	35.71			
Dry+Tare	35.82	34.71			
Tare	28.03	27.92			
Moisture	14.6	14.7			

MAB 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 405-DH	STP-067	158.5'-160'	10/21/2006	CH	Fat Clay	23.7	55	38
		(SS-27)							

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC/TH Reviewed By:ST

ASTM D4318-05

MA 4-3-07

ICAW 4/3/07

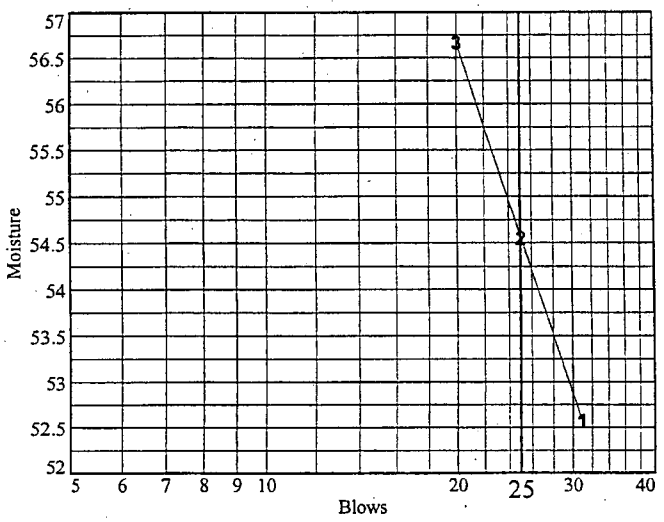
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 405-DH
Depth: 158.5'-160'
Sample Number: STP-067 (SS-27)
Material Description: Fat Clay
Date: 10/21/2006
USCS Class.: CH
Testing Remarks: Tested By:AC/TH Reviewed By:ST
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	37.21	37.42	36.68			
Dry+Tare	34.15	34.19	33.58			
Tare	28.33	28.27	28.11			
# Blows	31	25	20			
Moisture	52.6	54.6	56.7			



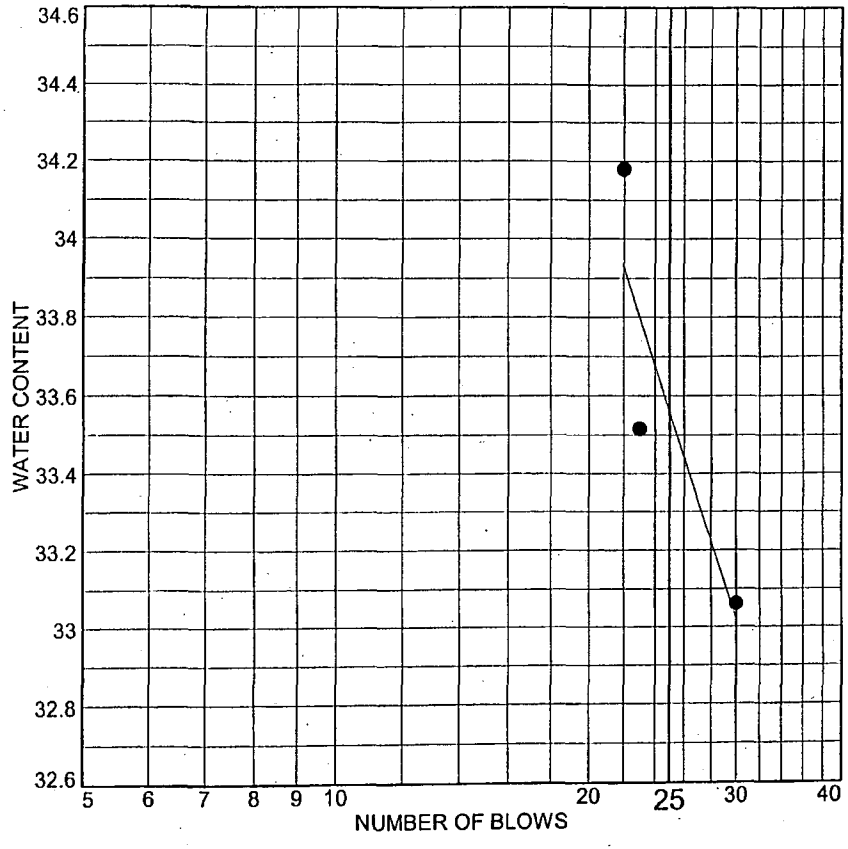
Liquid Limit= 55
Plastic Limit= 17
Plasticity Index= 38
Natural Moisture= 23.7
Liquidity Index= 0.2

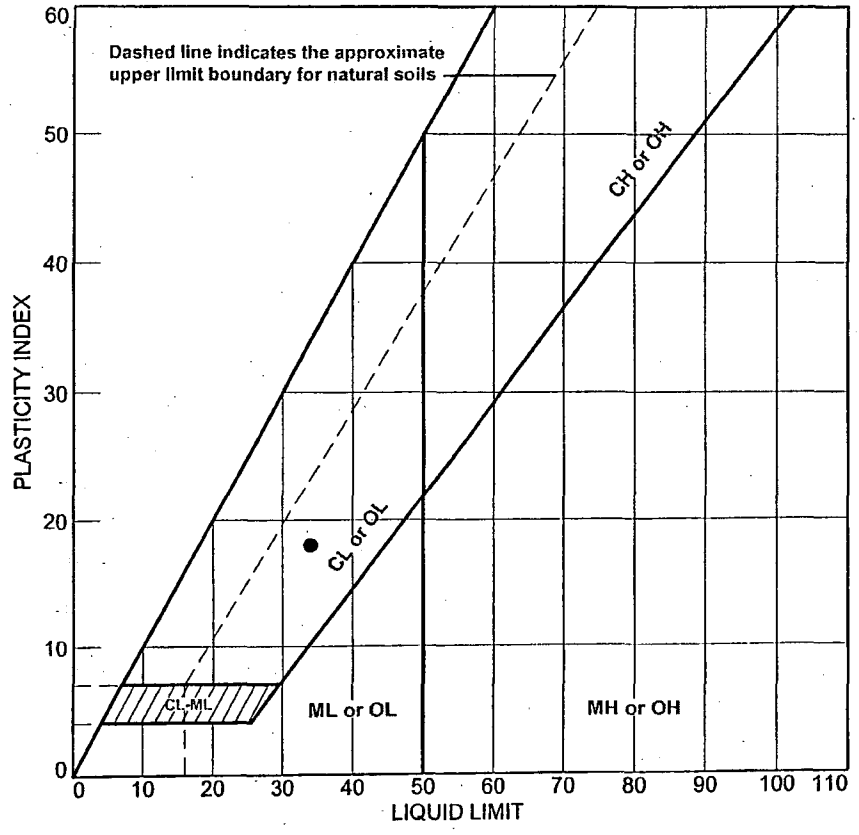
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	35.76	36.08			
Dry+Tare	34.61	34.96			
Tare	28.00	28.37			
Moisture	17.4	17.0			

MA 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 405-DH	STP-068	178.5'-180.0'	10/21/2006	CL	Sandy Lean Clay	22.6	34	18
		(SS-28)							

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC Reviewed By:RF

ASTM D4318-05

MA 4-3-07

KAW 4/3/07

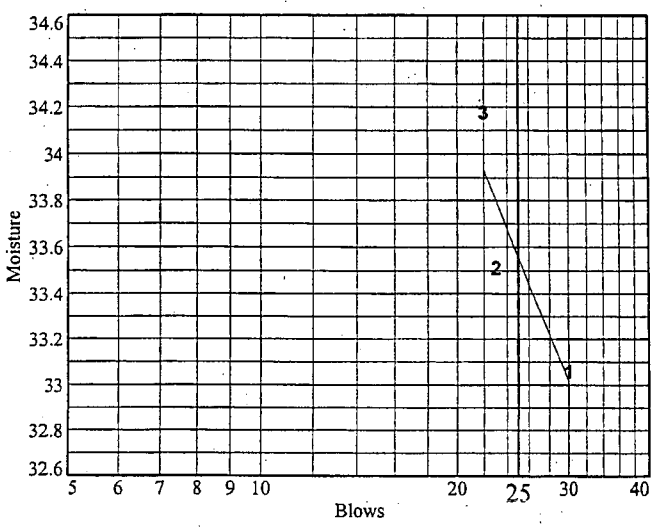
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 405-DH
Depth: 178.5'-180.0' **Sample Number:** STP-068 (SS-28)
Material Description: Sandy Lean Clay
Date: 10/21/2006 **USCS Class.:** CL
Testing Remarks: Tested By:AC Reviewed By:RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	32.46	36.92	36.27			
Dry+Tare	30.03	34.46	34.25			
Tare	22.68	27.12	28.34			
# Blows	30	23	22			
Moisture	33.1	33.5	34.2			



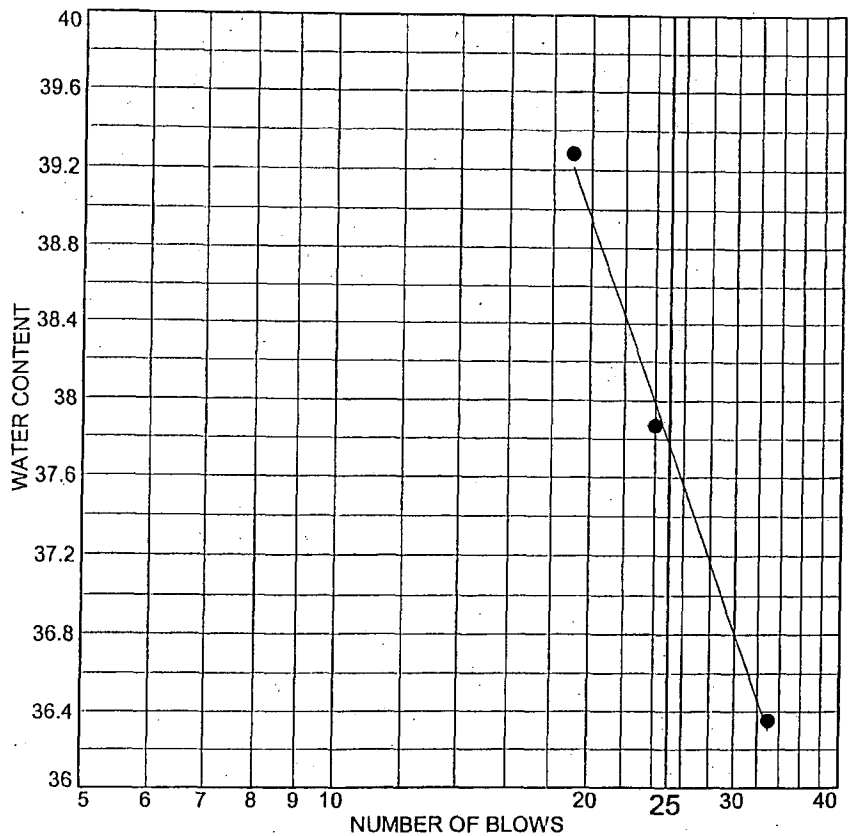
Liquid Limit= 34
Plastic Limit= 16
Plasticity Index= 18
Natural Moisture= 22.6
Liquidity Index= 0.4

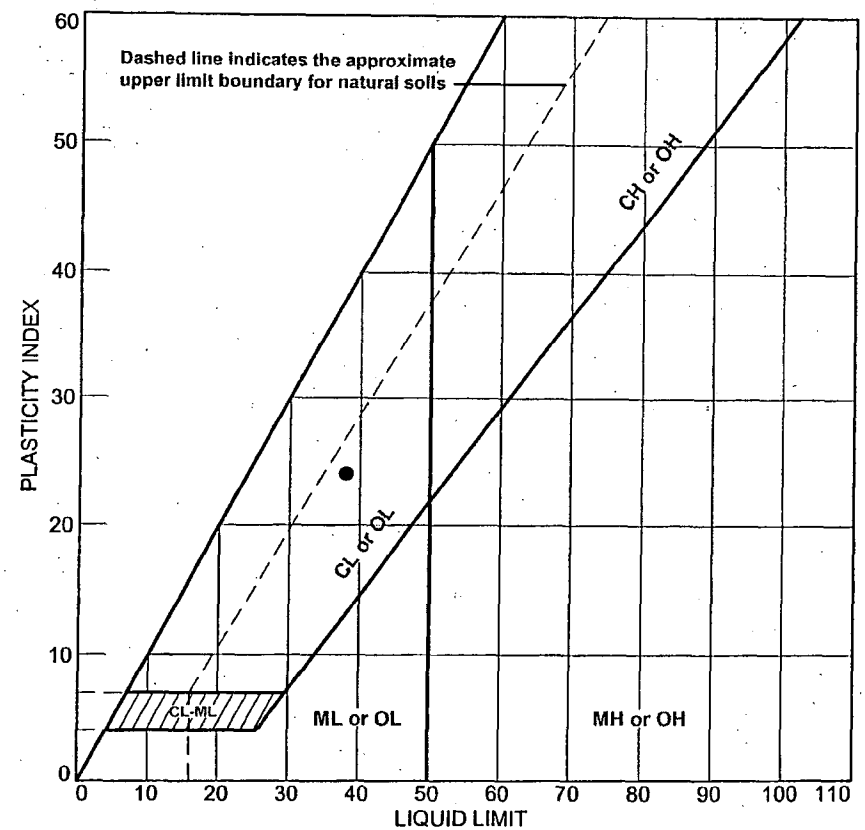
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	37.61	37.79			
Dry+Tare	36.43	36.48			
Tare	28.89	28.11			
Moisture	15.6	15.7			

MAK 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 405-DH	STP-069 (SS-29)	188.5'-190'	10/21/2006	CL	Sandy Lean Clay	16.7	38	24

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC/TH Reviewed By:ST/RF

ASTM D4318-05

MH 4-3-07

KAW 4/3/07

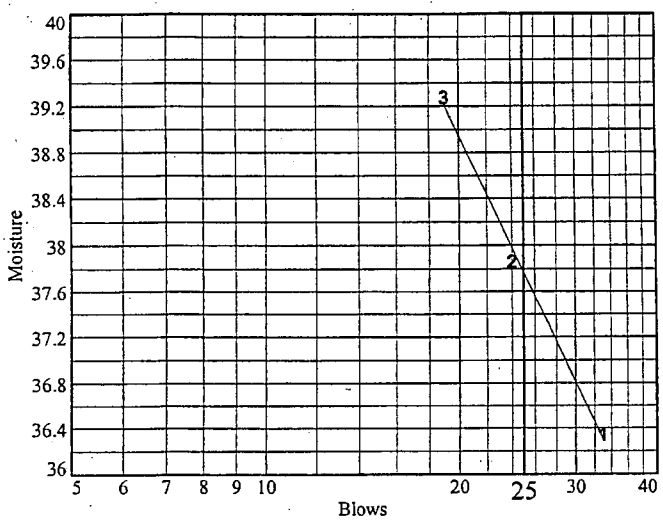
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 405-DH
Depth: 188.5'-190'
Sample Number: STP-069 (SS-29)
Material Description: Sandy Lean Clay
Date: 10/21/2006
USCS Class.: CL
Testing Remarks: Tested By:AC/TH
Reviewed By:ST/RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	31.74	38.03	32.04			
Dry+Tare	29.05	35.33	29.09			
Tare	21.65	28.20	21.58			
# Blows	33	24	19			
Moisture	36.4	37.9	39.3			



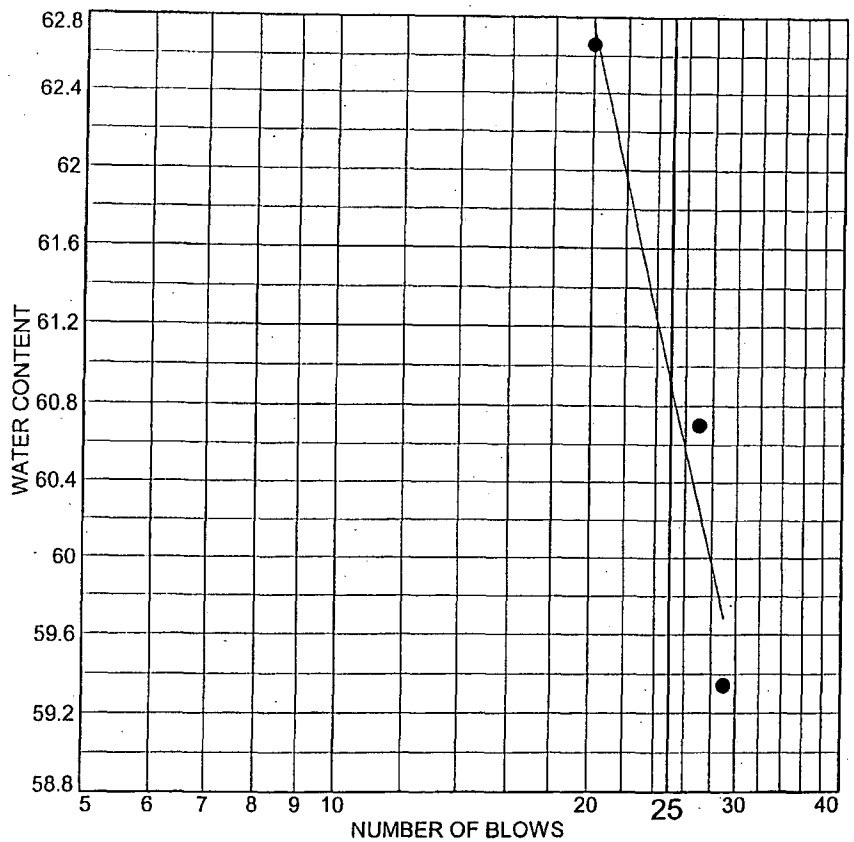
Liquid Limit= 38
Plastic Limit= 14
Plasticity Index= 24
Natural Moisture= 16.7
Liquidity Index= 0.1

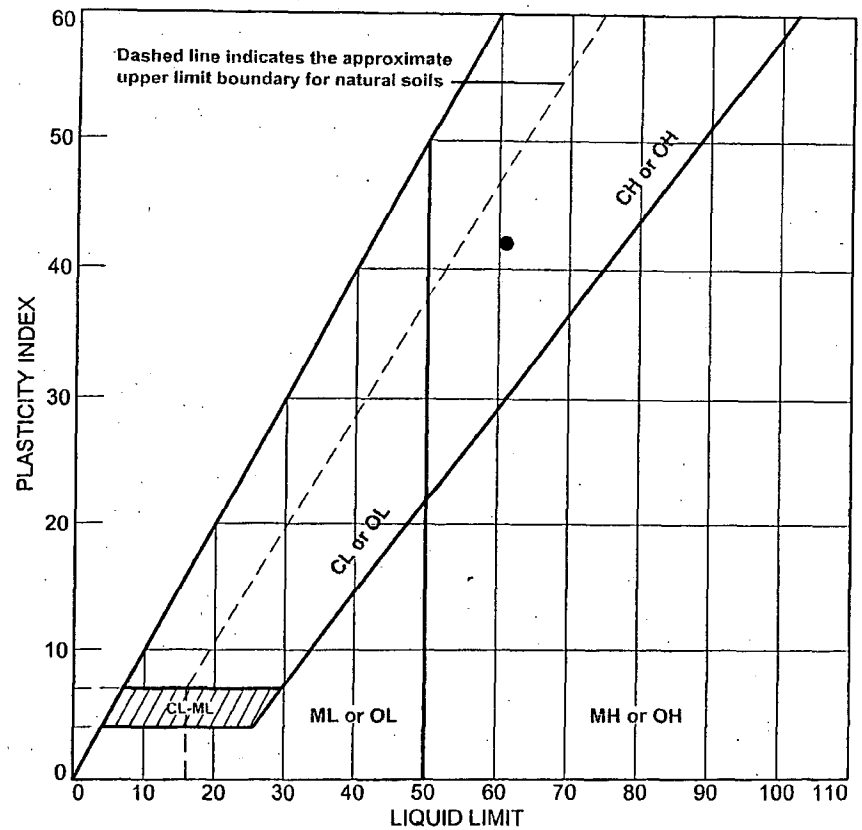
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	34.68	34.62			
Dry+Tare	33.72	33.67			
Tare	27.08	27.13			
Moisture	14.5	14.5			

MAK 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 405-DH	STP-070 (SS-30)	198.5'-200.0'	10/21/2006	CH	Fat Clay	24.0	61	42

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC/TH Reviewed By:RF
ASTM D4318-05

4-3-07

KAW 4/3/07

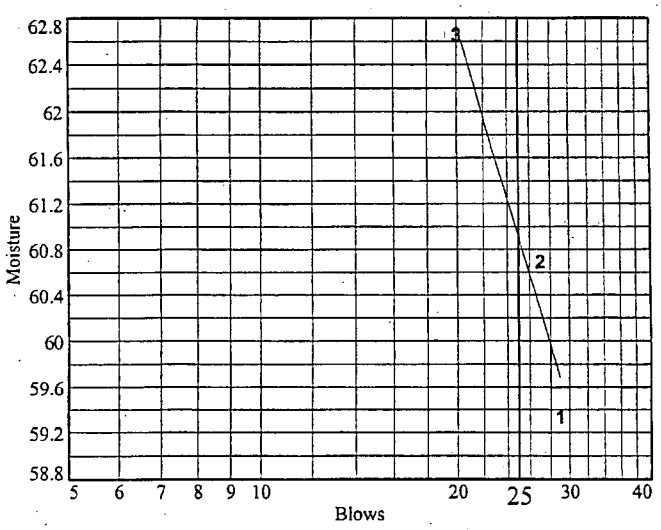
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 405-DH
Depth: 198.5'-200.0'
Sample Number: STP-070 (SS-30)
Material Description: Fat Clay
Date: 10/21/2006
USCS Class.: CH
Testing Remarks: Tested By:AC/TH
Reviewed By:RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	38.85	36.50	34.34			
Dry+Tare	34.88	33.38	30.90			
Tare	28.19	28.24	25.41			
# Blows	29	27	20			
Moisture	59.3	60.7	62.7			



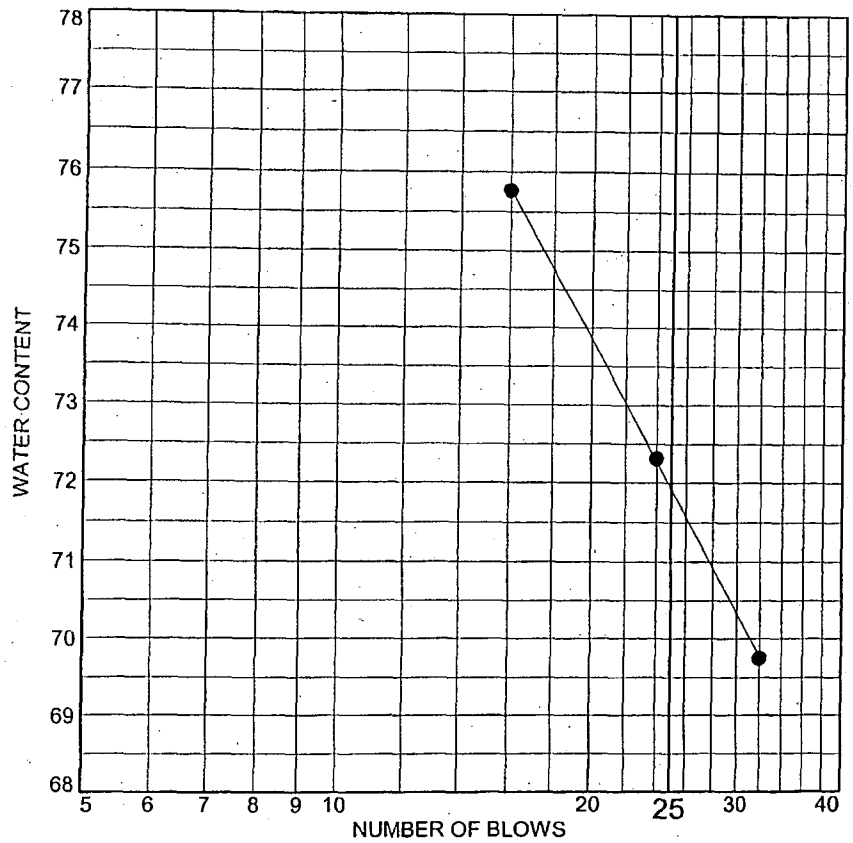
Liquid Limit= 61
Plastic Limit= 19
Plasticity Index= 42
Natural Moisture= 24.0
Liquidity Index= 0.1

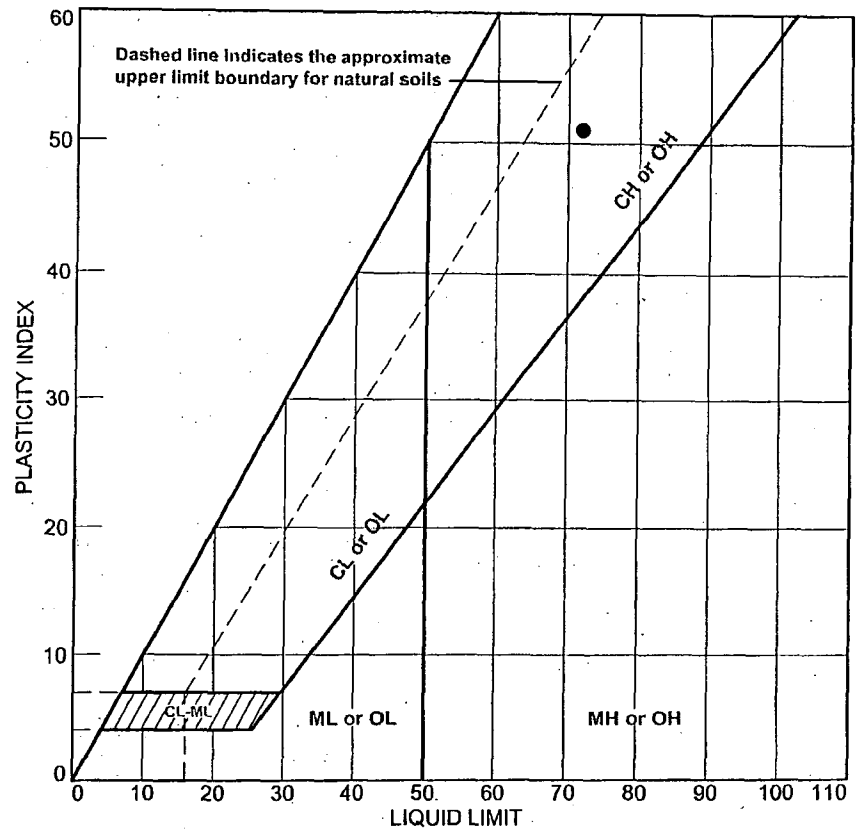
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	36.07	38.12			
Dry+Tare	34.83	36.59			
Tare	28.21	28.36			
Moisture	18.7	18.6			

MA 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 405-DH	STP-072	258.5'-260.0'	10/22/2006	CH	Fat Clay	27.3	72	51
		(SS-33)							

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC Reviewed By:RF

ASTM D4318-05

MA 4-3-07

KAW 4/3/07

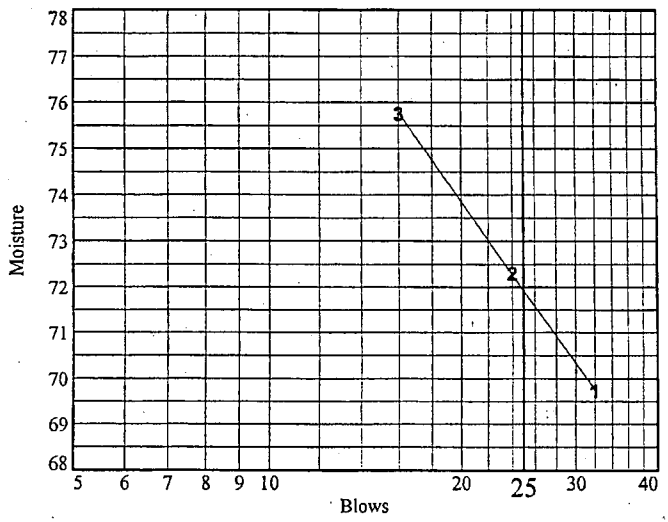
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 405-DH
Depth: 258.5'-260.0' **Sample Number:** STP-072 (SS-33)
Material Description: Fat Clay
Date: 10/22/2006 **USCS Class.:** CH
Testing Remarks: Tested By:AC Reviewed By:RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	33.32	35.71	35.66			
Dry+Tare	30.07	32.55	31.97			
Tare	25.41	28.18	27.10			
# Blows	32	24	16			
Moisture	69.7	72.3	75.8			



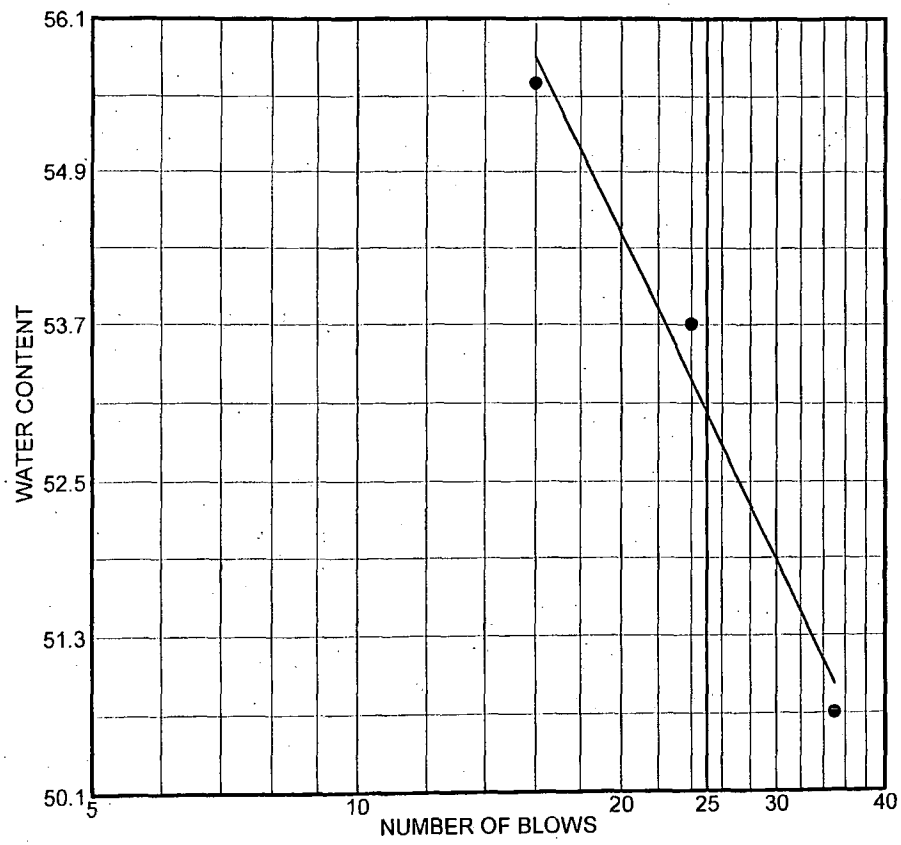
Liquid Limit= 72
Plastic Limit= 21
Plasticity Index= 51
Natural Moisture= 27.3
Liquidity Index= 0.1

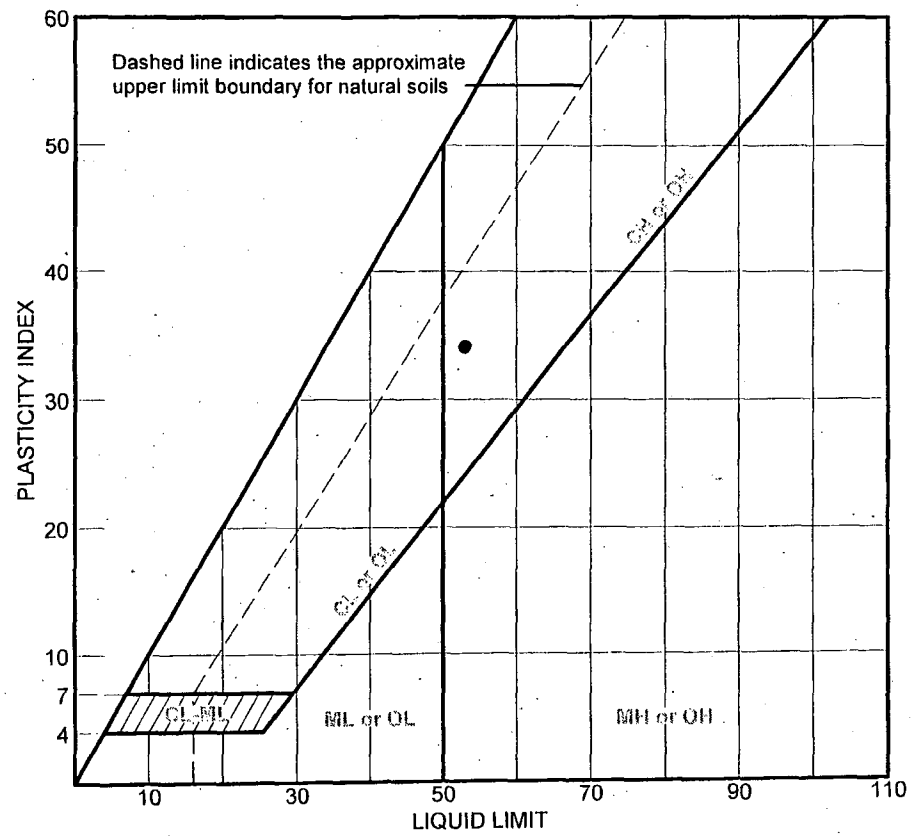
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	37.59	36.67			
Dry+Tare	35.96	35.24			
Tare	28.05	28.28			
Moisture	20.6	20.5			

MK 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-405-DH	SS-36	320.0' to 321.5'	3-15-07	CH	Fat clay	19.7	53	34

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496 | Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reviewed by: MH KAW 4/13/07
ASTM D4318-05

KAW 4/13/07

LIQUID AND PLASTIC LIMIT TEST DATA

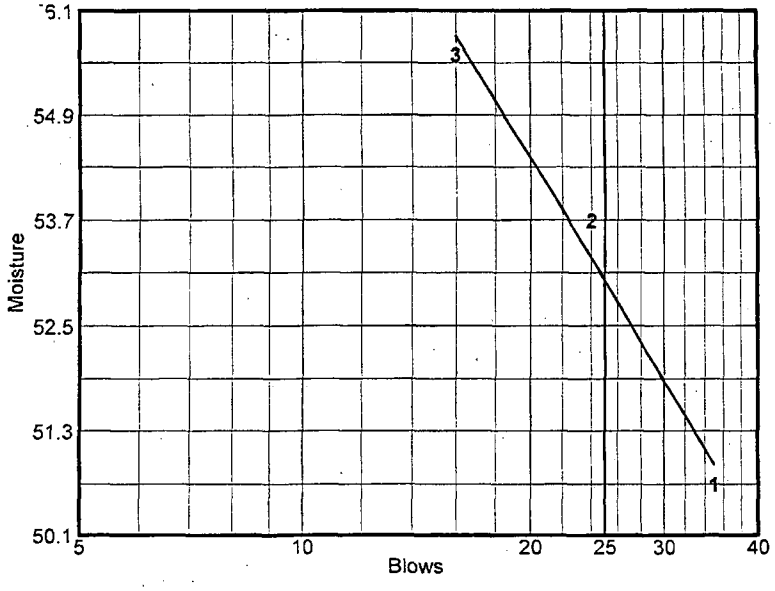
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496

Sample Data

Source: B-405-DH
Sample No.: SS-36
Elev. or Depth: 320.0' to 321.5' **Sample Length(in./cm.):**
Location: B-405-DH
Description: Fat clay
Date: 3-15-07 **Natural Moisture:** 19.7
USCS Class.: CH **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed by: MH
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	25.39	26.12	26.72			
Dry+Tare	20.52	20.83	21.05			
Tare	10.92	10.97	10.86			
# Blows	35	24	16			
Moisture	50.7	53.7	55.6			

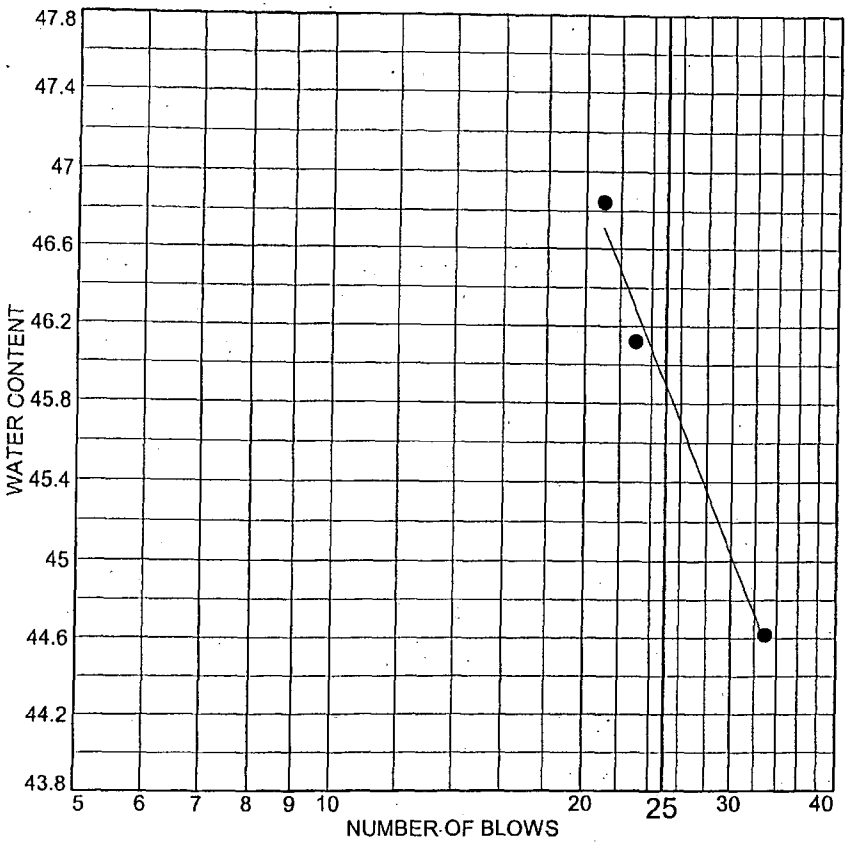


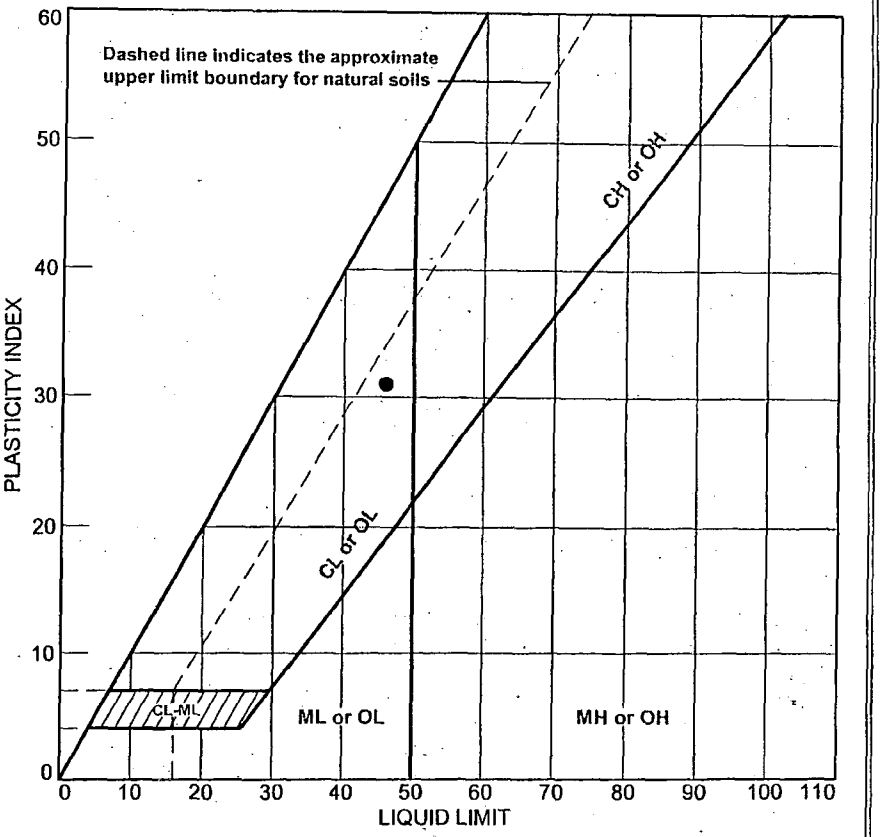
Liquid Limit= 53
Plastic Limit= 19
Plasticity Index= 34

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	18.28	18.43			
Dry+Tare	17.09	17.22			
Tare	10.89	10.94			
Moisture	19.2	19.3			

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 405-DH	STP-075 (SS-40)	398.5'-400'	10/30/2006	CL	Sandy Lean Clay	17.1	46	31

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC/TH Reviewed By:ST

ASTM D4319-05

MH 4-3-07

KAW 4/3/07

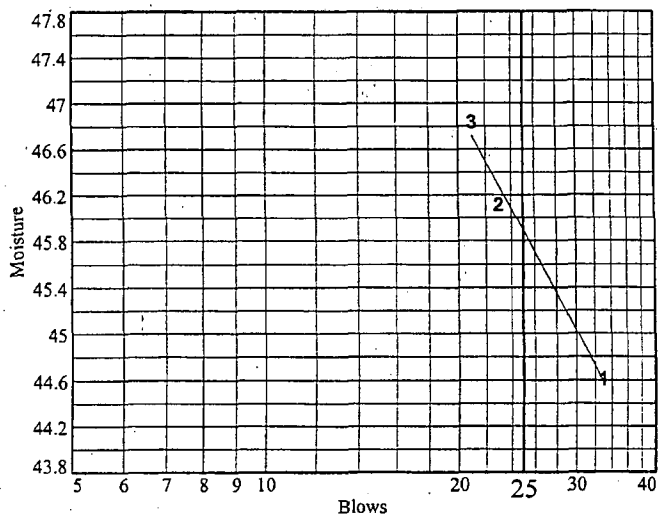
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 405-DH
Depth: 398.5'-400'
Sample Number: STP-075 (SS-40)
Material Description: Sandy Lean Clay
Date: 10/30/2006
USCS Class.: CL
Testing Remarks: Tested By:AC/TH Reviewed By:ST
ASTM D4319-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	39.59	38.51	36.44			
Dry+Tare	36.15	35.24	33.47			
Tare	28.44	28.15	27.13			
# Blows	33	23	21			
Moisture	44.6	46.1	46.8			



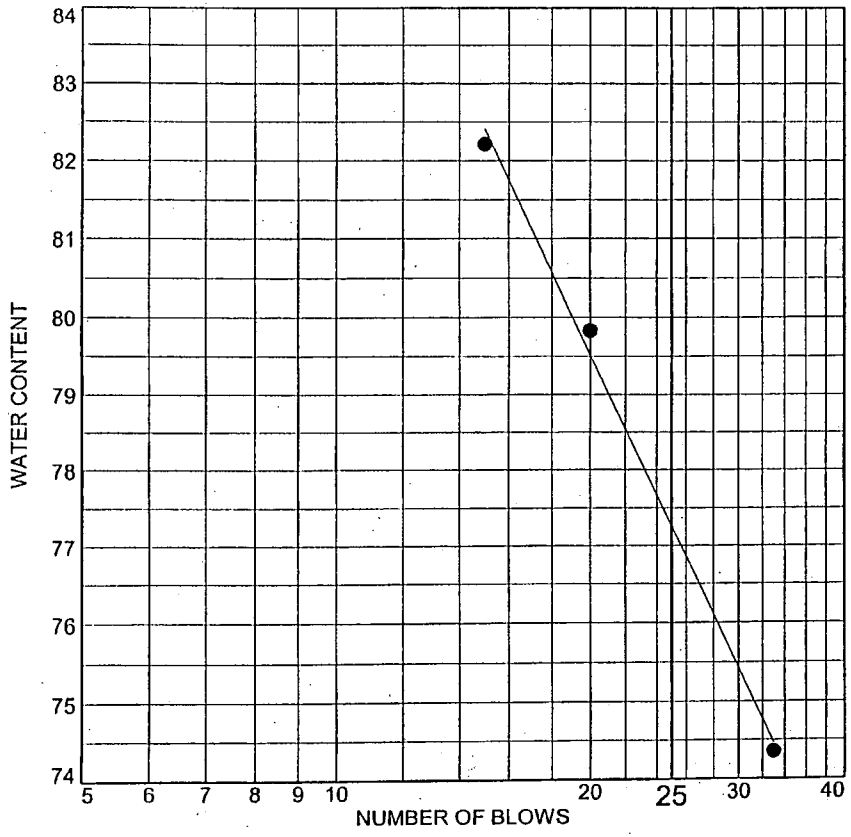
Liquid Limit= 46
Plastic Limit= 15
Plasticity Index= 31
Natural Moisture= 17.1
Liquidity Index= 0.1

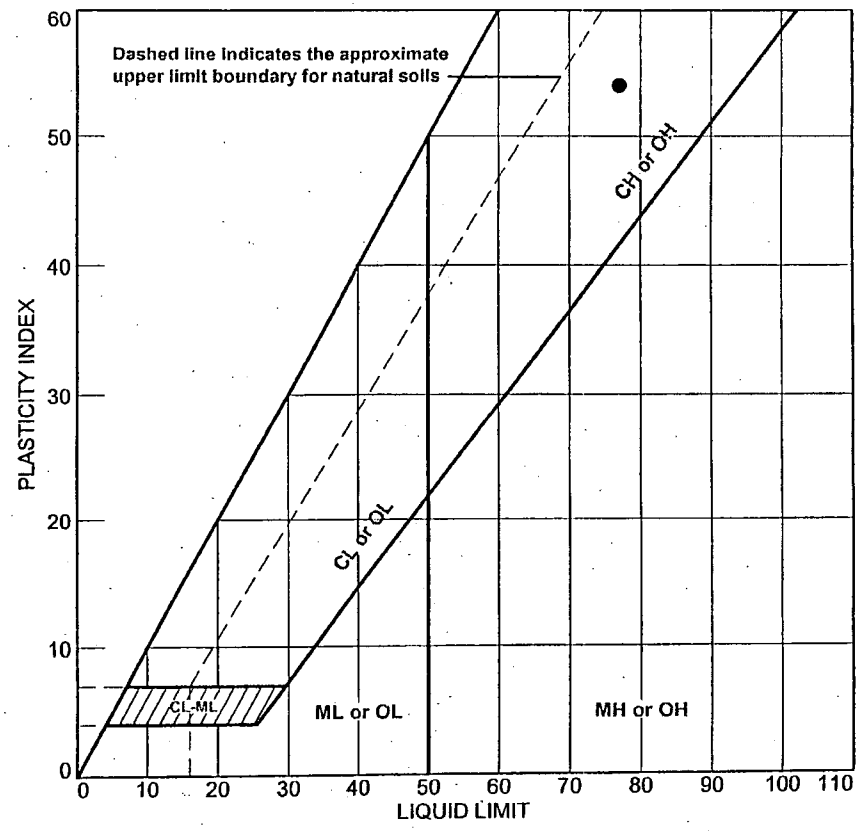
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	36.21	37.43			
Dry+Tare	35.14	36.22			
Tare	27.91	28.24			
Moisture	14.8	15.2			

MAA 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 405-DH	STP-076	423.5'-425'	10/31/2006	CH	Fat Clay	25.3	77	54
		(SS-41)							

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC/TH Reviewed By:ST

ASTM D4318-05

NH 4-3-07

KAW 4/3/07

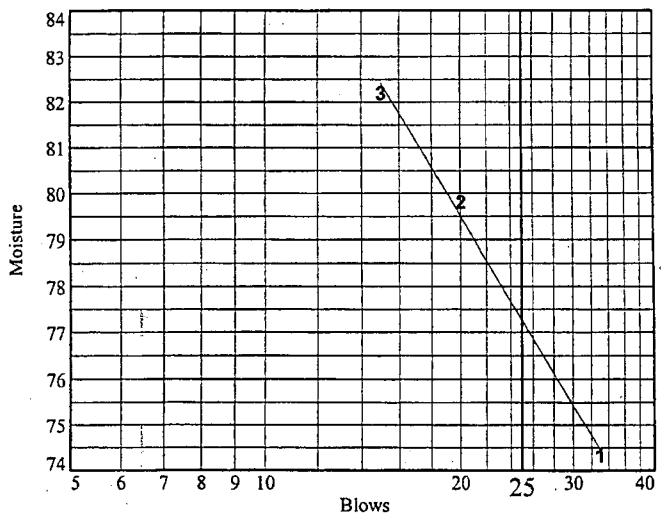
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 405-DH
Depth: 423.5'-425'
Sample Number: STP-076 (SS-41)
Material Description: Fat Clay
Date: 10/31/2006
USCS Class.: CH
Testing Remarks: Tested By:AC/TH Reviewed By:ST
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	36.29	36.33	38.09			
Dry+Tare	32.87	32.69	33.70			
Tare	28.27	28.13	28.36			
# Blows	33	20	15			
Moisture	74.3	79.8	82.2			



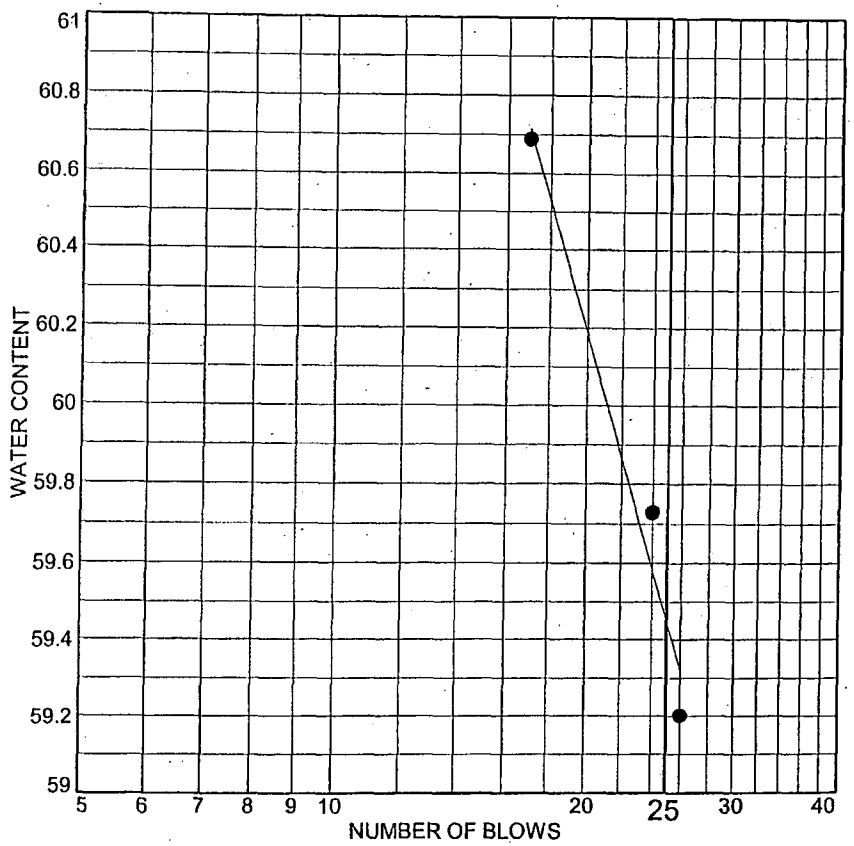
Liquid Limit= 77
Plastic Limit= 23
Plasticity Index= 54
Natural Moisture= 25.3
Liquidity Index= 0.0

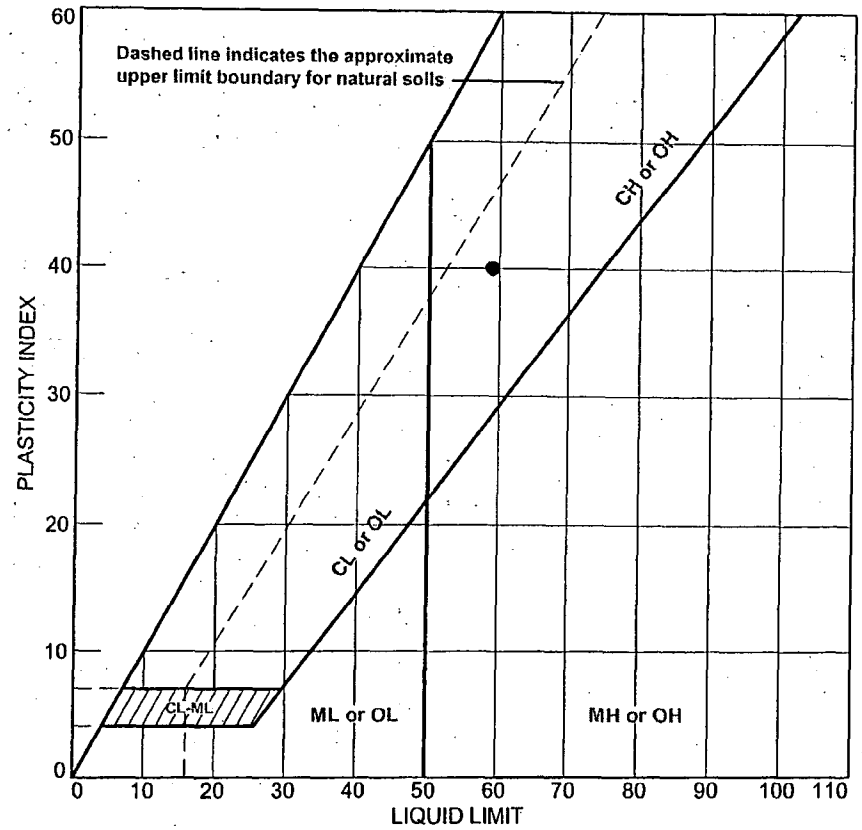
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	35.91	36.07			
Dry+Tare	34.39	34.61			
Tare	27.99	28.33			
Moisture	23.7	23.2			

4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 405-DH	STP-077	498.5'-500'	11/2/2006	CH	Sandy Fat Clay	21.8	59	40
		(SS-45)							

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC/TH Rewiewed By:ST

ASTM D4319-05

4-3-07

KAW 4/3/07

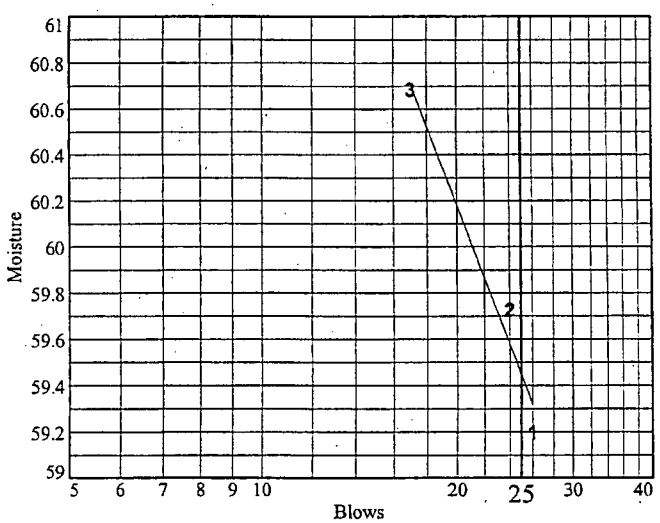
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 405-DH
Depth: 498.5'-500'
Sample Number: STP-077 (SS-45)
Material Description: Sandy Fat Clay
Date: 11/2/2006
USCS Class.: CH
Testing Remarks: Tested By:AC/TH Rewiewed By:ST
ASTM D4319-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	37.44	37.80	36.85			
Dry+Tare	34.03	34.27	33.50			
Tare	28.27	28.36	27.98			
# Blows	26	24	17			
Moisture	59.2	59.7	60.7			



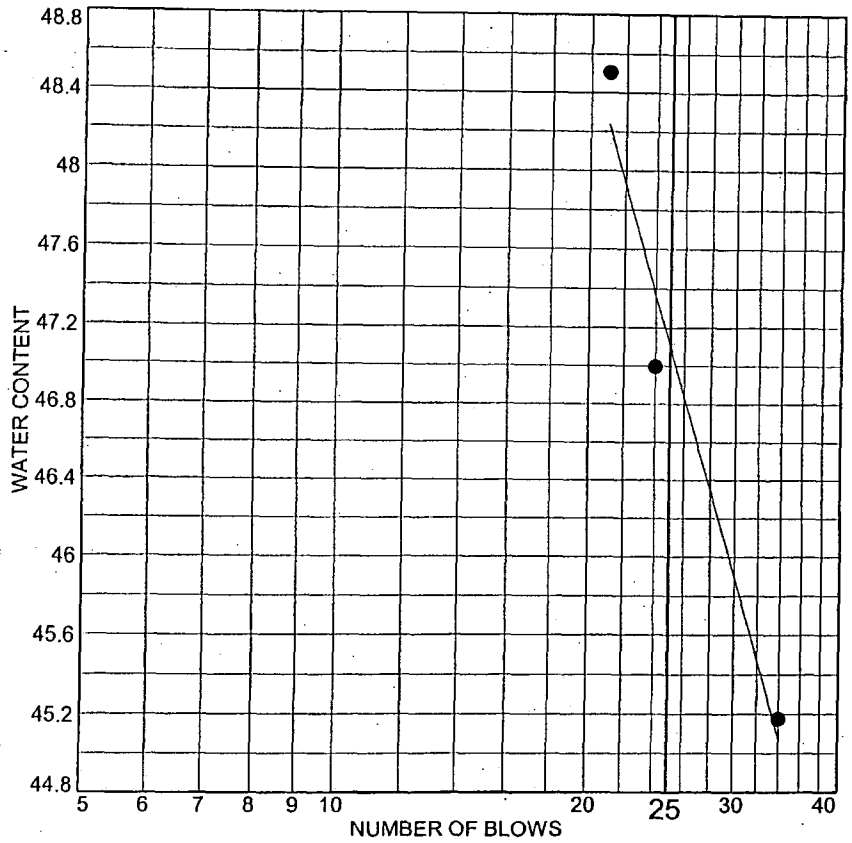
Liquid Limit= 59
Plastic Limit= 19
Plasticity Index= 40
Natural Moisture= 21.8
Liquidity Index= 0.1

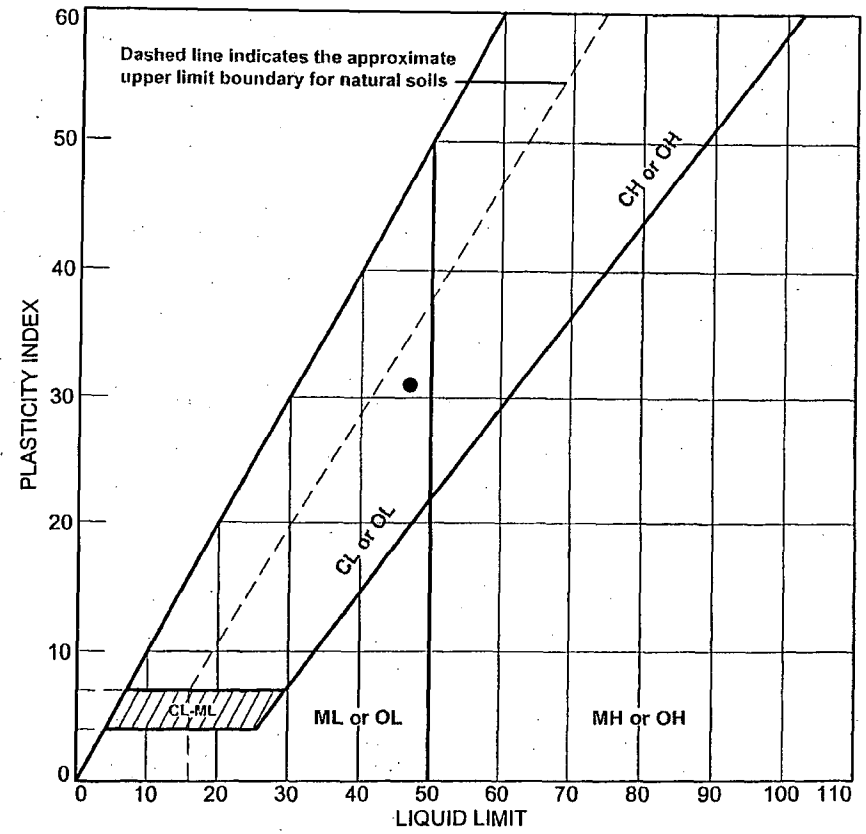
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	35.23	34.60			
Dry+Tare	34.08	33.39			
Tare	28.16	27.13			
Moisture	19.4	19.3			

MAK 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 405-DH	STP-080 (SS-49)	578.5'-580'	11/5/2006	CL	Lean Clay with Sand	19.9	47	31

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC/TH Reviewed By:ST
ASTM D4318-05

MH
4-3-07

KAW 4/3/07

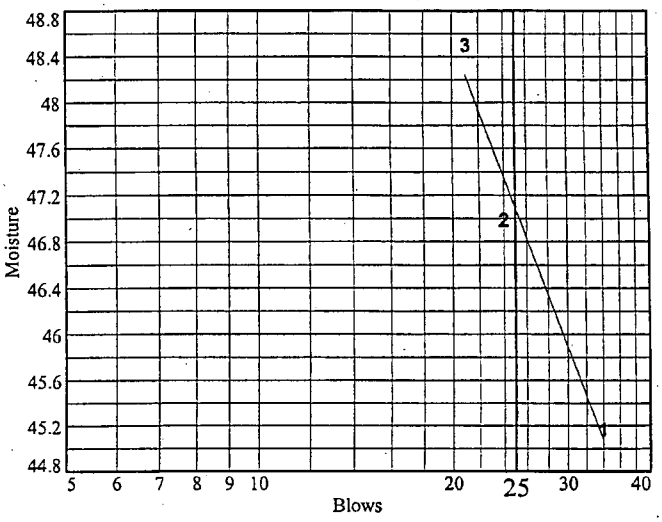
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 405-DH
Depth: 578.5'-580' **Sample Number:** STP-080 (SS-49)
Material Description: Lean Clay with Sand
Date: 11/5/2006 **USCS Class.:** CL
Testing Remarks: Tested By:AC/TH Reviewed By:ST
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	38.02	39.08	37.33			
Dry+Tare	34.93	35.64	34.25			
Tare	28.09	28.32	27.90			
# Blows	34	24	21			
Moisture	45.2	47.0	48.5			



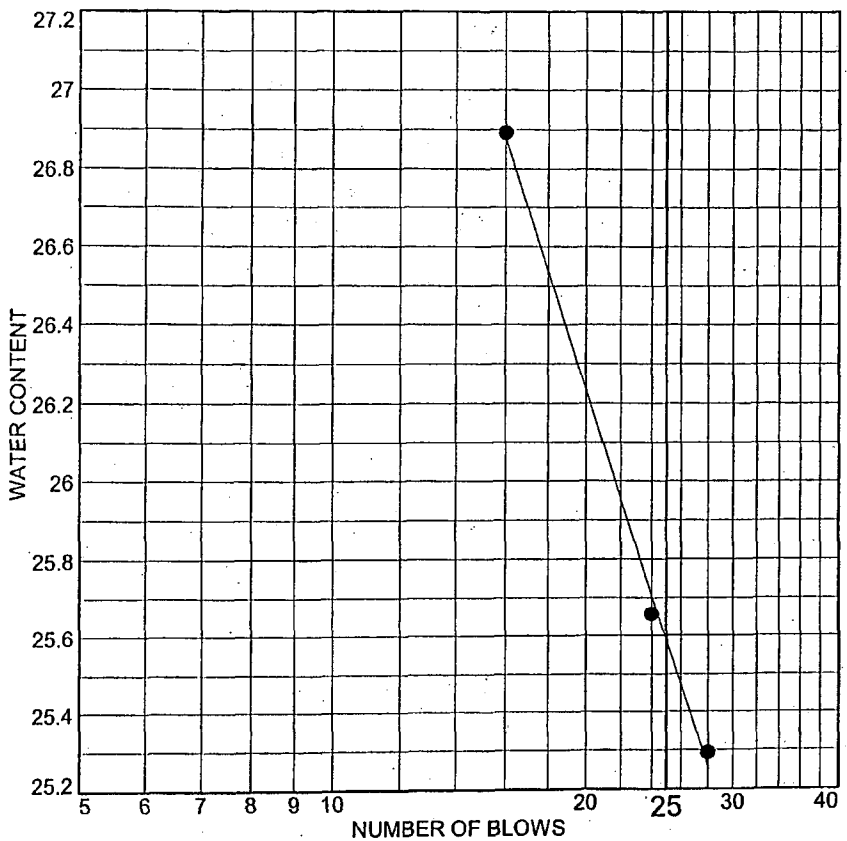
Liquid Limit= 47
Plastic Limit= 16
Plasticity Index= 31
Natural Moisture= 19.9
Liquidity Index= 0.1

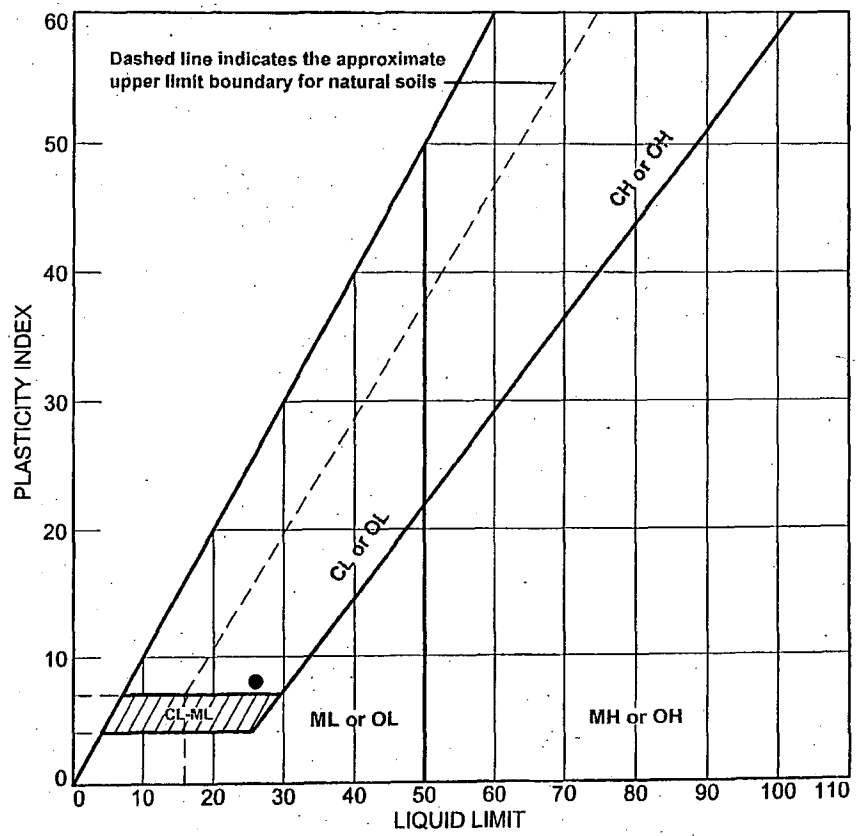
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	35.99	36.44			
Dry+Tare	34.94	35.37			
Tare	28.24	28.45			
Moisture	15.7	15.5			

MH 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 407	STP-308	23.5'-25.0'	12/14/2006	CL	Lean Clay with Sand	22.8	26	8
		(SS-12)							

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC Reviewed By:MH

ASTM D4318-05

MS 4-3-07

KAW 4/3/07

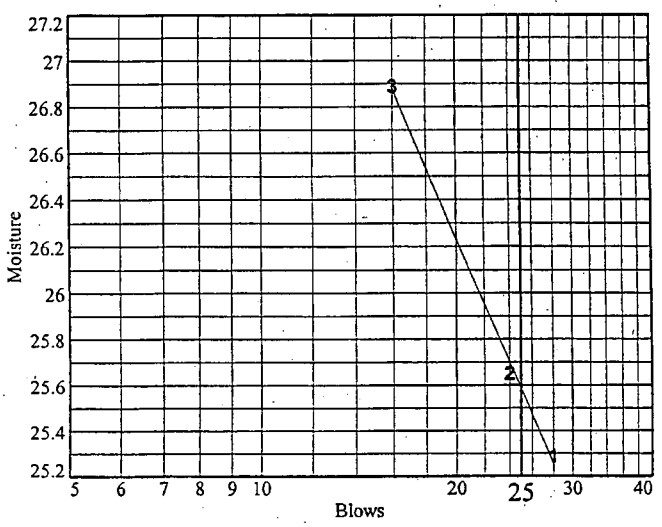
LIQUID AND PLASTIC LIMIT TEST DATA

4/1/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 407
Depth: 23.5'-25.0' **Sample Number:** STP-308 (SS-12)
Material Description: Lean Clay with Sand
Date: 12/14/2006 **USCS Class.:** CL **AASHTO Class.:** A-4(4)
Testing Remarks: Tested By:AC Reviewed By:MH
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	39.85	39.32	39.19			
Dry+Tare	37.47	37.07	36.88			
Tare	28.06	28.30	28.29			
# Blows	28	24	16			
Moisture	25.3	25.7	26.9			



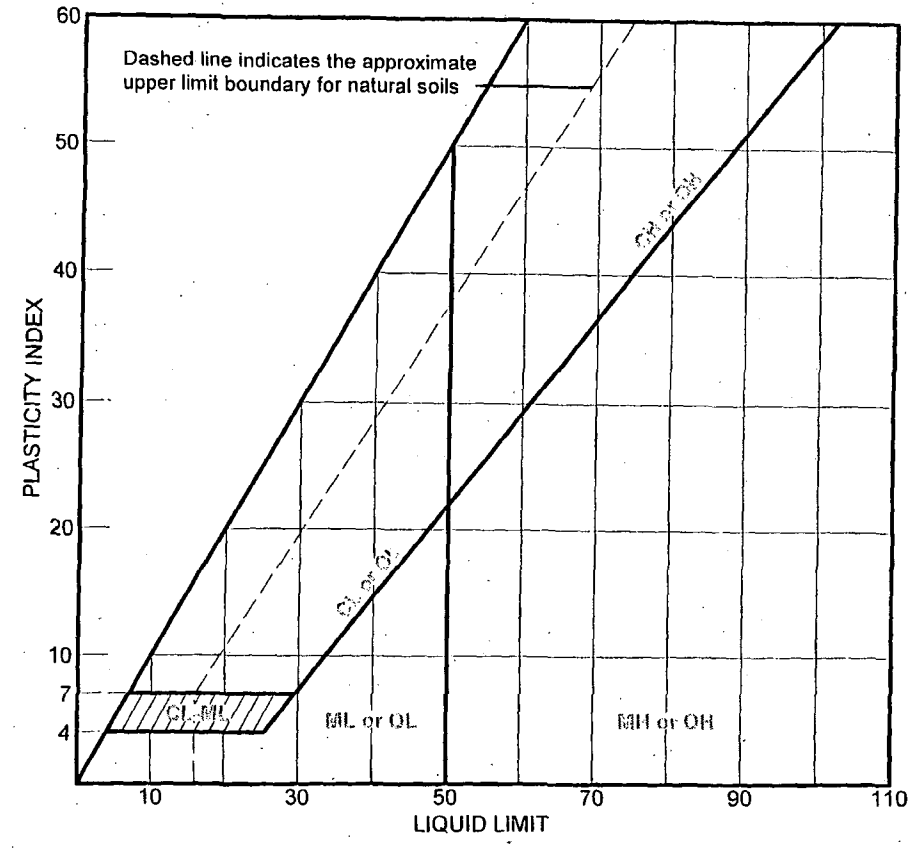
Liquid Limit= 26
Plastic Limit= 18
Plasticity Index= 8
Natural Moisture= 22.8
Liquidity Index= 0.6

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	37.79	35.63			
Dry+Tare	36.30	34.35			
Tare	28.08	27.17			
Moisture	18.1	17.8			

MH 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT



	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-409	UD-1	68' to 70'	2-14-07	SM	Silty Sand	14.9	NV	NP

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496 | Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reviewed by: SS
ASTM D4318-05

SS 2/25/2007

KAW 4/3/07

LIQUID AND PLASTIC LIMIT TEST DATA

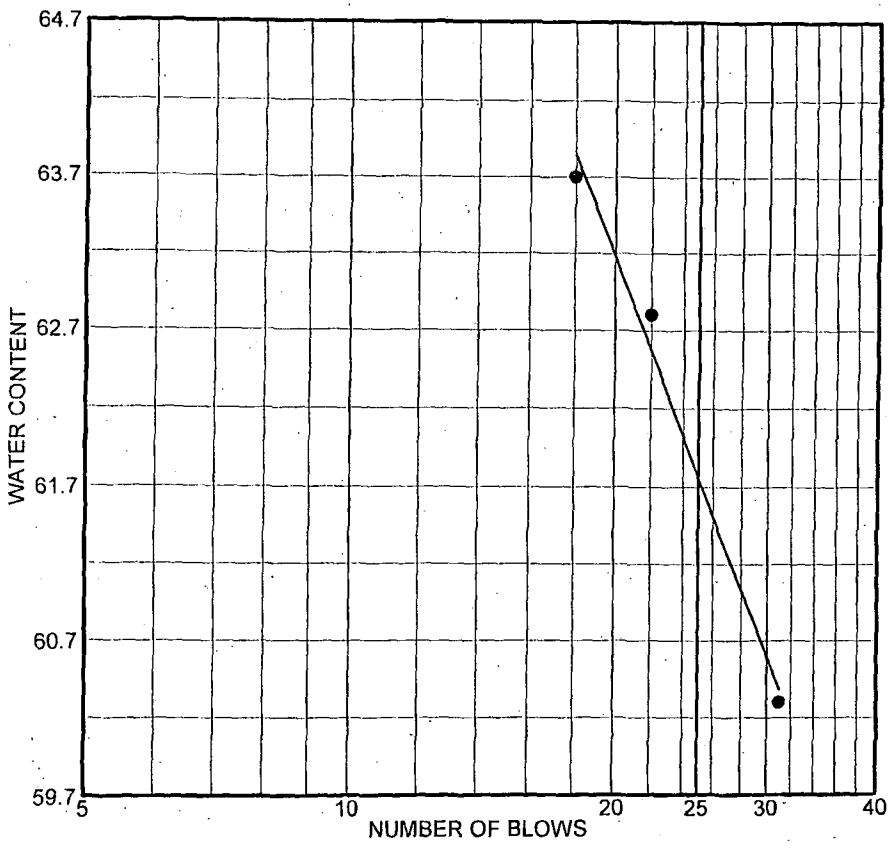
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496

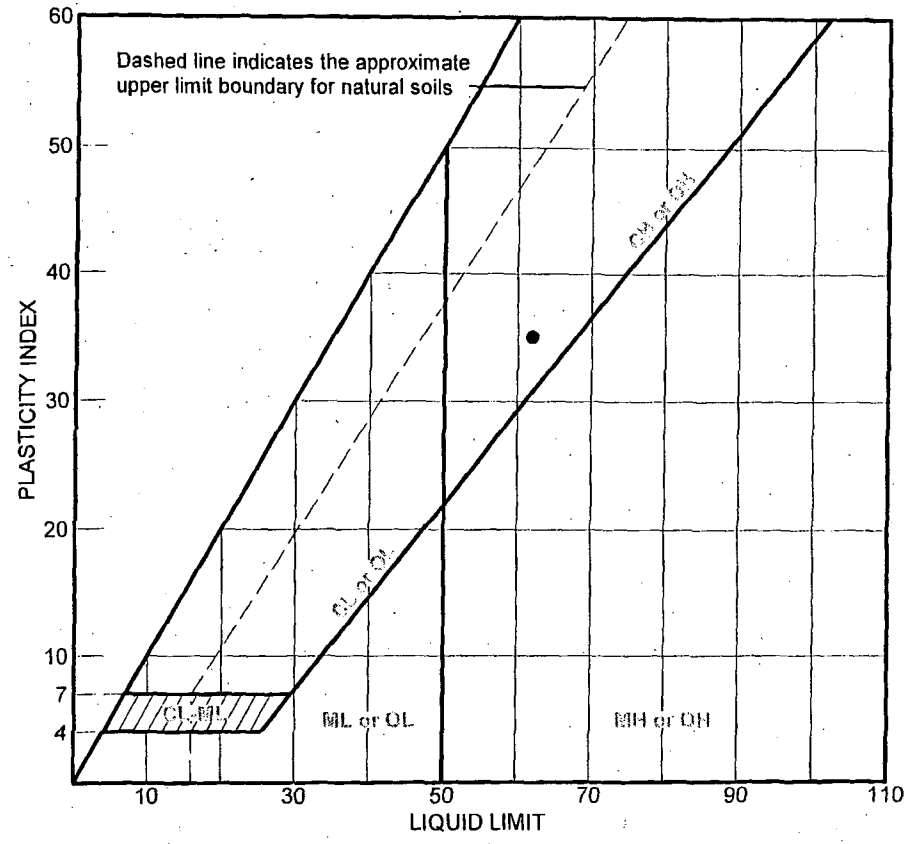
Sample Data

Source: B-409
Sample No.: UD-1
Elev. or Depth: 68' to 70' **Sample Length(in./cm.):**
Location: B-409
Description: Silty Sand
Date: 2-14-07 **Natural Moisture:** 14.9
USCS Class.: SM **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed by: SS
ASTM D4318-05

Liquid Limit= NV
Plastic Limit= NP
Plasticity Index= NP

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-409	UD-4A	160' to 162'	2-24-07	CH	Fat Clay	19.6	62	35

Client Bechtel Power Corporation
Project Bechtel/STP/COL
Project No. 5050-06-0496 Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reviewed by: MH
ASTM D4318-05

KAW 4/3/07

LIQUID AND PLASTIC LIMIT TEST DATA

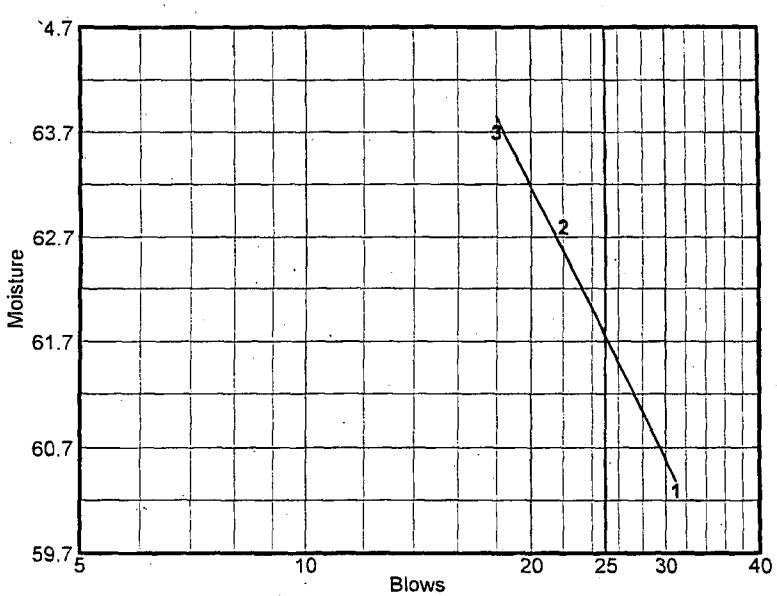
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496

Sample Data

Source: B-409
Sample No.: UD-4A
Elev. or Depth: 160' to 162' **Sample Length(in./cm.):**
Location: B-409
Description: Fat Clay
Date: 2-24-07 **Natural Moisture:** 19.6
USCS Class.: CH **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed by: MH
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	24.41	22.05	22.78			
Dry+Tare	19.58	17.77	18.17			
Tare	11.57	10.96	10.93			
# Blows	31	22	18			
Moisture	60.3	62.8	63.7			

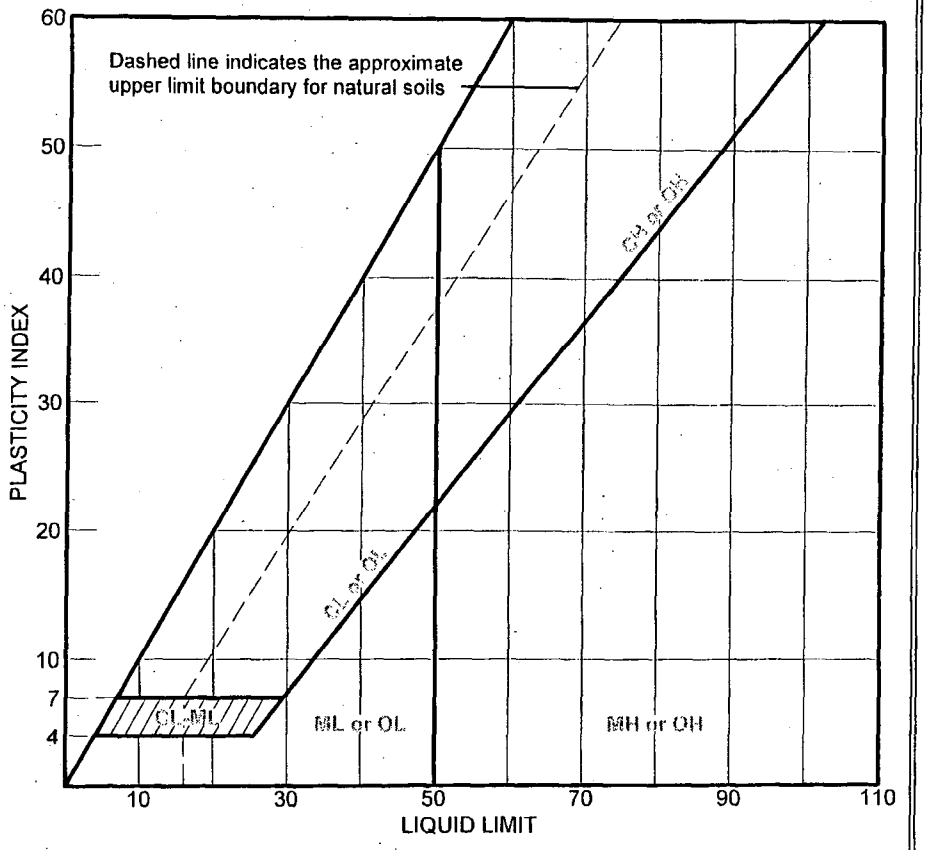


Liquid Limit= 62
Plastic Limit= 27
Plasticity Index= 35

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	19.86	21.16			
Dry+Tare	18.05	19.07			
Tare	11.30	11.64			
Moisture	26.8	28.1			

LIQUID AND PLASTIC LIMITS TEST REPORT



	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-409	UD-5	188' to 190'	2-25-07	SP-SM	Poorly graded sand with silt	38.2	NV	NP

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496 Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reviewed by: MH
ASTM D4318-05 KAW 4/3/07

KAW 4/3/07

LIQUID AND PLASTIC LIMIT TEST DATA

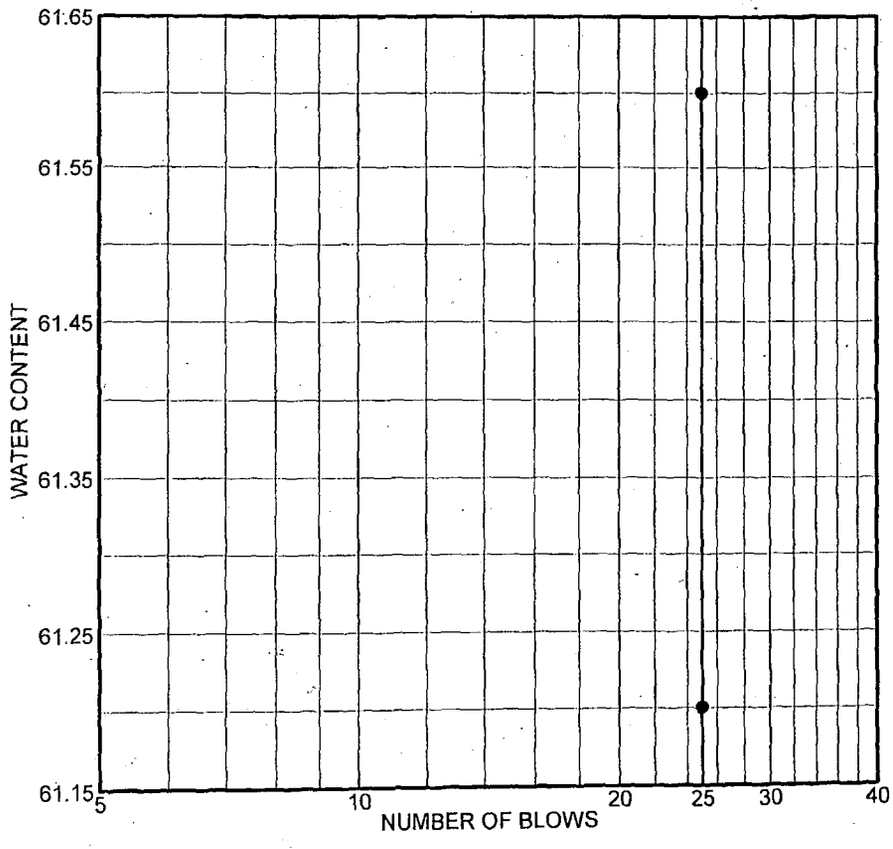
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496

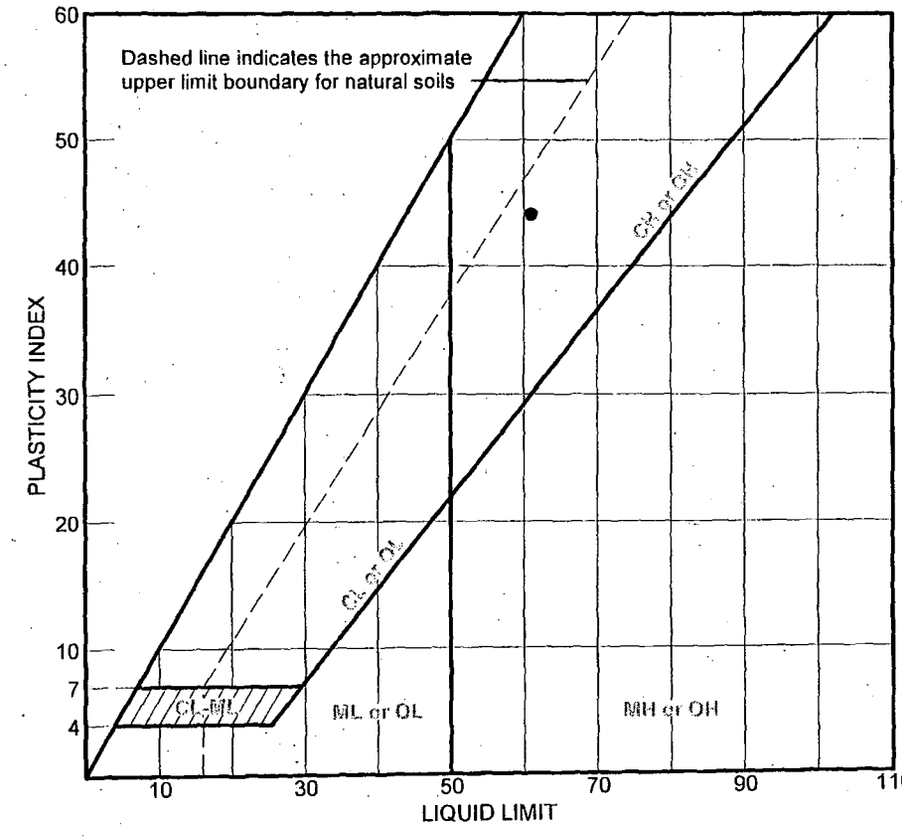
Sample Data

Source: B-409
Sample No.: UD-5
Elev. or Depth: 188' to 190' **Sample Length(in./cm.):**
Location: B-409
Description: Poorly graded sand with silt
Date: 2-25-07 **Natural Moisture:** 38.2
USCS Class.: SP-SM **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed by: MH
ASTM D4318-05

Liquid Limit= NV
Plastic Limit= NP
Plasticity Index= NP

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-415	UD-1	88' to 90'	3-16-07	CH	Fat clay	23.9	61	44

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496 | Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reviewed by: MH
ASTM D4318-05

KAW 4/3/07

LIQUID AND PLASTIC LIMIT TEST DATA

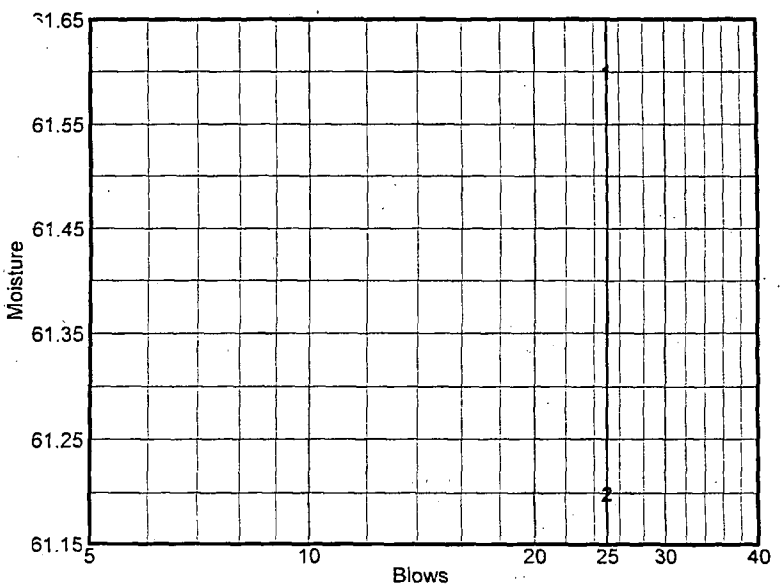
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496

Sample Data

Source: B-415
Sample No.: UD-1
Elev. or Depth: 88' to 90' **Sample Length(in./cm.):**
Location: B-415
Description: Fat clay
Date: 3-16-07 **Natural Moisture:** 23.9
USCS Class.: CH **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed by: MH
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	19.92	20.11				
Dry+Tare	16.50	16.65				
Tare	10.95	11.0				
# Blows	25	25				
Moisture	61.6	61.2				

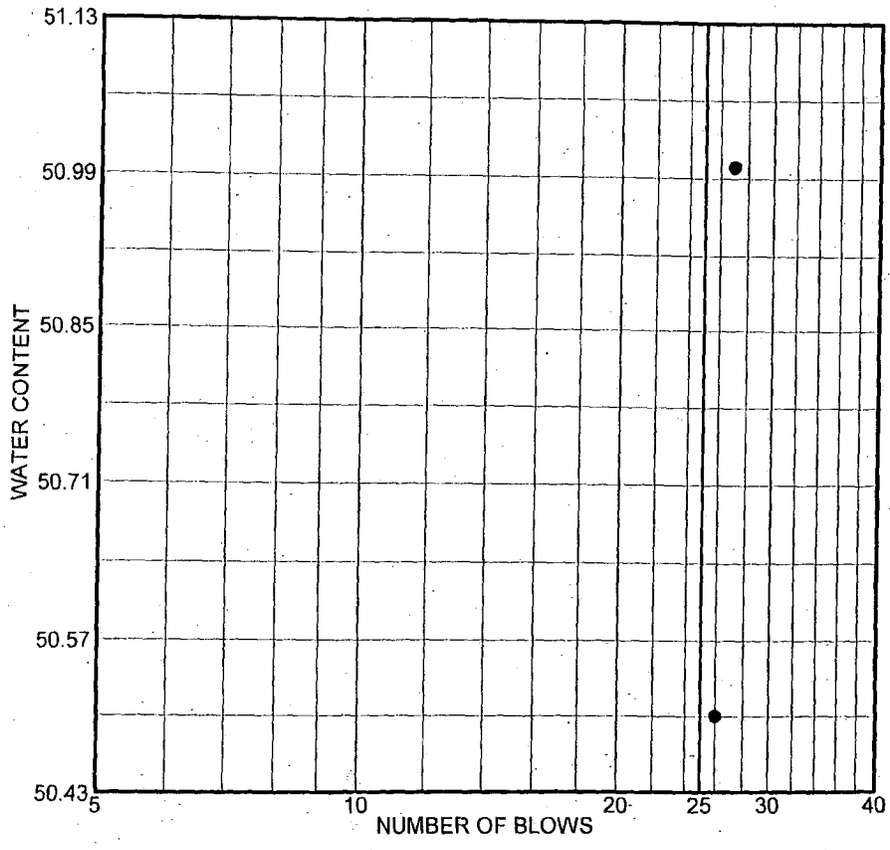


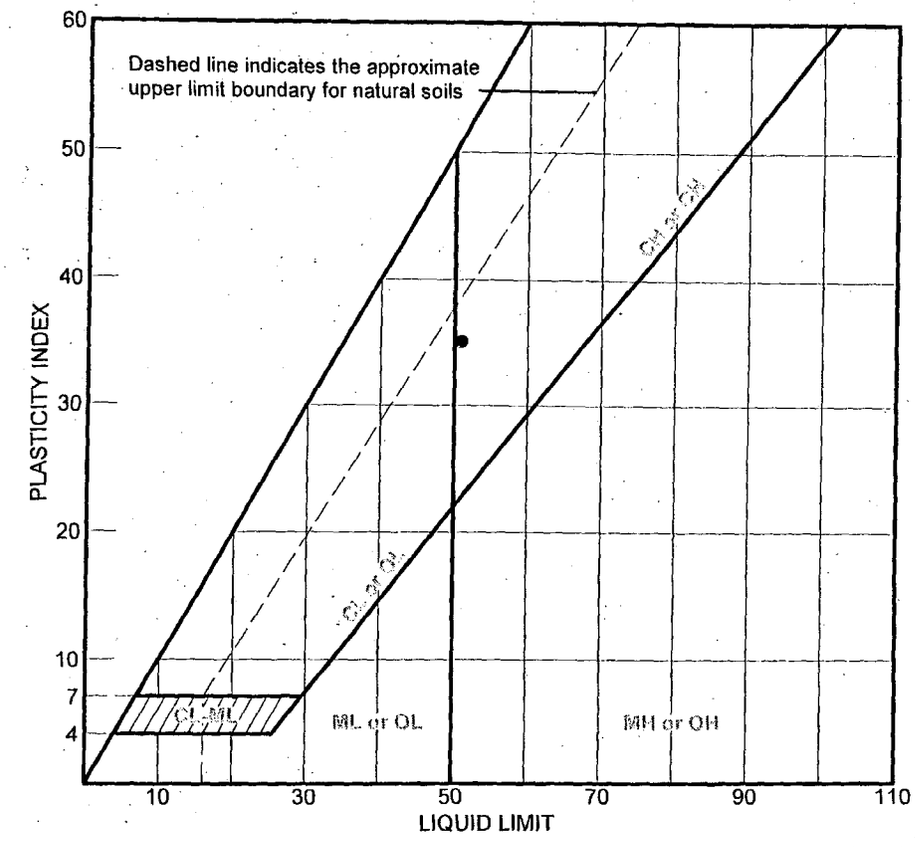
Liquid Limit= 61
Plastic Limit= 17
Plasticity Index= 44

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	17.89	20.37			
Dry+Tare	16.89	19.07			
Tare	10.81	11.54			
Moisture	16.4	17.3			

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-415	UD-3	124' to 126'	3-16-07	CH	Fat clay with sand	34.0	51	35

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496 | Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reviewed by: MH
ASTM D4318-05

KAW 4/3/07

LIQUID AND PLASTIC LIMIT TEST DATA

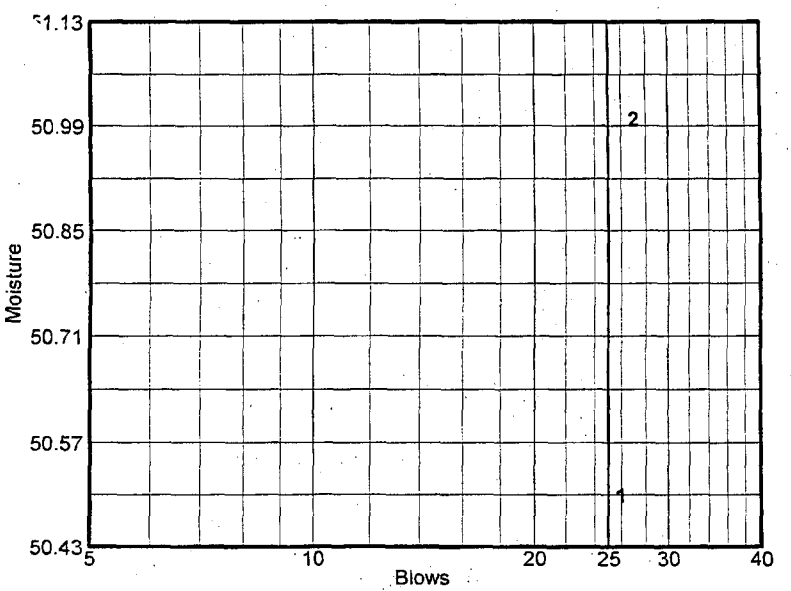
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496

Sample Data

Source: B-415
Sample No.: UD-3
Elev. or Depth: 124' to 126' **Sample Length(in./cm.):**
Location: B-415
Description: Fat clay with sand
Date: 3-16-07 **Natural Moisture:** 34.0
USCS Class.: CH **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed by: MH
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	21.91	18.45				
Dry+Tare	18.23	15.94				
Tare	10.94	11.02				
# Blows	26	27				
Moisture	50.5	51.0				

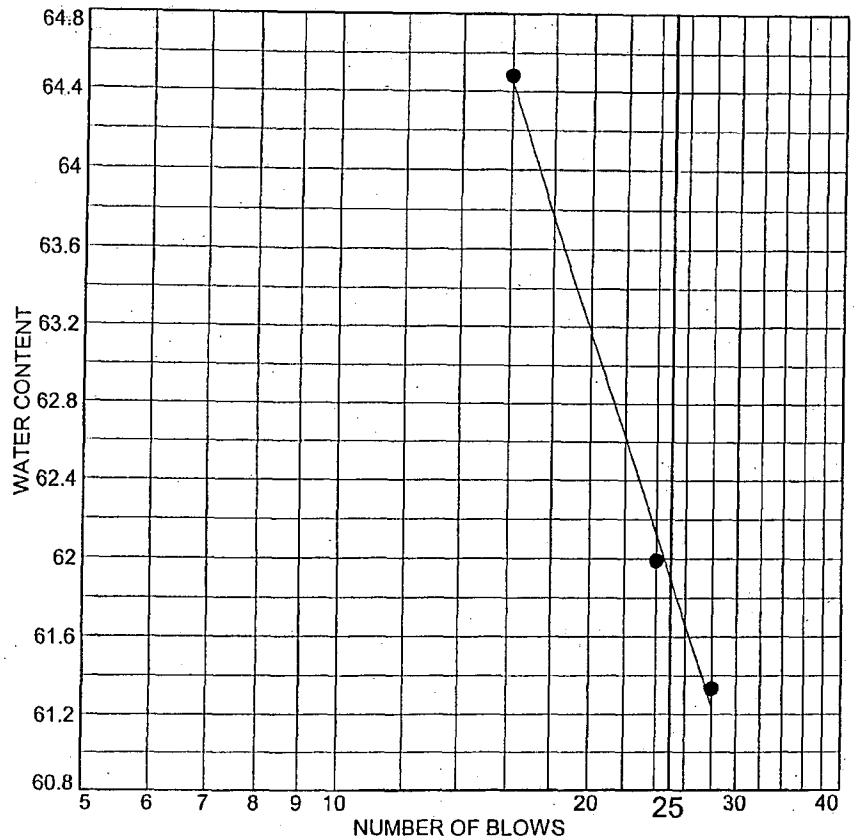


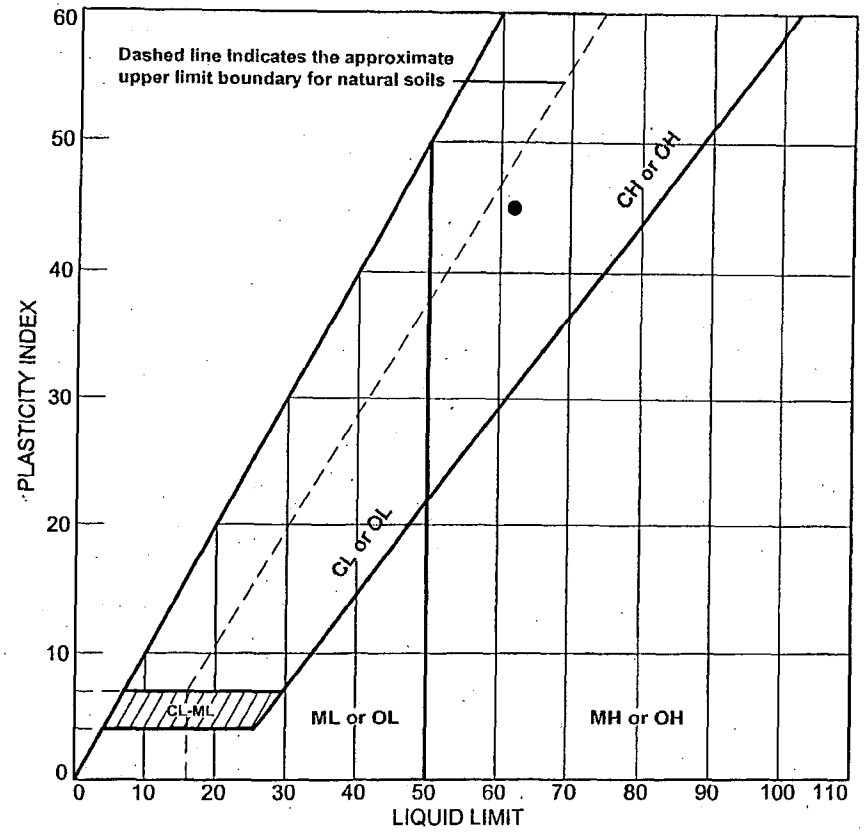
Liquid Limit= 51
Plastic Limit= 16
Plasticity Index= 35

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	17.55	19.10			
Dry+Tare	16.62	18.05			
Tare	10.70	11.46			
Moisture	15.7	15.9			

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 419	STP-150 (SS-3)	3.0'-4.5'	12/1/2006	CH	Fat Clay	25.3	62	45

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC/TH
ASTM D4318-05

Reviewed By:RF

MA
4-3-07

KAW 4/3/07

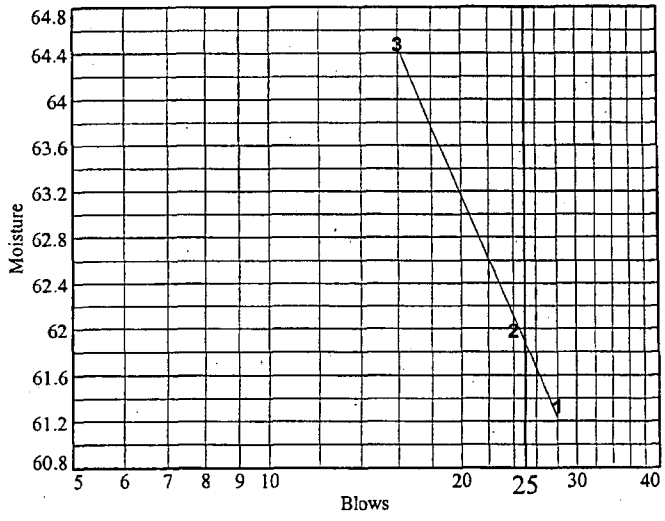
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 419
Depth: 3.0'-4.5'
Sample Number: STP-150 (SS-3)
Material Description: Fat Clay
Date: 12/1/2006
USCS Class.: CH
Testing Remarks: Tested By:AC/TH
Reviewed By:RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	37.08	36.58	37.77			
Dry+Tare	33.40	33.40	34.03			
Tare	27.40	28.27	28.23			
# Blows	28	24	16			
Moisture	61.3	62.0	64.5			



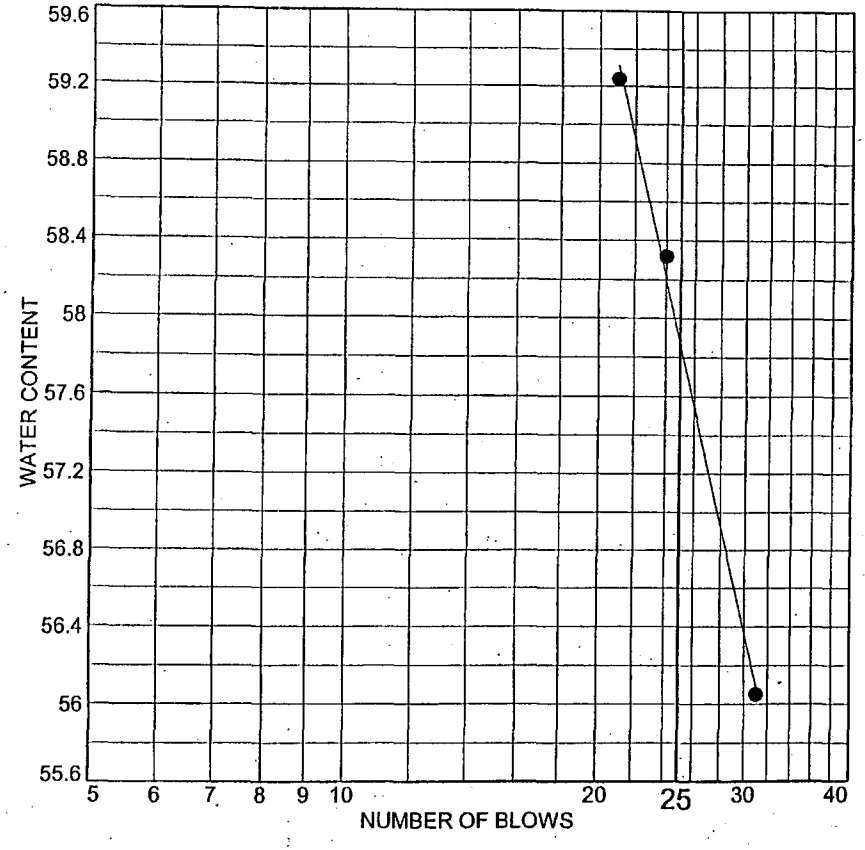
Liquid Limit= 62
Plastic Limit= 17
Plasticity Index= 45
Natural Moisture= 25.3
Liquidity Index= 0.2

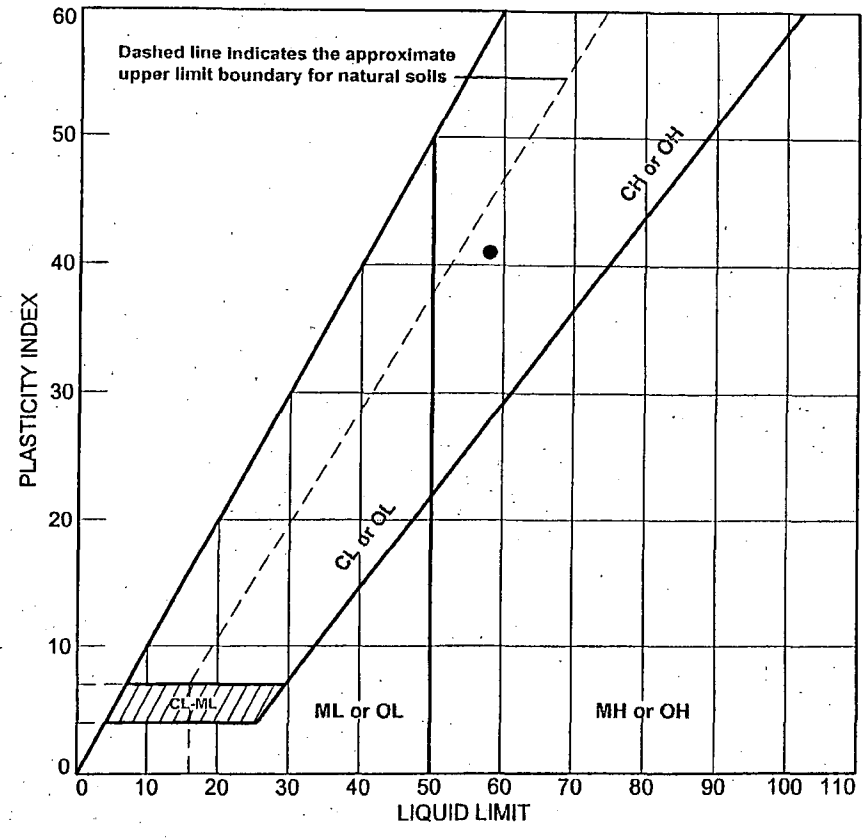
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	36.35	35.53			
Dry+Tare	35.17	34.52			
Tare	28.30	28.25			
Moisture	17.2	16.1			

MK 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 419	STP-151 (SS-7)	9.0'-10.5'	12/1/2006	CH	Fat Clay	22.8	58	41

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC/TH/MH Reviewed By:RF

ASTM D4318-05

MA 4-3-07

KAW 4/3/07

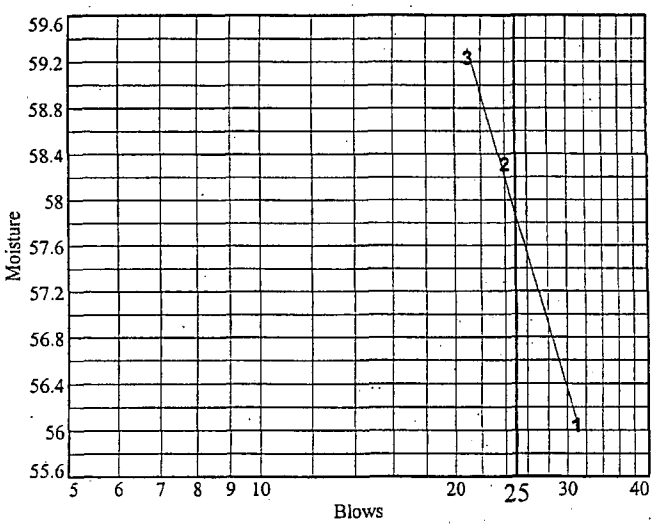
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 419
Depth: 9.0'-10.5' **Sample Number:** STP-151 (SS-7)
Material Description: Fat Clay
Date: 12/1/2006 **USCS Class.:** CH
Testing Remarks: Tested By:AC/TH/MH Reviewed By:RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	35.94	35.53	36.73			
Dry+Tare	32.79	32.41	33.62			
Tare	27.17	27.06	28.37			
# Blows	31	24	21			
Moisture	56.0	58.3	59.2			



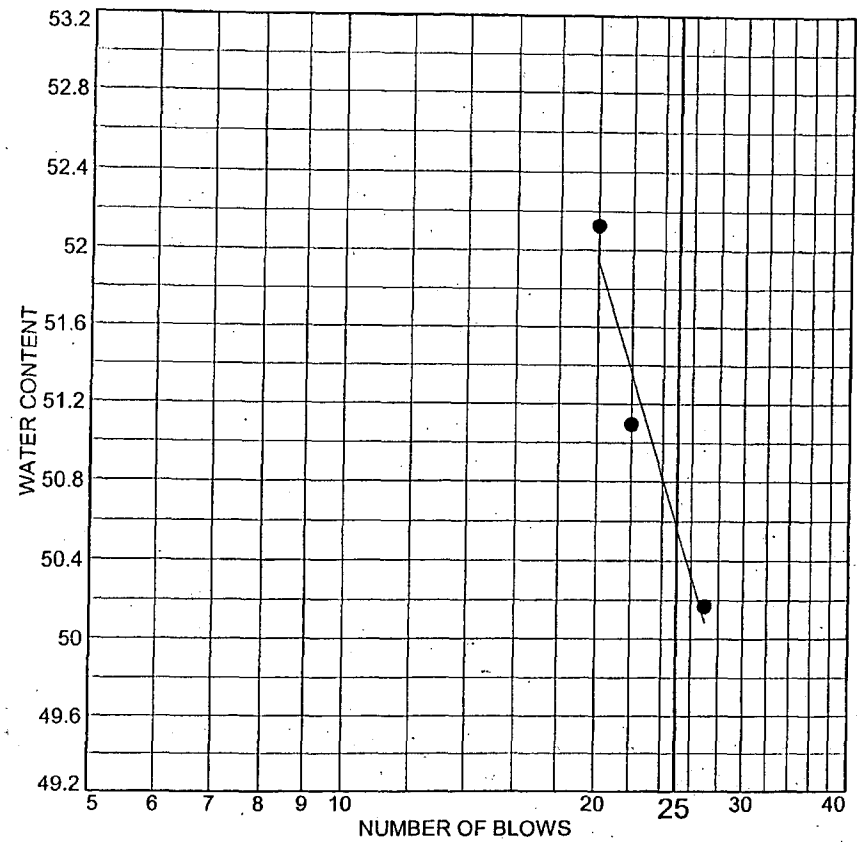
Liquid Limit= 58
Plastic Limit= 17
Plasticity Index= 41
Natural Moisture= 22.8
Liquidity Index= 0.1

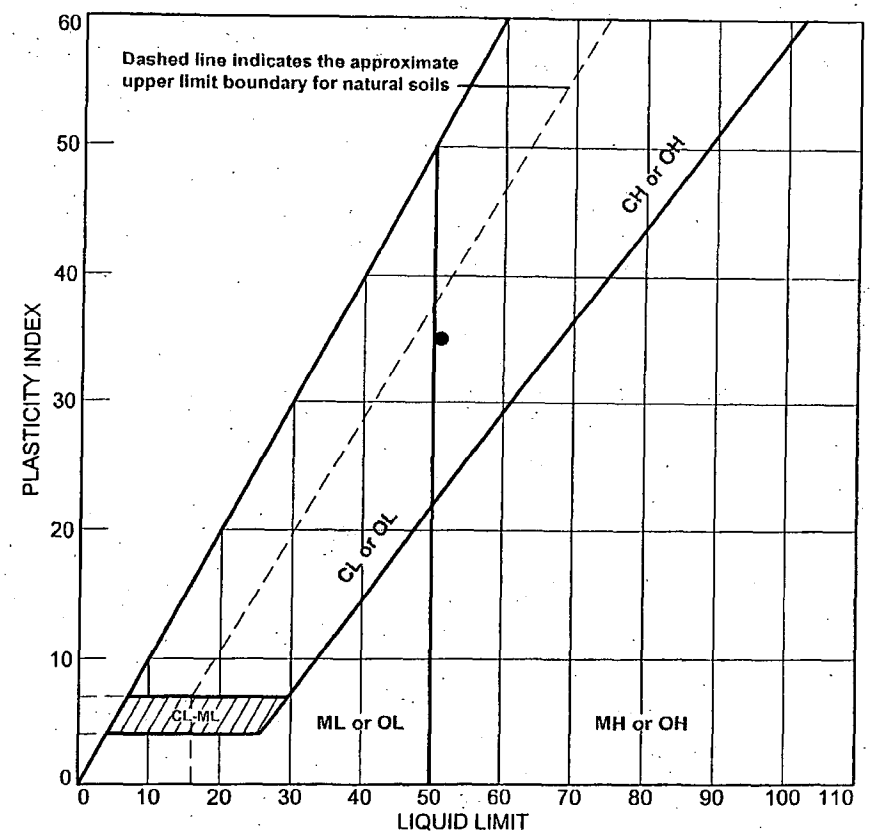
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	34.87	35.20			
Dry+Tare	33.87	34.19			
Tare	28.11	28.24			
Moisture	17.4	17.0			

MAC 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 419	STP-152 (SS-10)	13.5'-15.0'	12/1/2006	CH	Fat Clay	21.2	51	35

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC/MH Reviewed By:RF

ASTM D4318-05

MH 4-3-07

KAW 4/3/07

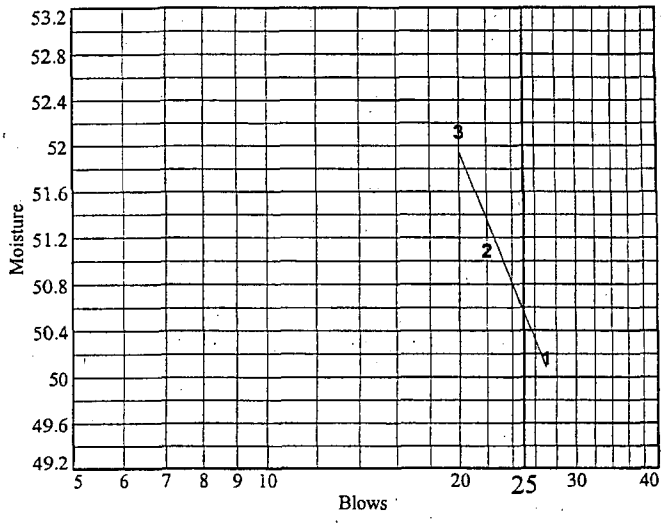
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 419
Depth: 13.5'-15.0'
Sample Number: STP-152 (SS-10)
Material Description: Fat Clay
Date: 12/1/2006
USCS Class.: CH
Testing Remarks: Tested By:AC/MH Reviewed By:RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	36.09	38.51	34.15			
Dry+Tare	33.10	35.01	31.21			
Tare	27.14	28.16	25.57			
# Blows	27	22	20			
Moisture	50.2	51.1	52.1			



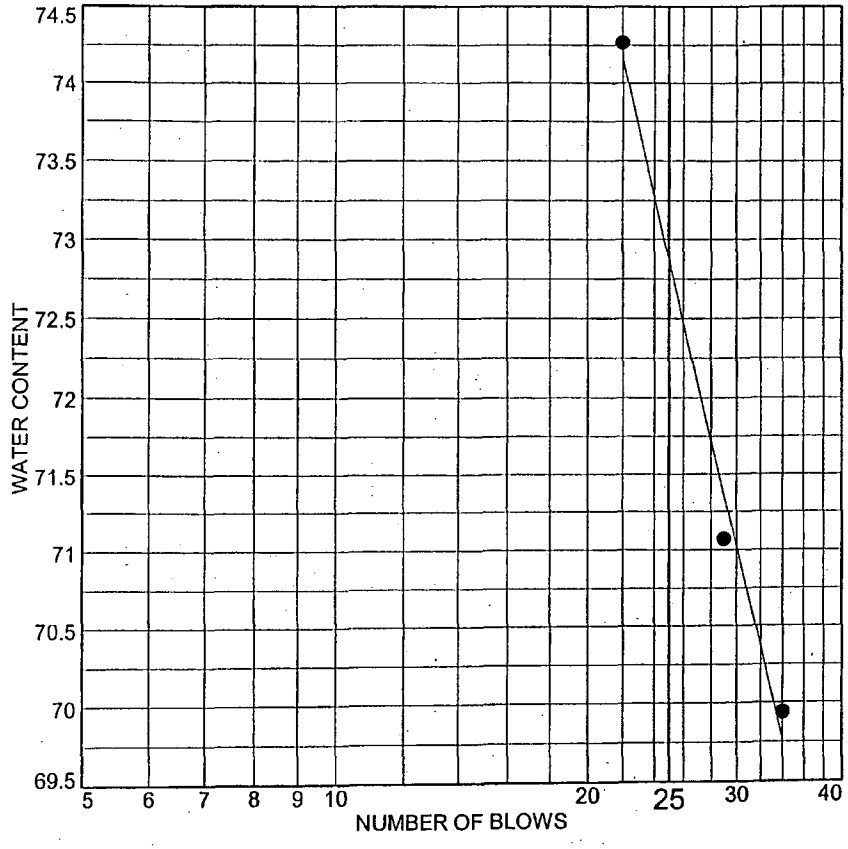
Liquid Limit= 51
Plastic Limit= 16
Plasticity Index= 35
Natural Moisture= 21.2
Liquidity Index= 0.1

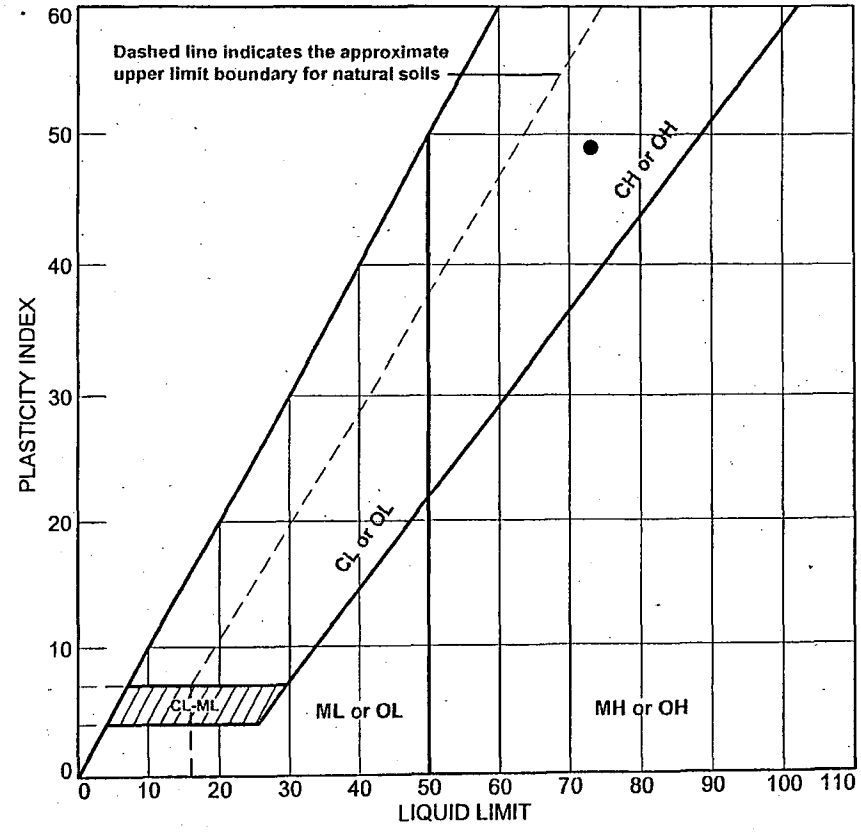
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	38.93	38.83			
Dry+Tare	37.41	37.33			
Tare	28.09	28.32			
Moisture	16.3	16.6			

MC 4/3/07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 419	STP-155	43.5'-45.0'	12/1/2006	CH	Fat Clay	29.0	73	49
		(SS-16)							

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC/TH Reviewed By:RF

ASTM D4318-05

4-3-07

KAW 4/3/07

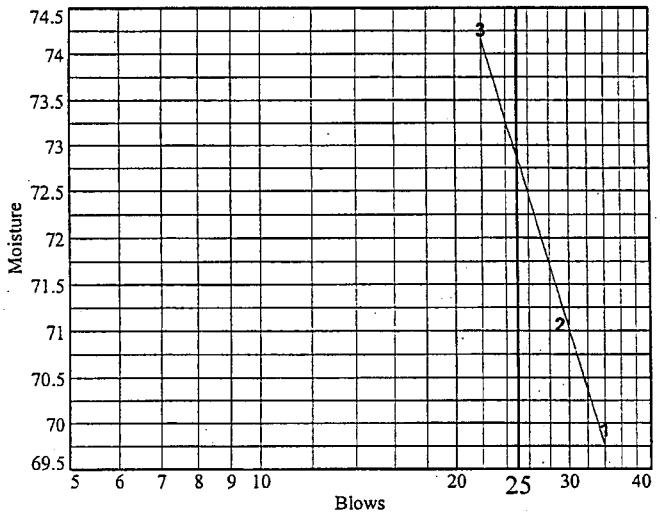
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 419
Depth: 43.5'-45.0'
Sample Number: STP-155 (SS-16)
Material Description: Fat Clay
Date: 12/1/2006
USCS Class.: CH
Testing Remarks: Tested By:AC/TH Reviewed By:RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	36.44	34.66	35.64			
Dry+Tare	33.02	31.54	32.35			
Tare	28.13	27.15	27.92			
# Blows	34	29	22			
Moisture	69.9	71.1	74.3			



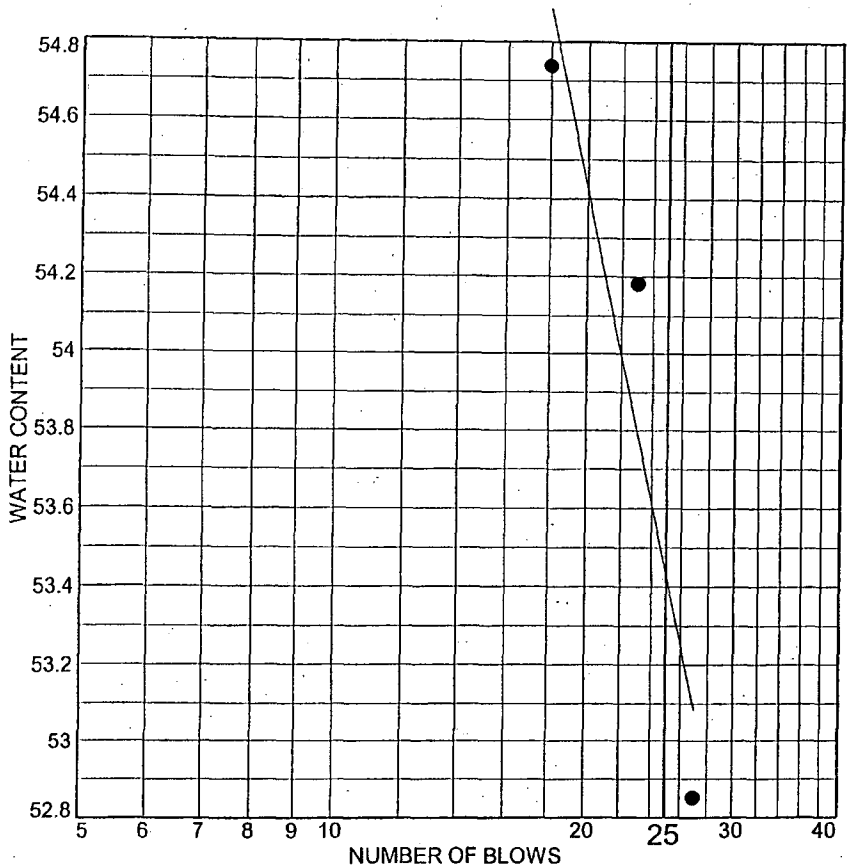
Liquid Limit= 73
Plastic Limit= 24
Plasticity Index= 49
Natural Moisture= 29.0
Liquidity Index= 0.1

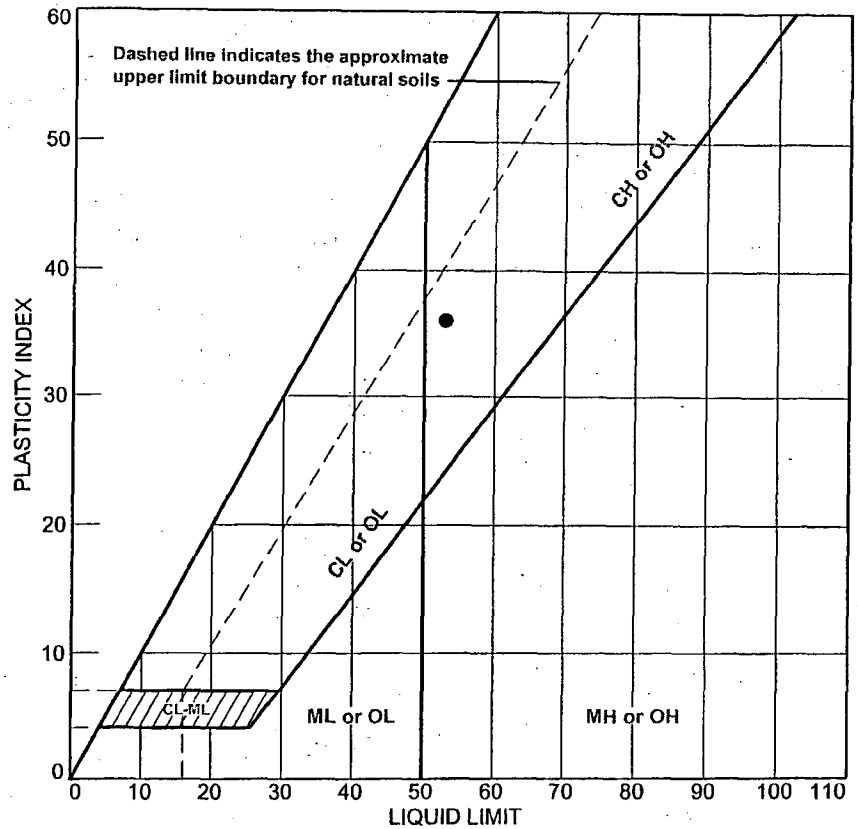
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	31.83	29.97			
Dry+Tare	30.39	28.59			
Tare	24.37	22.68			
Moisture	23.9	23.4			

MA 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 419	STP-156 (SS-18)	53.5'-55.0'	12/1/2006	CH	Fat Clay	18.0	53	36

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC/TH/JW Reviewed By:RF
ASTM D4318-05

MH 4-3-07

KAW 4/3/07

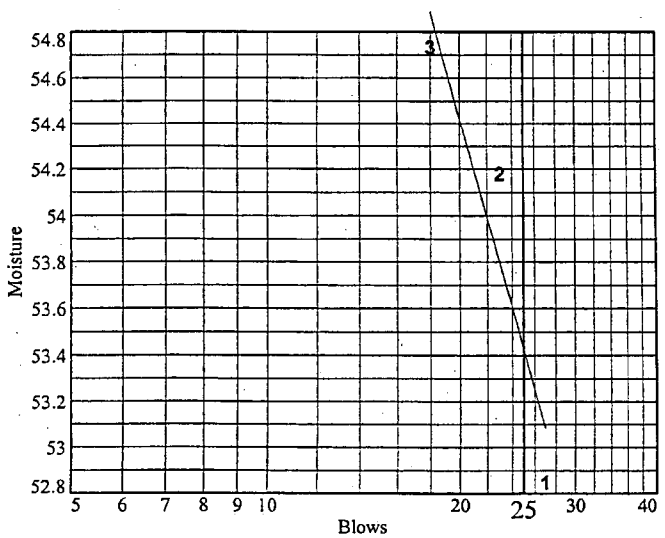
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 419
Depth: 53.5'-55.0' **Sample Number:** STP-156 (SS-18)
Material Description: Fat Clay
Date: 12/1/2006 **USCS Class.:** CH
Testing Remarks: Tested By:AC/TH/JW Reviewed By:RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	39.37	36.76	38.29			
Dry+Tare	35.57	33.78	34.65			
Tare	28.38	28.28	28			
# Blows	27	23	18			
Moisture	52.9	54.2	54.7			



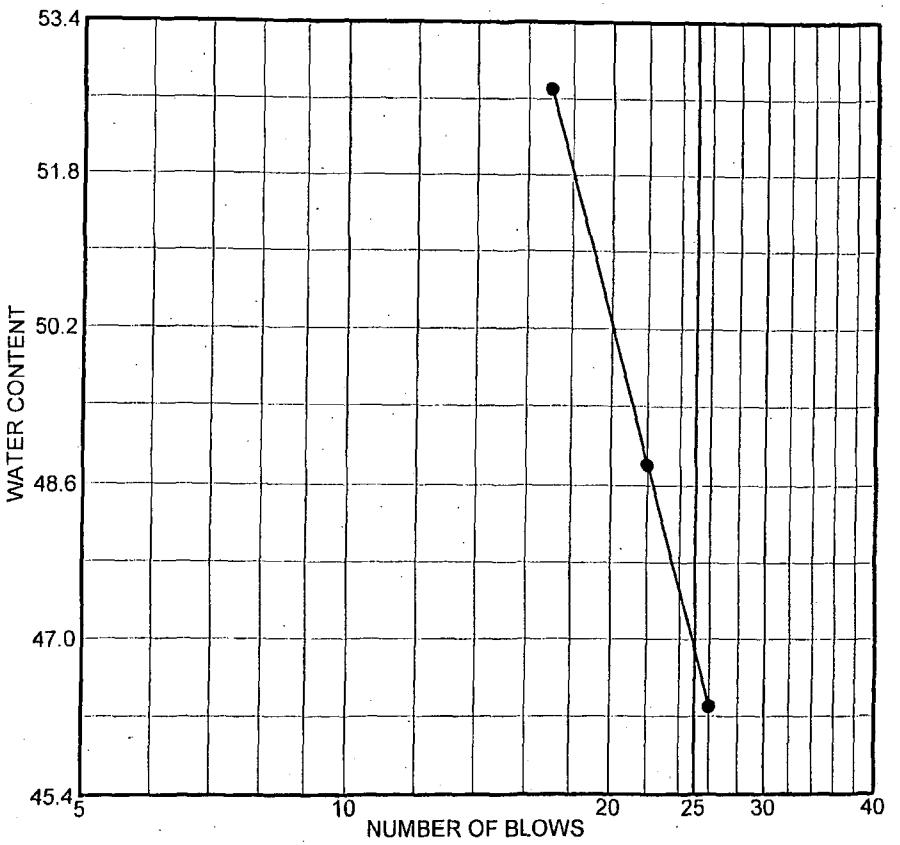
Liquid Limit= 53
Plastic Limit= 17
Plasticity Index= 36
Natural Moisture= 18.0
Liquidity Index= 0.0

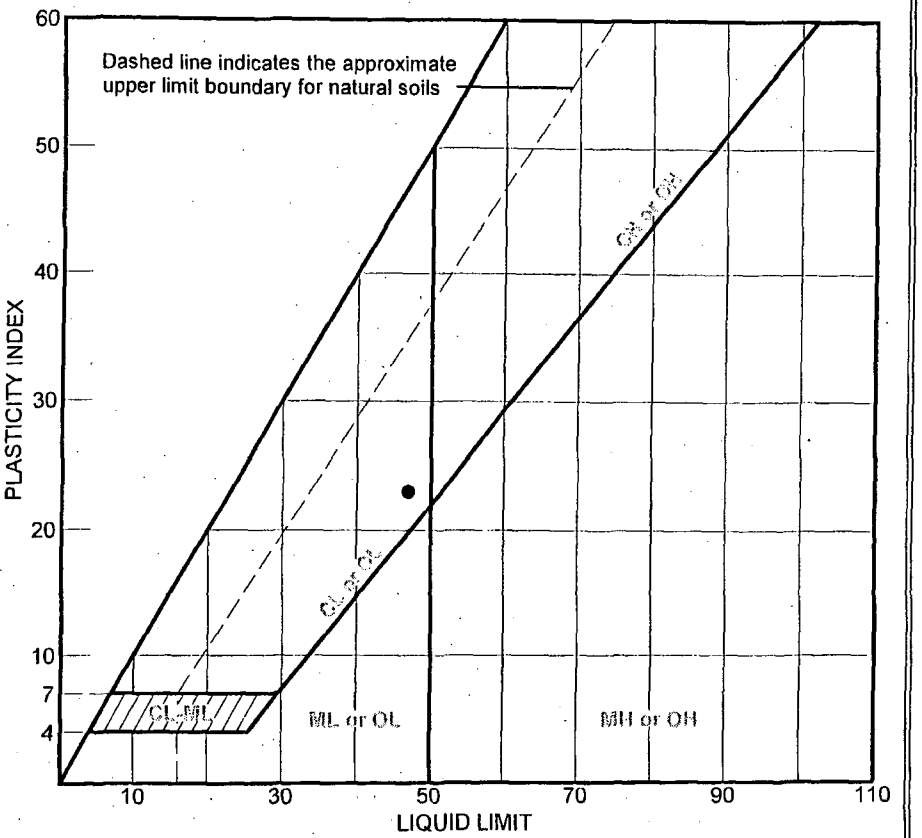
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	35.99	34.60			
Dry+Tare	34.84	33.50			
Tare	28.25	27.10			
Moisture	17.5	17.2			

NW 4.3.07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-419	UD-1	78' to 80'	2-22-07	CL	Lean clay	21.3	47	23

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496 | Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reviewed by: MH
ASTM D4318-05 KAW 4/3/07

KAW 4/3/07

LIQUID AND PLASTIC LIMIT TEST DATA

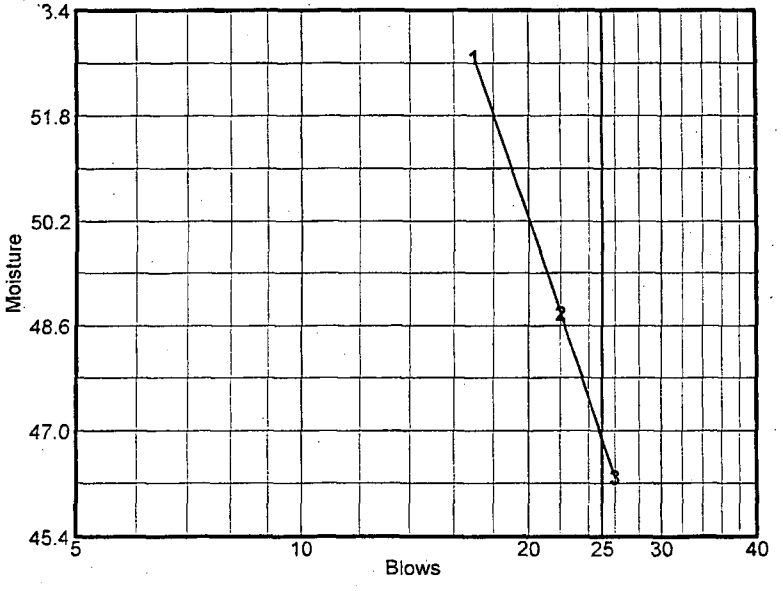
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496

Sample Data

Source: B-419
Sample No.: UD-1
Elev. or Depth: 78' to 80' **Sample Length(in./cm.):**
Location: B-419
Description: Lean clay
Date: 2-22-07 **Natural Moisture:** 21.3
USCS Class.: CL **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed by: MH
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	14.95	14.01	14.39			
Dry+Tare	11.30	10.84	11.22			
Tare	4.38	4.34	4.37			
# Blows	17	22	26			
Moisture	52.7	48.8	46.3			

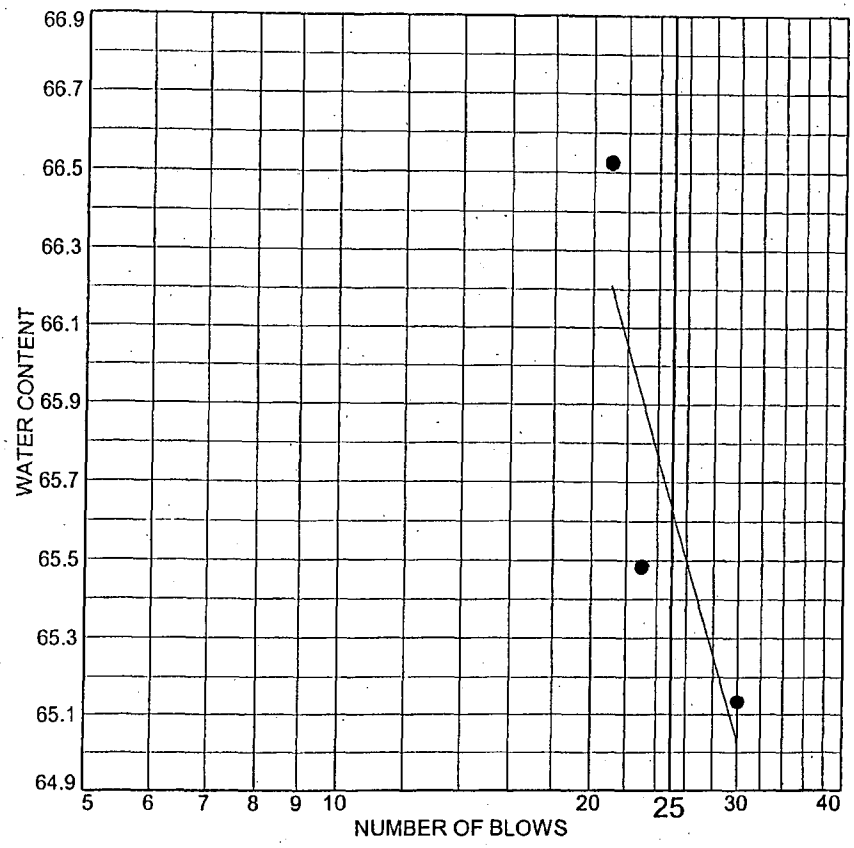


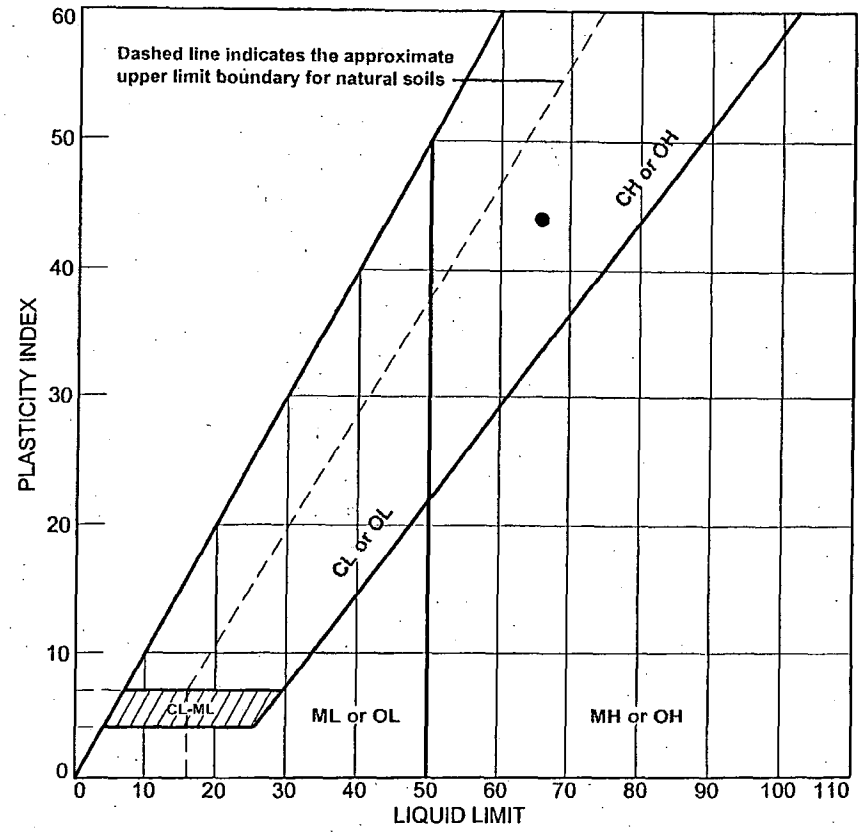
Liquid Limit= 47
Plastic Limit= 24
Plasticity Index= 23

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	17.77	16.93			
Dry+Tare	16.20	15.21			
Tare	9.48	7.92			
Moisture	23.4	23.6			

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 419	STP-159	88.5'-90.0'	12/2/2006	CH	Fat Clay	25.5	66	44
		(SS-24)							

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC/TH/JW Reviewed By:RF

ASTM D4318-05

4-3-07

KAW 413107

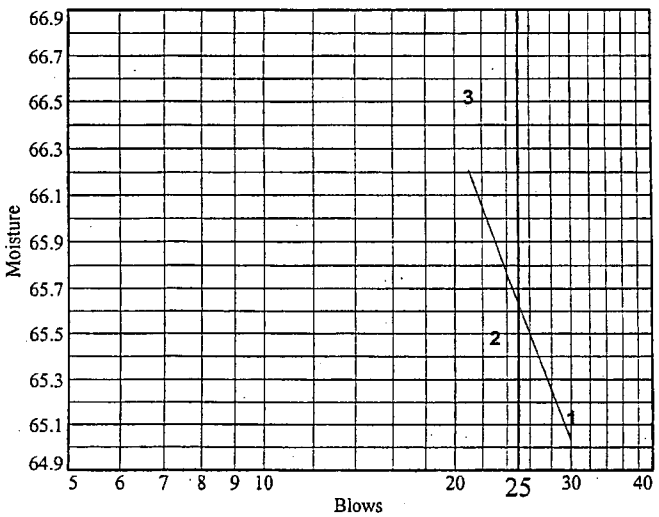
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 419
Depth: 88.5'-90.0' **Sample Number:** STP-159 (SS-24)
Material Description: Fat Clay
Date: 12/2/2006 **USCS Class.:** CH
Testing Remarks: Tested By:AC/TH/JW Reviewed By:RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	35.75	36.49	33.16			
Dry+Tare	32.35	33.17	30.06			
Tare	27.13	28.10	25.40			
# Blows	30	23	21			
Moisture	65.1	65.5	66.5			



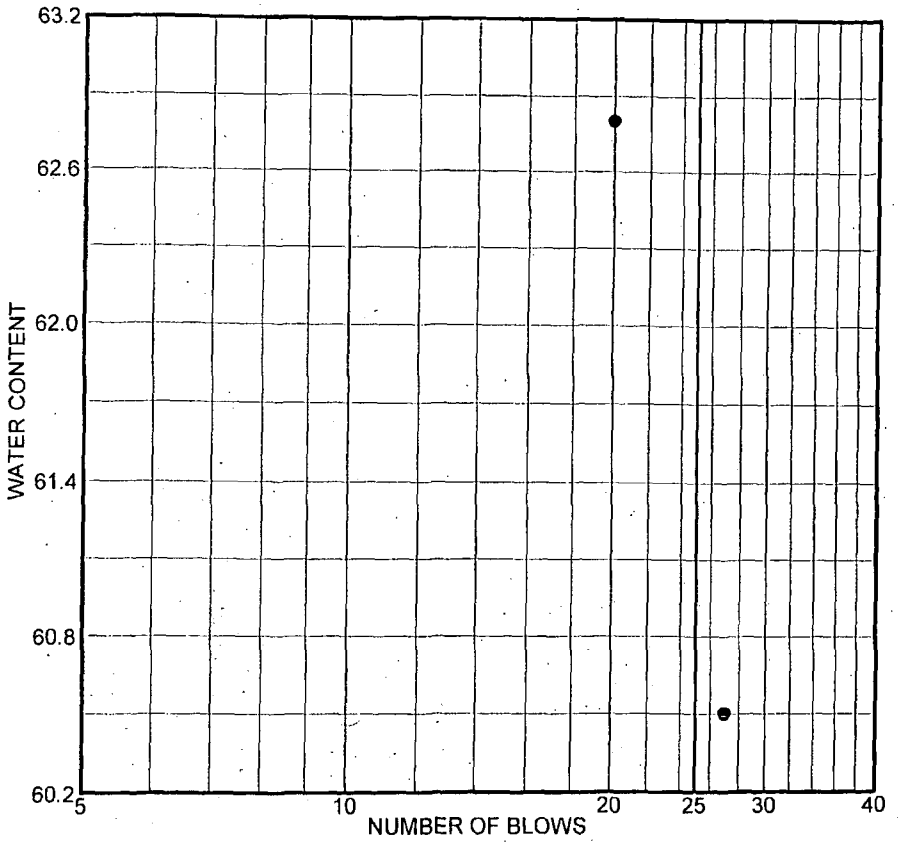
Liquid Limit= 66
Plastic Limit= 22
Plasticity Index= 44
Natural Moisture= 25.5
Liquidity Index= 0.1

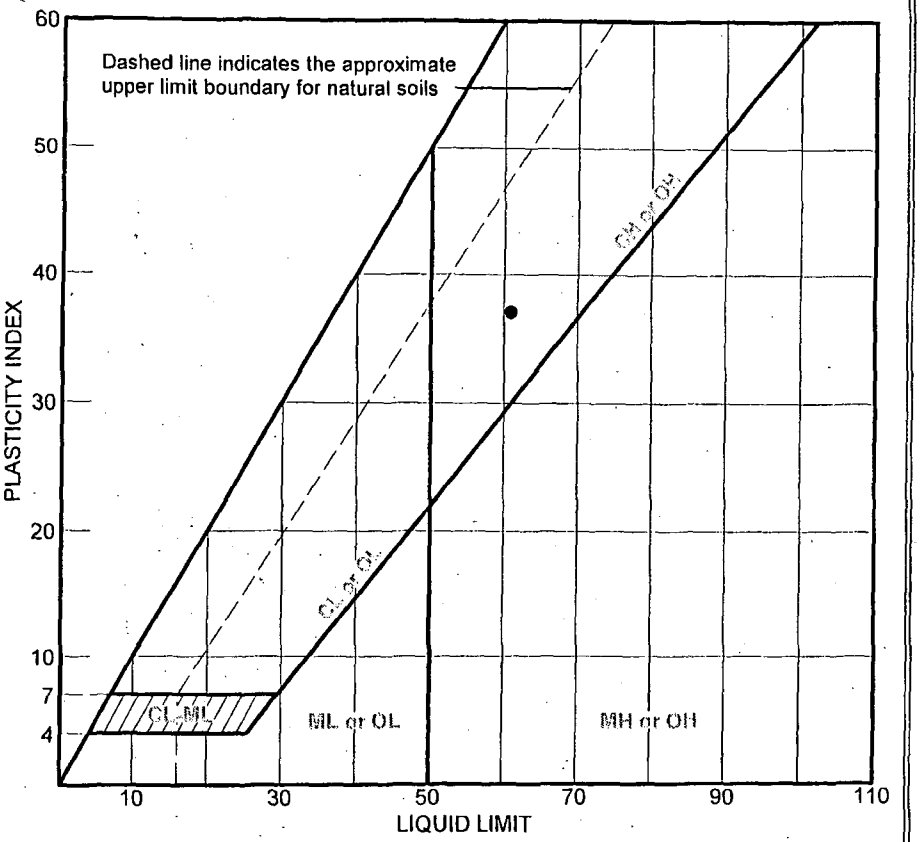
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	34.81	34.49			
Dry+Tare	33.62	33.37			
Tare	28.29	28.31			
Moisture	22.3	22.1			

MK 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-419	UD-2	98' to 100'	2-22-07	CH	Fat clay	27.0	61	37

Client Bechtel Power Corporation
Project Bechtel/STP/COL

Project No. 5050-06-0496 | Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reviewed by: MH KAW 4/3/07
ASTM D4318-05
One point ran due to insufficient material.

KAW 4/3/07

LIQUID AND PLASTIC LIMIT TEST DATA

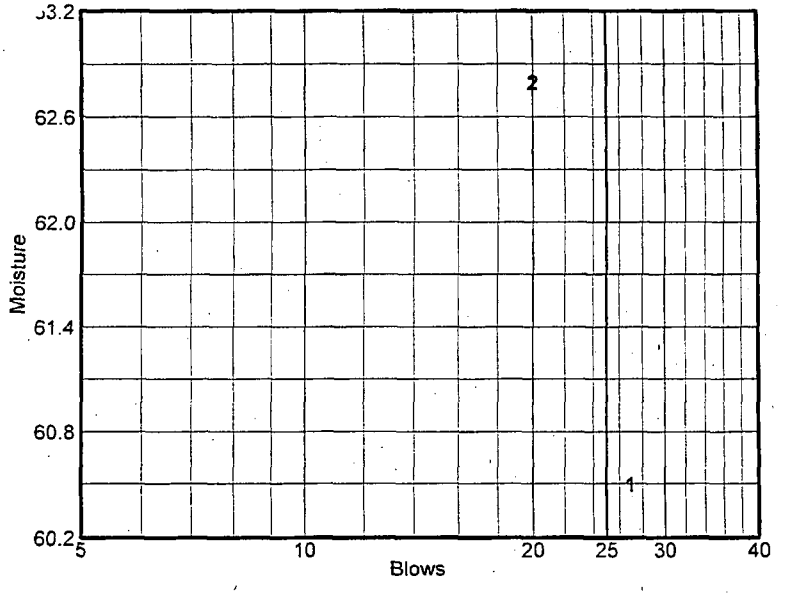
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496

Sample Data

Source: B-419
Sample No.: UD-2
Elev. or Depth: 98' to 100' **Sample Length(in./cm.):**
Location: B-419
Description: Fat clay
Date: 2-22-07 **Natural Moisture:** 27.0
USCS Class.: CH **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed by: MH
ASTM D4318-05
One point ran due to insufficient material.

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	24.16	19.52				
Dry+Tare	21.08	16.21				
Tare	15.99	10.94				
# Blows	27	20				
Moisture	60.5	62.8				

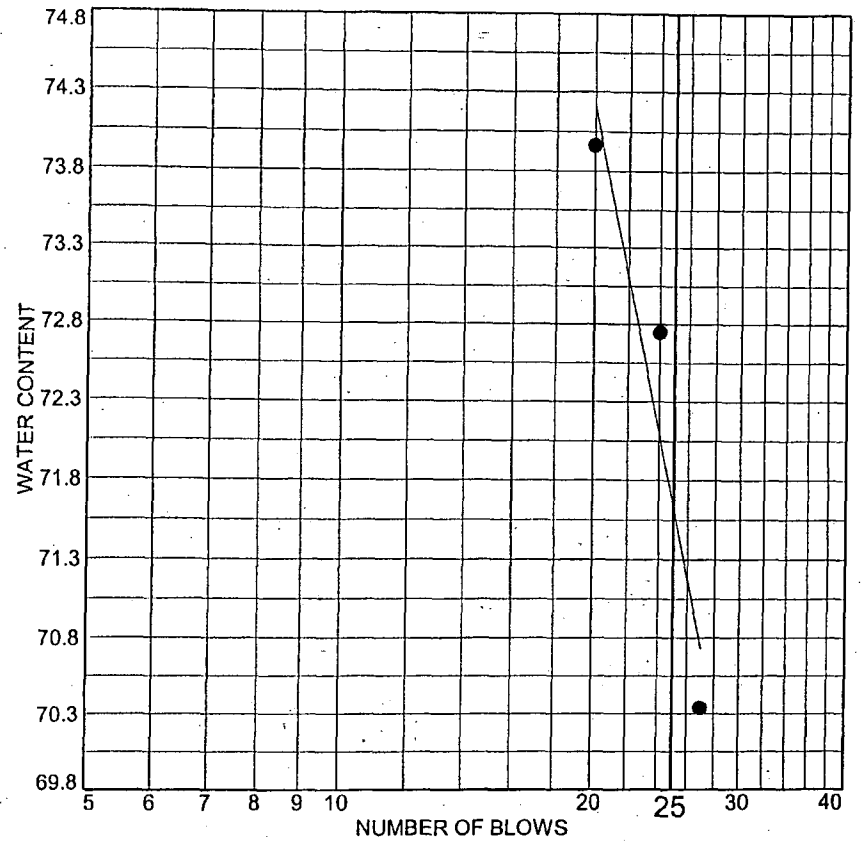


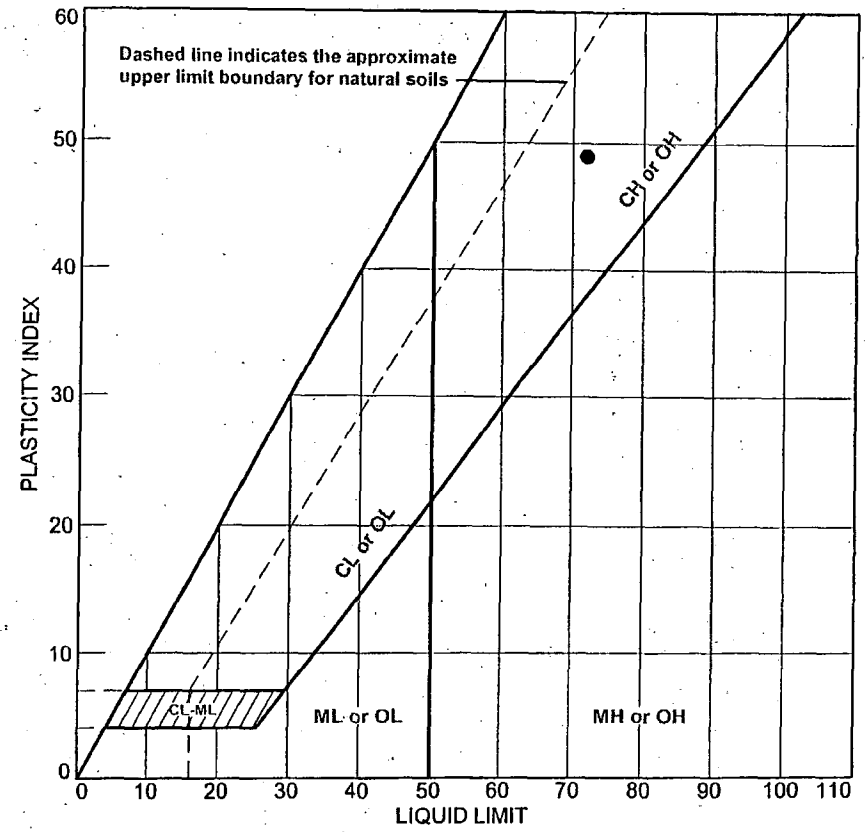
Liquid Limit= 61
Plastic Limit= 24
Plasticity Index= 37

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	20.70	18.32			
Dry+Tare	18.81	17.05			
Tare	10.74	11.67			
Moisture	23.4	23.6			

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 419	STP-161 (SS-27)	128.5'-130'	12/2/2006	CH	Fat CLay	25.0	72	49

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC/TH/JW Reviewed By:RF

ASTM D4318-05

MA 4-3-07

KAW 4/3/07

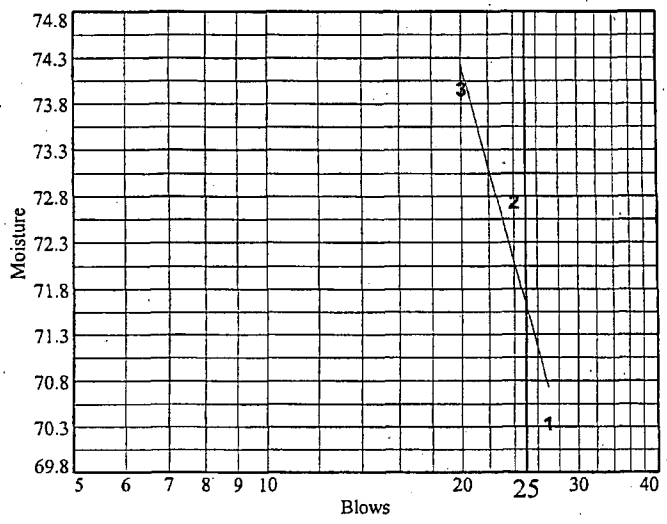
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 419
Depth: 128.5'-130'
Sample Number: STP-161 (SS-27)
Material Description: Fat CLay
Date: 12/2/2006
USCS Class.: CH
Testing Remarks: Tested By:AC/TH/JW Reviewed By:RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	36.32	34.04	36.99			
Dry+Tare	33	30.41	33.24			
Tare	28.28	25.42	28.17			
# Blows	27	24	20			
Moisture	70.3	72.7	74.0			



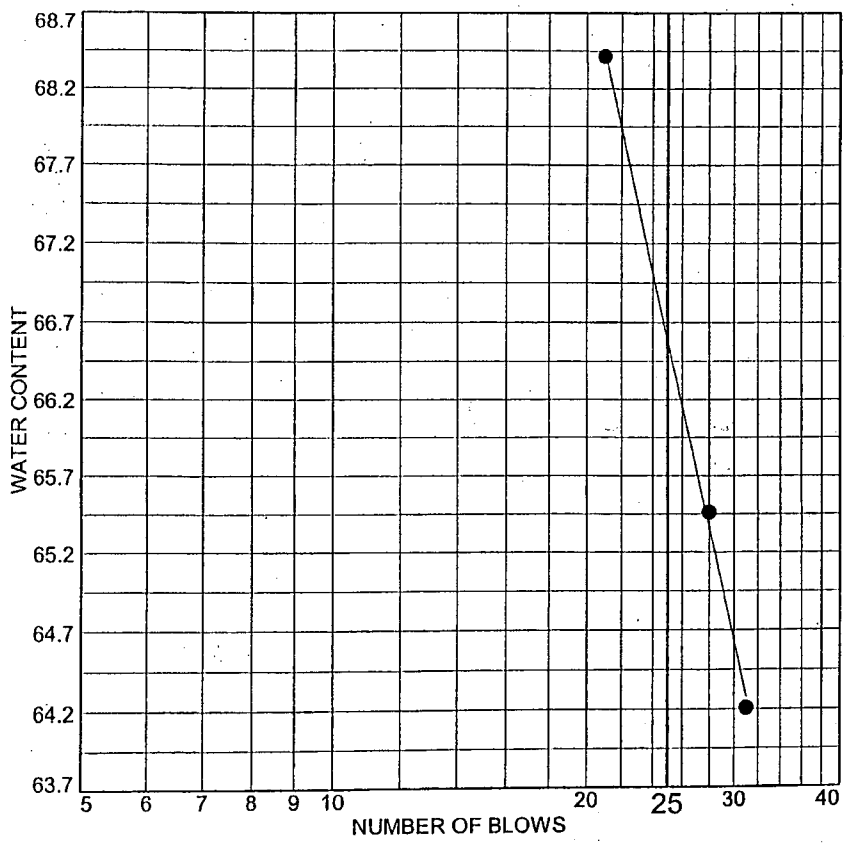
Liquid Limit= 72
Plastic Limit= 23
Plasticity Index= 49
Natural Moisture= 25.0
Liquidity Index= 0.0

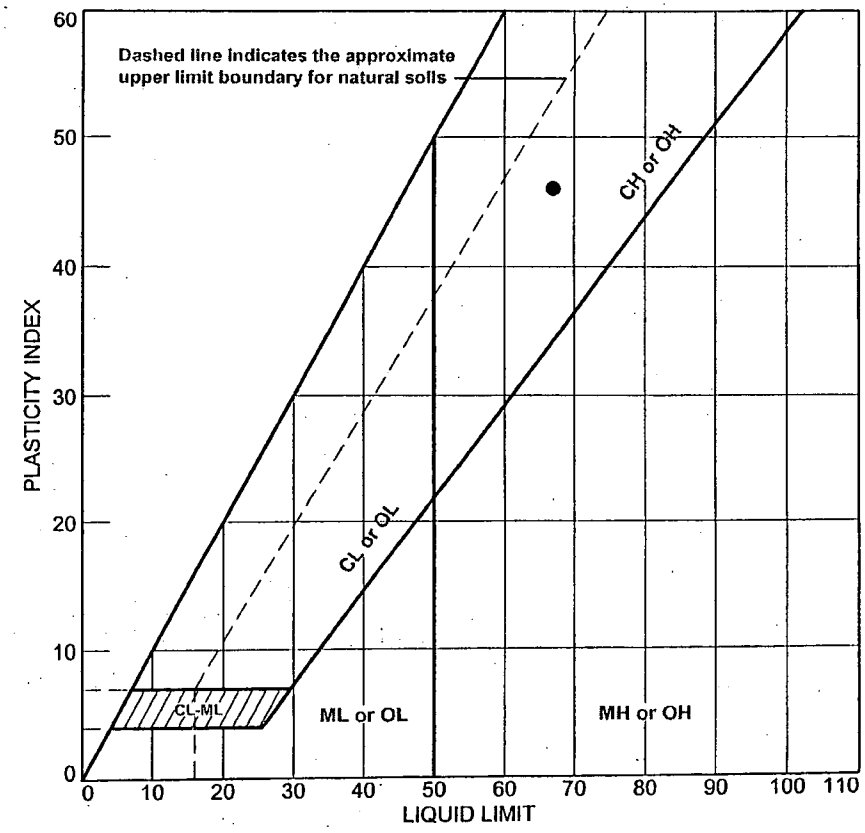
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	37.60	34.91			
Dry+Tare	35.81	33.45			
Tare	28.18	27.09			
Moisture	23.5	23.0			

MA 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 419	STP-163	168.5'-170'	12/2/2006	CH	Fat Clay	24.8	67	46
		(SS-29)							

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:MH/TH
ASTM D4318-05

Reviewed By:RF

MA 4-3-07

KAW 4/3/07

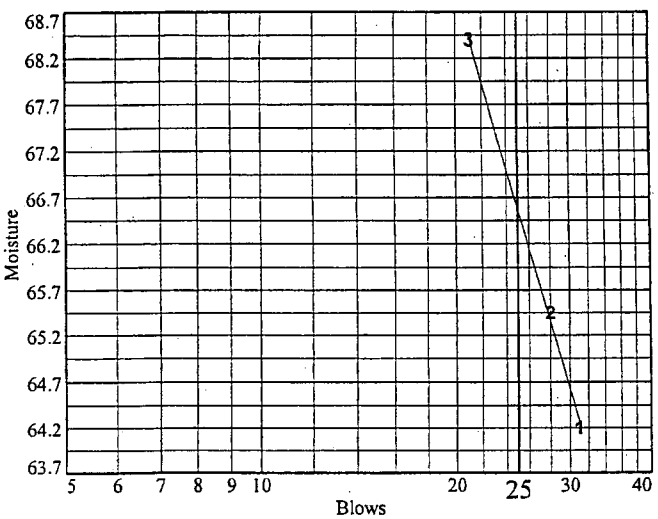
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 419
Depth: 168.5'-170'
Sample Number: STP-163 (SS-29)
Material Description: Fat Clay
Date: 12/2/2006
USCS Class.: CH
Testing Remarks: Tested By:MH/TH Reviewed By:RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	37.43	38.39	37.69			
Dry+Tare	33.86	34.41	33.38			
Tare	28.30	28.33	27.08			
# Blows	31	28	21			
Moisture	64.2	65.5	68.4			



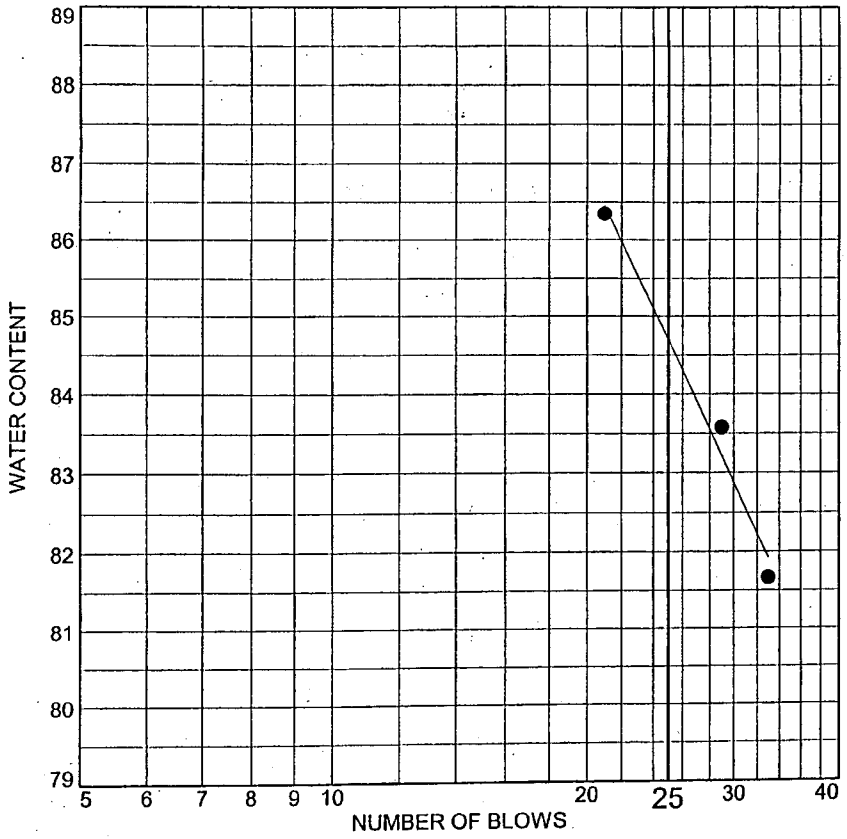
Liquid Limit= 67
Plastic Limit= 21
Plasticity Index= 46
Natural Moisture= 24.8
Liquidity Index= 0.1

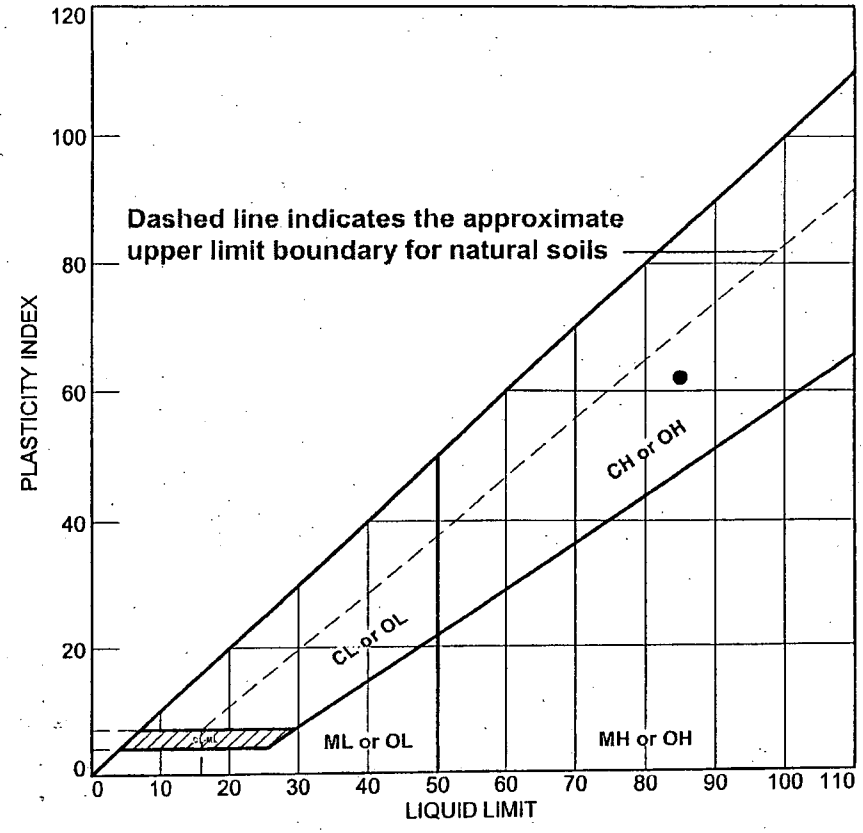
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	39.14	40.18			
Dry+Tare	37.26	38.09			
Tare	28.36	28.17			
Moisture	21.1	21.1			

Nat 43.07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 419	STP-164	188.5'-190.0'	12/06/2006	CH	Fat Clay	31.6	85	62
		(SS-30)							

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC Reviewed By:RF
ASTM D4318-05

MA
4-3-07

KAW 4/3/07

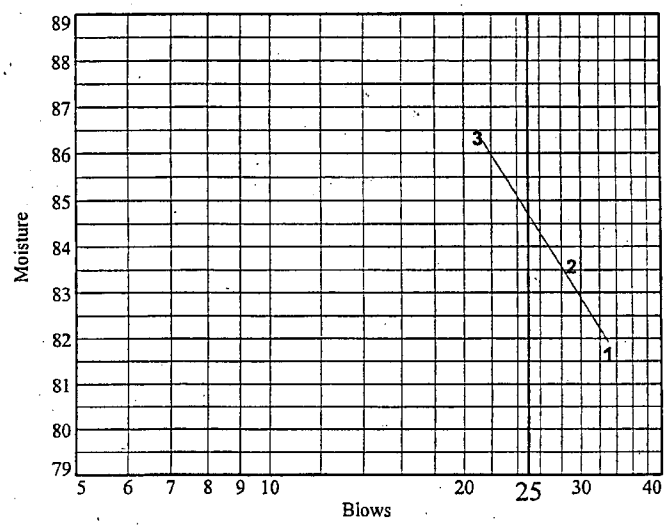
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 419
Depth: 188.5'-190.0'
Sample Number: STP-164 (SS-30)
Material Description: Fat Clay
Date: 12/06/2006
USCS Class.: CH
Testing Remarks: Tested By:AC Reviewed By:RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	36.66	36.09	36.28			
Dry+Tare	32.83	32.68	32.55			
Tare	28.14	28.60	28.23			
# Blows	33	29	21			
Moisture	81.7	83.6	86.3			



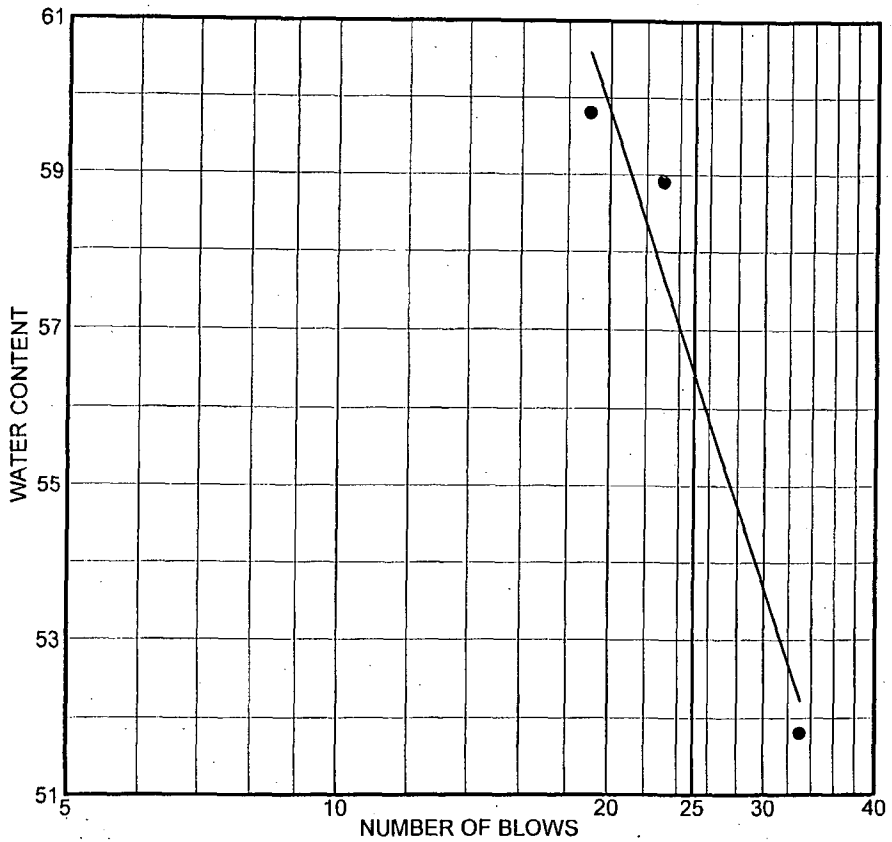
Liquid Limit= 85
Plastic Limit= 23
Plasticity Index= 62
Natural Moisture= 31.6
Liquidity Index= 0.1

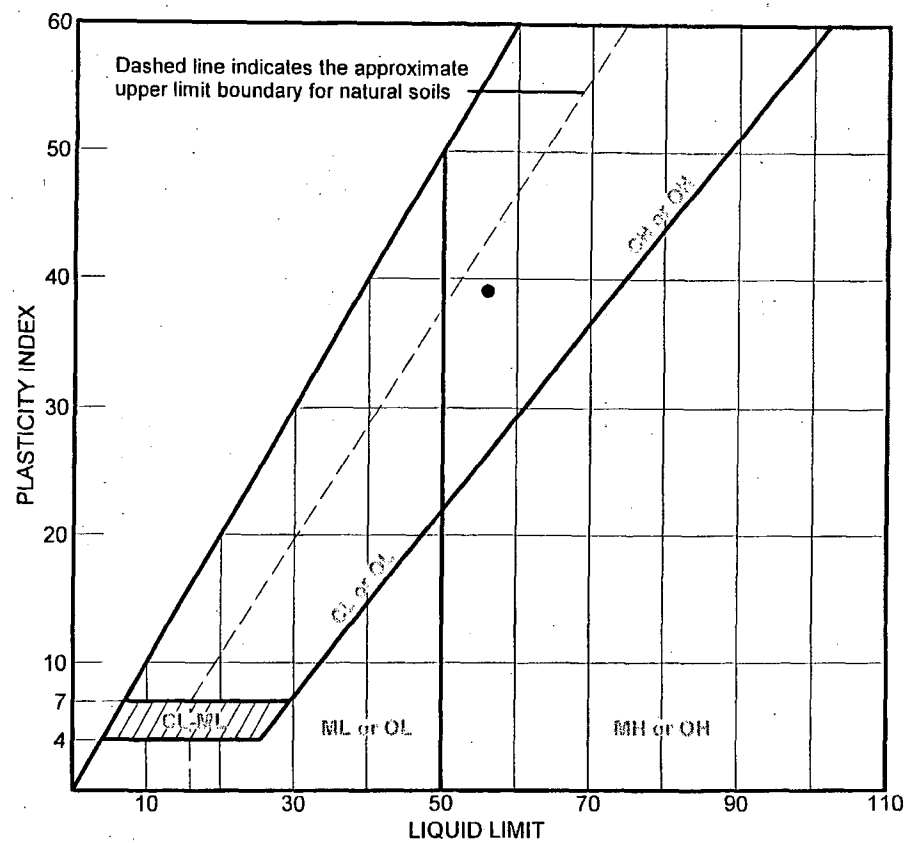
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	39.04	37.96			
Dry+Tare	36.99	36.14			
Tare	28.26	28.28			
Moisture	23.5	23.2			

MAK 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-419	UD-3	118' to 120'	2-20-07	CH	Fat clay	19.3	56	39

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496 | Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reviewed by: SS
ASTM D4318-05

SS 2/25/2007

KAW 4/3/07

LIQUID AND PLASTIC LIMIT TEST DATA

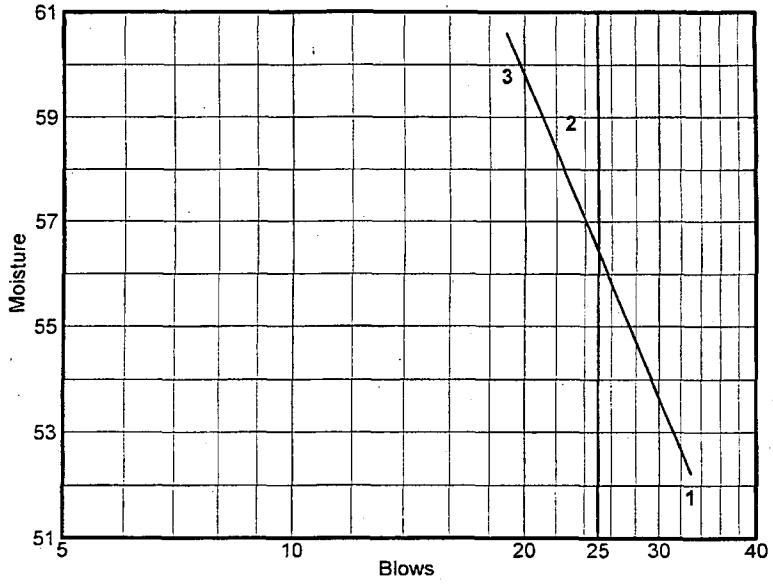
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
ject Number: 5050-06-0496

Sample Data

Source: B-419
Sample No.: UD-3
Elev. or Depth: 118' to 120' **Sample Length(in./cm.):**
Location: B-419
Description: Fat clay
Date: 2-20-07 **Natural Moisture:** 19.3
USCS Class.: CH **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed by: SS
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	28.79	32.44	32.30			
Dry+Tare	22.71	24.43	24.32			
Tare	10.98	10.84	10.97			
# Blows	33	23	19			
Moisture	51.8	58.9	59.8			

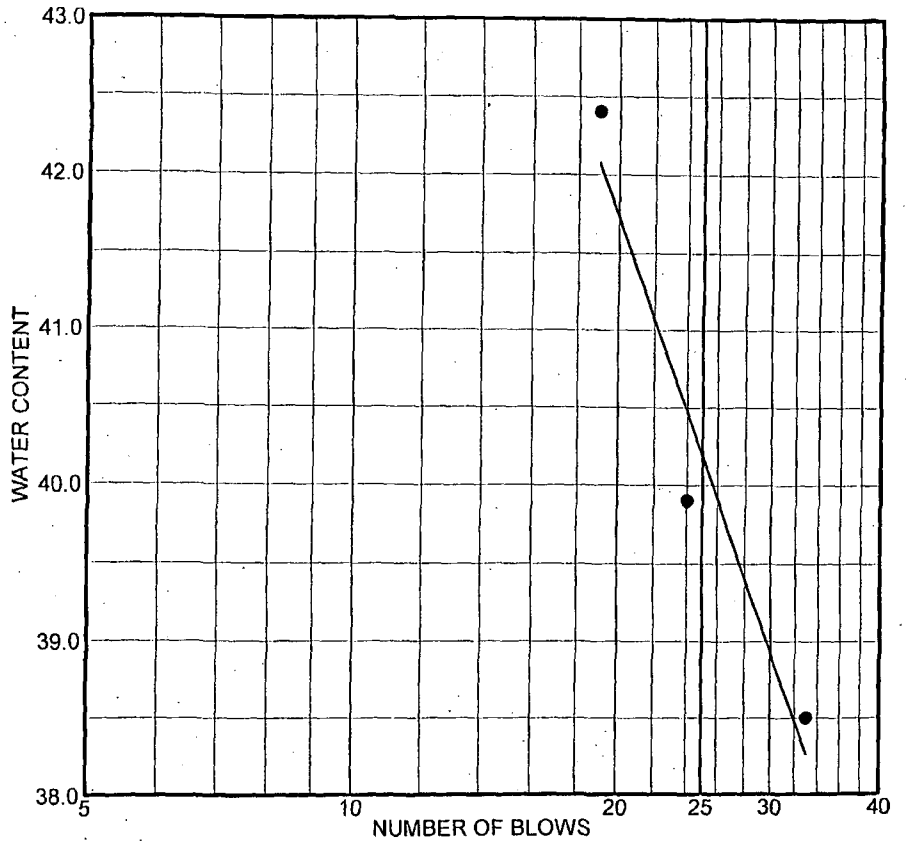


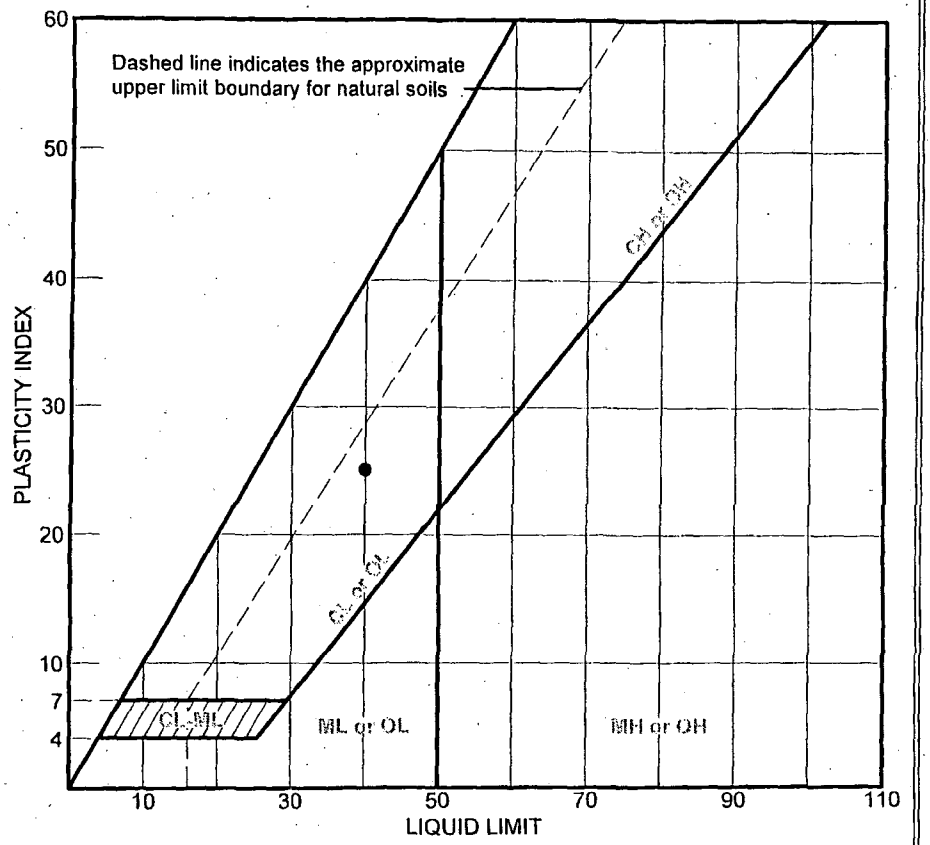
Liquid Limit= 56
Plastic Limit= 17
Plasticity Index= 39

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	27.55	24.27			
Dry+Tare	25.10	22.39			
Tare	11.01	11.05			
Moisture	17.4	16.6			

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-419	UD-4	138' to 140'	2-20-07	CL	Lean clay with sand	14.9	40	25

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496 | Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reviewed by: SS
ASTM D4318-05

SS 2/25/2007

KAW 4/3/07

LIQUID AND PLASTIC LIMIT TEST DATA

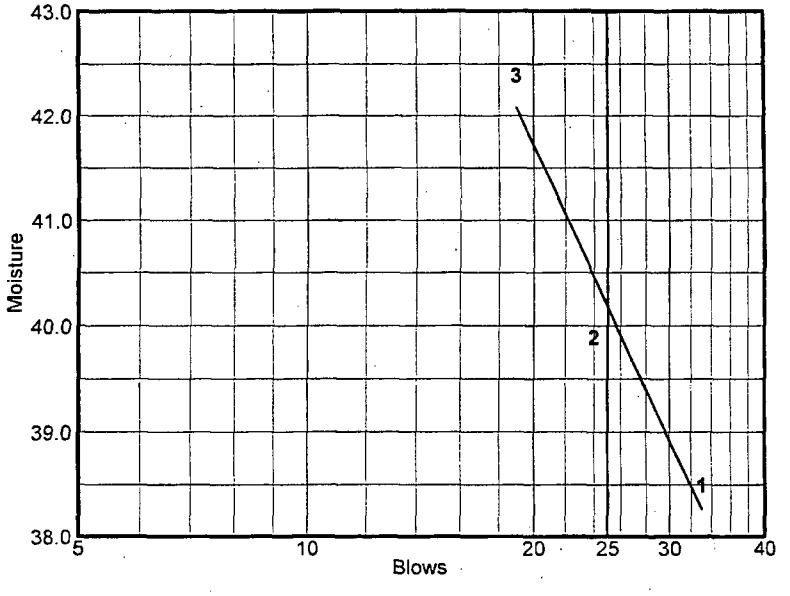
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496

Sample Data

Source: B-419
Sample No.: UD-4
Elev. or Depth: 138' to 140' **Sample Length(in./cm.):**
Location: B-419
Description: Lean clay with sand
Date: 2-20-07 **Natural Moisture:** 14.9
USCS Class.: CL **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed by: SS
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	31.70	32.95	35.82			
Dry+Tare	26.13	26.69	28.40			
Tare	11.65	11.02	10.90			
# Blows	33	24	19			
Moisture	38.5	39.9	42.4			

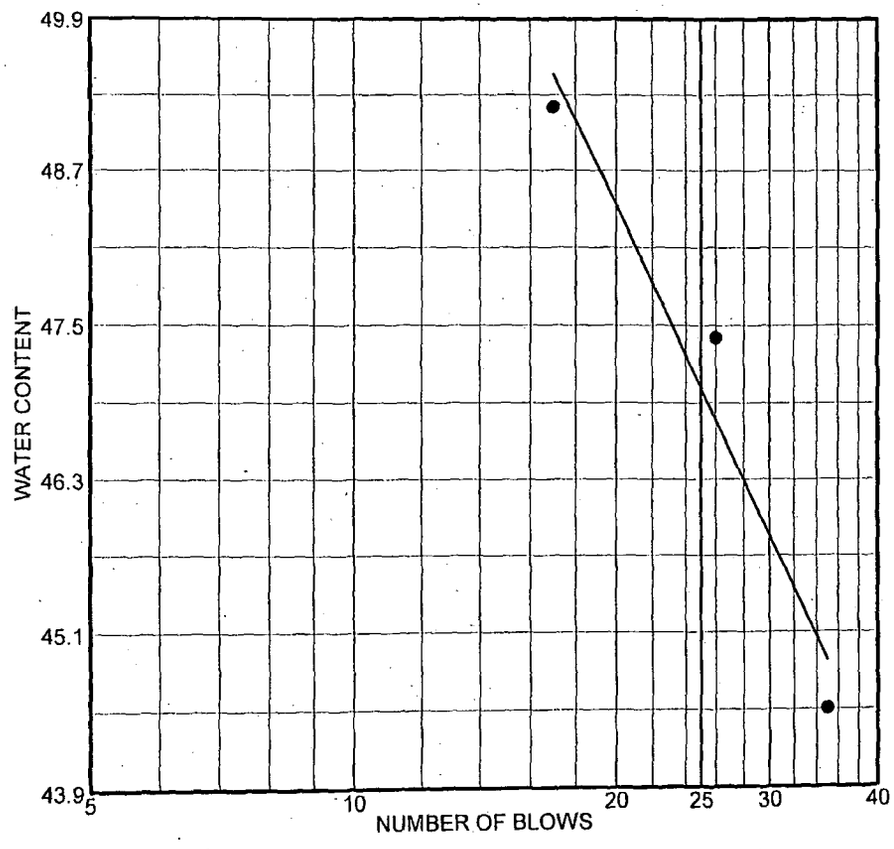


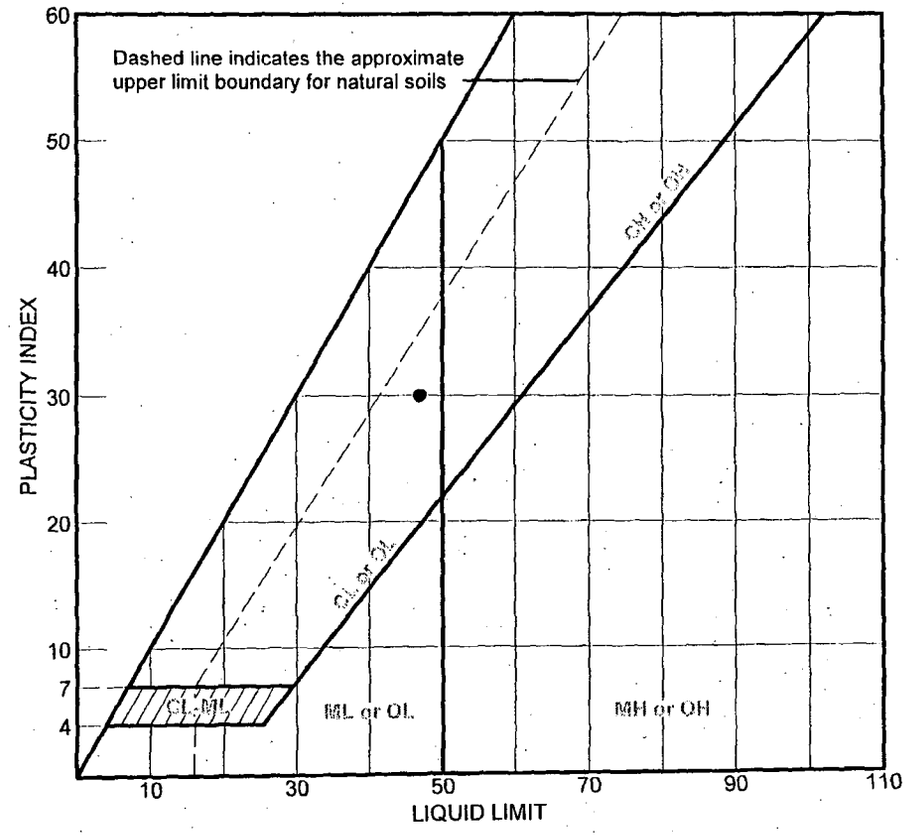
Liquid Limit= 40
Plastic Limit= 15
Plasticity Index= 25

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	25.04	25.04			
Dry+Tare	23.14	23.14			
Tare	10.84	10.84			
Moisture	15.4	15.4			

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-419	UD-5	158' to 160'	2-20-07	CL	Lean clay	19.3	47	30

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496 | Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reviewed by: SS
ASTM D4318-05

SS 2/25/2007

KAW 4/3/07

LIQUID AND PLASTIC LIMIT TEST DATA

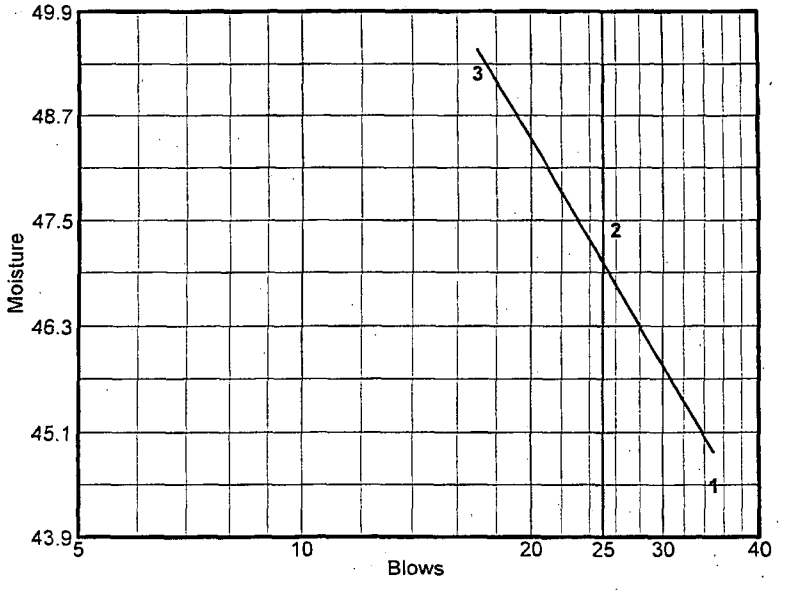
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
ject Number: 5050-06-0496

Sample Data

Source: B-419
Sample No.: UD-5
Elev. or Depth: 158' to 160' **Sample Length(in./cm.):**
Location: B-419
Description: Lean clay
Date: 2-20-07 **Natural Moisture:** 19.3
USCS Class.: CL **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed by: SS
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	30.07	26.02	28.13			
Dry+Tare	24.13	21.37	22.46			
Tare	10.79	11.57	10.93			
# Blows	35	26	17			
Moisture	44.5	47.4	49.2			

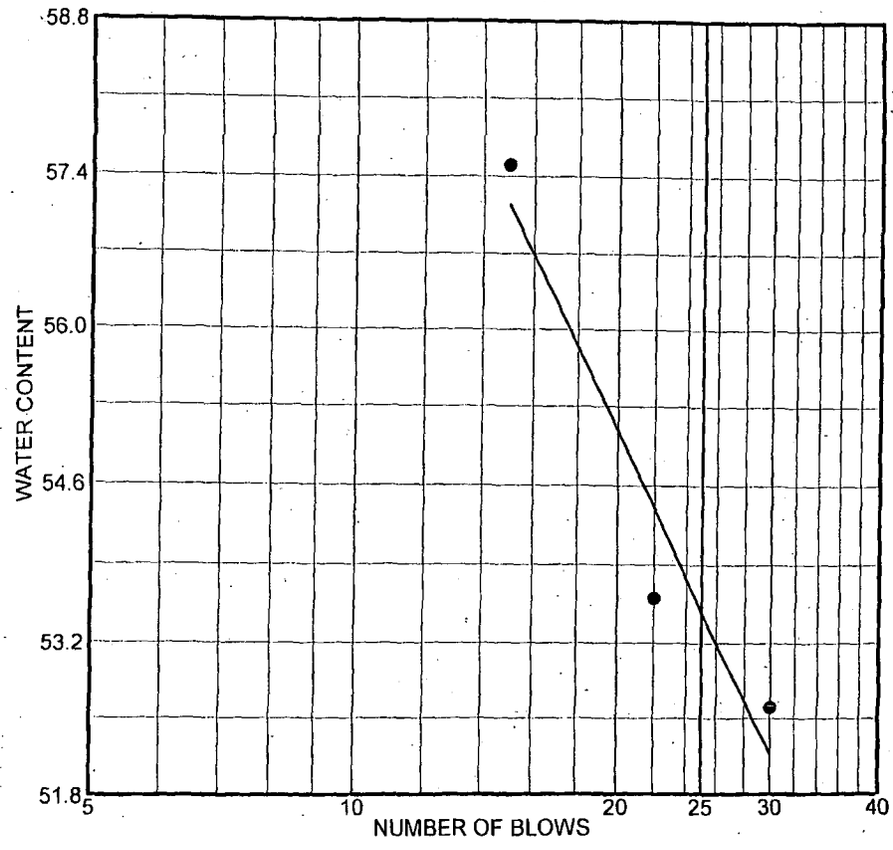


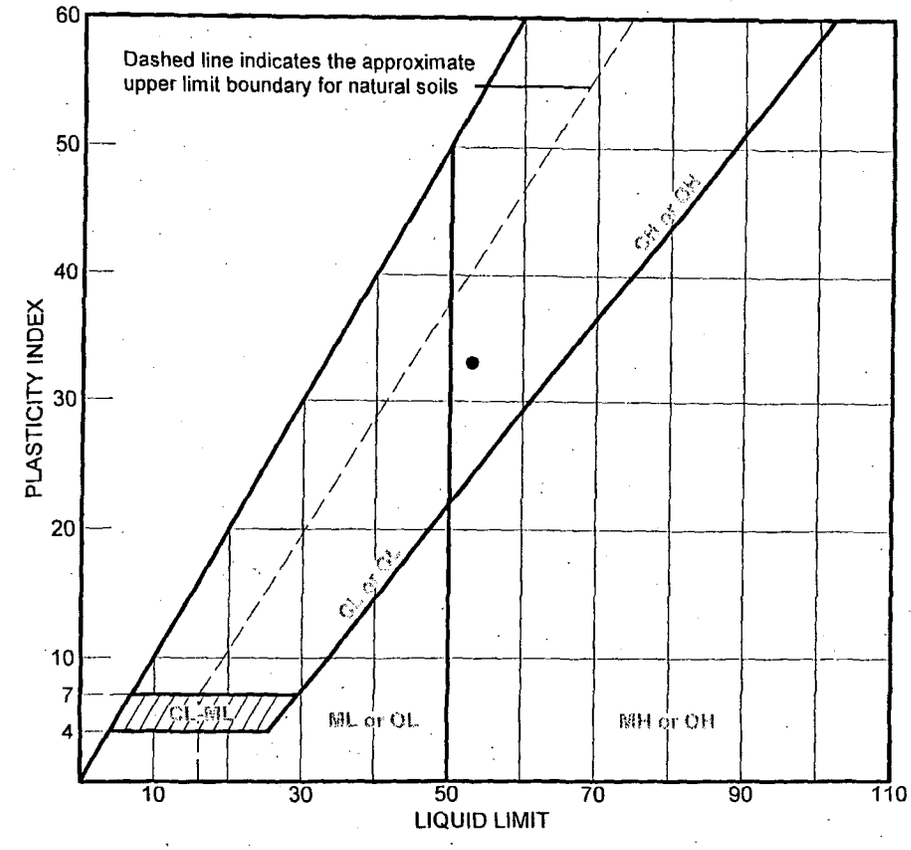
Liquid Limit= 47
Plastic Limit= 17
Plasticity Index= 30

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	21.73	20.33			
Dry+Tare	20.32	18.99			
Tare	11.66	11.05			
Moisture	16.3	16.9			

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-419	UD-6	178' to 180'	2-20-07	CH	Fat clay	20.6	53	33

Client Bechtel Power Corporation
Project Bechtel/STP/COL

Project No. 5050-06-0496 | Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reviewed by: SS
ASTM D4318-05

SS 2/25/2007

KAW 4/3/07

LIQUID AND PLASTIC LIMIT TEST DATA

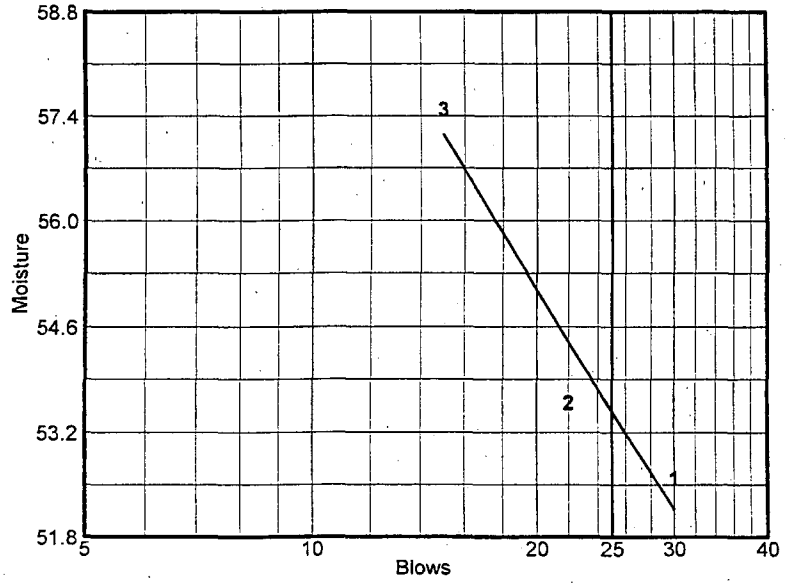
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496

Sample Data

Source: B-419
Sample No.: UD-6
Elev. or Depth: 178' to 180' **Sample Length(in./cm.):**
Location: B-419
Description: Fat clay
Date: 2-20-07 **Natural Moisture:** 20.6
USCS Class.: CH **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed by: SS
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	30.80	29.15	36.61			
Dry+Tare	23.88	22.99	27.46			
Tare	10.72	11.49	11.56			
# Blows	30	22	15			
Moisture	52.6	53.6	57.5			

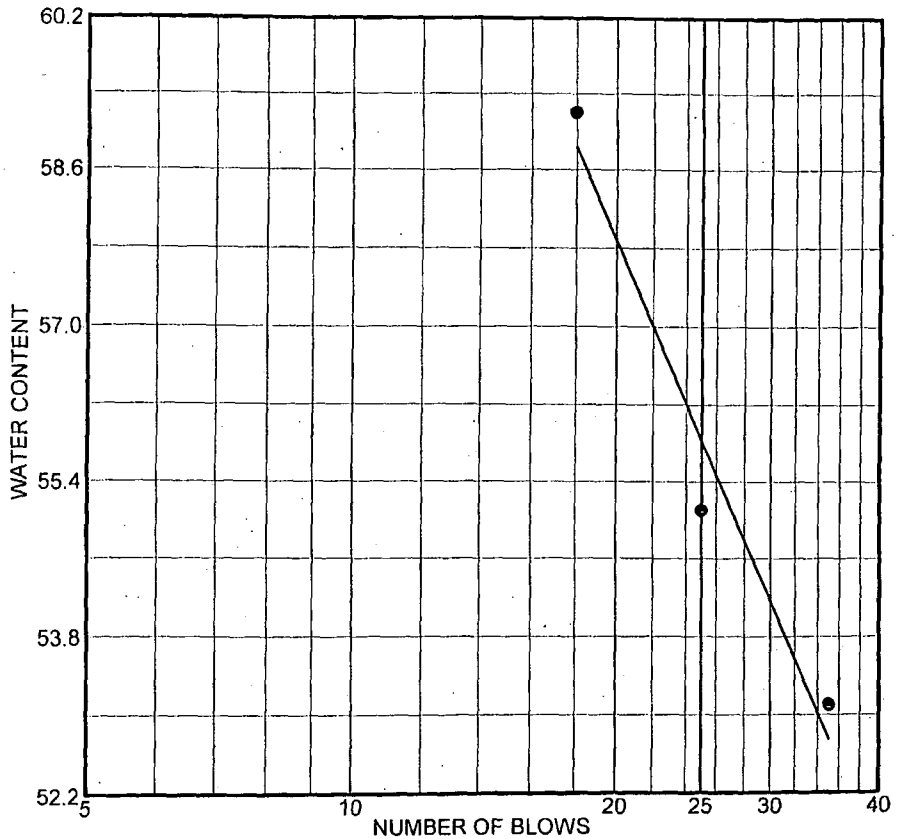


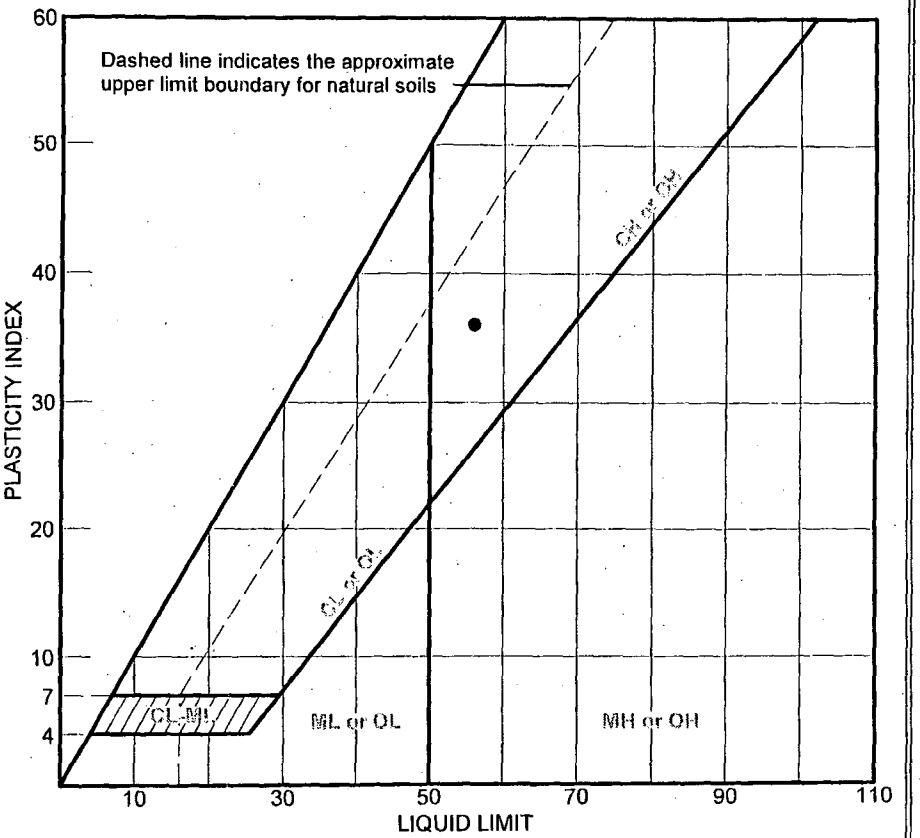
Liquid Limit= 53
Plastic Limit= 20
Plasticity Index= 33

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	25.45	24.98			
Dry+Tare	23.09	22.78			
Tare	11.00	11.60			
Moisture	19.5	19.7			

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-419	UD-7	198' to 200'	2-20-07	CH	Fat clay	22.5	56	36

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496 | Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reviewed by: SS
ASTM D4318-05

SS 2/25/2007

KAW 4/3/07

LIQUID AND PLASTIC LIMIT TEST DATA

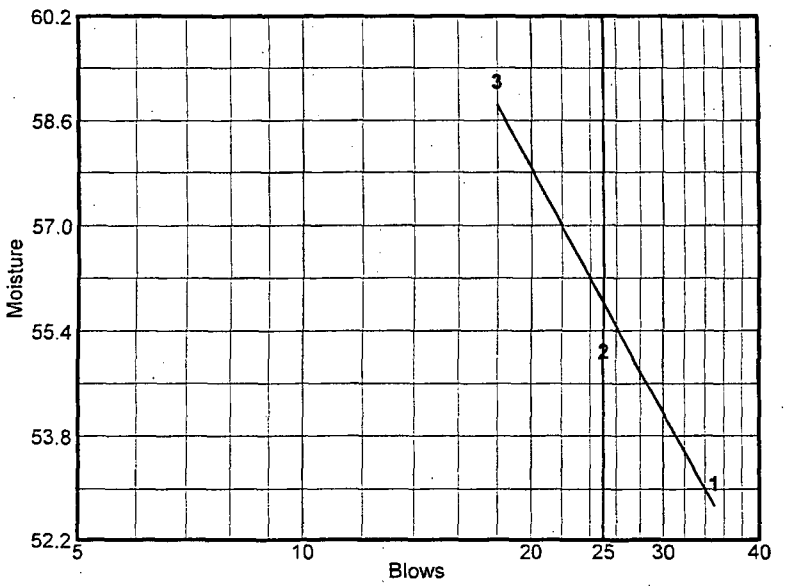
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496

Sample Data

Source: B-419
Sample No.: UD-7
Elev. or Depth: 198' to 200' **Sample Length(in./cm.):**
Location: B-419
Description: Fat clay
Date: 2-20-07 **Natural Moisture:** 22.5
USCS Class.: CH **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed by: SS
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	19.11	25.10	25.41			
Dry+Tare	16.24	20.07	19.99			
Tare	10.84	10.94	10.84			
# Blows	35	25	18			
Moisture	53.1	55.1	59.2			

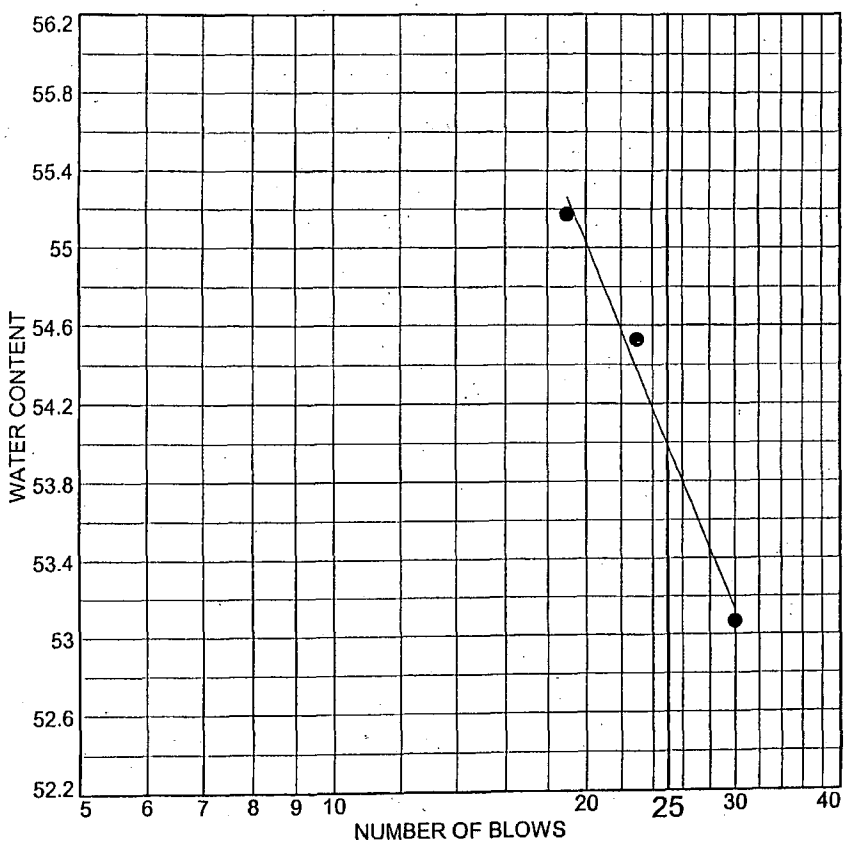


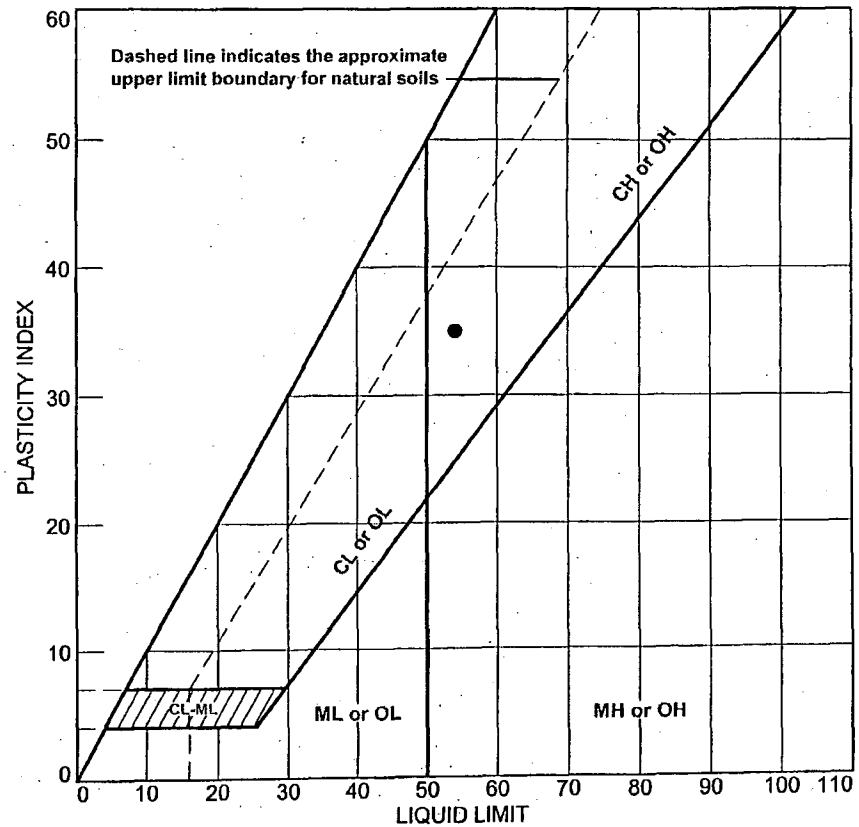
Liquid Limit= 56
Plastic Limit= 20
Plasticity Index= 36

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	19.88	21.19			
Dry+Tare	18.42	19.48			
Tare	11.01	11.02			
Moisture	19.7	20.2			

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 421	STP-137 (SS-4)	4.5'-6.0'	11/27/2006	CH	Fat Clay	18.9	54	35

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC/TH
ASTM D4318-05

Reviewed By:RF

MA 4-3-07

KAW 4/3/07

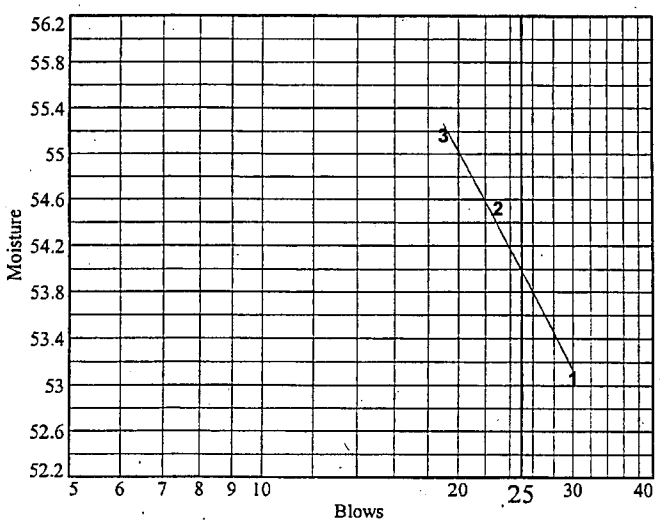
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 421
Depth: 4.5'-6.0' **Sample Number:** STP-137 (SS-4)
Material Description: Fat Clay
Date: 11/27/2006 **USCS Class.:** CH
Testing Remarks: Tested By:AC/TH Reviewed By:RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	33.14	34.77	36.55			
Dry+Tare	30.46	32.06	33.19			
Tare	25.41	27.09	27.10			
# Blows	30	23	19			
Moisture	53.1	54.5	55.2			



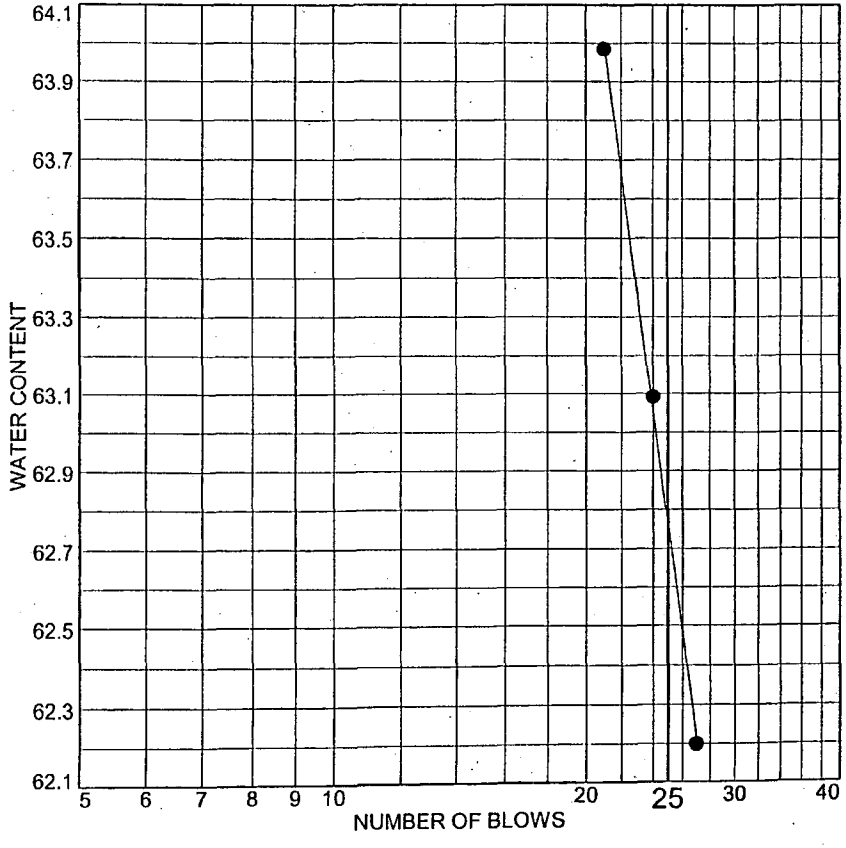
Liquid Limit= 54
Plastic Limit= 19
Plasticity Index= 35
Natural Moisture= 18.9
Liquidity Index= 0.0

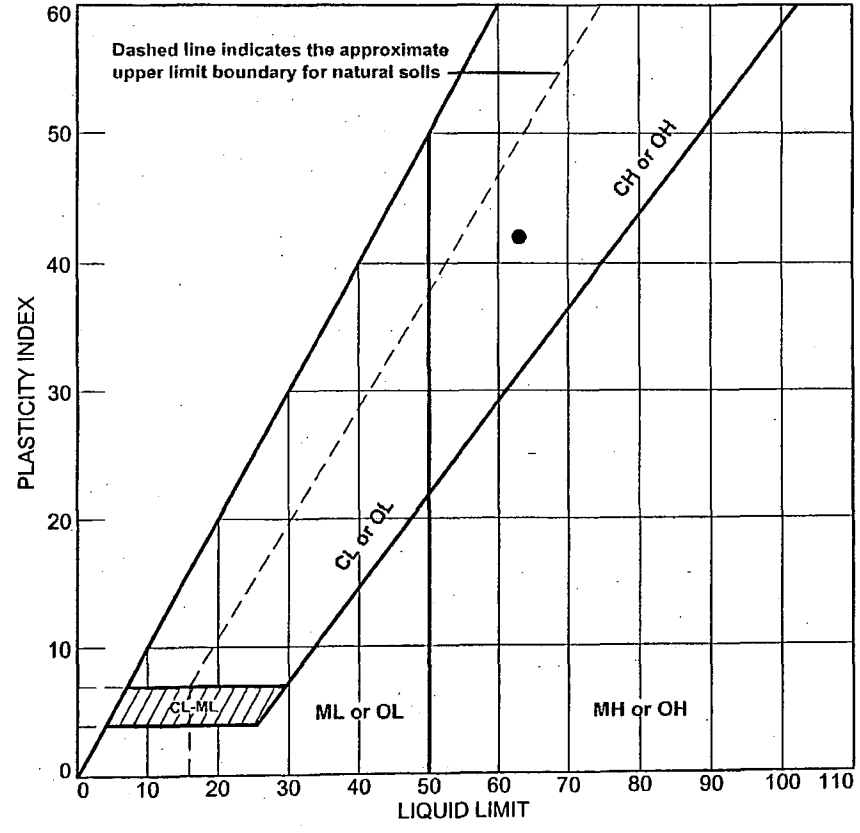
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	35.28	36.72			
Dry+Tare	34.20	35.37			
Tare	28.25	28.24			
Moisture	18.2	18.9			

MAT 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 421	STP-138	12.0'-13.5'	11/27/2006	CH	Fat Clay	20.4	63	42
		(SS-9)							

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC Reviewed By:RF

ASTM D4318-05

4-3-07

KAW 4/3/07

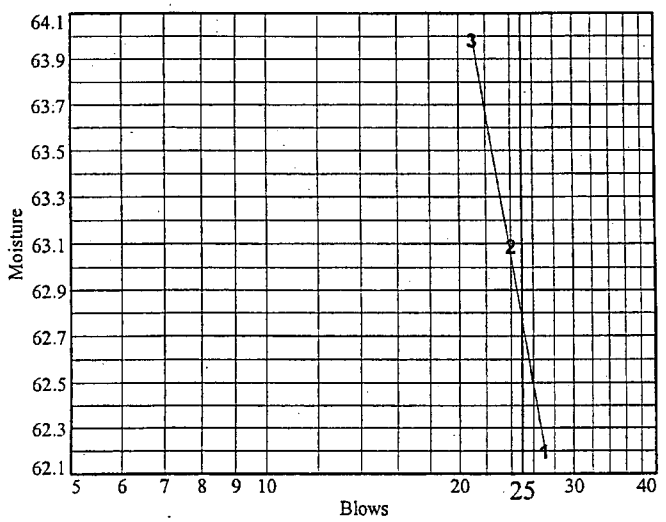
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 421
Depth: 12.0'-13.5' **Sample Number:** STP-138 (SS-9)
Material Description: Fat Clay
Date: 11/27/2006 **USCS Class.:** CH
Testing Remarks: Tested By:AC Reviewed By:RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	38.35	37.11	36.55			
Dry+Tare	34.73	33.64	33.21			
Tare	28.91	28.14	27.99			
# Blows	27	24	21			
Moisture	62.2	63.1	64.0			



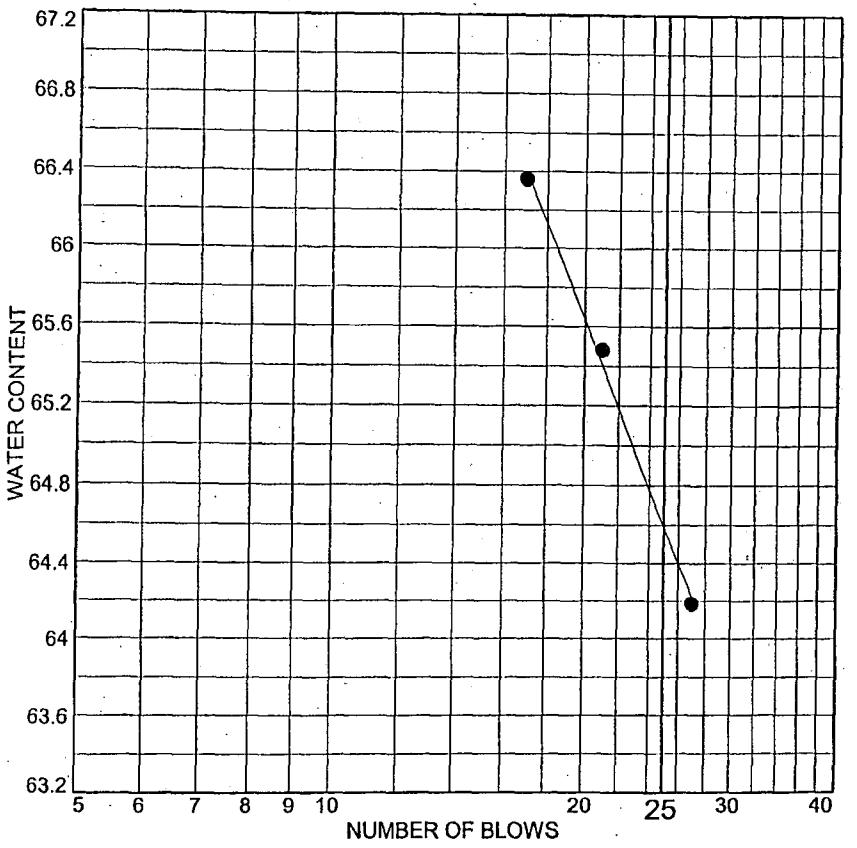
Liquid Limit= 63
Plastic Limit= 21
Plasticity Index= 42
Natural Moisture= 20.4
Liquidity Index= 0.0

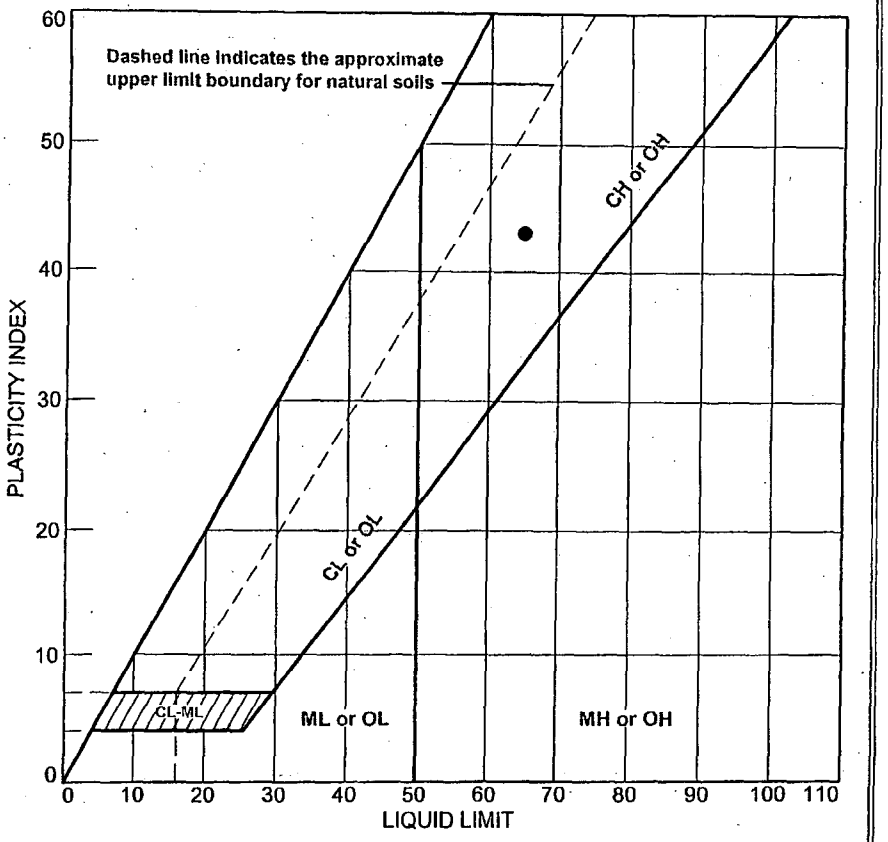
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	36.27	36.07			
Dry+Tare	34.88	34.75			
Tare	28.35	28.29			
Moisture	21.3	20.4			

MW 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 421	STP-139 (SS-11)	18.5'-20.0'	11/27/2006	CH	Fat Clay	22.5	65	43

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC/TH Reviewed By:RF
ASTM D4318-05

MA
4-3-07

KAW 4/3/07

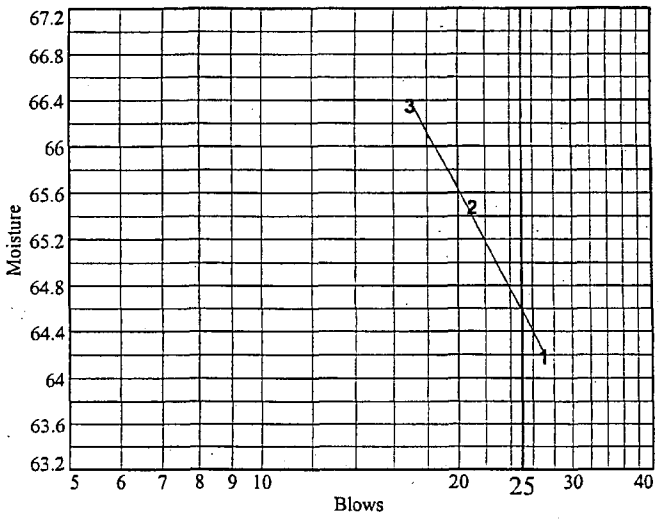
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 421
Depth: 18.5'-20.0'
Sample Number: STP-139 (SS-11)
Material Description: Fat Clay
Date: 11/27/2006
USCS Class.: CH
Testing Remarks: Tested By:AC/TH Reviewed By:RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	36.33	35.99	36.21			
Dry+Tare	33.14	32.86	32.62			
Tare	28.17	28.08	27.21			
# Blows	27	21	17			
Moisture	64.2	65.5	66.4			



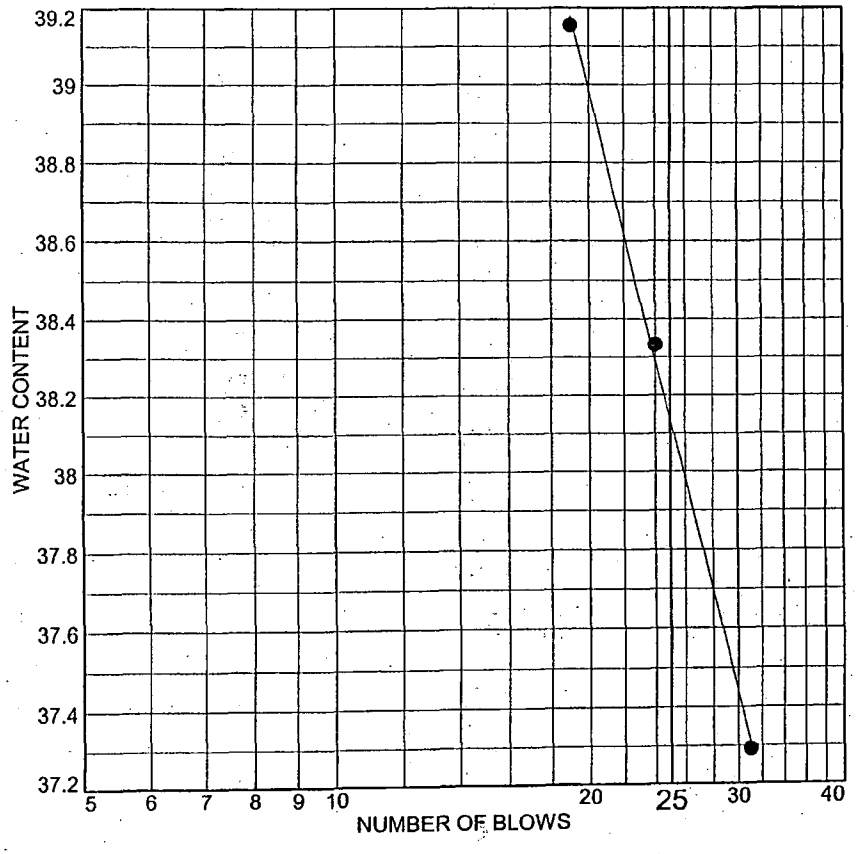
Liquid Limit= 65
Plastic Limit= 22
Plasticity Index= 43
Natural Moisture= 22.5
Liquidity Index= 0.0

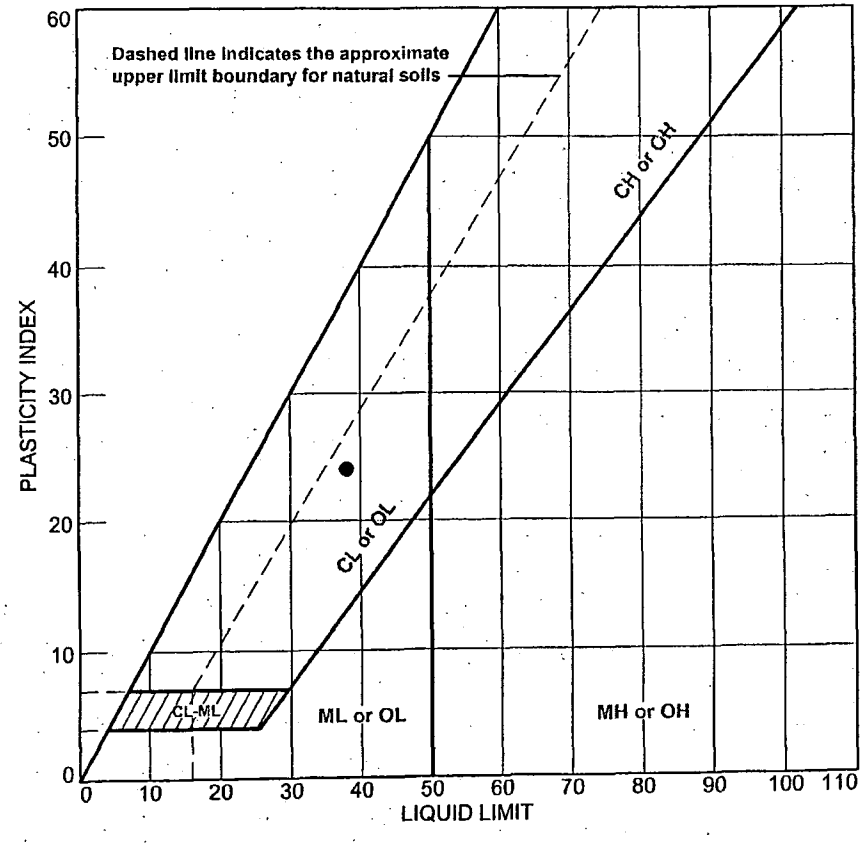
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	36.60	34.91			
Dry+Tare	35.05	32.98			
Tare	28.11	24.37			
Moisture	22.3	22.4			

MK 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 421	STP-140 (SS-12)	23.5'-24.5'	11/27/2006	CL	Lean Clay	25.5	38	24

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC Reviewed By:RF

ASTM D4318-05

4-3-07

KAW 4/3/07

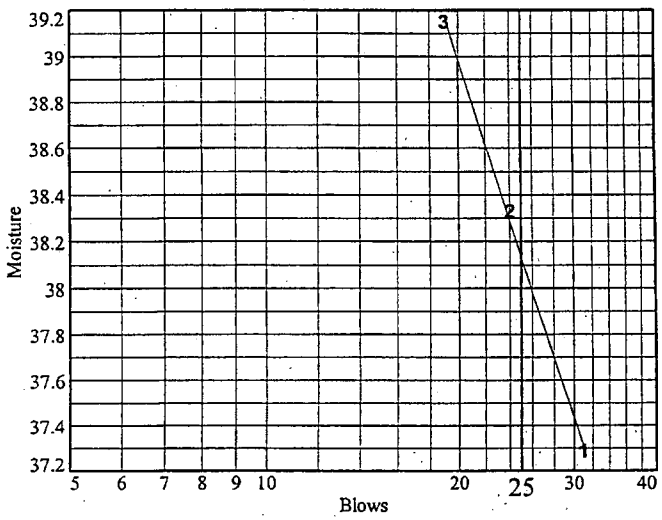
LIQUID AND PLASTIC LIMIT TEST DATA

4/1/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 421
Depth: 23.5'-24.5' **Sample Number:** STP-140 (SS-12)
Material Description: Lean Clay
Date: 11/27/2006 **USCS Class.:** CL
Testing Remarks: Tested By:AC Reviewed By:RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	37.21	37.41	38.77			
Dry+Tare	34.76	34.88	35.99			
Tare	28.19	28.28	28.89			
# Blows	31	24	19			
Moisture	37.3	38.3	39.2			



Liquid Limit= 38
Plastic Limit= 14
Plasticity Index= 24
Natural Moisture= 25.5
Liquidity Index= 0.5

Plastic Limit Data

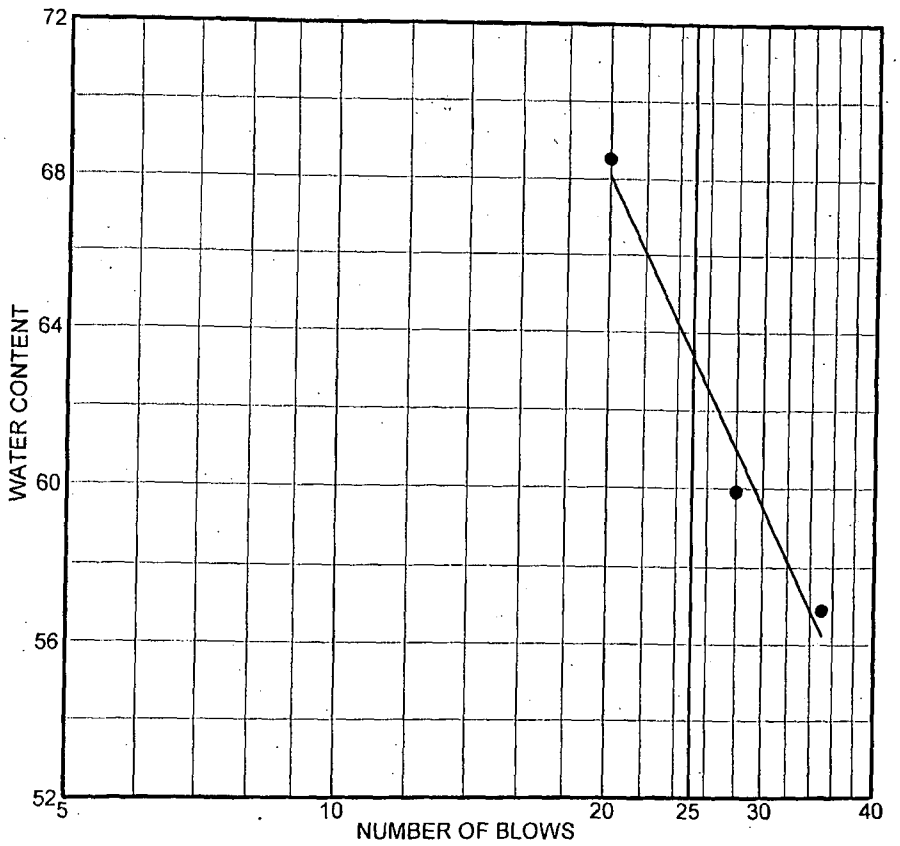
Run No.	1	2	3	4	
Wet+Tare	36.57	36.60			
Dry+Tare	35.58	35.45			
Tare	28.28	26.91			
Moisture	13.6	13.5			

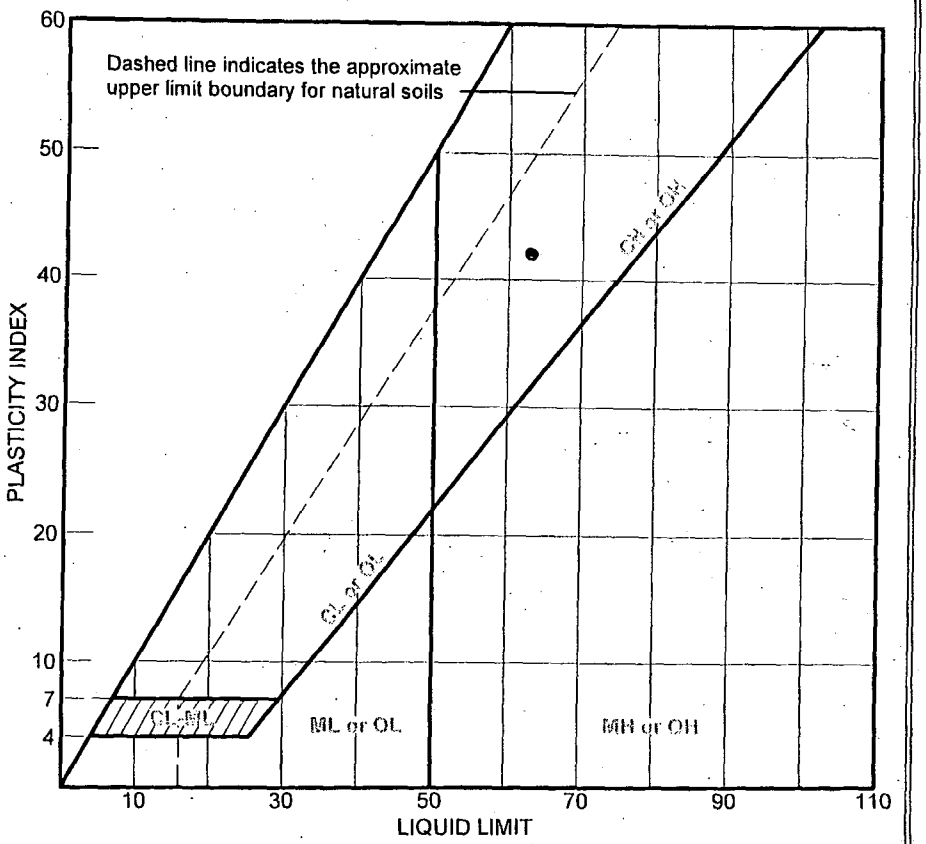
Natural Moisture Data

Wet+Tare	Dry+Tare	Tare	Moisture
539.2	465.3	175.2	25.5

MA 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-421	UD-2	53' to 55'	2-19-07	CH	Fat clay	28.1	63	42

Client Bechtel Power Corporation
Project Bechtel/STP/COL

Project No. 5050-06-0496 | Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reviewed by: SS
ASTM D4318-05

KAW 4/13/07

KAW 4/13/07

LIQUID AND PLASTIC LIMIT TEST DATA

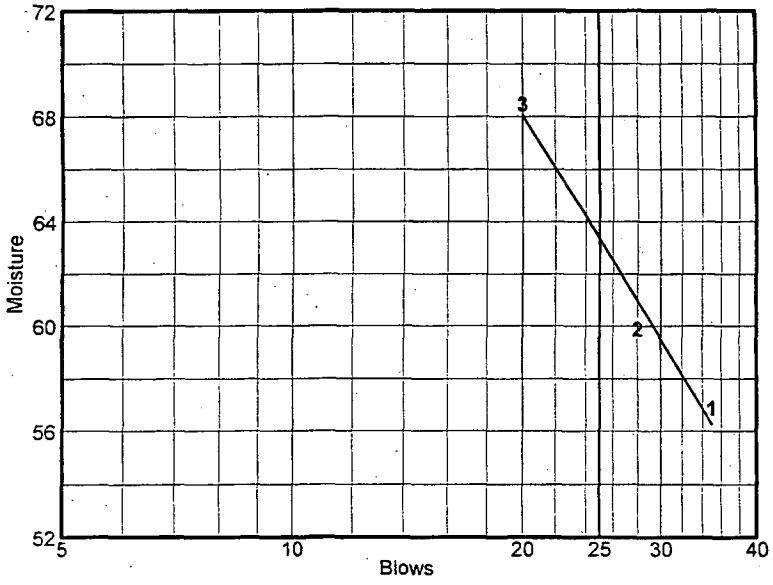
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
ject Number: 5050-06-0496

Sample Data

Source: B-421
Sample No.: UD-2
Elev. or Depth: 53' to 55' **Sample Length(in./cm.):**
Location: B-421
Description: Fat clay
Date: 2-19-07 **Natural Moisture:** 28.1
USCS Class.: CH **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed by: SS
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	32.15	34.70	35.08			
Dry+Tare	24.45	25.72	25.23			
Tare	10.92	10.73	10.85			
# Blows	35	28	20			
Moisture	56.9	59.9	68.5			

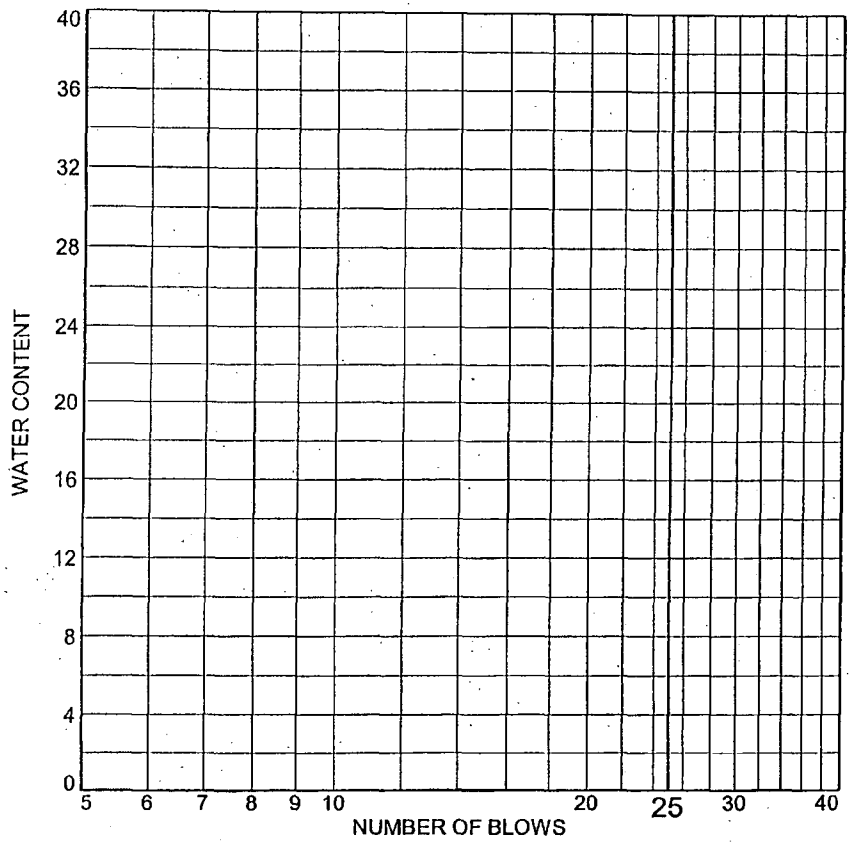


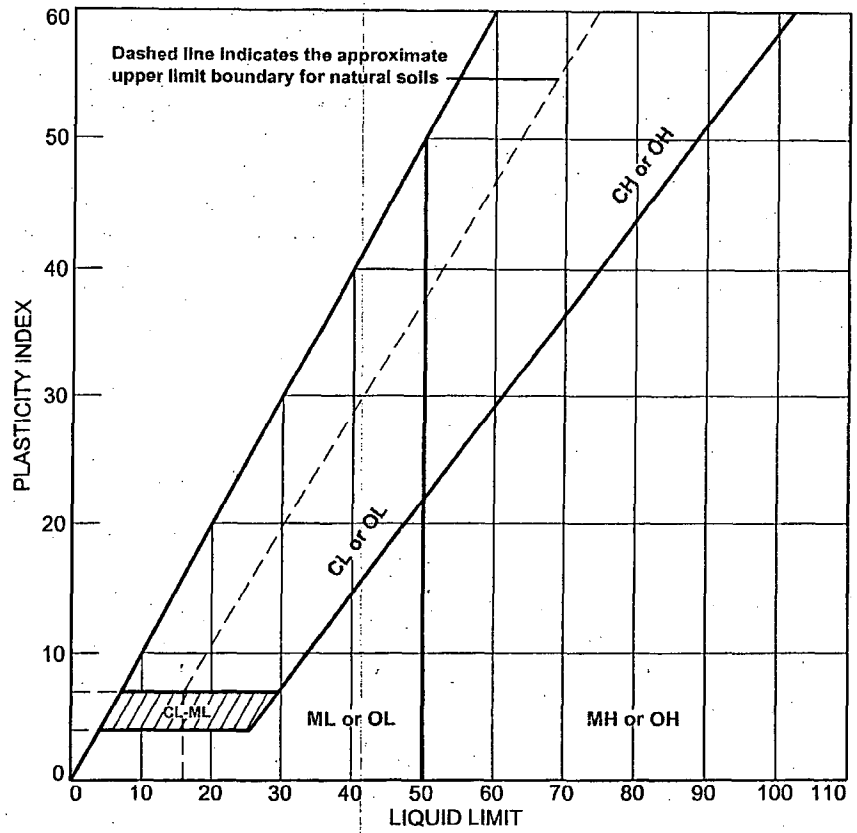
Liquid Limit= 63
Plastic Limit= 21
Plasticity Index= 42

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	25.07	25.44			
Dry+Tare	22.62	23.05			
Tare	10.91	11.46			
Moisture	20.9	20.6			

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 421	STP-144	59.0'-60.0'	11/28/2006	ML	Sandy Silt	19.0	NV	NP
		(SS-17)							

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC Reviewed By:RF

ASTM D4318-05

4-3-07

KAW 4/3/07

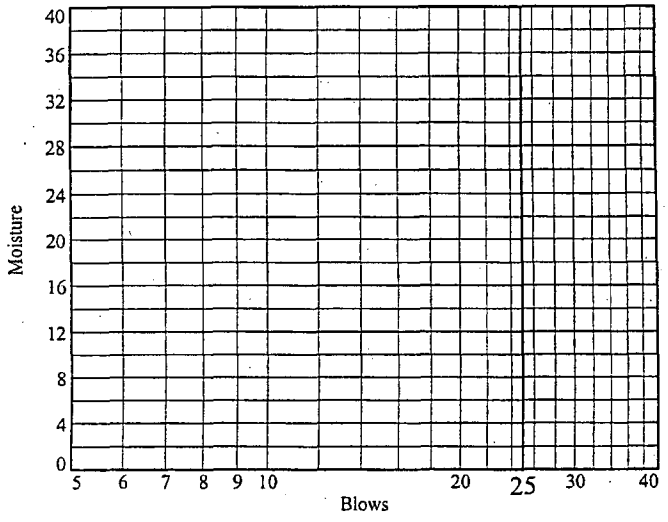
LIQUID AND PLASTIC LIMIT TEST DATA

4/1/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 421
Depth: 59.0'-60.0' **Sample Number:** STP-144 (SS-17)
Material Description: Sandy Silt
Date: 11/28/2006 **USCS Class.:** ML
Testing Remarks: Tested By:AC Reviewed By:RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare						
Dry+Tare						
Tare						
# Blows						
Moisture						



Liquid Limit= NV
Plastic Limit= NP
Plasticity Index= NP
Natural Moisture= 19.0

Plastic Limit Data

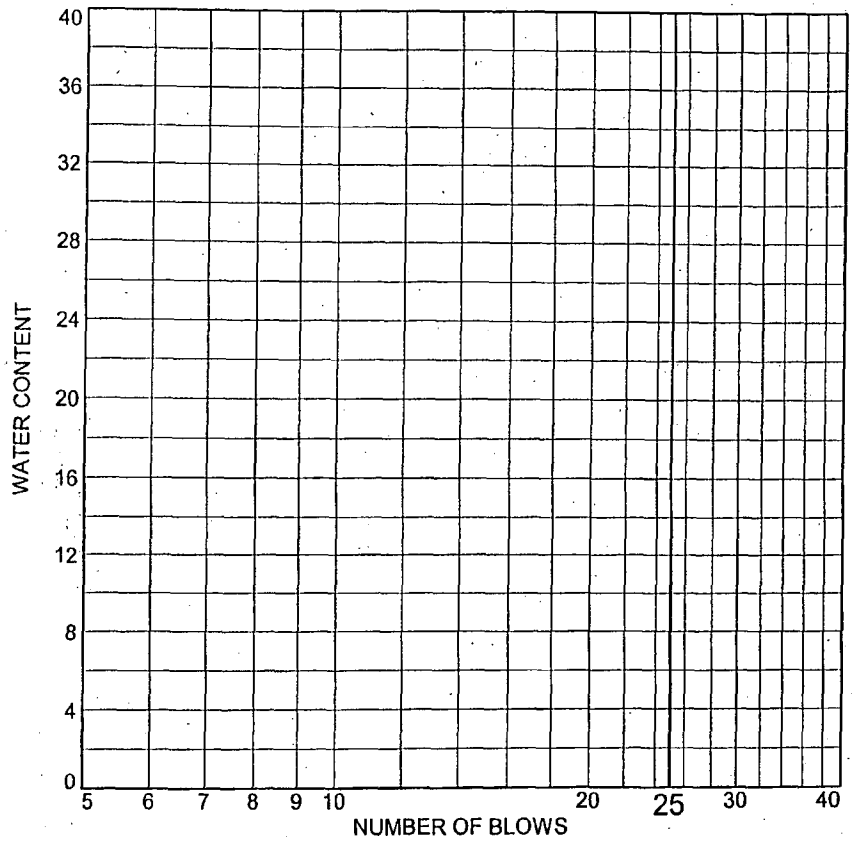
Run No.	1	2	3	4	
Wet+Tare					
Dry+Tare					
Tare					
Moisture					

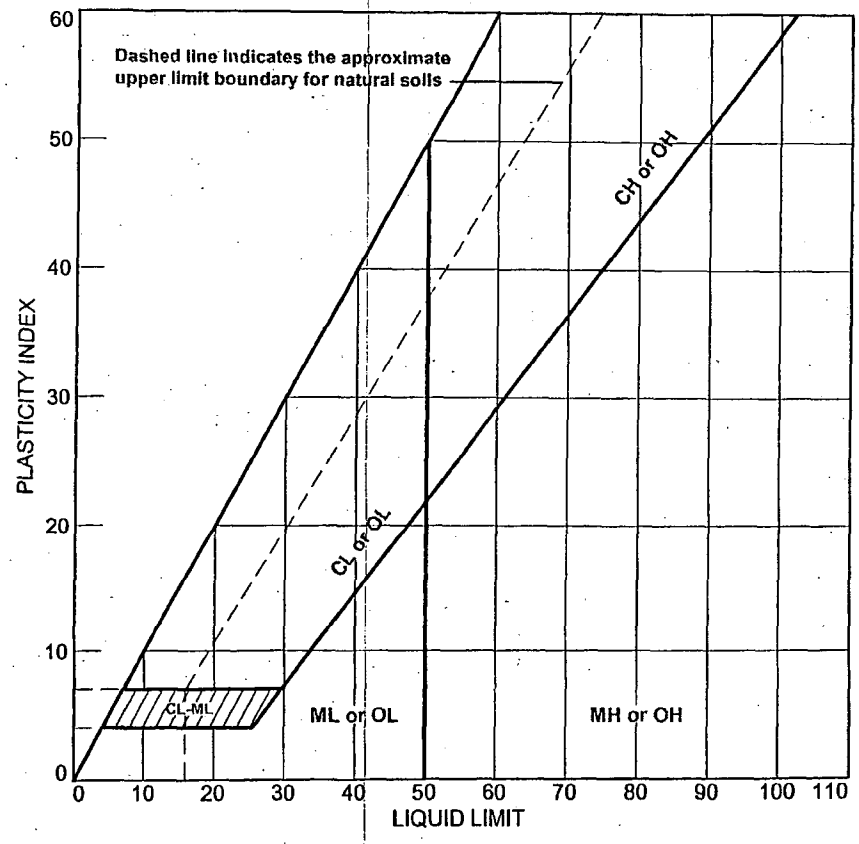
Natural Moisture Data

Wet+Tare	Dry+Tare	Tare	Moisture
471.9	424.4	174.8	19.0

MK 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 421	STP-145 (SS-19)	68.5'-70.0'	11/28/2006	ML	Silt	20.1	NV	NP

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC/TH
ASTM D4318-05

Reviewed By:RF

4-3-07

KAW 4/03/07

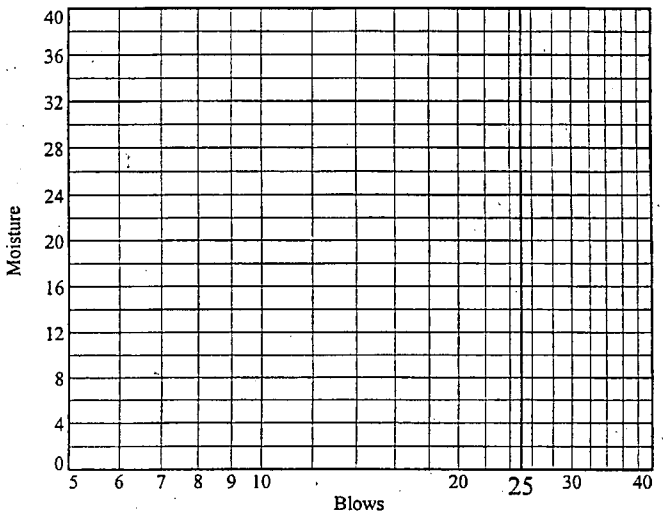
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 421
Depth: 68.5'-70.0'
Sample Number: STP-145 (SS-19)
Material Description: Silt
Date: 11/28/2006
USCS Class.: ML
Testing Remarks: Tested By:AC/TH Reviewed By:RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare						
Dry+Tare						
Tare						
# Blows						
Moisture						



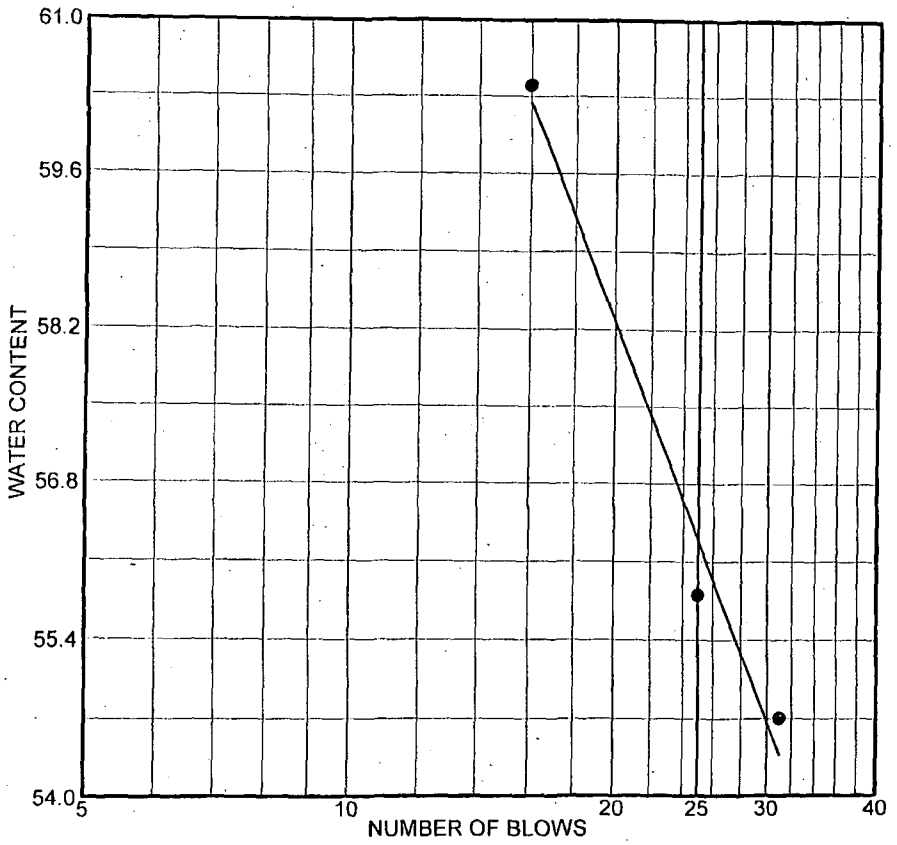
Liquid Limit= NV
Plastic Limit= NP
Plasticity Index= NP
Natural Moisture= 20.1

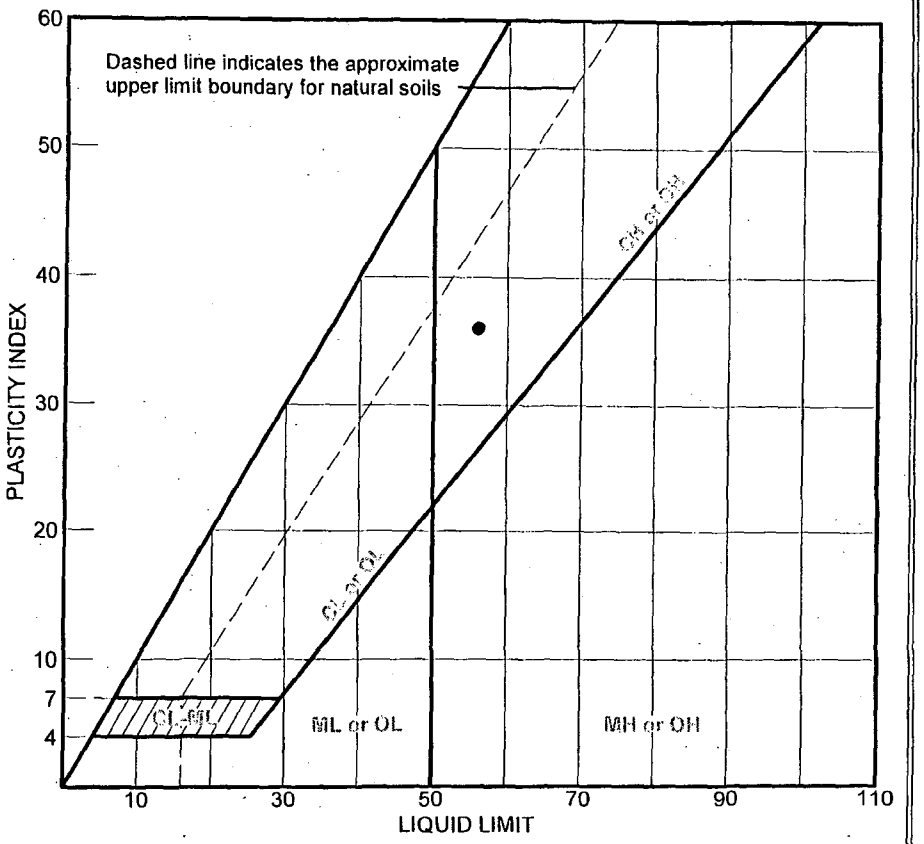
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare					
Dry+Tare					
Tare					
Moisture					

MAT 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-421	UD-3	83' to 85'	2-20-07	CH	Fat clay	21.2	56	36

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496 Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reviewed by: SS
ASTM D4318-05 KAW 4/3/07

KAW 4/3/07

LIQUID AND PLASTIC LIMIT TEST DATA

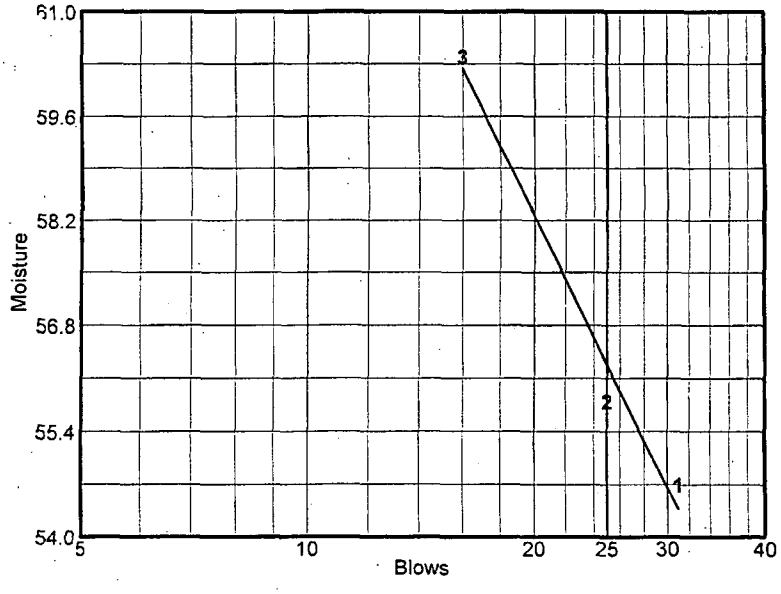
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
ject Number: 5050-06-0496

Sample Data

Source: B-421
Sample No.: UD-3
Elev. or Depth: 83' to 85' **Sample Length(in./cm.):**
Location: B-421
Description: Fat clay
Date: 2-20-07 **Natural Moisture:** 21.2
USCS Class.: CH **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed by: SS
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	23.71	29.11	22.02			
Dry+Tare	17.62	21.02	16.20			
Tare	6.49	6.51	6.56			
# Blows	31	25	16			
Moisture	54.7	55.8	60.4			

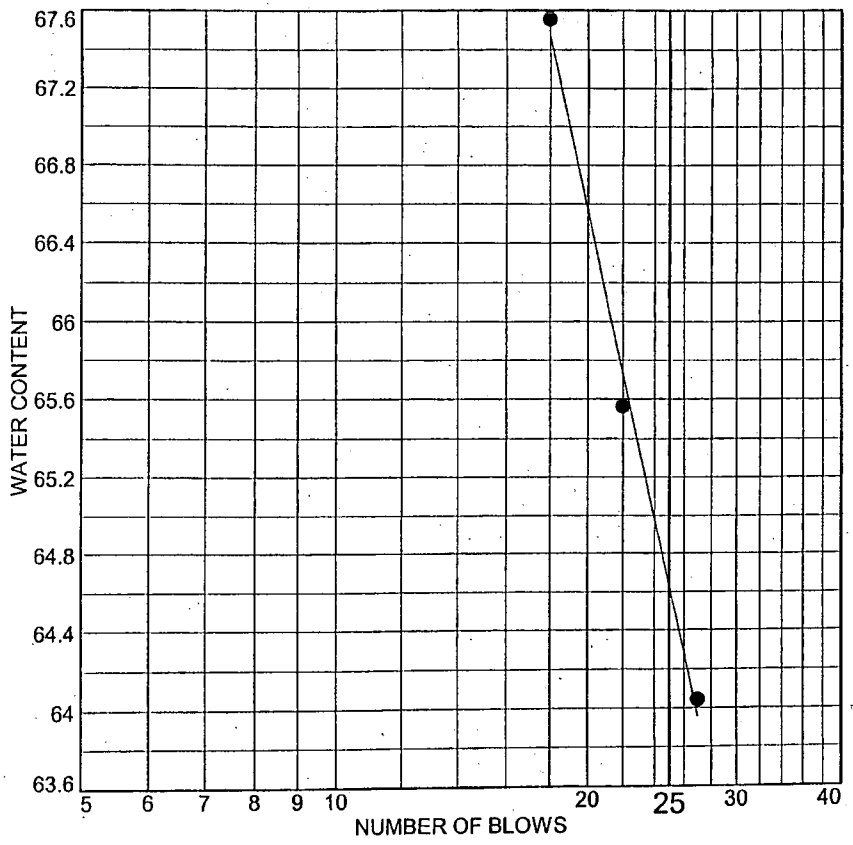


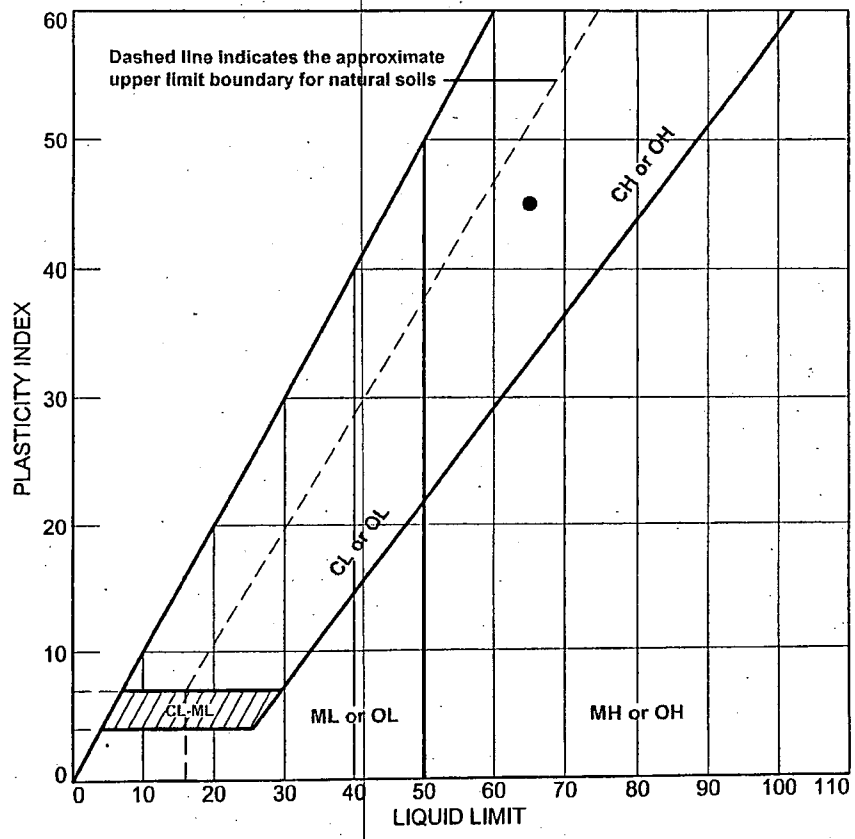
Liquid Limit= 56
Plastic Limit= 20
Plasticity Index= 36

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	18.20	20.04			
Dry+Tare	16.27	17.77			
Tare	6.50	6.47			
Moisture	19.8	20.1			

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 421	STP-148	93.5'-95.0'	11/29/2006	CH	Fat Clay	21.5	65	45
		(SS-23)							

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC/TH Reviewed By:RF

ASTM D4318-05

4-3-07

KAW 4/3/07

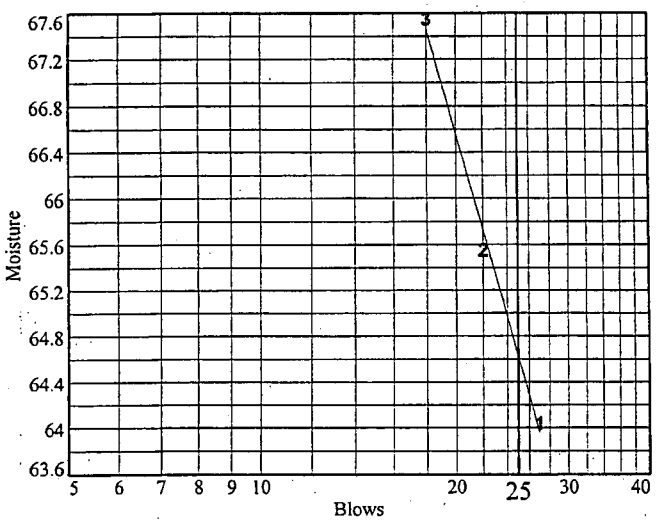
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 421
Depth: 93.5'-95.0'
Sample Number: STP-148 (SS-23)
Material Description: Fat Clay
Date: 11/29/2006
USCS Class.: CH
Testing Remarks: Tested By:AC/TH Reviewed By:RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	37.39	35.70	36.83			
Dry+Tare	33.81	32.73	33.29			
Tare	28.22	28.20	28.05			
# Blows	27	22	18			
Moisture	64.0	65.6	67.6			



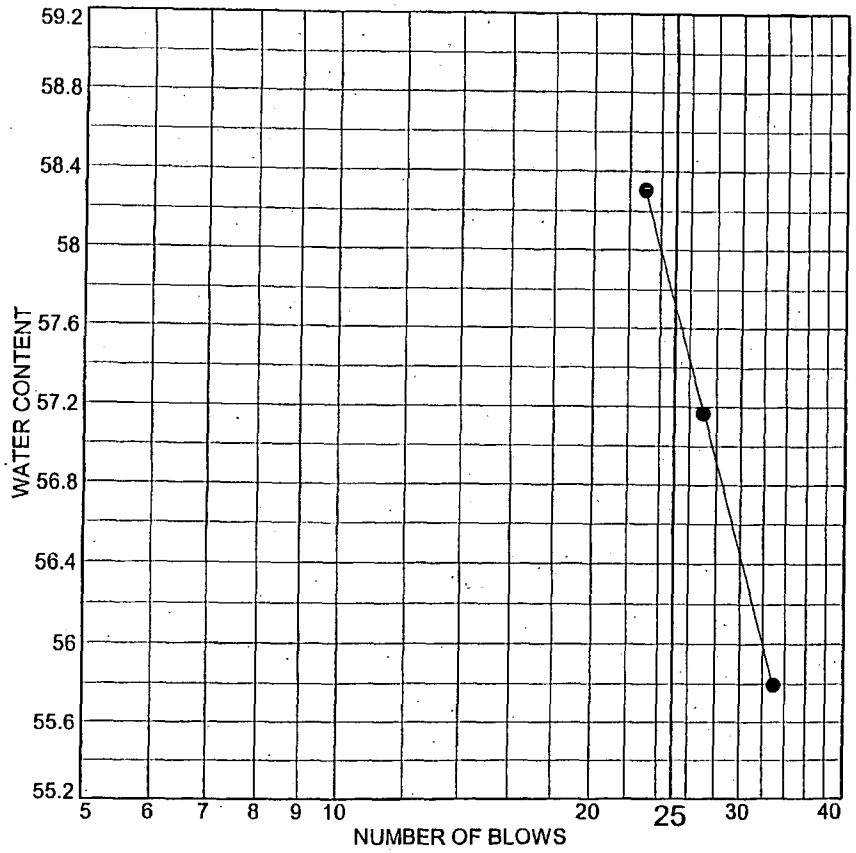
Liquid Limit= 65
Plastic Limit= 20
Plasticity Index= 45
Natural Moisture= 21.5
Liquidity Index= 0.0

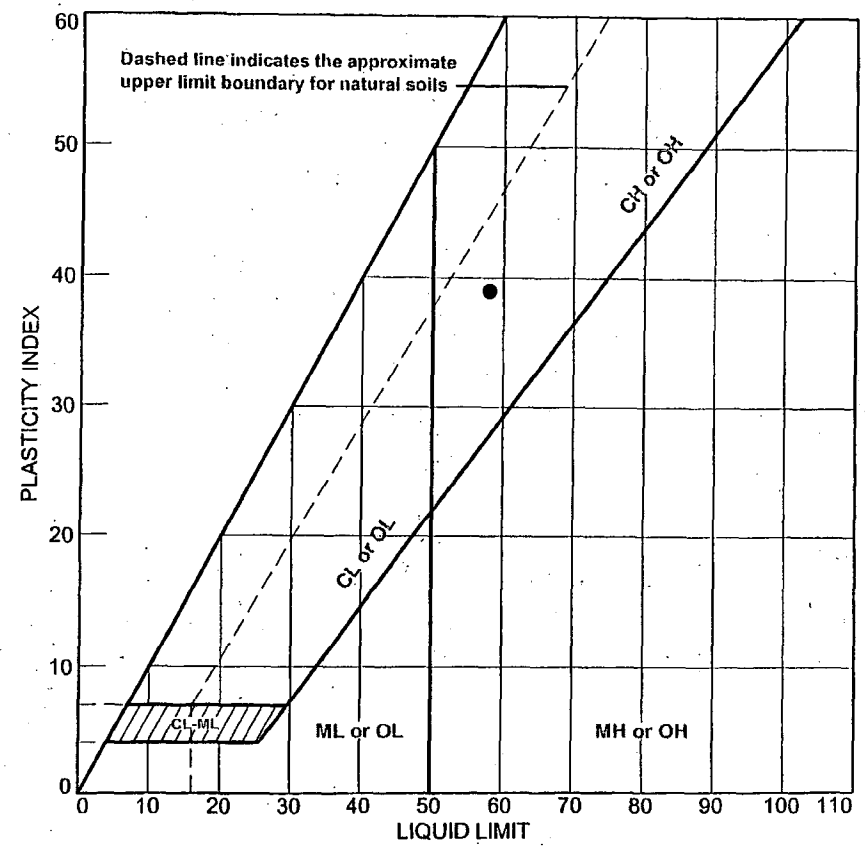
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	34.96	36.10			
Dry+Tare	33.84	34.76			
Tare	28.29	28.17			
Moisture	20.2	20.3			

MAA 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 427	STP-165	3.0'-4.5'	11/29/2006	CH	Fat clay	23.5	58	39
		(SS-3)							

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC/TH/JW Reviewed By:RF

ASTM D4318-05

MH 4-3-07

KAW 4/3/07

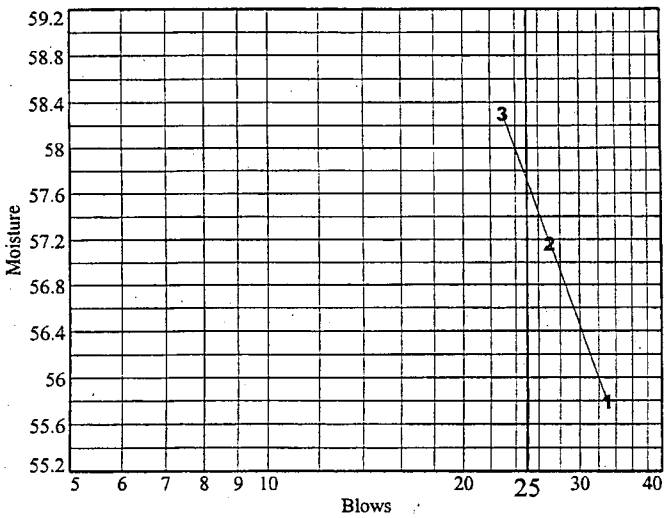
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 427
Depth: 3.0'-4.5' **Sample Number:** STP-165 (SS-3)
Material Description: Fat clay
Date: 11/29/2006 **USCS Class.:** CH
Testing Remarks: Tested By:AC/TH/JW Reviewed By:RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	36.04	37.75	37.60			
Dry+Tare	32.91	34.28	34.09			
Tare	27.30	28.21	28.07			
# Blows	33	27	23			
Moisture	55.8	57.2	58.3			



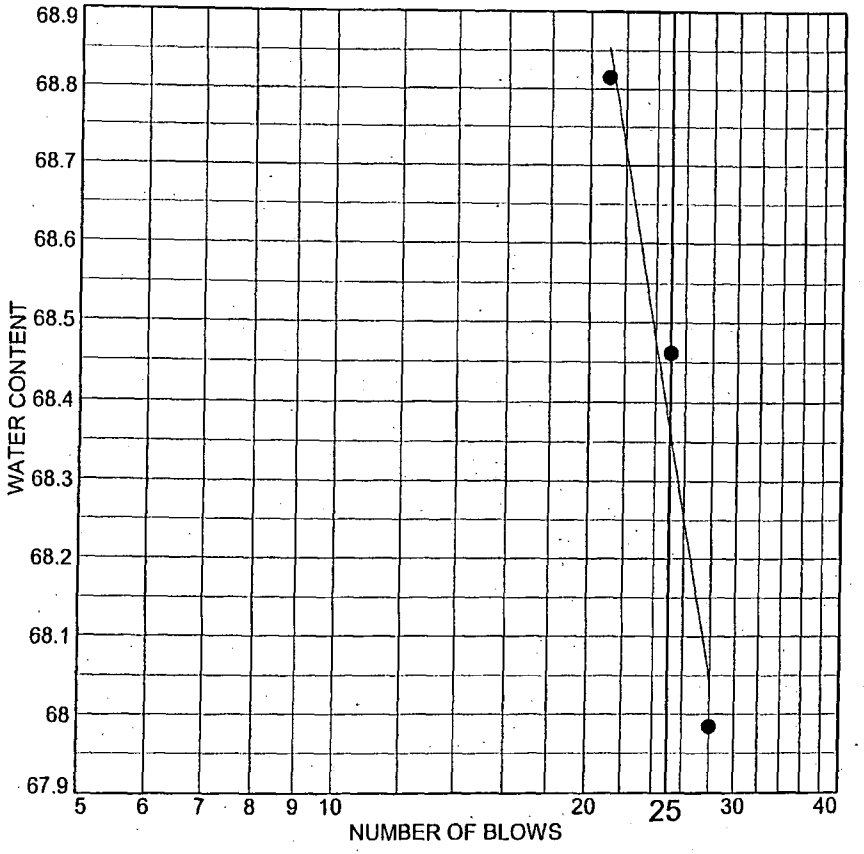
Liquid Limit= 58
Plastic Limit= 19
Plasticity Index= 39
Natural Moisture= 23.5
Liquidity Index= 0.1

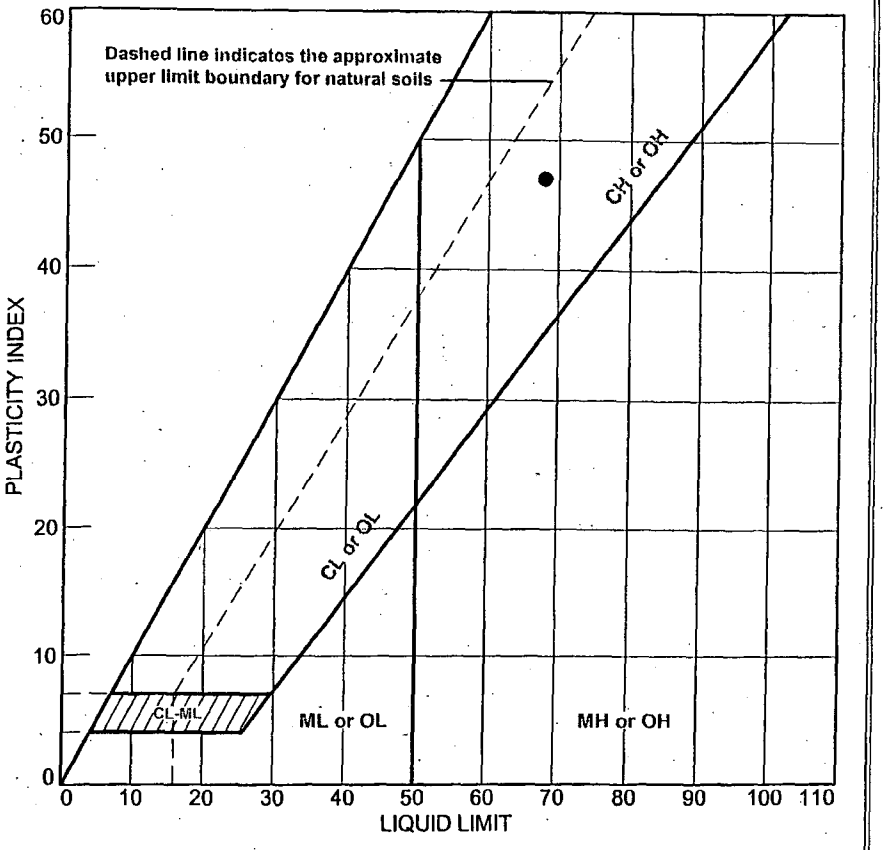
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	32.79	36.36			
Dry+Tare	31.16	34.99			
Tare	22.69	27.92			
Moisture	19.2	19.4			

4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 427	STP-166 (SS-7)	9.0'-10.5'	11/29/2006	CH	Fat Clay	24.0	68	47

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC/TH
ASTM D4318-05

Reviewed By:MH

MH
4-3-07

KAW 4/3/07

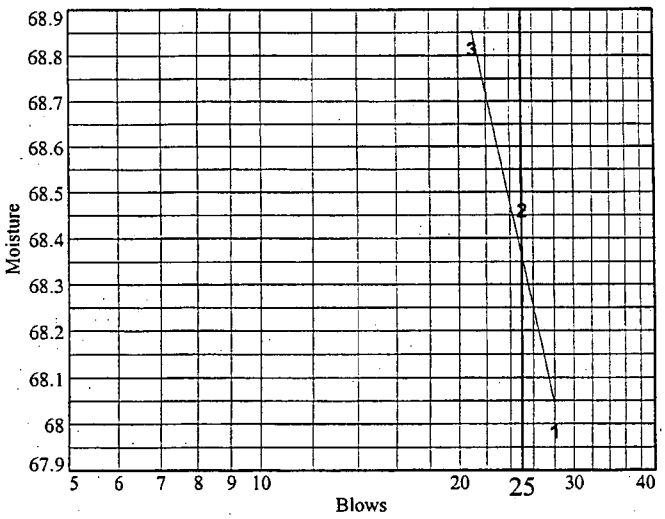
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 427
Depth: 9.0'-10.5'
Sample Number: STP-166 (SS-7)
Material Description: Fat Clay
Date: 11/29/2006
USCS Class.: CH
Testing Remarks: Tested By:AC/TH
Reviewed By:MH
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	36.61	36.94	36.29			
Dry+Tare	33.17	33.38	32.98			
Tare	28.11	28.18	28.17			
# Blows	28	25	21			
Moisture	68.0	68.5	68.8			



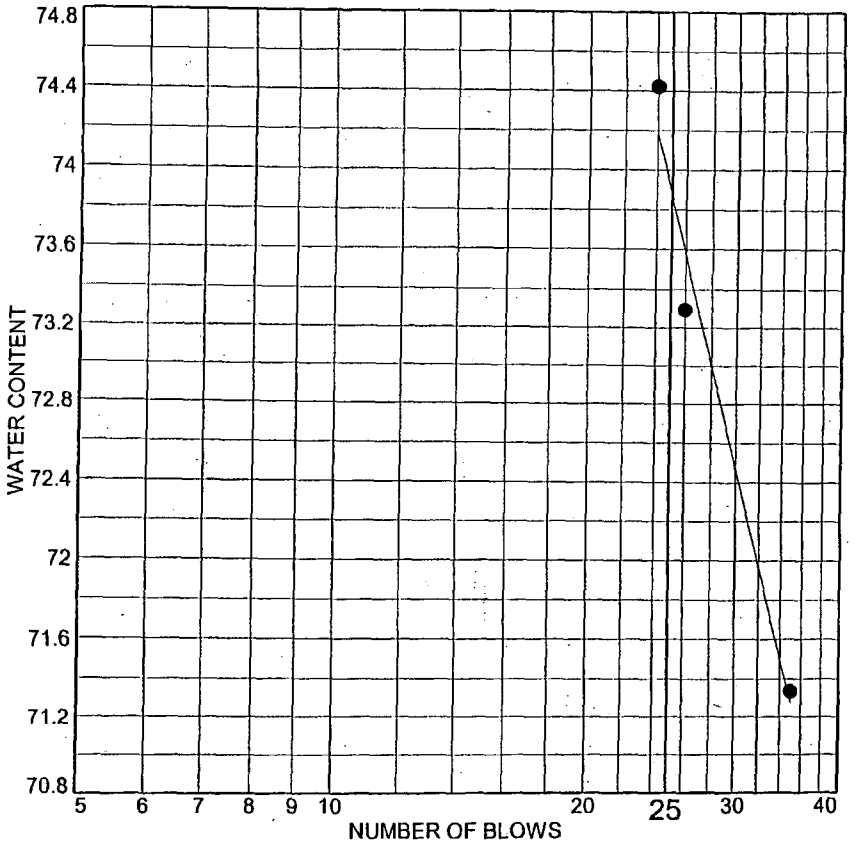
Liquid Limit= 68
Plastic Limit= 21
Plasticity Index= 47
Natural Moisture= 24.0
Liquidity Index= 0.1

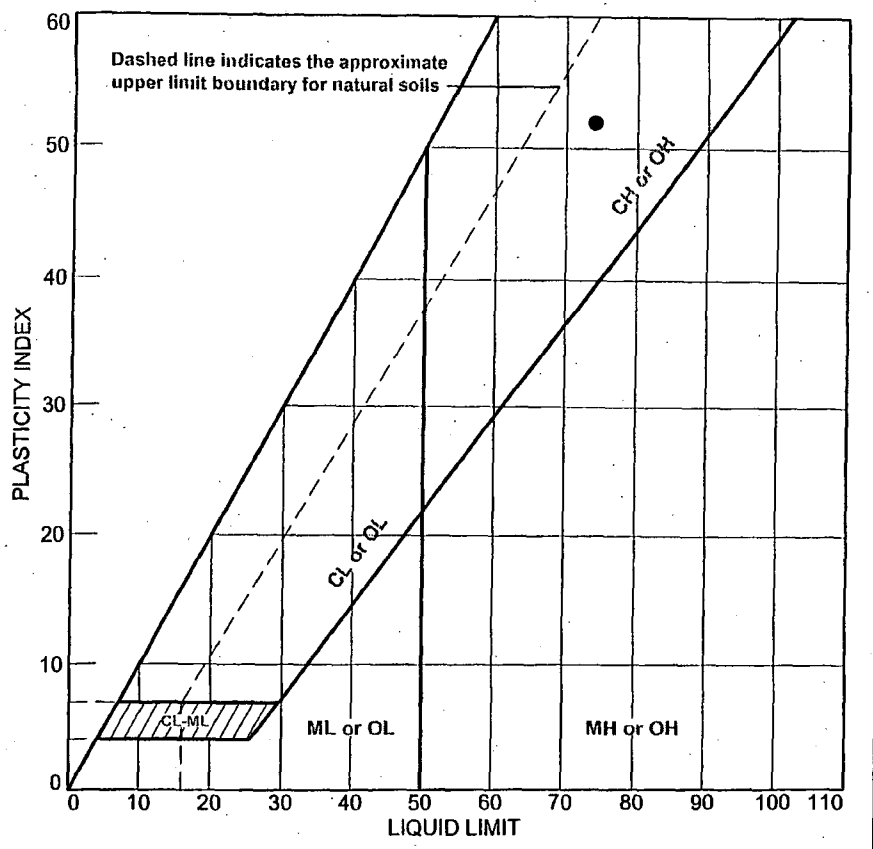
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	34.80	37.01			
Dry+Tare	33.46	35.42			
Tare	27.24	27.89			
Moisture	21.5	21.1			

MAA 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 427	STP-260 (SS-17)	48.5'-50.0'	11/30/2006	CH	Fat Clay	43.0	74	52

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC Reviewed By:RF

ASTM D4318-05

4-3-07

KAW 4/3/07

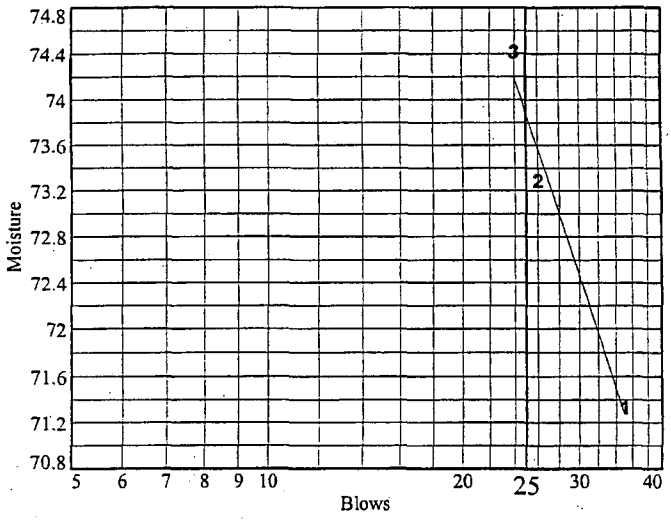
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 427
Depth: 48.5'-50.0' **Sample Number:** STP-260 (SS-17)
Material Description: Fat Clay
Date: 11/30/2006 **USCS Class.:** CH
Testing Remarks: Tested By:AC Reviewed By:RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	36.02	36.32	36.64			
Dry+Tare	32.71	32.78	33.09			
Tare	28.07	27.95	28.32			
# Blows	35	26	24			
Moisture	71.3	73.3	74.4			



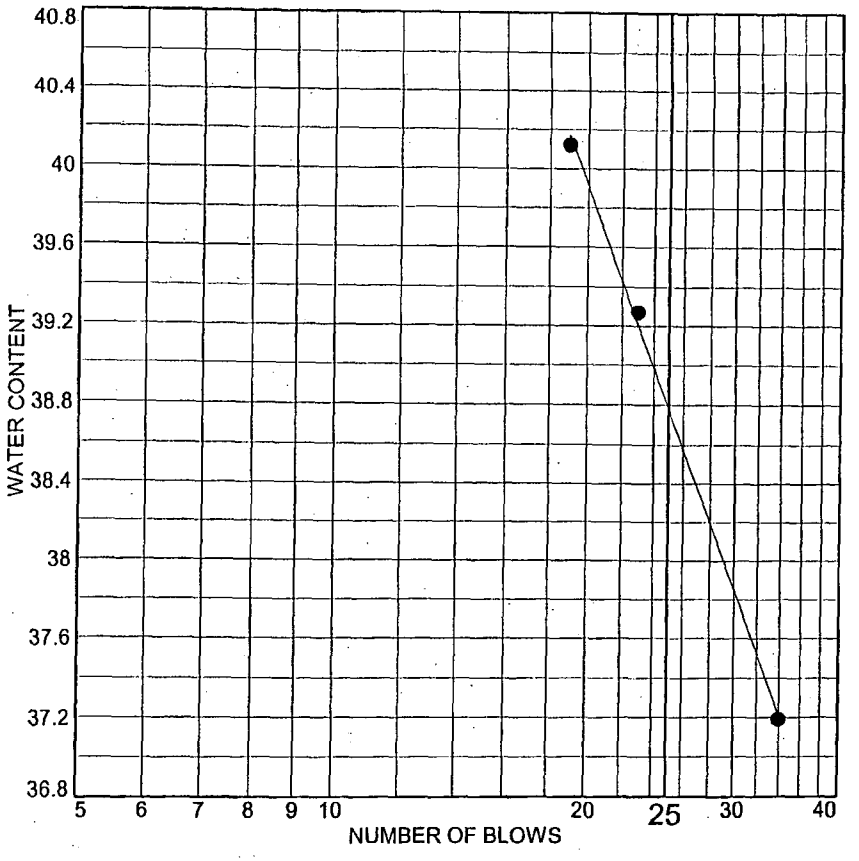
Liquid Limit= 74
Plastic Limit= 22
Plasticity Index= 52
Natural Moisture= 43.0
Liquidity Index= 0.4

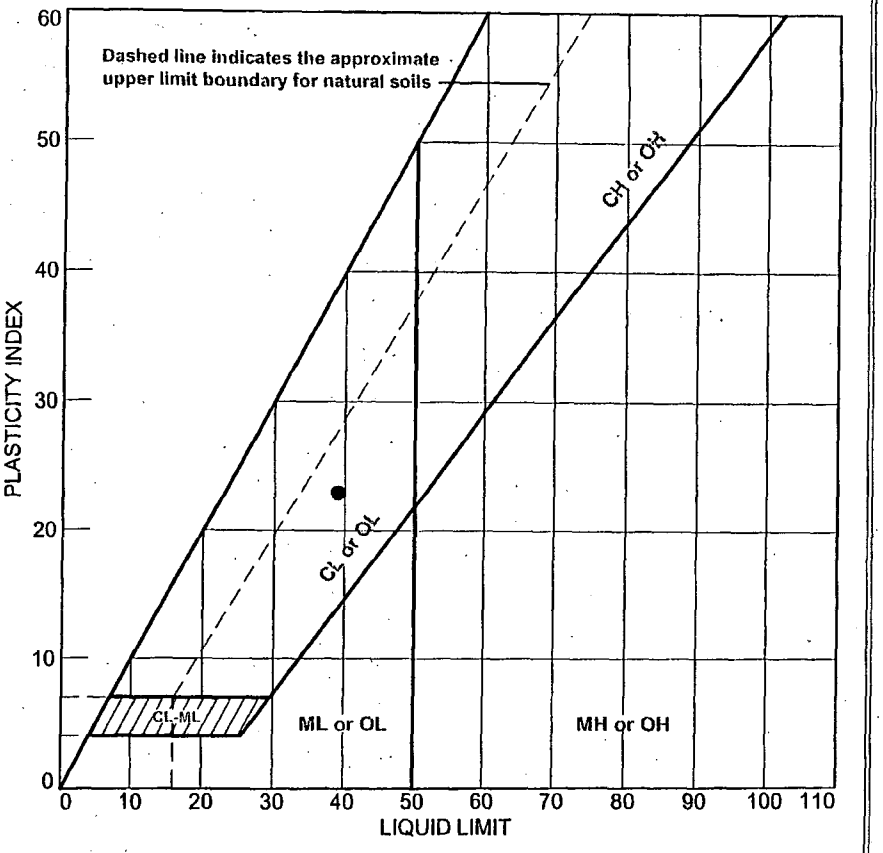
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	36.29	36.14			
Dry+Tare	34.84	34.52			
Tare	28.13	27.10			
Moisture	21.6	21.8			

MW 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 427	STP-170	58.5'-60.0'	11/30/2006	CL	Lean CLay	18.9	39	23
		(SS-19)							

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC/TH/JW Reviewed By:RF
ASTM D4318-05

MA
4-3-07

KAW 4/3/07

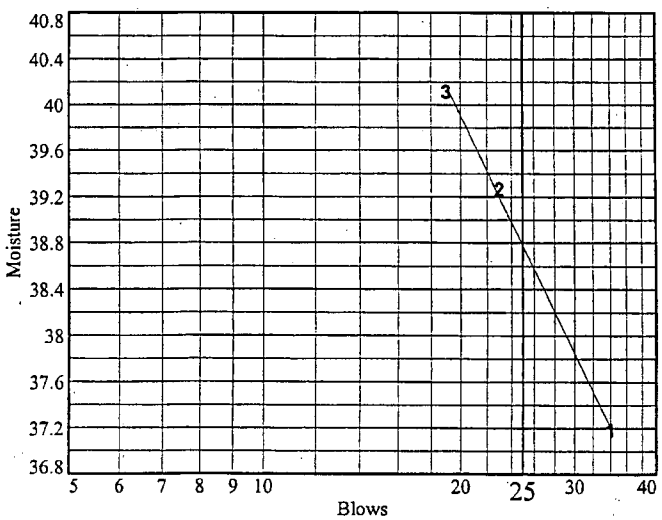
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 427
Depth: 58.5'-60.0' **Sample Number:** STP-170 (SS-19)
Material Description: Lean CLay
Date: 11/30/2006 **USCS Class.:** CL
Testing Remarks: Tested By:AC/TH/JW Reviewed By:RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	38.23	38.87	39.64			
Dry+Tare	35.53	35.85	36.33			
Tare	28.27	28.16	28.08			
# Blows	34	23	19			
Moisture	37.2	39.3	40.1			



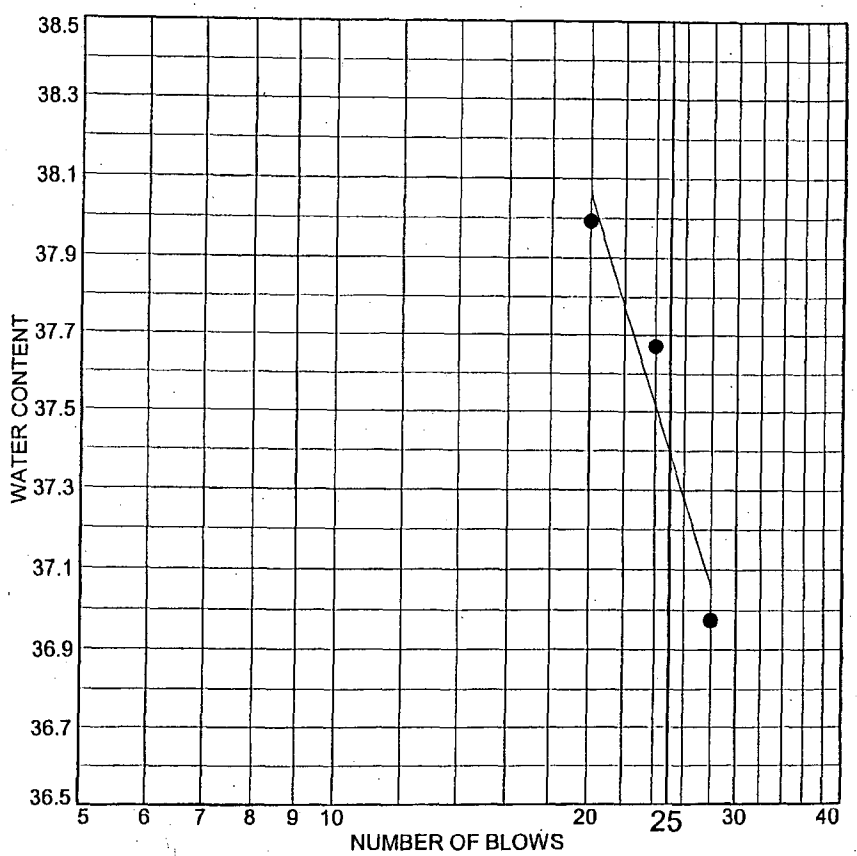
Liquid Limit= 39
Plastic Limit= 16
Plasticity Index= 23
Natural Moisture= 18.9
Liquidity Index= 0.1

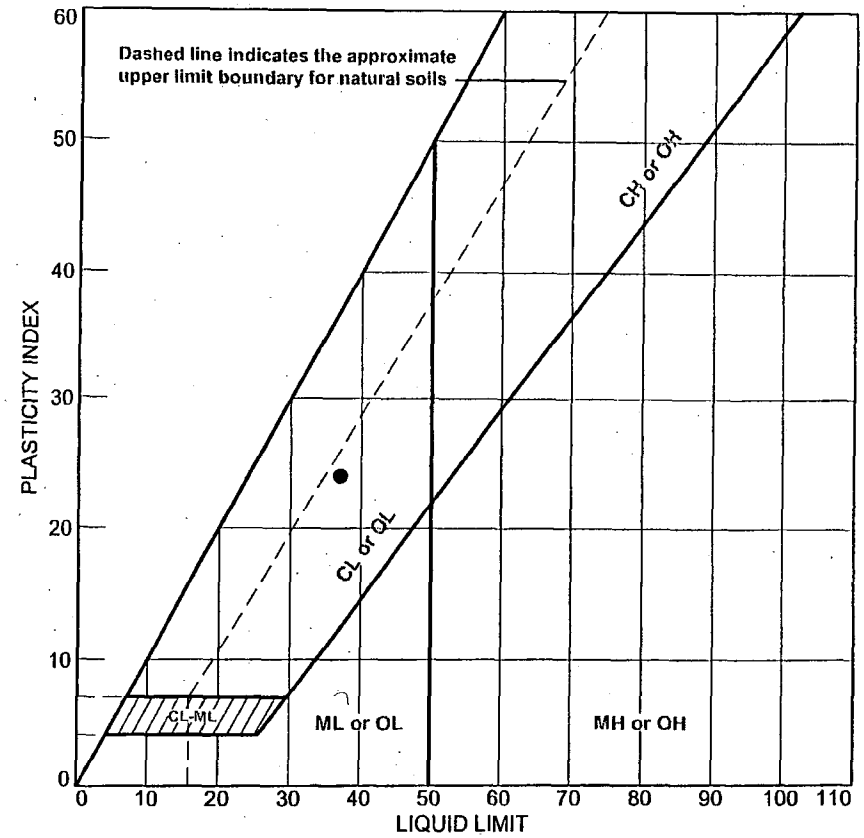
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	35.69	35.52			
Dry+Tare	34.68	34.52			
Tare	28.25	28.33			
Moisture	15.7	16.2			

MAA 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 427	STP-172	83.5'-85.0'	12/1/2006	CL	Lean Clay	18.9	37	24
		(SS-24)							

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC Reviewed By:RF

ASTM D4318-05

MH 4-3-07

KAW 413107

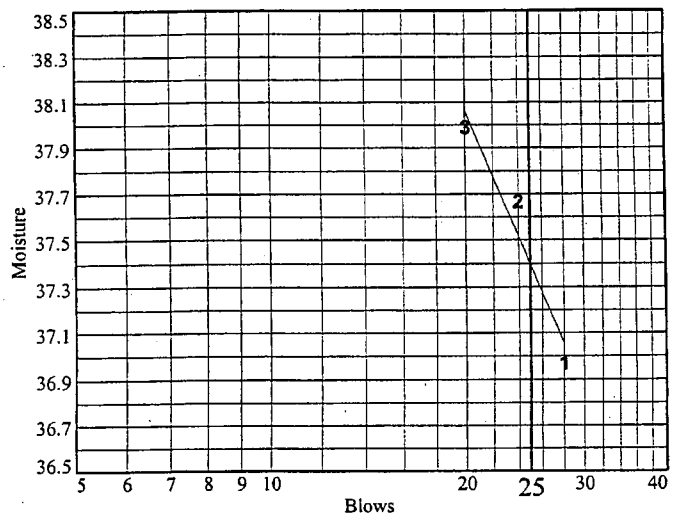
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 427
Depth: 83.5'-85.0'
Sample Number: STP-172 (SS-24)
Material Description: Lean Clay
Date: 12/1/2006
USCS Class.: CL
Testing Remarks: Tested By:AC Reviewed By:RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	37.95	39.20	36.28			
Dry+Tare	35.31	36.16	33.29			
Tare	28.17	28.09	25.42			
# Blows	28	24	20			
Moisture	37.0	37.7	38.0			



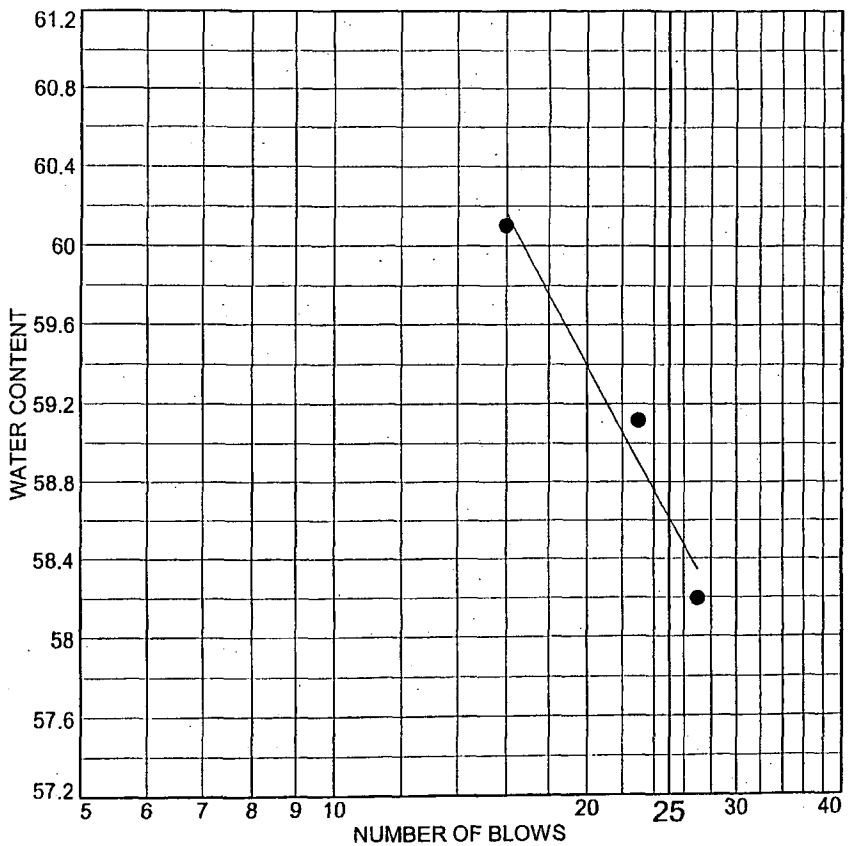
Liquid Limit= 37
Plastic Limit= 13
Plasticity Index= 24
Natural Moisture= 18.9
Liquidity Index= 0.2

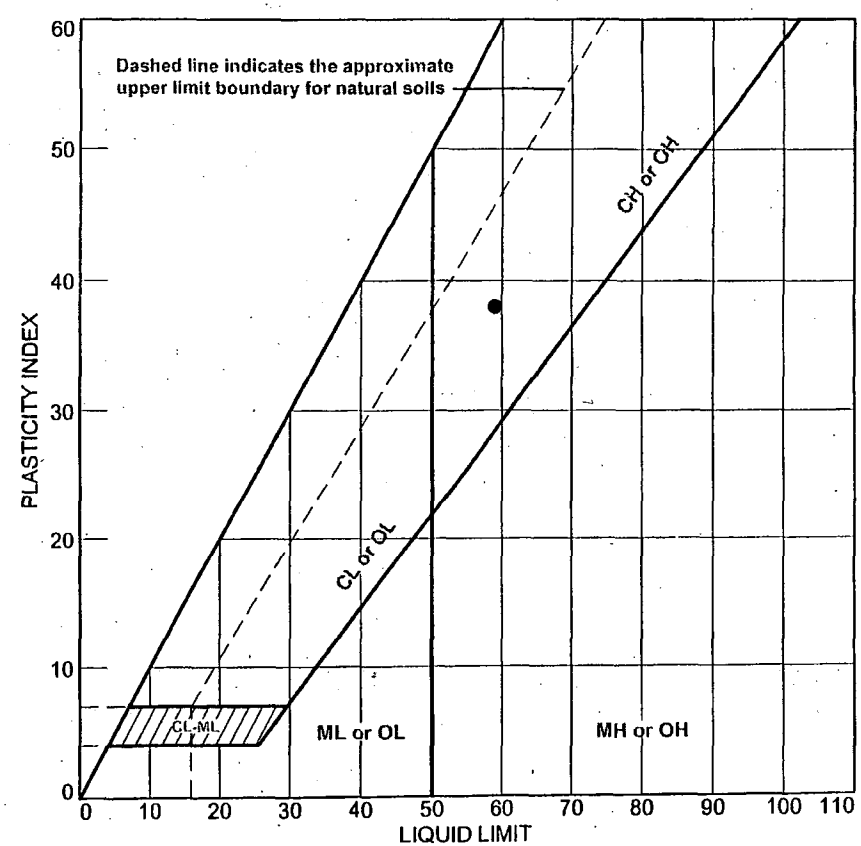
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	35.57	35.17			
Dry+Tare	34.67	34.27			
Tare	27.61	27.20			
Moisture	12.7	12.7			

MA 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 427	STP-175 (SS-29)	118.5'-120.0'	12/2/2006	CH	Fat CLay	21.0	59	38

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC Reviewed By:MH

ASTM D4318-05

MH 4-3-07

KAW 4/3/07

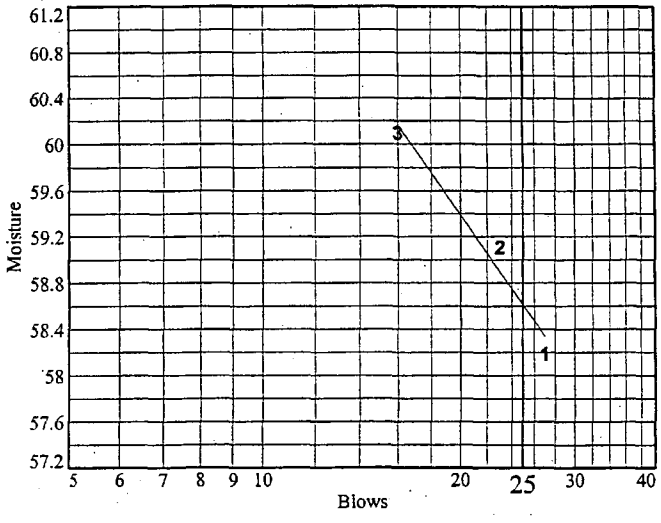
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 427
Depth: 118.5'-120.0' **Sample Number:** STP-175 (SS-29)
Material Description: Fat CLay
Date: 12/2/2006 **USCS Class.:** CH
Testing Remarks: Tested By:AC Reviewed By:MH
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	35.64	31.32	33.79			
Dry+Tare	32.87	28.11	30.25			
Tare	28.11	22.68	24.36			
# Blows	27	23	16			
Moisture	58.2	59.1	60.1			



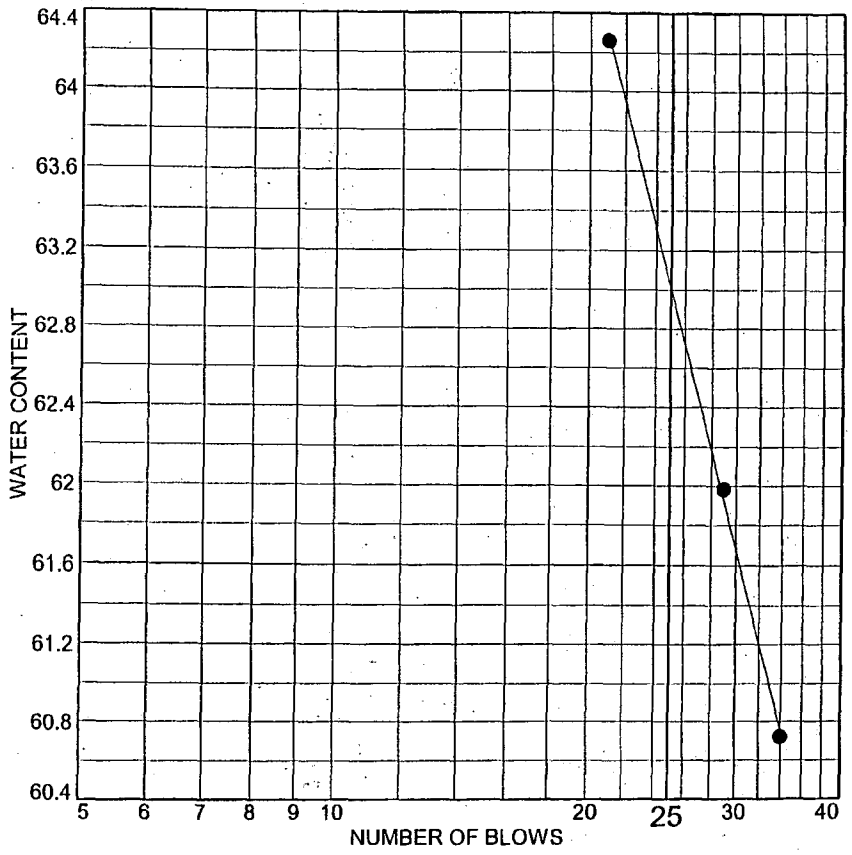
Liquid Limit= 59
Plastic Limit= 21
Plasticity Index= 38
Natural Moisture= 21.0
Liquidity Index= 0.0

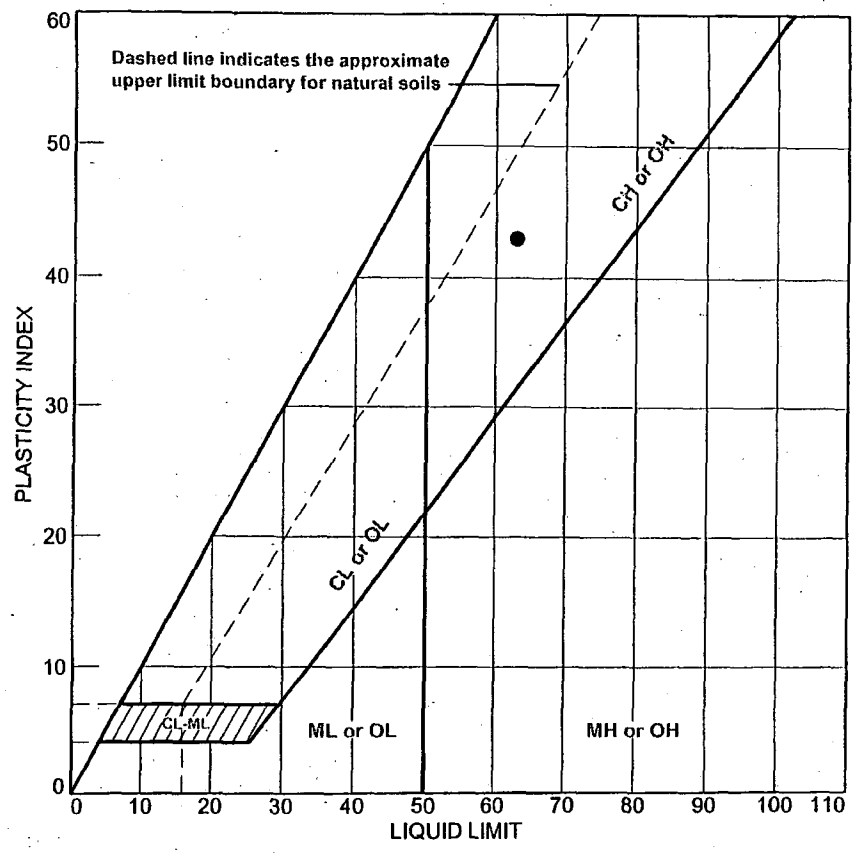
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	37.23	35.21			
Dry+Tare	35.62	33.81			
Tare	28	27.17			
Moisture	21.1	21.1			

NM 4-9-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 427	STP-176 (SS-30)	128.5'-130	12/1/2006	CH	Fat Clay	20.6	63	43

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC/TH/JW Reviewed By:RF

ASTM D4318-05

4-3-07

KAW 4/3/07

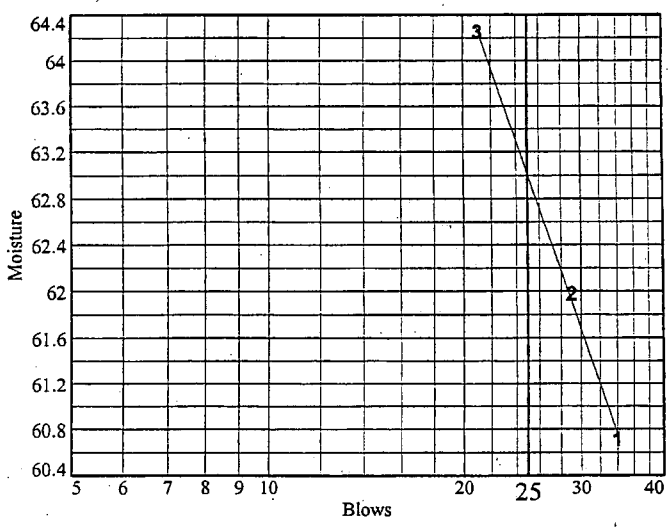
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 427
Depth: 128.5'-130 **Sample Number:** STP-176 (SS-30)
Material Description: Fat Clay
Date: 12/1/2006 **USCS Class.:** CH
Testing Remarks: Tested By:AC/TH/JW Reviewed By:RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	36.95	35.89	37.47			
Dry+Tare	33.58	32.89	33.91			
Tare	28.03	28.05	28.37			
# Blows	34	29	21			
Moisture	60.7	62.0	64.3			



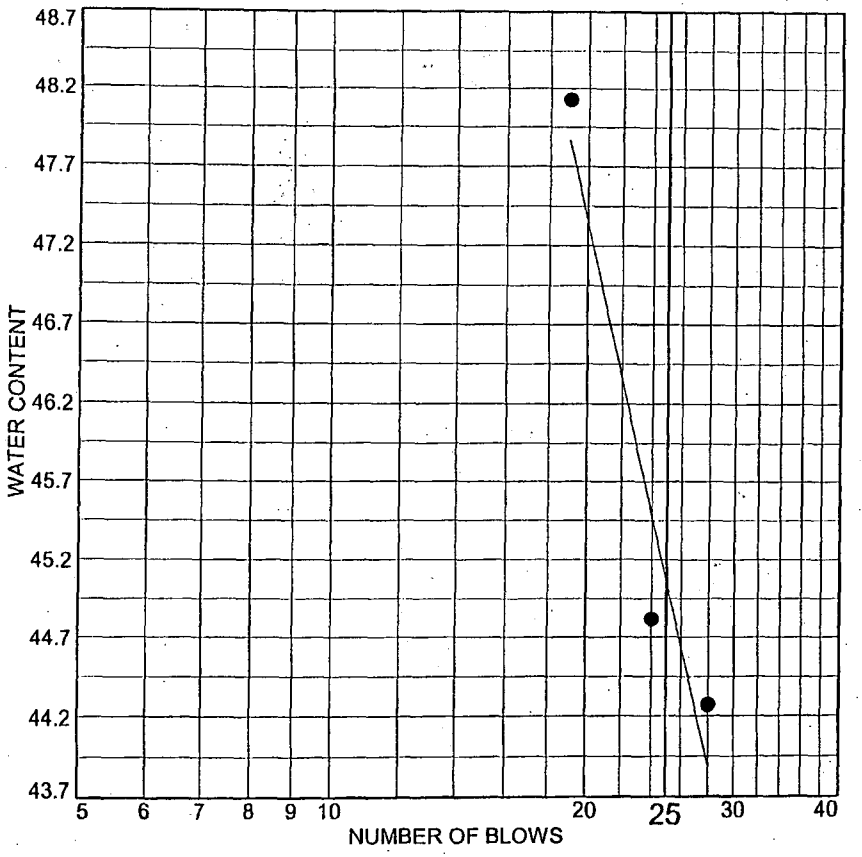
Liquid Limit= 63
Plastic Limit= 20
Plasticity Index= 43
Natural Moisture= 20.6
Liquidity Index= 0.0

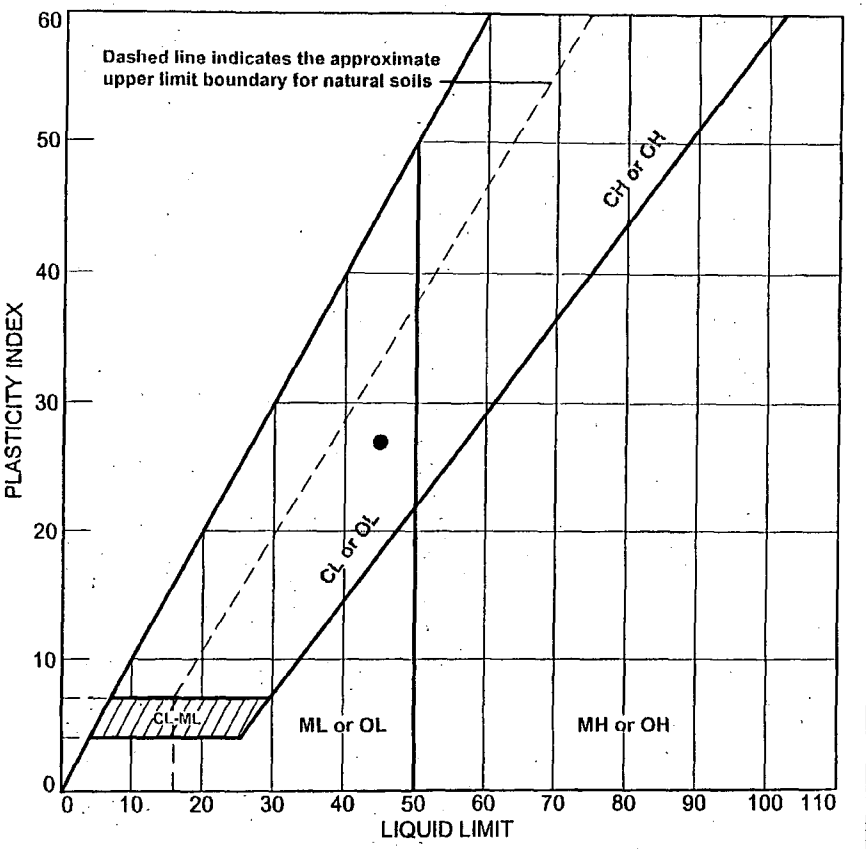
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	33.65	35.20			
Dry+Tare	32.75	34.03			
Tare	28.28	28.19			
Moisture	20.1	20.0			

MK 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 427	STP-177 (SS-31)	138.5'-140'	12/1/2006	CL	Lean Clay	15.7	45	27

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC/TH/JW Reviewed By:RF
ASTM D4318-05

4-3-07

KAW 4/3/07

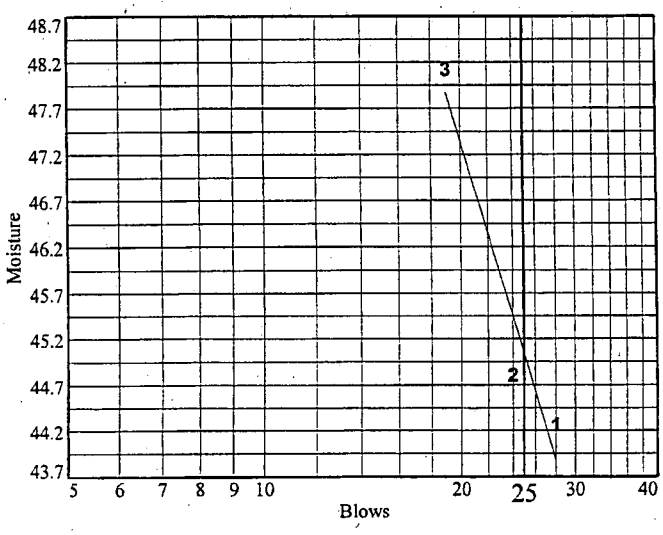
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 427
Depth: 138.5'-140'
Sample Number: STP-177 (SS-31)
Material Description: Lean Clay
Date: 12/1/2006
USCS Class.: CL
Testing Remarks: Tested By:AC/TH/JW Reviewed By:RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	37.37	34.69	37.73			
Dry+Tare	34.24	31.49	34.26			
Tare	27.17	24.35	27.05			
# Blows	28	24	19			
Moisture	44.3	44.8	48.1			



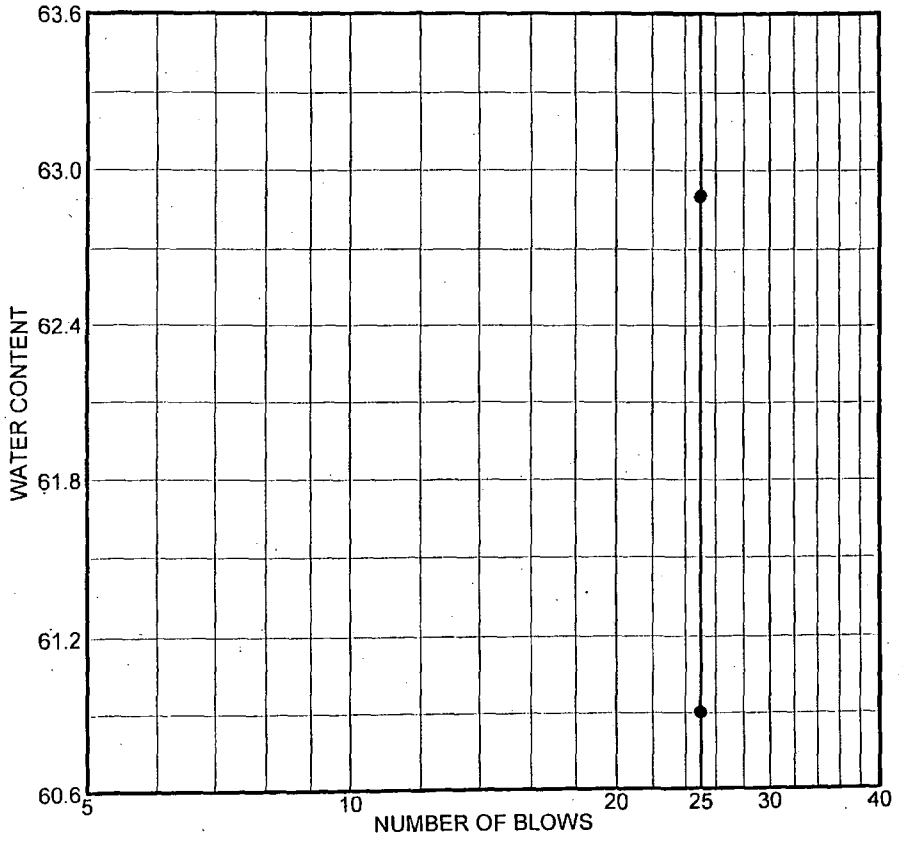
Liquid Limit= 45
Plastic Limit= 18
Plasticity Index= 27
Natural Moisture= 15.7
Liquidity Index= -0.1

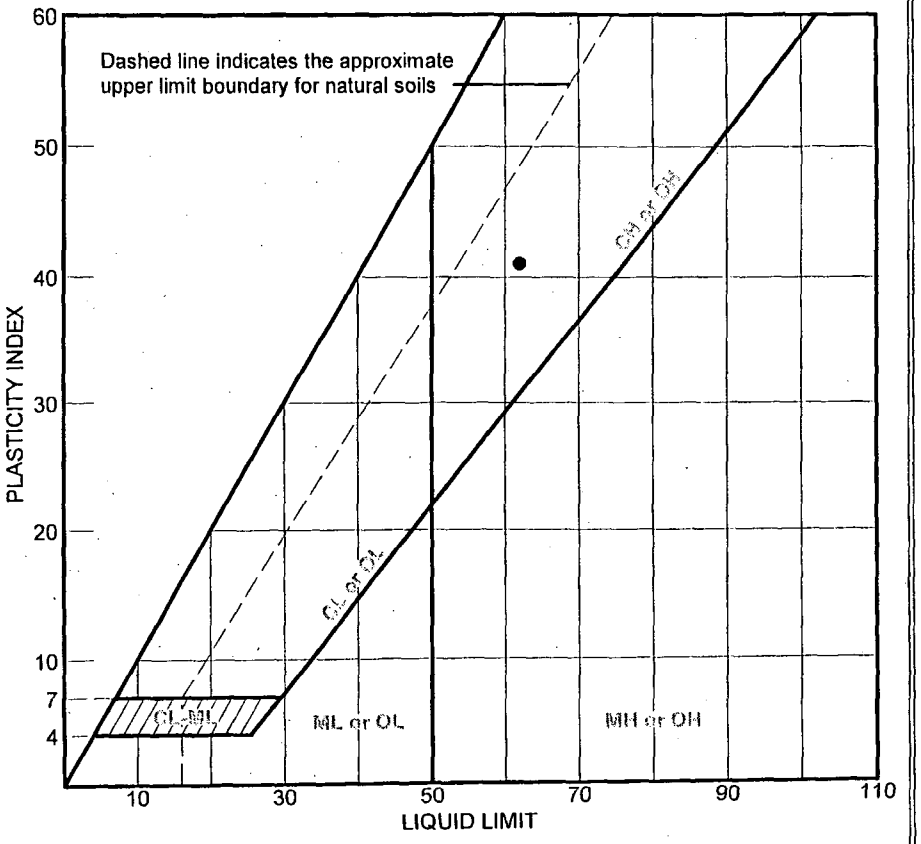
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	35.86	34.92			
Dry+Tare	34.66	33.72			
Tare	28.14	27.14			
Moisture	18.4	18.2			

MAR 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-428-DH	UD-6	113' to 115'	3-16-07	CH	Fat clay	27.3	62	41

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496 | Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reviewed by: MH
ASTM D4318-05

KAW 4/3/07

LIQUID AND PLASTIC LIMIT TEST DATA

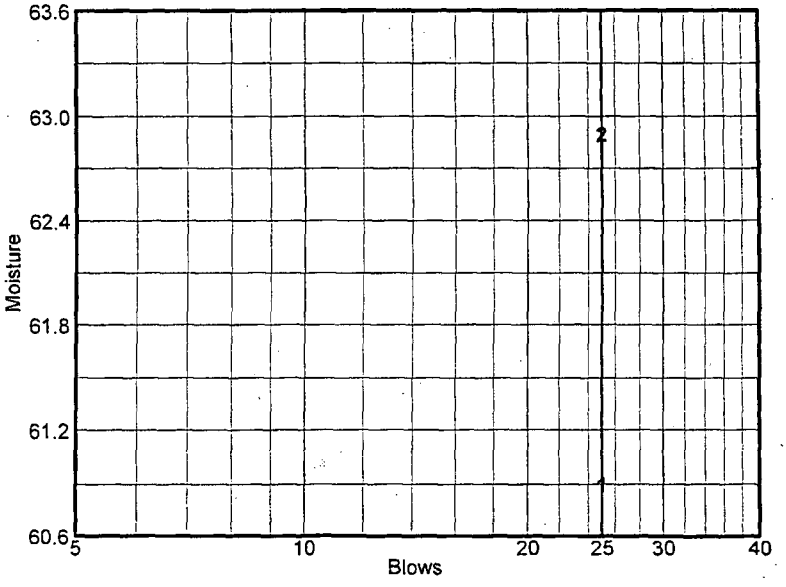
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496

Sample Data

Source: B-428-DH
Sample No.: UD-6
Elev. or Depth: 113' to 115' **Sample Length(in./cm.):**
Location: B-428-DH
Description: Fat clay
Date: 3-16-07 **Natural Moisture:** 27.3
USCS Class.: CH **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed by: MH
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	23.68	26.62				
Dry+Tare	18.90	20.51				
Tare	11.05	10.79				
# Blows	25	25				
Moisture	60.9	62.9				

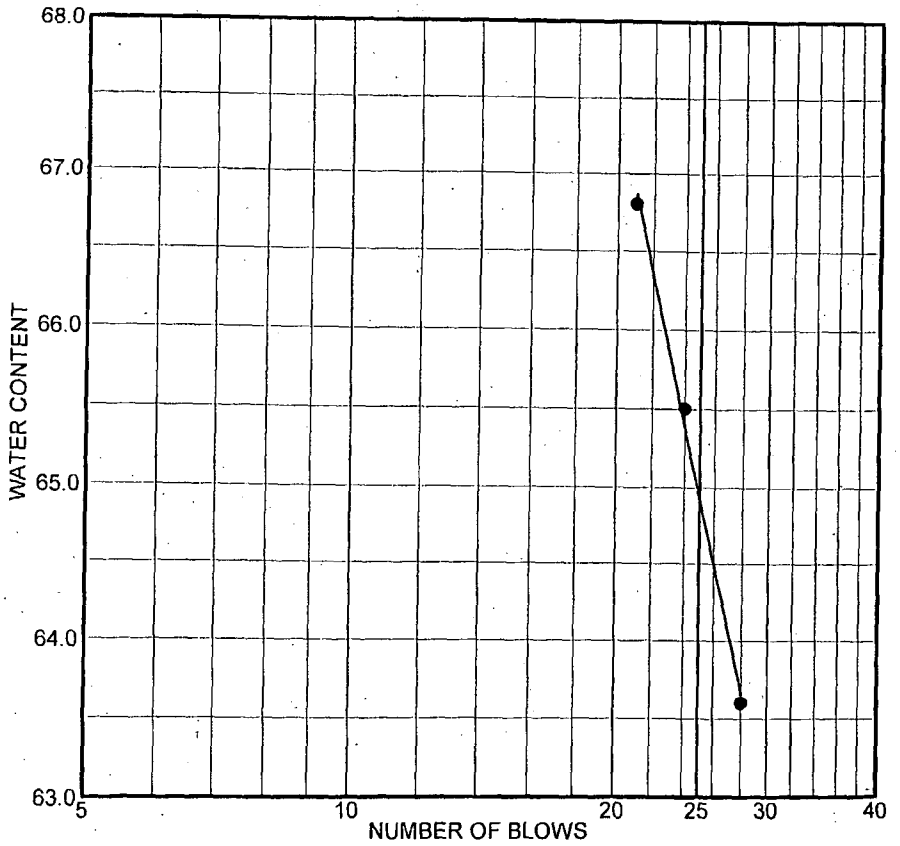


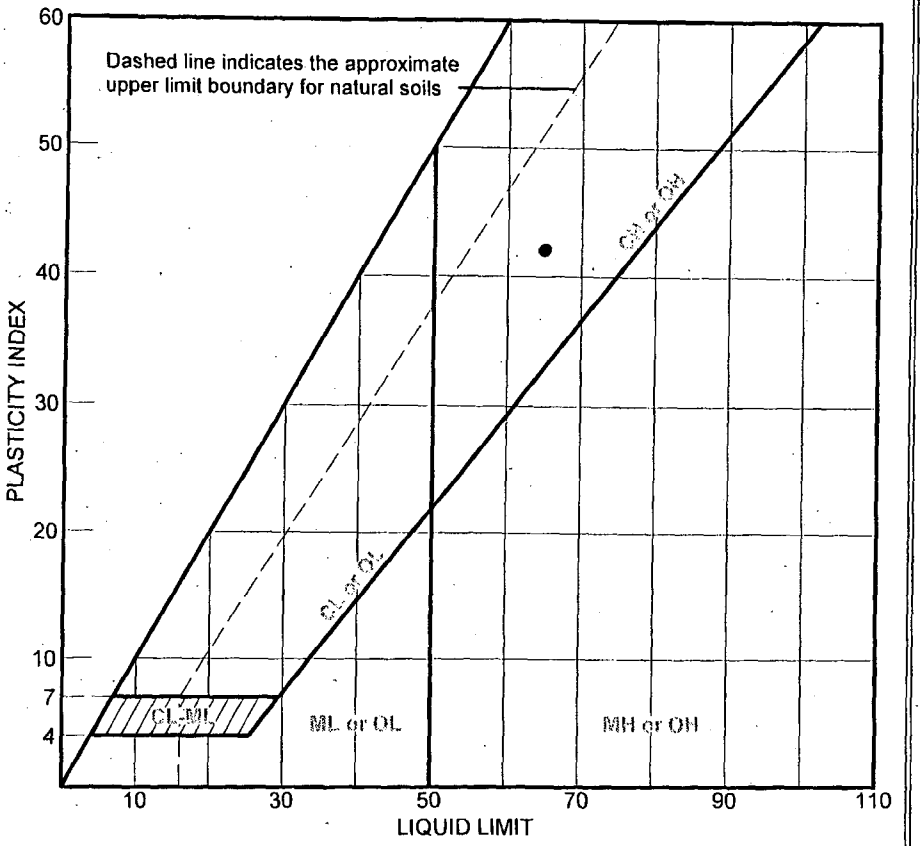
Liquid Limit= 62
Plastic Limit= 21
Plasticity Index= 41

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	18.02	17.60			
Dry+Tare	16.75	16.44			
Tare	10.66	10.88			
Moisture	20.9	20.9			

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-432	UD-1	3' to 5'	2-22-07	CH	Fat clay	20.7	65	42

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496 | Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reviewed by: MH KAW 4/3/07

ASTM D4318-05

KAW 4/3/07

LIQUID AND PLASTIC LIMIT TEST DATA

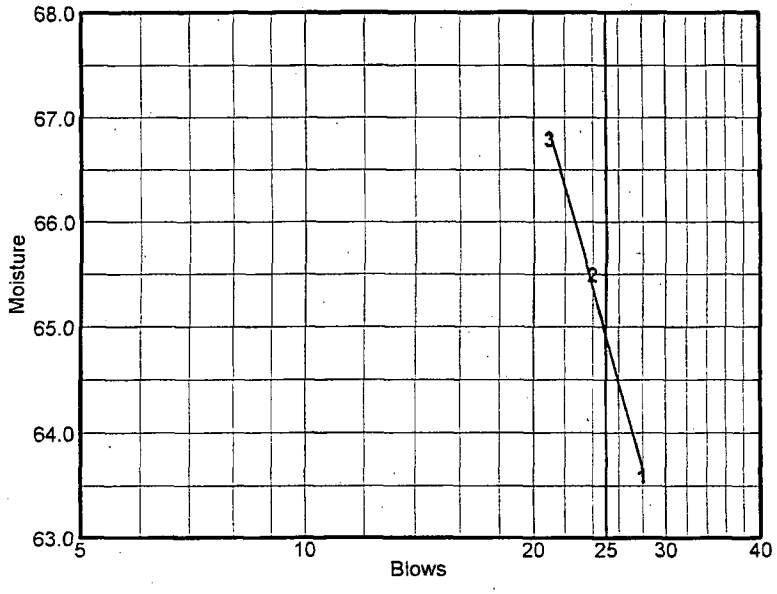
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496

Sample Data

Source: B-432
Sample No.: UD-1
Elev. or Depth: 3' to 5' **Sample Length(in./cm.):**
Location: B-432
Description: Fat clay
Date: 2-22-07 **Natural Moisture:** 20.7
USCS Class.: CH **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed by: MH
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	16.44	17.88	15.85			
Dry+Tare	11.75	12.46	11.28			
Tare	4.38	4.19	4.44			
# Blows	28	24	21			
Moisture	63.6	65.5	66.8			

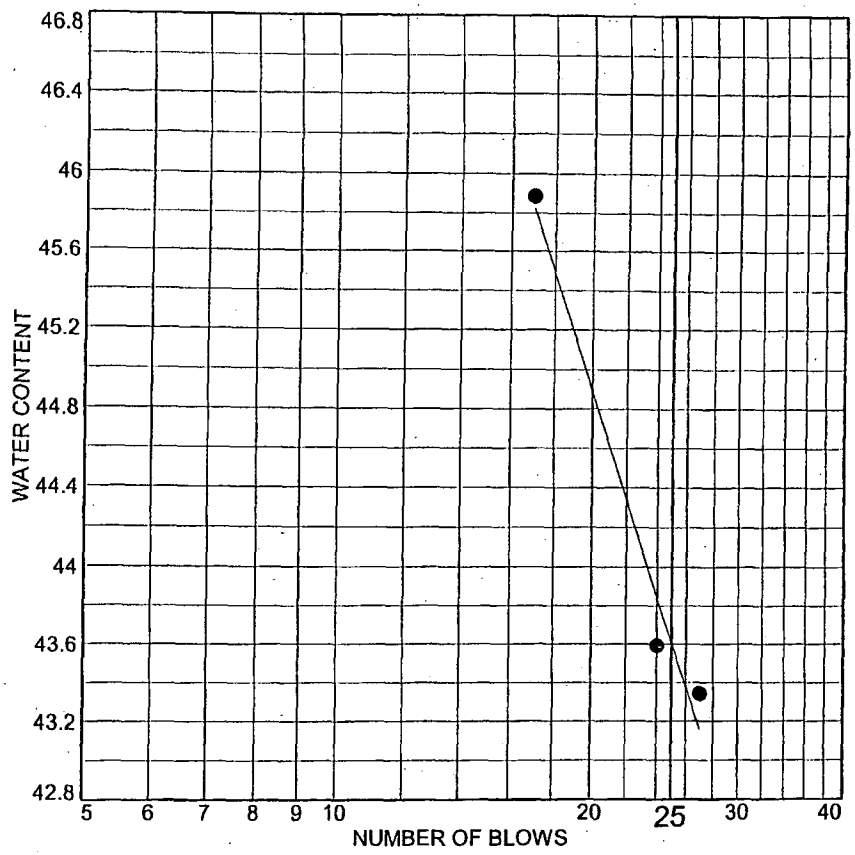


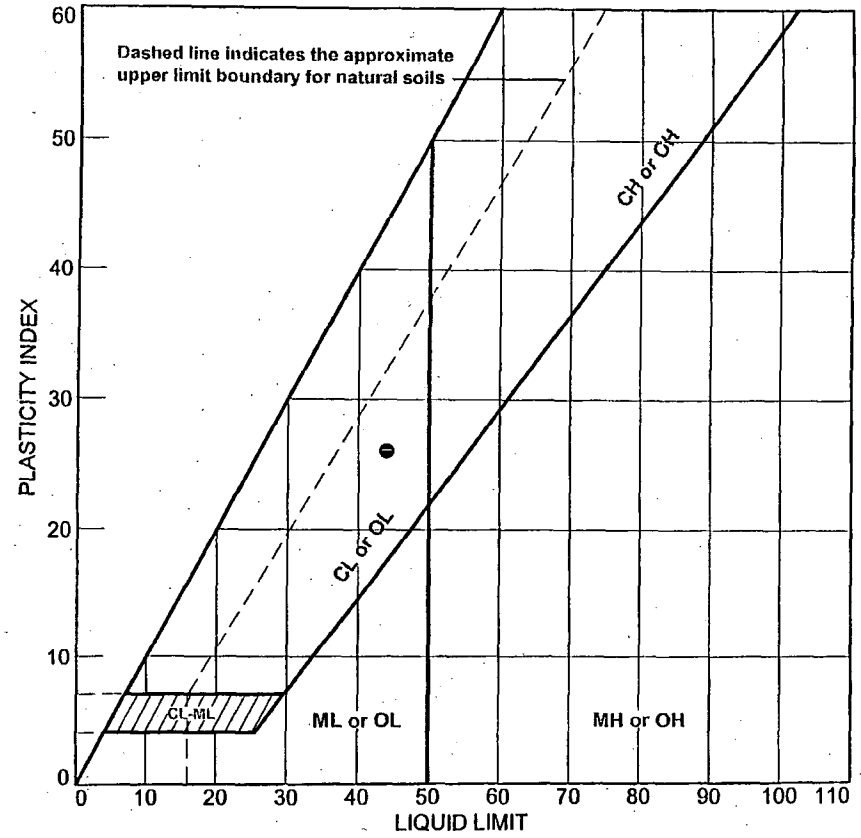
Liquid Limit= 65
Plastic Limit= 23
Plasticity Index= 42

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	13.26	12.18			
Dry+Tare	12.29	11.41			
Tare	8.22	8.08			
Moisture	23.8	23.1			

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 432	STP-082	12.5'-14.0'	11/8/2006	CL	Lean Clay	21.4	44	26
		(SS-8)							

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC/TH
ASTM D4318-05

Reviewed By:ST

MA
4-3-07

KAW 4/3/07

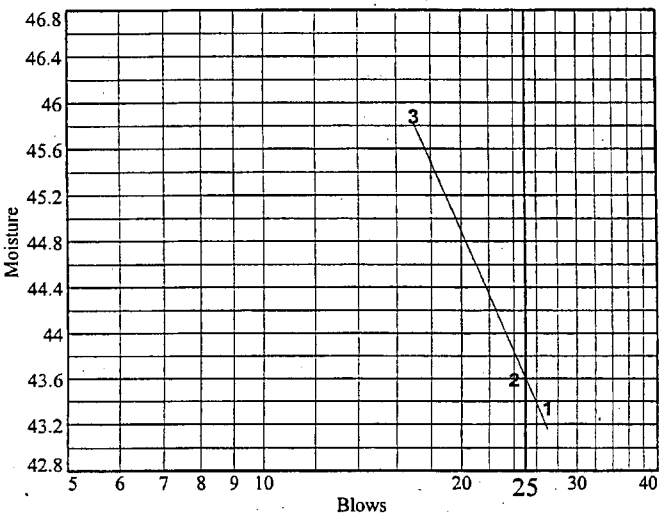
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 432
Depth: 12.5'-14.0'
Sample Number: STP-082 (SS-8)
Material Description: Lean Clay
Date: 11/8/2006
USCS Class.: CL
Testing Remarks: Tested By:AC/TH Reviewed By:ST
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	38.51	38.57	32.03			
Dry+Tare	35.45	35.44	28.74			
Tare	28.39	28.26	21.57			
# Blows	27	24	17			
Moisture	43.3	43.6	45.9			



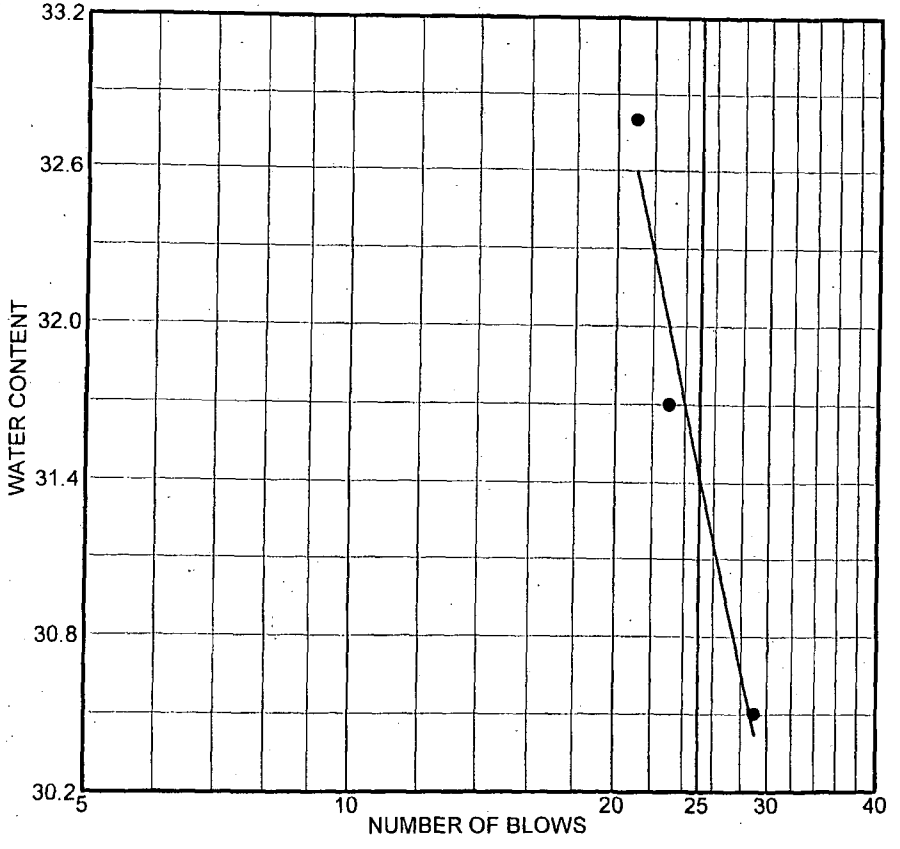
Liquid Limit= 44
Plastic Limit= 18
Plasticity Index= 26
Natural Moisture= 21.4
Liquidity Index= 0.1

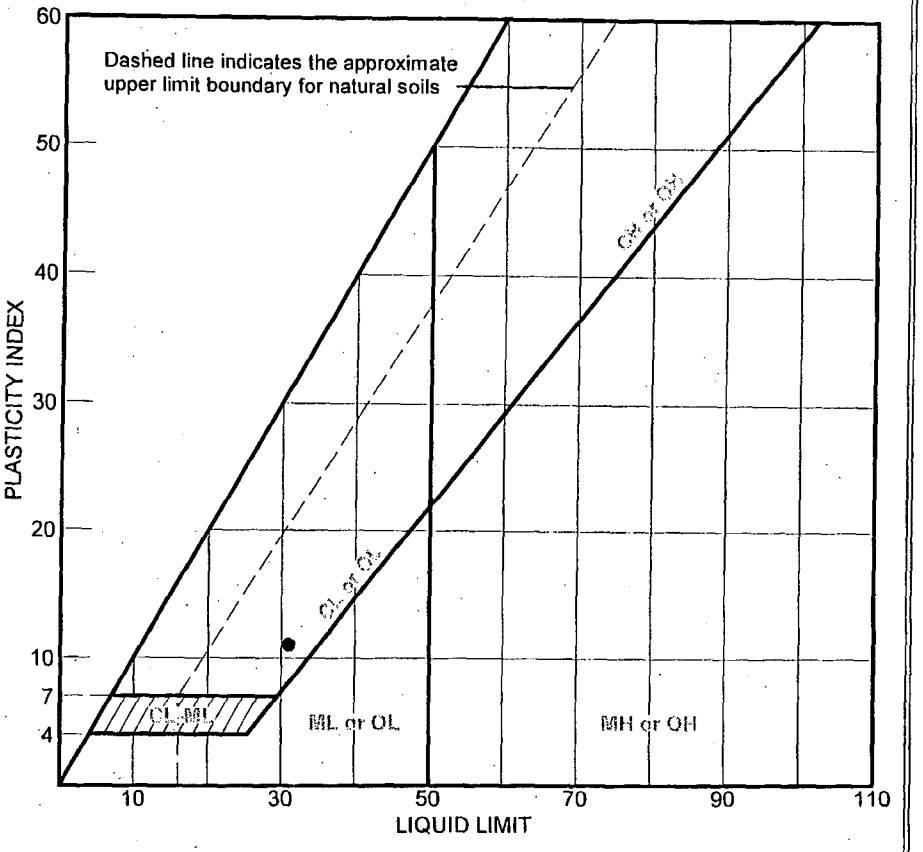
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	35.16	35.19			
Dry+Tare	33.94	33.95			
Tare	27.15	27.08			
Moisture	18.0	18.0			

MM 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-432	UD-2	15' to 17'	2-22-07	CL	Lean clay	23.2	31	11

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496 | Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reviewed by: MH KAW 4/3/07
ASTM D4318-05

KAW 4/3/07

LIQUID AND PLASTIC LIMIT TEST DATA

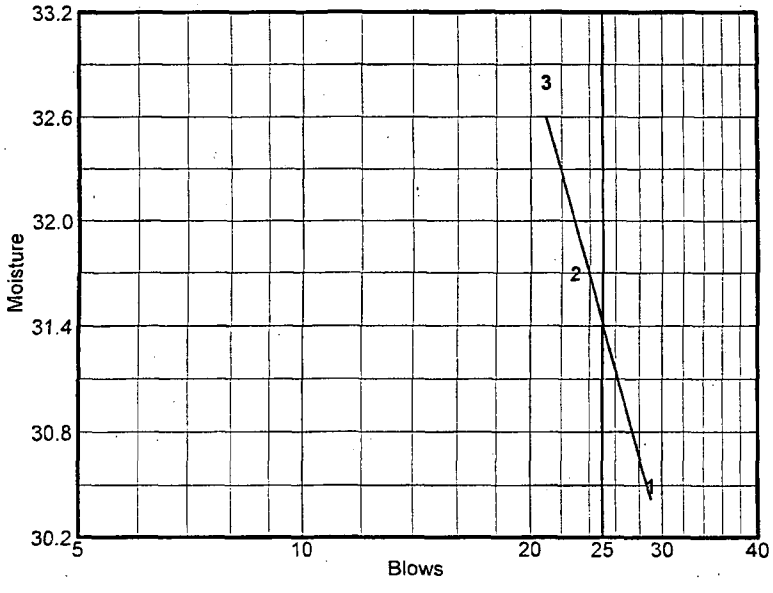
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496

Sample Data

Source: B-432
Sample No.: UD-2
Elev. or Depth: 15' to 17' **Sample Length(in./cm.):**
Location: B-432
Description: Lean clay
Date: 2-22-07 **Natural Moisture:** 23.2
USCS Class.: CL **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed by: MH
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	24.77	24.16	22.87			
Dry+Tare	21.51	20.95	19.87			
Tare	10.83	10.83	10.72			
# Blows	29	23	21			
Moisture	30.5	31.7	32.8			

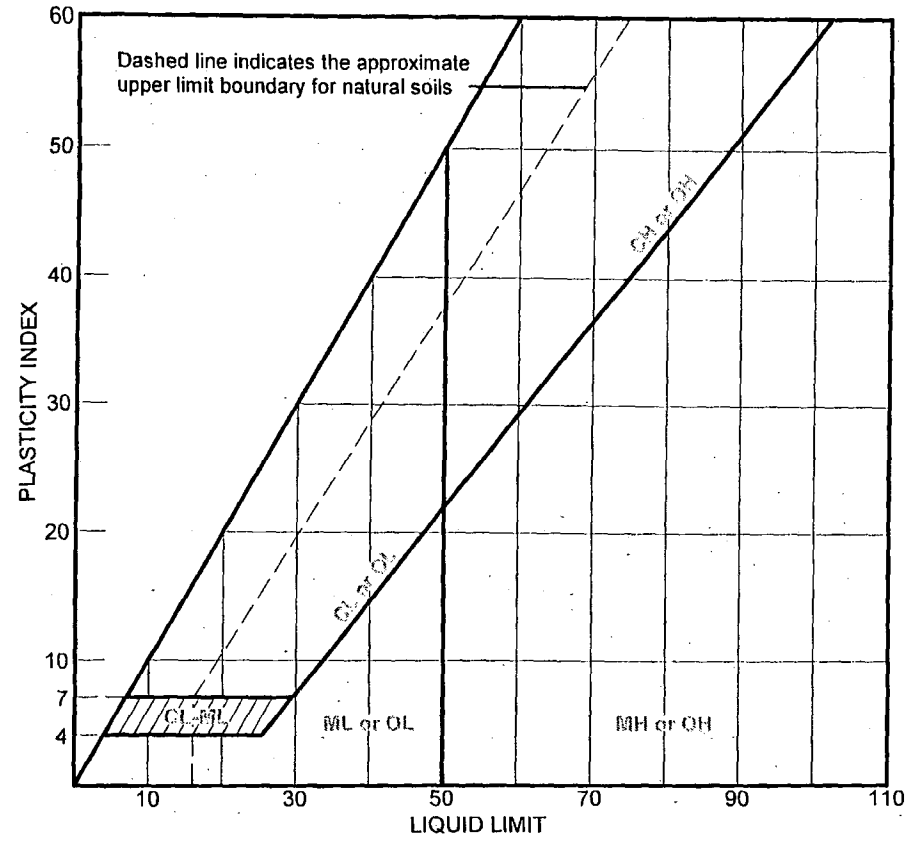


Liquid Limit= 31
Plastic Limit= 20
Plasticity Index= 11

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	23.27	22.36			
Dry+Tare	21.34	20.47			
Tare	11.50	10.94			
Moisture	19.6	19.8			

LIQUID AND PLASTIC LIMITS TEST REPORT



	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-432	UD-3	25' to 27'	3-22-07	SM	Silty Sand		NV	NP

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496 | Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reviewed by: MH
ASTM D4318-05 KAW 413107

KAW 413107

LIQUID AND PLASTIC LIMIT TEST DATA

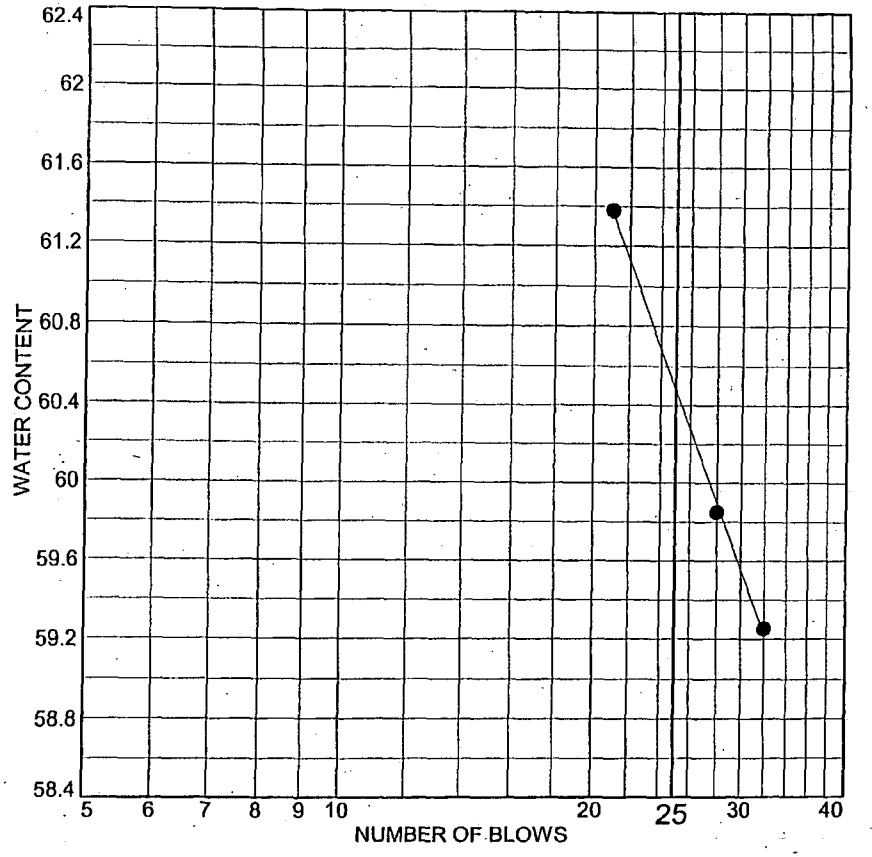
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496

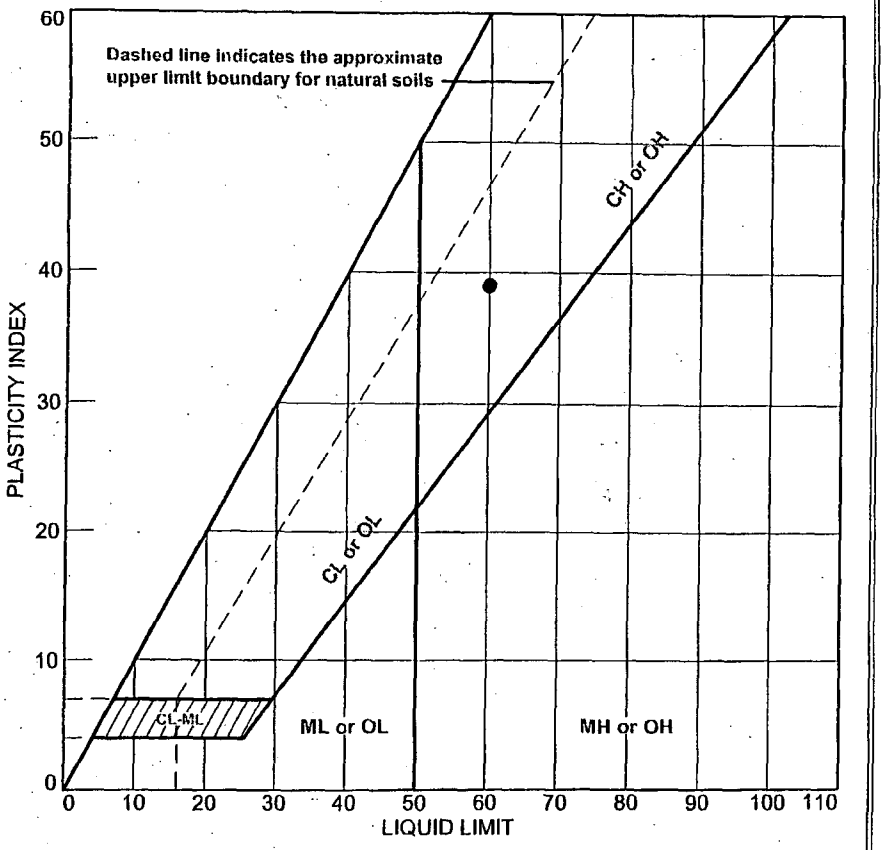
Sample Data

Source: B-432
Sample No.: UD-3
Elev. or Depth: 25' to 27' **Sample Length(in./cm.):**
Location: B-432
Description: Silty Sand
Date: 3-22-07 **Natural Moisture:** **USCS Class.:** SM **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed by: MH
ASTM D4318-05

Liquid Limit= NV
Plastic Limit= NP
Plasticity Index= NP

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 432	STP-085 (SS-15)	48.5'-50.0'	11/13/2006	CH	Fat Clay	29.8	60	39

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC/TH Reviewed By:ST

ASTM D4318-05

NM 4-3-07

KAW 4/3/07

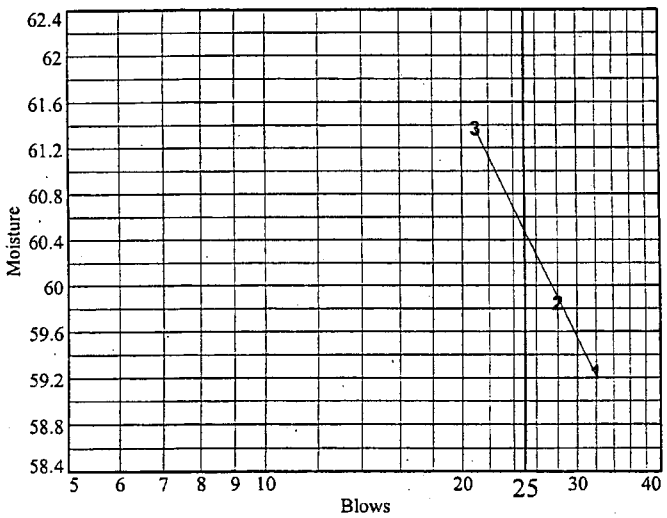
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 432
Depth: 48.5'-50.0'
Sample Number: STP-085 (SS-15)
Material Description: Fat Clay
Date: 11/13/2006
USCS Class.: CH
Testing Remarks: Tested By:AC/TH
Reviewed By:ST
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	32.32	34.01	37.57			
Dry+Tare	28.35	30.79	34.01			
Tare	21.65	25.41	28.21			
# Blows	32	28	21			
Moisture	59.3	59.9	61.4			



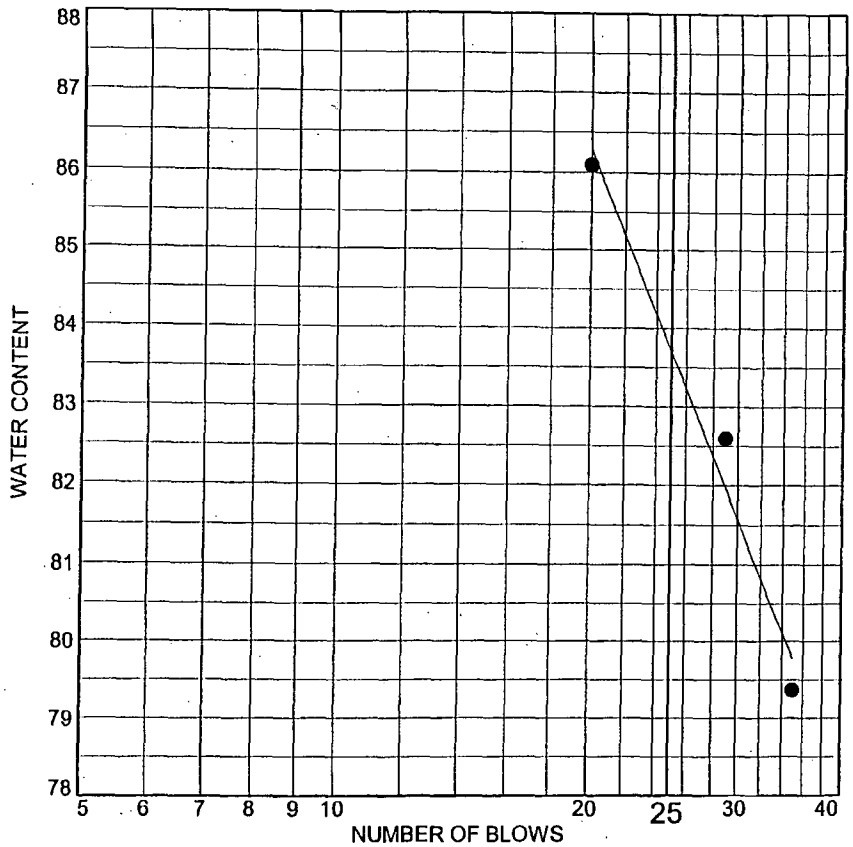
Liquid Limit= 60
Plastic Limit= 21
Plasticity Index= 39
Natural Moisture= 29.8
Liquidity Index= 0.2

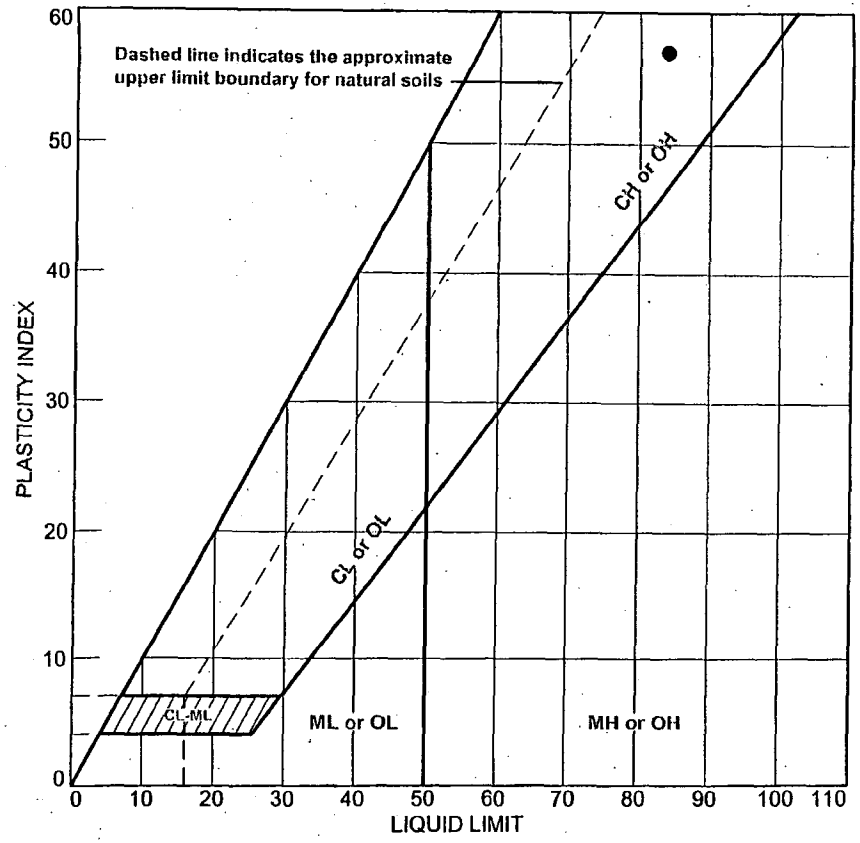
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	35.64	35.80			
Dry+Tare	34.35	34.50			
Tare	28.08	28.17			
Moisture	20.6	20.5			

MK 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 432	STP-088	63.5'-65.0'	11/13/2006	CH	Fat Clay	26.2	84	57
		(SS-18)							

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC/TH Reviewed By:ST

ASTM D4318-05

4-3-07

KAW 4/3/07

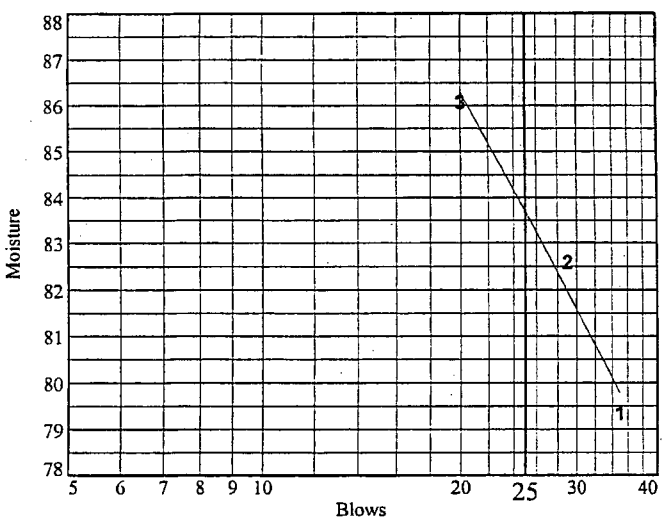
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 432
Depth: 63.5'-65.0'
Sample Number: STP-088 (SS-18)
Material Description: Fat Clay
Date: 11/13/2006
USCS Class.: CH
Testing Remarks: Tested By:AC/TH Reviewed By:ST
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	32.79	37.32	35.36			
Dry+Tare	29.06	33.38	31.77			
Tare	24.36	28.61	27.60			
# Blows	35	29	20			
Moisture	79.4	82.6	86.1			



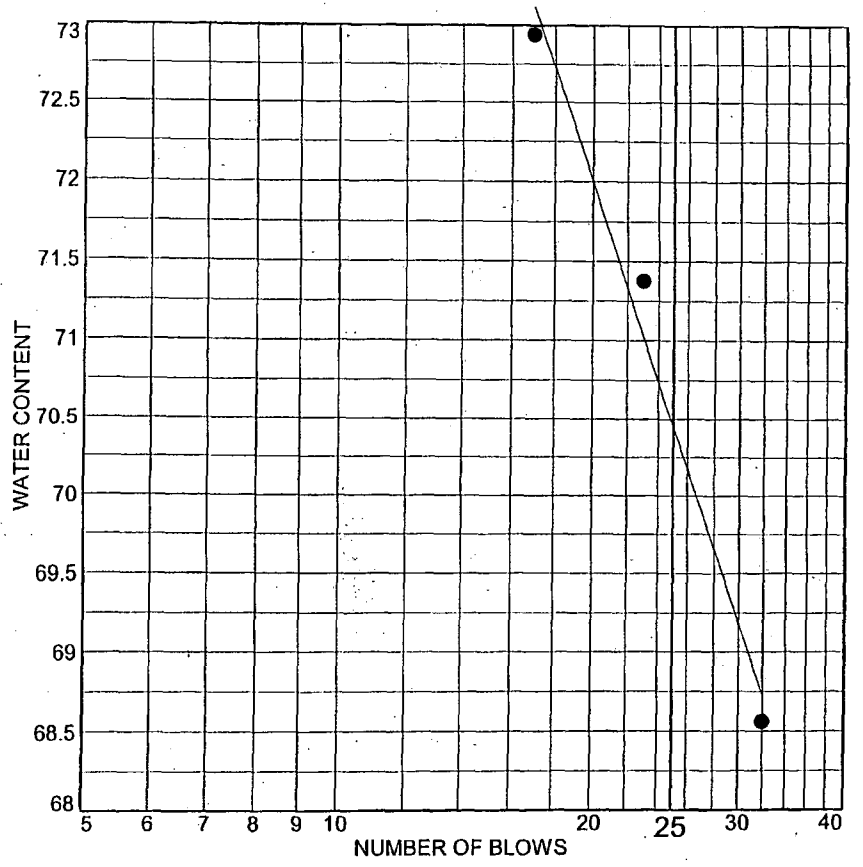
Liquid Limit= 84
Plastic Limit= 27
Plasticity Index= 57
Natural Moisture= 26.2
Liquidity Index= 0.0

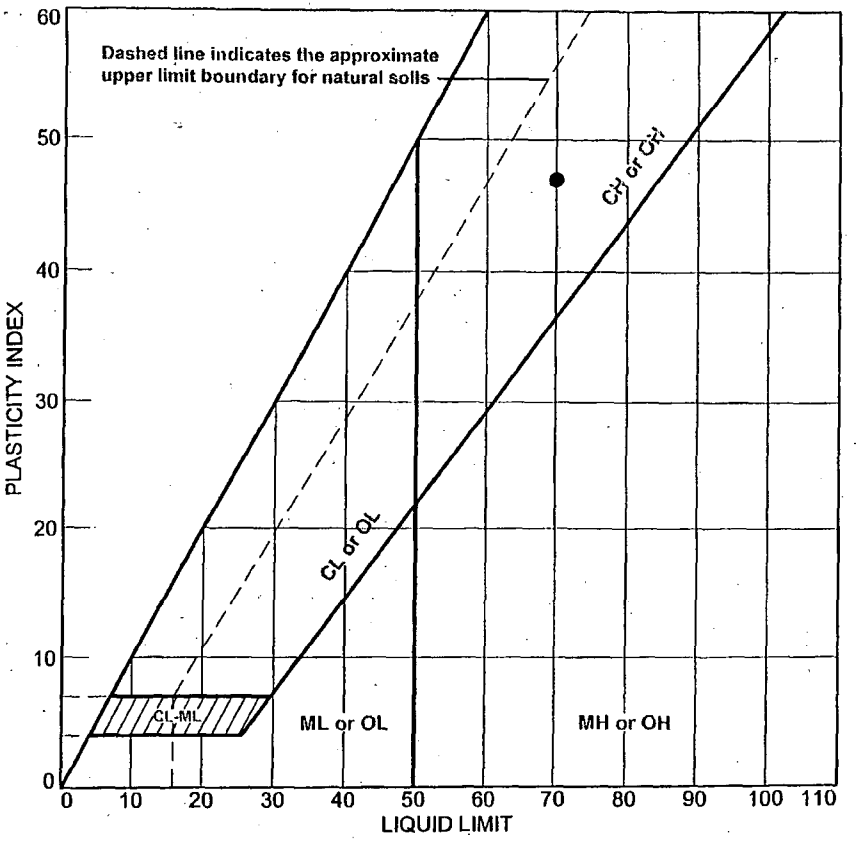
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	36.35	29.96			
Dry+Tare	34.79	28.42			
Tare	28.90	22.69			
Moisture	26.5	26.9			

NMT 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 432	STP-094	118.5'-120'	11/14/2006	CH	Fat Clay	24.7	70	47
		(SS-27)							

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC/TH Reviewed By:ST

ASTM D4318-05

MA 4-3-07

KAW 4/3/07

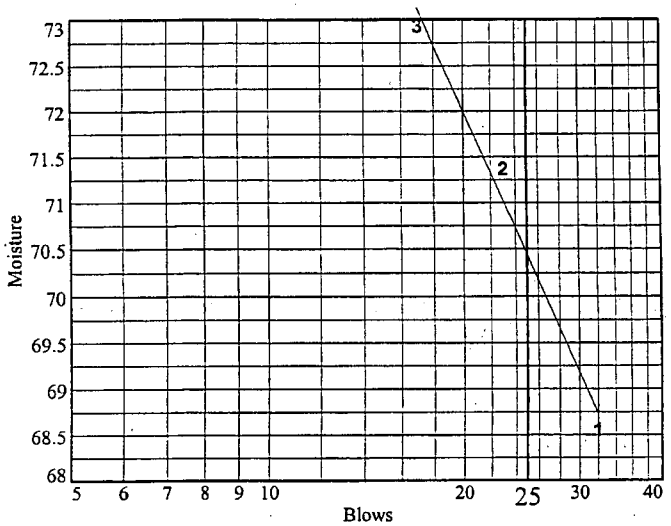
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 432
Depth: 118.5'-120'
Sample Number: STP-094 (SS-27)
Material Description: Fat Clay
Date: 11/14/2006
USCS Class.: CH
Testing Remarks: Tested By:AC/TH Reviewed By:ST
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	37.23	37.96	37.10			
Dry+Tare	33.13	33.97	33.38			
Tare	27.15	28.38	28.28			
# Blows	32	23	17			
Moisture	68.6	71.4	72.9			



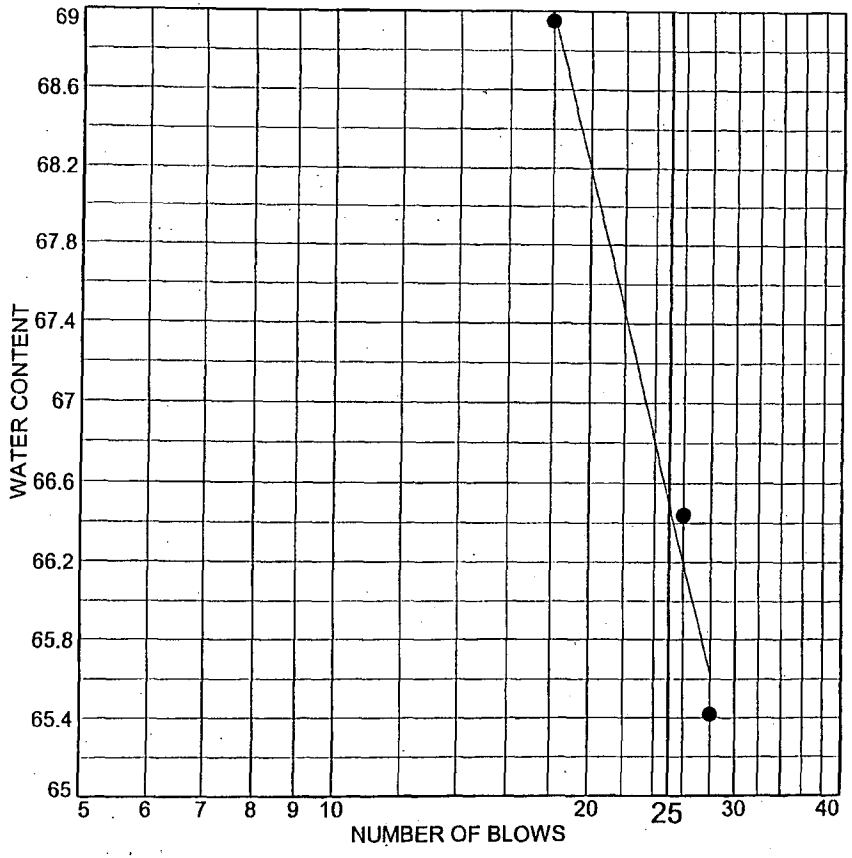
Liquid Limit= 70
Plastic Limit= 23
Plasticity Index= 47
Natural Moisture= 24.7
Liquidity Index= 0.0

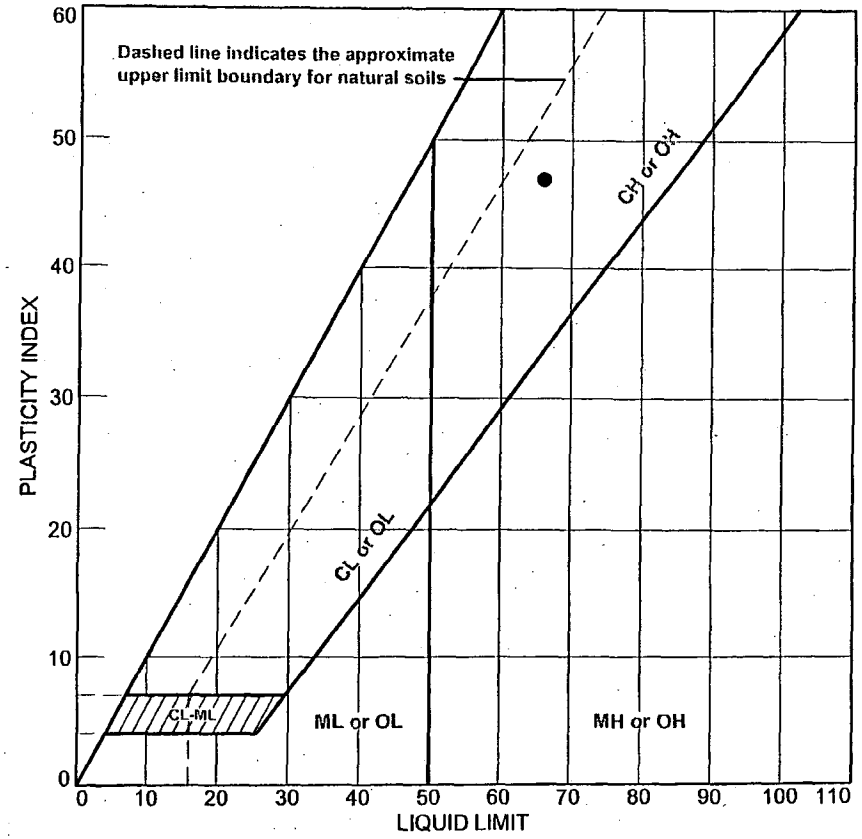
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	35.61	35.76			
Dry+Tare	34.17	34.34			
Tare	27.99	28.16			
Moisture	23.3	23.0			

NM 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 432	STP-259	128.5'-130.0'	11/14/2006	CH	Fat Clay	21.2	66	47
		(SS-28)							

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC/TH Reviewed By:RF

ASTM D4318-05

MA 4-3-07

KAW 4/3/07

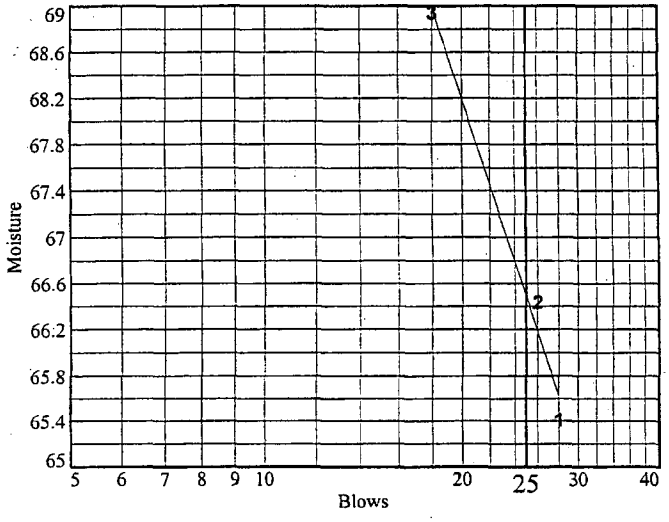
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 432
Depth: 128.5'-130.0'
Sample Number: STP-259 (SS-28)
Material Description: Fat Clay
Date: 11/14/2006
USCS Class.: CH
Testing Remarks: Tested By:AC/TH
Reviewed By:RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	35.35	35.72	36.49			
Dry+Tare	32.21	32.77	33.07			
Tare	27.41	28.33	28.11			
# Blows	28	26	18			
Moisture	65.4	66.4	69.0			



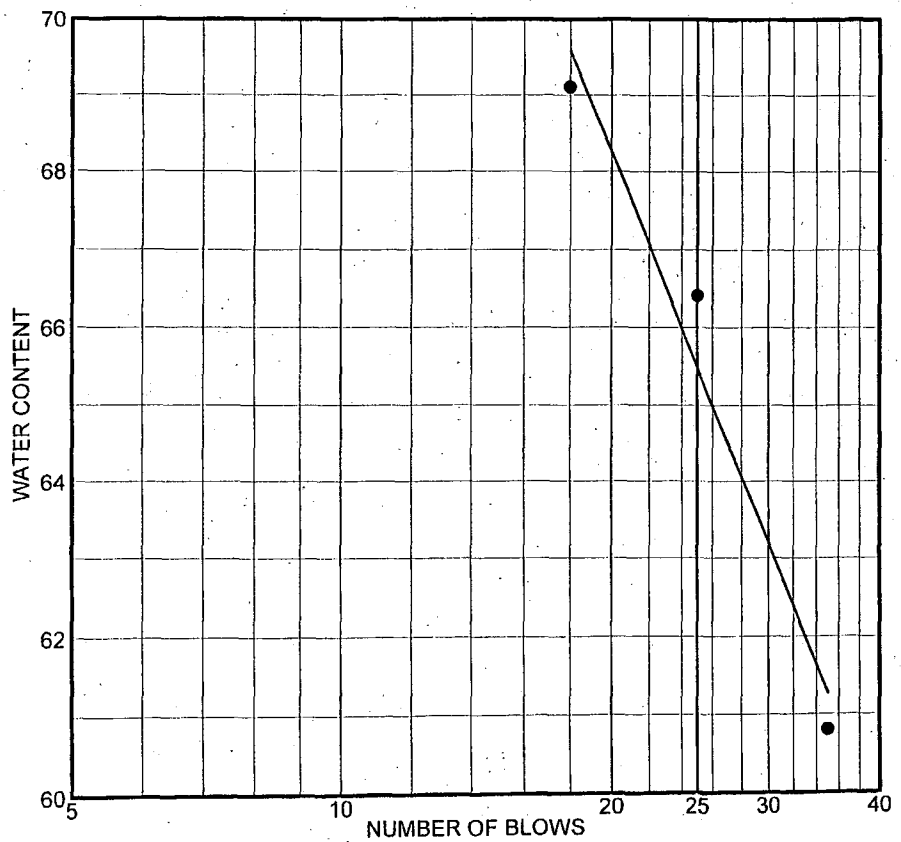
Liquid Limit= 66
Plastic Limit= 19
Plasticity Index= 47
Natural Moisture= 21.2
Liquidity Index= 0.0

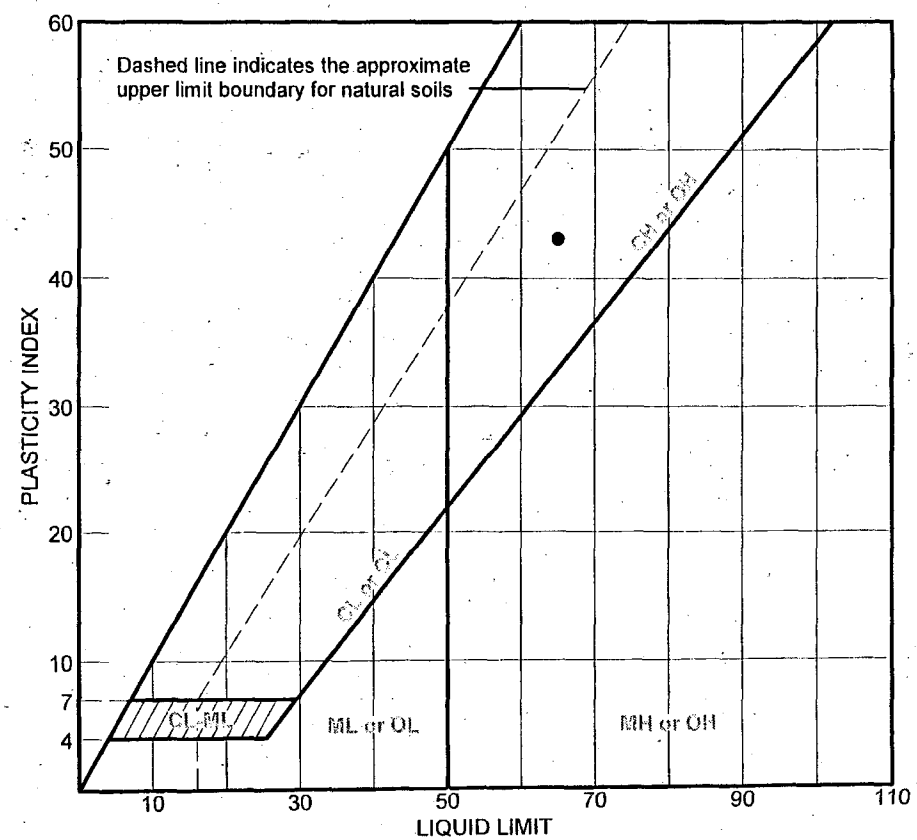
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	36.80	36.34			
Dry+Tare	35.39	35.05			
Tare	28.07	28.25			
Moisture	19.3	19.0			

MAK 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-902	UD-1	5' to 7'	2-19-07	CH	Fat Clay	21.3	65	43

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496 | Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reviewed by: MH
ASTM D4318-05 KAW 4/3/07

LIQUID AND PLASTIC LIMIT TEST DATA

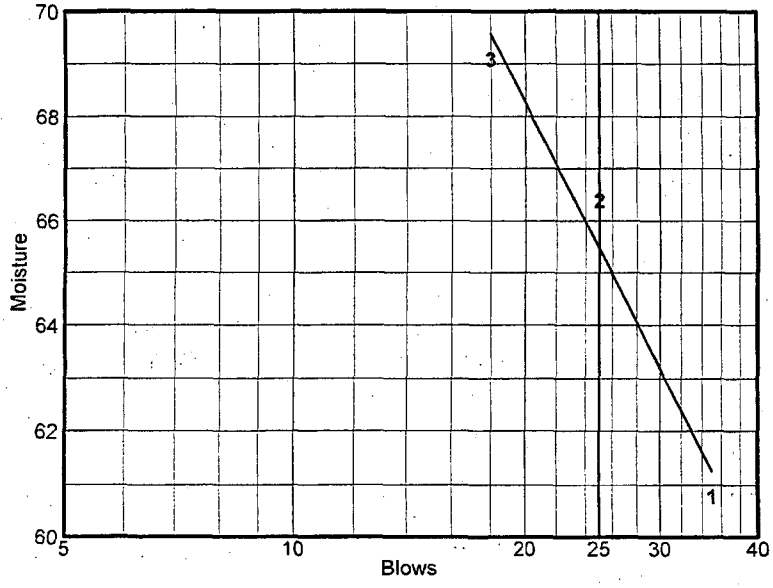
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
ject Number: 5050-06-0496

Sample Data

Source: B-902
Sample No.: UD-1
Elev. or Depth: 5' to 7' **Sample Length(in./cm.):**
Location: B-902
Description: Fat Clay
Date: 2-19-07 **Natural Moisture:** 21.3
USCS Class.: CH **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed by: MH
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	28.92	30.55	35.20			
Dry+Tare	22.38	22.75	25.29			
Tare	11.63	11.00	10.94			
# Blows	35	25	18			
Moisture	60.8	66.4	69.1			

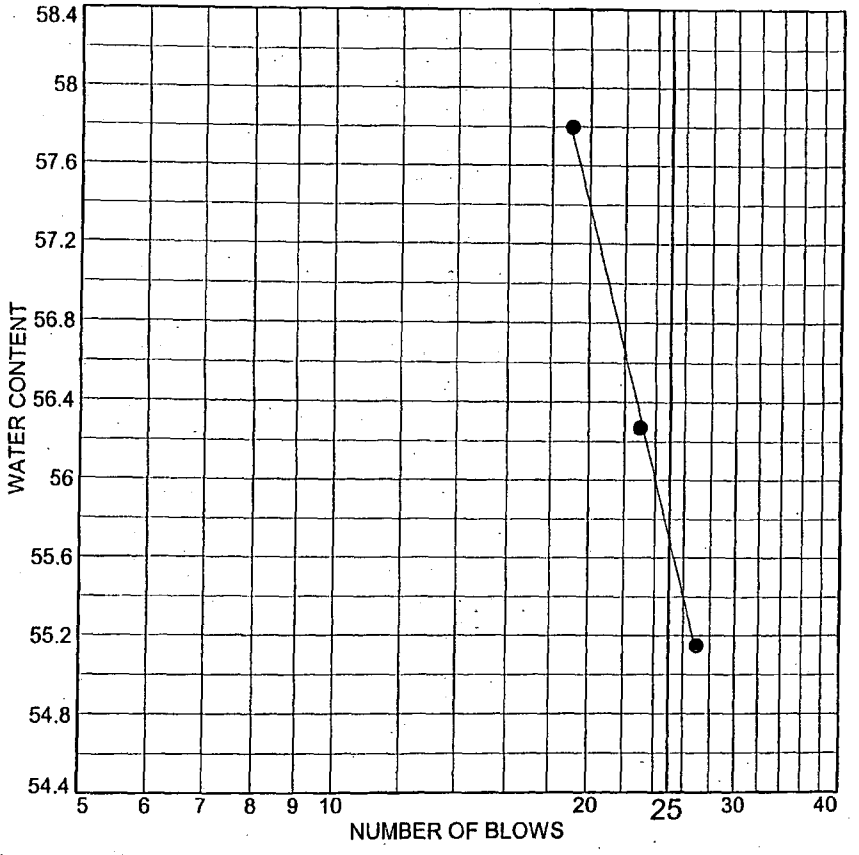


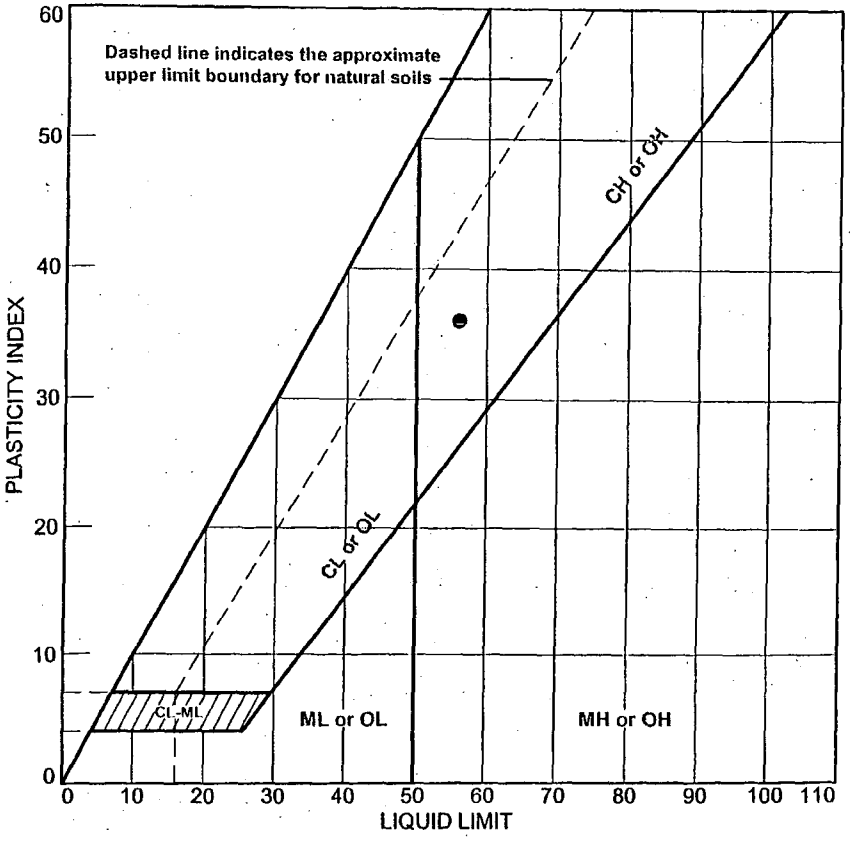
Liquid Limit= 65
Plastic Limit= 22
Plasticity Index= 43

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	18.96	17.52			
Dry+Tare	17.57	16.29			
Tare	11.33	10.74			
Moisture	22.3	22.2			

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 902	STP-179 (SS-7)	11.5'-13.0'	12/12/2006	CH	Fat Clay	19.5	56	36

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC/TH/JW Reviewed By:RF

ASTM D4318-05

NWA 4-3-07

KAW 4/3/07

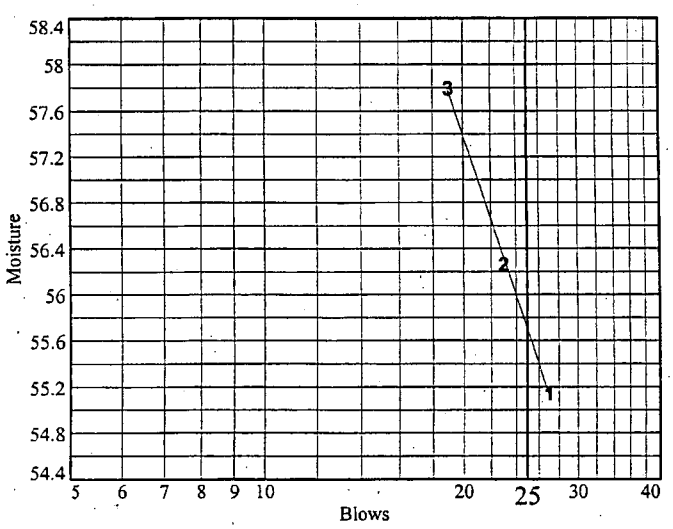
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 902
Depth: 11.5'-13.0' **Sample Number:** STP-179 (SS-7)
Material Description: Fat Clay
Date: 12/12/2006 **USCS Class.:** CH
Testing Remarks: Tested By:AC/TH/JW Reviewed By:RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	37.67	37.77	36.67			
Dry+Tare	34.35	34.27	33.52			
Tare	28.33	28.05	28.07			
# Blows	27	23	19			
Moisture	55.1	56.3	57.8			



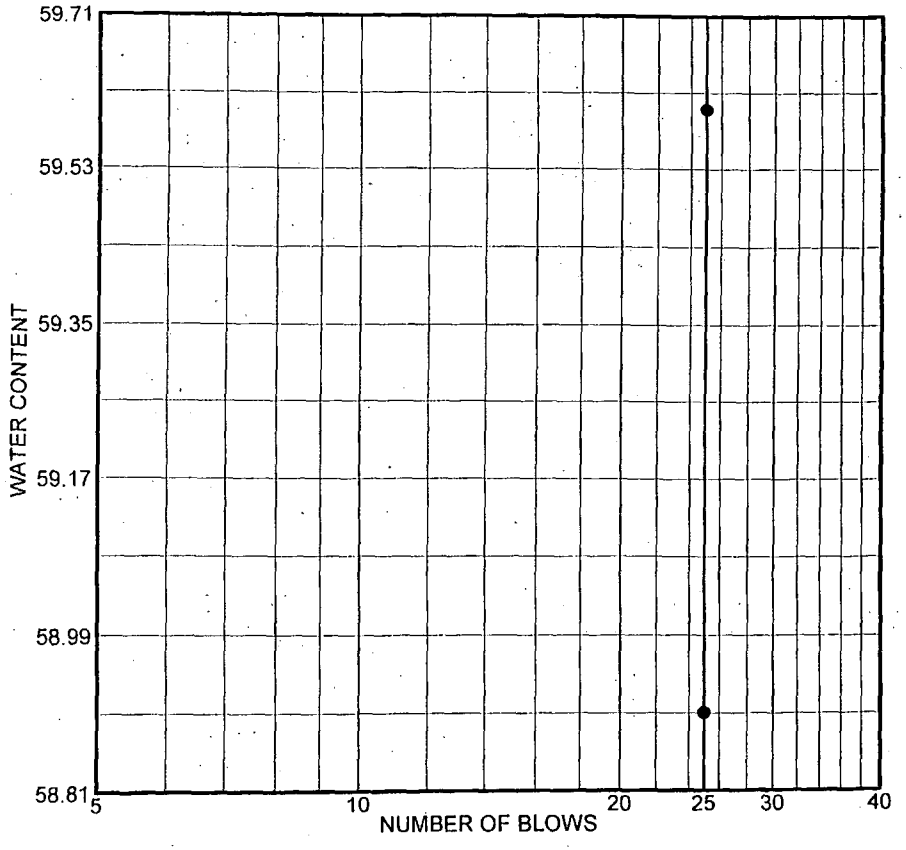
Liquid Limit= 56
Plastic Limit= 20
Plasticity Index= 36
Natural Moisture= 19.5
Liquidity Index= 0.0

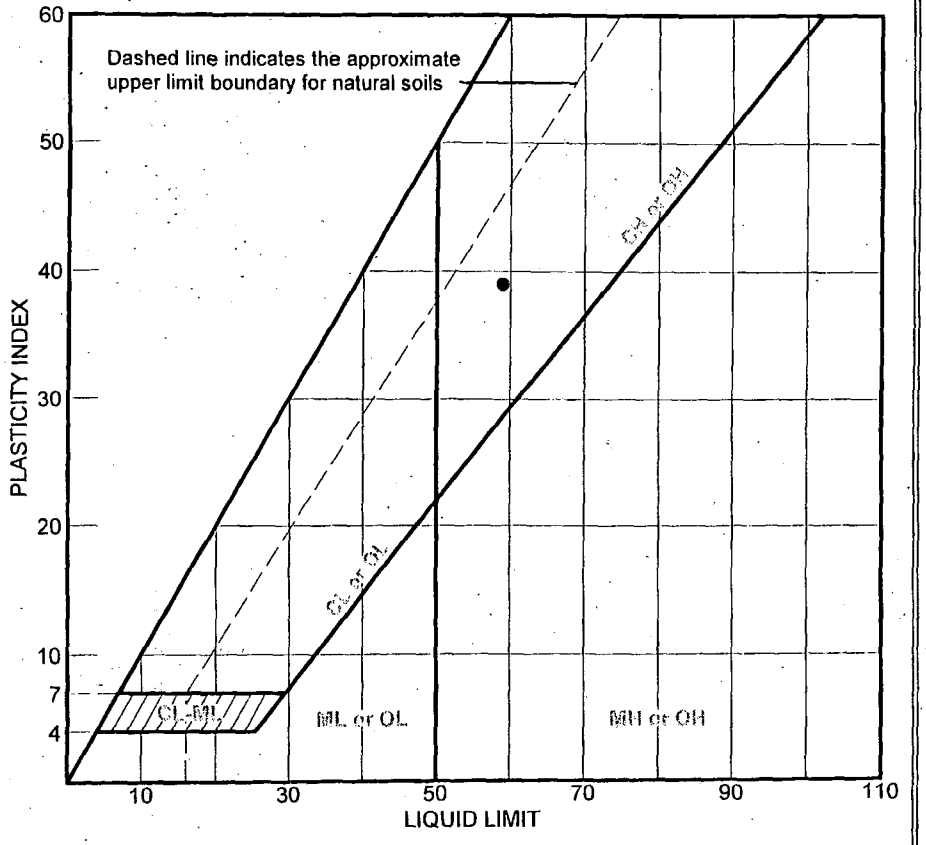
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	38.02	37.30			
Dry+Tare	36.37	35.77			
Tare	28.29	28.21			
Moisture	20.4	20.2			

NW 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-902	UD-2	15' to 17'	3-16-07	CH	Fat clay	24.3	59	39

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496 | Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reviewed by: MH
ASTM D4318-05

KAW 4/03/07

LIQUID AND PLASTIC LIMIT TEST DATA

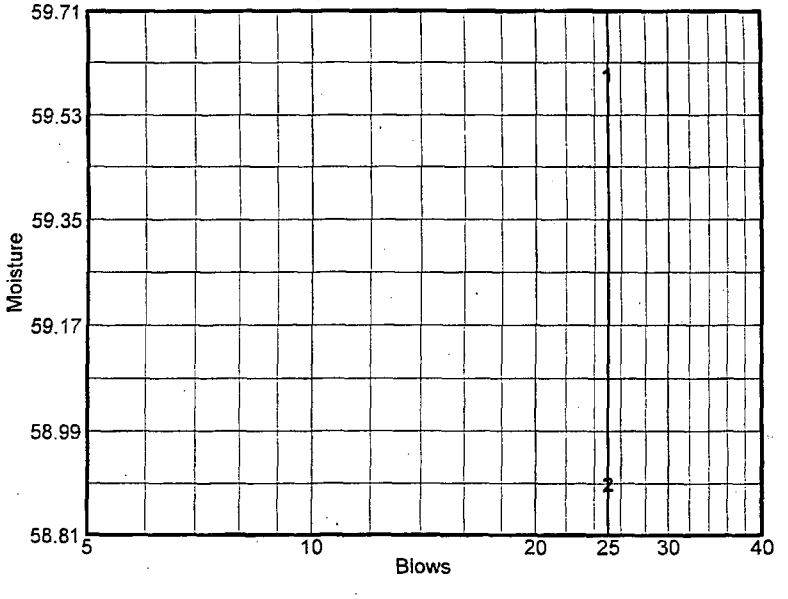
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496

Sample Data

Source: B-902
Sample No.: UD-2
Elev. or Depth: 15' to 17' **Sample Length(in./cm.):**
Location: B-902
Description: Fat clay
Date: 3-16-07 **Natural Moisture:** 24.3
USCS Class.: CH **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed by: MH
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	23.26	28.91				
Dry+Tare	18.57	22.25				
Tare	10.70	10.94				
# Blows	25	25				
Moisture	59.6	58.9				

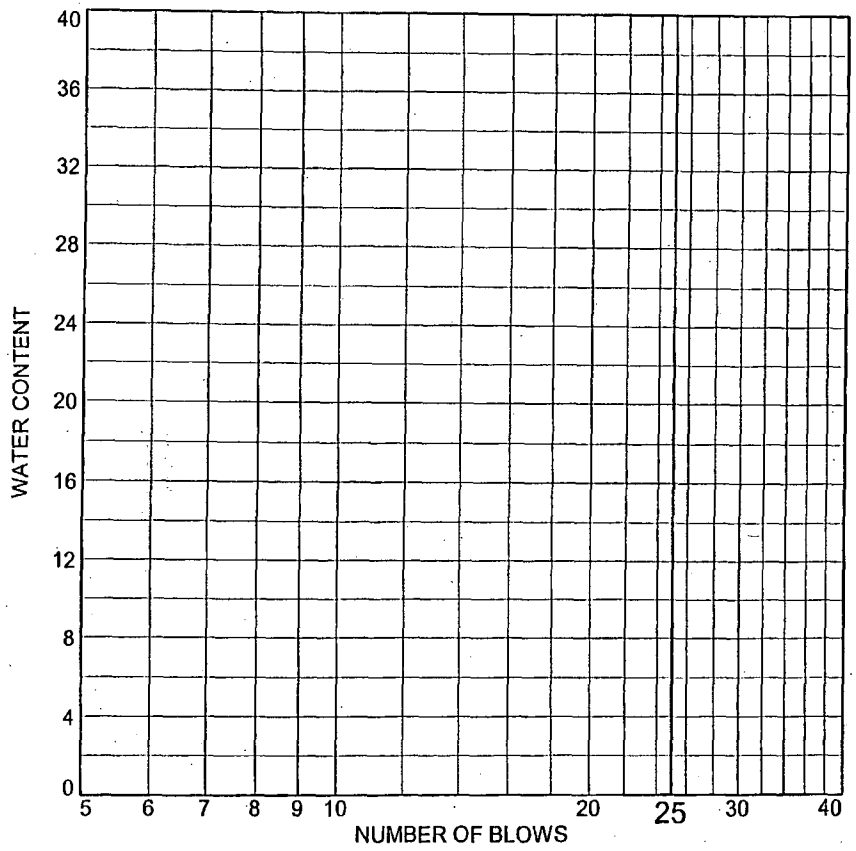


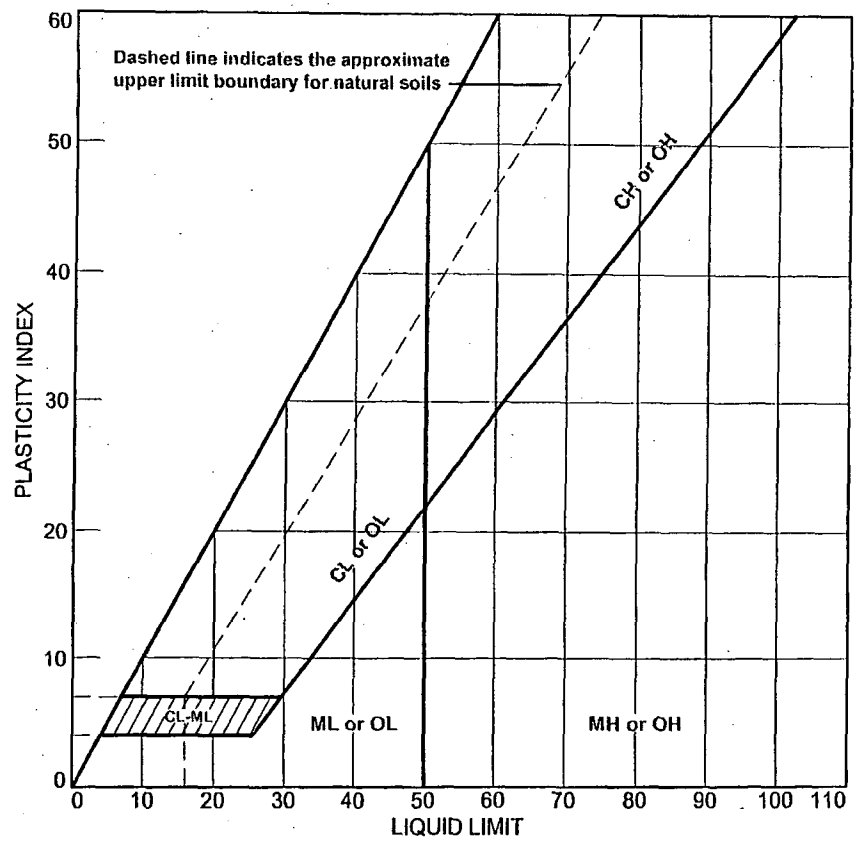
Liquid Limit= 59
Plastic Limit= 20
Plasticity Index= 39

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	19.69	20.27			
Dry+Tare	18.36	18.73			
Tare	11.54	10.97			
Moisture	19.5	19.8			

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 902	STP-180	18.5'-20.0'	12/12/2006	ML	Silt with Sand	26.8	NV	NP
		(SS-9)							

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC/TH Reviewed By:RF

ASTM D4318-05

4-3-07

KAW 4/3/07

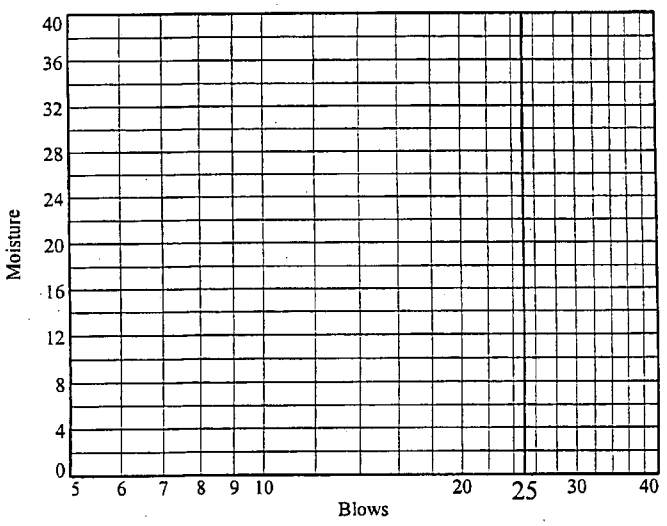
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 902
Depth: 18.5'-20.0'
Sample Number: STP-180 (SS-9)
Material Description: Silt with Sand
Date: 12/12/2006
USCS Class.: ML
Testing Remarks: Tested By:AC/TH Reviewed By:RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare						
Dry+Tare						
Tare						
# Blows						
Moisture						



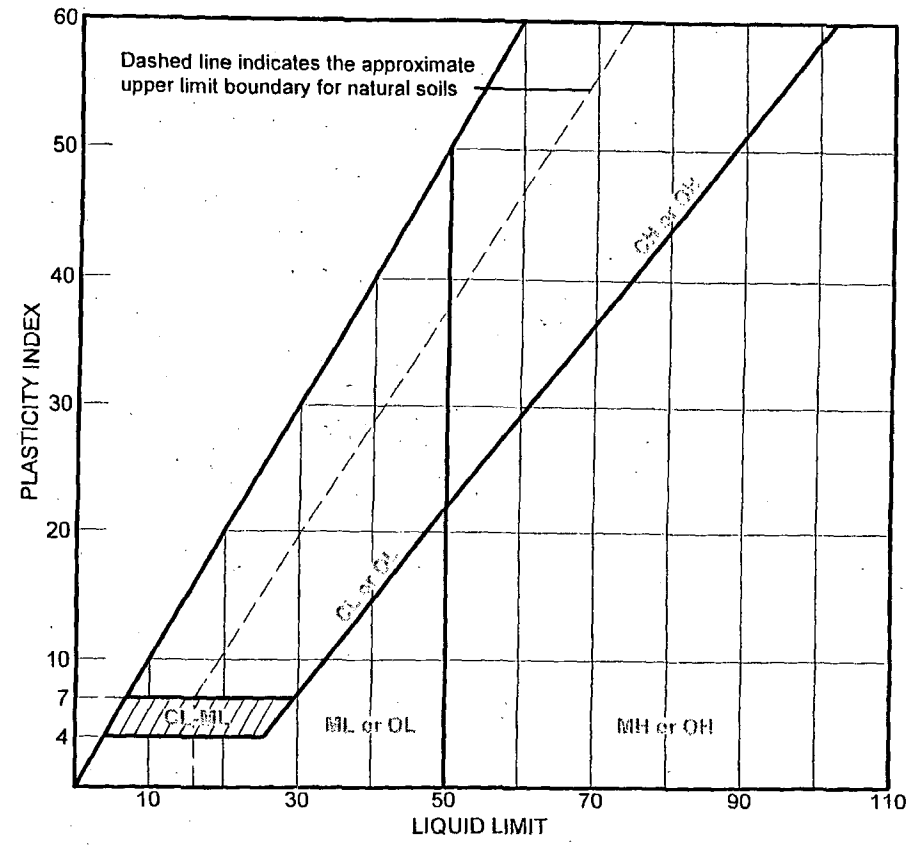
Liquid Limit= NV
Plastic Limit= NP
Plasticity Index= NP
Natural Moisture= 26.8

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare					
Dry+Tare					
Tare					
Moisture					

NM 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT



	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-902	UD-3	23' to 25'	2-13-07	SM	Silty sand	24.8	NV	NP

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496 | Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reviewed by: SS
ASTM D4318-05

SS 2/25/2007

KAW 4/3/07

LIQUID AND PLASTIC LIMIT TEST DATA

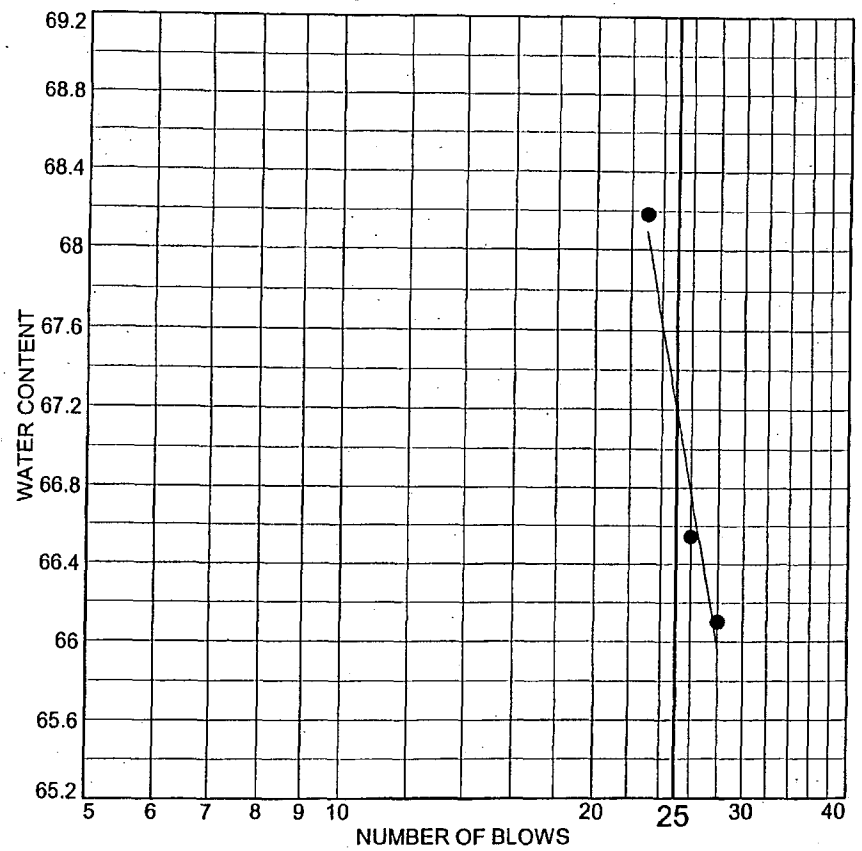
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496

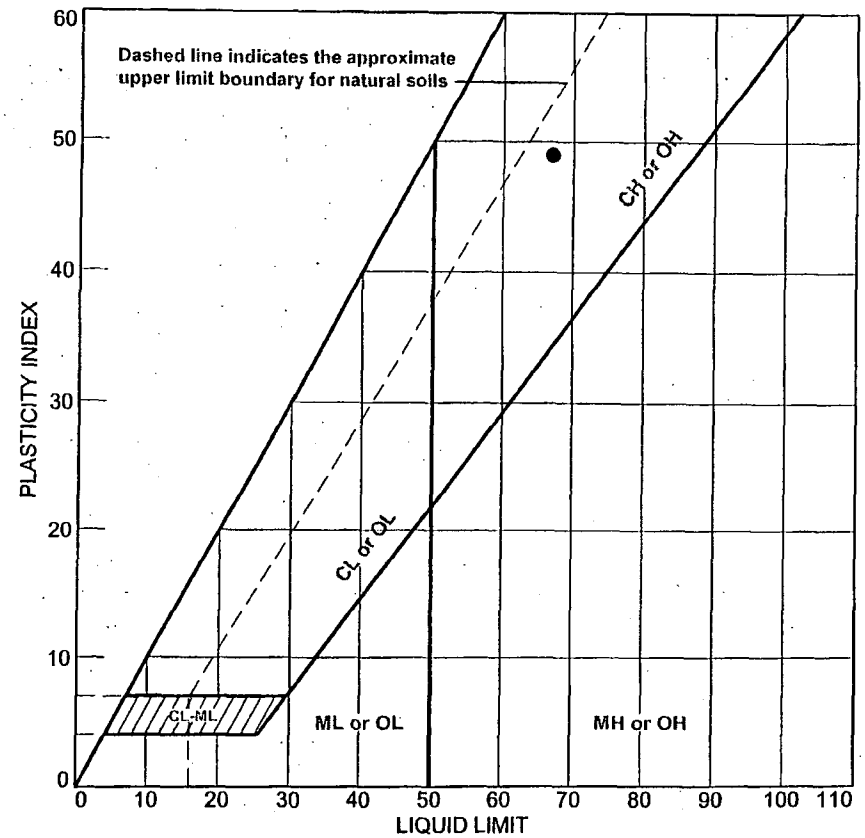
Sample Data

Source: B-902
Sample No.: UD-3
Elev. or Depth: 23' to 25' **Sample Length(in./cm.):**
Location: B-902
Description: Silty sand
Date: 2-13-07 **Natural Moisture:** 24.8
USCS Class.: SM **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed by: SS
ASTM D4318-05

Liquid Limit= NV
Plastic Limit= NP
Plasticity Index= NP

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 902	STP-184	48.5'-50.0'	12/12/2006	CH	Fat Clay	31.4	67	49
		(SS-14)							

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC/TH Reviewed By:MH

ASTM D4318-05

4-3-07

KAW 4/3/07

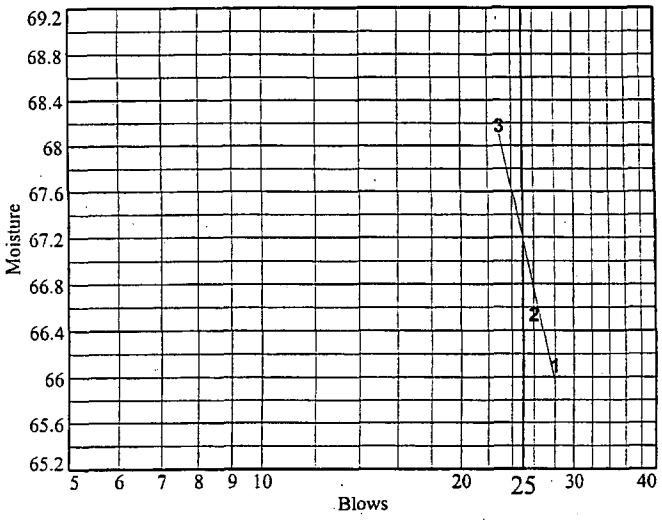
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 902
Depth: 48.5'-50.0'
Sample Number: STP-184 (SS-14)
Material Description: Fat Clay
Date: 12/12/2006
USCS Class.: CH
Testing Remarks: Tested By:AC/TH
Reviewed By:MH
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	38.13	37.13	37.26			
Dry+Tare	34.23	33.51	33.51			
Tare	28.33	28.07	28.01			
# Blows	28	26	23			
Moisture	66.1	66.5	68.2			



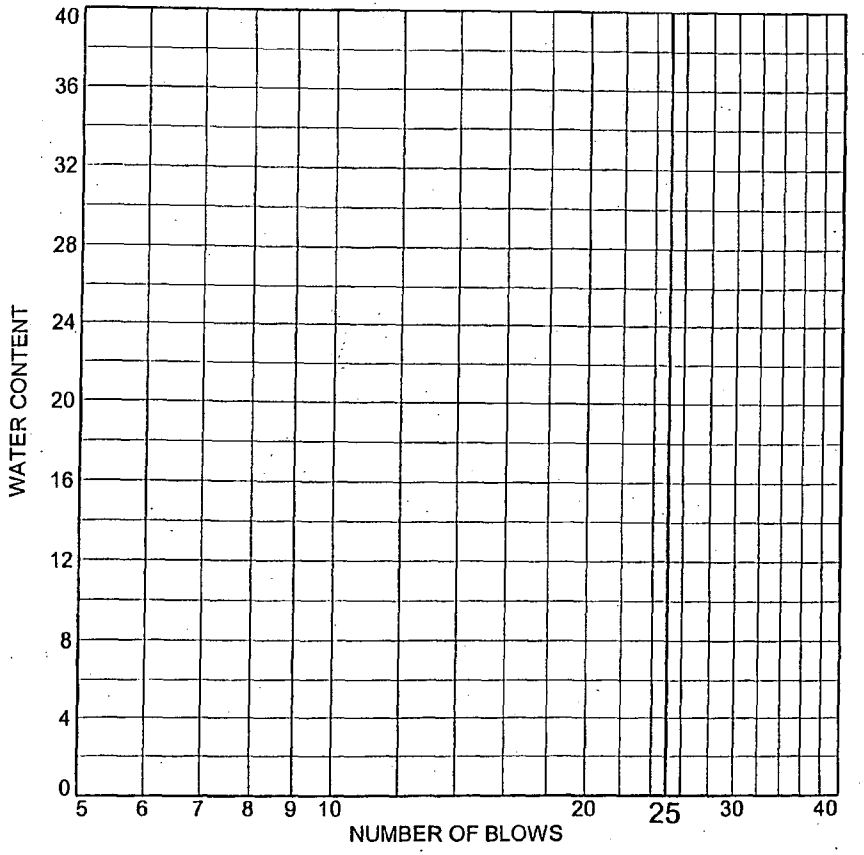
Liquid Limit= 67
Plastic Limit= 18
Plasticity Index= 49
Natural Moisture= 31.4
Liquidity Index= 0.3

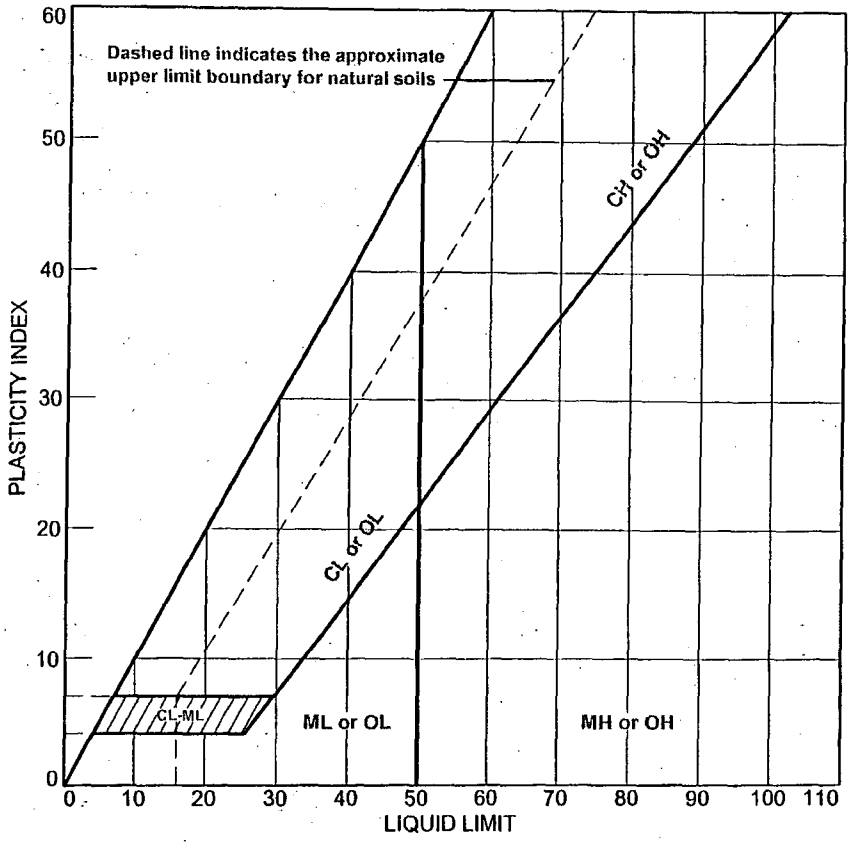
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	36.79	37.17			
Dry+Tare	35.48	35.61			
Tare	28.18	27.07			
Moisture	17.9	18.3			

4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 902	STP-185	58.5'-60.0'	12/12/2006	ML	Silt with Sand	24.9	NV	NP
		(SS-16)							

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC/TH Reviewed By:RF

ASTM D4318-05

MA 4-3-07

KAW 4/3/07

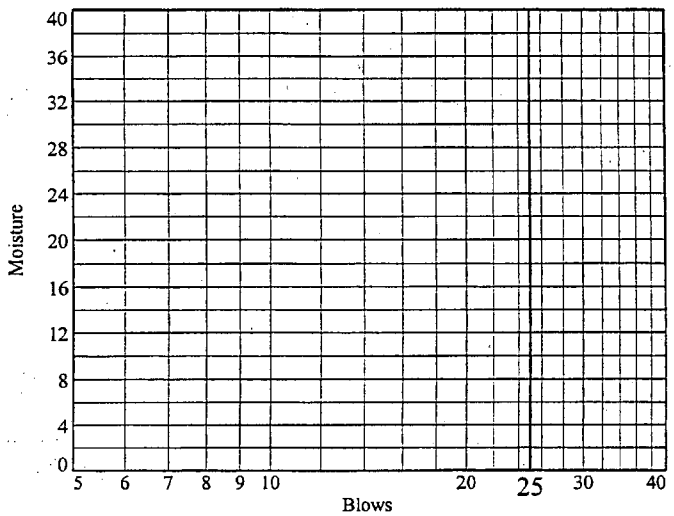
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 902
Depth: 58.5'-60.0' **Sample Number:** STP-185 (SS-16)
Material Description: Silt with Sand
Date: 12/12/2006 **USCS Class.:** ML
Testing Remarks: Tested By:AC/TH Reviewed By:RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare						
Dry+Tare						
Tare						
# Blows						
Moisture						



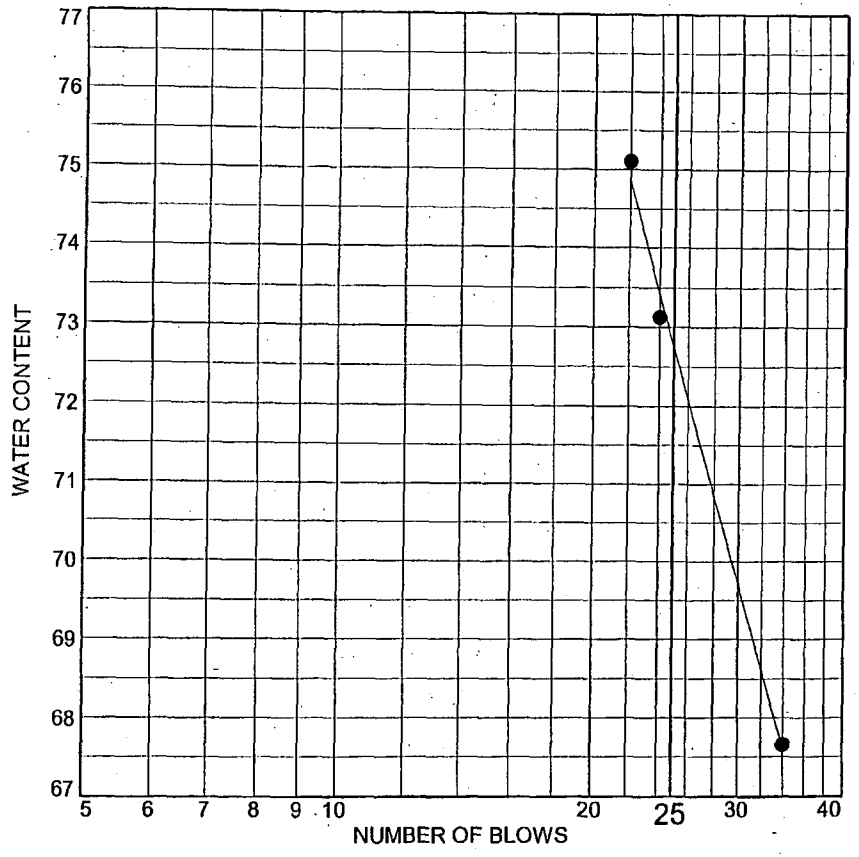
Liquid Limit= NV
Plastic Limit= NP
Plasticity Index= NP
Natural Moisture= 24.9

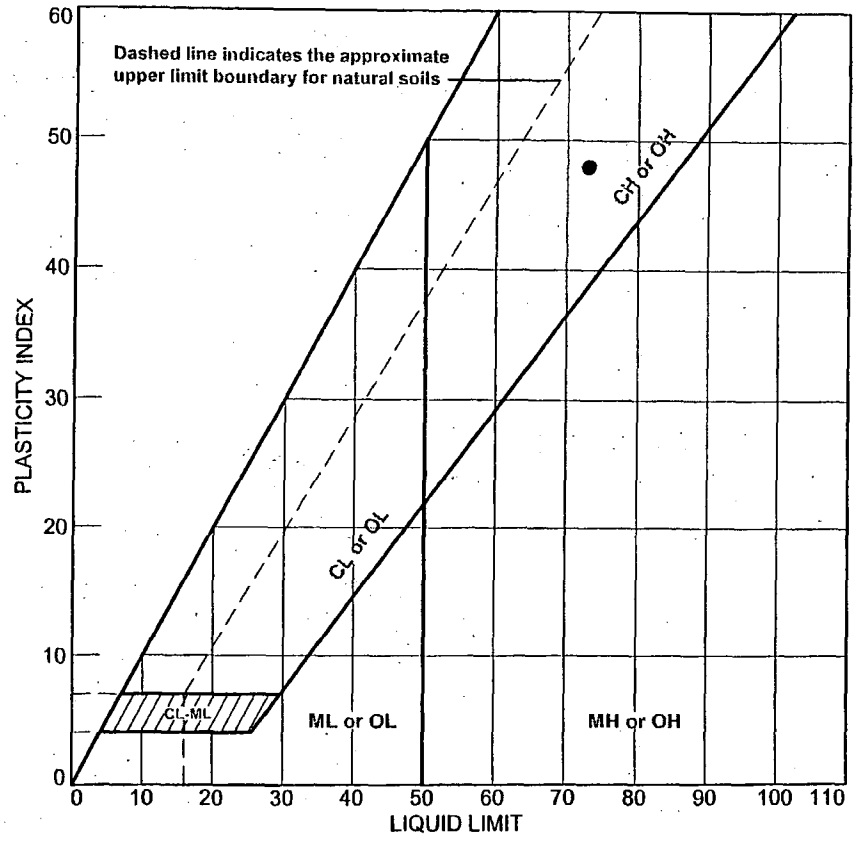
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare					
Dry+Tare					
Tare					
Moisture					

NM 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 902	STP-186 (SS-18)	68.5'-70'	12/13/2006	CH	Fat Clay	25.7	73	48

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC Reviewed By:RF

ASTM D4318-05

MH 4-3-07

KAW 4/3/07

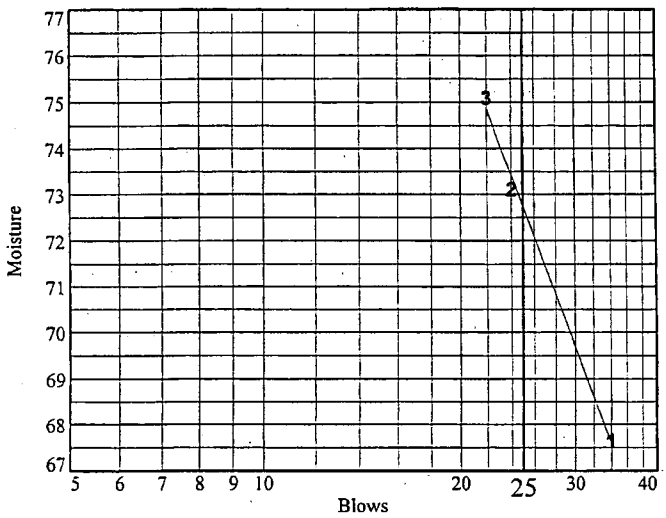
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 902
Depth: 68.5'-70'
Sample Number: STP-186 (SS-18)
Material Description: Fat Clay
Date: 12/13/2006
USCS Class.: CH
Testing Remarks: Tested By:AC Reviewed By:RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	38.43	35.89	36.09			
Dry+Tare	34.33	32.57	32.62			
Tare	28.27	28.03	28			
# Blows	34	24	22			
Moisture	67.7	73.1	75.1			



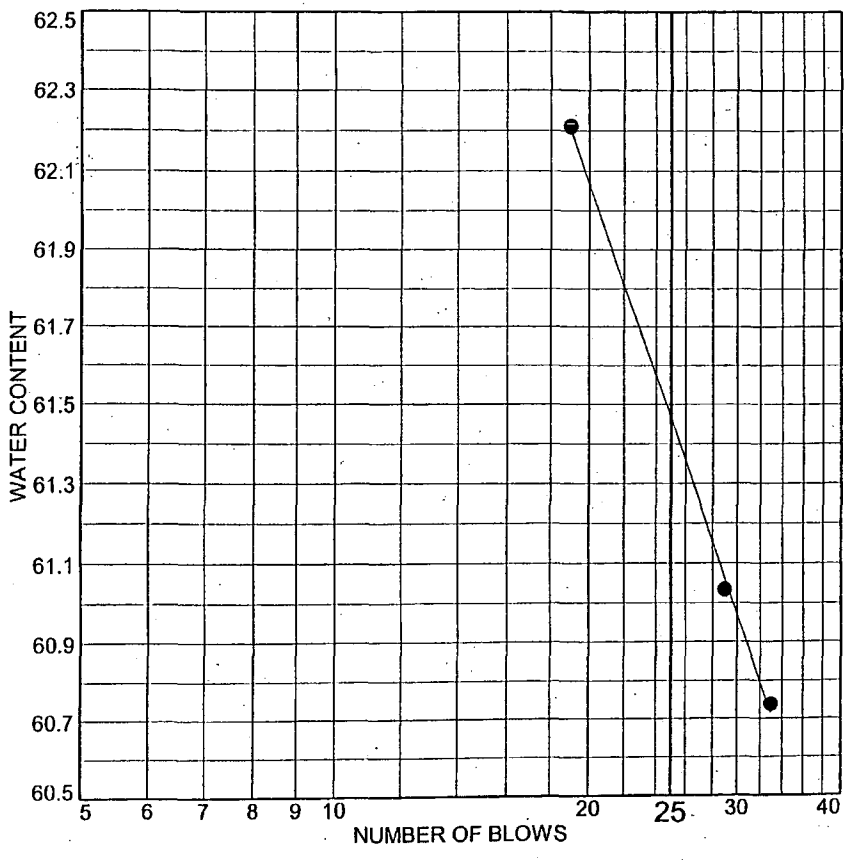
Liquid Limit= 73
Plastic Limit= 25
Plasticity Index= 48
Natural Moisture= 25.7
Liquidity Index= 0.0

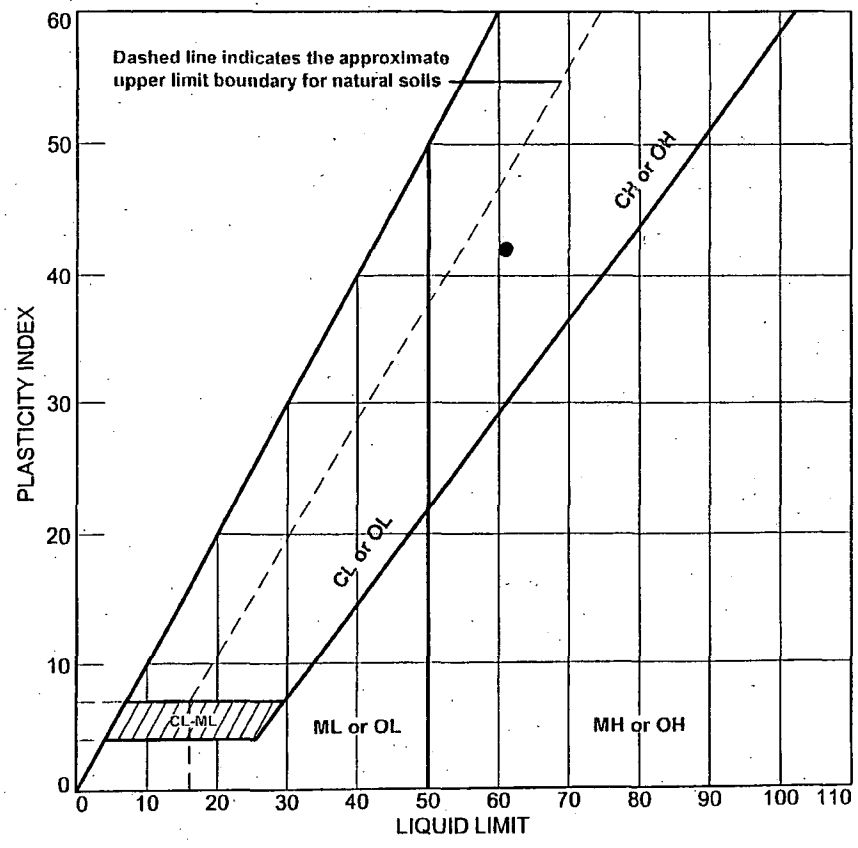
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	35.54	37.96			
Dry+Tare	34.22	35.85			
Tare	28.89	27.40			
Moisture	24.8	25.0			

MW 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 902	STP-187	78.5'-80.0'	12/13/2006	CH	Fat Clay	23.2	61	42
		(SS-20)							

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:MH/TH Reviewed By:RF

ASTM D4318-05

MH 4-3-07

KAW 4/3/07

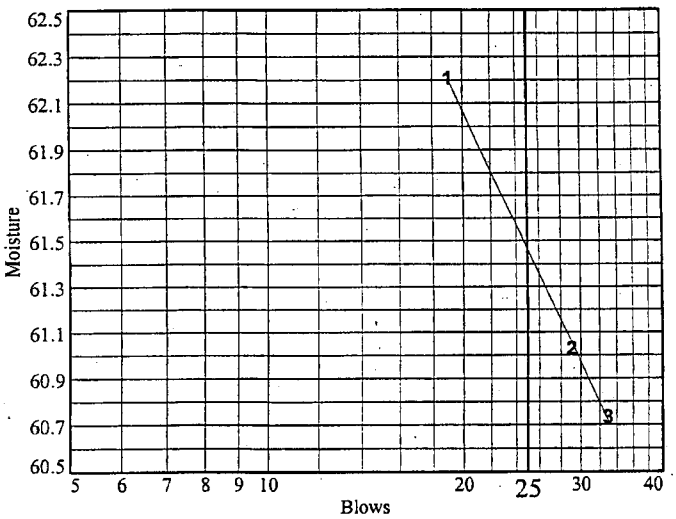
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 902
Depth: 78.5'-80.0'
Sample Number: STP-187 (SS-20)
Material Description: Fat Clay
Date: 12/13/2006
USCS Class.: CH
Testing Remarks: Tested By:MH/TH Reviewed By:RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	37.12	41.09	38.41			
Dry+Tare	33.35	36.25	34.62			
Tare	27.29	28.32	28.38			
# Blows	19	29	33			
Moisture	62.2	61.0	60.7			



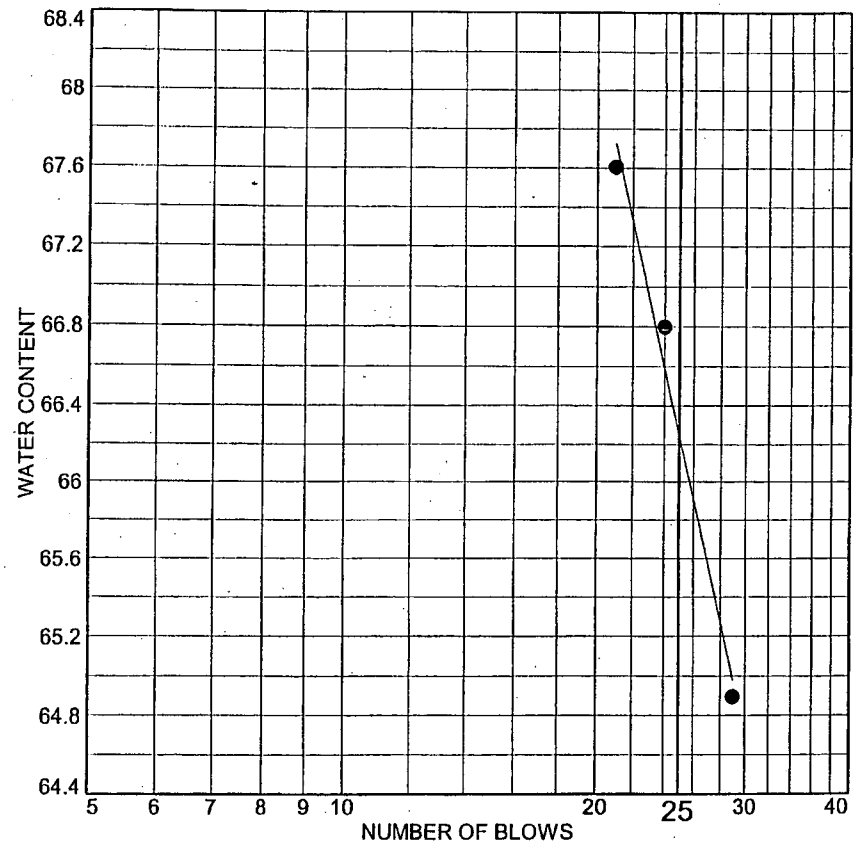
Liquid Limit= 61
Plastic Limit= 19
Plasticity Index= 42
Natural Moisture= 23.2
Liquidity Index= 0.1

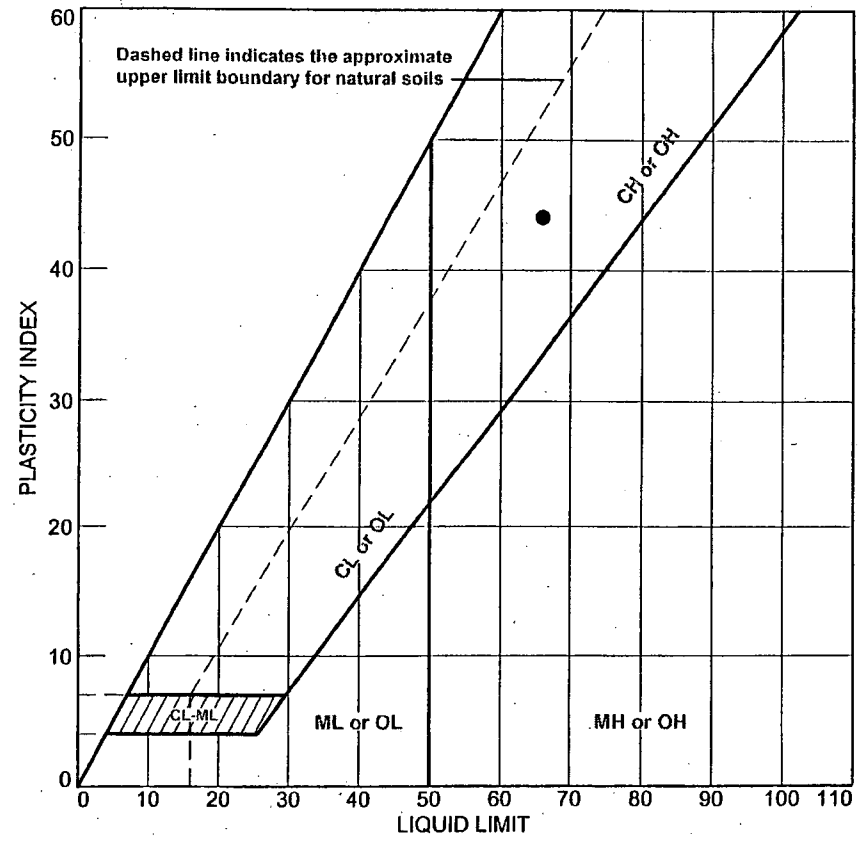
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	39.94	37.94			
Dry+Tare	38.08	36.31			
Tare	28.29	27.61			
Moisture	19.0	18.7			

MA 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 902	STP-188	88.5'-90.0'	12/13/2006	CH	Fat Clay	23.8	66	44
		(SS-22)							

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC Reviewed By:RF

ASTM D4318-05

4-3-07

KAW 4/3/07

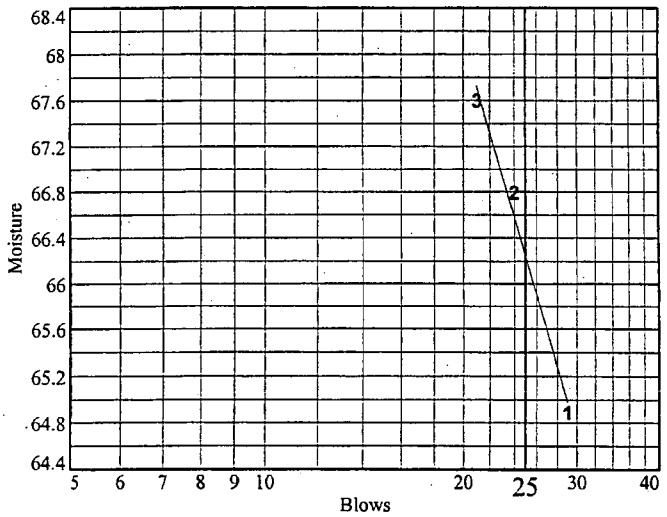
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 902
Depth: 88.5'-90.0' **Sample Number:** STP-188 (SS-22)
Material Description: Fat Clay
Date: 12/13/2006 **USCS Class.:** CH
Testing Remarks: Tested By:AC Reviewed By:RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	33.15	36.59	36.70			
Dry+Tare	30.10	33.21	33.34			
Tare	25.40	28.15	28.37			
# Blows	29	24	21			
Moisture	64.9	66.8	67.6			



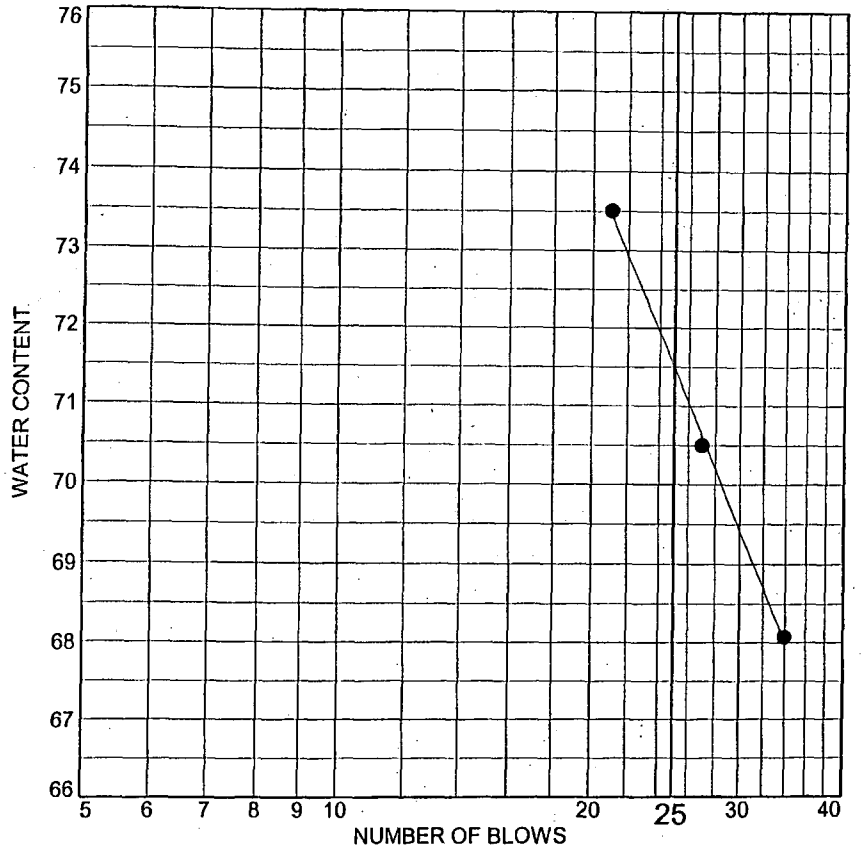
Liquid Limit= 66
Plastic Limit= 22
Plasticity Index= 44
Natural Moisture= 23.8
Liquidity Index= 0.0

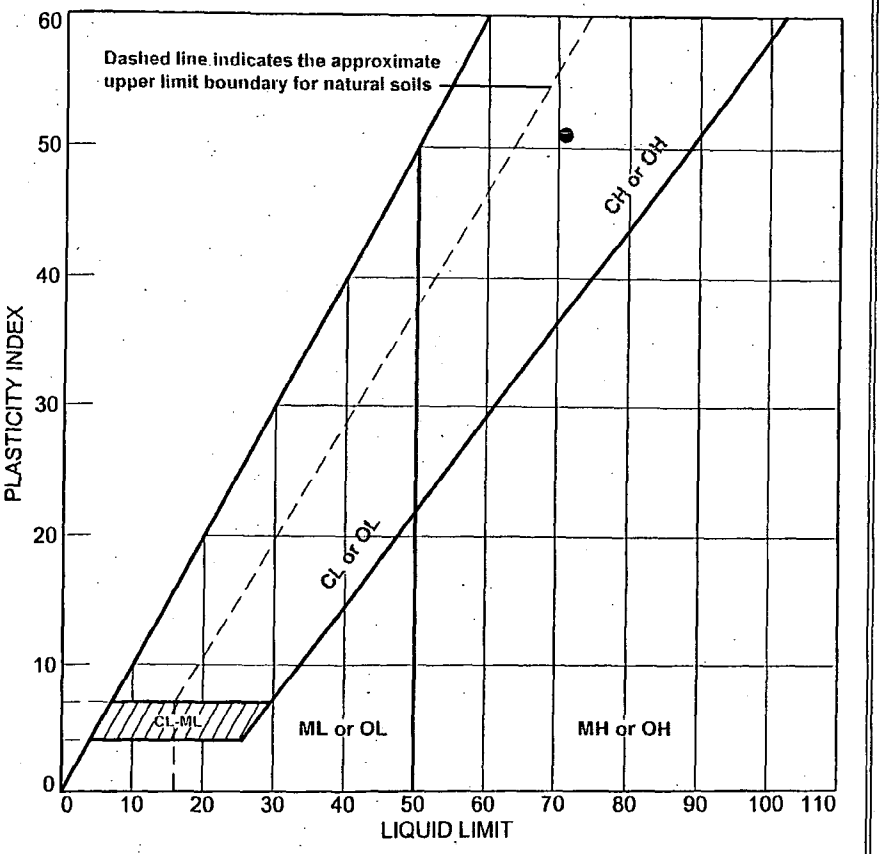
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	37.68	35.43			
Dry+Tare	35.99	34.13			
Tare	28.28	28.33			
Moisture	21.9	22.4			

NM 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 902	STP-189	98.5'-100'	12/13/2006	CH	Fat Clay	28.0	71	51
		(SS-24)							

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC/TH Reviewed By:RF

ASTM D4318-05

MA 4-3-07

KAW 4/3/07

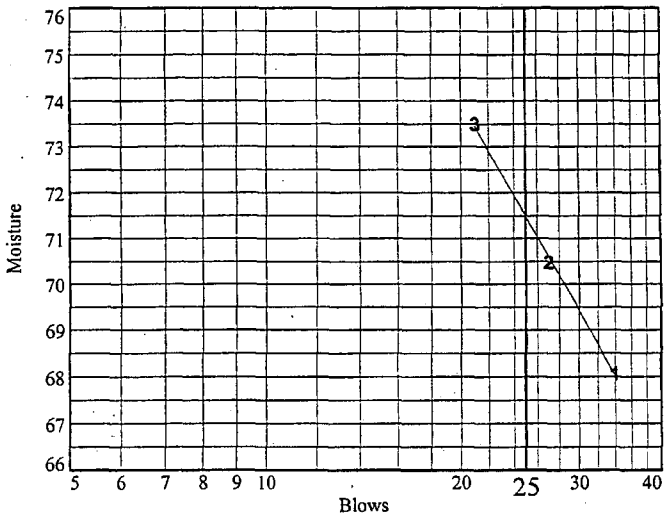
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 902
Depth: 98.5'-100'
Sample Number: STP-189 (SS-24)
Material Description: Fat Clay
Date: 12/13/2006
USCS Class.: CH
Testing Remarks: Tested By:AC/TH Reviewed By:RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	37.23	35.95	36.98			
Dry+Tare	33.52	32.27	33.29			
Tare	28.07	27.05	28.27			
# Blows	34	27	21			
Moisture	68.1	70.5	73.5			



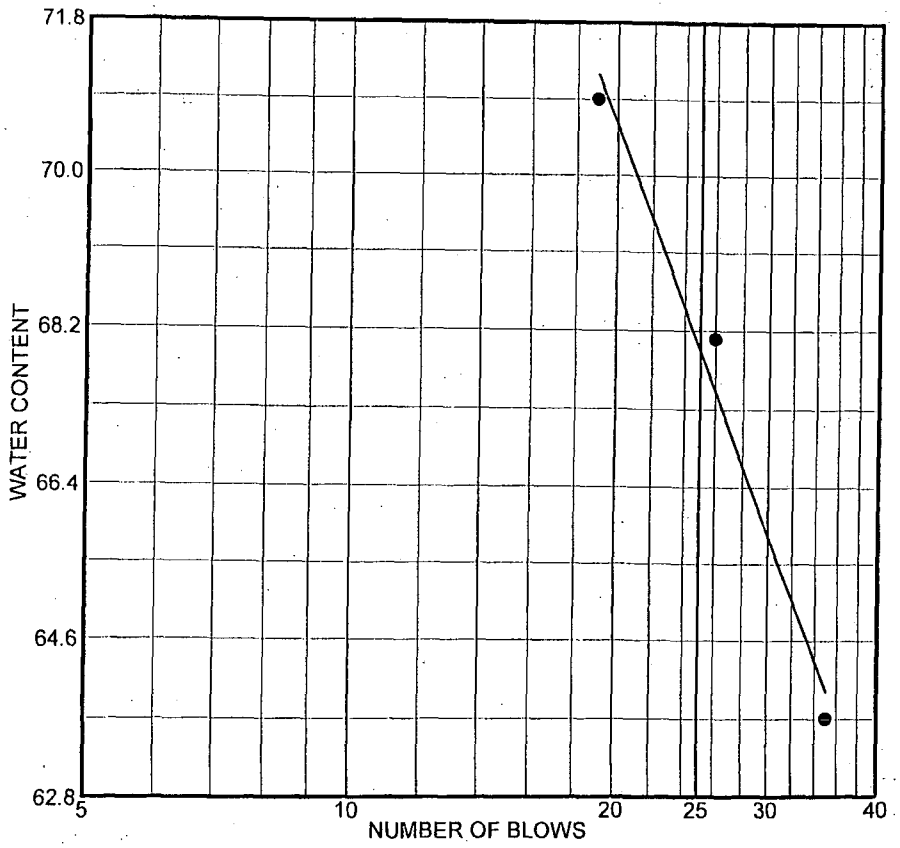
Liquid Limit= 71
Plastic Limit= 20
Plasticity Index= 51
Natural Moisture= 28.0
Liquidity Index= 0.2

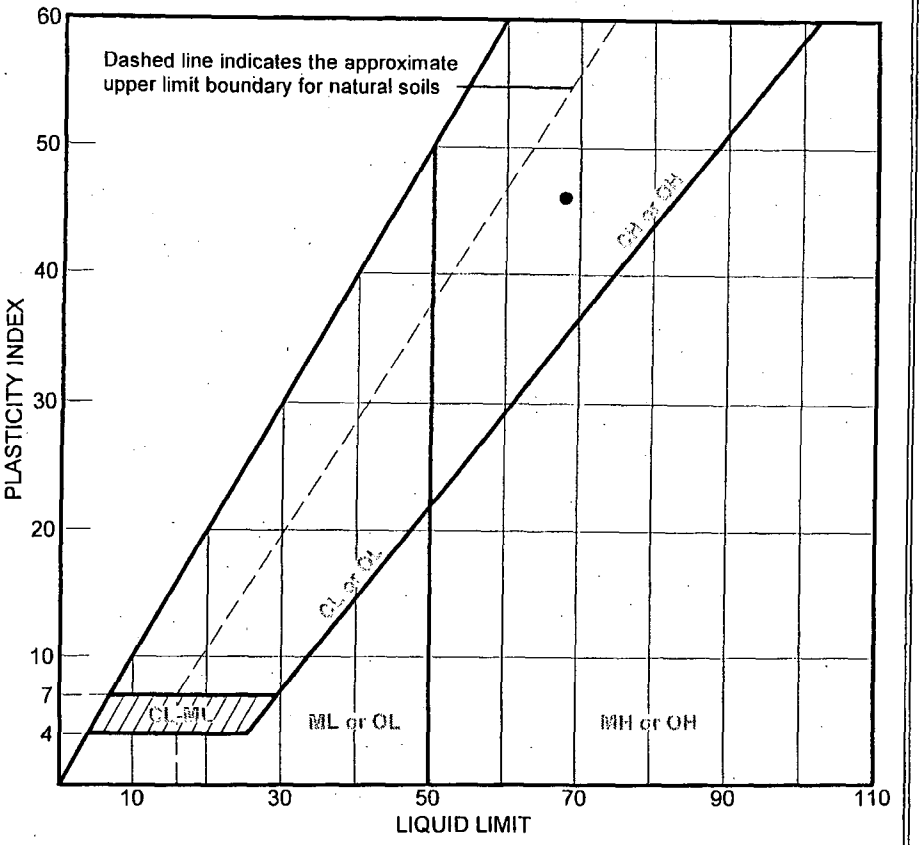
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	35.18	34.05			
Dry+Tare	34.01	33.07			
Tare	28.27	28.18			
Moisture	20.4	20.0			

MA 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-904	UD-1	5' to 7'	2-19-07	CH	Fat Clay	22.3	68	46

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496 | Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reviewed by: MH
ASTM D4318-05 KAW 413107

KAW 413107

LIQUID AND PLASTIC LIMIT TEST DATA

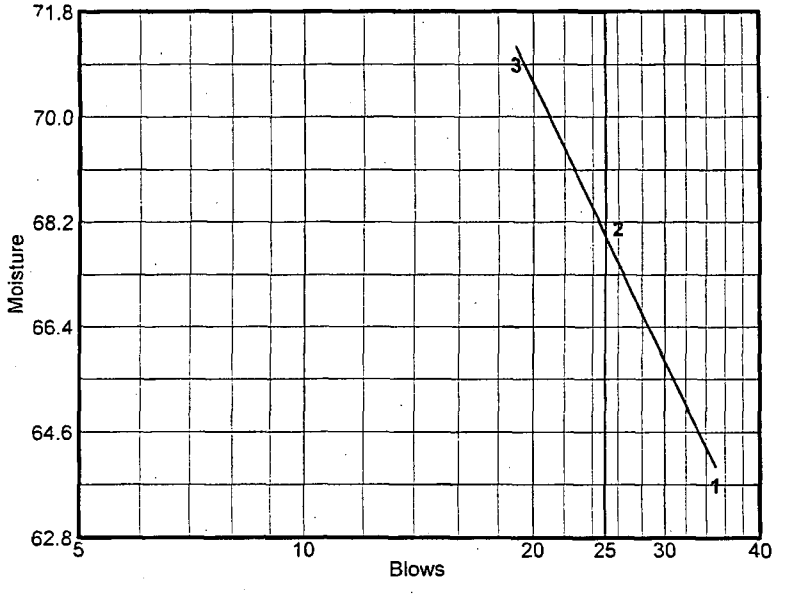
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496

Sample Data

Source: B-904
Sample No.: UD-1
Elev. or Depth: 5' to 7' **Sample Length(in./cm.):**
Location: B-904
Description: Fat Clay
Date: 2-19-07 **Natural Moisture:** 22.3
USCS Class.: CH **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed by: MH
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	28.66	32.83	31.35			
Dry+Tare	22.02	23.96	22.87			
Tare	11.60	10.93	10.91			
# Blows	35	26	19			
Moisture	63.7	68.1	70.9			

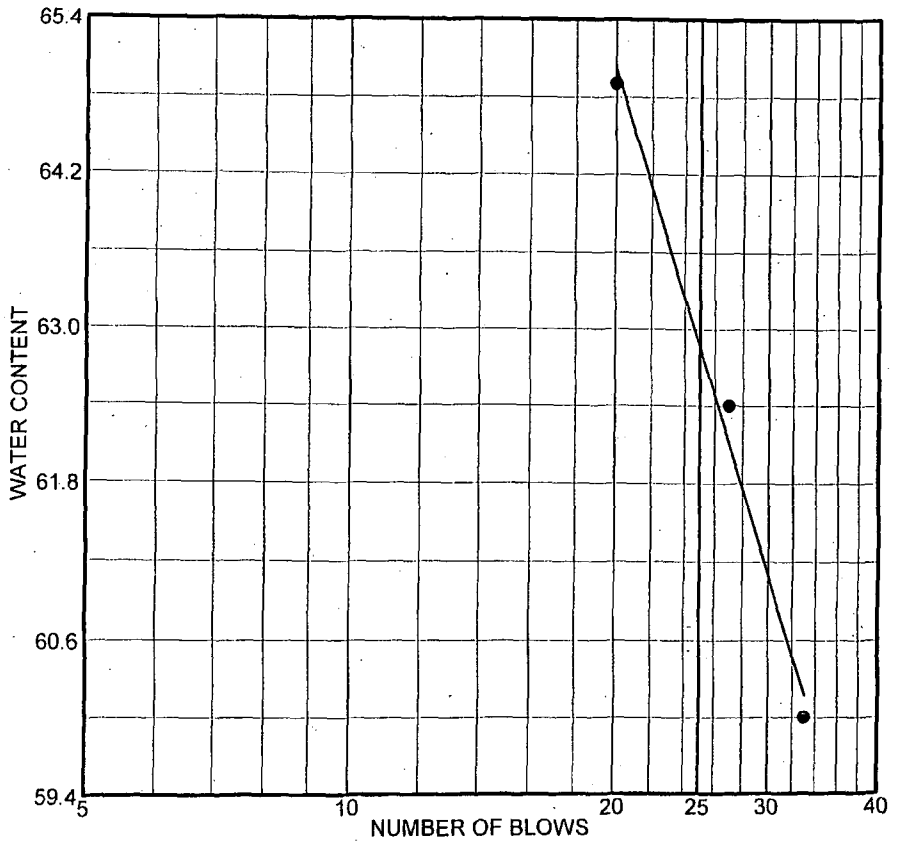


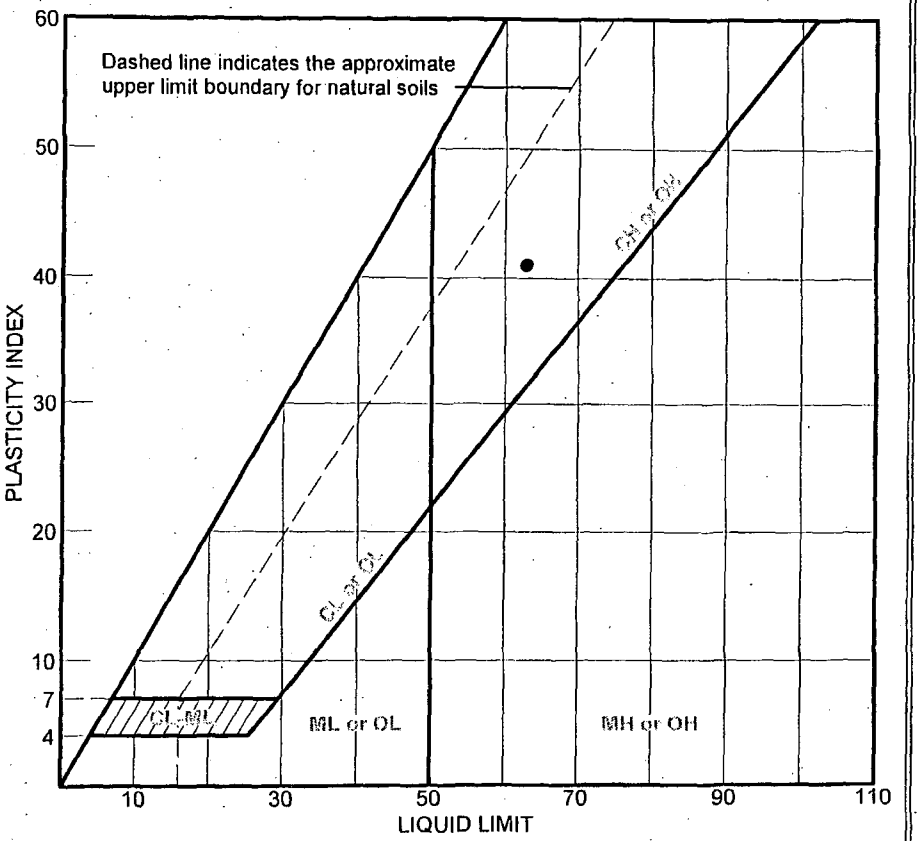
Liquid Limit= 68
Plastic Limit= 22
Plasticity Index= 46

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	17.86	20.82			
Dry+Tare	16.59	19.02			
Tare	10.84	10.88			
Moisture	22.1	22.1			

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-904	UD-2	18' to 20'	2-19-07	CH	Fat Clay	21.1	63	41

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496 Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reviewed by: MH
ASTM D4318-05 KAW 413/07

KAW 413/07

LIQUID AND PLASTIC LIMIT TEST DATA

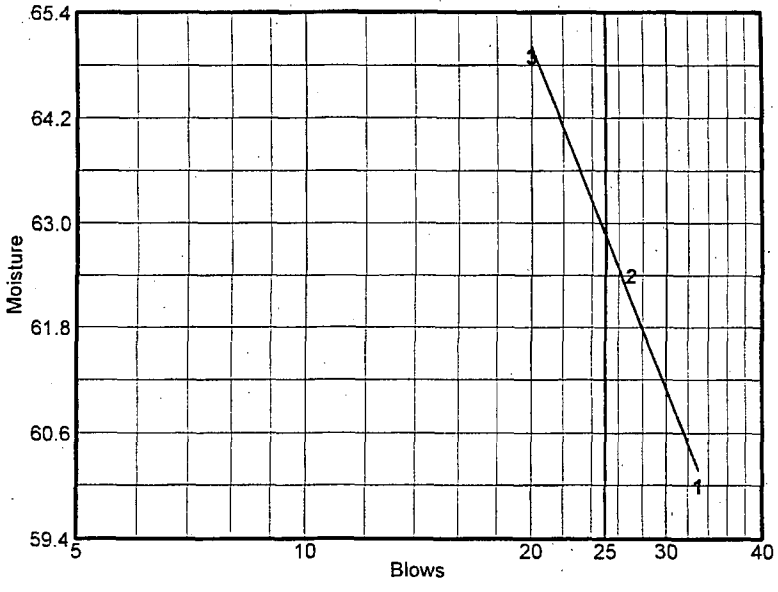
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496

Sample Data

Source: B-904
Sample No.: UD-2
Elev. or Depth: 18' to 20' **Sample Length(in./cm.):**
Location: B-904
Description: Fat Clay
Date: 2-19-07 **Natural Moisture:** 21.1
USCS Class.: CH **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed by: MH
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	27.25	32.61	31.82			
Dry+Tare	21.17	24.17	23.63			
Tare	11.03	10.64	11.02			
# Blows	33	27	20			
Moisture	60.0	62.4	64.9			

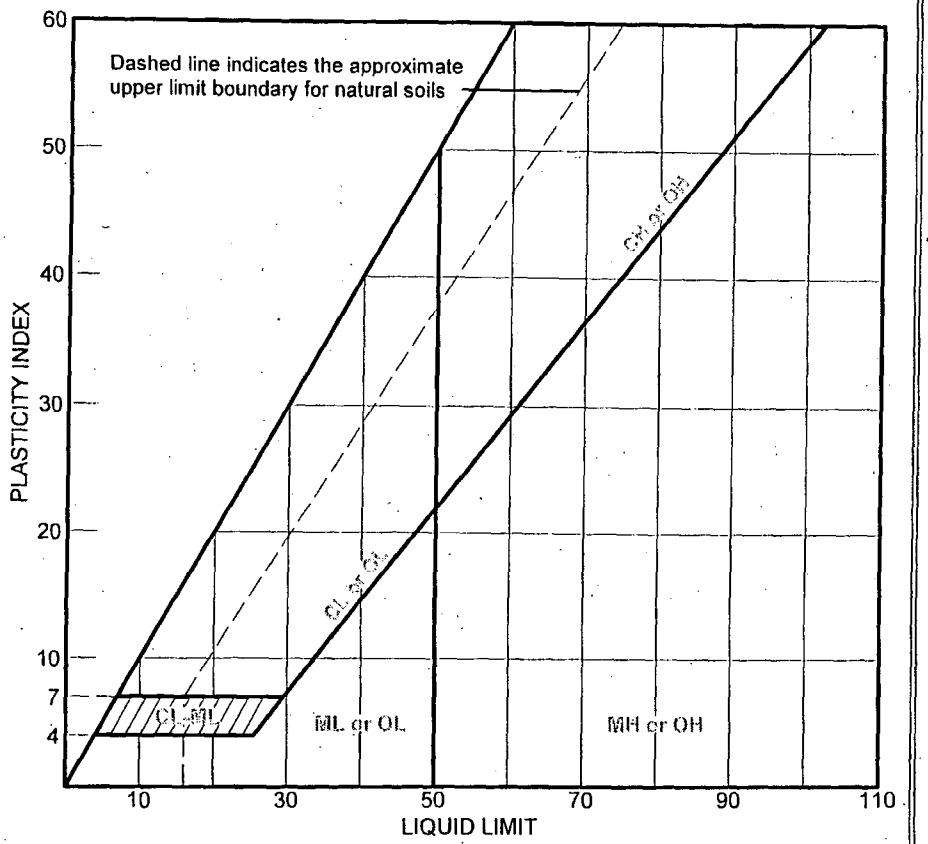


Liquid Limit= 63
Plastic Limit= 22
Plasticity Index= 41

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	20.97	20.20			
Dry+Tare	19.28	18.63			
Tare	11.57	11.40			
Moisture	21.9	21.7			

LIQUID AND PLASTIC LIMITS TEST REPORT



	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-904	UD-3	28' to 30'	2-25-07	ML	Sandy silt	25.2	NV	NP

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496 | Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reviewed by: MH KAW 4/3/07
ASTM D4318-05

KAW 4/3/07

LIQUID AND PLASTIC LIMIT TEST DATA

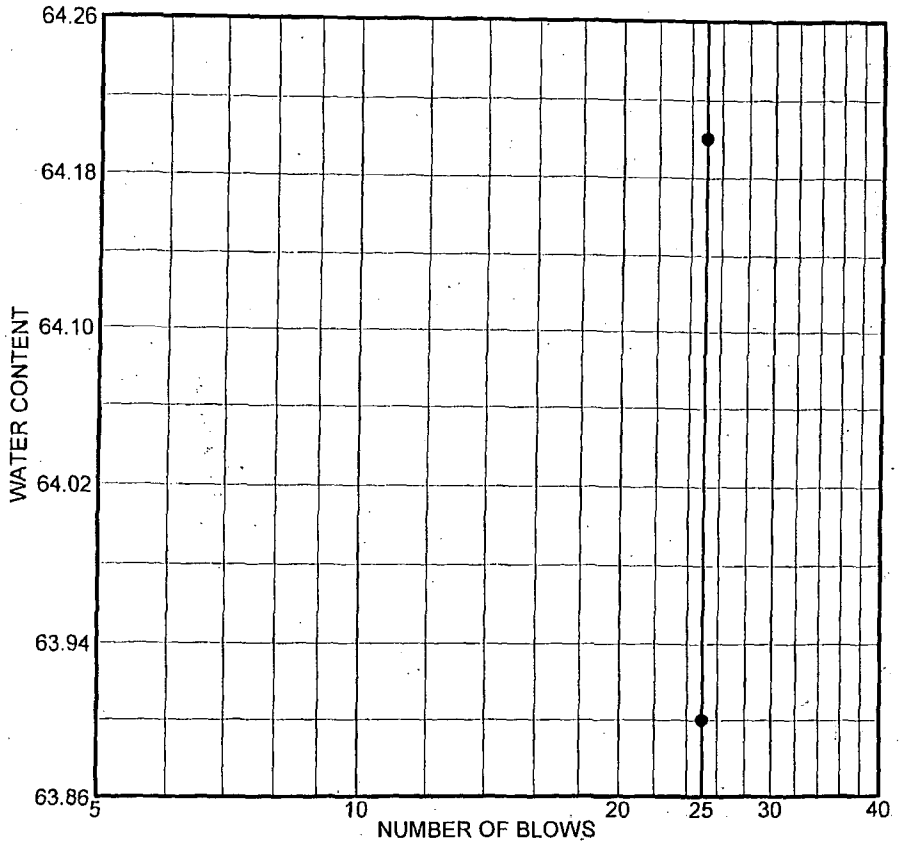
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496

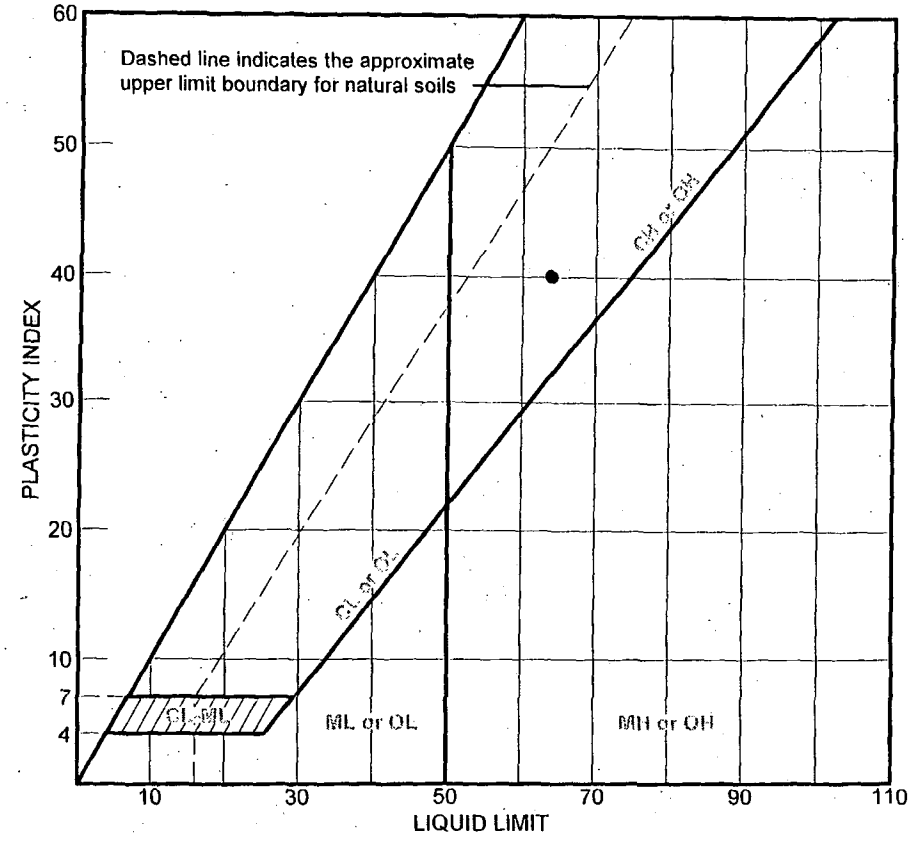
Sample Data

Source: B-904
Sample No.: UD-3
Elev. or Depth: 28' to 30' **Sample Length(in./cm.):**
Location: B-904
Description: Sandy silt
Date: 2-25-07 **Natural Moisture:** 25.2
USCS Class.: ML **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed by: MH
ASTM D4318-05

Liquid Limit= NV
Plastic Limit= NP
Plasticity Index= NP

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-904	UD-4	53' to 55'	3-22-07	SC	Clayey sand	32.5	64	40

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496 | Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reviewed by: MH
ASTM D4318-05

KAW 4/3/07

LIQUID AND PLASTIC LIMIT TEST DATA

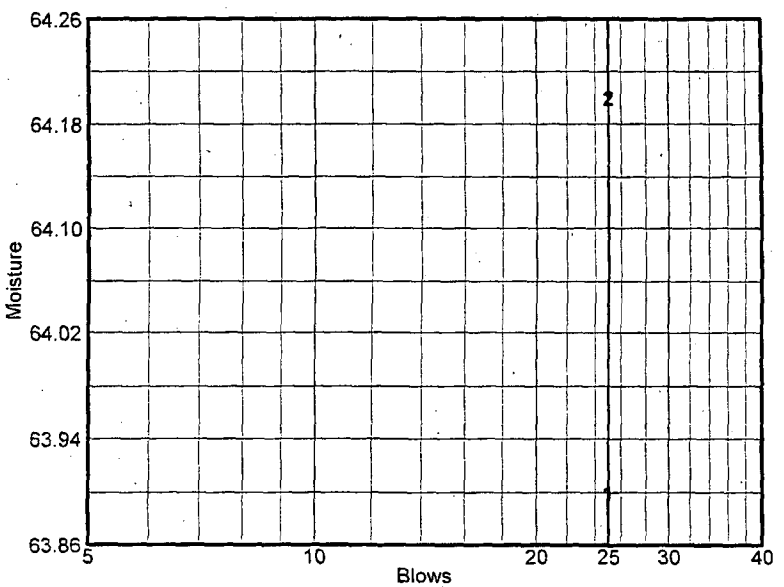
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496

Sample Data

Source: B-904
Sample No.: UD-4
Elev. or Depth: 53' to 55' **Sample Length(in./cm.):**
Location: B-904
Description: Clayey sand
Date: 3-22-07 **Natural Moisture:** 32.5
USCS Class.: SC **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed by: MH
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	22.51	22.73				
Dry+Tare	17.90	18.14				
Tare	10.68	10.99				
# Blows	25	25				
Moisture	63.9	64.2				

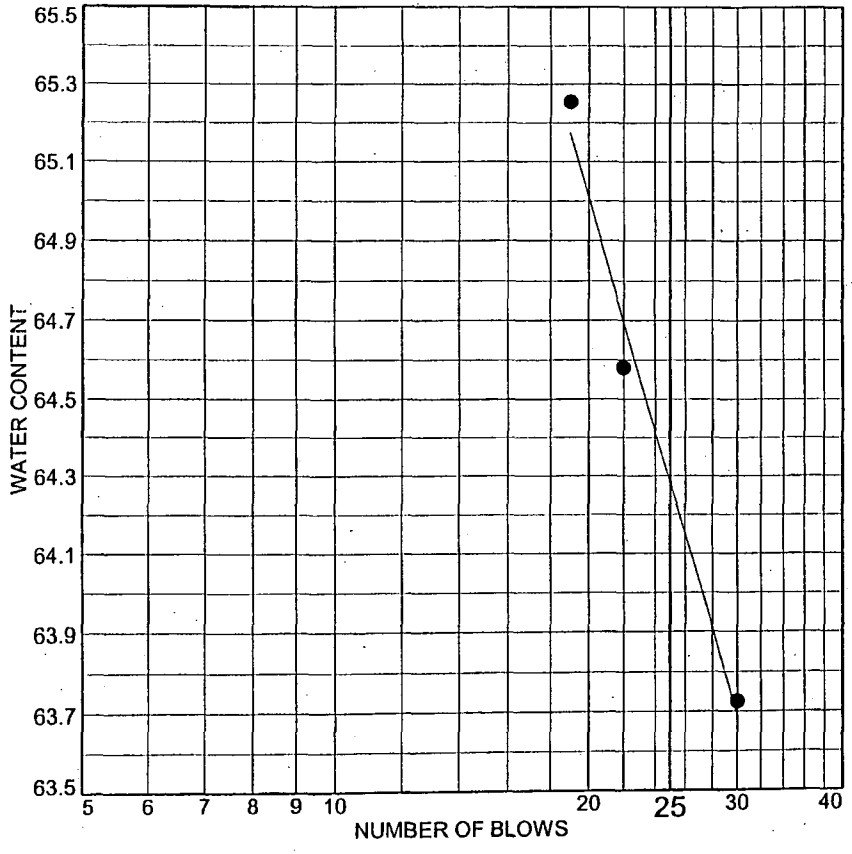


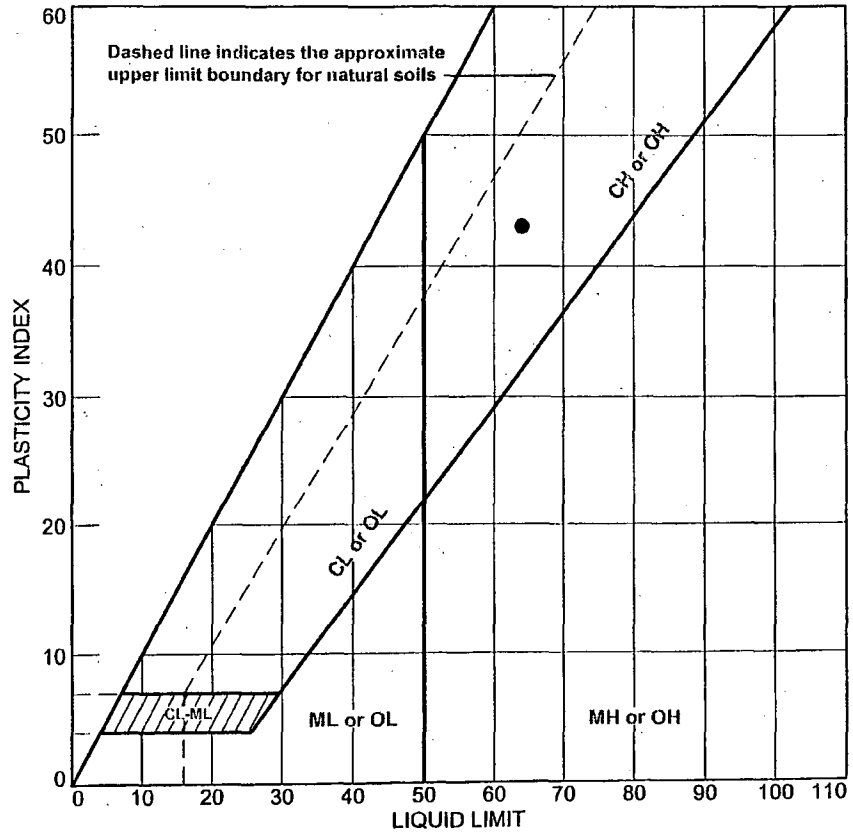
Liquid Limit= 64
Plastic Limit= 24
Plasticity Index= 40

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	19.31	18.78			
Dry+Tare	17.68	17.25			
Tare	10.86	10.89			
Moisture	23.9	24.1			

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 904	STP-191	63.5'-65.0'	12/17/2006	CH	Fat Clay	23.1	64	43
		(SS-15)							

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC Reviewed By:MH

ASTM D4318-05

MH 4-3-07

KAW 4/3/07

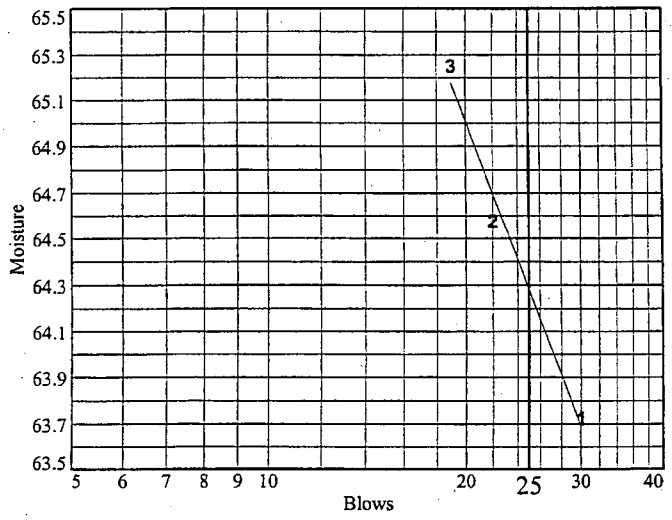
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 904
Depth: 63.5'-65.0'
Sample Number: STP-191 (SS-15)
Material Description: Fat Clay
Date: 12/17/2006
USCS Class.: CH
Testing Remarks: Tested By:AC Reviewed By:MH
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	36.39	38.15	38			
Dry+Tare	33.14	34.23	34.15			
Tare	28.04	28.16	28.25			
# Blows	30	22	19			
Moisture	63.7	64.6	65.3			



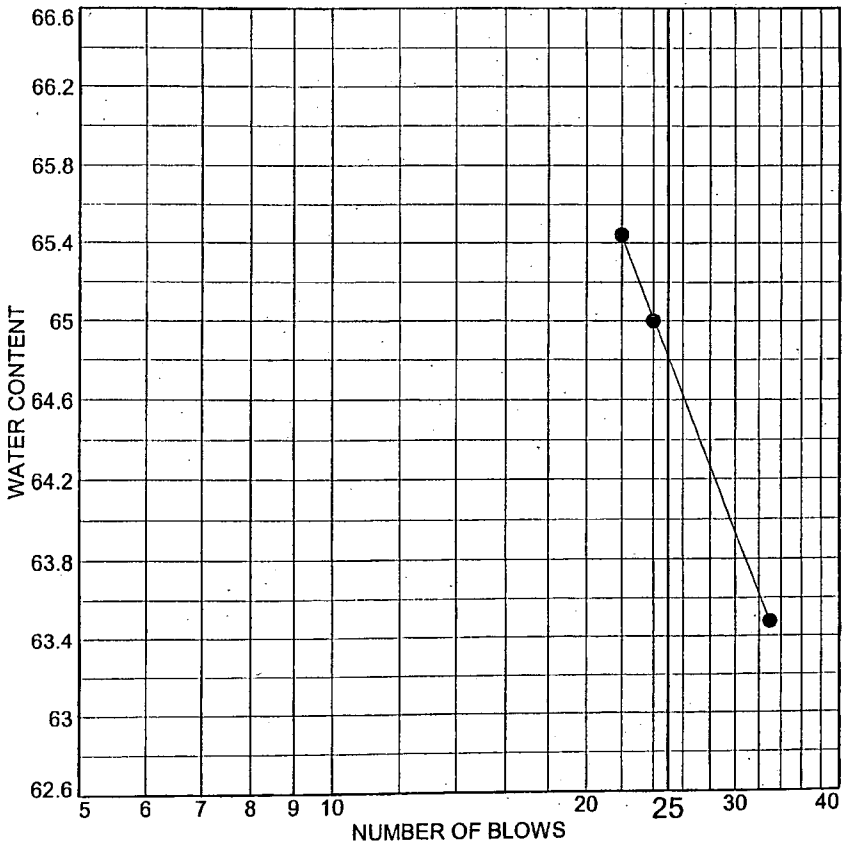
Liquid Limit= 64
Plastic Limit= 21
Plasticity Index= 43
Natural Moisture= 23.1
Liquidity Index= 0.0

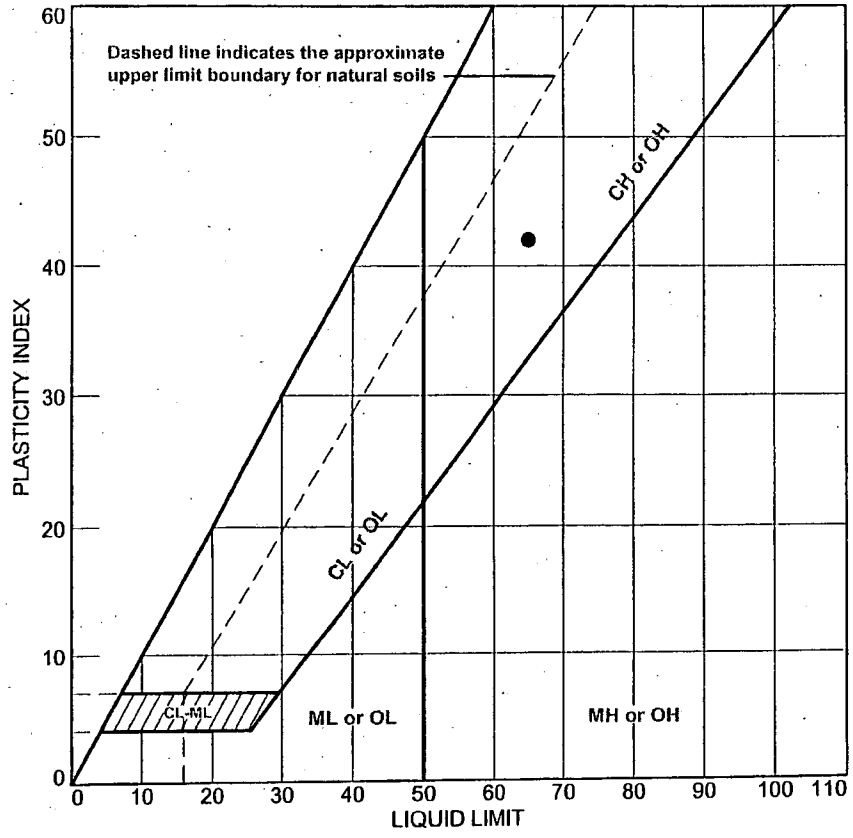
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	35.52	35.39			
Dry+Tare	34.22	34.11			
Tare	28.09	28.06			
Moisture	21.2	21.2			

MM 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 904	STP-192 (SS-17)	73.5'-75.0'	12/17/2006	CH	Fat Clay	22.4	65	42

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC Reviewed By:RF

ASTM D4318-05

MA 4-3-07

KAW 4/3/07

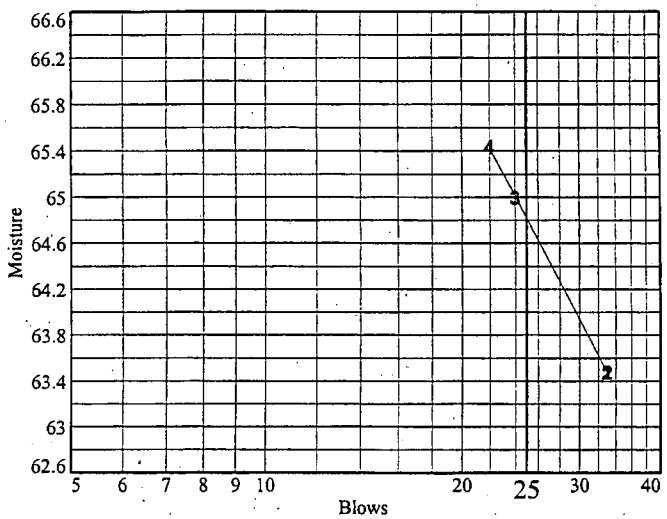
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 904
Depth: 73.5'-75.0' **Sample Number:** STP-192 (SS-17)
Material Description: Fat Clay
Date: 12/17/2006 **USCS Class.:** CH
Testing Remarks: Tested By:AC Reviewed By:RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	33.76	33.76	36.90	37.07		
Dry+Tare	30.11	30.11	33.52	33.51		
Tare	24.36	24.36	28.32	28.07		
# Blows	33	33	24	22		
Moisture	63.5	63.5	65.0	65.4		



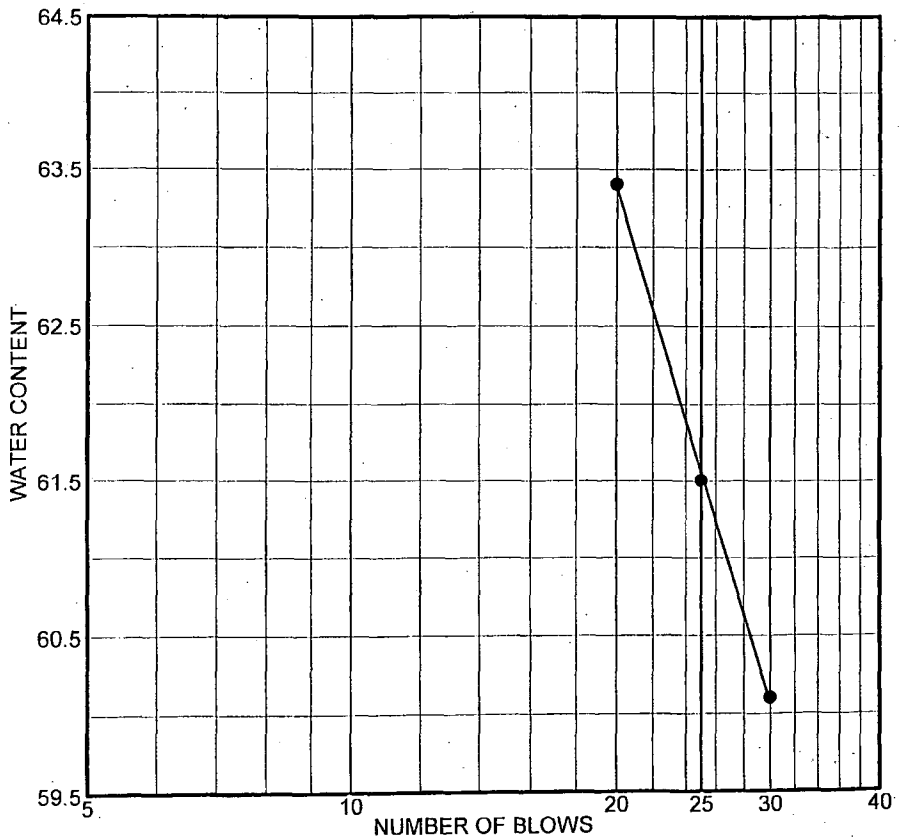
Liquid Limit= 65
Plastic Limit= 23
Plasticity Index= 42
Natural Moisture= 22.4
Liquidity Index= 0.0

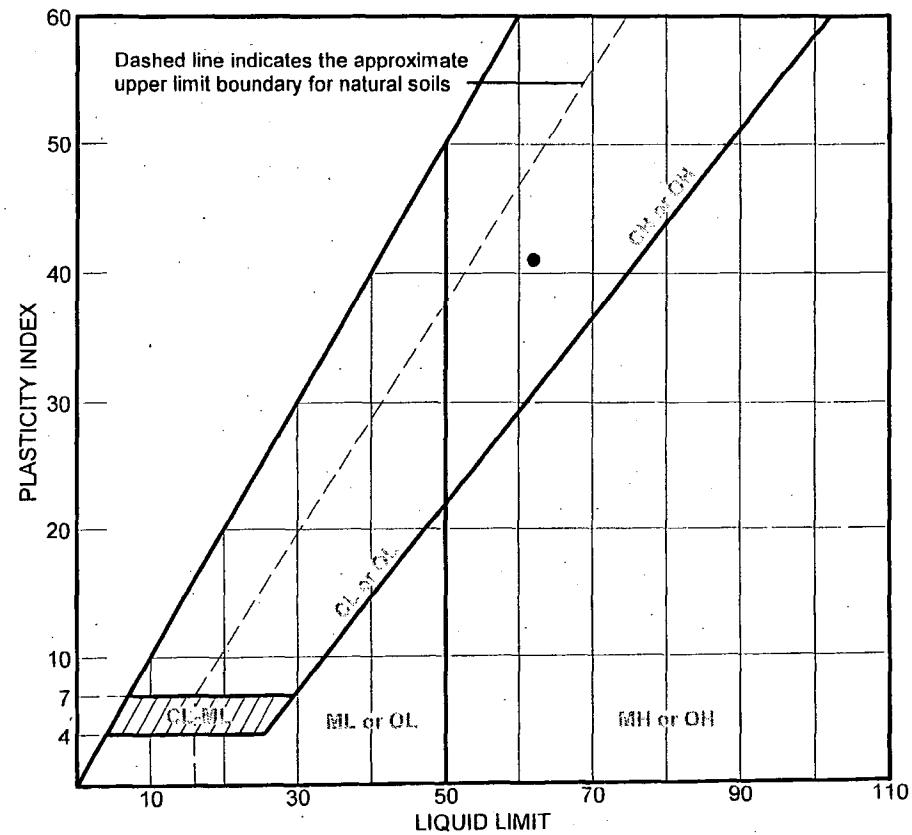
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	33.45	35.74			
Dry+Tare	32.25	34.17			
Tare	27.05	27.30			
Moisture	23.1	22.9			

MK 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-904	UD-5	83' to 85'	2-19-07	CH	Fat Clay	24.0	62	41

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496 | Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reviewed by: MH
ASTM D4318-05

KAW 4/13/07

KAW 4/13/07

LIQUID AND PLASTIC LIMIT TEST DATA

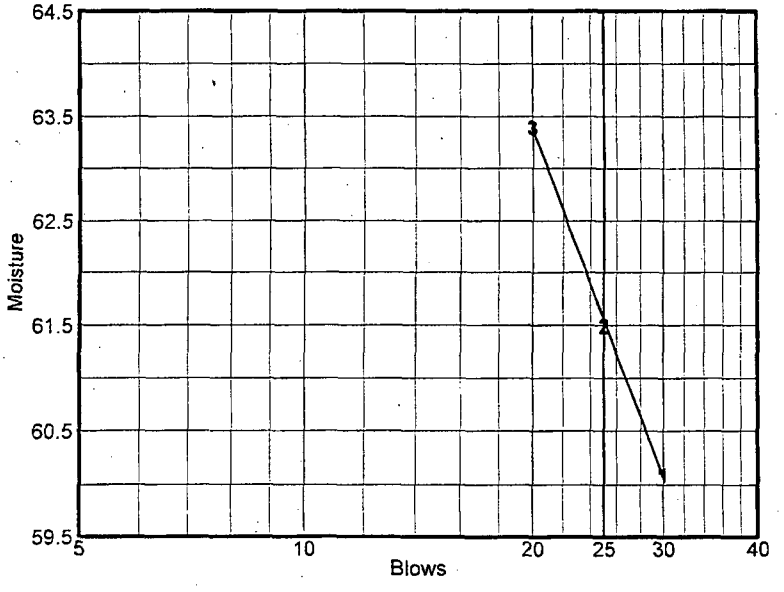
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496

Sample Data

Source: B-904
Sample No.: UD-5
Elev. or Depth: 83' to 85' **Sample Length(in./cm.):**
Location: B-904
Description: Fat Clay
Date: 2-19-07 **Natural Moisture:** 24.0
USCS Class.: CH **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed by: MH
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	26.79	28.97	30.74			
Dry+Tare	20.80	22.30	23.07			
Tare	10.84	11.45	10.98			
# Blows	30	25	20			
Moisture	60.1	61.5	63.4			

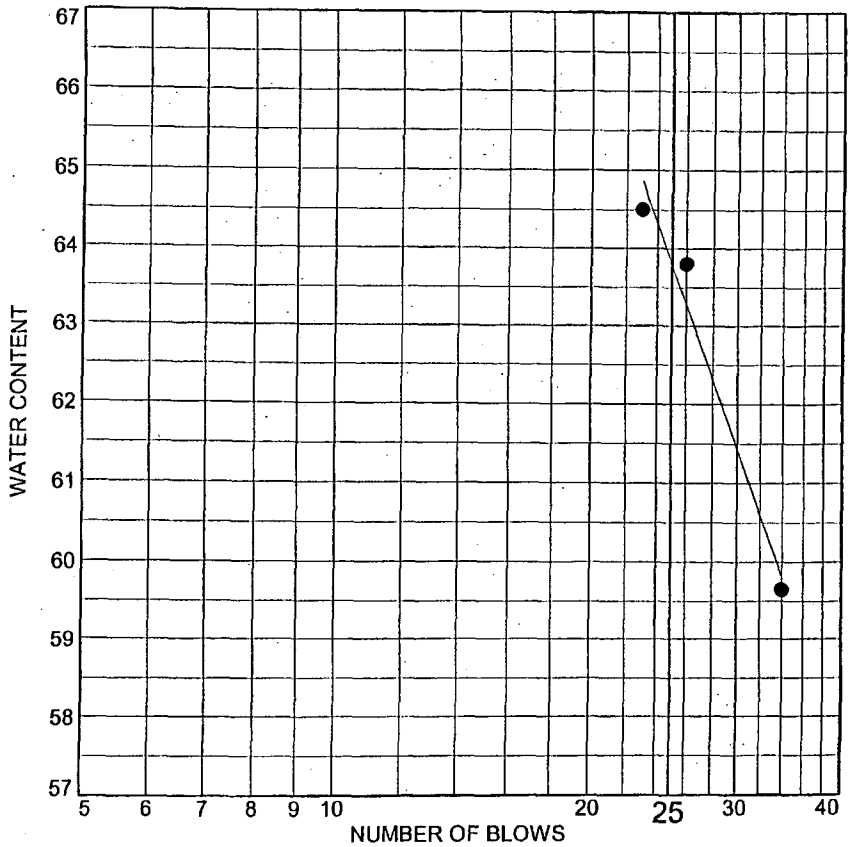


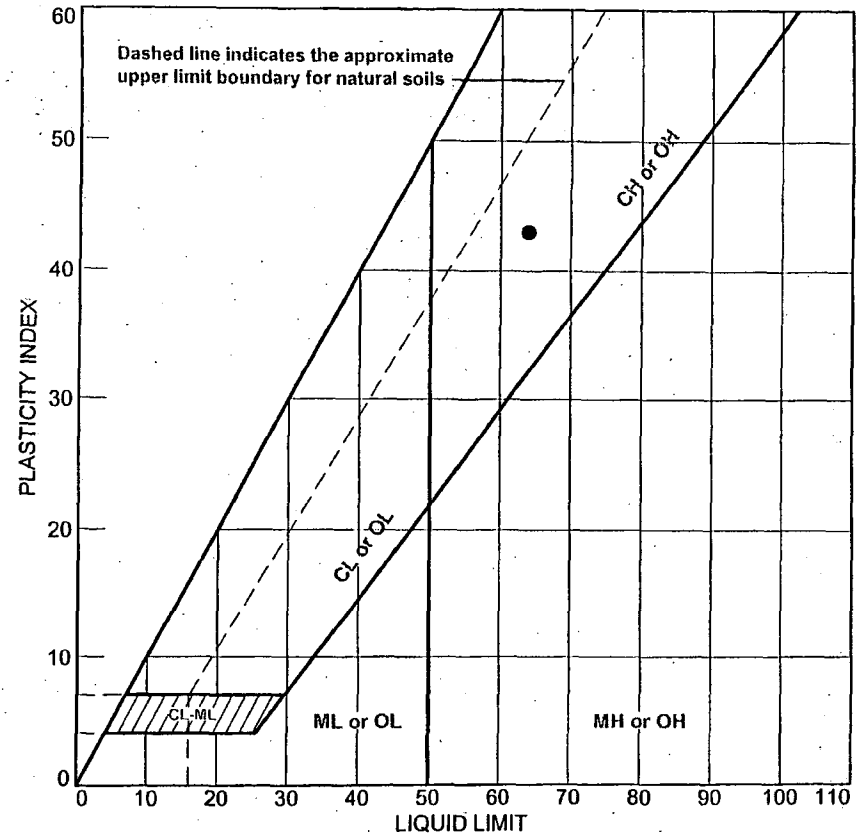
Liquid Limit= 62
Plastic Limit= 21
Plasticity Index= 41

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	18.13	19.05			
Dry+Tare	16.84	17.71			
Tare	10.79	11.18			
Moisture	21.3	20.5			

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 904	STP-193	93.5'-95.0'	12/17/2006	CH	Fat Clay	25.0	64	43
		(SS-20)							

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC Reviewed By:RF

ASTM D4318-05

MA 4-3-07

KAW 4/3/07

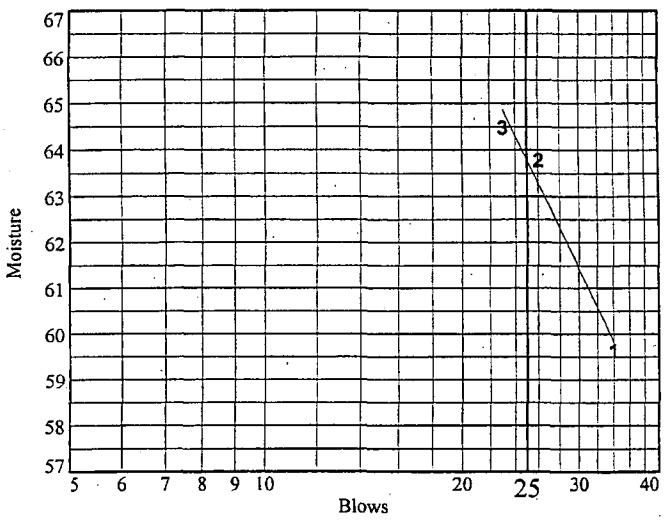
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 904
Depth: 93.5'-95.0' **Sample Number:** STP-193 (SS-20)
Material Description: Fat Clay
Date: 12/17/2006 **USCS Class.:** CH
Testing Remarks: Tested By:AC Reviewed By:RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	33.83	36.40	35.77			
Dry+Tare	30.74	33.28	32.79			
Tare	25.56	28.39	28.17			
# Blows	34	26	23			
Moisture	59.7	63.8	64.5			



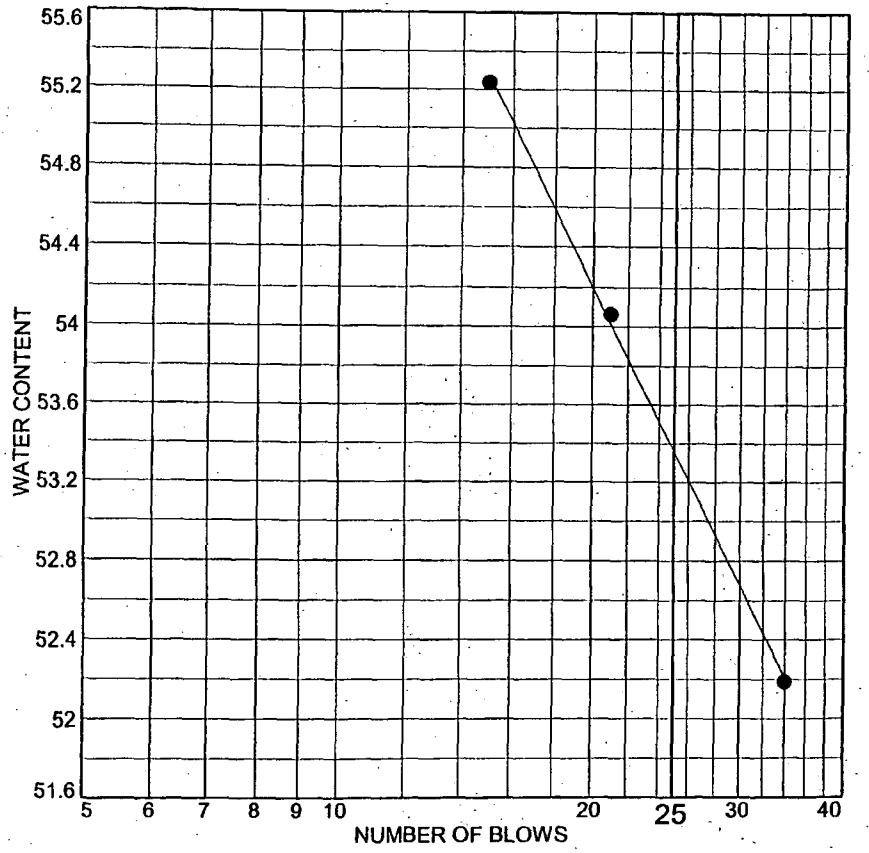
Liquid Limit= 64
Plastic Limit= 21
Plasticity Index= 43
Natural Moisture= 25.0
Liquidity Index= 0.1

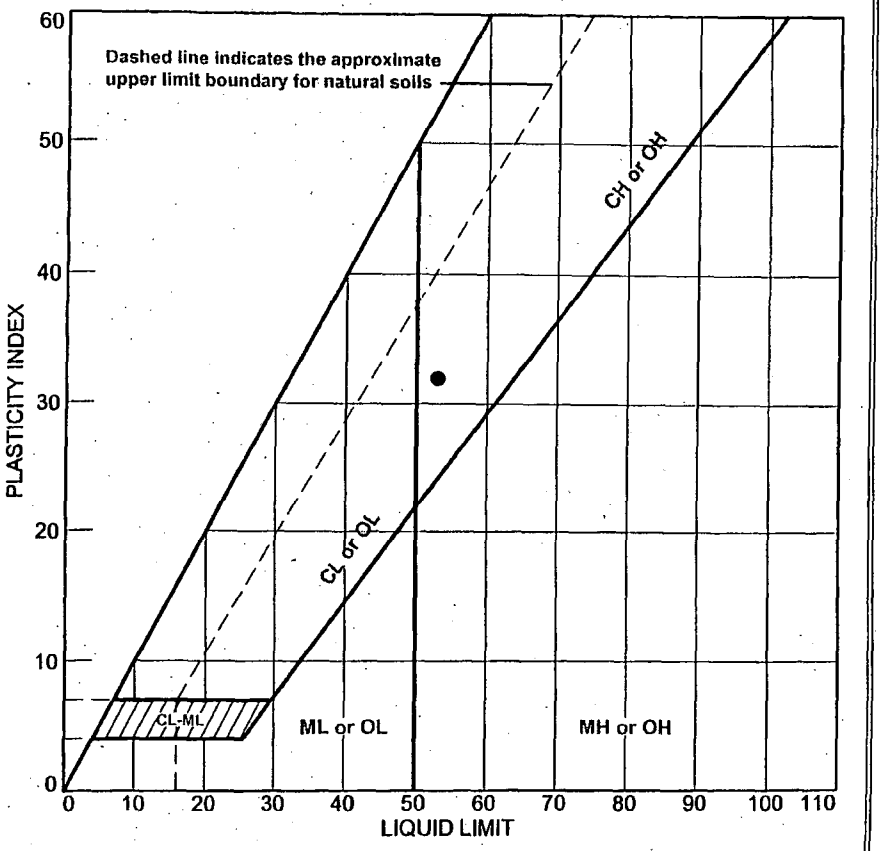
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	34.76	36.12			
Dry+Tare	33.61	34.79			
Tare	28.08	28.22			
Moisture	20.8	20.2			

NA 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 908	STP-194	3.0'-4.5'	12/15/2006	CH	Fat Clay	27.0	53	32
		(SS-3)							

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC Reviewed By:MH/RF

ASTM D4318-05

4/4/07

KAW 4/4/07

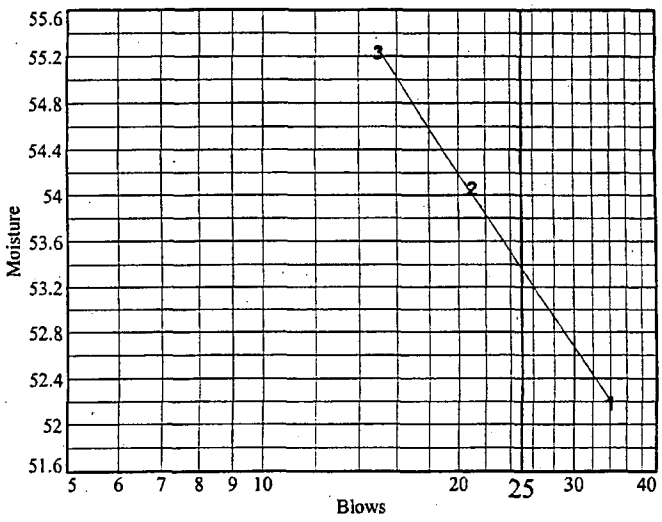
LIQUID AND PLASTIC LIMIT TEST DATA

4/4/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 908
Depth: 3.0'-4.5' **Sample Number:** STP-194 (SS-3)
Material Description: Fat Clay
Date: 12/15/2006 **USCS Class.:** CH
Testing Remarks: Tested By:AC Reviewed By:MH/RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	39.05	37.54	37.36			
Dry+Tare	35.35	34.28	34.09			
Tare	28.26	28.25	28.17			
# Blows	34	21	15			
Moisture	52.2	54.1	55.2			



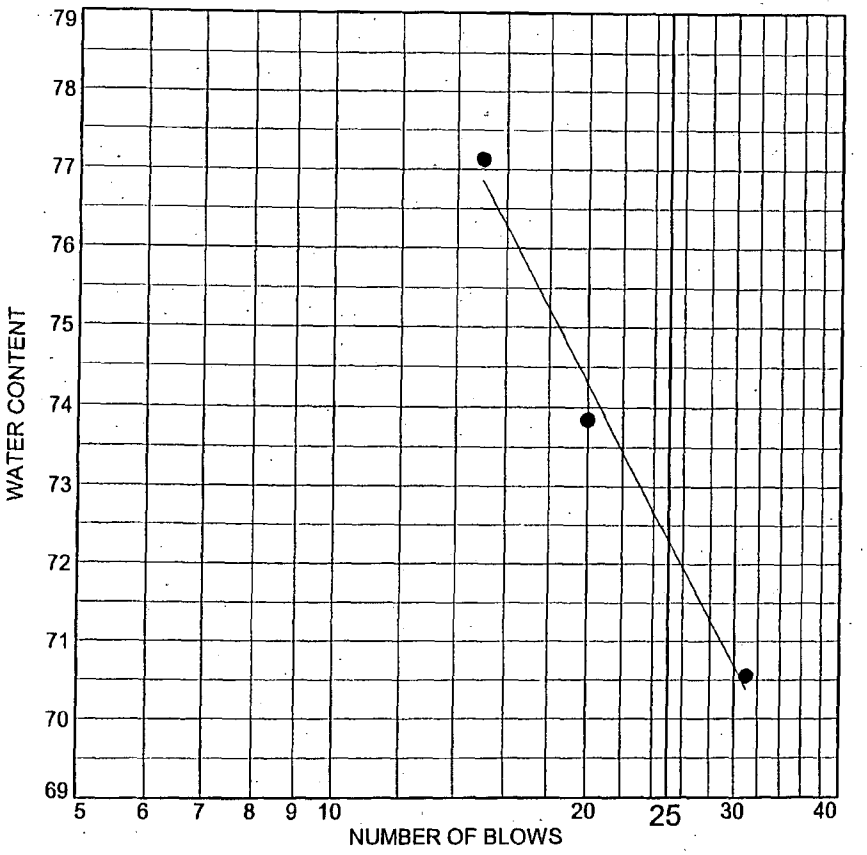
Liquid Limit= 53
Plastic Limit= 21
Plasticity Index= 32
Natural Moisture= 27.0
Liquidity Index= 0.2

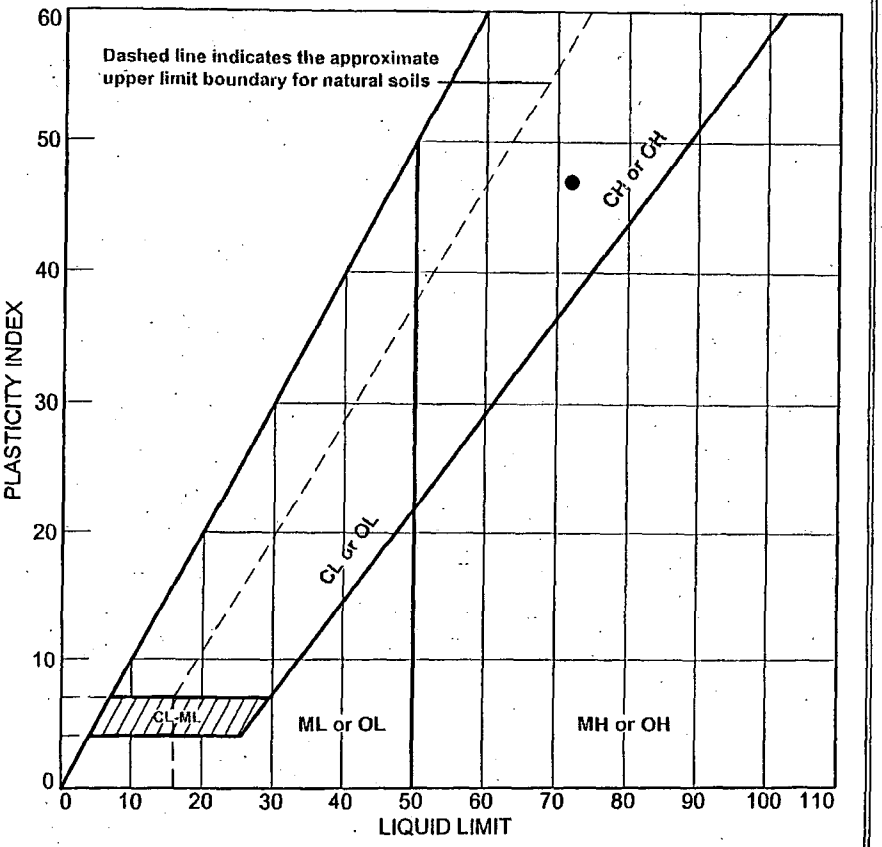
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	36.40	34.57			
Dry+Tare	34.81	33.28			
Tare	27.13	27.10			
Moisture	20.7	20.9			

DE 4/4/07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 908	STP-195	12.0'-13.5'	12/15/2006	CH	Fat Clay	24.8	72	47
		(SS-9)							

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC Reviewed By:RF

ASTM D4318-05

MA 4-3-07

KAW 4/3/07

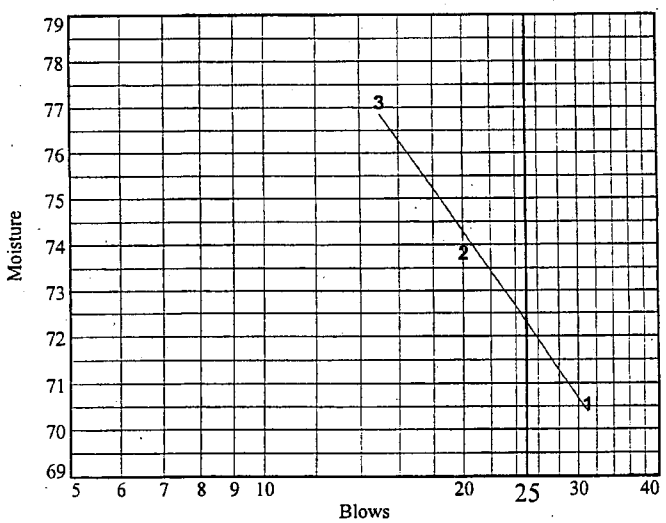
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 908
Depth: 12.0'-13.5'
Sample Number: STP-195 (SS-9)
Material Description: Fat Clay
Date: 12/15/2006
USCS Class.: CH
Testing Remarks: Tested By:AC Reviewed By:RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	37.65	35.75	32.88			
Dry+Tare	33.72	32.56	29.17			
Tare	28.15	28.24	24.36			
# Blows	31	20	15			
Moisture	70.6	73.8	77.1			



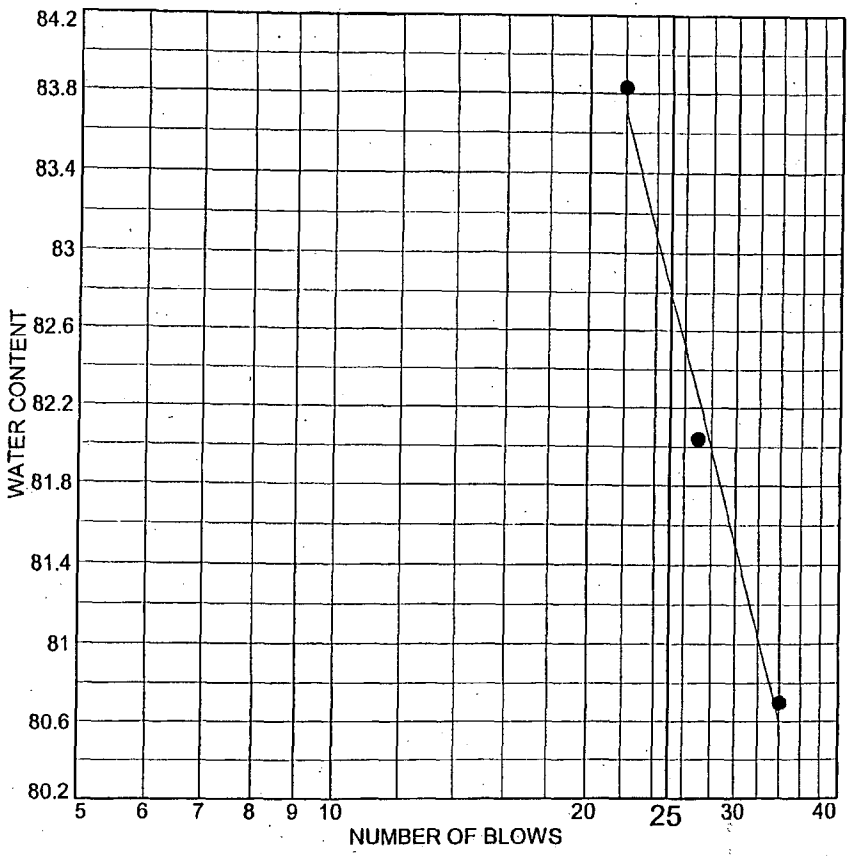
Liquid Limit= 72
Plastic Limit= 25
Plasticity Index= 47
Natural Moisture= 24.8
Liquidity Index= 0.0

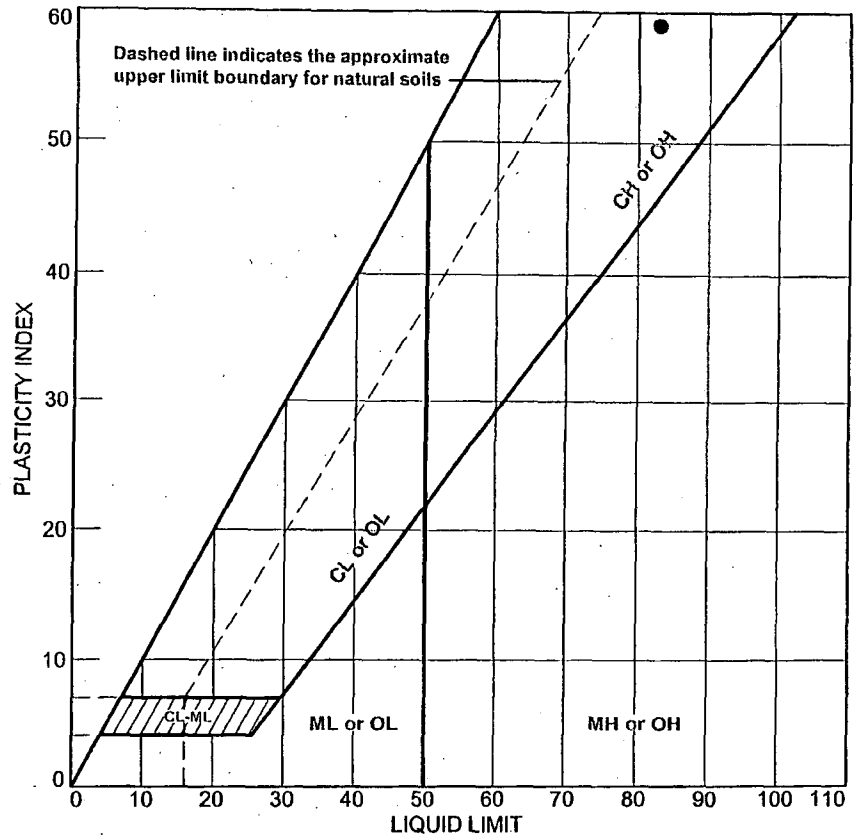
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	33.83	37.45			
Dry+Tare	32.18	35.57			
Tare	25.55	28.24			
Moisture	24.9	25.6			

MAK 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 908	STP-201 (SS-18)	53.5'-55.0'	12/15/2006	CH	Fat Clay	30.6	83	59

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC Reviewed By:RF

ASTM D4318-05

MH 4-3-07

KAW 4/3/07

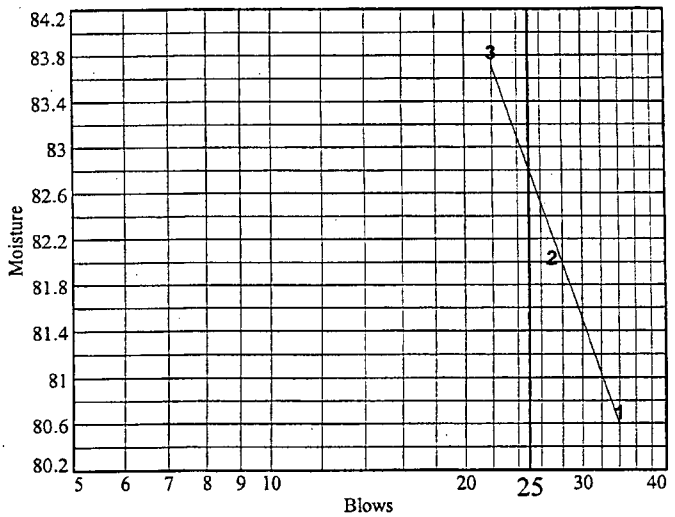
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 908
Depth: 53.5'-55.0'
Sample Number: STP-201 (SS-18)
Material Description: Fat Clay
Date: 12/15/2006
USCS Class.: CH
Testing Remarks: Tested By:AC Reviewed By:RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	37.03	36.31	36.95			
Dry+Tare	33.10	32.61	33.01			
Tare	28.23	28.10	28.31			
# Blows	34	27	22			
Moisture	80.7	82.0	83.8			



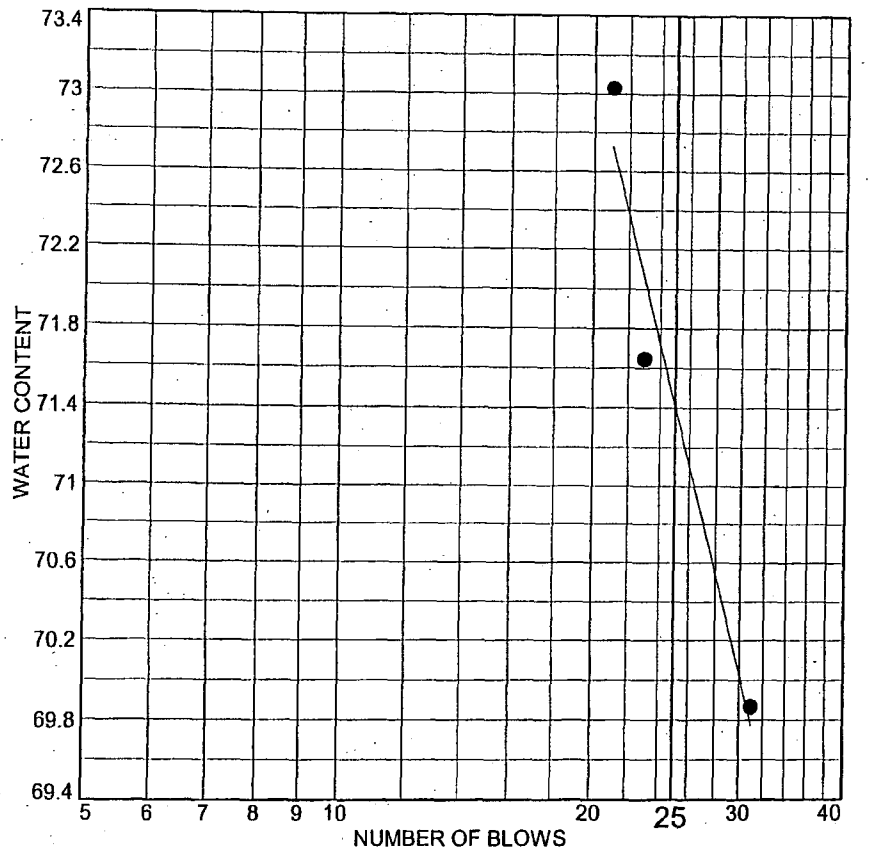
Liquid Limit= 83
Plastic Limit= 24
Plasticity Index= 59
Natural Moisture= 30.6
Liquidity Index= 0.1

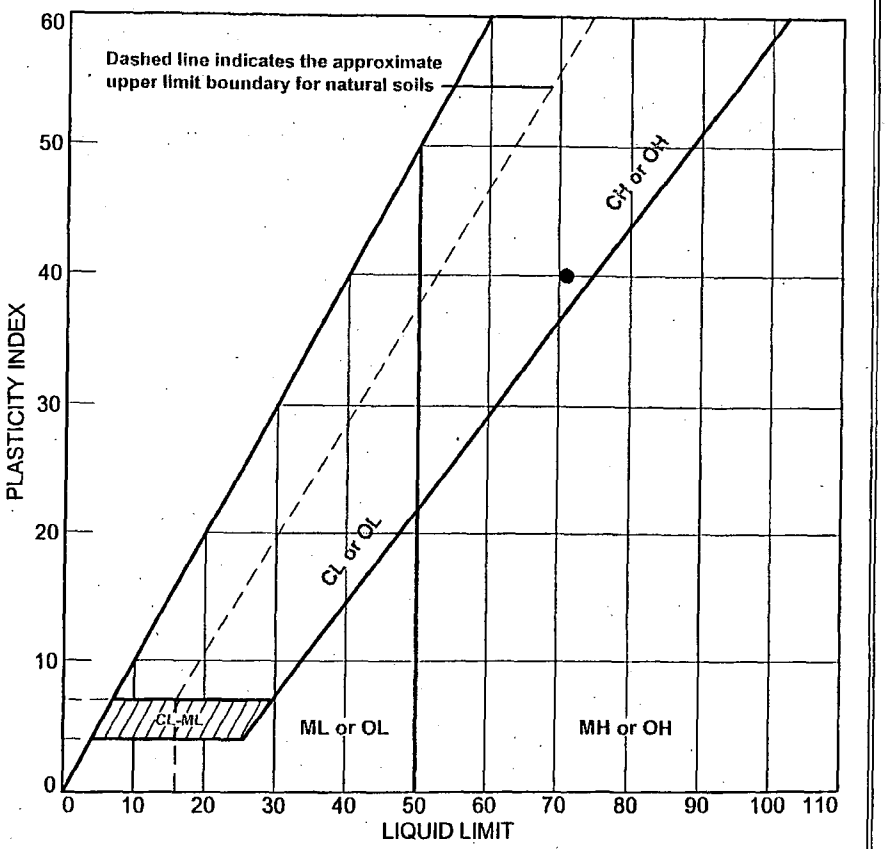
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	33.27	33.54			
Dry+Tare	32.10	32.53			
Tare	27.17	28.24			
Moisture	23.7	23.5			

MAA 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 908	STP-202 (SS-21)	68.5'-70.0'	12/15/2006	CH	Fat Clay	26.1	71	40

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC Reviewed By:RF

ASTM D4318-05

MA 4-3-07

KAW 4/3/07

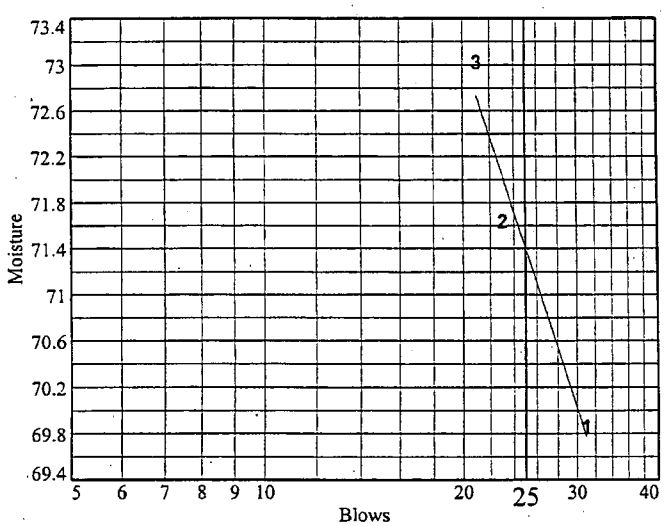
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 908
Depth: 68.5'-70.0' **Sample Number:** STP-202 (SS-21)
Material Description: Fat Clay
Date: 12/15/2006 **USCS Class.:** CH
Testing Remarks: Tested By:AC Reviewed By:RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	35.71	34.88	35.43			
Dry+Tare	32.58	32.05	32.37			
Tare	28.10	28.10	28.18			
# Blows	31	23	21			
Moisture	69.9	71.6	73.0			



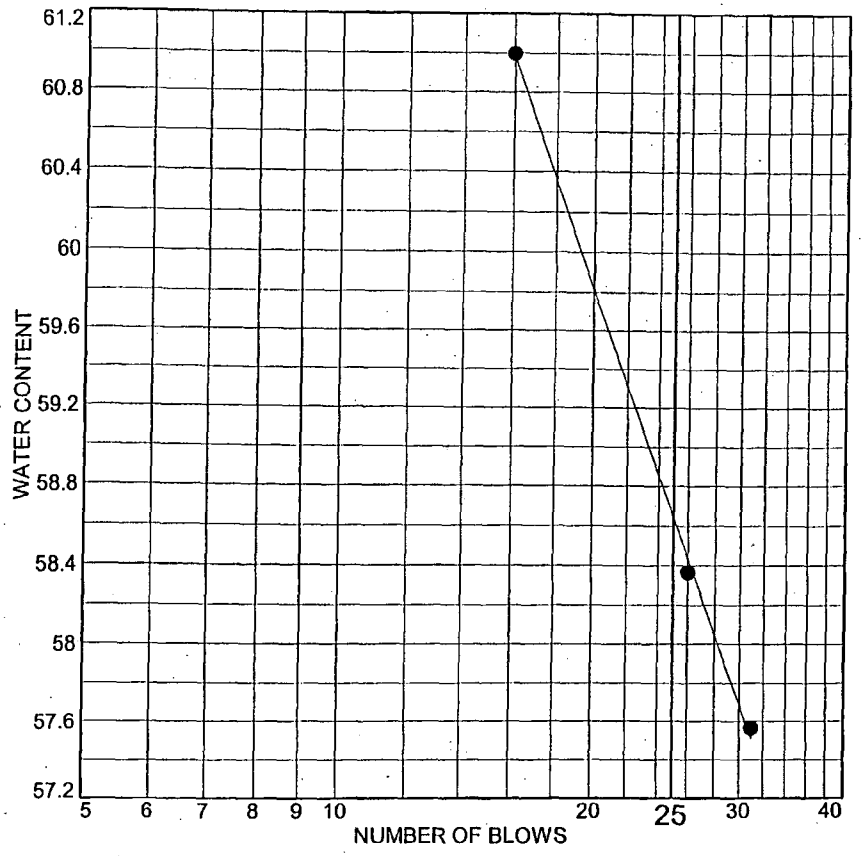
Liquid Limit= 71
Plastic Limit= 31
Plasticity Index= 40
Natural Moisture= 26.1
Liquidity Index= -0.1

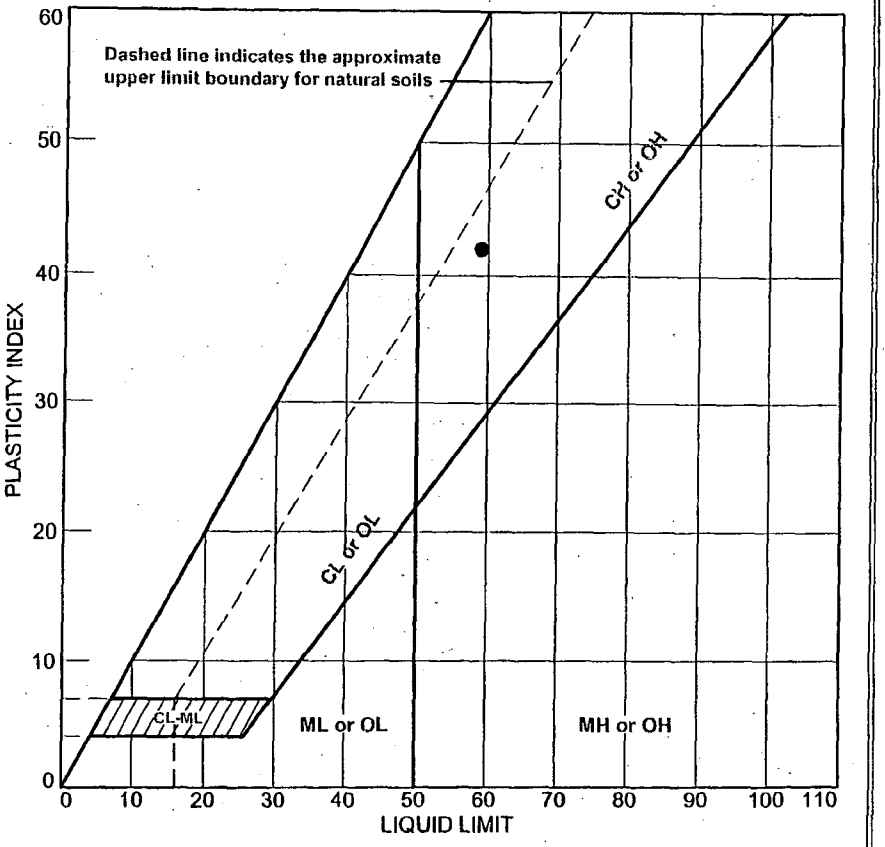
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	33.22	35.54			
Dry+Tare	31.83	33.75			
Tare	27.20	28.20			
Moisture	30.0	32.3			

NMA 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 908	STP-203 (SS-23)	78.5'-80.0'	12/15/2006	CH	Fat Clay	21.8	59	42

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC/TH Reviewed By:MH

ASTM D4318-05

MH 4-3-07

KAW 4/3/07

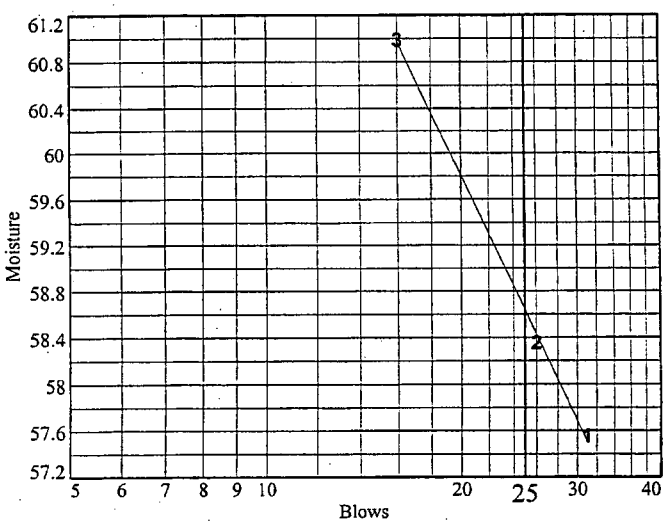
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 908
Depth: 78.5'-80.0'
Sample Number: STP-203 (SS-23)
Material Description: Fat Clay
Date: 12/15/2006
USCS Class.: CH
Testing Remarks: Tested By:AC/TH
Reviewed By:MH
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	35.71	35.57	37.39			
Dry+Tare	32.59	32.50	33.84			
Tare	27.17	27.24	28.02			
# Blows	31	26	16			
Moisture	57.6	58.4	61.0			



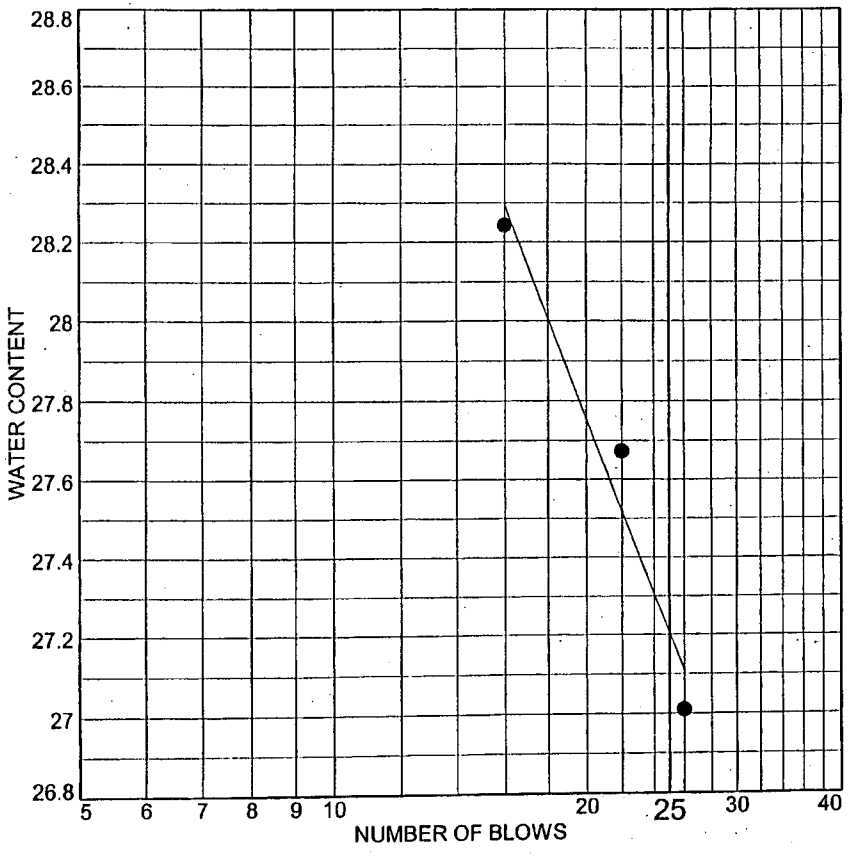
Liquid Limit= 59
Plastic Limit= 17
Plasticity Index= 42
Natural Moisture= 21.8
Liquidity Index= 0.1

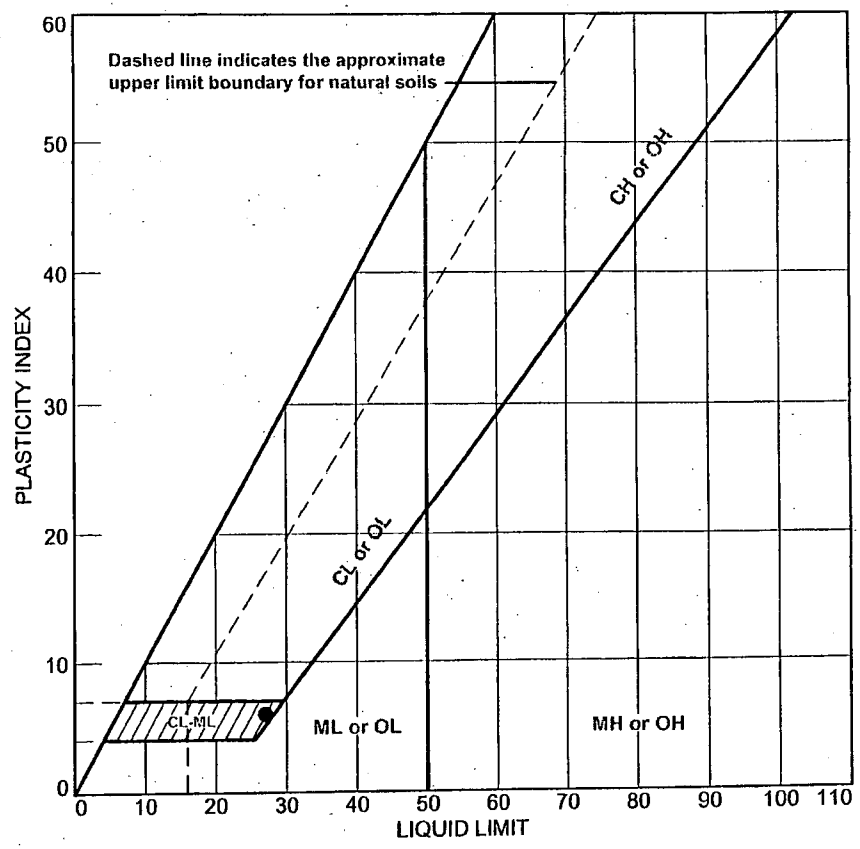
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	34.87	37.56			
Dry+Tare	33.75	36.19			
Tare	27.30	28.33			
Moisture	17.4	17.4			

MAH 4/3/07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 908	STP-204	83.5'-85.0'	12/15/2006	CL-ML	Silty Clay	20.5	27	6
		(SS-24)							

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC/TH/JW Reviewed By:RF

ASTM D4318-05

MH 4-3-07

KAW 4/3/07

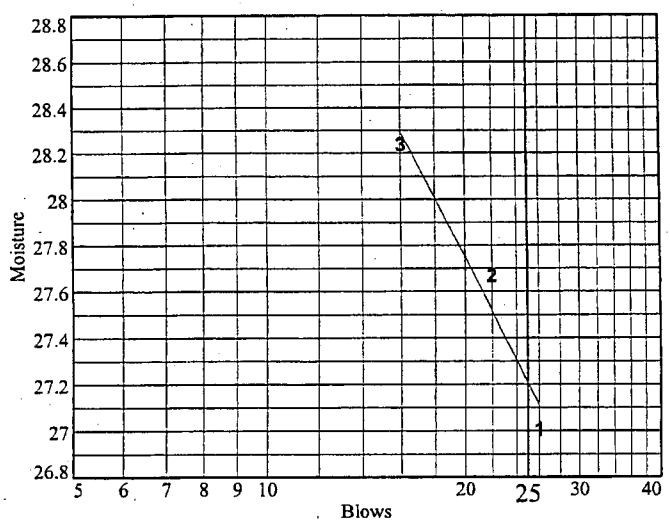
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 908
Depth: 83.5'-85.0' **Sample Number:** STP-204 (SS-24)
Material Description: Silty Clay
Date: 12/15/2006 **USCS Class.:** CL-ML
Testing Remarks: Tested By:AC/TH/JW Reviewed By:RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	40.52	40.67	38.65			
Dry+Tare	37.90	37.77	36.32			
Tare	28.20	27.29	28.07			
# Blows	26	22	16			
Moisture	27.0	27.7	28.2			



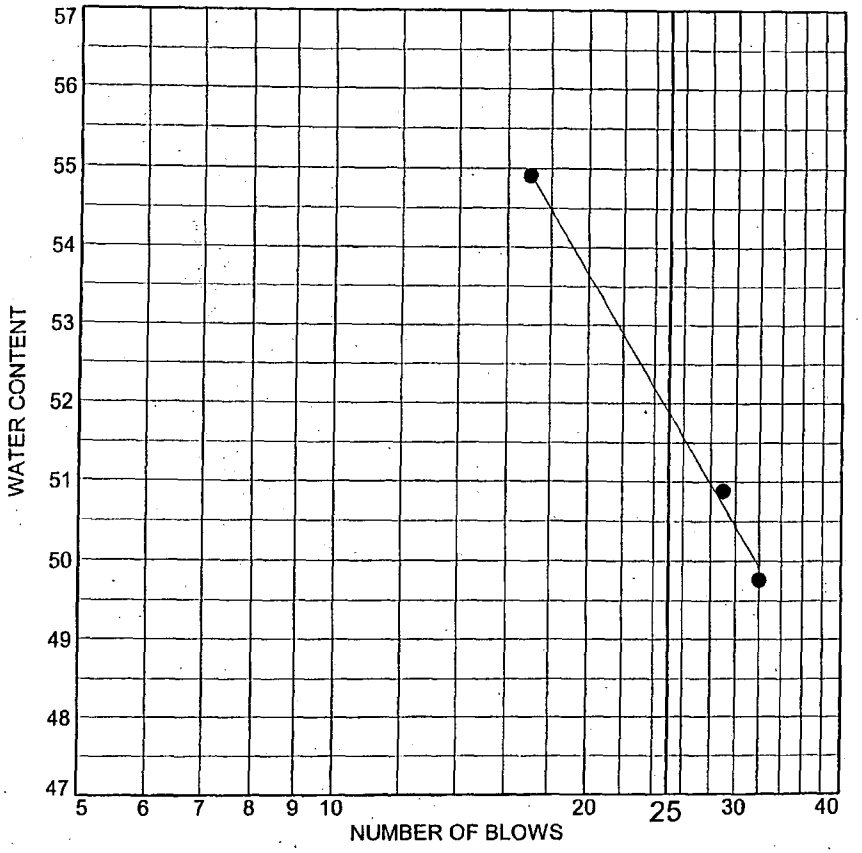
Liquid Limit= 27
Plastic Limit= 21
Plasticity Index= 6
Natural Moisture= 20.5
Liquidity Index= -0.1

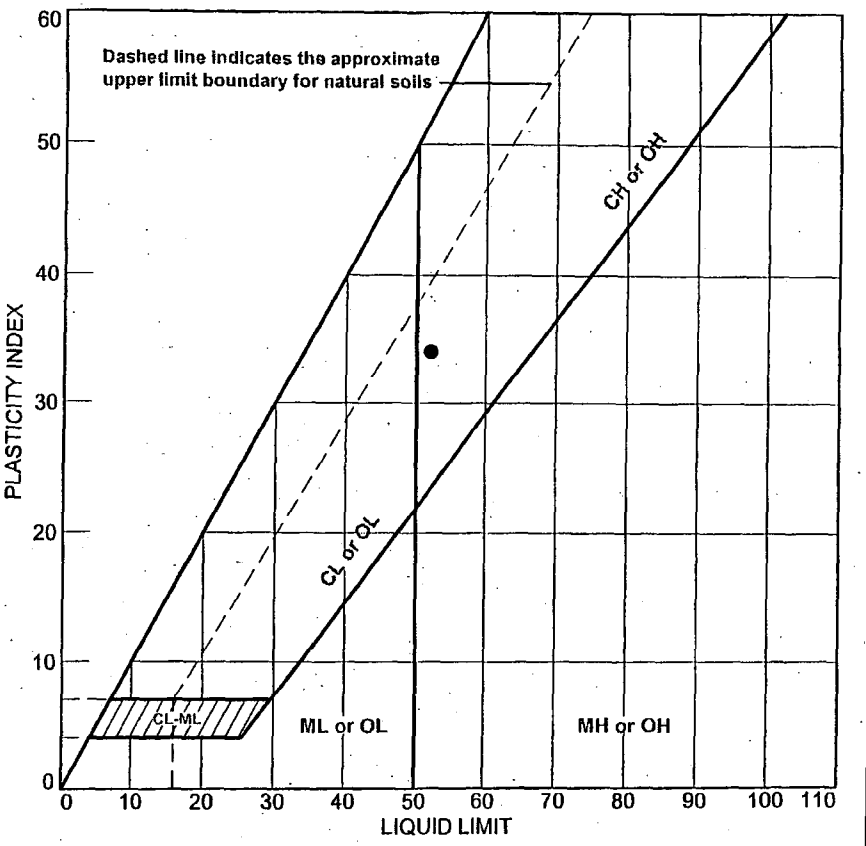
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	40.07	35.63			
Dry+Tare	38.01	34.35			
Tare	28.37	28.04			
Moisture	21.4	20.3			

MA 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 908	STP-205	93.5'-95.0'	12/15/2006	CH	Fat Clay	19.1	52	34
		(SS-26)							

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC Reviewed By:RF

ASTM D4318-05

MA 4-3-07

KAW 4/3/07

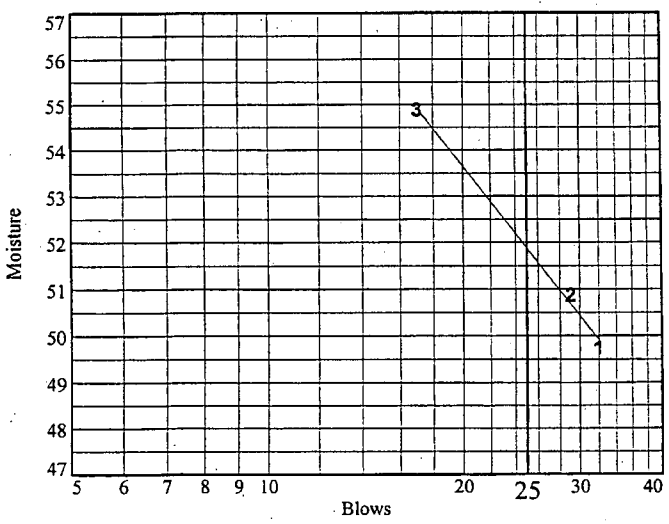
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 908
Depth: 93.5'-95.0' **Sample Number:** STP-205 (SS-26)
Material Description: Fat Clay
Date: 12/15/2006 **USCS Class.:** CH
Testing Remarks: Tested By:AC Reviewed By:RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	37.62	40.02	37.18			
Dry+Tare	34.47	36.00	33.60			
Tare	28.14	28.10	27.08			
# Blows	32	29	17			
Moisture	49.8	50.9	54.9			



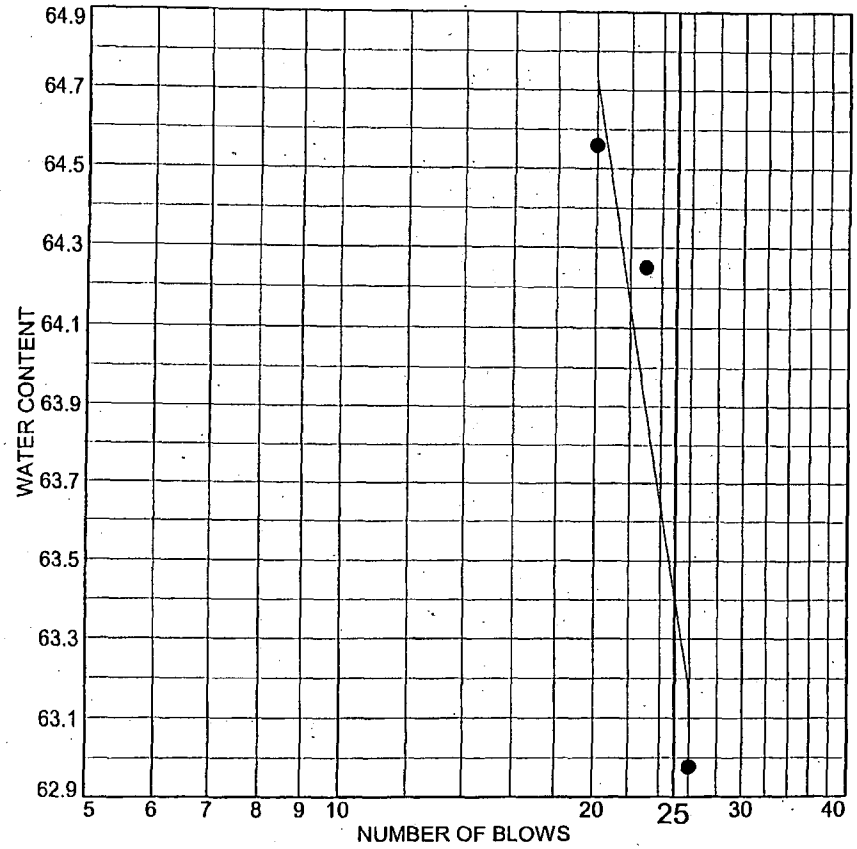
Liquid Limit= 52
Plastic Limit= 18
Plasticity Index= 34
Natural Moisture= 19.1
Liquidity Index= 0.0

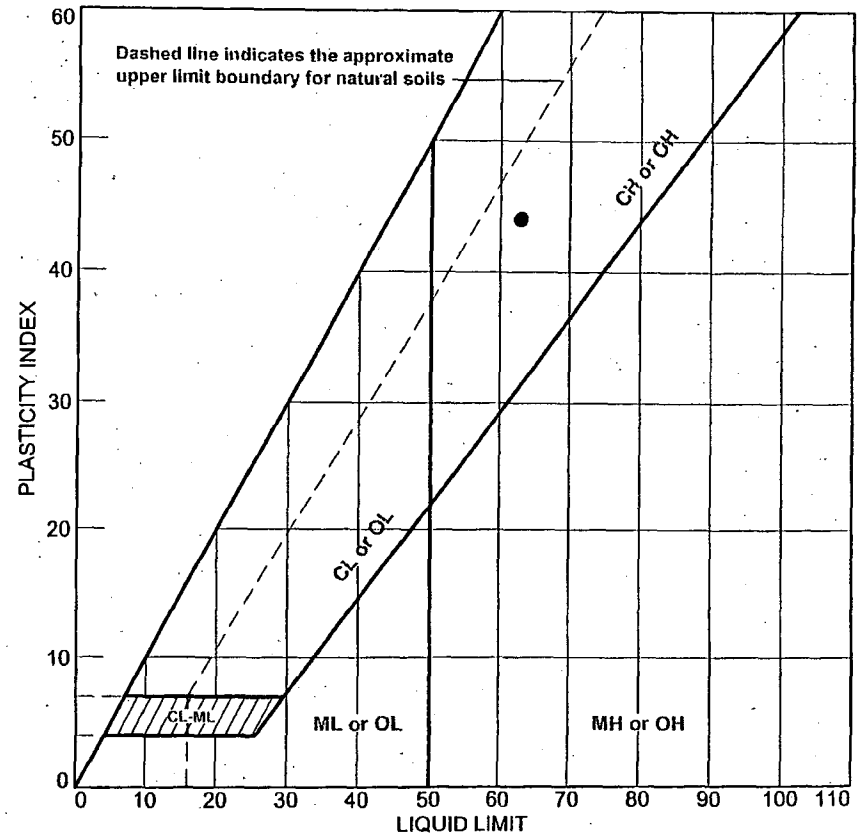
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	34.96	35.75			
Dry+Tare	33.95	34.61			
Tare	28.28	28.32			
Moisture	17.8	18.1			

MAC 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 909	STP-206 (SS-2)	1.5'-3.0'	12/13/2006	CH	Fat Clay	27.0	63	44

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC Reviewed By:MH

ASTM D4318-05

MH 4.3.07

KAW 4/3/07

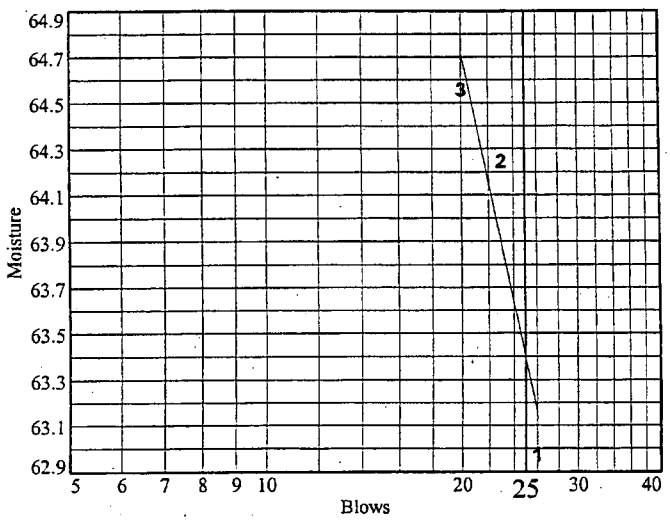
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 909
Depth: 1.5'-3.0'
Sample Number: STP-206 (SS-2)
Material Description: Fat Clay
Date: 12/13/2006
USCS Class.: CH
Testing Remarks: Tested By:AC Reviewed By:MH
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	31.21	37.99	36.75			
Dry+Tare	27.91	34.09	33.38			
Tare	22.67	28.02	28.16			
# Blows	26	23	20			
Moisture	63.0	64.3	64.6			



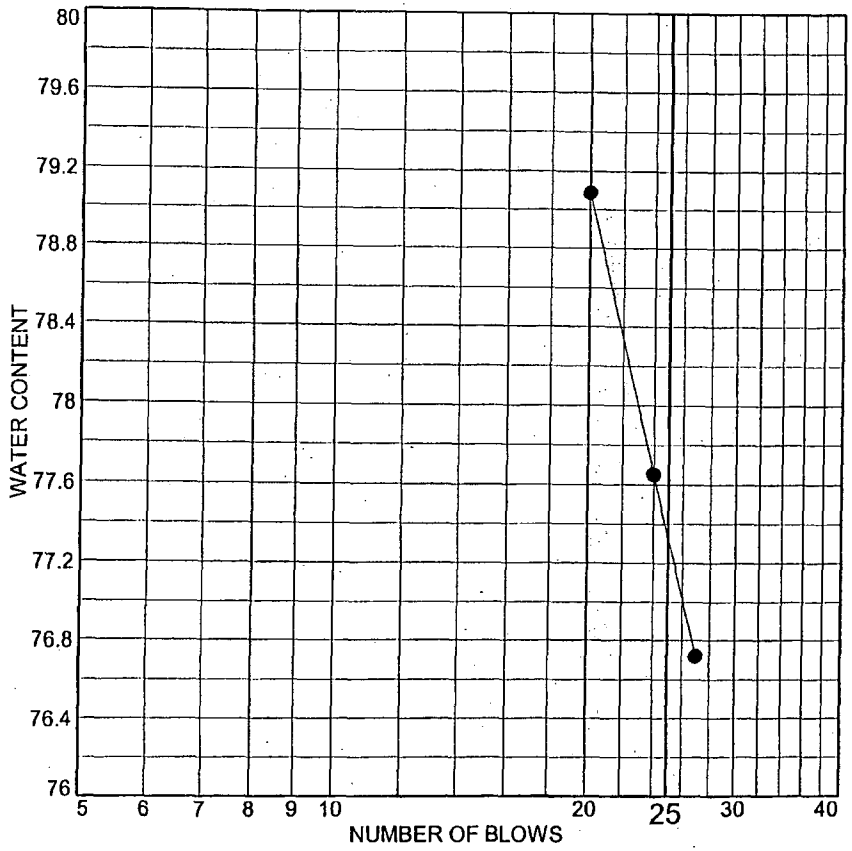
Liquid Limit= 63
Plastic Limit= 19
Plasticity Index= 44
Natural Moisture= 27.0
Liquidity Index= 0.2

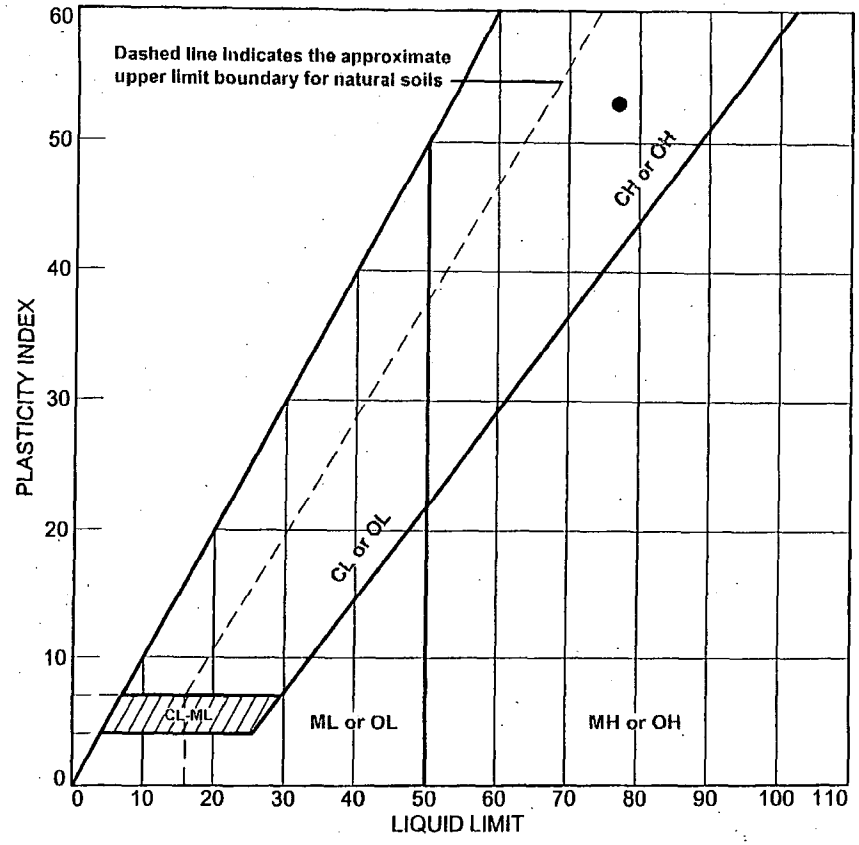
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	36.10	36.80			
Dry+Tare	34.65	35.42			
Tare	27.12	28.24			
Moisture	19.3	19.2			

NM 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 909	STP-207 (SS-6)	7.5'-9.0'	12/13/06	CH	Fat Clay	26.5	77	53

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC Reviewed By:RF

ASTM D4318-05

4-3-07

KAW 4/3/07

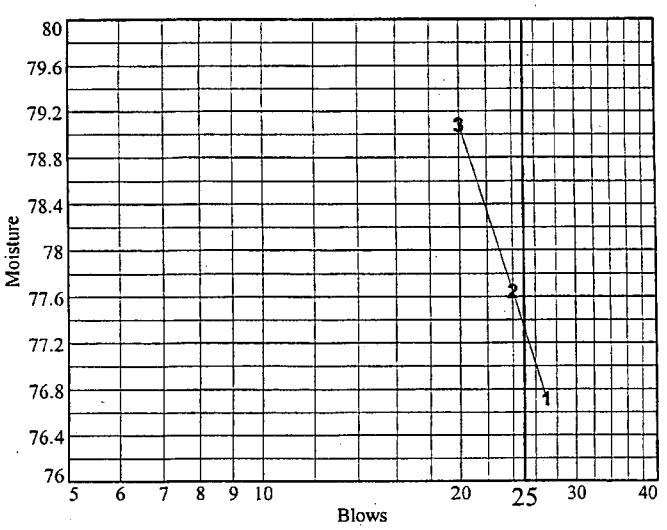
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 909
Depth: 7.5'-9.0' **Sample Number:** STP-207 (SS-6)
Material Description: Fat Clay
Date: 12/13/06 **USCS Class.:** CH
Testing Remarks: Tested By:AC Reviewed By:RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	35.90	35.97	35.69			
Dry+Tare	32.11	32.53	32.40			
Tare	27.17	28.10	28.24			
# Blows	27	24	20			
Moisture	76.7	77.7	79.1			



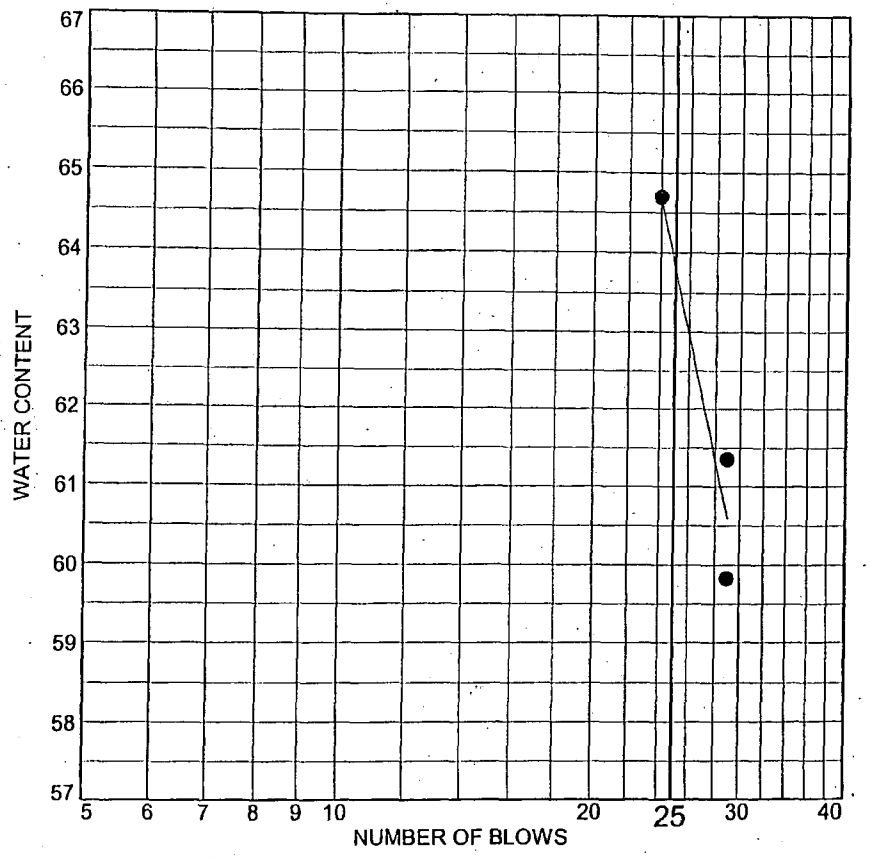
Liquid Limit= 77
Plastic Limit= 24
Plasticity Index= 53
Natural Moisture= 26.5
Liquidity Index= 0.0

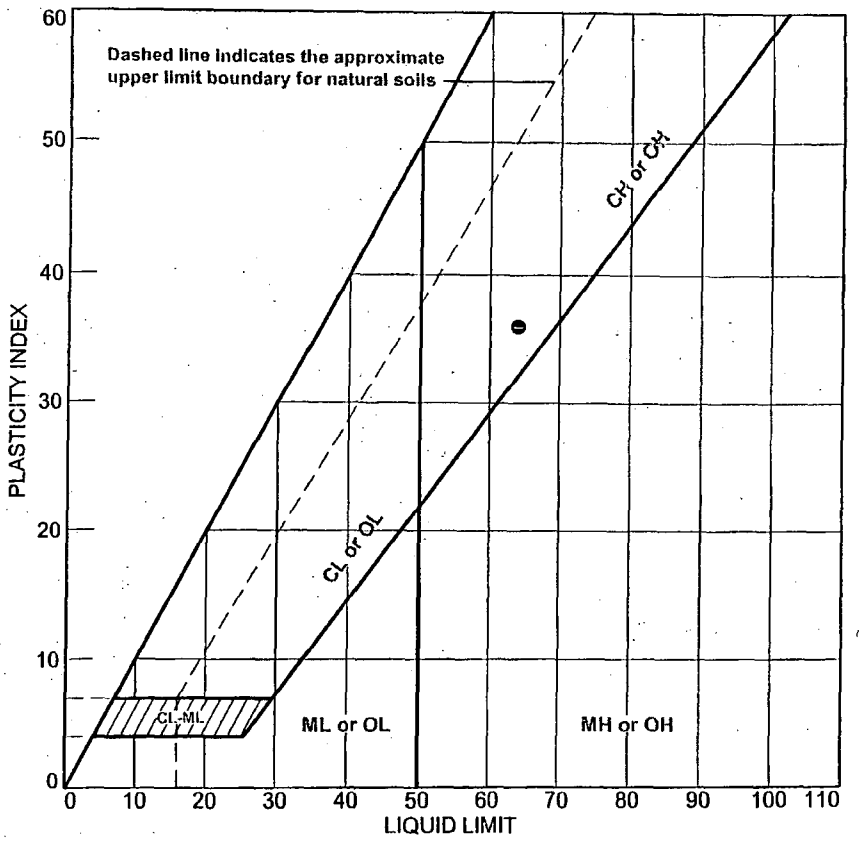
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	36.80	37.04			
Dry+Tare	35.16	35.32			
Tare	28.25	28.17			
Moisture	23.7	24.1			

MA 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 909	STP-208 (SS-10)	13.5'-15.0'	12/13/2006	CH	Fat Clay	21.1	64	36

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:MH Reviewed By:RF

ASTM D4318-05

MH 4-3-07

KAW 4/3/07

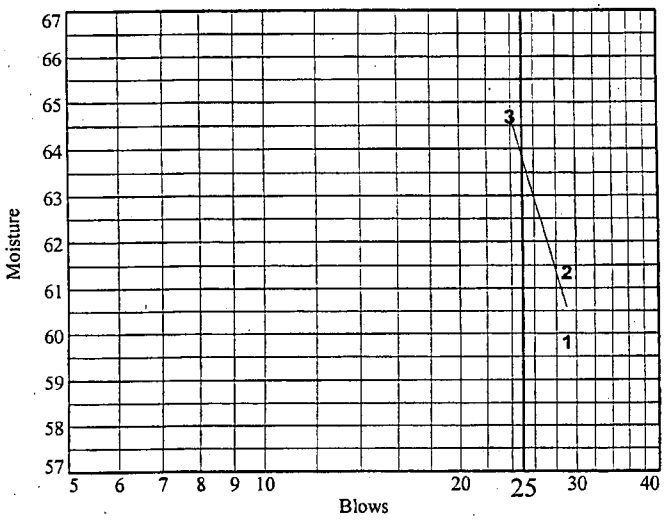
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 909
Depth: 13.5'-15.0'
Sample Number: STP-208 (SS-10)
Material Description: Fat Clay
Date: 12/13/2006
USCS Class.: CH
Testing Remarks: Tested By:MH Reviewed By:RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	37.11	38.16	38.84			
Dry+Tare	33.67	34.35	34.24			
Tare	27.92	28.14	27.13			
# Blows	29	29	24			
Moisture	59.8	61.4	64.7			



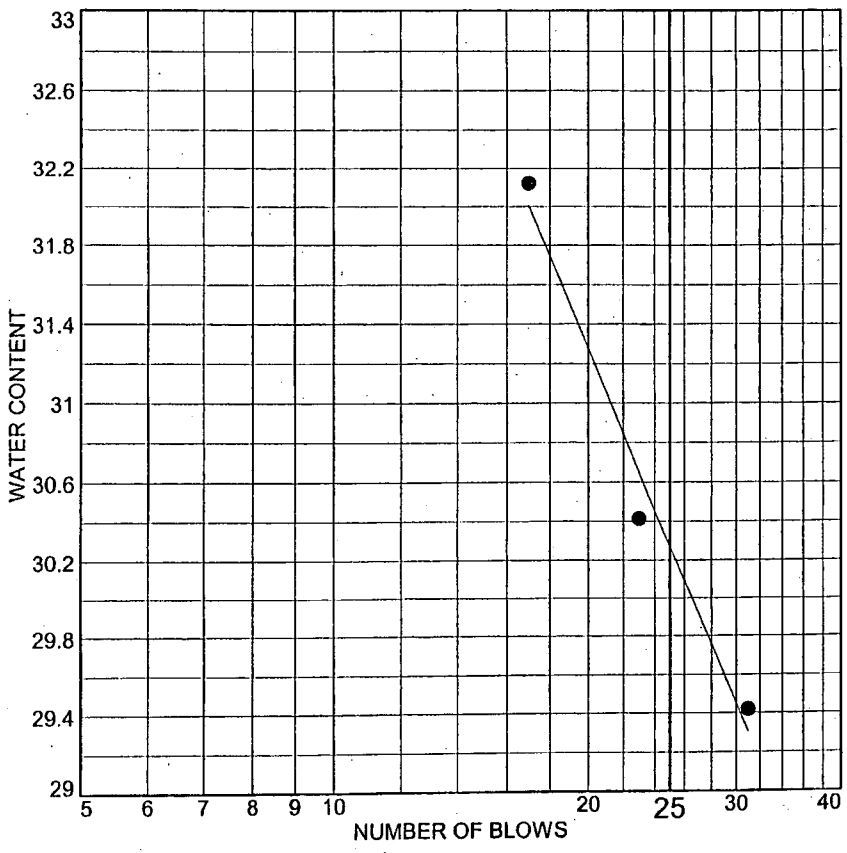
Liquid Limit= 64
Plastic Limit= 28
Plasticity Index= 36
Natural Moisture= 21.1
Liquidity Index= -0.2

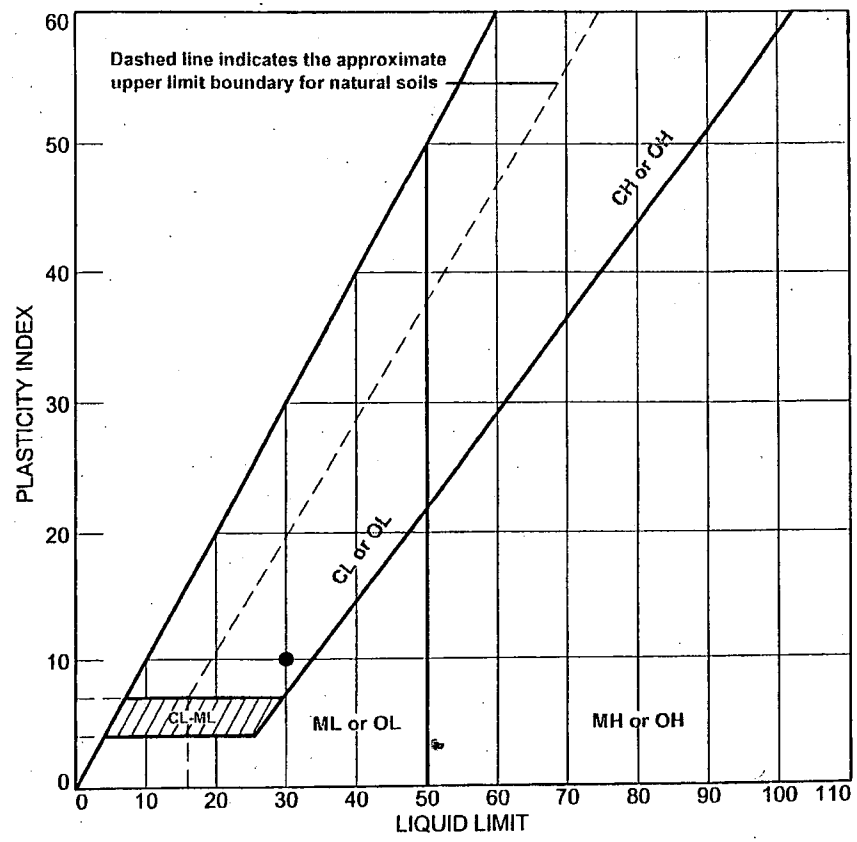
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	30.23	34.32			
Dry+Tare	28.35	33.12			
Tare	22.67	28.05			
Moisture	33.1	23.7			

MAK 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 909	STP-209 (SS-12)	23.5'-25.0'	12/13/2006	CL	Lean Clay	21.6	30	10

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC Reviewed By:RF

ASTM D4318-05

4-3-07

KAW 4/3/07

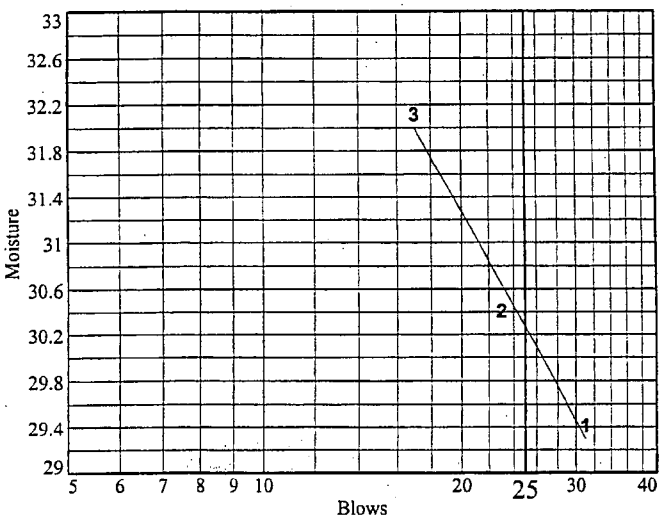
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 909
Depth: 23.5'-25.0' **Sample Number:** STP-209 (SS-12)
Material Description: Lean Clay
Date: 12/13/2006 **USCS Class.:** CL
Testing Remarks: Tested By:AC Reviewed By:RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	36.75	38.45	39.17			
Dry+Tare	34.17	35.81	36.52			
Tare	25.40	27.13	28.27			
# Blows	31	23	17			
Moisture	29.4	30.4	32.1			



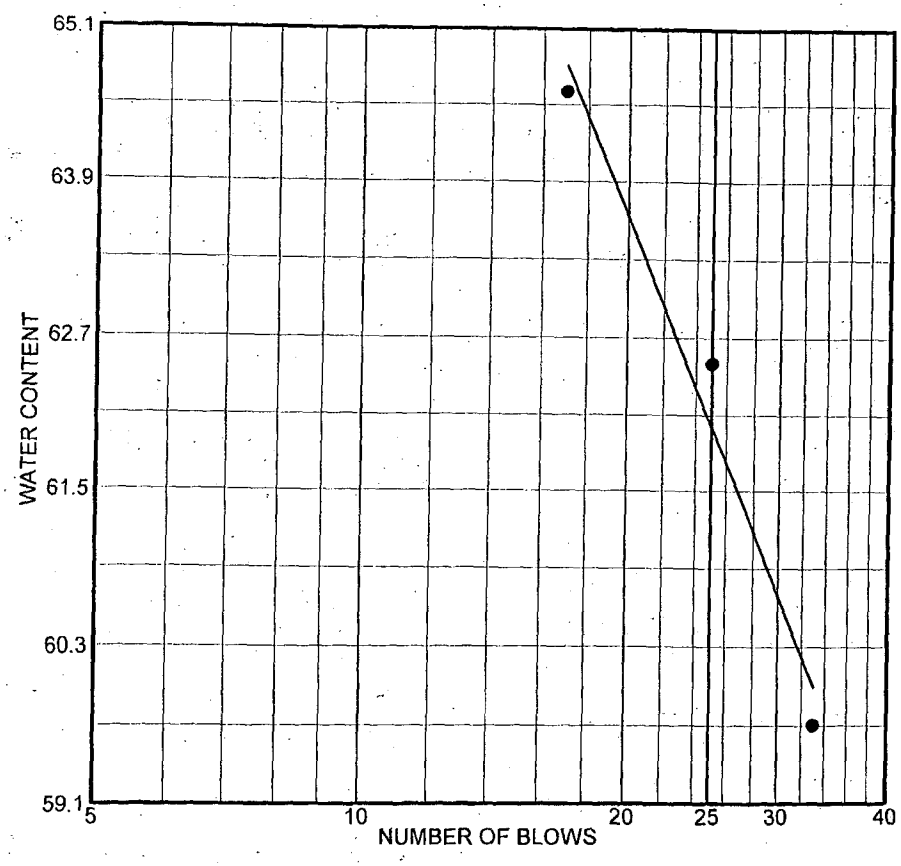
Liquid Limit= 30
Plastic Limit= 20
Plasticity Index= 10
Natural Moisture= 21.6
Liquidity Index= 0.2

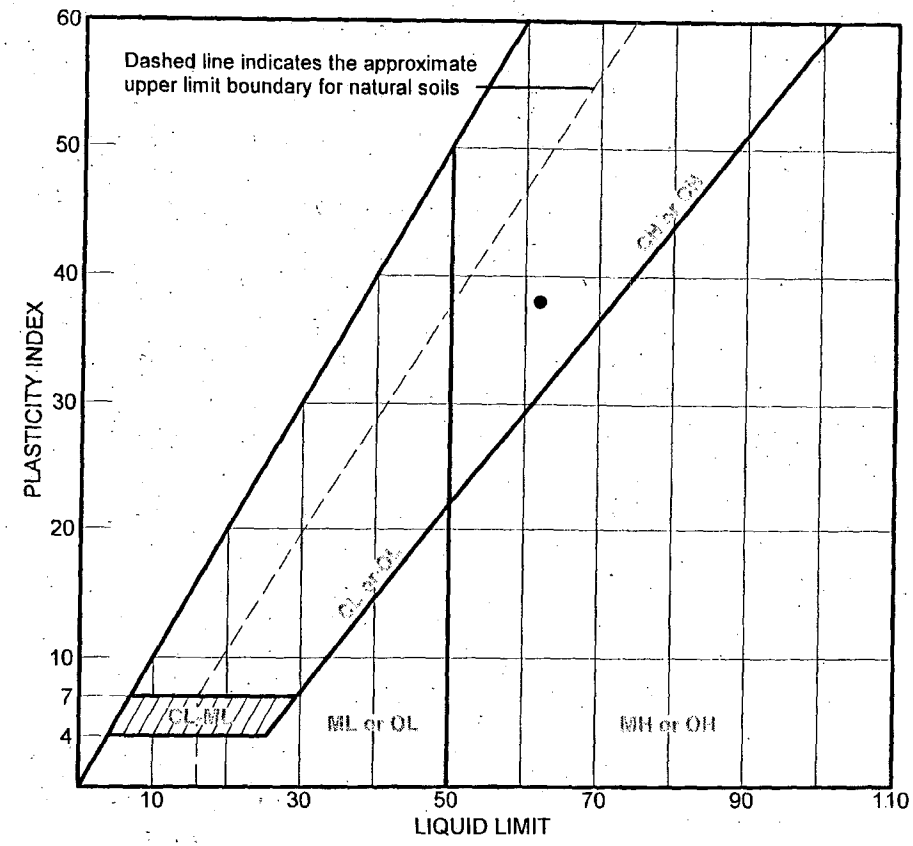
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	35.80	35.55			
Dry+Tare	34.57	34.37			
Tare	28.33	28.39			
Moisture	19.7	19.7			

MM 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-909	UD-2	43' to 45'	2-20-07	CH	Fat clay	25.0	62	38

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496 | Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reviewed by: SS
ASTM D4318-05

SS 2/28/2007

KAW 4/3/07

LIQUID AND PLASTIC LIMIT TEST DATA

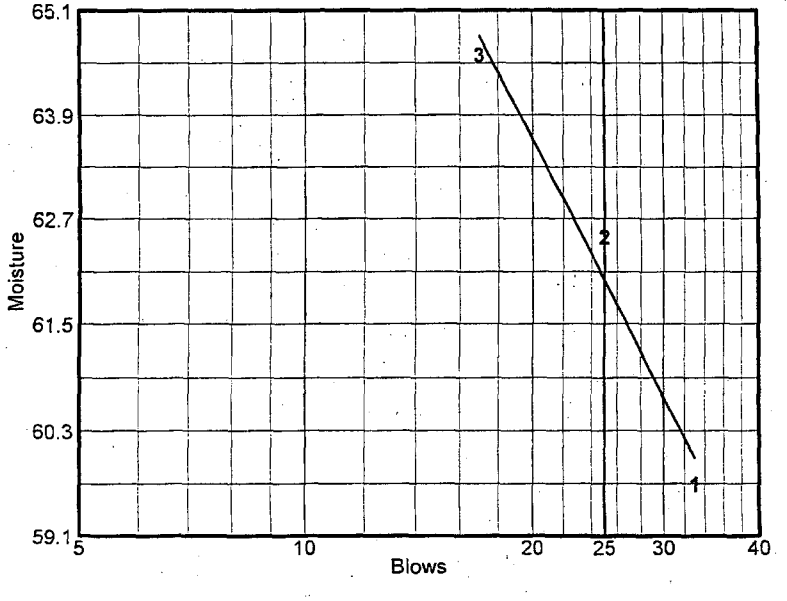
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496

Sample Data

Source: B-909
Sample No.: UD-2
Elev. or Depth: 43' to 45' **Sample Length(in./cm.):**
Location: B-909
Description: Fat clay
Date: 2-20-07 **Natural Moisture:** 25.0
USCS Class.: CH **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed by: SS
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	24.77	26.72	25.25			
Dry+Tare	19.77	20.63	19.56			
Tare	11.39	10.89	10.75			
# Blows	33	25	17			
Moisture	59.7	62.5	64.6			

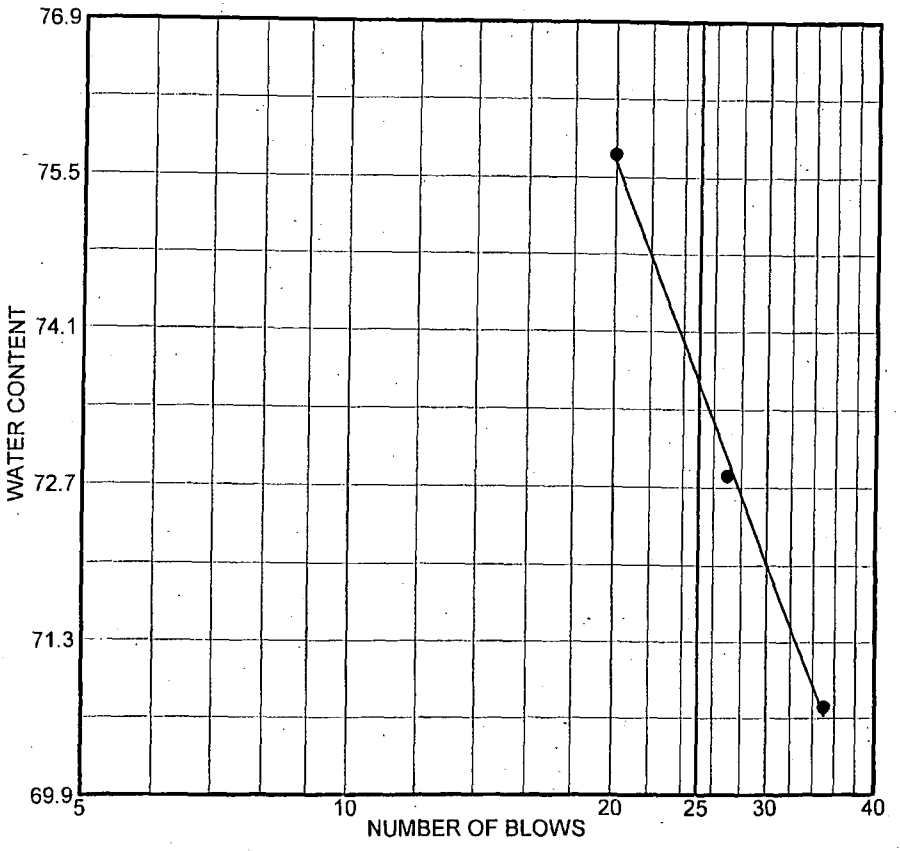


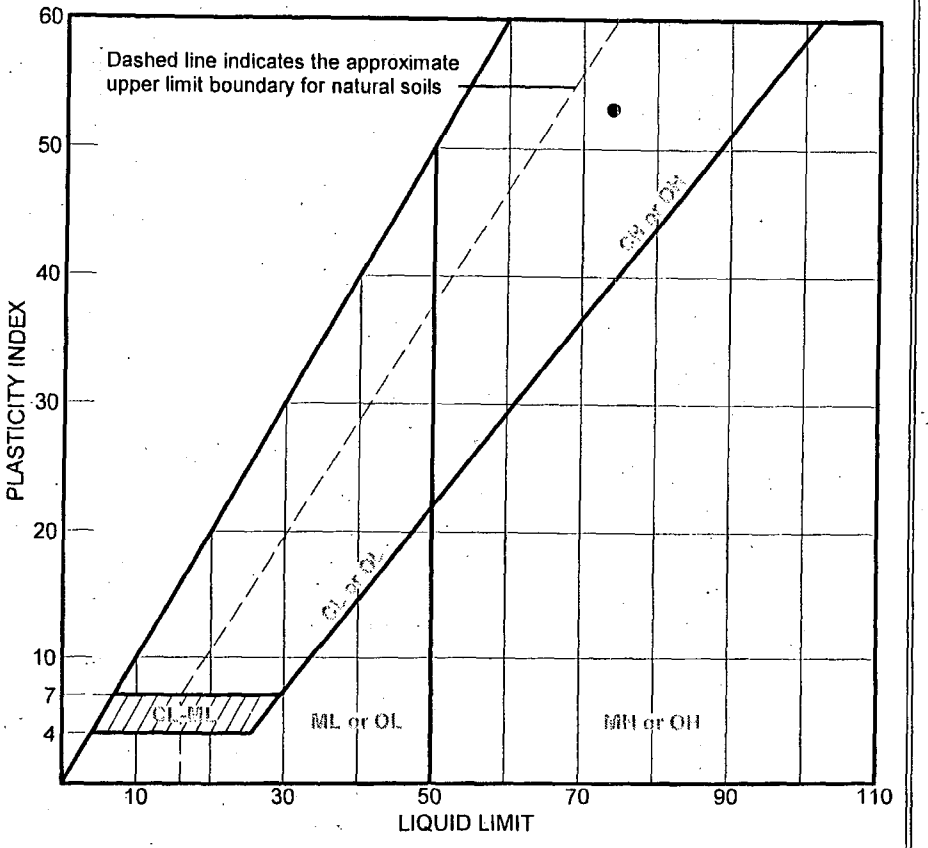
Liquid Limit= 62
Plastic Limit= 24
Plasticity Index= 38

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	21.43	20.50			
Dry+Tare	19.40	18.63			
Tare	10.85	10.95			
Moisture	23.7	24.3			

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-909	UD-3	48' to 50'	2-20-07	CH	Fat Clay	30.6	74	53

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496 | Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reviewed by: SS
ASTM D4318-05

SS 2/25/2007

KAW 4/3/07

LIQUID AND PLASTIC LIMIT TEST DATA

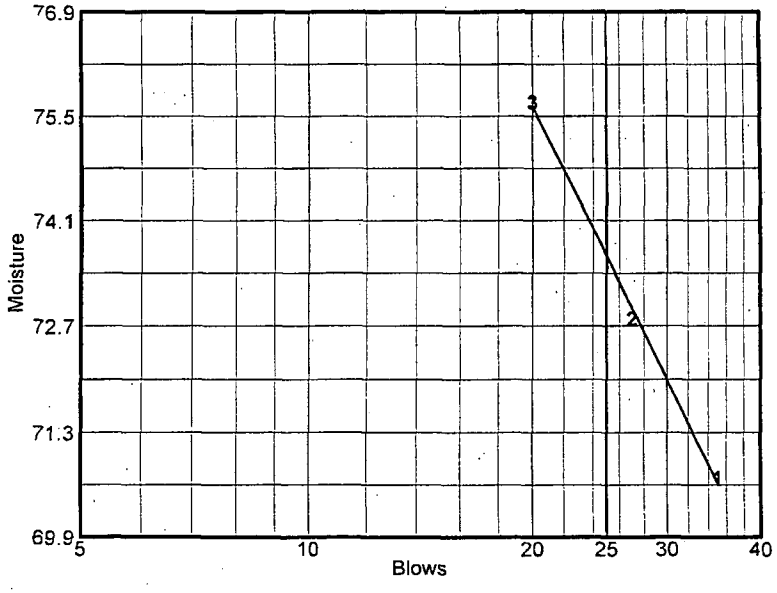
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496

Sample Data

Source: B-909
Sample No.: UD-3
Elev. or Depth: 48' to 50' **Sample Length(in./cm.):**
Location: B-909
Description: Fat Clay
Date: 2-20-07 **Natural Moisture:** 30.6
USCS Class.: CH **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed by: SS
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	28.52	27.55	31.81			
Dry+Tare	21.49	20.71	22.86			
Tare	11.55	11.31	11.03			
# Blows	35	27	20			
Moisture	70.7	72.8	75.7			

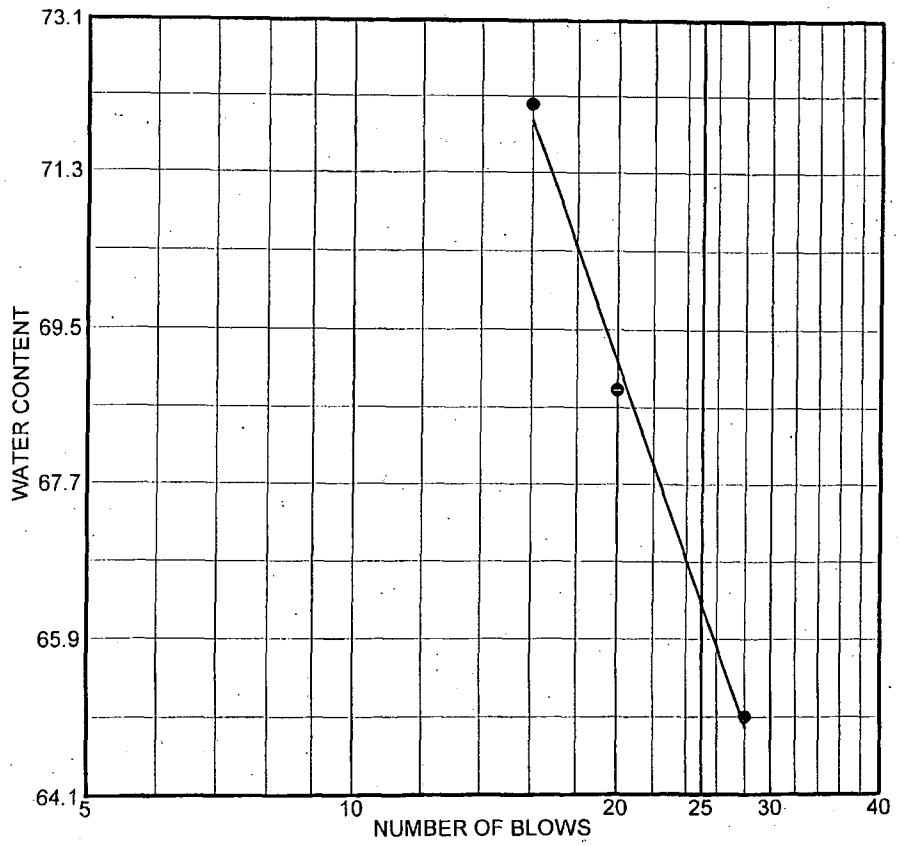


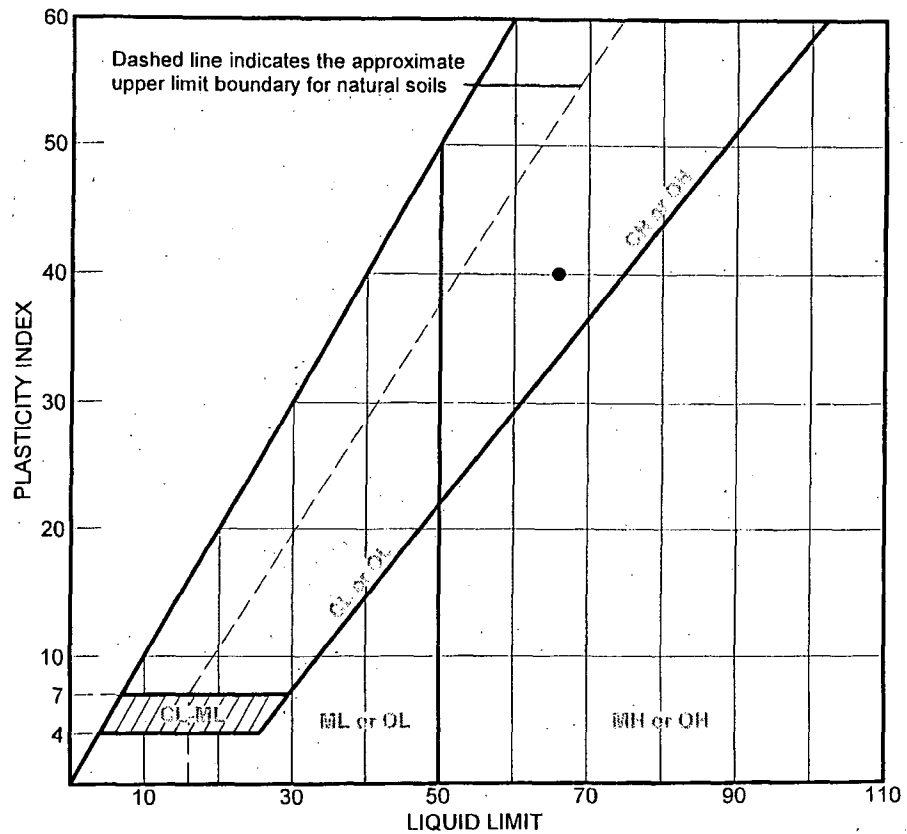
Liquid Limit= 74
Plastic Limit= 21
Plasticity Index= 53

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	24.36	24.54			
Dry+Tare	21.93	22.19			
Tare	10.73	11.11			
Moisture	21.7	21.2			

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-909	UD-4	53' to 55'	2-22-07	CH	Fat clay	30.0	66	40

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496 | Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reviewed by: MH KAW 4/3/07

ASTM D4318-05

KAW 4/3/07

LIQUID AND PLASTIC LIMIT TEST DATA

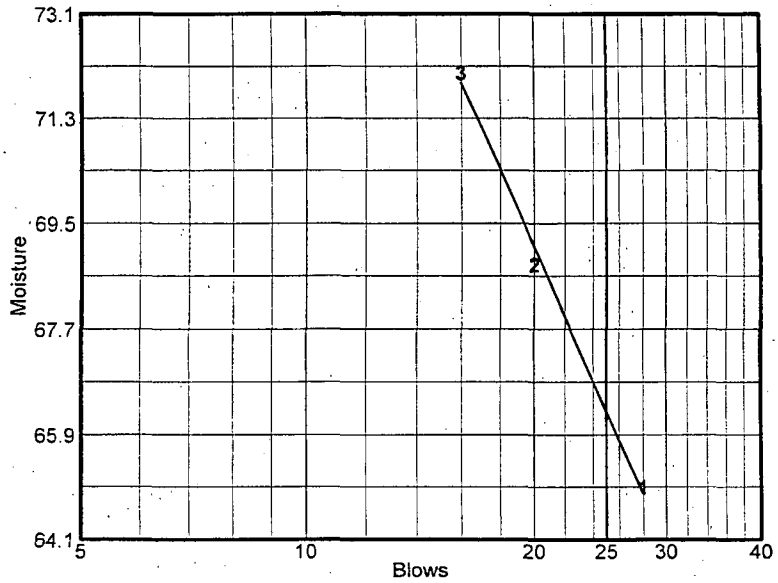
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496

Sample Data

Source: B-909
Sample No.: UD-4
Elev. or Depth: 53' to 55' **Sample Length(in./cm.):**
Location: B-909
Description: Fat clay
Date: 2-22-07 **Natural Moisture:** 30.0
USCS Class.: CH **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed by: MH
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	25.03	25.43	29.40			
Dry+Tare	19.56	19.56	21.66			
Tare	11.15	11.03	10.92			
# Blows	28	20	16			
Moisture	65.0	68.8	72.1			

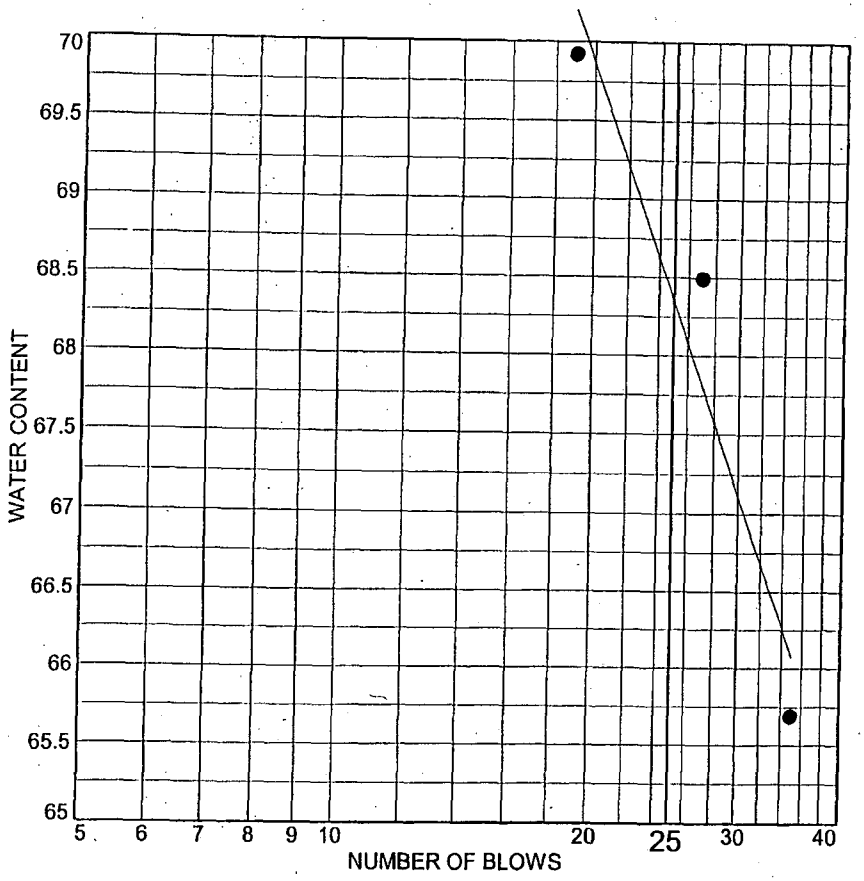


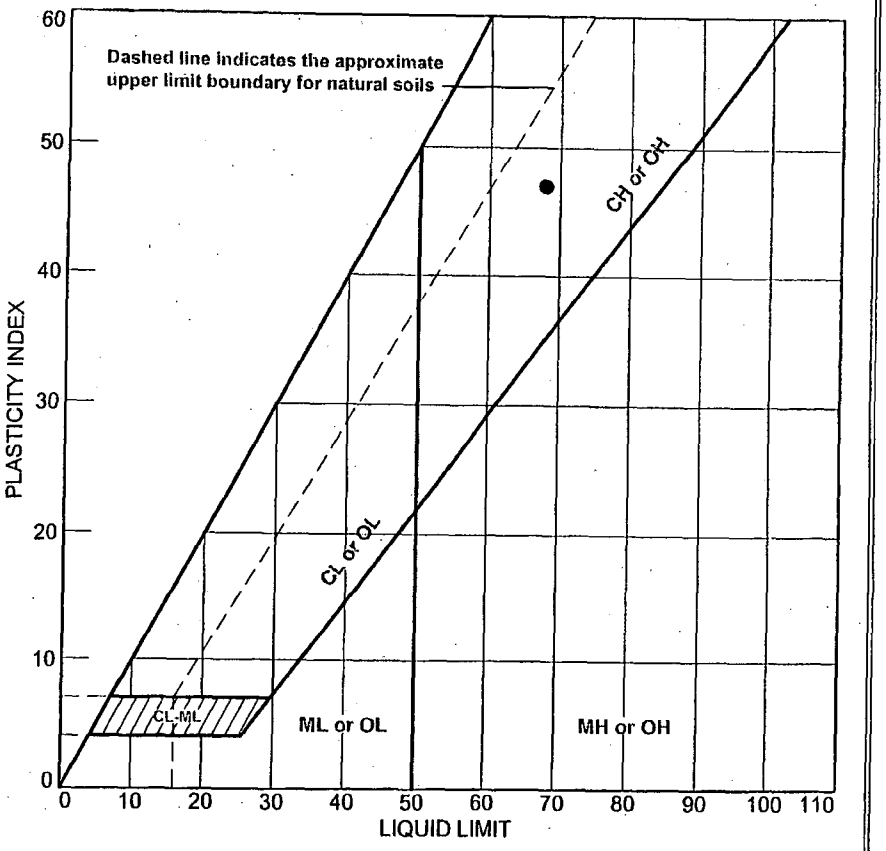
Liquid Limit= 66
Plastic Limit= 26
Plasticity Index= 40

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	21.44	18.90			
Dry+Tare	19.27	17.25			
Tare	10.93	11.03			
Moisture	26.0	26.5			

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 909	STP-211 (SS-16)	63.5'-65.0'	12/14/2006	CH	Fat Clay	23.5	68	47

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC/MH Reviewed By:RF

ASTM D4318-05

MA 4-3-07

KAW 4/3/07

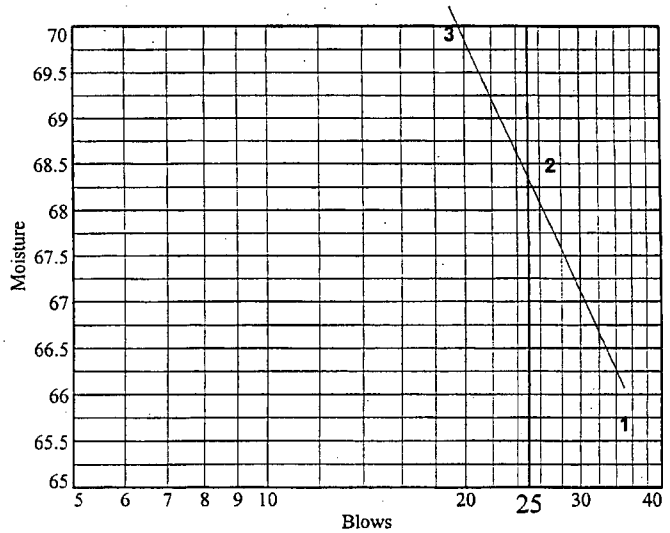
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 909
Depth: 63.5'-65.0'
Sample Number: STP-211 (SS-16)
Material Description: Fat Clay
Date: 12/14/2006
USCS Class.: CH
Testing Remarks: Tested By:AC/MH Reviewed By:RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	41.71	40.56	37.01			
Dry+Tare	36.33	35.56	33.43			
Tare	28.14	28.26	28.31			
# Blows	35	27	19			
Moisture	65.7	68.5	69.9			



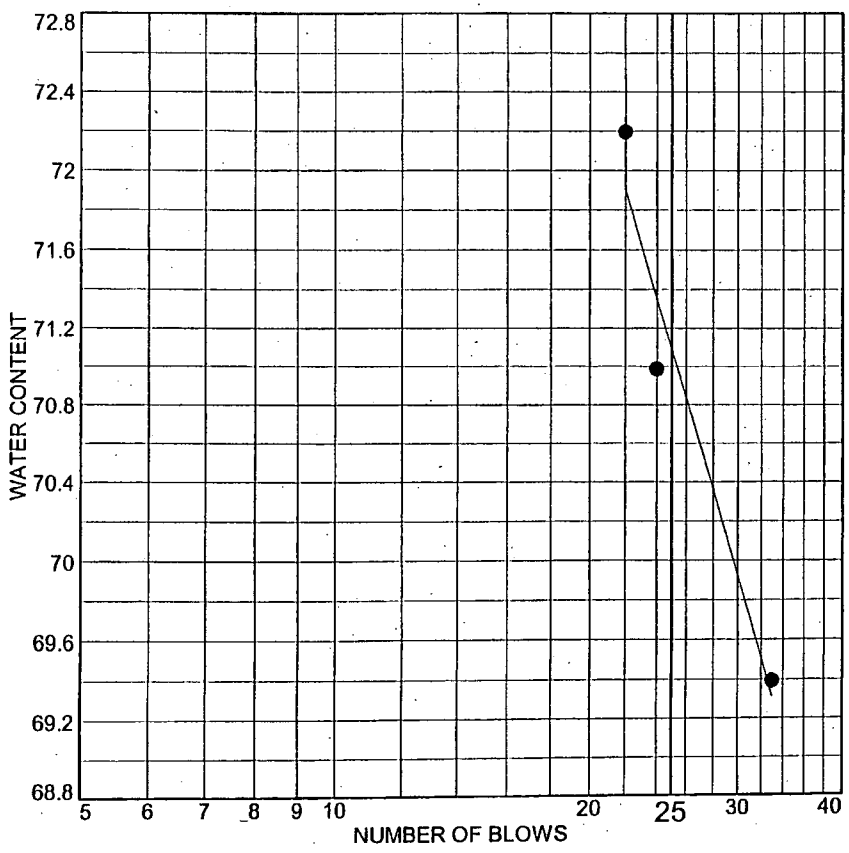
Liquid Limit= 68
Plastic Limit= 21
Plasticity Index= 47
Natural Moisture= 23.5
Liquidity Index= 0.1

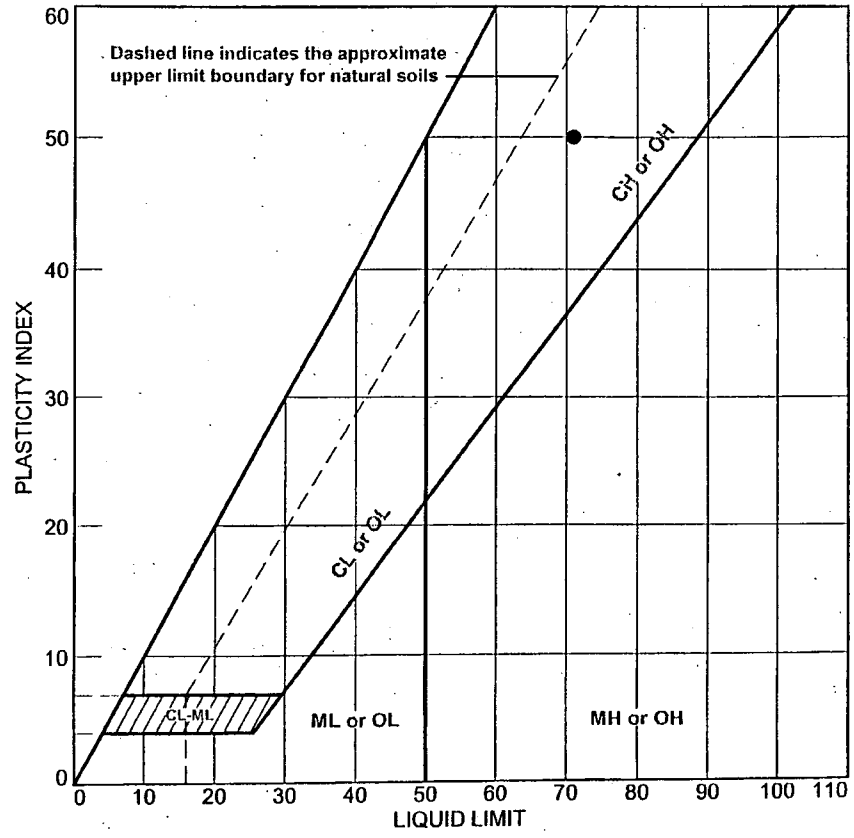
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	35.49	35.81			
Dry+Tare	34.19	34.51			
Tare	27.93	28.13			
Moisture	20.8	20.4			

MAA 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 909	STP-212	73.5'-75.0'	12/14/2006	CH	Fat Clay	23.7	71	50
		(SS-18)							

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC/TH Reviewed By:RF

ASTM D4318-05

4-3-07

KAW 4/3/07

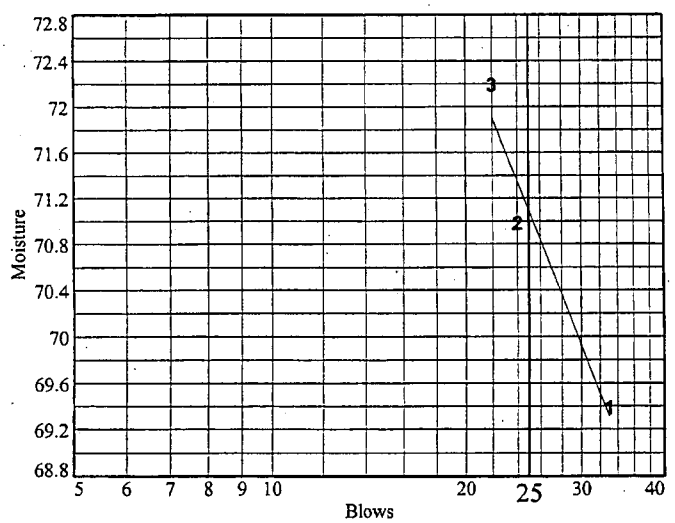
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 909
Depth: 73.5'-75.0'
Sample Number: STP-212 (SS-18)
Material Description: Fat Clay
Date: 12/14/2006
USCS Class.: CH
Testing Remarks: Tested By:AC/TH
Reviewed By:RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	36.24	37.09	35.70			
Dry+Tare	32.93	33.42	32.61			
Tare	28.16	28.25	28.33			
# Blows	33	24	22			
Moisture	69.4	71.0	72.2			



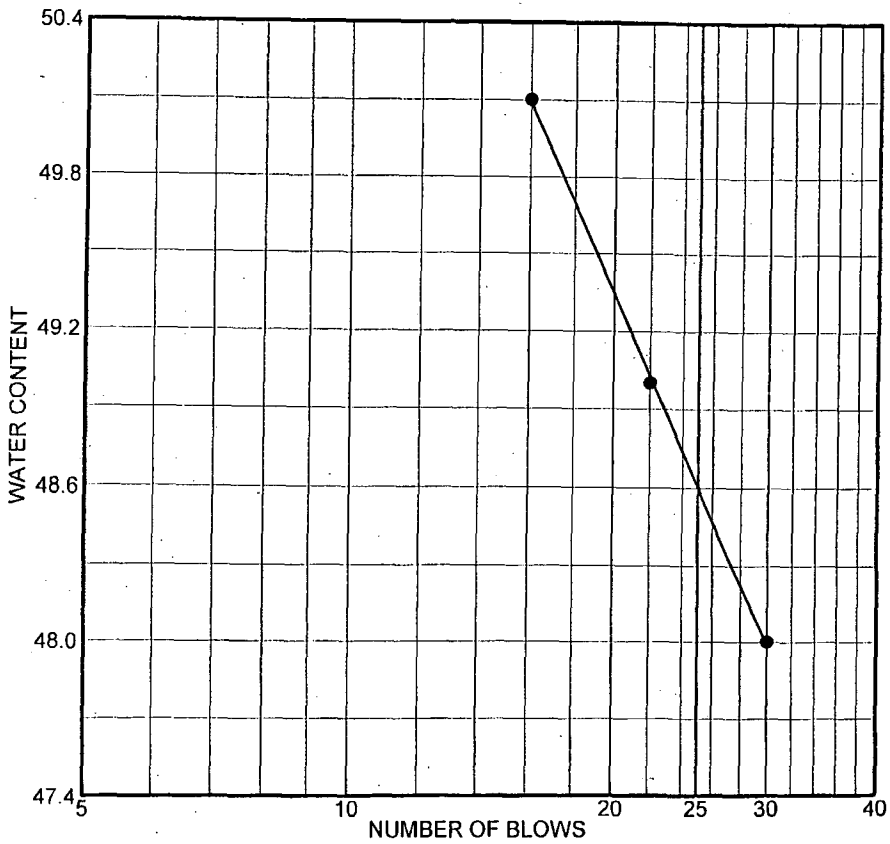
Liquid Limit= 71
Plastic Limit= 21
Plasticity Index= 50
Natural Moisture= 23.7
Liquidity Index= 0.1

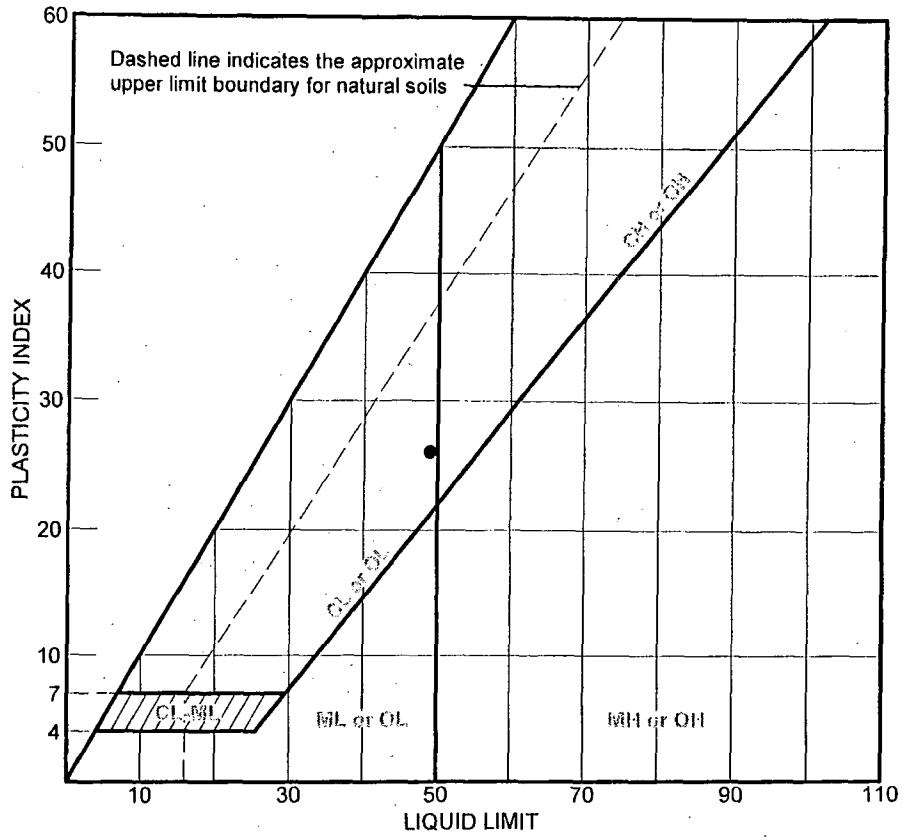
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	37.18	36.76			
Dry+Tare	35.59	35.07			
Tare	28.08	27.09			
Moisture	21.2	21.2			

MAT 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-909	UD-5	85' to 87'	2-24-07	CL	Lean clay	27.6	49	26

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496 | Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reviewed by: MH
ASTM D4318-05 KAW 4/3/07

KAW 4/3/07

LIQUID AND PLASTIC LIMIT TEST DATA

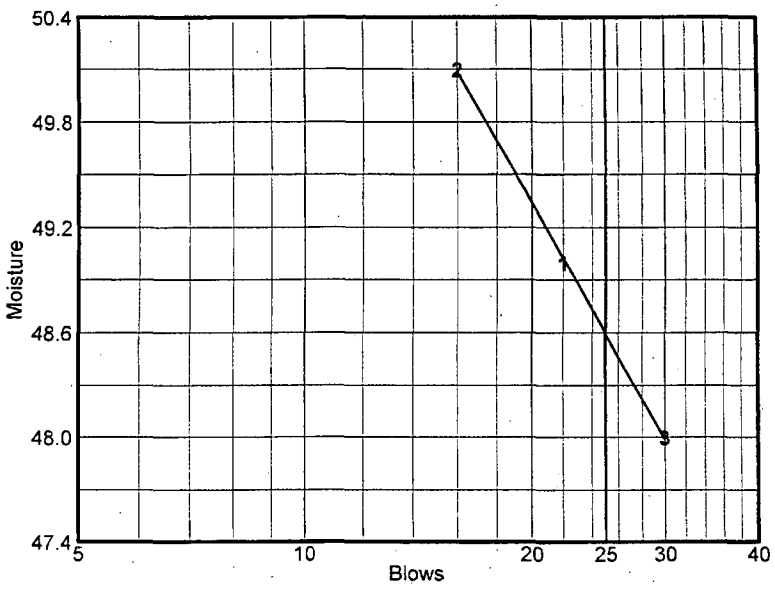
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496

Sample Data

Source: B-909
Sample No.: UD-5
Elev. or Depth: 85' to 87' **Sample Length(in./cm.):**
Location: B-909
Description: Lean clay
Date: 2-24-07 **Natural Moisture:** 27.6
USCS Class.: CL **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed by: MH
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	32	32.92	24.19			
Dry+Tare	26.73	25.53	20.07			
Tare	15.97	10.77	11.48			
# Blows	22	16	30			
Moisture	49.0	50.1	48.0			

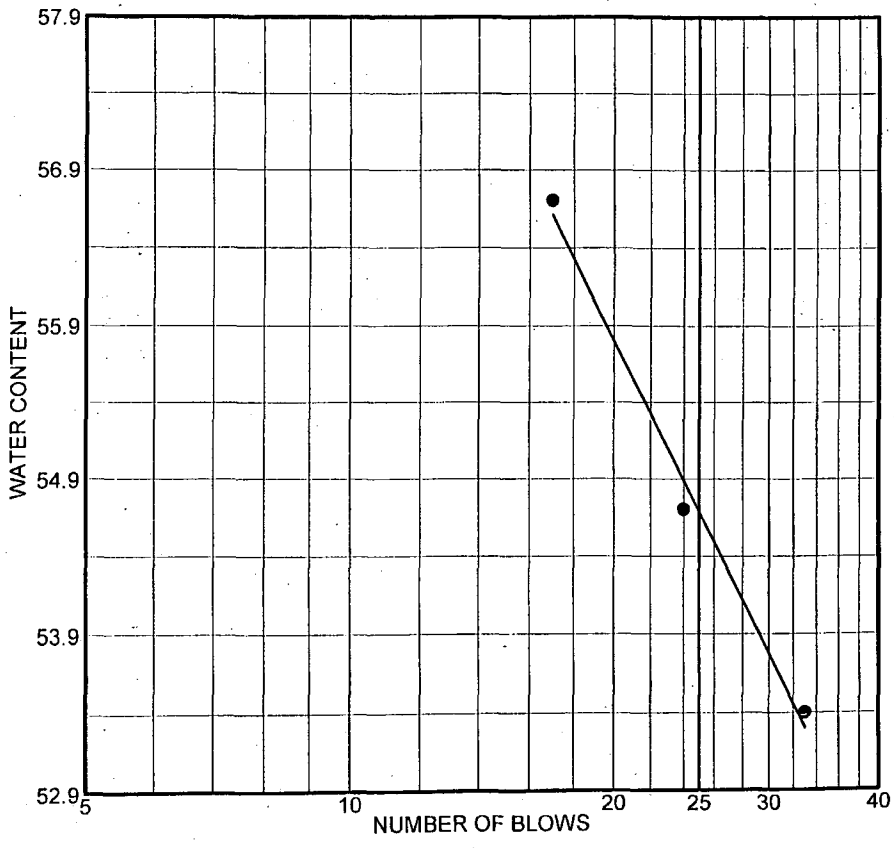


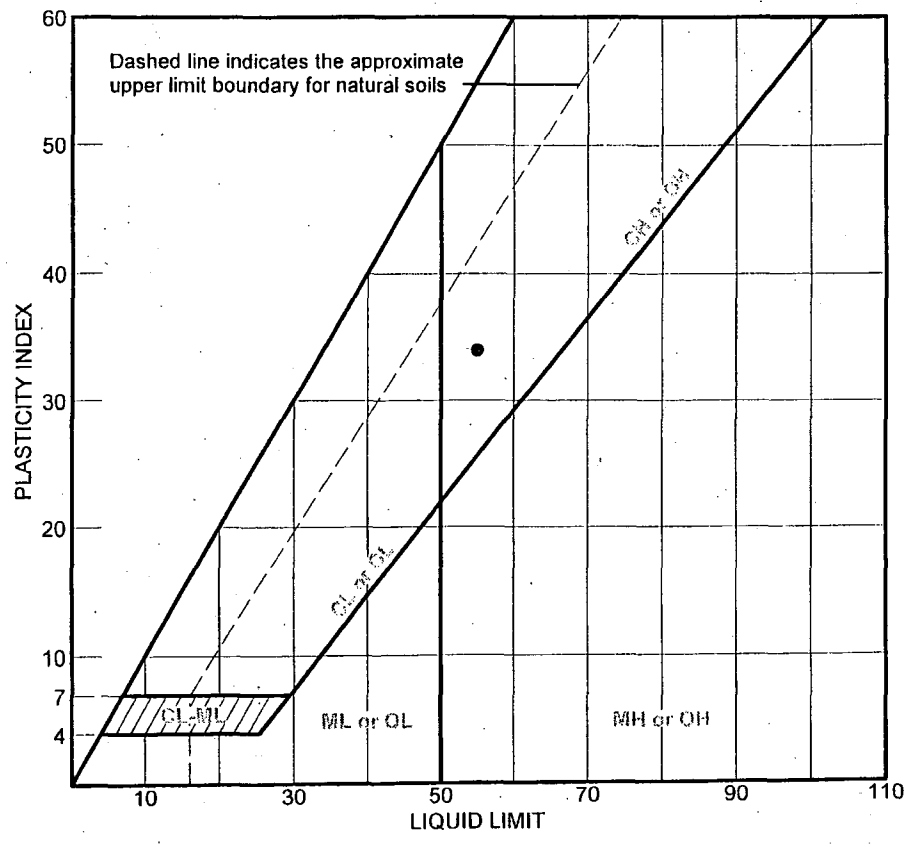
Liquid Limit= 49
Plastic Limit= 23
Plasticity Index= 26

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	20.31	17.83			
Dry+Tare	18.72	16.54			
Tare	11.59	10.89			
Moisture	22.3	22.8			

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-909	UD-6	93' to 95'	2-20-07	CH	Fat Clay	17.9	55	34

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496 | Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reviewed by: MH KAW 4/3/07
ASTM D4318-05

KAW 4/3/07

LIQUID AND PLASTIC LIMIT TEST DATA

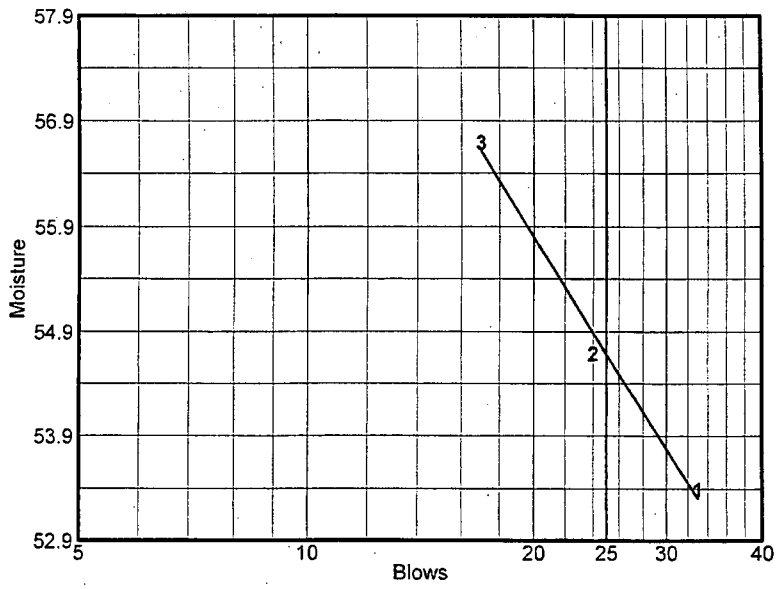
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
ject Number: 5050-06-0496

Sample Data

Source: B-909
Sample No.: UD-6
Elev. or Depth: 93' to 95' **Sample Length(in./cm.):**
Location: B-909
Description: Fat Clay
Date: 2-20-07 **Natural Moisture:** 17.9
USCS Class.: CH **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed by: MH
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	35.30	31.10	36.70			
Dry+Tare	27.07	24.20	27.36			
Tare	11.67	11.59	10.89			
# Blows	33	24	17			
Moisture	53.4	54.7	56.7			

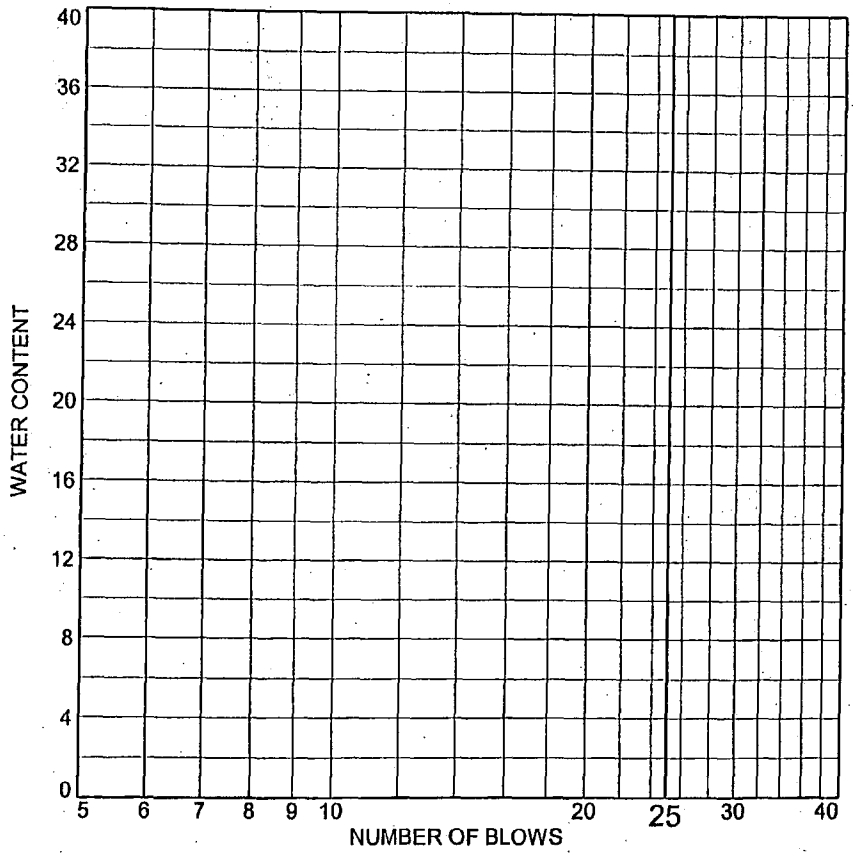


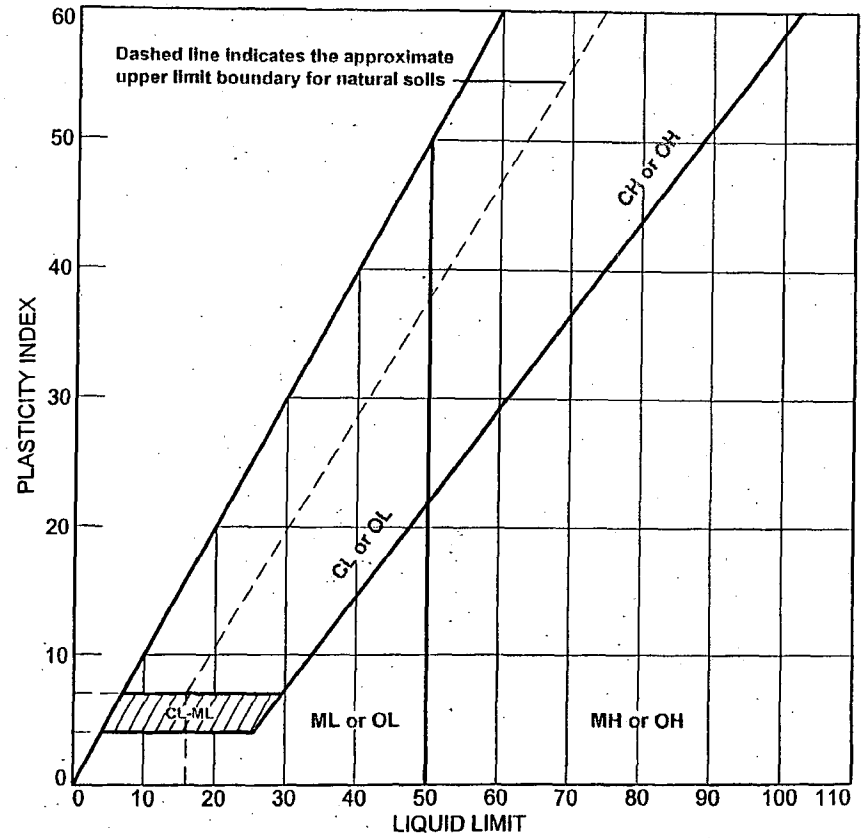
Liquid Limit= 55
Plastic Limit= 21
Plasticity Index= 34

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	18.64	20.34			
Dry+Tare	17.25	18.70			
Tare	10.69	11.00			
Moisture	21.2	21.3			

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 911	STP-311 (SS-12)	23.5'-25.0'	12/14/2006	ML	Silt	28.4	NV	NP

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC Reviewed By:RF KAW 4/3/07

ASTM D4318-05

4-3-07

KAW 4/3/07

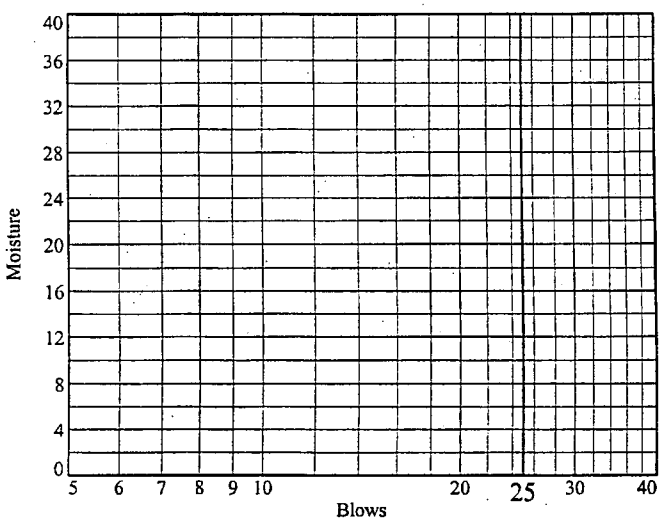
LIQUID AND PLASTIC LIMIT TEST DATA

4/1/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 911
Depth: 23.5'-25.0' **Sample Number:** STP-311 (SS-12)
Material Description: Silt
Date: 12/14/2006 **USCS Class.:** ML **AASHTO Class.:** A-4(0)
Testing Remarks: Tested By:AC Reviewed By:RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare						
Dry+Tare						
Tare						
# Blows						
Moisture						



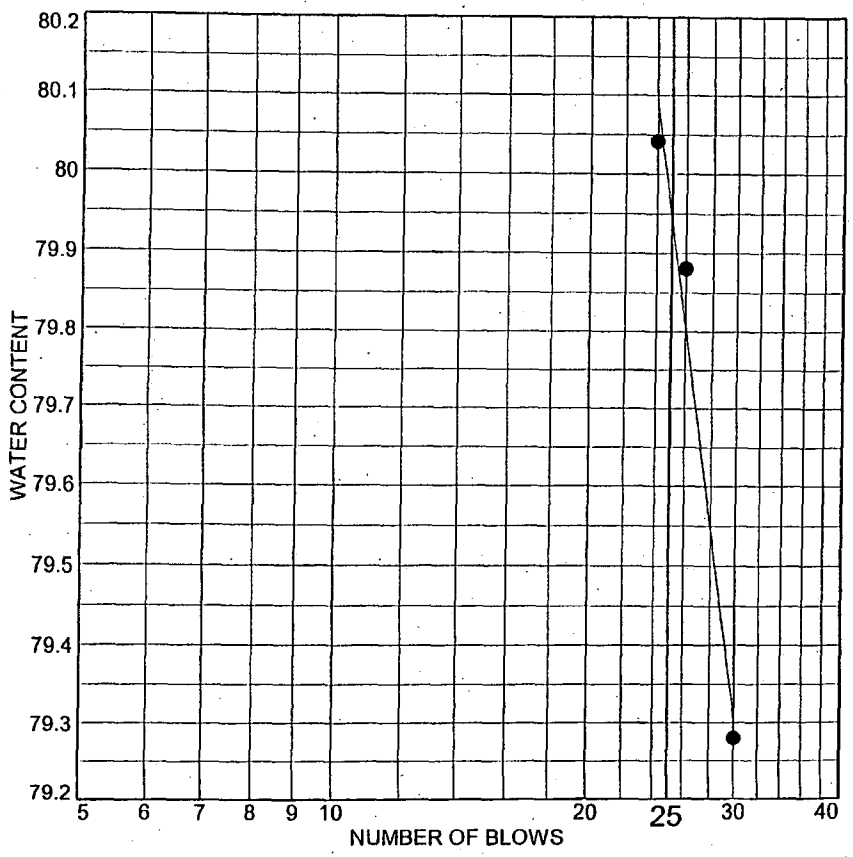
Liquid Limit= NV
Plastic Limit= NP
Plasticity Index= NP
Natural Moisture= 28.4

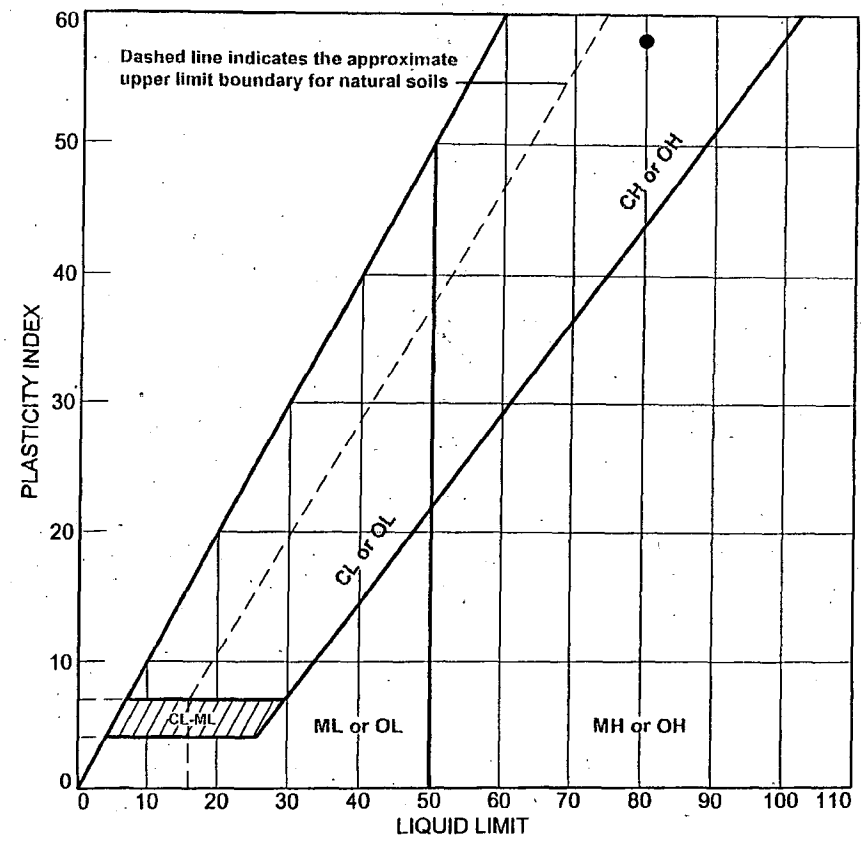
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare					
Dry+Tare					
Tare					
Moisture					

MA 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 912	STP-213	7.5'-9.0'	12/13/2006	CH	Fat Clay	28.5	80	58
		(SS-6)							

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:MH Reviewed By:RF

ASTM D4318-05

MH 4-3-07

KAW 4/3/07

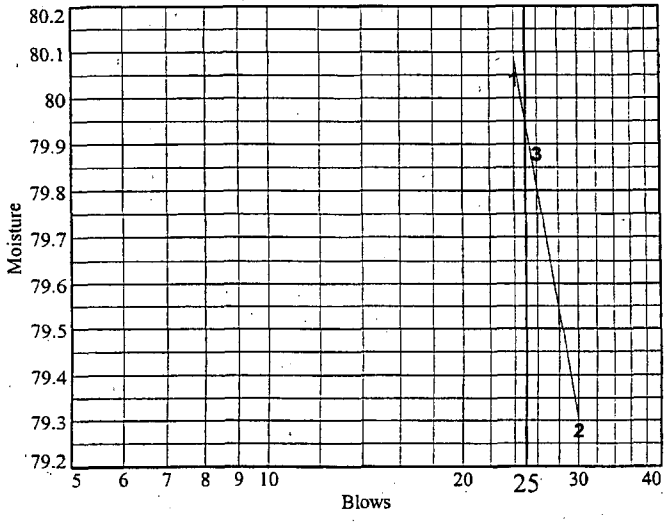
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 912
Depth: 7.5'-9.0'
Sample Number: STP-213 (SS-6)
Material Description: Fat Clay
Date: 12/13/2006
USCS Class.: CH
Testing Remarks: Tested By:MH Reviewed By:RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	36.85	37.97	37.06			
Dry+Tare	33.00	33.57	33.05			
Tare	28.19	28.02	28.03			
# Blows	24	30	26			
Moisture	80.0	79.3	79.9			



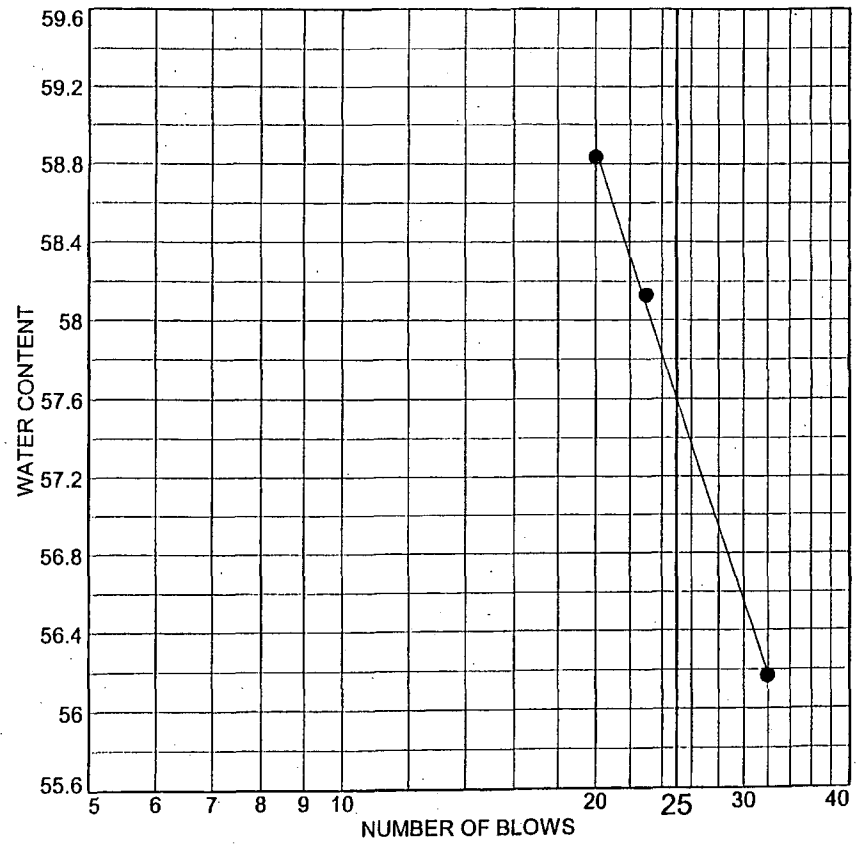
Liquid Limit= 80
Plastic Limit= 22
Plasticity Index= 58
Natural Moisture= 28.5
Liquidity Index= 0.1

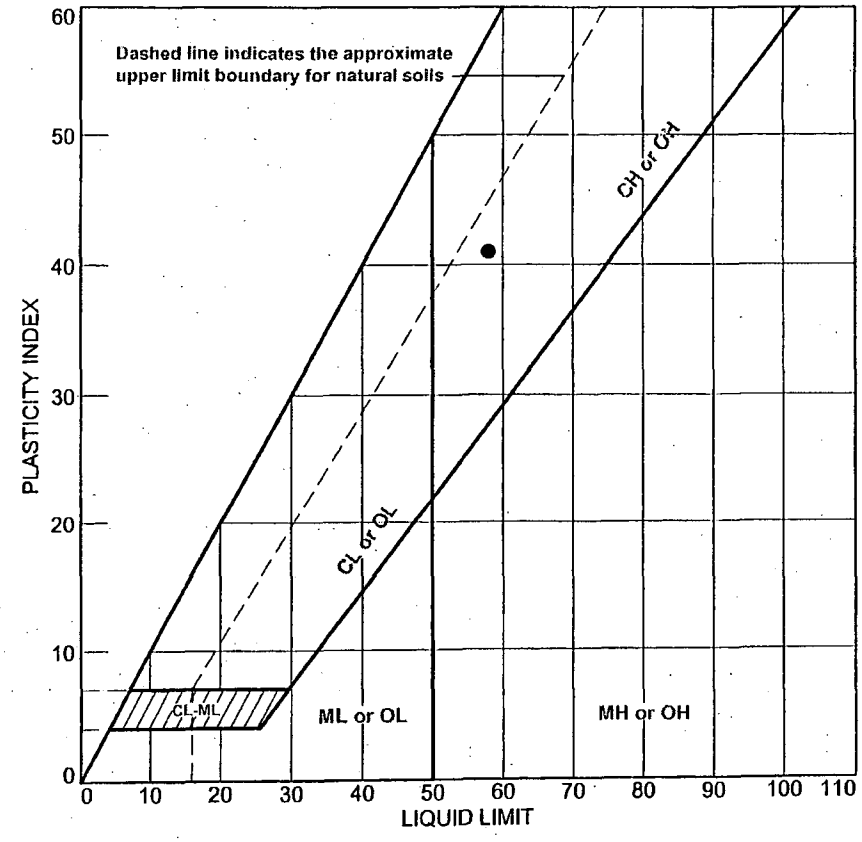
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	34.76	35.69			
Dry+Tare	33.55	34.33			
Tare	28.08	28.22			
Moisture	22.1	22.3			

NM 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 912	STP-214	13.5'-15.0'	12/13/2006	CH	Fat Clay	17.2	58	41
		(SS-10)							

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC Reviewed By:RF

ASTM D4318-05

4-3-07

KAW 4/3/07

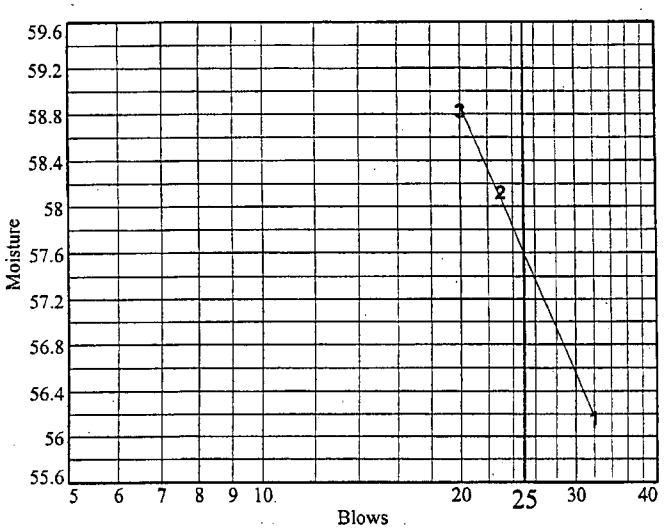
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 912
Depth: 13.5'-15.0'
Sample Number: STP-214 (SS-10)
Material Description: Fat Clay
Date: 12/13/2006
USCS Class.: CH
Testing Remarks: Tested By:AC Reviewed By:RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	36.34	36.45	33.08			
Dry+Tare	33.38	33.41	29.85			
Tare	28.11	28.18	24.36			
# Blows	32	23	20			
Moisture	56.2	58.1	58.8			



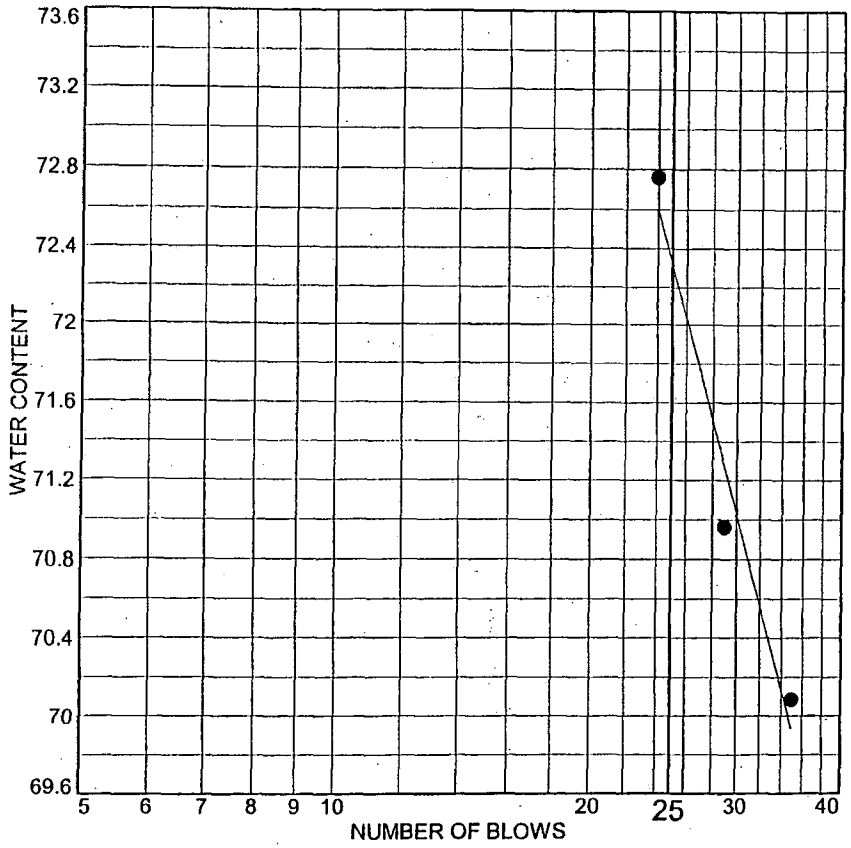
Liquid Limit= 58
Plastic Limit= 17
Plasticity Index= 41
Natural Moisture= 17.2
Liquidity Index= 0.0

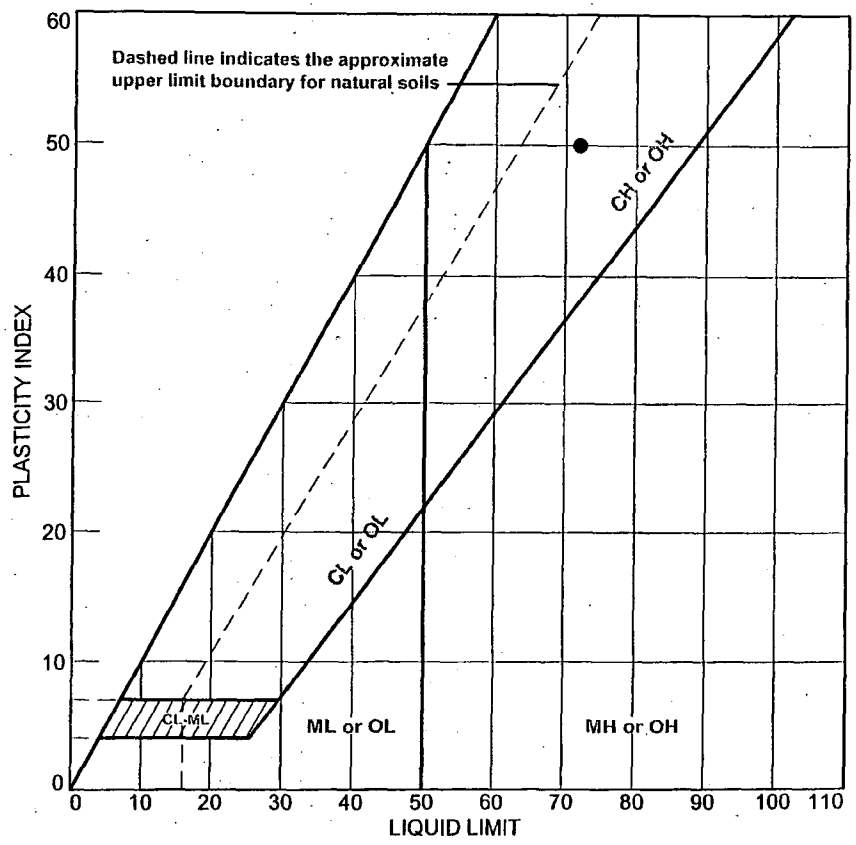
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	35.76	35.88			
Dry+Tare	34.66	34.81			
Tare	28.11	28.38			
Moisture	16.8	16.6			

MM 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 912	STP-220 (SS-19)	58.5'-60.0'	12/13/2006	CH	Fat Clay	25.9	72	50

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:MH/TH
ASTM D4318-05

Reviewed By:RF

MH 4-3-07

KAW 3/4/07

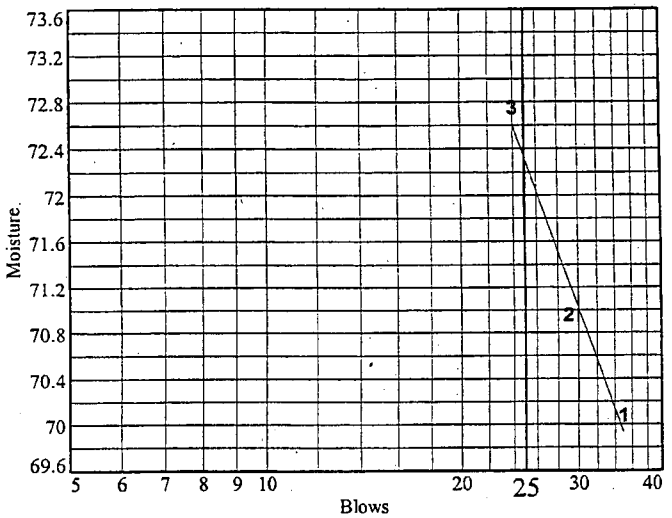
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 912
Depth: 58.5'-60.0'
Sample Number: STP-220 (SS-19)
Material Description: Fat Clay
Date: 12/13/2006
USCS Class.: CH
Testing Remarks: Tested By:MH/TH Reviewed By:RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	38.25	37.47	37.85			
Dry+Tare	34.08	32.46	33.71			
Tare	28.13	25.40	28.02			
# Blows	35	29	24			
Moisture	70.1	71.0	72.8			



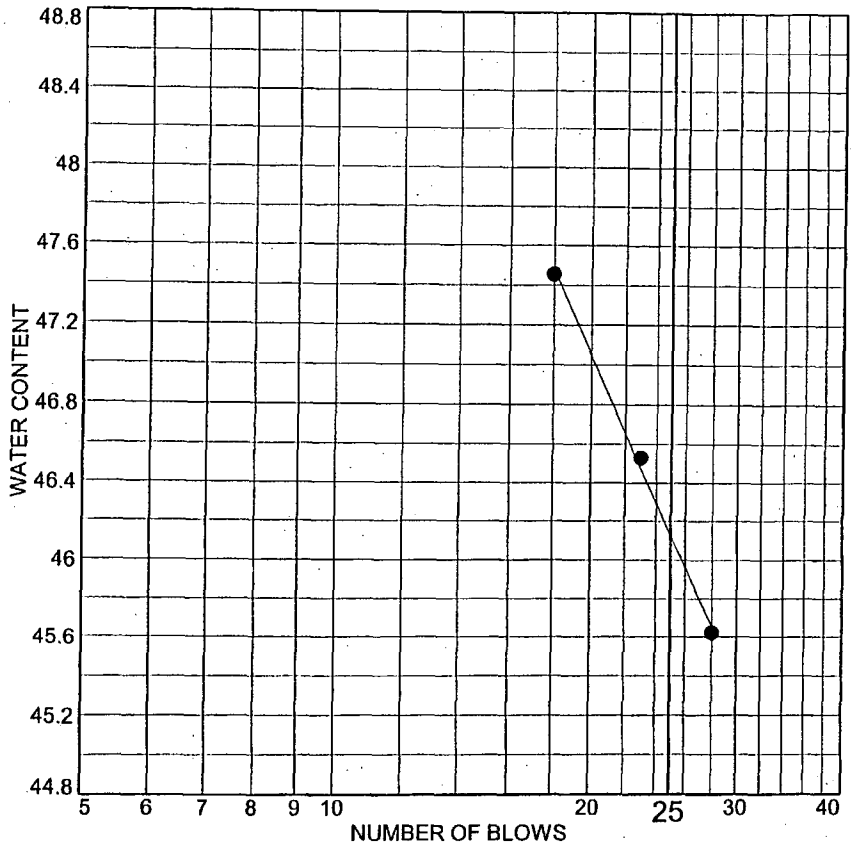
Liquid Limit= 72
Plastic Limit= 22
Plasticity Index= 50
Natural Moisture= 25.9
Liquidity Index= 0.1

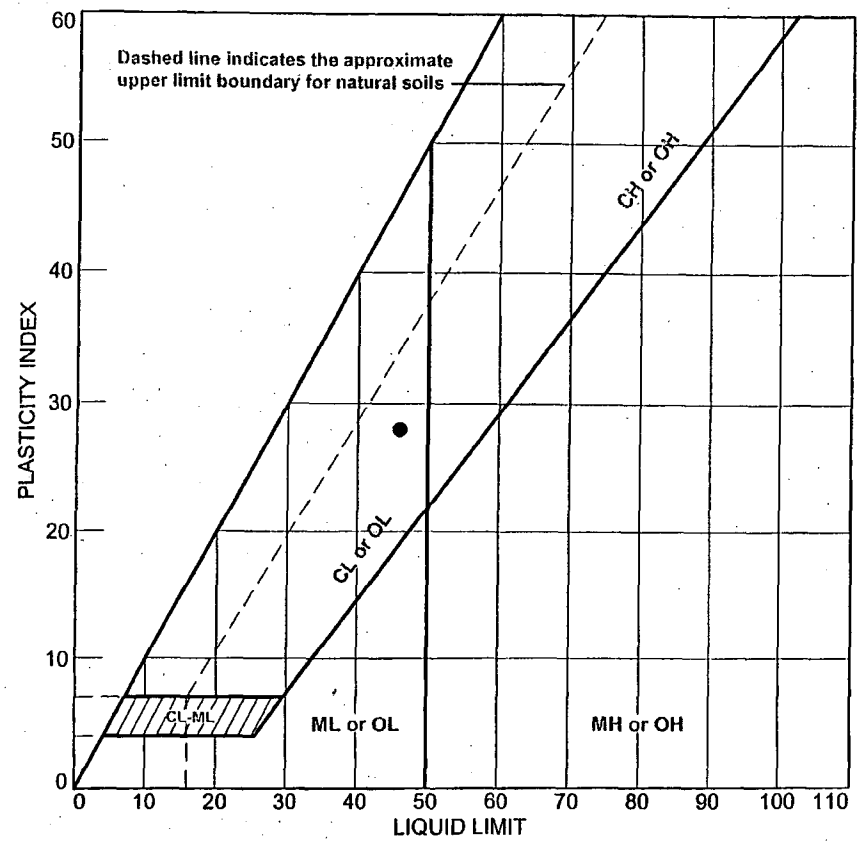
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	38.33	38.84			
Dry+Tare	36.48	36.85			
Tare	28.11	27.90			
Moisture	22.1	22.2			

MA 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 912	STP-222	68.5'-70.0'	12/13/2006	CL	Lean Clay	19.2	46	28
		(SS-21)							

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC/TH
ASTM D4318-05

Reviewed By:RF

4-3-07

KAW 4/3/07

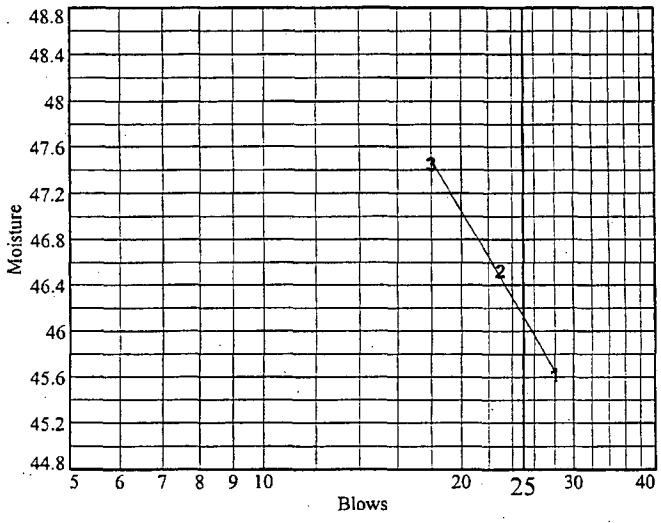
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 912
Depth: 68.5'-70.0'
Sample Number: STP-222 (SS-21)
Material Description: Lean Clay
Date: 12/13/2006
USCS Class.: CL
Testing Remarks: Tested By:AC/TH Reviewed By:RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	36.71	36.54	37.04			
Dry+Tare	34	33.59	34.15			
Tare	28.06	27.25	28.06			
# Blows	28	23	18			
Moisture	45.6	46.5	47.5			



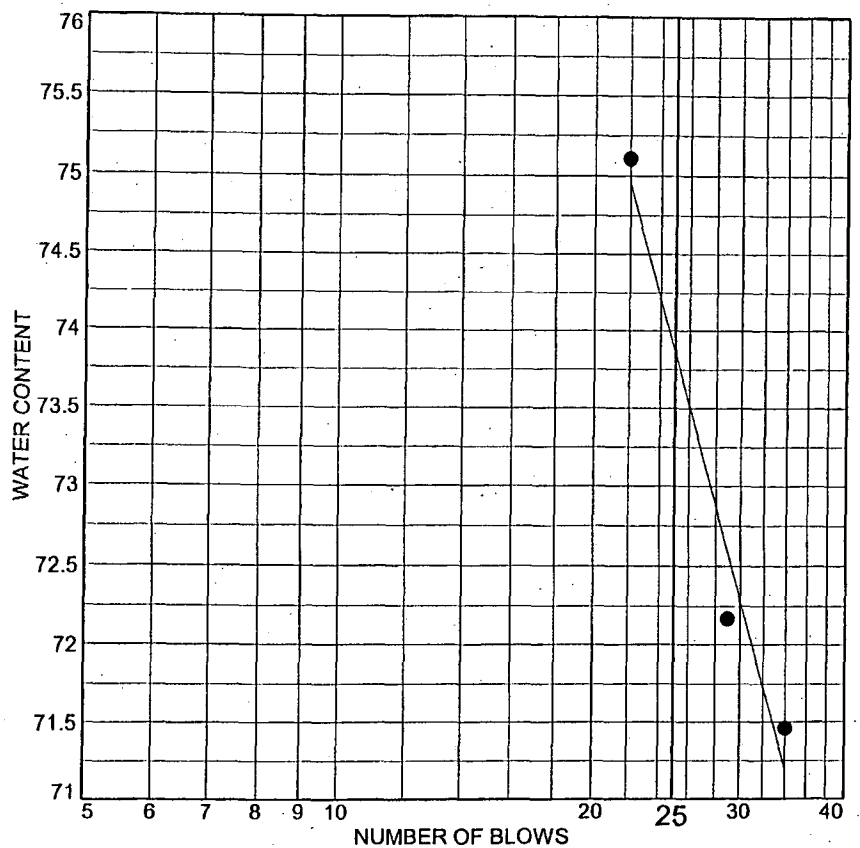
Liquid Limit= 46
Plastic Limit= 18
Plasticity Index= 28
Natural Moisture= 19.2
Liquidity Index= 0.0

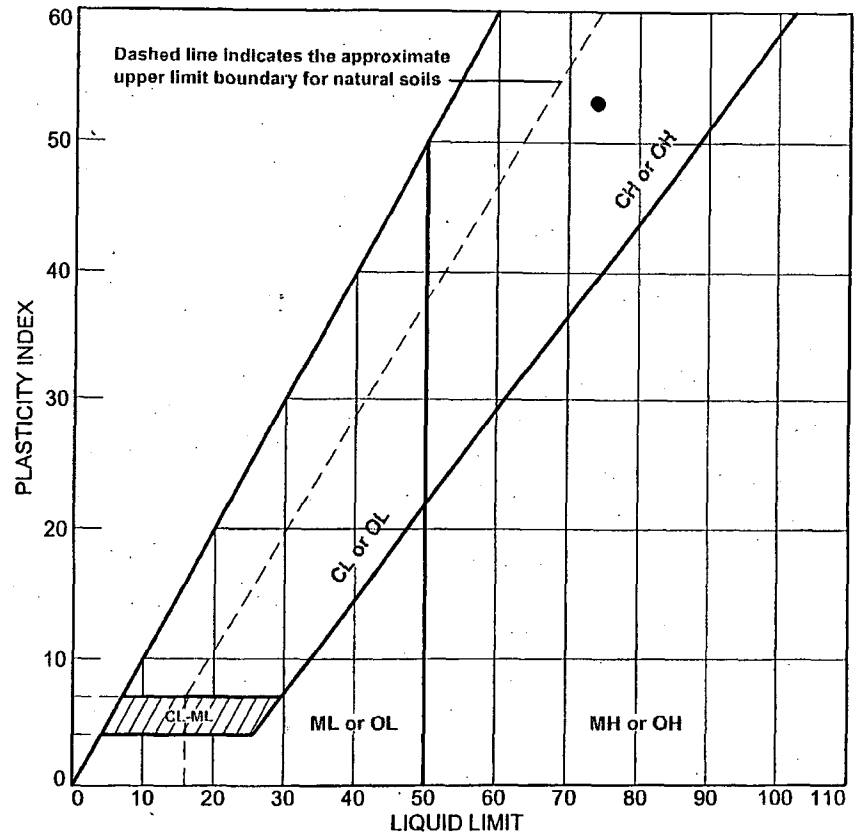
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	42.21	41.08			
Dry+Tare	40.09	38.99			
Tare	28.18	27.25			
Moisture	17.8	17.8			

MAK 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 912	STP-225	83.5'-85.0'	12/13/2006	CH	Fat Clay	25.0	74	53
		(SS-24)							

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC Reviewed By:RF

ASTM D4318-05

4-3-07

KAW 4/3/07

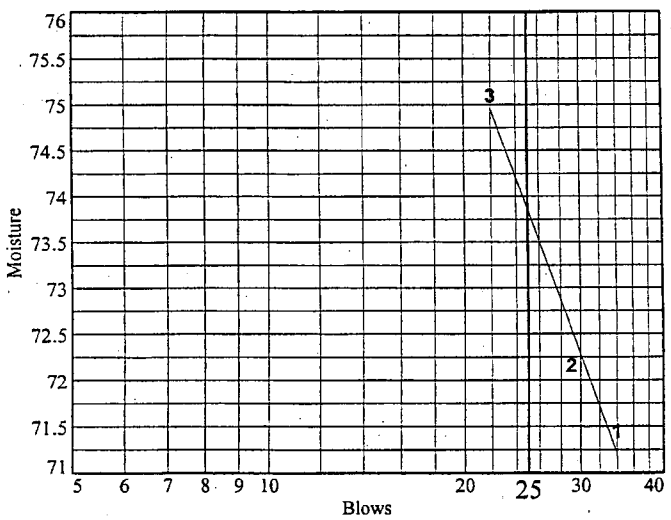
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 912
Depth: 83.5'-85.0' **Sample Number:** STP-225 (SS-24)
Material Description: Fat Clay
Date: 12/13/2006 **USCS Class.:** CH
Testing Remarks: Tested By:AC Reviewed By:RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	36.22	37.24	36.58			
Dry+Tare	32.94	33.48	33.02			
Tare	28.35	28.27	28.28			
# Blows	34	29	22			
Moisture	71.5	72.2	75.1			



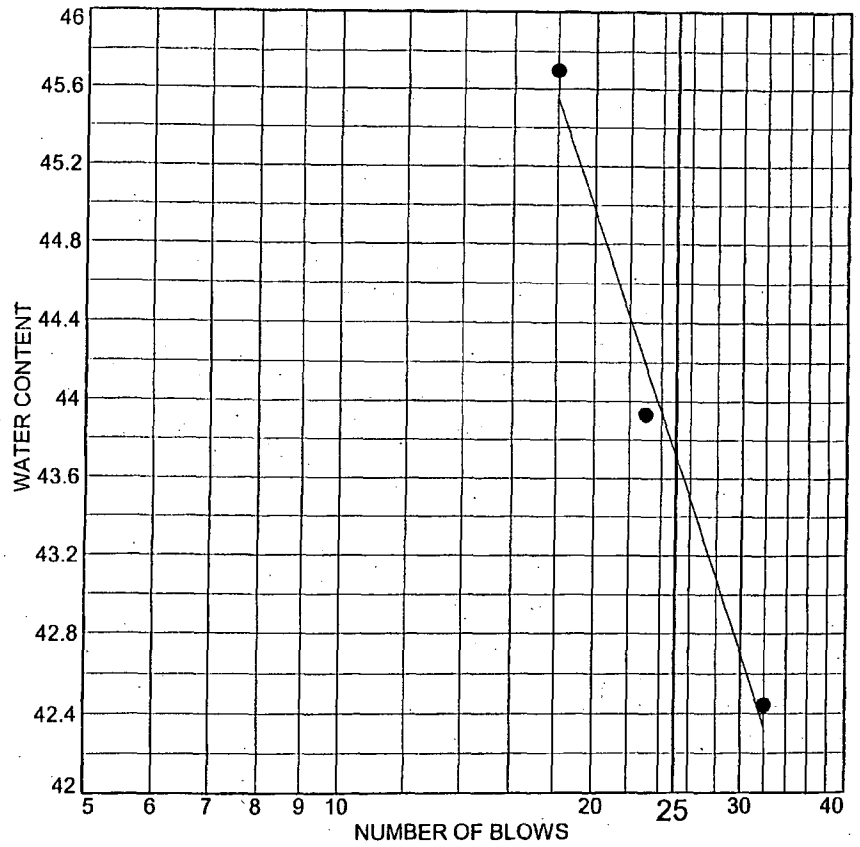
Liquid Limit= 74
Plastic Limit= 21
Plasticity Index= 53
Natural Moisture= 25.0
Liquidity Index= 0.1

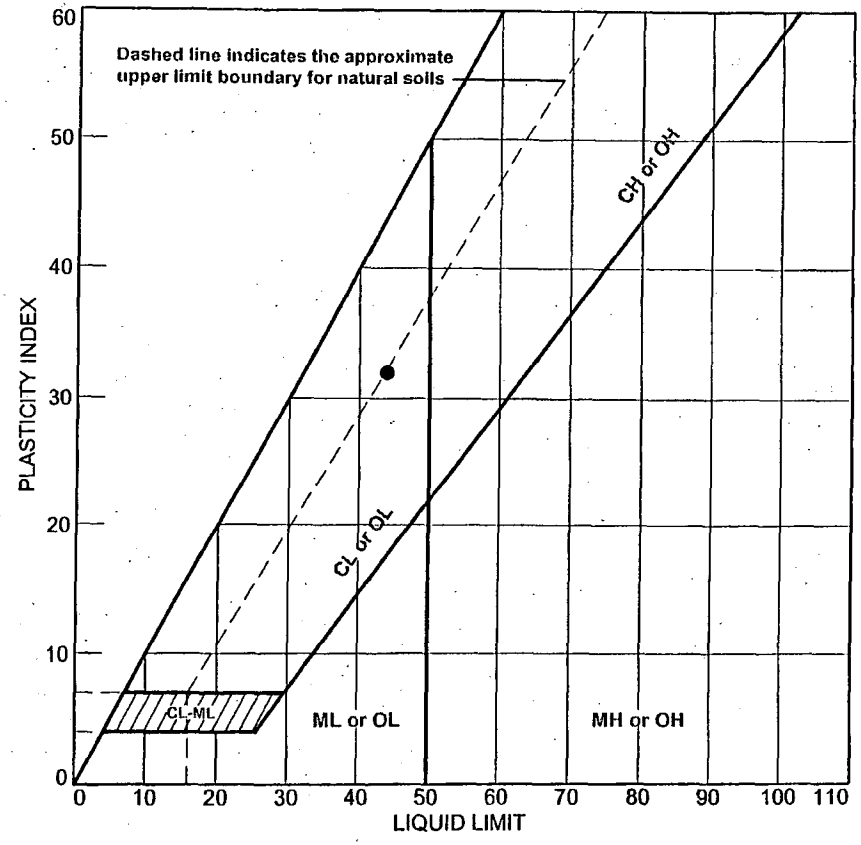
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	39.52	39.83			
Dry+Tare	37.57	37.85			
Tare	28.19	28.35			
Moisture	20.8	20.8			

MAK 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 914	STP-229	4.5'-6.0'	12/12/2006	CL	Lean Clay	16.5	44	32
		(SS-4)							

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC Reviewed By:RF

ASTM D4318-05

MA 4-3-07

KAW 4/3/07

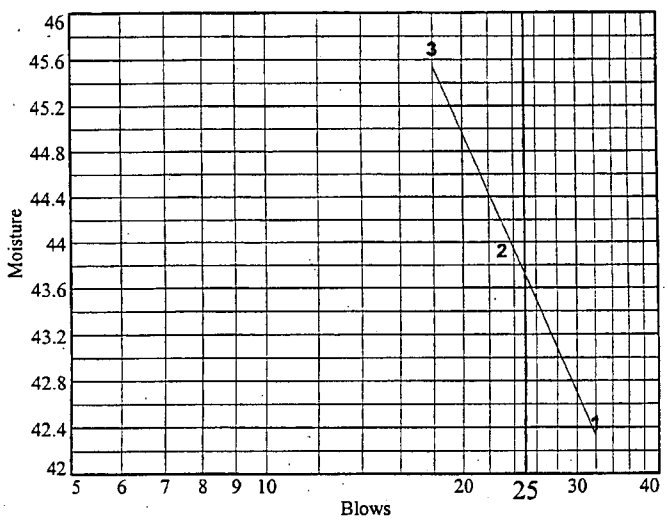
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 914
Depth: 4.5'-6.0' **Sample Number:** STP-229 (SS-4)
Material Description: Lean Clay
Date: 12/12/2006 **USCS Class.:** CL
Testing Remarks: Tested By:AC Reviewed By:RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	37.56	38.82	38.42			
Dry+Tare	34.78	35.49	35.34			
Tare	28.23	27.91	28.60			
# Blows	32	23	18			
Moisture	42.4	43.9	45.7			



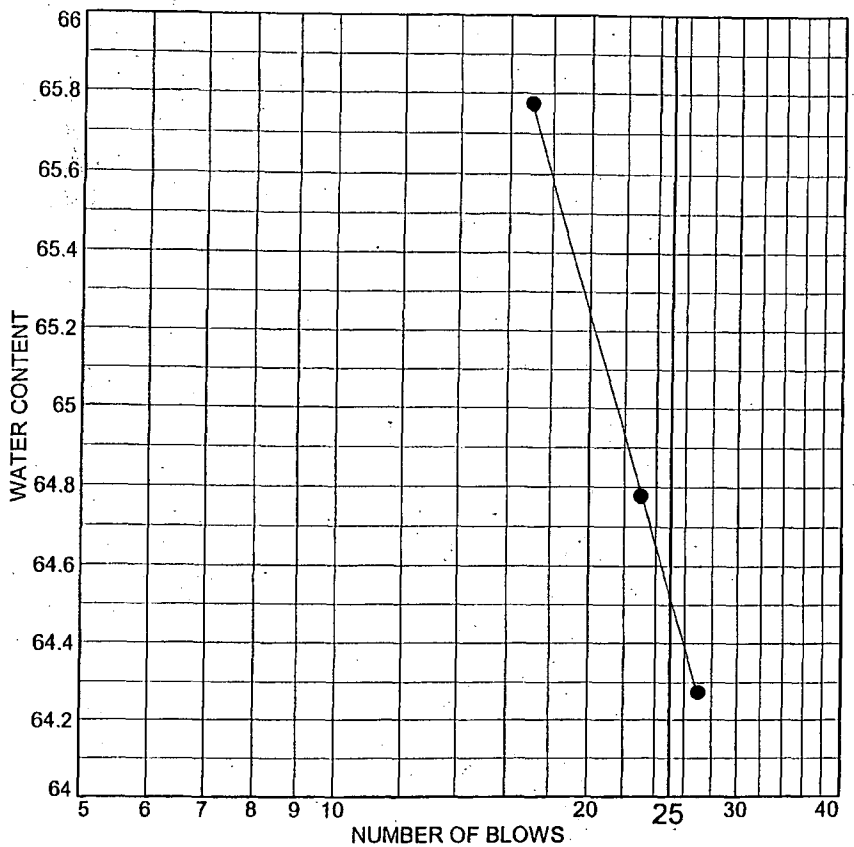
Liquid Limit= 44
Plastic Limit= 12
Plasticity Index= 32
Natural Moisture= 16.5
Liquidity Index= 0.1

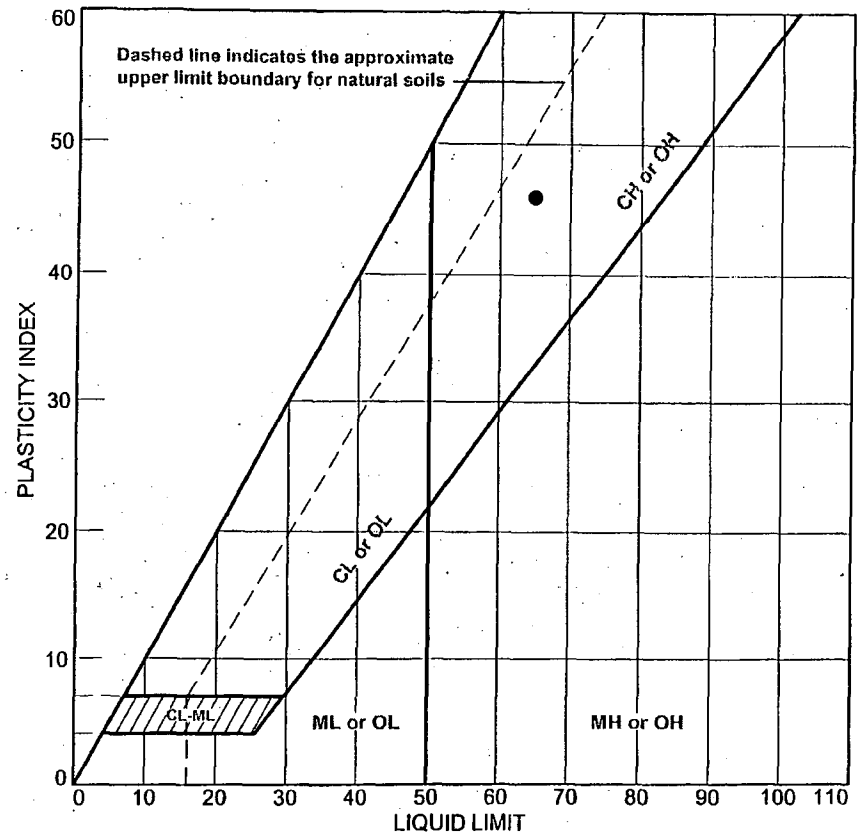
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	35.62	34.46			
Dry+Tare	34.83	33.68			
Tare	28.25	27.12			
Moisture	12.0	11.9			

NM 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 914	STP-233	18.5'-20.0'	12/12/2006	CH	Fat Clay	24.4	65	46
		(SS-11)							

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC/MH
ASTM D4318-05

Reviewed By:RF

MH 4-3-07

KAW 4/3/07

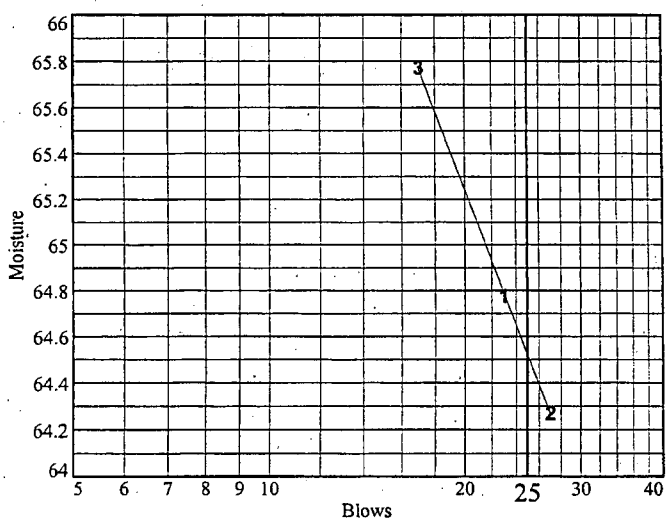
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 914
Depth: 18.5'-20.0' **Sample Number:** STP-233 (SS-11)
Material Description: Fat Clay
Date: 12/12/2006 **USCS Class.:** CH
Testing Remarks: Tested By:AC/MH Reviewed By:RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	36.51	37.44	36.70			
Dry+Tare	32.85	33.77	33.26			
Tare	27.20	28.06	28.03			
# Blows	23	27	17			
Moisture	64.8	64.3	65.8			



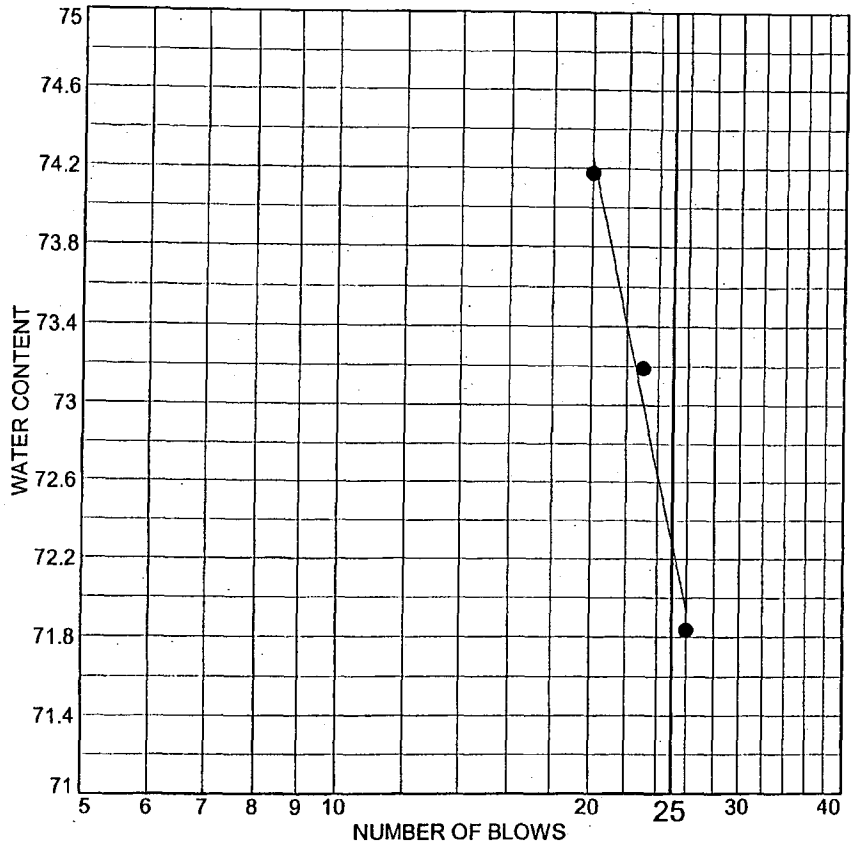
Liquid Limit= 65
Plastic Limit= 19
Plasticity Index= 46
Natural Moisture= 24.4
Liquidity Index= 0.1

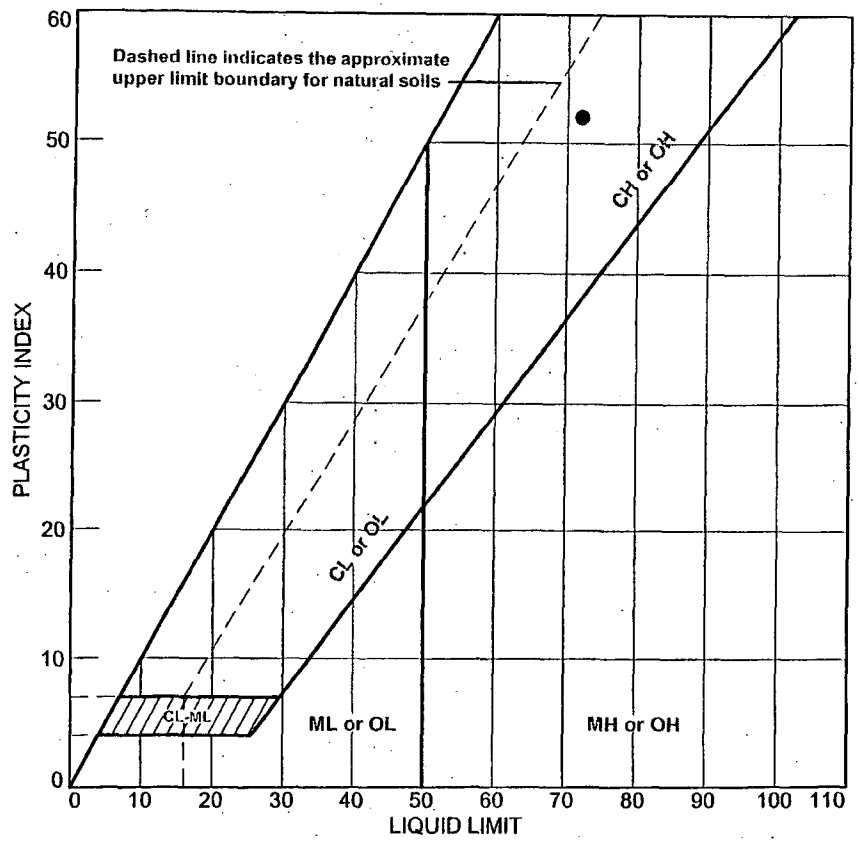
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	34.81	35.87			
Dry+Tare	33.61	34.66			
Tare	27.24	28.05			
Moisture	18.8	18.3			

MM 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 914	STP-238 (SS-16)	43.5'-45.0'	12/12/2006	CH	Fat Clay	28.1	72	52

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC/TH
ASTM D4318-05

Reviewed By:RF

NM
4-30-07

KAW 4/3/07

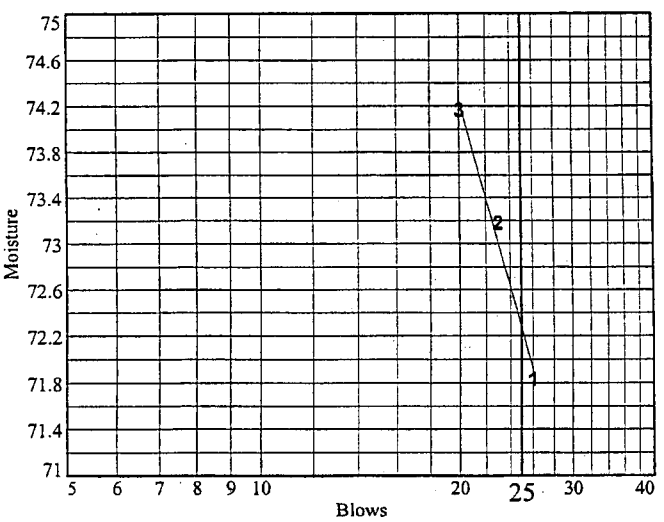
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 914
Depth: 43.5'-45.0'
Sample Number: STP-238 (SS-16)
Material Description: Fat Clay
Date: 12/12/2006
USCS Class.: CH
Testing Remarks: Tested By:AC/TH
Reviewed By:RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	36.42	35.14	37.31			
Dry+Tare	32.9	32.11	33.49			
Tare	28	27.97	28.34			
# Blows	26	23	20			
Moisture	71.8	73.2	74.2			



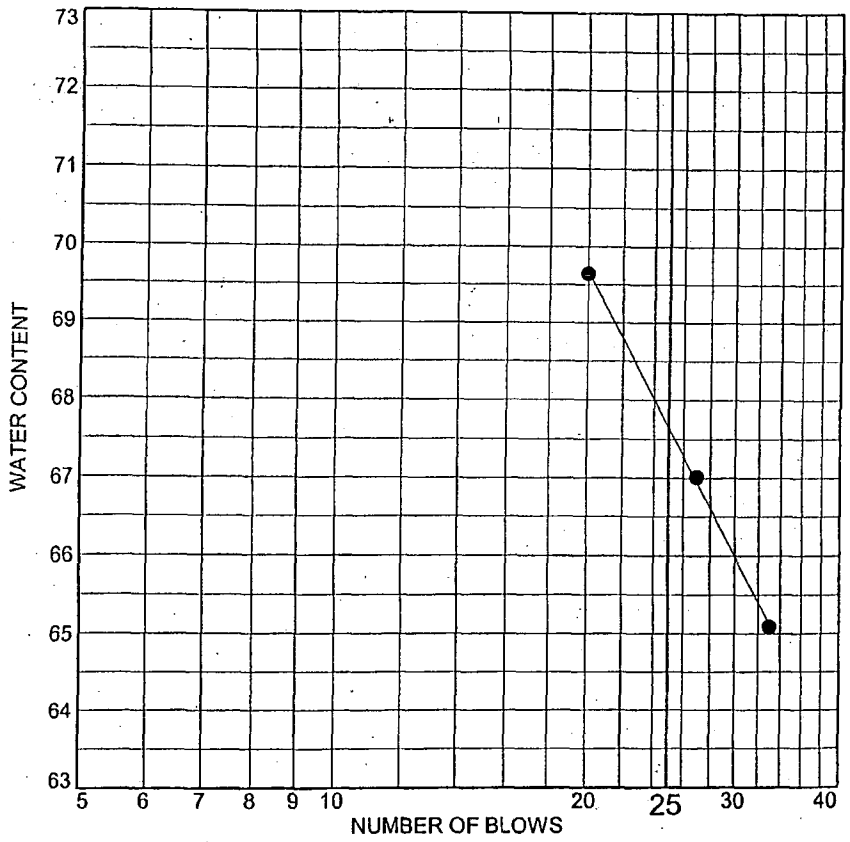
Liquid Limit= 72
Plastic Limit= 20
Plasticity Index= 52
Natural Moisture= 28.1
Liquidity Index= 0.2

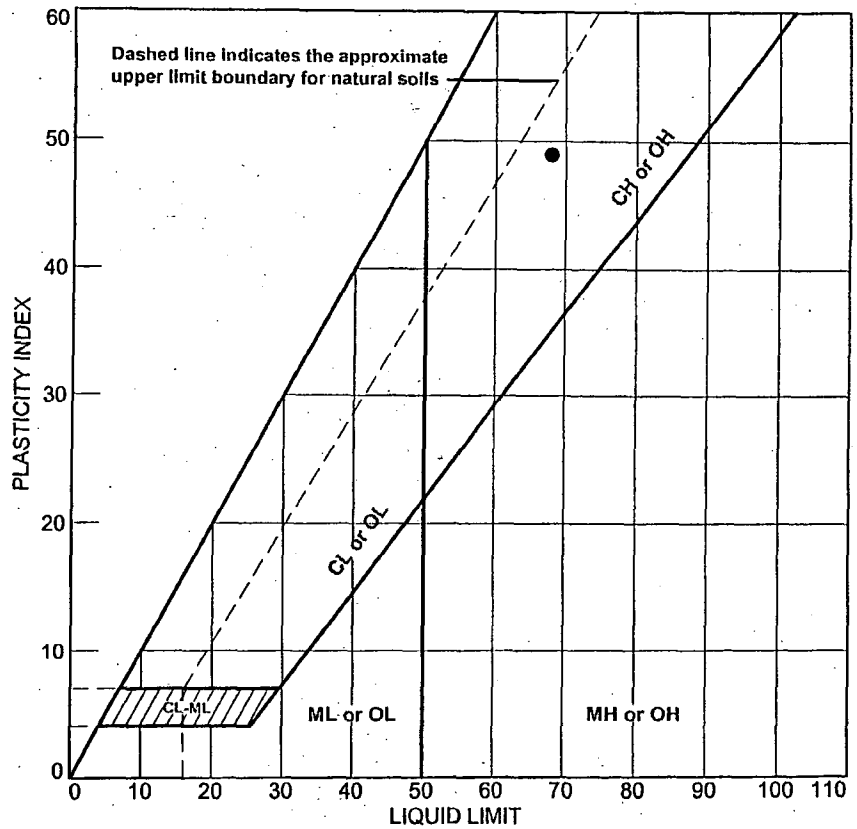
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	35.02	40.07			
Dry+Tare	33.67	38.04			
Tare	26.92	28.15			
Moisture	20.0	20.5			

MAT 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 914	STP-246	83.5'-85.0'	12/12/2006	CH	Fat Clay	22.3	68	49
		(SS-24)							

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC Reviewed By:RF

ASTM D4318-05

RF 3/30/07

KAW 4/1/07

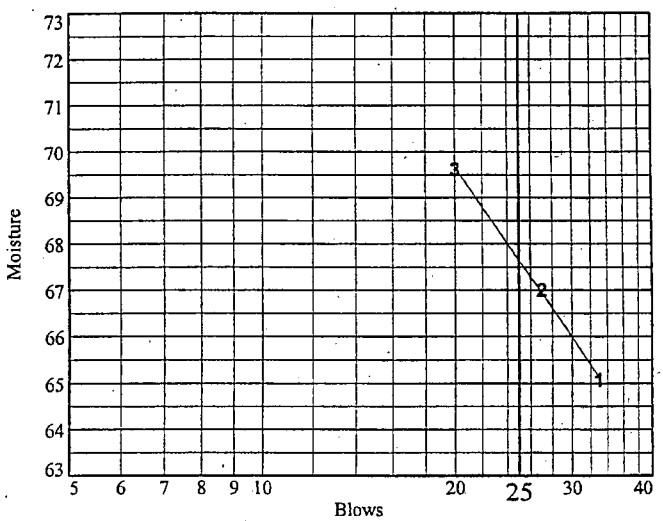
LIQUID AND PLASTIC LIMIT TEST DATA

3/30/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 914
Depth: 83.5'-85.0' **Sample Number:** STP-246 (SS-24)
Material Description: Fat Clay
Date: 12/12/2006 **USCS Class.:** CH
Testing Remarks: Tested By:AC Reviewed By:RF RF 3/30/07
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	36.63	35.25	36.33			
Dry+Tare	33.33	32.06	33.05			
Tare	28.26	27.30	28.34			
# Blows	33	27	20			
Moisture	65.1	67.0	69.6			



Liquid Limit= 68
Plastic Limit= 19
Plasticity Index= 49
Natural Moisture= 22.3
Liquidity Index= 0.1

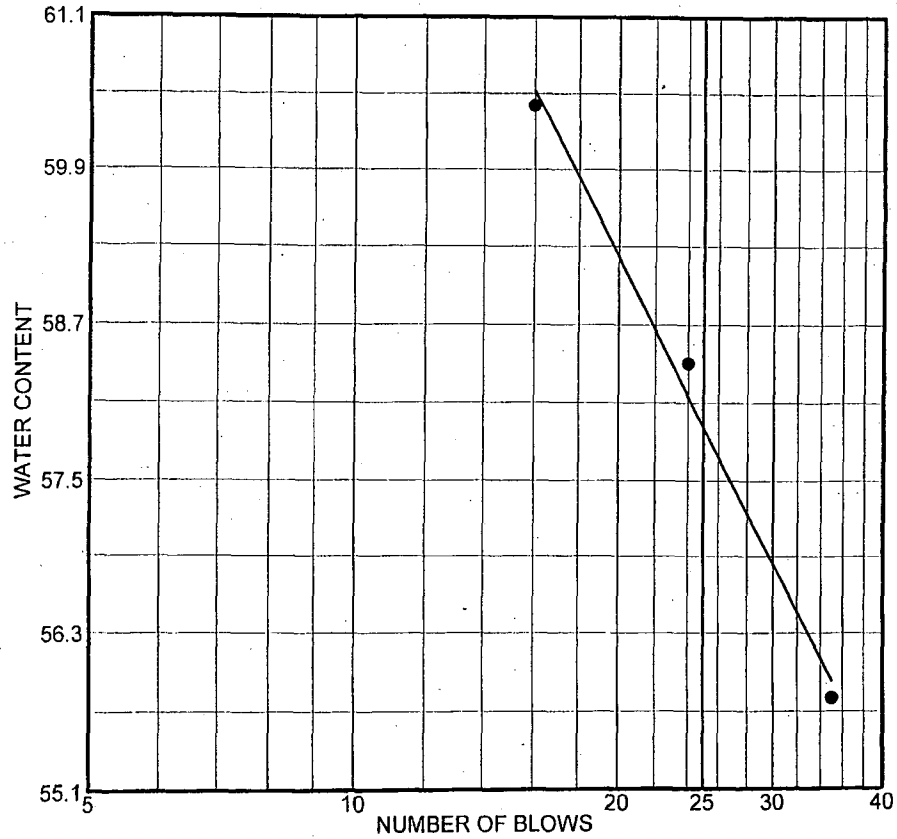
Plastic Limit Data

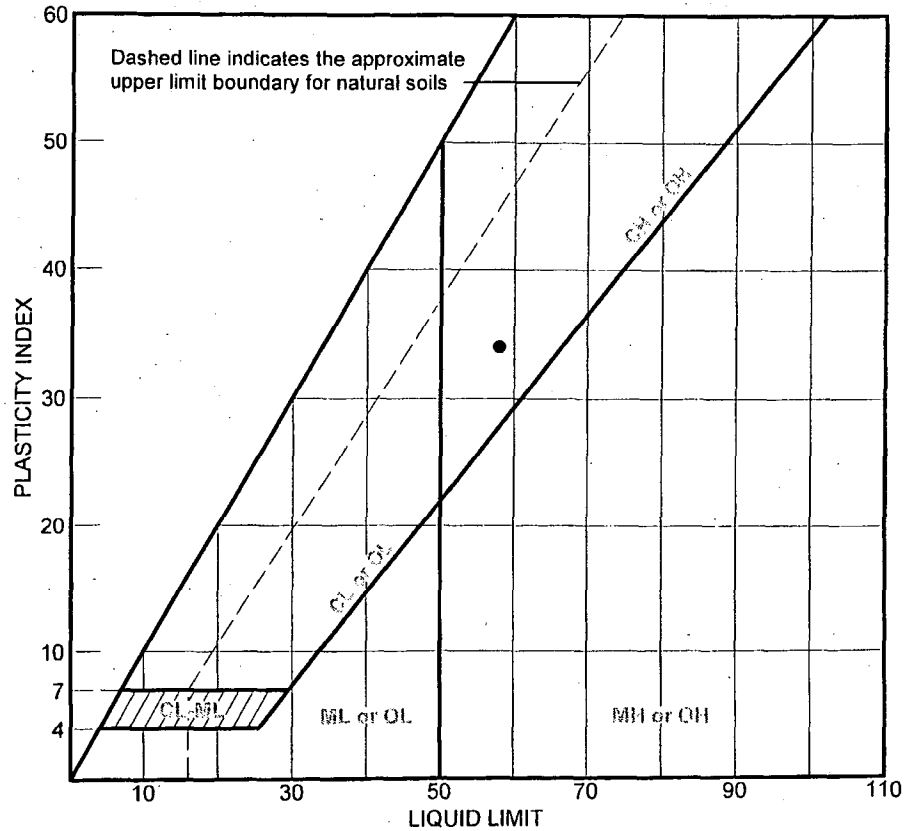
Run No.	1	2	3	4	
Wet+Tare	37.30	36.32			
Dry+Tare	35.88	35.06			
Tare	28.25	28.33			
Moisture	18.6	18.7			

Natural Moisture Data

Wet+Tare	Dry+Tare	Tare	Moisture
406.7	364.5	175.2	22.3

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-916	UD-1	13' to 15'	3-13-07	CH	Fat Clay	21.3	58	34

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496 | Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reviewed by: MH
ASTM D4318-05 KAW 4/13/07

KAW 4/13/07

LIQUID AND PLASTIC LIMIT TEST DATA

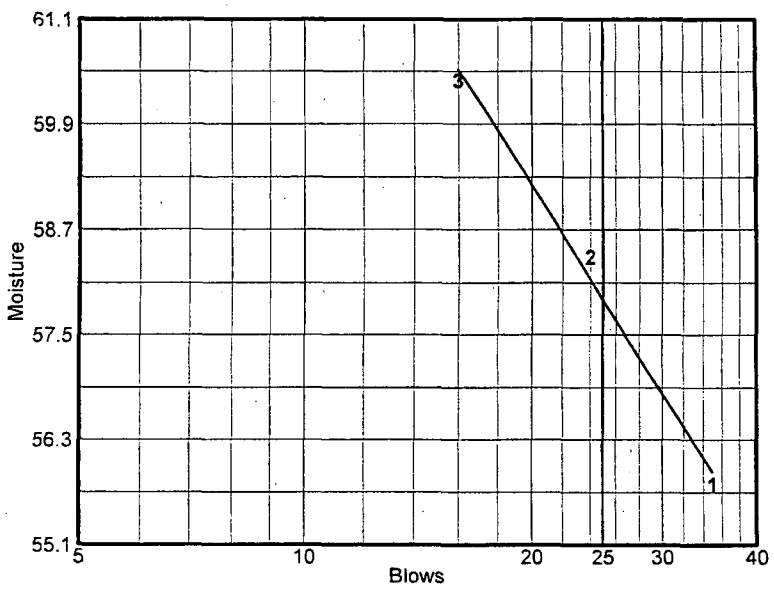
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496

Sample Data

Source: B-916
Sample No.: UD-1
Elev. or Depth: 13' to 15' **Sample Length(in./cm.):**
Location: B-916
Description: Fat Clay
Date: 3-13-07 **Natural Moisture:** 21.3
USCS Class.: CH **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed by: MH
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	22.12	22.54	22.93			
Dry+Tare	18.34	18.21	18.41			
Tare	11.57	10.80	10.93			
# Blows	35	24	16			
Moisture	55.8	58.4	60.4			

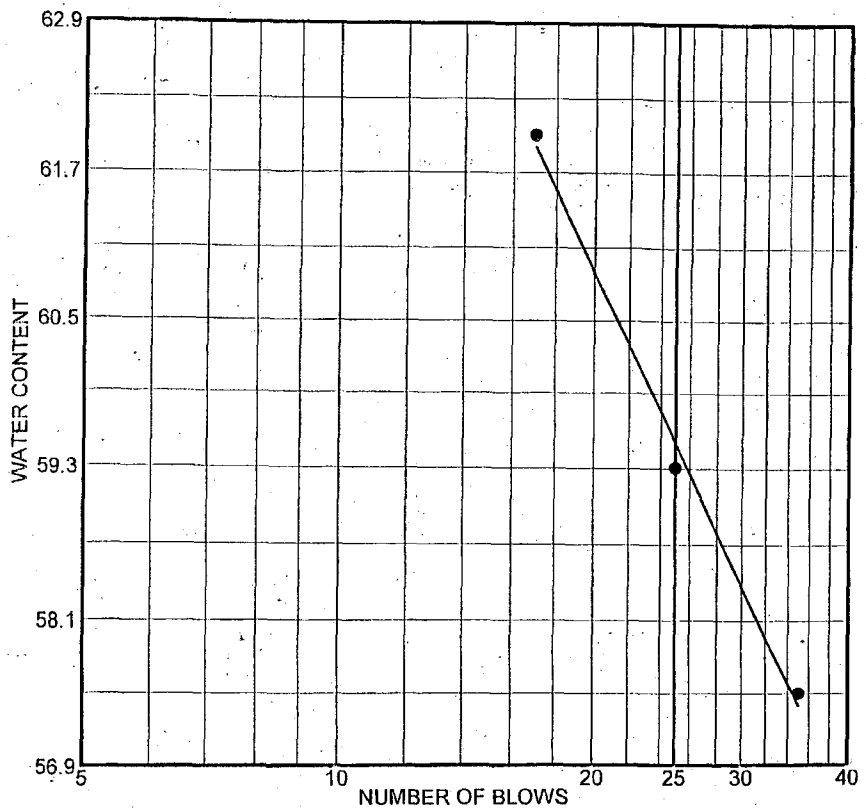


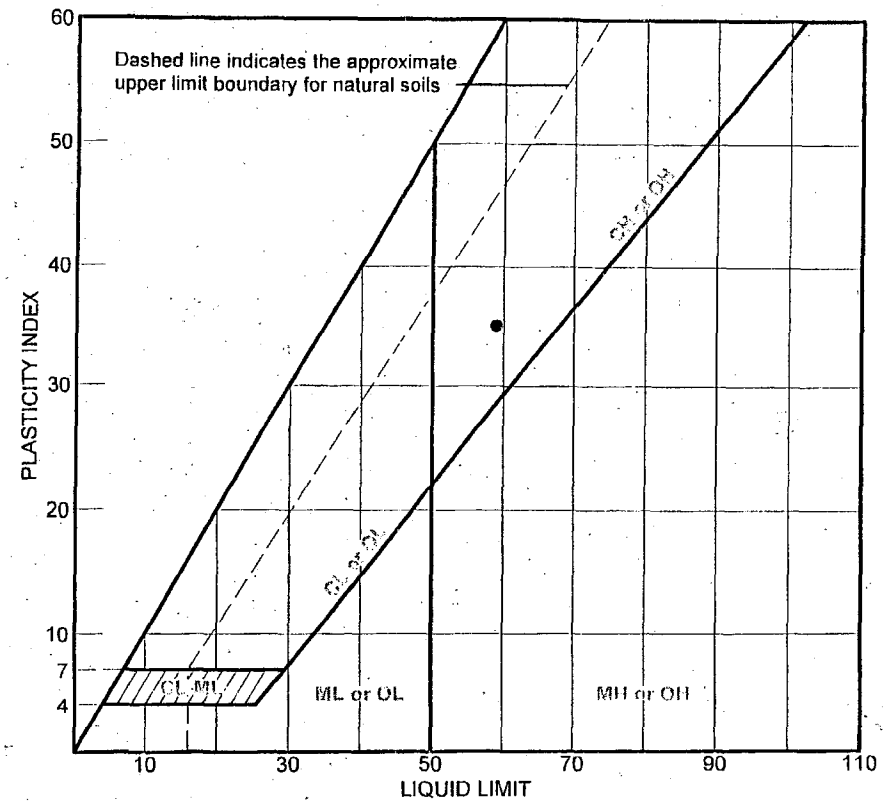
Liquid Limit= 58
Plastic Limit= 24
Plasticity Index= 34

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	21.36	20.08			
Dry+Tare	19.34	18.34			
Tare	10.79	10.98			
Moisture	23.6	23.6			

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-916	UD-3	48' to 50'	3-22-07	CH	Fat Clay	22.5	59	35

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496 | Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reviewed by: MH
ASTM D4318-05

KAW 4/3/07

KAW 3/31/07

LIQUID AND PLASTIC LIMIT TEST DATA

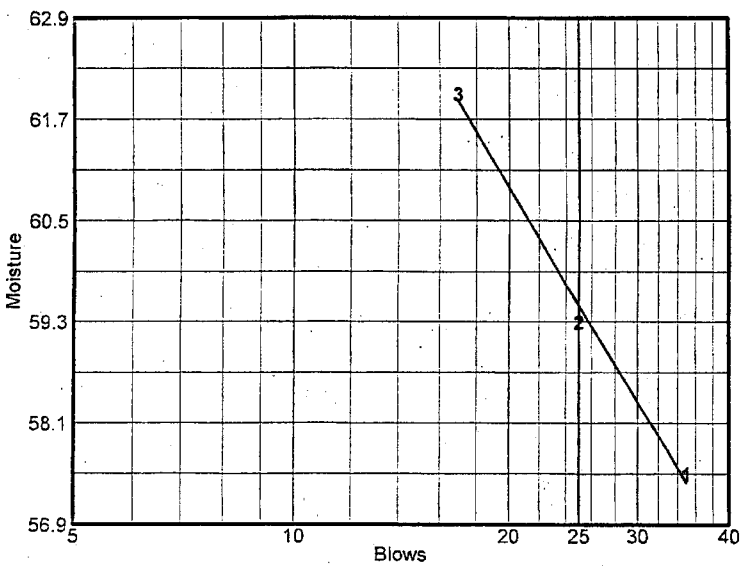
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496

Sample Data

Source: B-916
Sample No.: UD-3
Elev. or Depth: 48' to 50' **Sample Length(in./cm.):**
Location: B-916
Description: Fat Clay
Date: 3-22-07 **Natural Moisture:** 22.5
USCS Class.: CH **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed by: MH
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	27.85	29.57	31.72			
Dry+Tare	21.66	22.64	24.00			
Tare	10.90	10.95	11.54			
# Blows	35	25	17			
Moisture	57.5	59.3	62.0			

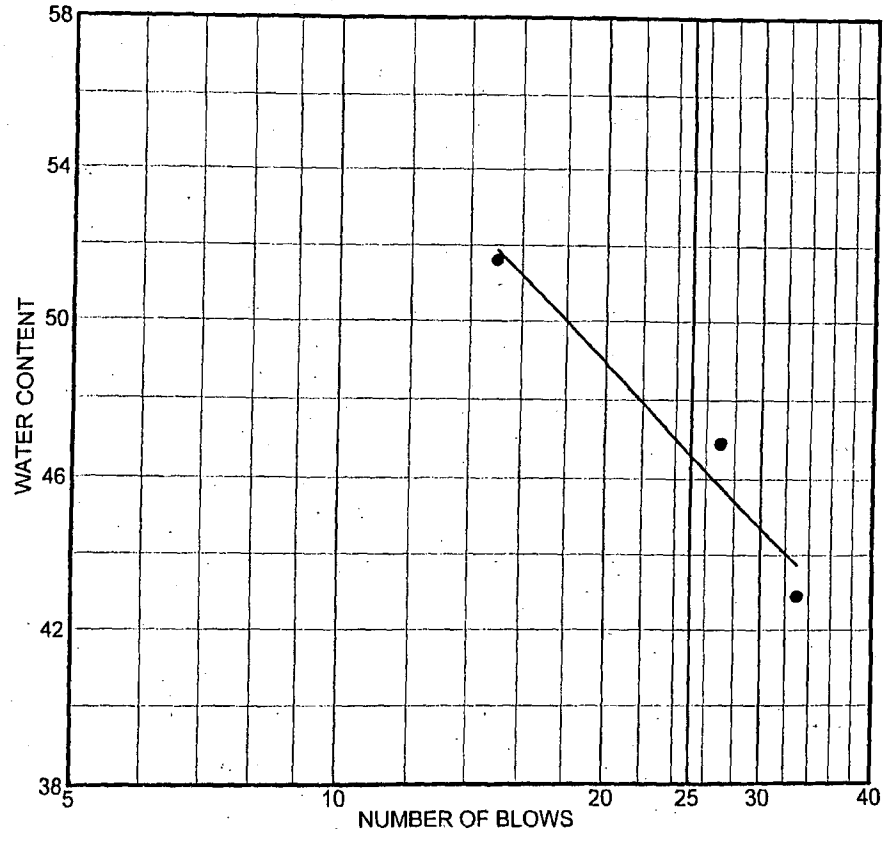


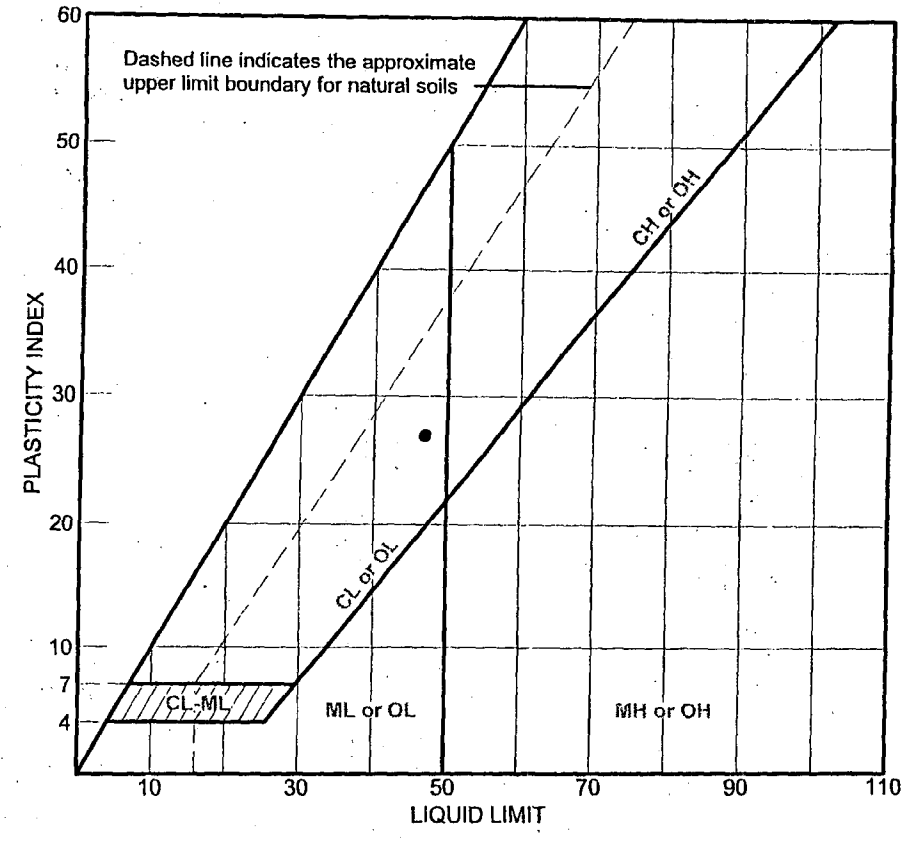
Liquid Limit= 59
Plastic Limit= 24
Plasticity Index= 35

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	23.02	20.96			
Dry+Tare	20.71	18.99			
Tare	10.87	10.72			
Moisture	23.5	23.8			

LIQUID AND PLASTIC LIMITS TEST REPORT ASTM D 4318-04





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-918	UD-2	18-20	12/16/06	CL	Lean Clay	23.4	47	27

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050060486 | Lab no. 7329

MACTEC ENGINEERING AND CONSULTING, INC.

● Tested by: BM Reviewed by; HJ

HJ 4/4/07

KAW 4/3/07

LIQUID AND PLASTIC LIMIT TEST DATA

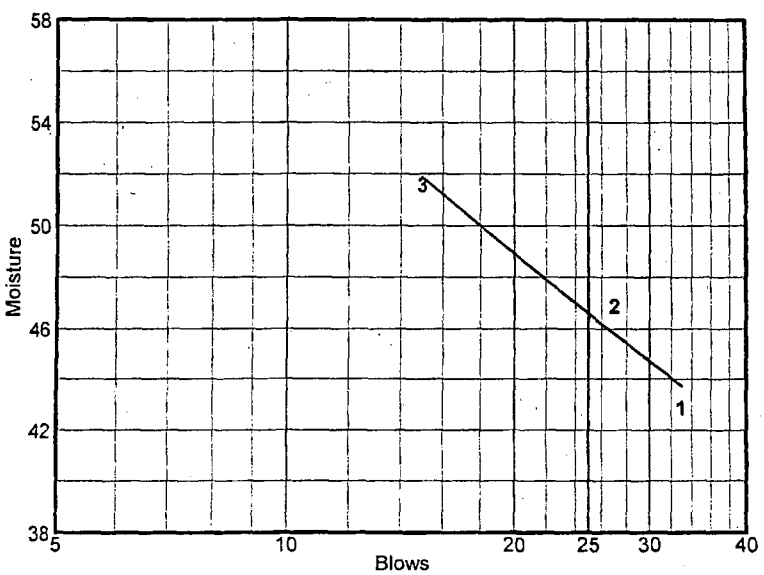
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050060486

Sample Data

Source: B-918
Sample No.: UD-2
Elev. or Depth: 18-20 **Sample Length(in./cm.):** 7329
Location: B-918
Description: Lean Clay
Date: 12/16/06 **Natural Moisture:** 23.4
USCS Class.: CL **AASHTO Class.:**
Testing Remarks: Tested by: BM Reviewed by; HJ

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	23.31	21.41	21.73			
Dry+Tare	19.96	18.51	18.57			
Tare	12.15	12.33	12.45			
# Blows	33	27	15			
Moisture	42.9	46.9	51.6			

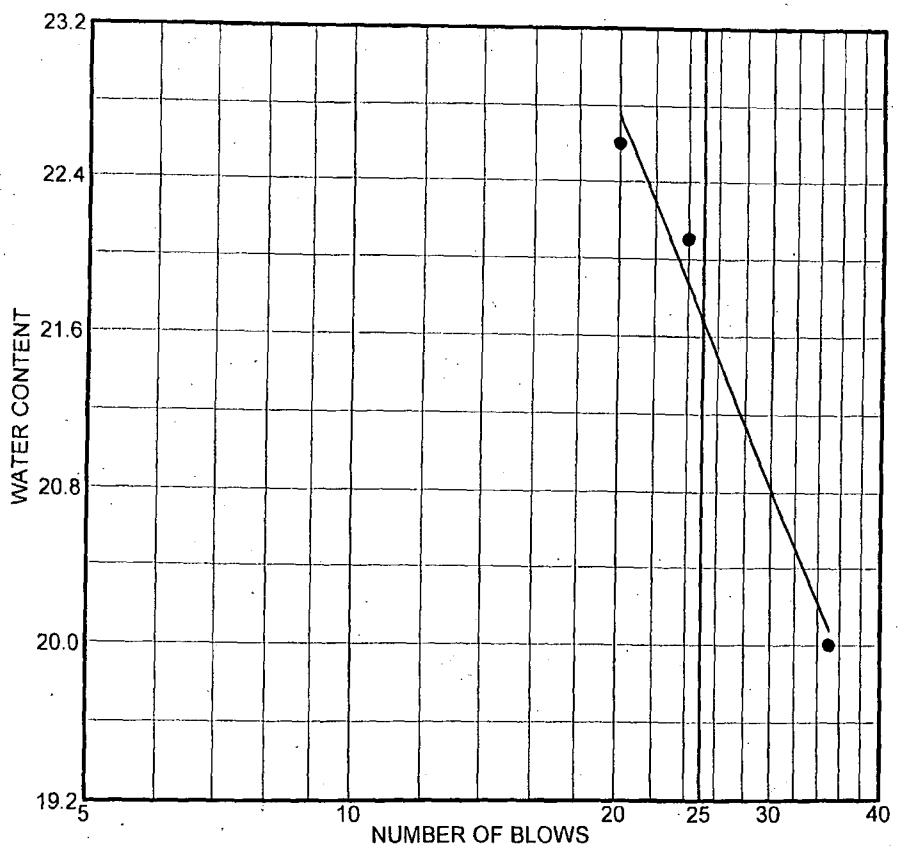


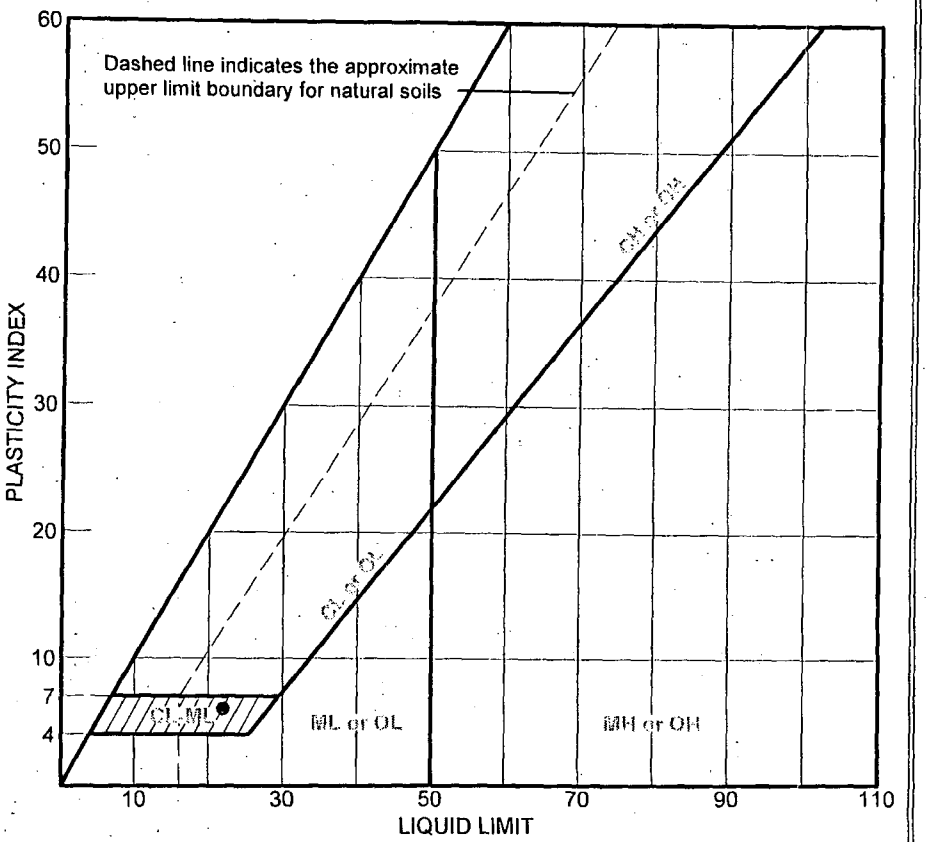
Liquid Limit= 47
Plastic Limit= 20
Plasticity Index= 27

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	18.65	18.89			
Dry+Tare	17.58	17.8			
Tare	12.17	12.41			
Moisture	19.8	20.2			

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-918	UD-4	58' to 60'	2-24-07	CL-ML	Silty Clay with Sand	17.7	22	6

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496 Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reviewed by: MS MAS
ASTM D4318-05

LIQUID AND PLASTIC LIMIT TEST DATA

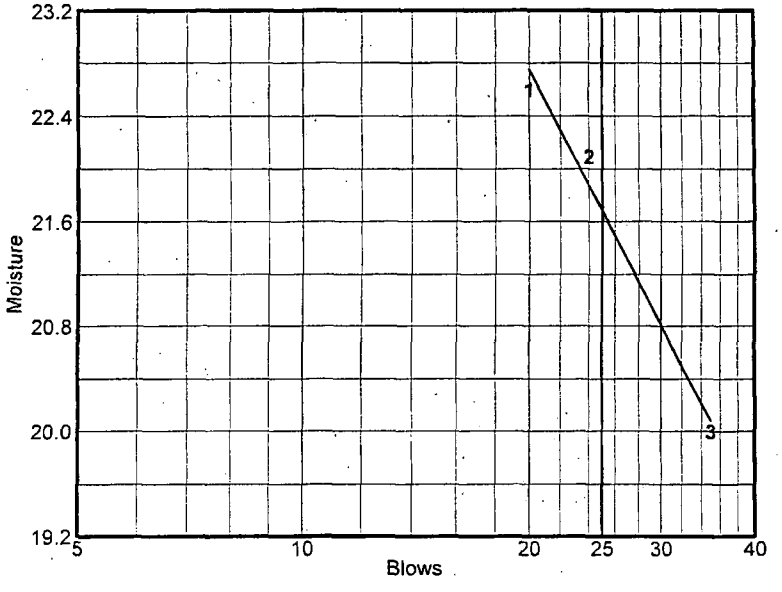
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496

Sample Data

Source: B-918
Sample No.: UD-4
Elev. or Depth: 58' to 60' **Sample Length(in./cm.):**
Location: B-918
Description: Silty Clay with Sand
Date: 2-24-07 **Natural Moisture:** 17.7
USCS Class.: CL-ML **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed by: MS
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	23.46	26.82	32.82			
Dry+Tare	21.16	23.97	29.29			
Tare	11.0	11.07	11.60			
# Blows	20	24	35			
Moisture	22.6	22.1	20.0			

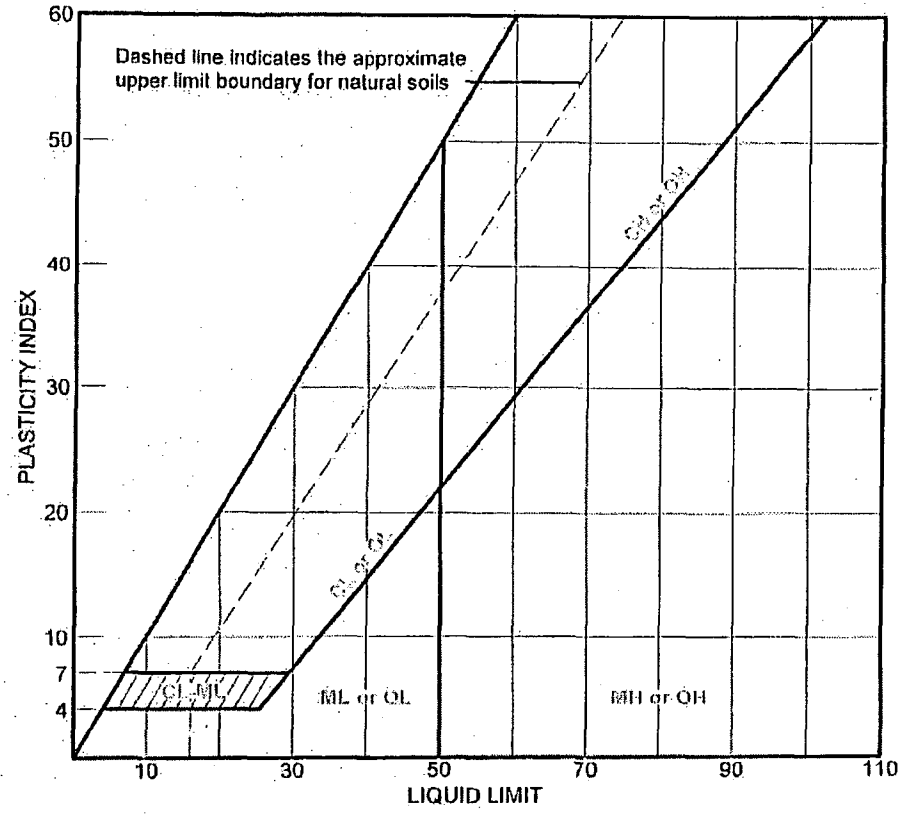


Liquid Limit= 22
Plastic Limit= 16
Plasticity Index= 6

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	18.19	12.64			
Dry+Tare	16.74	11.48			
Tare	7.92	4.33			
Moisture	16.4	16.2			

LIQUID AND PLASTIC LIMITS TEST REPORT



	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
•	B-918	SS-19	83.5' to 85'	3-15-07	SP	Poorly graded sand	19.3	NV	NP

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496 | Figure

MACTEC, INC.

Charlotte, North Carolina

• Tested by: JA Reviewed by: MH MR 3-26-07
ASTM D4318-05

KAW 3/29/07

LIQUID AND PLASTIC LIMIT TEST DATA

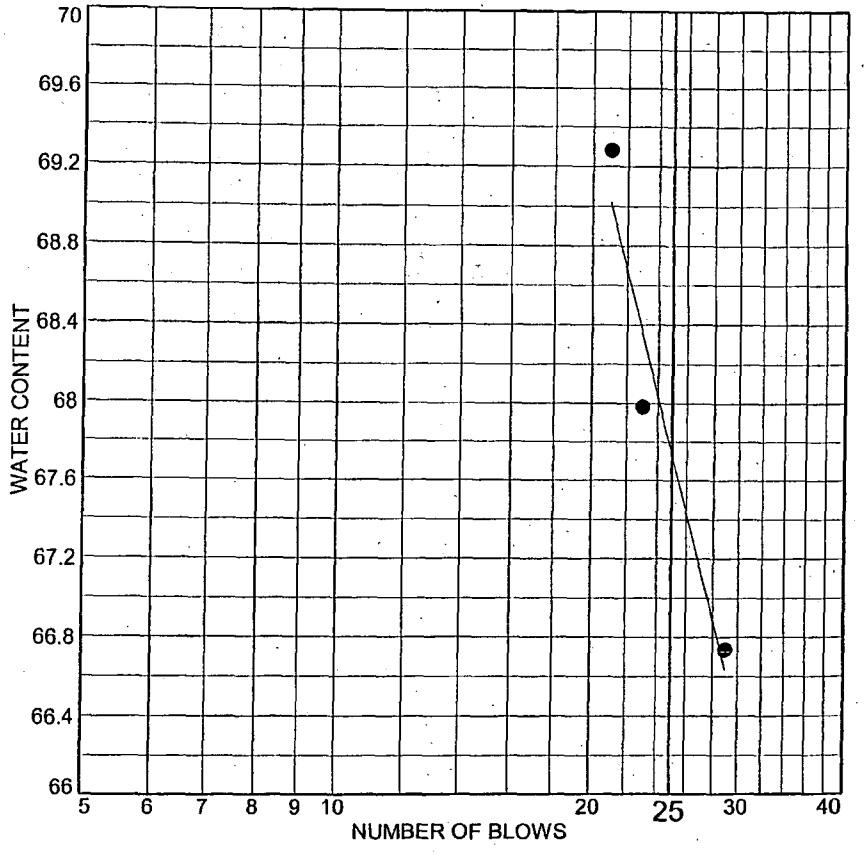
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
roject Number: 5050-06-0496

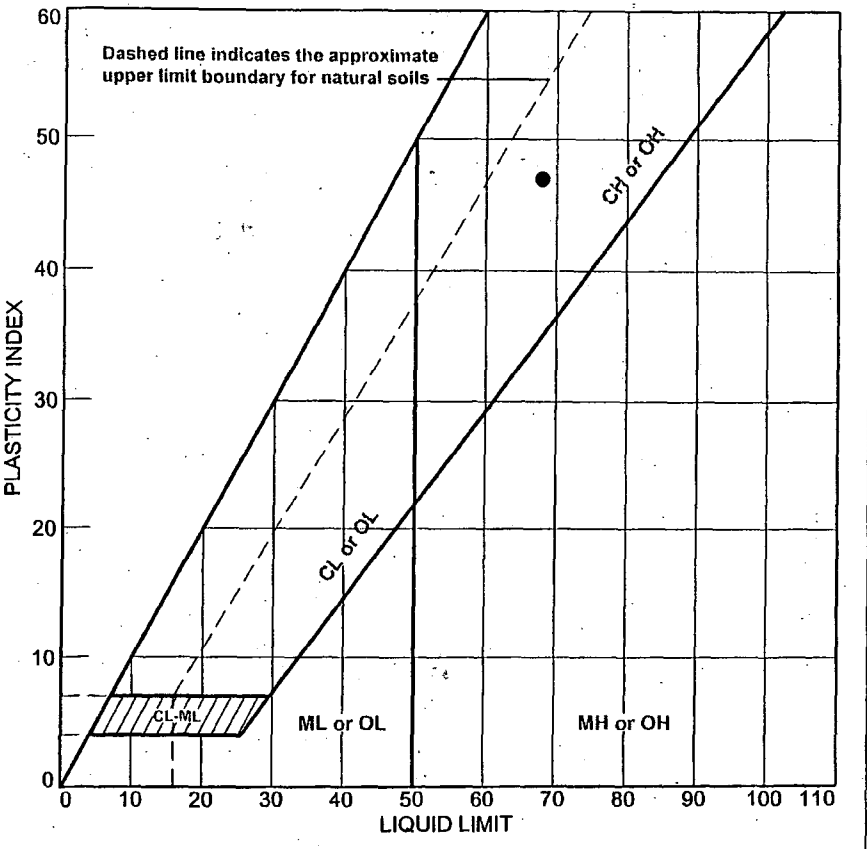
Sample Data

Source: B-918
Sample No.: SS-19
Elev. or Depth: 83.5' to 85' **Sample Length(in./cm.):**
Location: B-918
Description: Poorly graded sand
Date: 3-15-07 **Natural Moisture:** 19.3
USCS Class.: SP **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed by: MH
ASTM D4318-05

Liquid Limit= NV
Plastic Limit= NP
Plasticity Index= NP

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 919	STP-273 (UD-1)	8.0'-10.0'	12/17/2006	CH	Fat Clay	23.3	68	47

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC Reviewed By:RF

ASTM D4318-05

MA 4-2-07

KAW 4/3/07

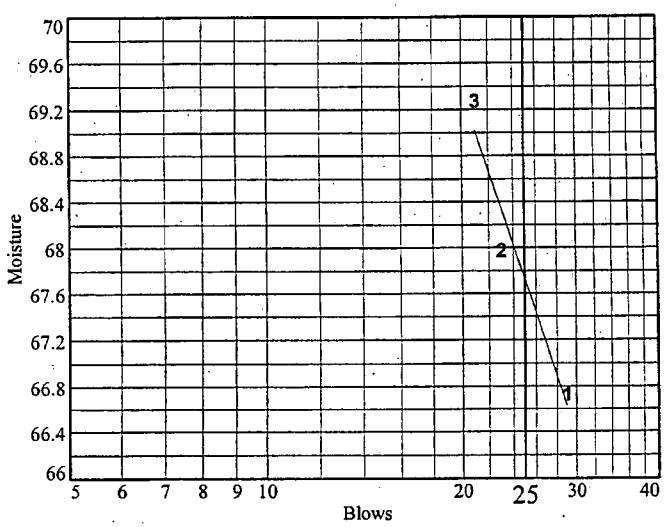
LIQUID AND PLASTIC LIMIT TEST DATA

3/19/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 919
Depth: 8.0'-10.0'
Sample Number: STP-273 (UD-1)
Material Description: Fat Clay
Date: 12/17/2006
USCS Class.: CH
Testing Remarks: Tested By:AC Reviewed By:RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	36.06	35.93	36.32			
Dry+Tare	32.87	32.83	33.05			
Tare	28.09	28.27	28.33			
# Blows	29	23	21			
Moisture	66.7	68.0	69.3			



Liquid Limit= 68
Plastic Limit= 21
Plasticity Index= 47
Natural Moisture= 23.3
Liquidity Index= 0.0

Plastic Limit Data

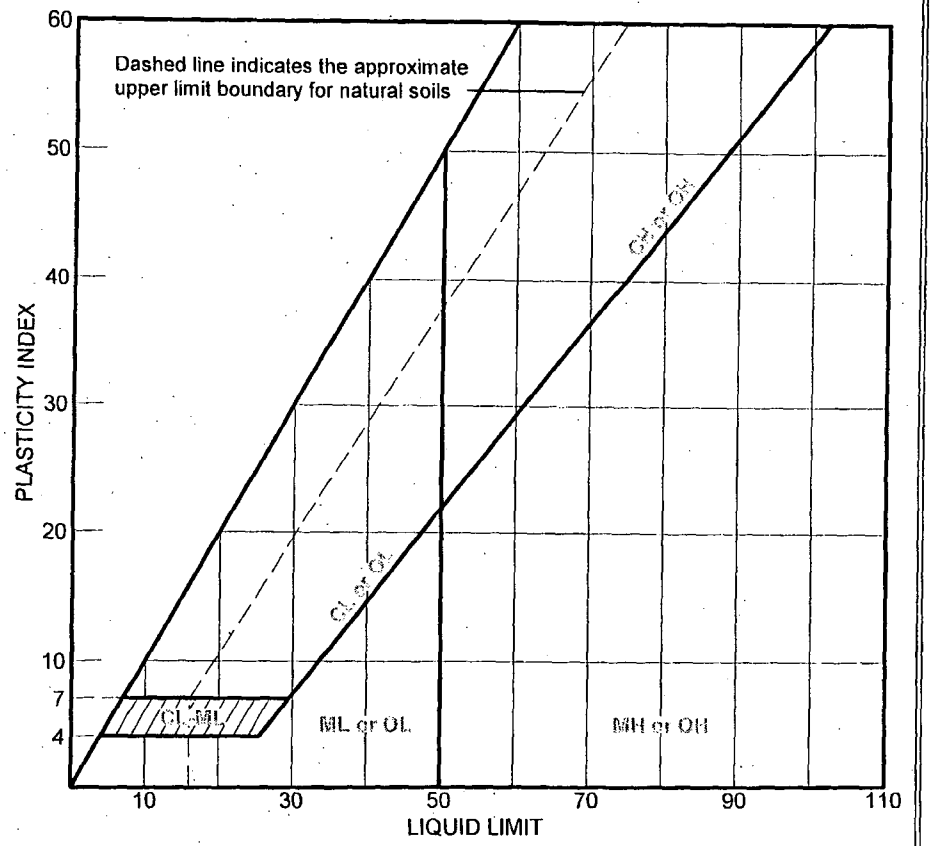
Run No.	1	2	3	4	
Wet+Tare	35.32	35.89			
Dry+Tare	33.88	34.53			
Tare	27.12	28.13			
Moisture	21.3	21.2			

Natural Moisture Data

Wet+Tare	Dry+Tare	Tare	Moisture
453.4	400.3	172.6	23.3

MA 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT



	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-919	UD-2	23' to 25'	2-25-07	ML	Sandy Silt	20.4	NV	NP

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496 | Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reviewed by: MH
ASTM D4318-05 KAW 4/13/07

KAW 4/13/07

LIQUID AND PLASTIC LIMIT TEST DATA

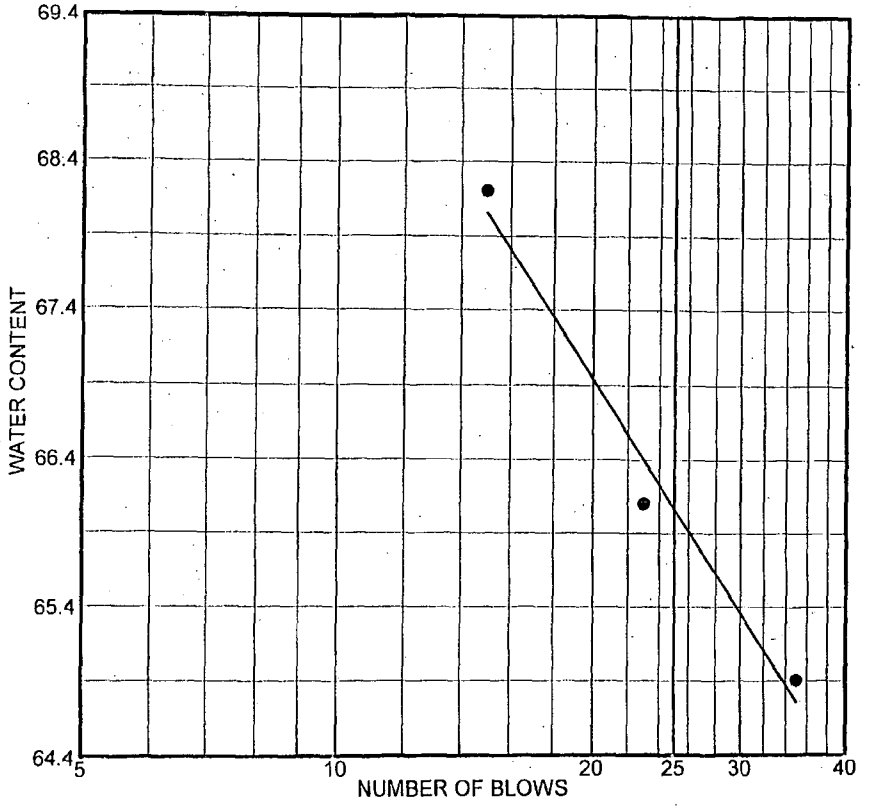
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496

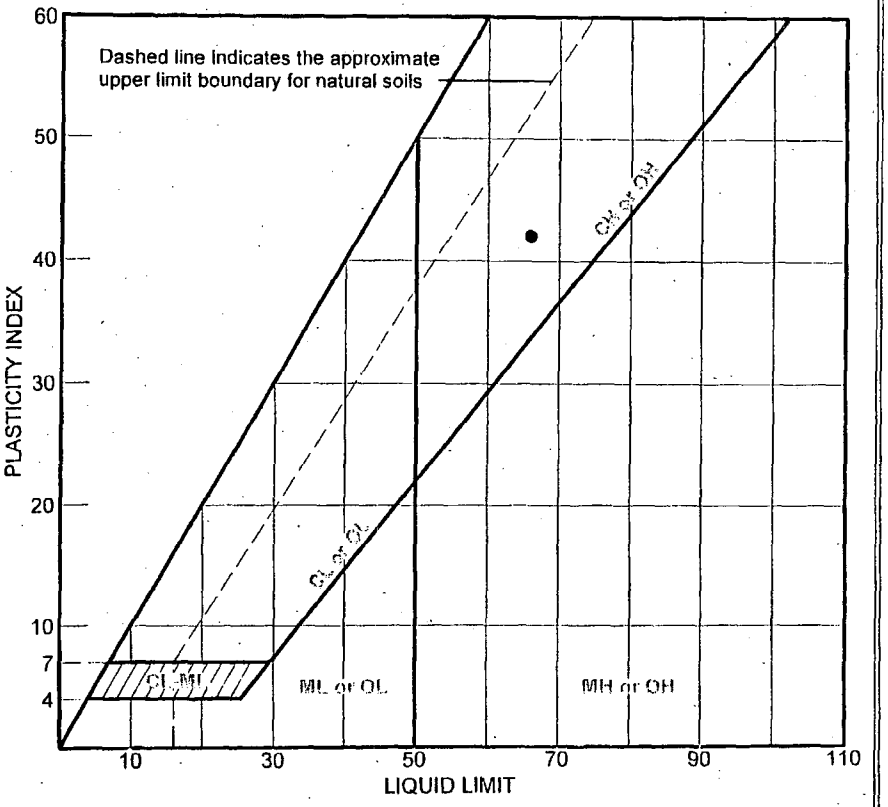
Sample Data

Source: B-919
Sample No.: UD-2
Elev. or Depth: 23' to 25' **Sample Length(in./cm.):**
Location: B-919
Description: Sandy Silt
Date: 2-25-07 **Natural Moisture:** 20.4
USCS Class.: ML **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed by: MH
ASTM D4318-05

Liquid Limit= NV
Plastic Limit= NP
Plasticity Index= NP

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-919	UD-3	43' to 45'	3-22-07	CH	Fat Clay	26.5	66	42

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496 | Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reveiwed by: MH
ASTM D4318-05

KAW 3/30/07

LIQUID AND PLASTIC LIMIT TEST DATA

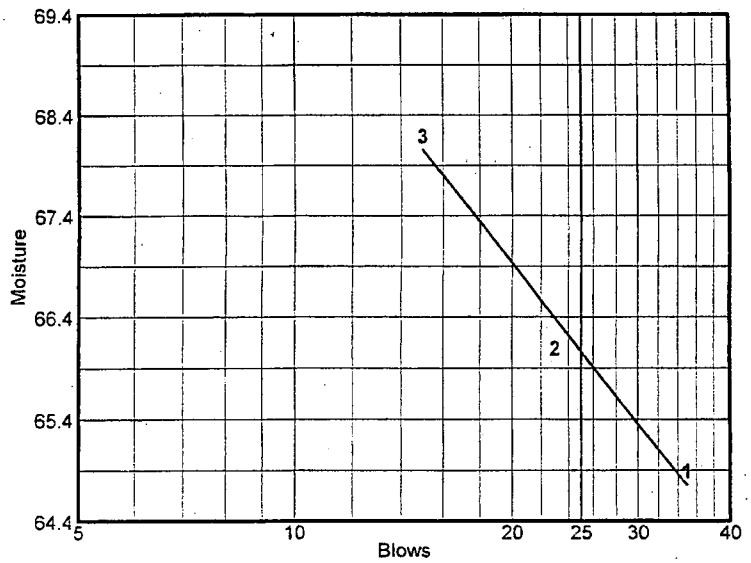
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496

Sample Data

Source: B-919
Sample No.: UD-3
Elev. or Depth: 43' to 45' **Sample Length(in./cm.):**
Location: B-919
Description: Fat Clay
Date: 3-22-07 **Natural Moisture:** 26.5
USCS Class.: CH **AASHTO Class.:**
Testing Remarks: Tested by: JA Reveiwed by: MH
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	27.44	29.35	29.47			
Dry+Tare	20.99	22.04	21.84			
Tare	11.05	10.98	10.66			
# Blows	35	23	15			
Moisture	64.9	66.1	68.2			

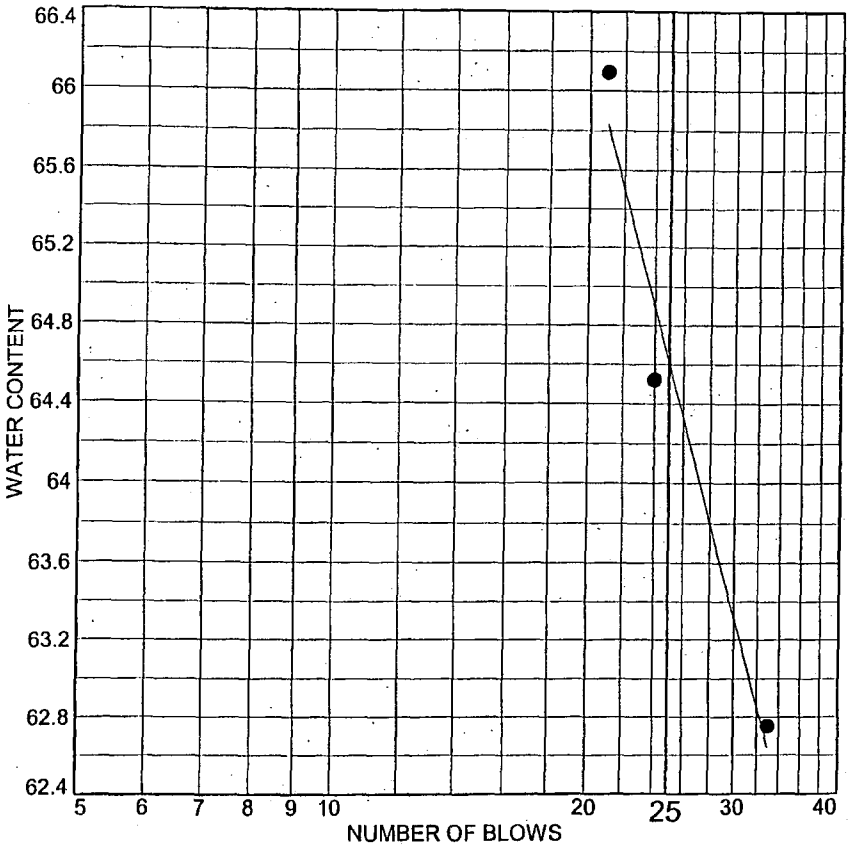


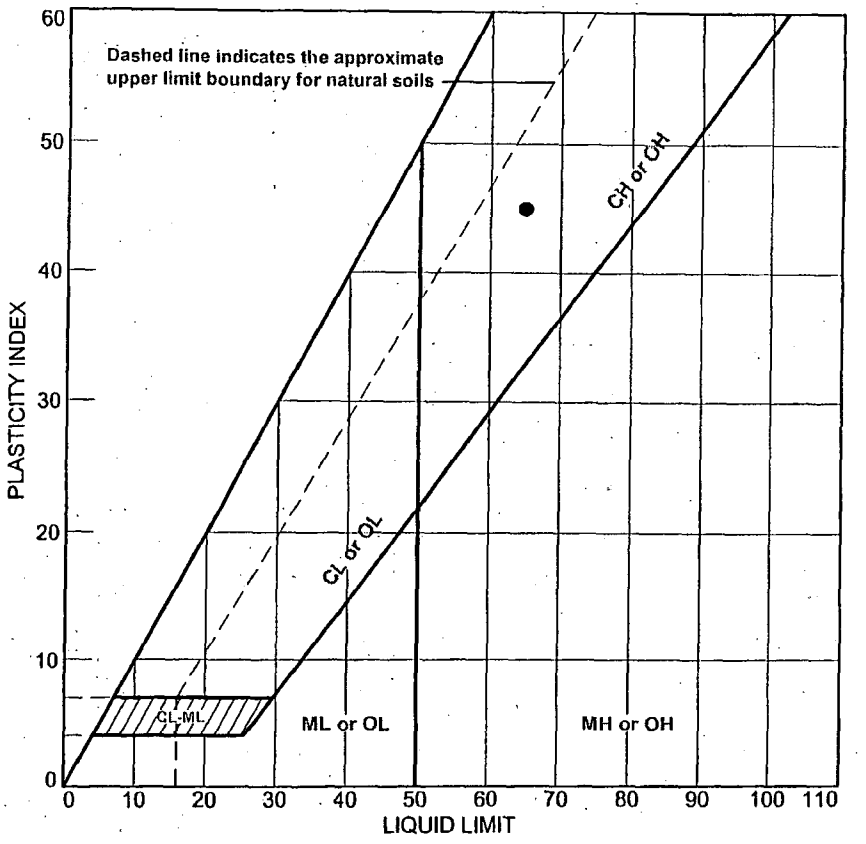
Liquid Limit= 66
Plastic Limit= 24
Plasticity Index= 42

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	17.37	18.32			
Dry+Tare	16.06	16.90			
Tare	10.80	10.95			
Moisture	24.9	23.9			

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 919	STP-252 (SS-13)	48.5'-50.0'	12/17/2006	CH	Fat Clay	23.1	65	45

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC Reviewed By:MH/RF
ASTM D4318-05

MA 4-3-07

KAW 4/3/07

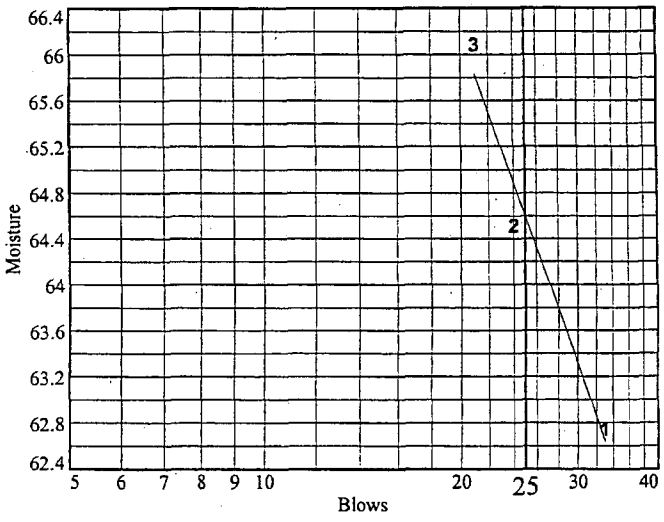
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 919
Depth: 48.5'-50.0'
Sample Number: STP-252 (SS-13)
Material Description: Fat Clay
Date: 12/17/2006
USCS Class.: CH
Testing Remarks: Tested By:AC Reviewed By:MH/RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	37.80	37.38	37.92			
Dry+Tare	34.06	33.67	34.08			
Tare	28.10	27.92	28.27			
# Blows	33	24	21			
Moisture	62.8	64.5	66.1			



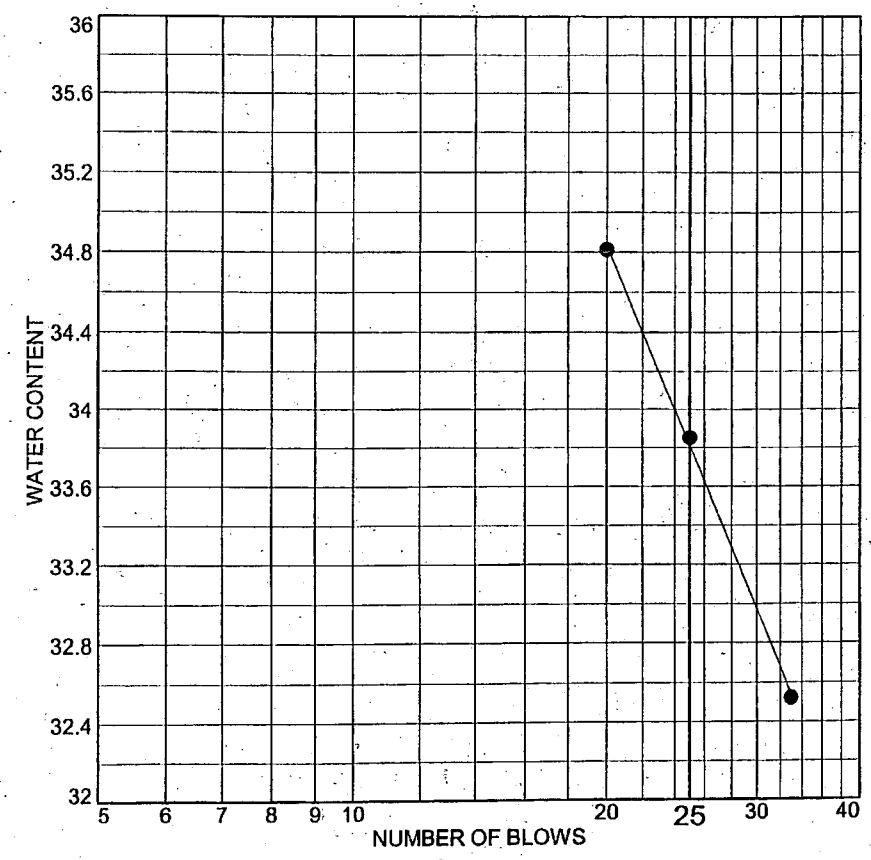
Liquid Limit= 65
Plastic Limit= 20
Plasticity Index= 45
Natural Moisture= 23.1
Liquidity Index= 0.1

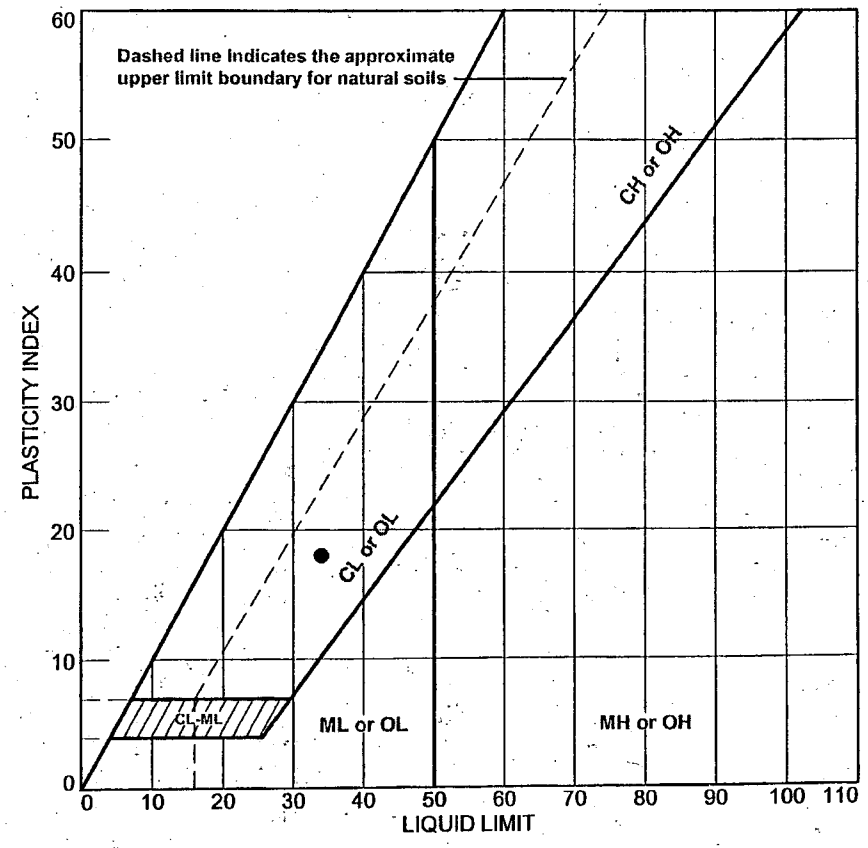
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	36.08	37.88			
Dry+Tare	34.75	36.32			
Tare	28.13	28.34			
Moisture	20.1	19.5			

MH 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 927	STP-313 (SS-5)	6.0'-7.5'	12/15/2006	CL	Lean Clay with Sand	19.2	34	18

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC Reviewed By:MH

ASTM D4318-05

MH 4-3-07

KAW 4/3/07

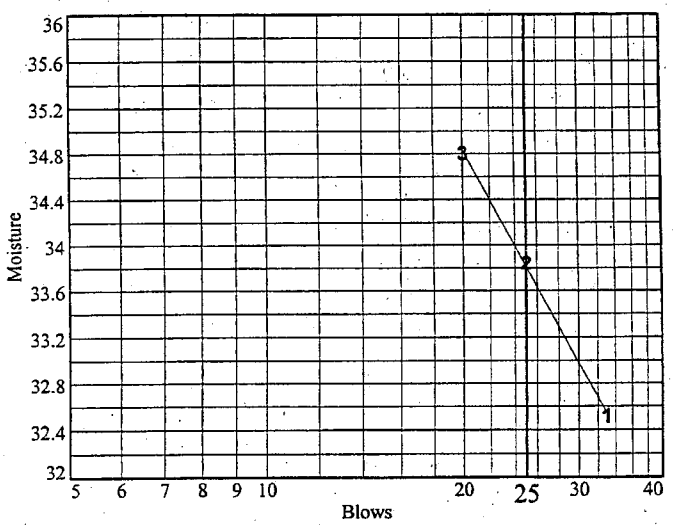
LIQUID AND PLASTIC LIMIT TEST DATA

4/1/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 927
Depth: 6.0'-7.5' **Sample Number:** STP-313 (SS-5)
Material Description: Lean Clay with Sand
Date: 12/15/2006 **USCS Class.:** CL **AASHTO Class.:** A-6(12)
Testing Remarks: Tested By:AC Reviewed By:MH
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	36.90	36.72	37.99			
Dry+Tare	34.76	34.32	35.48			
Tare	28.18	27.23	28.27			
# Blows	33	25	20			
Moisture	32.5	33.9	34.8			



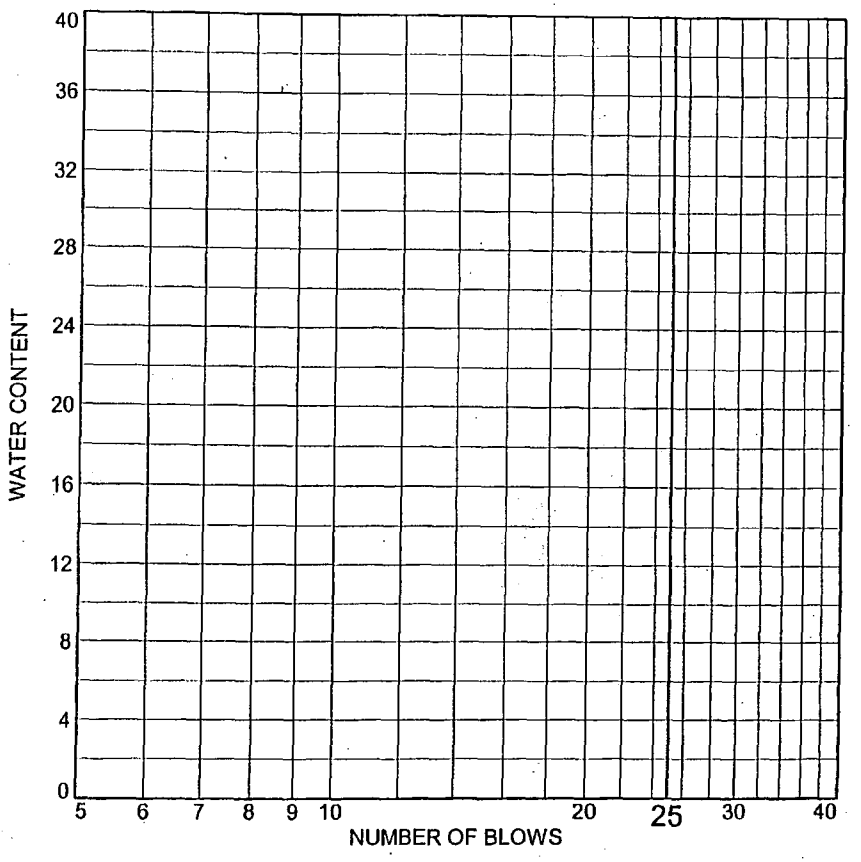
Liquid Limit= 34
Plastic Limit= 16
Plasticity Index= 18
Natural Moisture= 19.2
Liquidity Index= 0.2

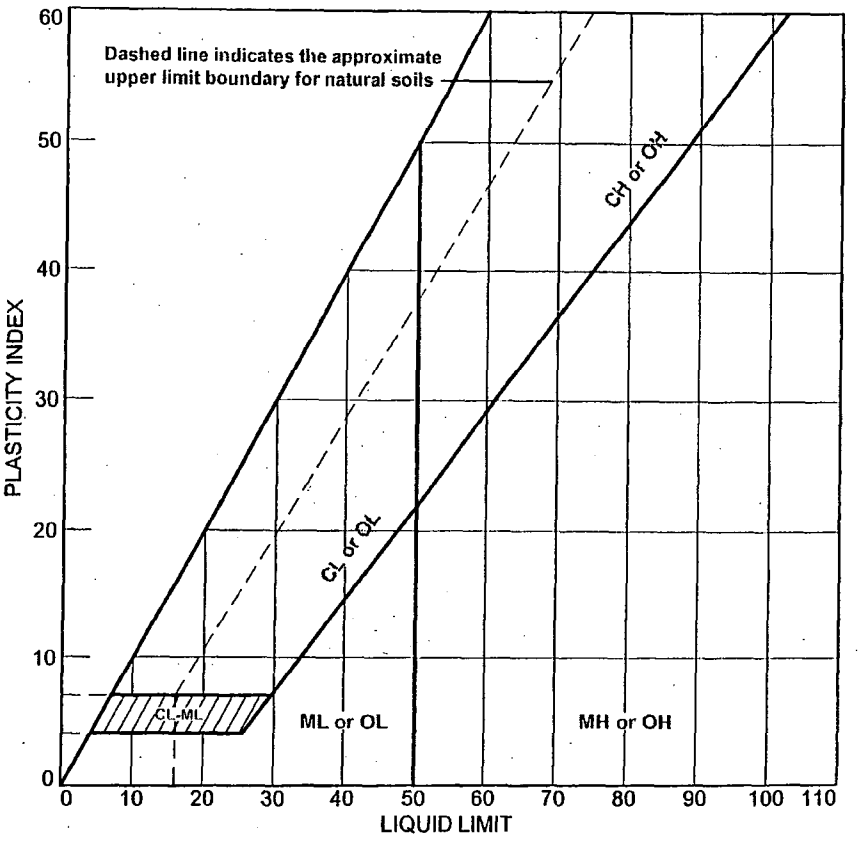
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	35.90	36.76			
Dry+Tare	34.84	35.57			
Tare	28.29	28.33			
Moisture	16.2	16.4			

MH 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 927	STP-257 (SS-8)	10.5'-12.0'	12/15/2006	ML	Sandy Silt	22.3	NV	NP

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC Reviewed By:RF

ASTM D4318-05

4-3-07

KAW 8 4/3/07

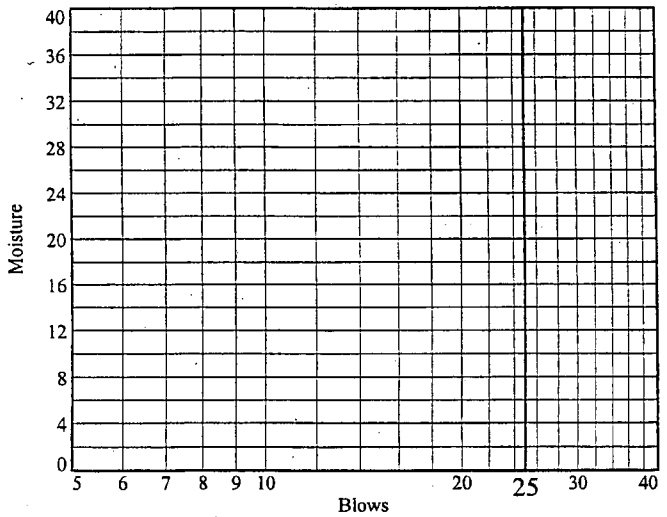
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 927
Depth: 10.5'-12.0' **Sample Number:** STP-257 (SS-8)
Material Description: Sandy Silt
Date: 12/15/2006 **USCS Class.:** ML
Testing Remarks: Tested By:AC Reviewed By:RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare						
Dry+Tare						
Tare						
# Blows						
Moisture						



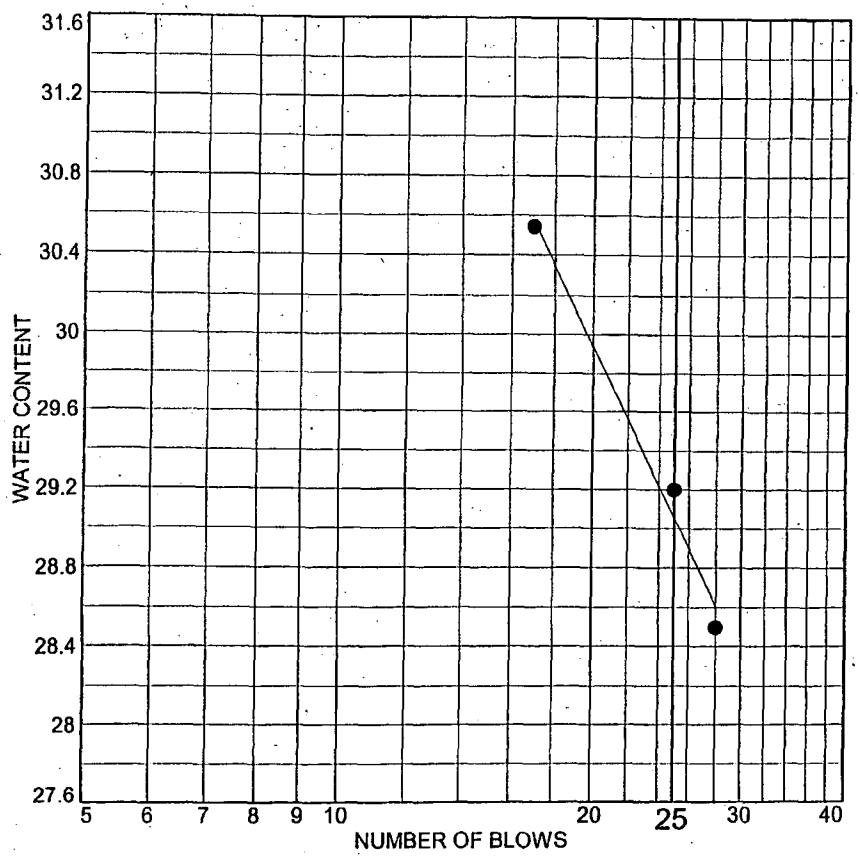
Liquid Limit= NV
Plastic Limit= NP
Plasticity Index= NP
Natural Moisture= 22.3

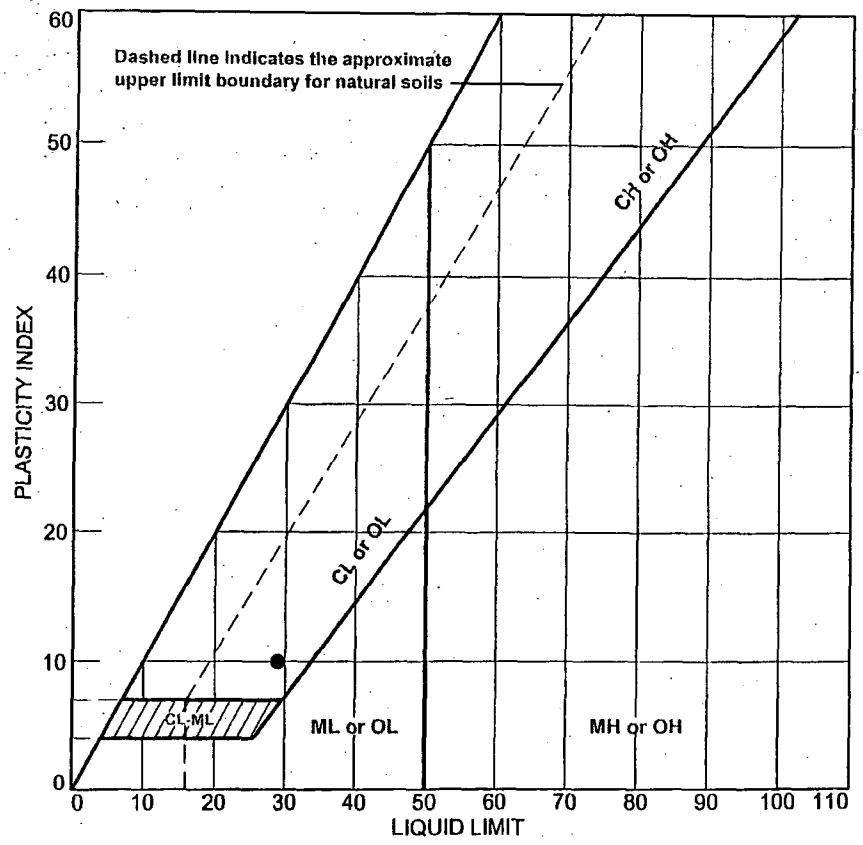
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare					
Dry+Tare					
Tare					
Moisture					

MA 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 927	STP-312 (SS-10)	23.5'-25.0'	12/16/2006	CL	Lean Clay	25.5	29	10

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC Reviewed By:MH
ASTM D4318-05

MH 4-3-07

KAW 4/3/07

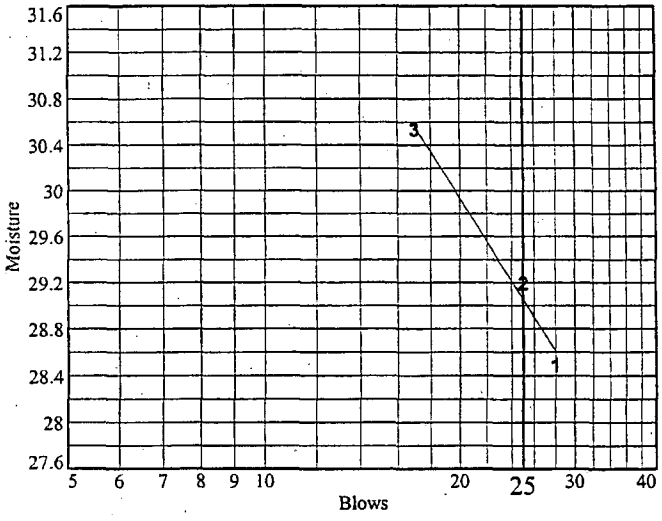
LIQUID AND PLASTIC LIMIT TEST DATA

4/1/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 927
Depth: 23.5'-25.0' **Sample Number:** STP-312 (SS-10)
Material Description: Lean Clay
Date: 12/16/2006 **USCS Class.:** CL
Testing Remarks: Tested By:AC Reviewed By:MH
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	37.90	38.22	36.81			
Dry+Tare	35.74	35.96	34.84			
Tare	28.16	28.22	28.39			
# Blows	28	25	17			
Moisture	28.5	29.2	30.5			



Liquid Limit= 29
Plastic Limit= 19
Plasticity Index= 10
Natural Moisture= 25.5
Liquidity Index= 0.6

Plastic Limit Data

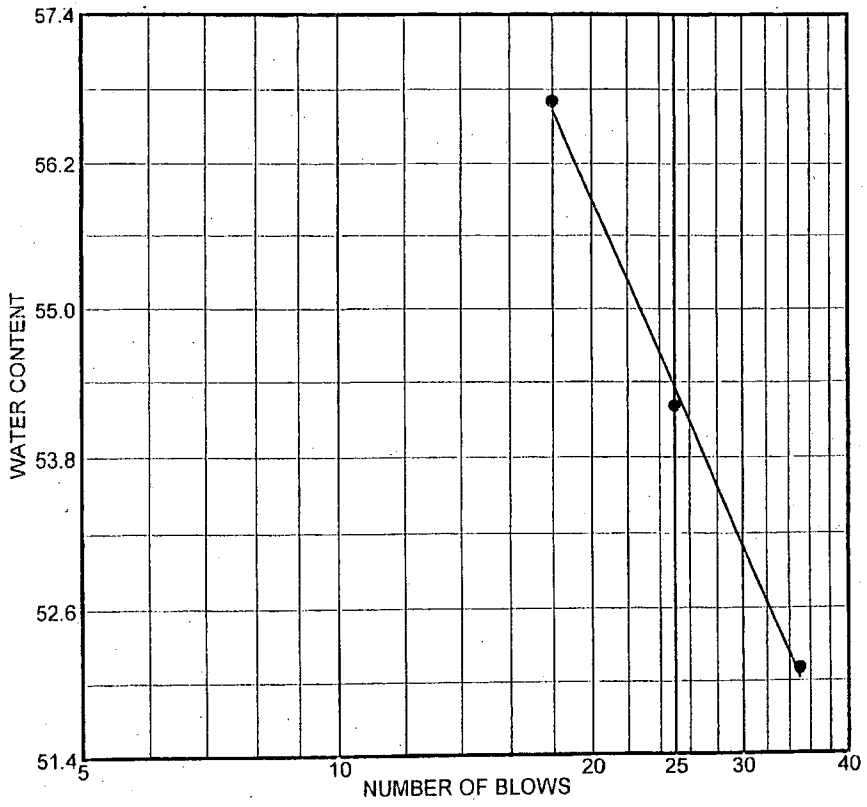
Run No.	1	2	3	4	
Wet+Tare	37.83	36.15			
Dry+Tare	36.30	34.90			
Tare	28.36	28.38			
Moisture	19.3	19.2			

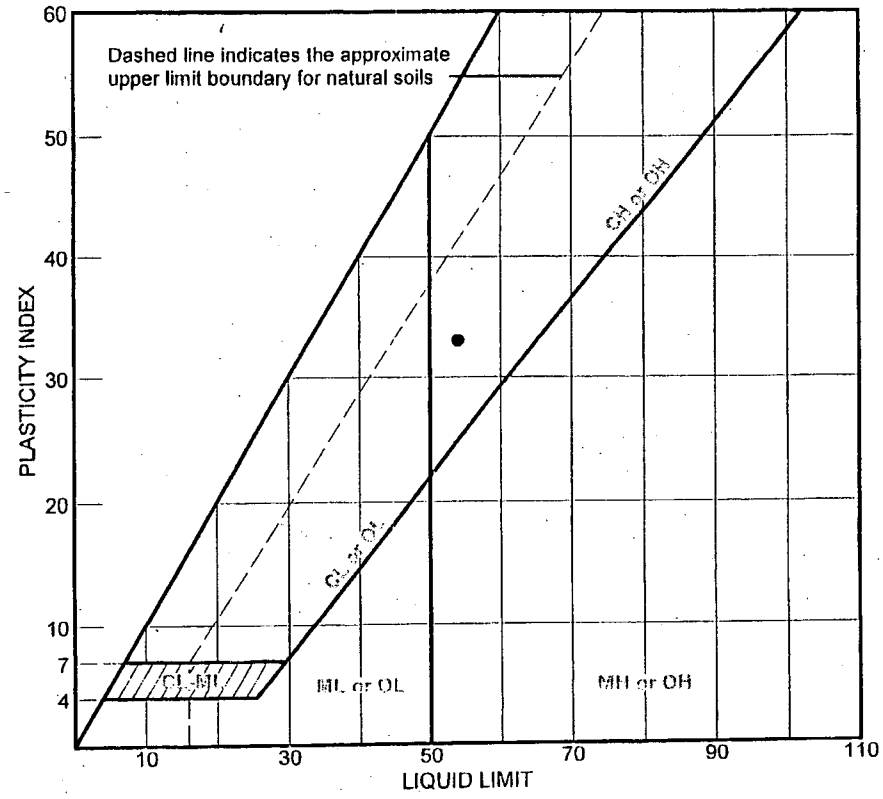
Natural Moisture Data

Wet+Tare	Dry+Tare	Tare	Moisture
806.2	678.4	177.6	25.5

MK 4-5-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	B-927	UD-3	48' to 50'	3-22-07	CH	Fat Clay	28.2	54	33

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496 | Figure

MACTEC, INC.

Charlotte, North Carolina

● Tested by: JA Reviewed by: MH
ASTM D4318-05

KAW 3/30/07

LIQUID AND PLASTIC LIMIT TEST DATA

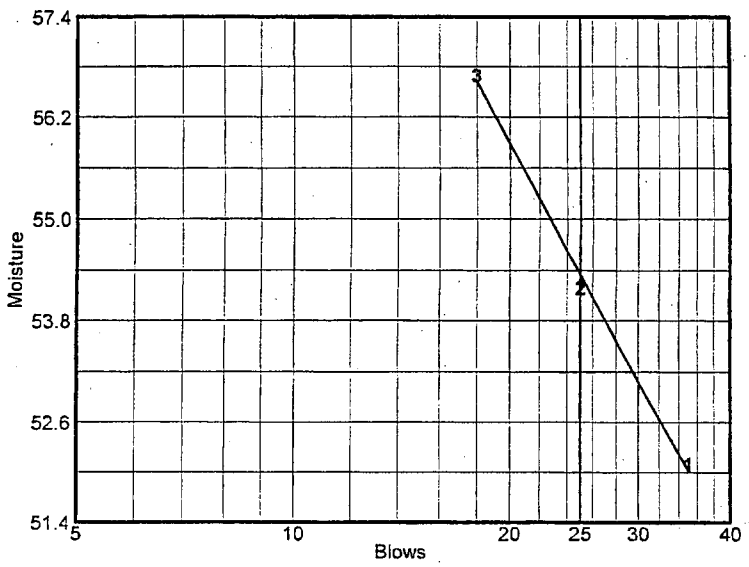
Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496

Sample Data

Source: B-927
Sample No.: UD-3
Elev. or Depth: 48' to 50' **Sample Length(in./cm.):**
Location: B-927
Description: Fat Clay
Date: 3-22-07 **Natural Moisture:** 28.2
USCS Class.: CH **AASHTO Class.:**
Testing Remarks: Tested by: JA Reviewed by: MH
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	33.66	32.89	29.43			
Dry+Tare	25.90	25.35	23.00			
Tare	11.01	11.43	11.65			
# Blows	35	25	18			
Moisture	52.1	54.2	56.7			

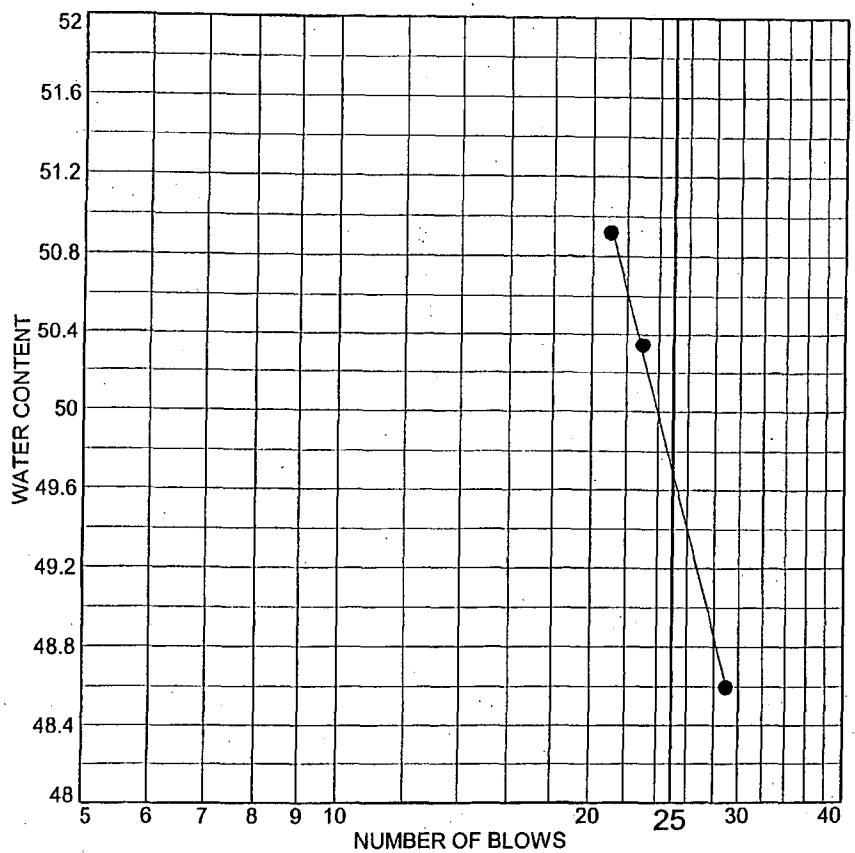


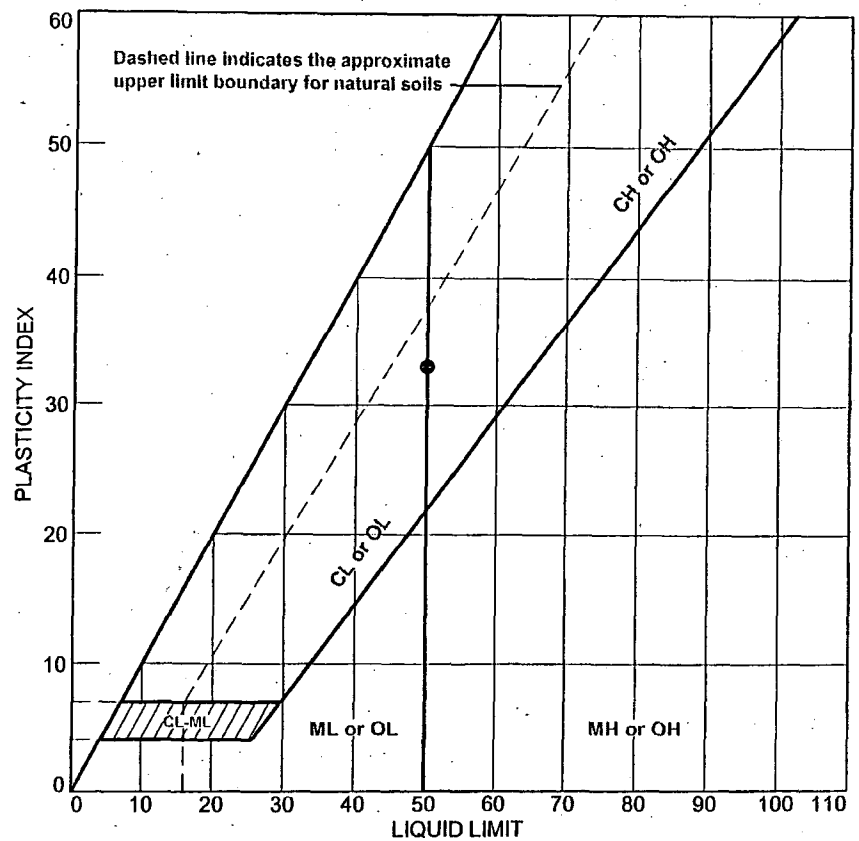
Liquid Limit= 54
Plastic Limit= 21
Plasticity Index= 33

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	18.14	18.28			
Dry+Tare	16.98	16.91			
Tare	10.94	10.88			
Moisture	19.2	22.7			

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 919	STP-265 (TP-1)	.5'-6.0'	2/17/07	CH	Fat Clay	20.2	50	33

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC Reviewed By:RF

ASTM D4318-05

4-3-07

KAW 4/3/07

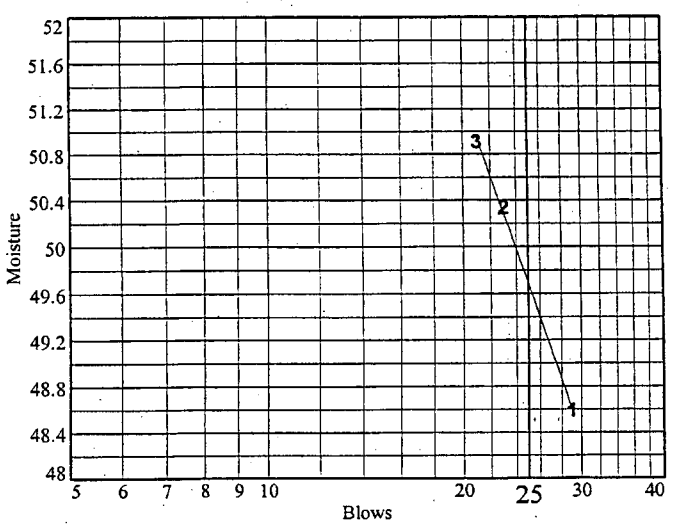
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 919
Depth: .5'-6.0' **Sample Number:** STP-265 (TP-1)
Material Description: Fat Clay
Date: 2/17/07 **USCS Class.:** CH
Testing Remarks: Tested By:AC Reviewed By:RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	38.26	36.88	36.97			
Dry+Tare	34.97	33.96	33.65			
Tare	28.20	28.16	27.13			
# Blows	29	23	21			
Moisture	48.6	50.3	50.9			



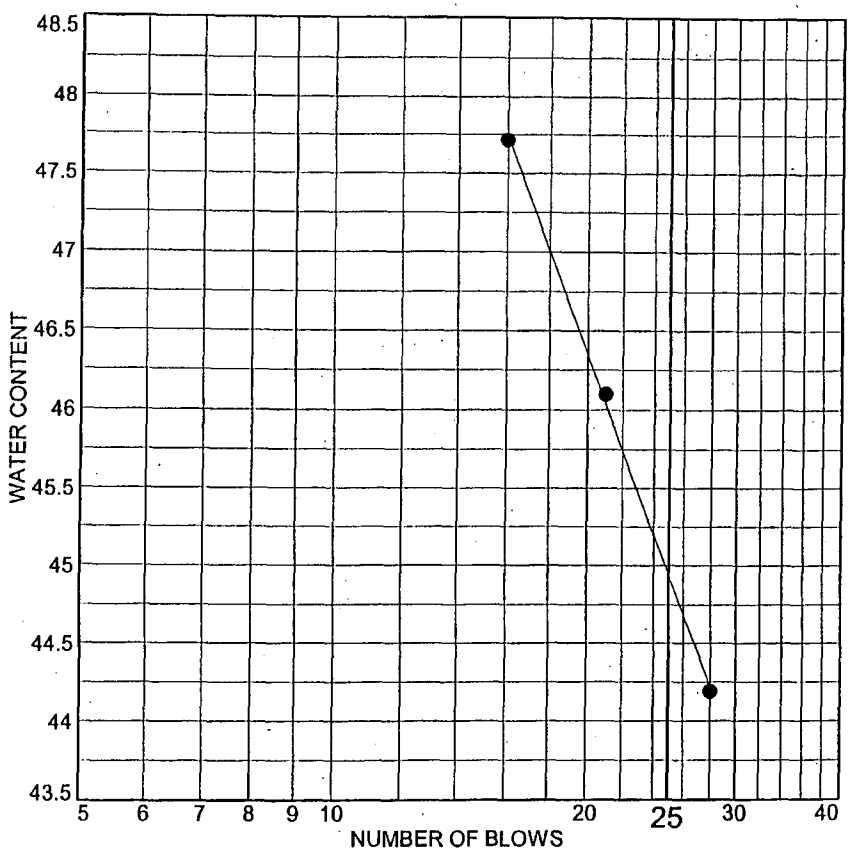
Liquid Limit= 50
Plastic Limit= 17
Plasticity Index= 33
Natural Moisture= 20.2
Liquidity Index= 0.1

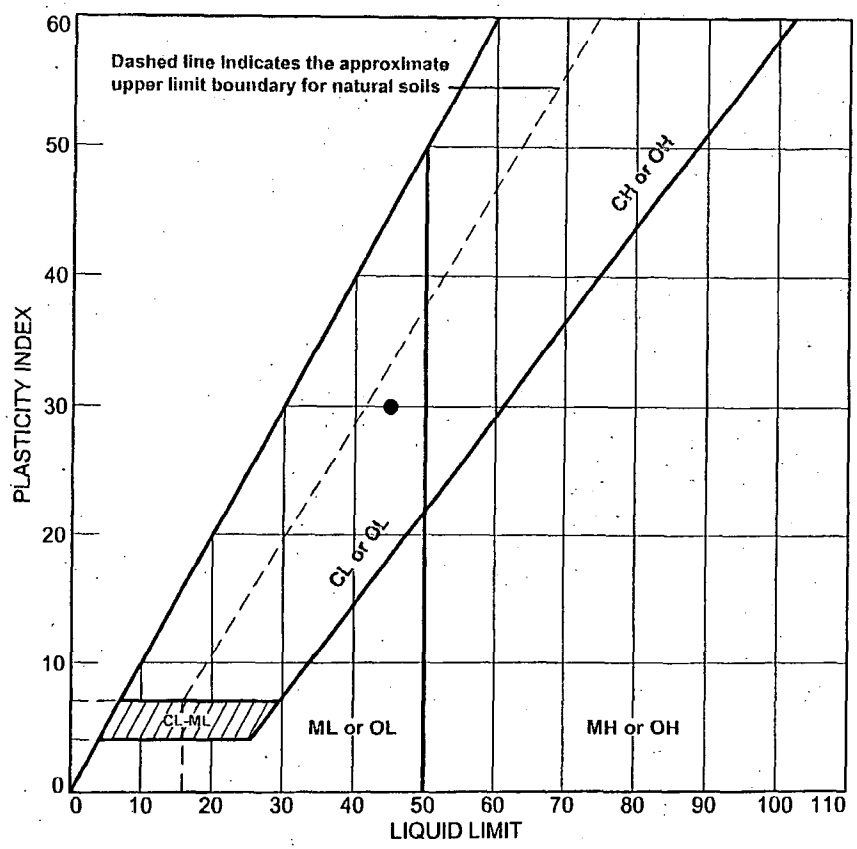
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	37.71	37.37			
Dry+Tare	36.29	36.01			
Tare	27.99	28.02			
Moisture	17.1	17.0			

MA
4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 927	STP-267 (TP1)	0.5'-4.0'	12/19/2006	CL	Lean Clay	24.1	45	30

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC Reviewed By:RF

ASTM D4318-05

MH 4-3-07

KAW 4/3/07

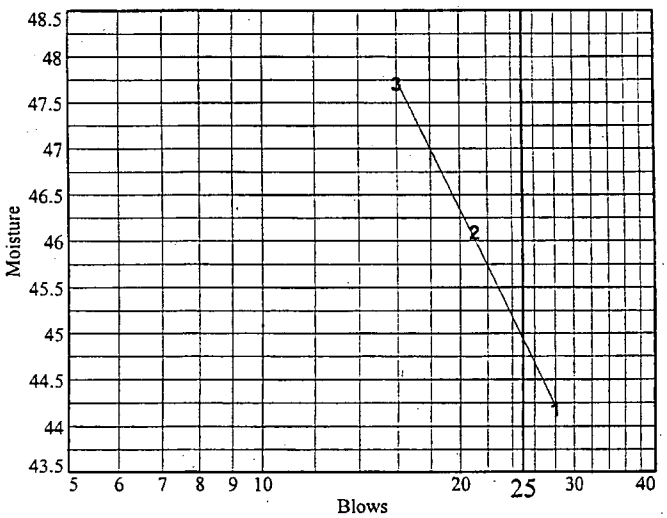
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 927
Depth: 0.5'-4.0'
Sample Number: STP-267 (TP1)
Material Description: Lean Clay
Date: 12/19/2006
USCS Class.: CL
Testing Remarks: Tested By:AC Reviewed By:RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	37.87	38.03	35.10			
Dry+Tare	34.60	34.90	31.97			
Tare	27.20	28.11	25.41			
# Blows	28	21	16			
Moisture	44.2	46.1	47.7			



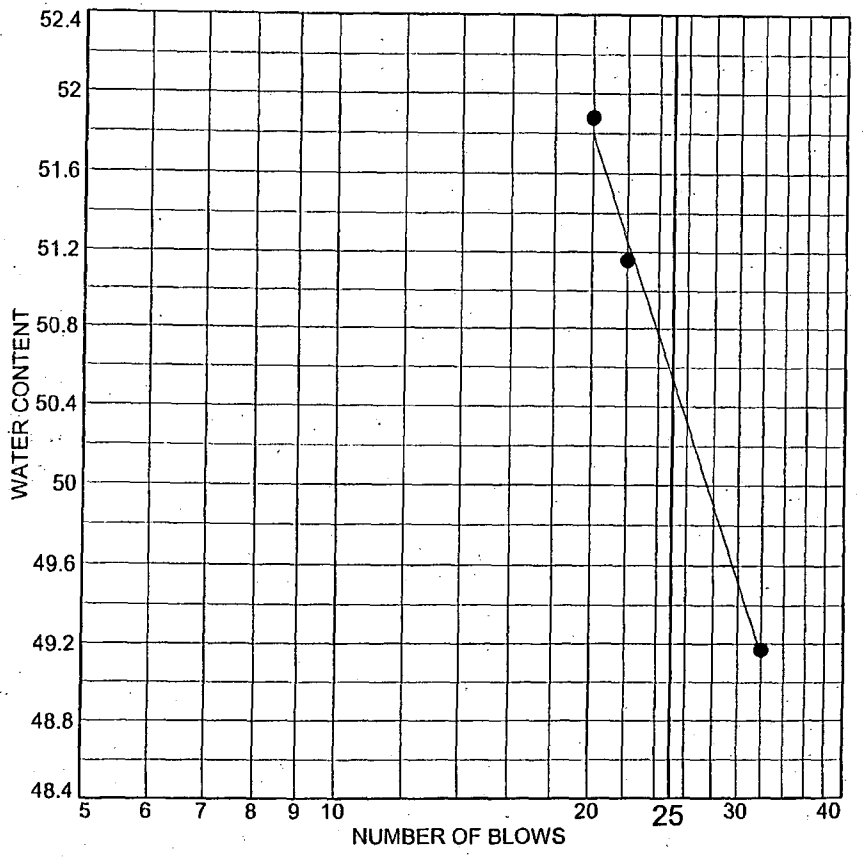
Liquid Limit= 45
Plastic Limit= 15
Plasticity Index= 30
Natural Moisture= 24.1
Liquidity Index= 0.3

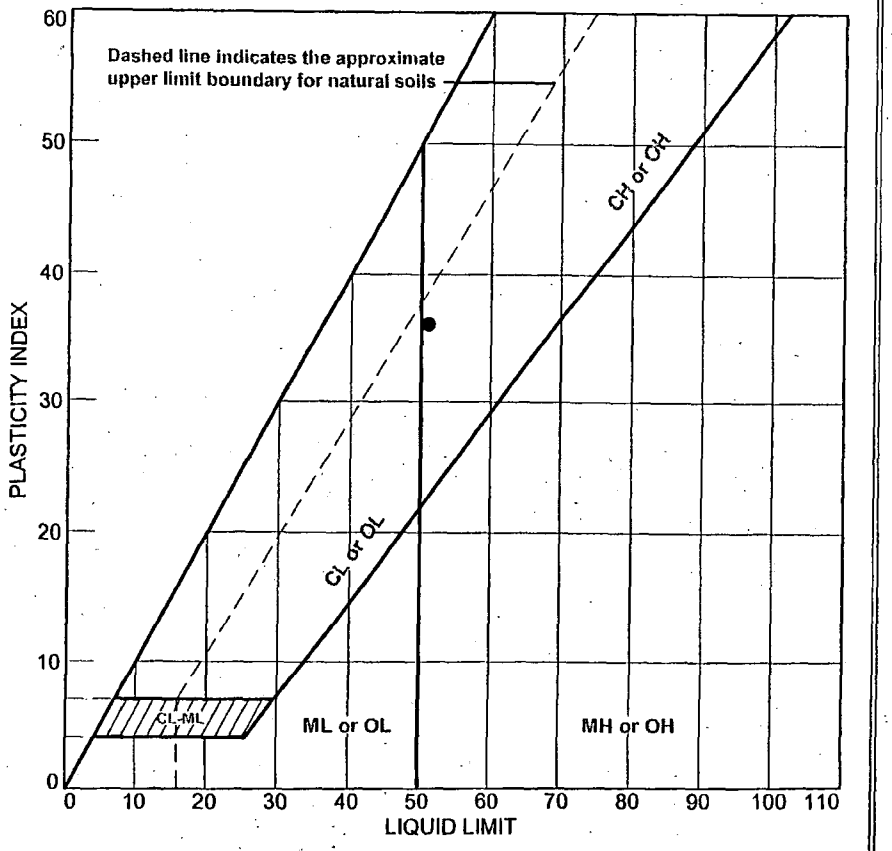
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	35.96	38.38			
Dry+Tare	34.88	37.08			
Tare	27.41	28.33			
Moisture	14.5	14.9			

MW 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	C 304	STP-261	3.0'-6.75'	12/18/2006	CH	Fat Clay	21.7	51	36
		(TP1)							

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC Reviewed By:MH/RF

ASTM D4318-05

MH
4-3-07

KAW 4/3/07

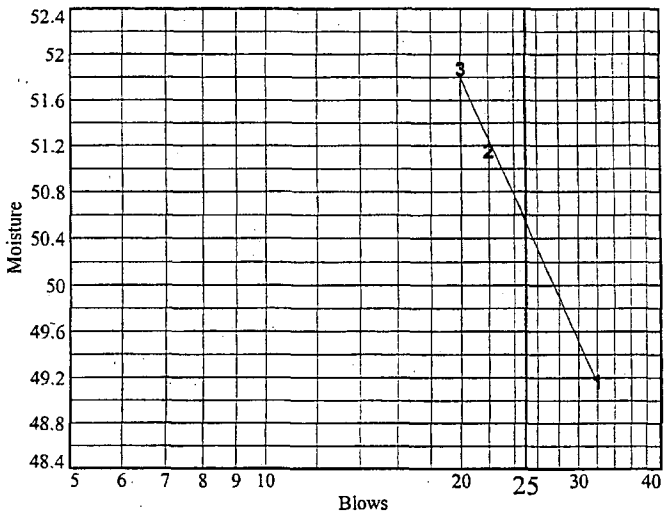
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: C 304
Depth: 3.0'-6.75' **Sample Number:** STP-261 (TP1)
Material Description: Fat Clay
Date: 12/18/2006 **USCS Class.:** CH
Testing Remarks: Tested By:AC Reviewed By:MH/RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	36.18	37.38	36.54			
Dry+Tare	33.22	34.29	33.64			
Tare	27.20	28.25	28.05			
# Blows	32	22	20			
Moisture	49.2	51.2	51.9			



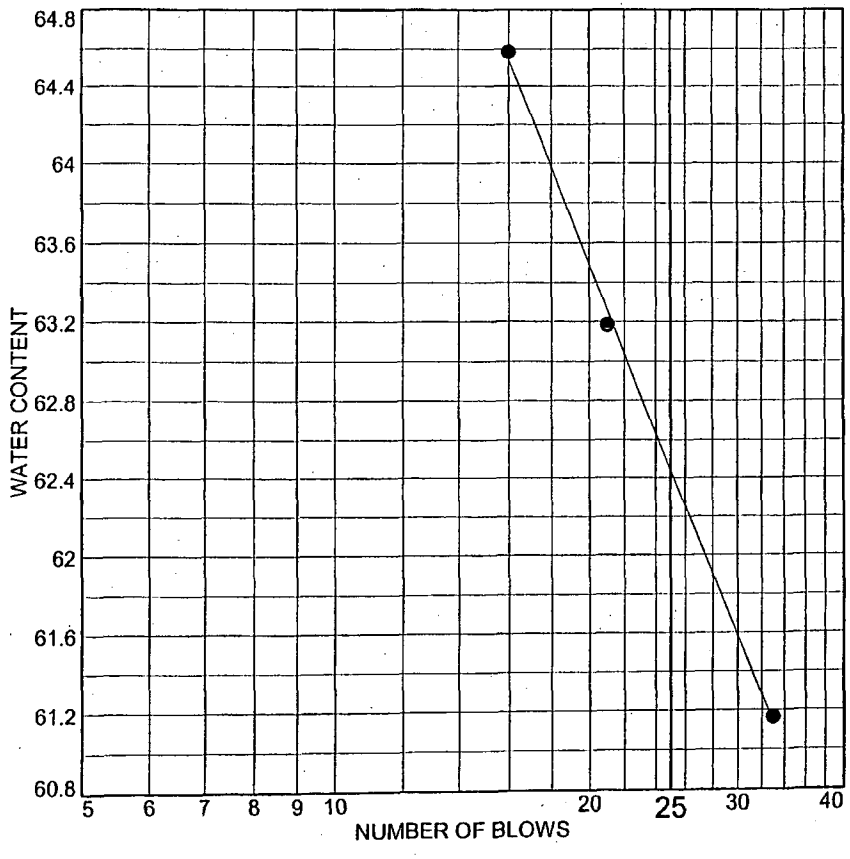
Liquid Limit= 51
Plastic Limit= 15
Plasticity Index= 36
Natural Moisture= 21.7
Liquidity Index= 0.2

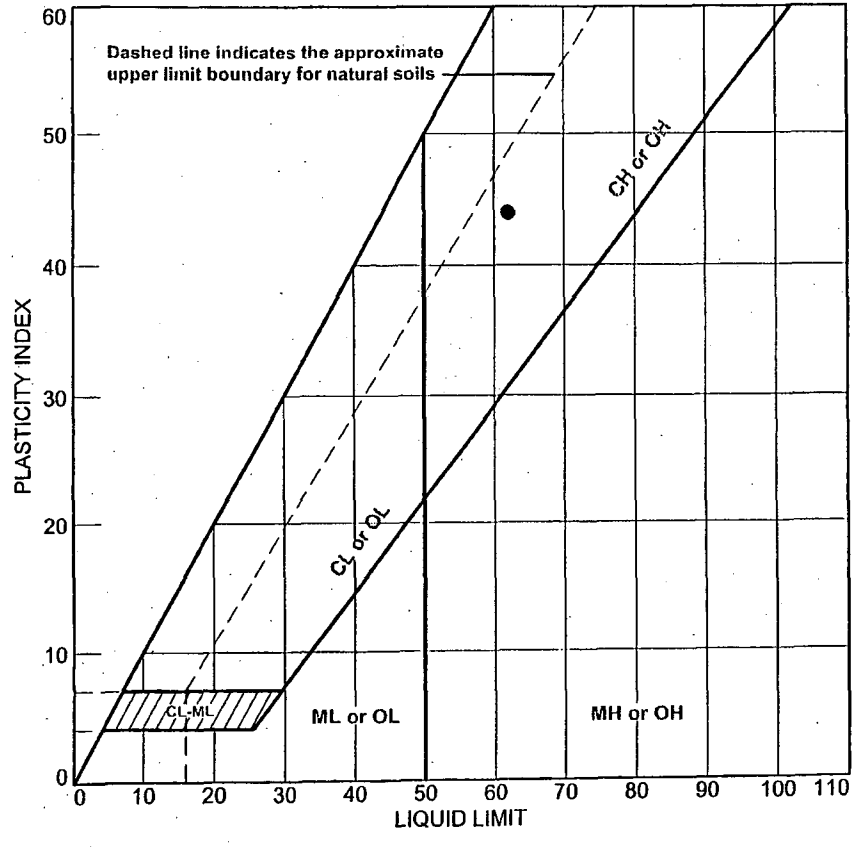
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	38.06	32.15			
Dry+Tare	36.78	31.27			
Tare	28.36	25.55			
Moisture	15.2	15.4			

MH 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	C 404	STP-263 (TP1)	2.25'-7.0'	12/18/2006	CH	Fat Clay	24.3	62	44

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC Reviewed By:RF

ASTM D4318-05

4-3-07

KAW 4/3/07

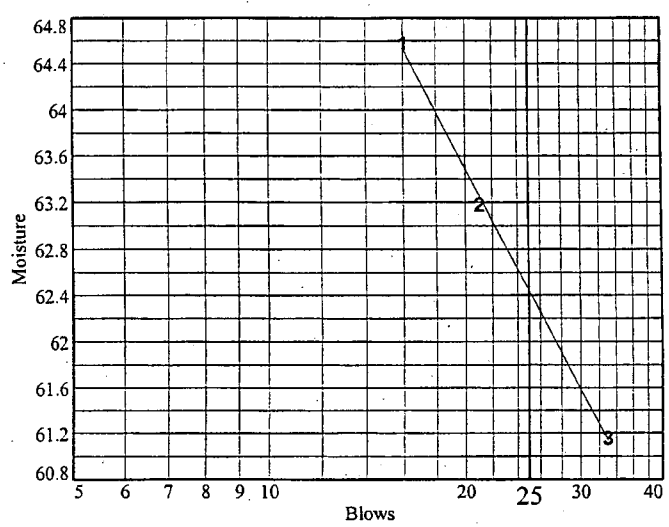
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: C 404
Depth: 2.25'-7.0' **Sample Number:** STP-263 (TP1)
Material Description: Fat Clay
Date: 12/18/2006 **USCS Class.:** CH
Testing Remarks: Tested By:AC Reviewed By:RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	38.32	37.92	32.66			
Dry+Tare	34.29	34.23	29.51			
Tare	28.05	28.39	24.36			
# Blows	16	21	33			
Moisture	64.6	63.2	61.2			



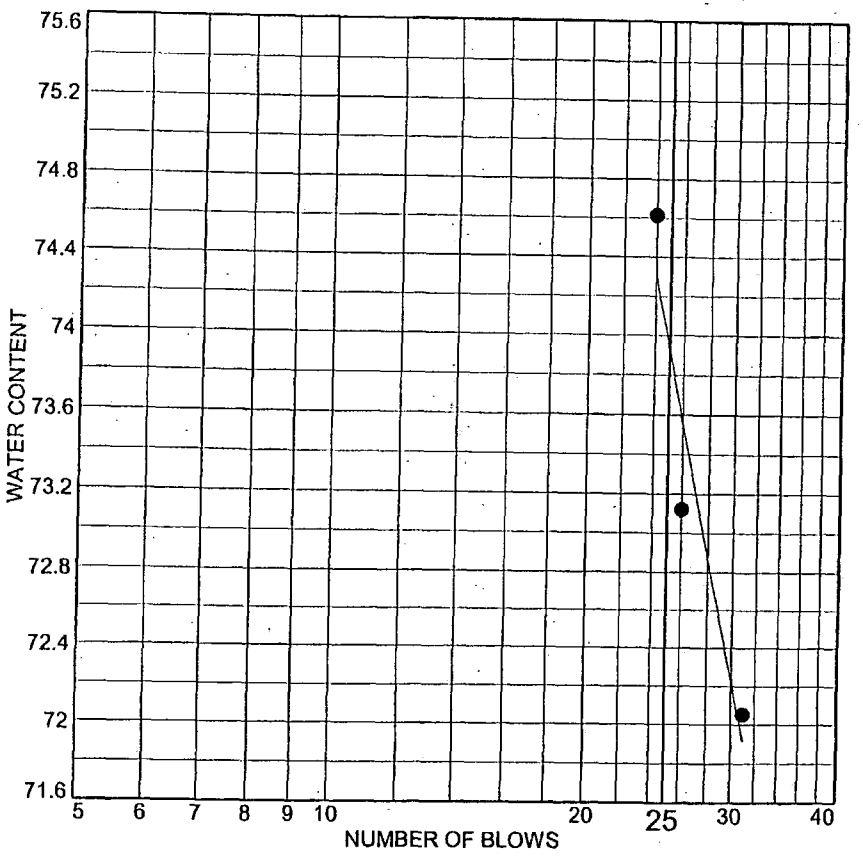
Liquid Limit= 62
Plastic Limit= 18
Plasticity Index= 44
Natural Moisture= 24.3
Liquidity Index= 0.1

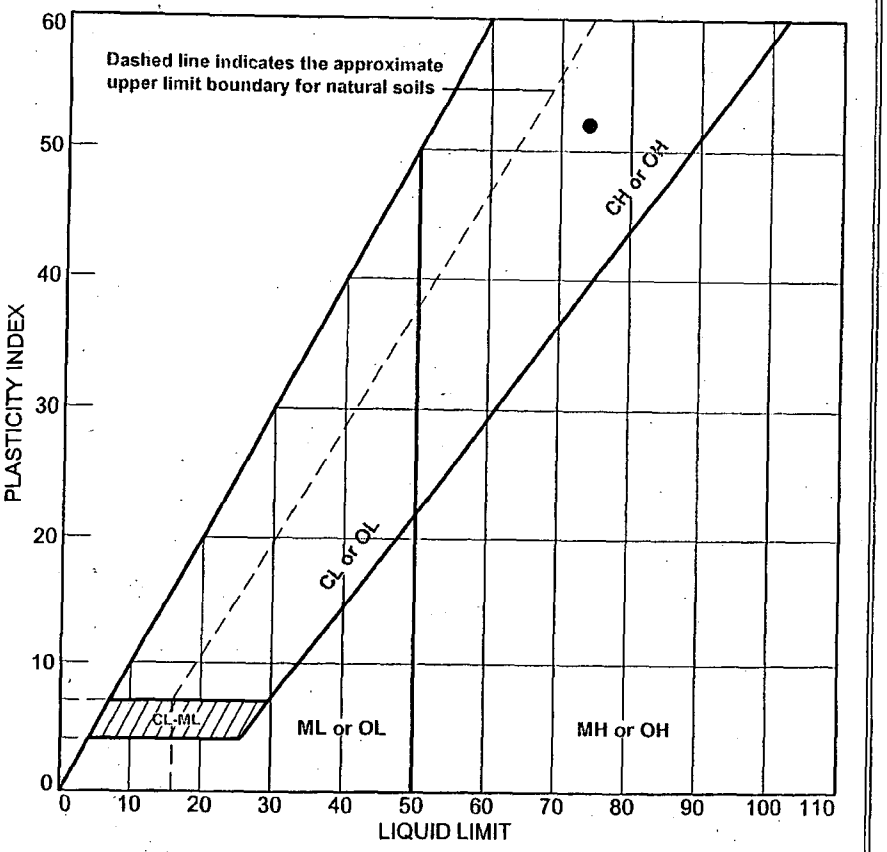
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	35.58	36.98			
Dry+Tare	34.45	35.67			
Tare	28.15	28.33			
Moisture	17.9	17.8			

MAK 4-2-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 919	STP-266 (TP-2)	6'-8.5'	12/19/2006	CH	Fat Clay	25.9	74	52

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC/TH Reviewed By:MH/RF

ASTM D4318-05

MH 4-3-07

KAW 4/3/07

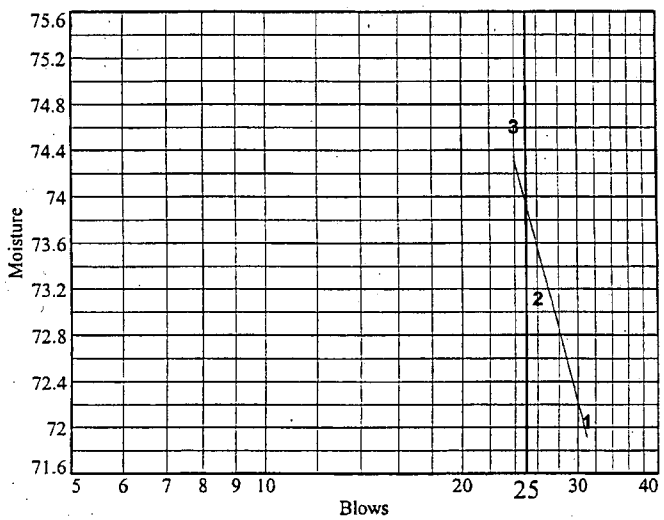
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 919
Depth: 6'-8.5'
Sample Number: STP-266 (TP-2)
Material Description: Fat Clay
Date: 12/19/2006
USCS Class.: CH
Testing Remarks: Tested By:AC/TH Reviewed By:MH/RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	34.93	35.67	36.12			
Dry+Tare	31.63	32.46	32.74			
Tare	27.05	28.07	28.21			
# Blows	31	26	24			
Moisture	72.1	73.1	74.6			



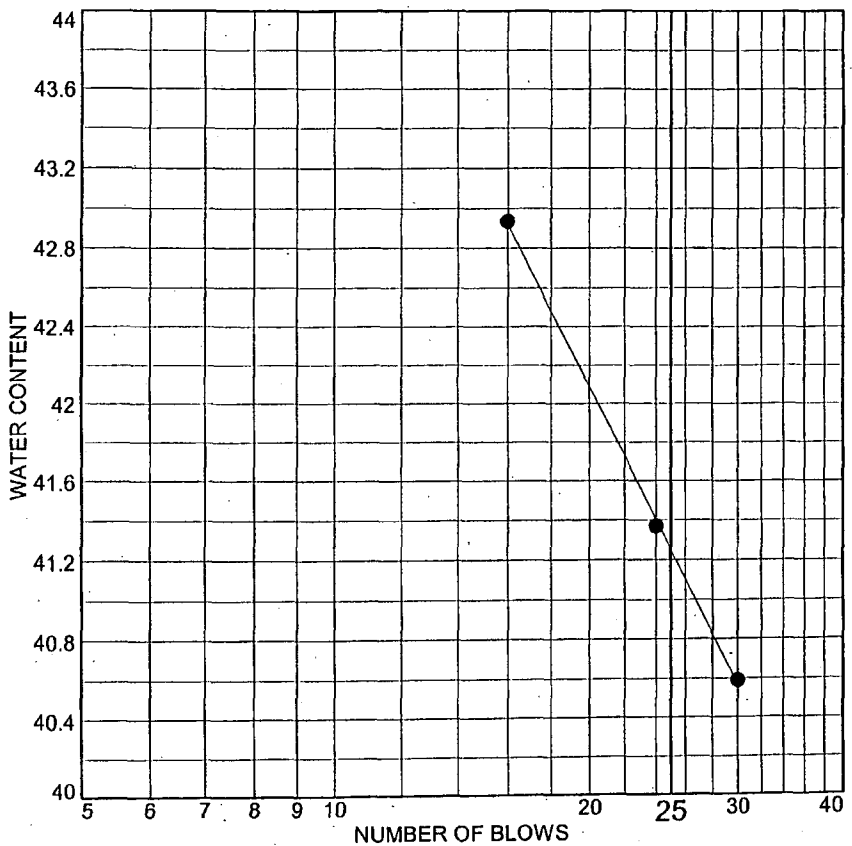
Liquid Limit= 74
Plastic Limit= 22
Plasticity Index= 52
Natural Moisture= 25.9
Liquidity Index= 0.1

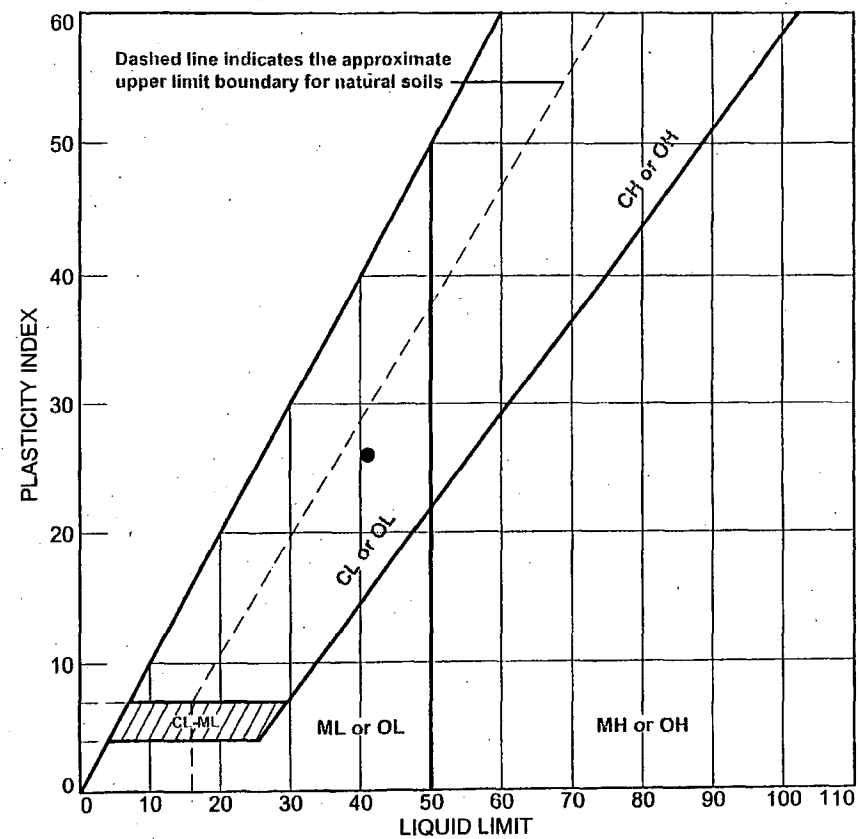
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	38.93	40.67			
Dry+Tare	36.76	38.45			
Tare	26.91	28.14			
Moisture	22.0	21.5			

MH 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Boring 927	STP-268 (TP2)	5.5'-8.5'	12/19/2006	CL	Lean Clay	22.0	41	26

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC Reviewed By:RF

ASTM D4318-05

4-7-07

KAW 4/3/07

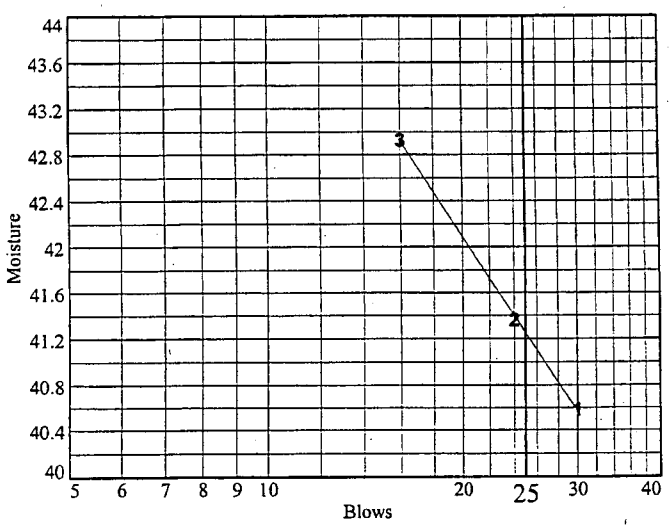
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: Boring 927
Depth: 5.5'-8.5'
Sample Number: STP-268 (TP2)
Material Description: Lean Clay
Date: 12/19/2006
USCS Class.: CL
Testing Remarks: Tested By:AC Reviewed By:RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	37.71	37.57	39.13			
Dry+Tare	34.95	34.79	35.97			
Tare	28.15	28.07	28.61			
# Blows	30	24	16			
Moisture	40.6	41.4	42.9			



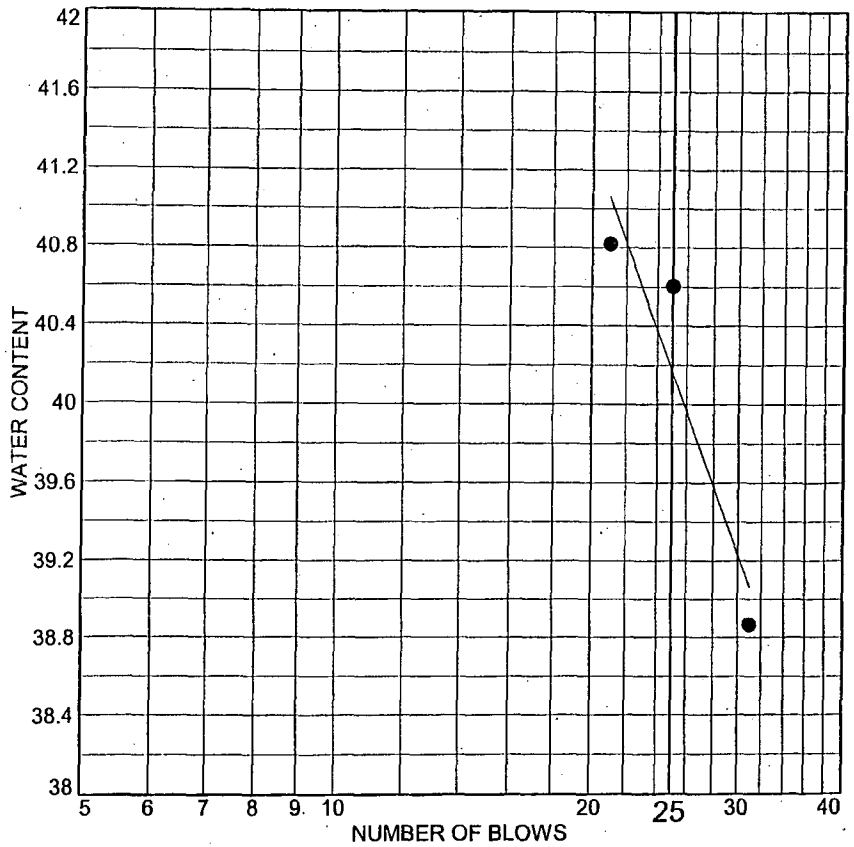
Liquid Limit= 41
Plastic Limit= 15
Plasticity Index= 26
Natural Moisture= 22.0
Liquidity Index= 0.3

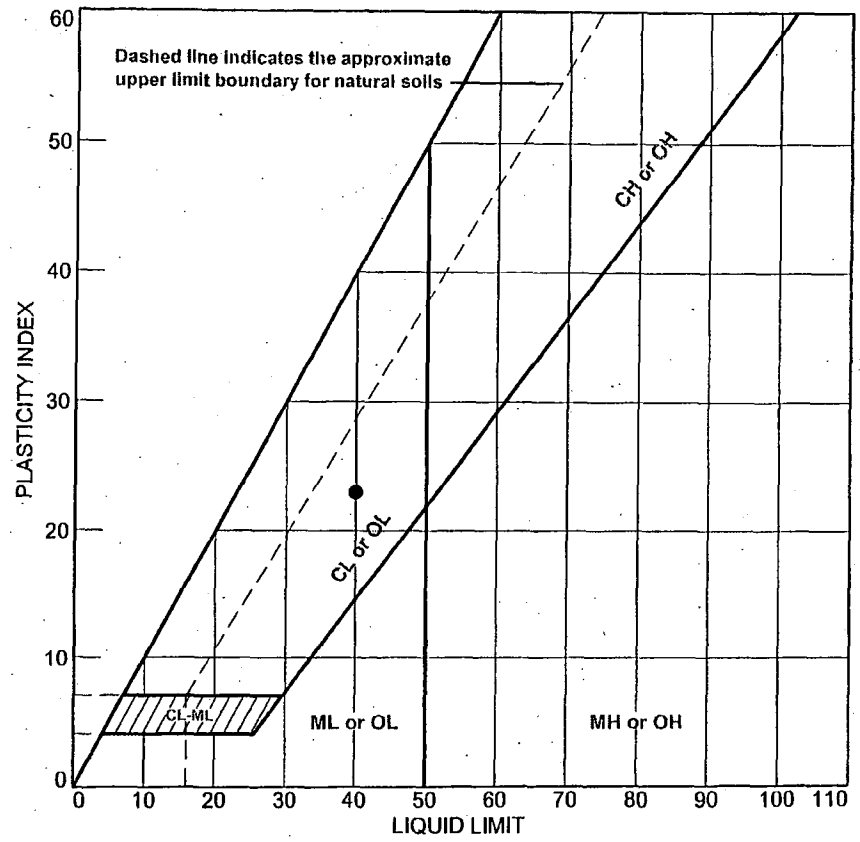
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	36.43	38.99	3		
Dry+Tare	35.42	37.58			
Tare	28.35	28.03			
Moisture	14.3	14.8			

MAA 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	C 304	STP-262 (TP-2)	6.57'-9.0'	12/18/2006	CL	Lean Clay	25.5	40	23

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC/TH Reviewed By:MH/RF
ASTM D4318-05

MH
4-3-07

KAW 4/3/07

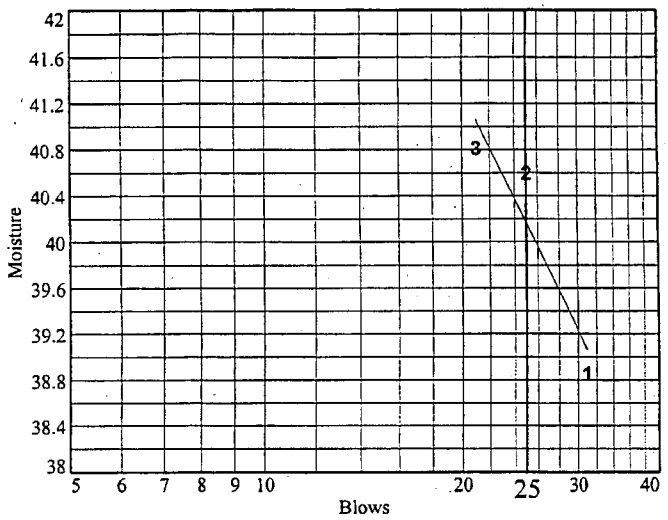
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: C 304
Depth: 6.57'-9.0'
Sample Number: STP-262 (TP-2)
Material Description: Lean Clay
Date: 12/18/2006
USCS Class.: CL
Testing Remarks: Tested By:AC/TH
Reviewed By:MH/RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	35.15	38.06	38.81			
Dry+Tare	32.13	35.23	35.72			
Tare	24.36	28.26	28.15			
# Blows	31	25	21			
Moisture	38.9	40.6	40.8			



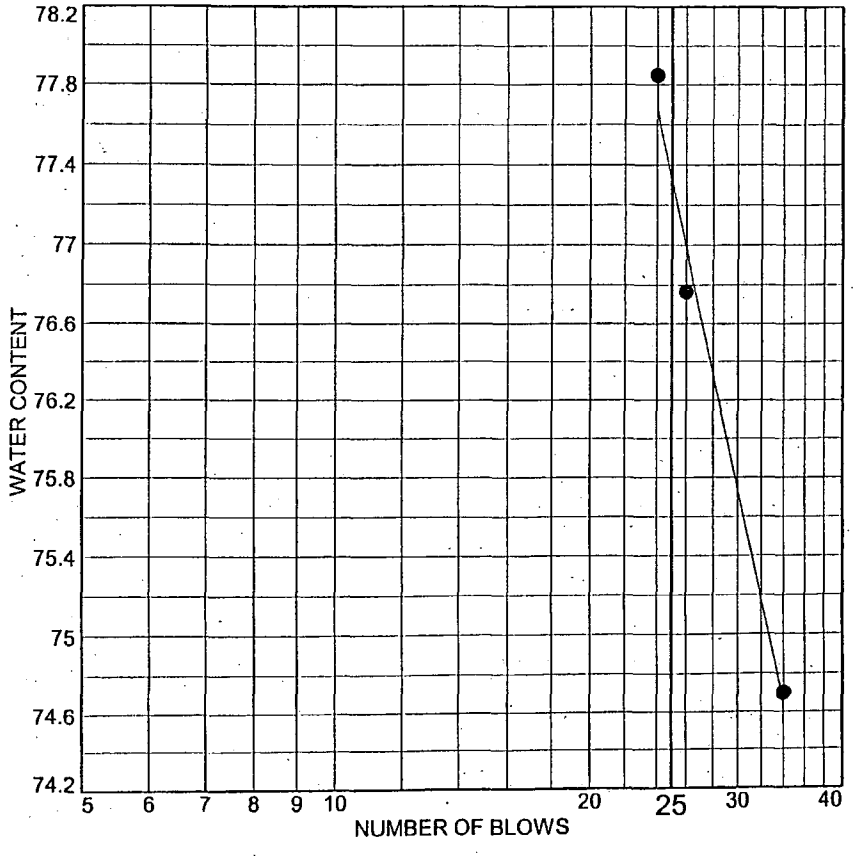
Liquid Limit= 40
Plastic Limit= 17
Plasticity Index= 23
Natural Moisture= 25.5
Liquidity Index= 0.4

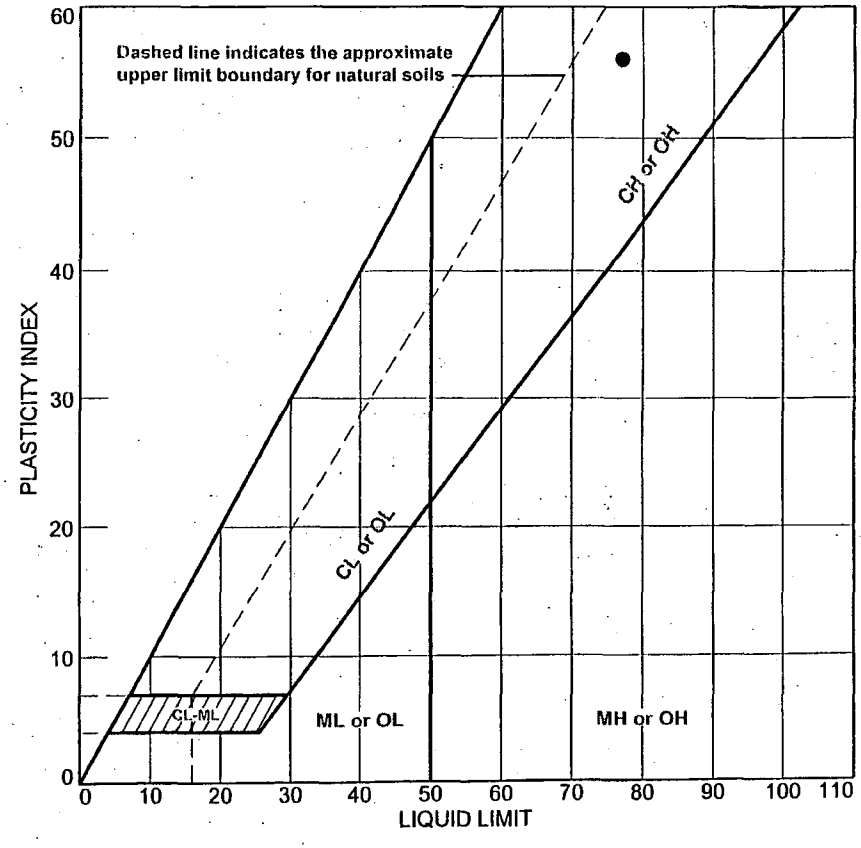
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	35.75	37.77			
Dry+Tare	34.64	36.36			
Tare	28.26	28.18			
Moisture	17.4	17.2			

MH 4-3-07

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	C 404	STP-264 (TP2)	7.0'-9.0'	12/18/2006	CH	Fat Clay	28.4	77	56

Client Bechtel Power Corporation

Project Bechtel/STP/COL

Project No. 5050-06-0496

MACTEC

● Tested By:AC Reviewed By:RF

ASTM D4318-05

4-3-07

KAW 4/3/07

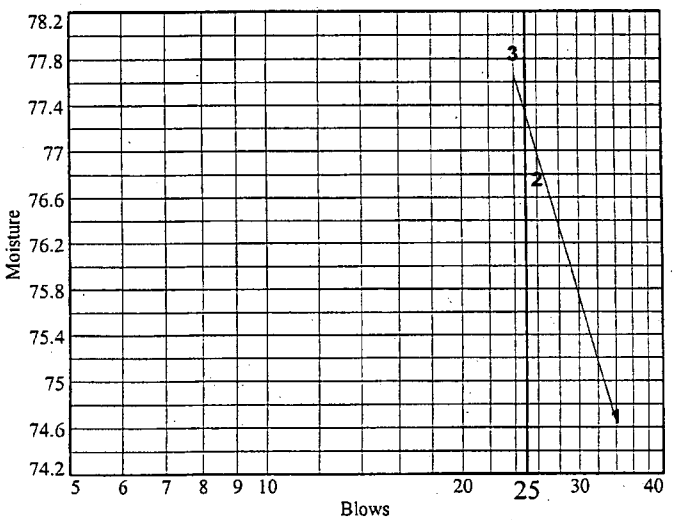
LIQUID AND PLASTIC LIMIT TEST DATA

2/23/2007

Client: Bechtel Power Corporation
Project: Bechtel/STP/COL
Project Number: 5050-06-0496
Location: C 404
Depth: 7.0'-9.0'
Sample Number: STP-264 (TP2)
Material Description: Fat Clay
Date: 12/18/2006
USCS Class.: CH
Testing Remarks: Tested By:AC Reviewed By:RF
ASTM D4318-05

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	36.79	36.88	36.64			
Dry+Tare	33.07	33.18	32.95			
Tare	28.09	28.36	28.21			
# Blows	34	26	24			
Moisture	74.7	76.8	77.8			



Liquid Limit= 77
Plastic Limit= 21
Plasticity Index= 56
Natural Moisture= 28.4
Liquidity Index= 0.1

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	32.27	39.89			
Dry+Tare	30.39	37.88			
Tare	21.56	28.27			
Moisture	21.3	20.9			

MM 4-3-07