

KEY TO BORING LOGS

Symbol Description

Strata symbols



Gravel frac



Low-high plasticity clays



Description not given for:
"OZ"



High plasticity clay



Description not given for:
"O.:"



Topsoil



Description not given for:
"O="



Description not given for:
"NR"



Low plasticity clay



Description not given for:
"C-3"



Silty sand



Shale

Symbol Description



Description not given for:
"OY"



Description not given for:
"LWU"

Misc. Symbols



Description not given for:
"FTRANGLE"



Description not given for:
"FSQUARE"



Water table during
drilling



Water table at
boring completion

Soil Samplers



Standard penetration test



Undisturbed thin wall
Shelby tube

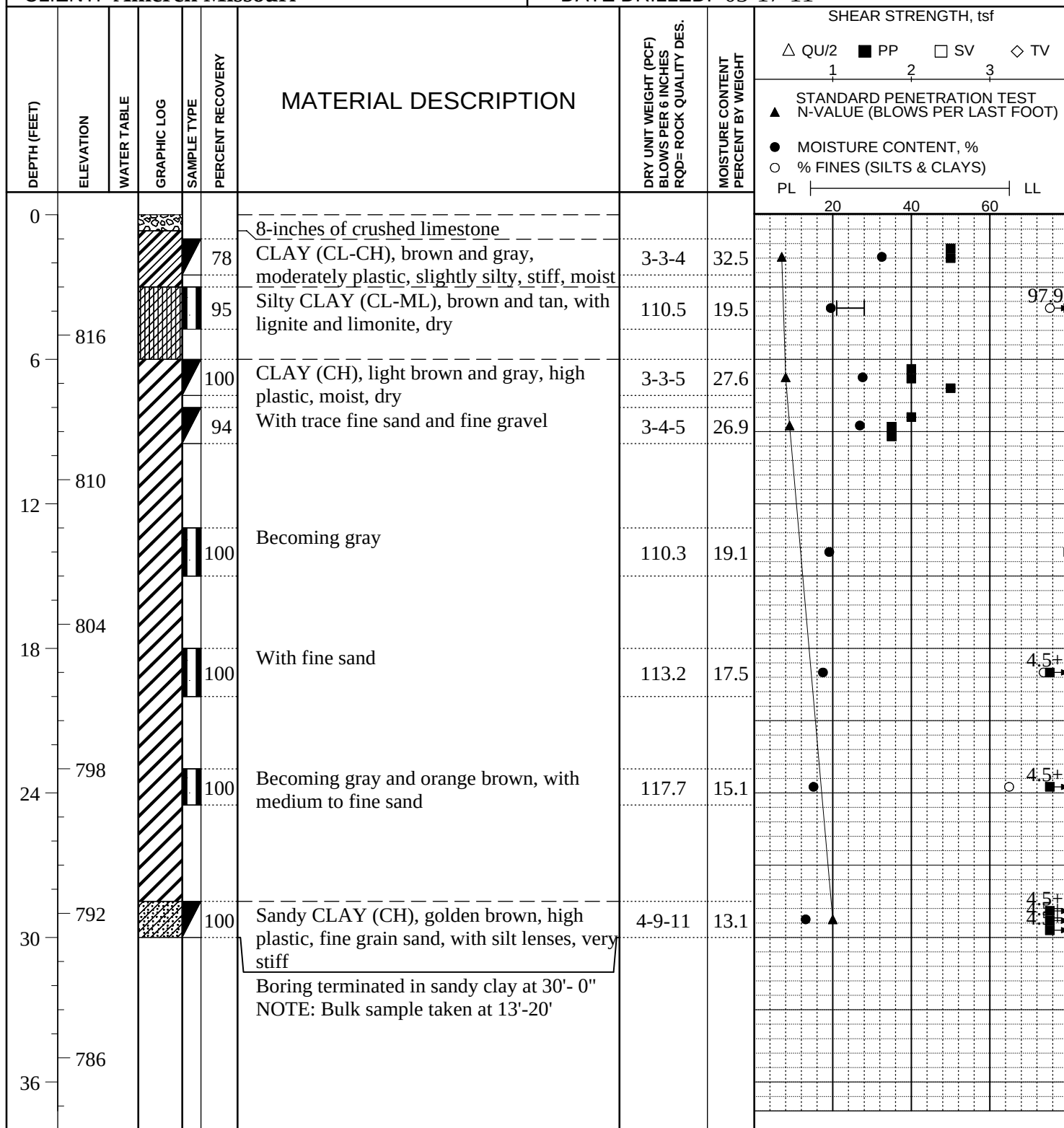
Notes:

1. Exploratory borings were drilled on 03-17-11 using a 4-inch diameter continuous flight power auger.
2. No free water was encountered at the time of drilling or when re-checked the following day.
3. Boring locations were taped from existing features and elevations extrapolated from the final design schematic plan.
4. These logs are subject to the limitations, conclusions, and recommendations in this report.
5. Results of tests conducted on samples recovered are reported on the logs.

BORING LOG B-1

Labadie Plant Utility Waste Landfill
Potential Clay Borrow at Callaway Plant
 CLIENT: **Ameren Missouri**

LOCATION: N 1070025 E 1850593
 ELEVATION: 821 DATUM:
 DATE DRILLED: 03-17-11



DRILLER: Midwest Drilling
 METHOD: 4.25" CFA
 TYPE OF SPT HAMMER: Automatic
 HAMMER EFFICIENCY (%): _____
 LOGGED BY: J. David

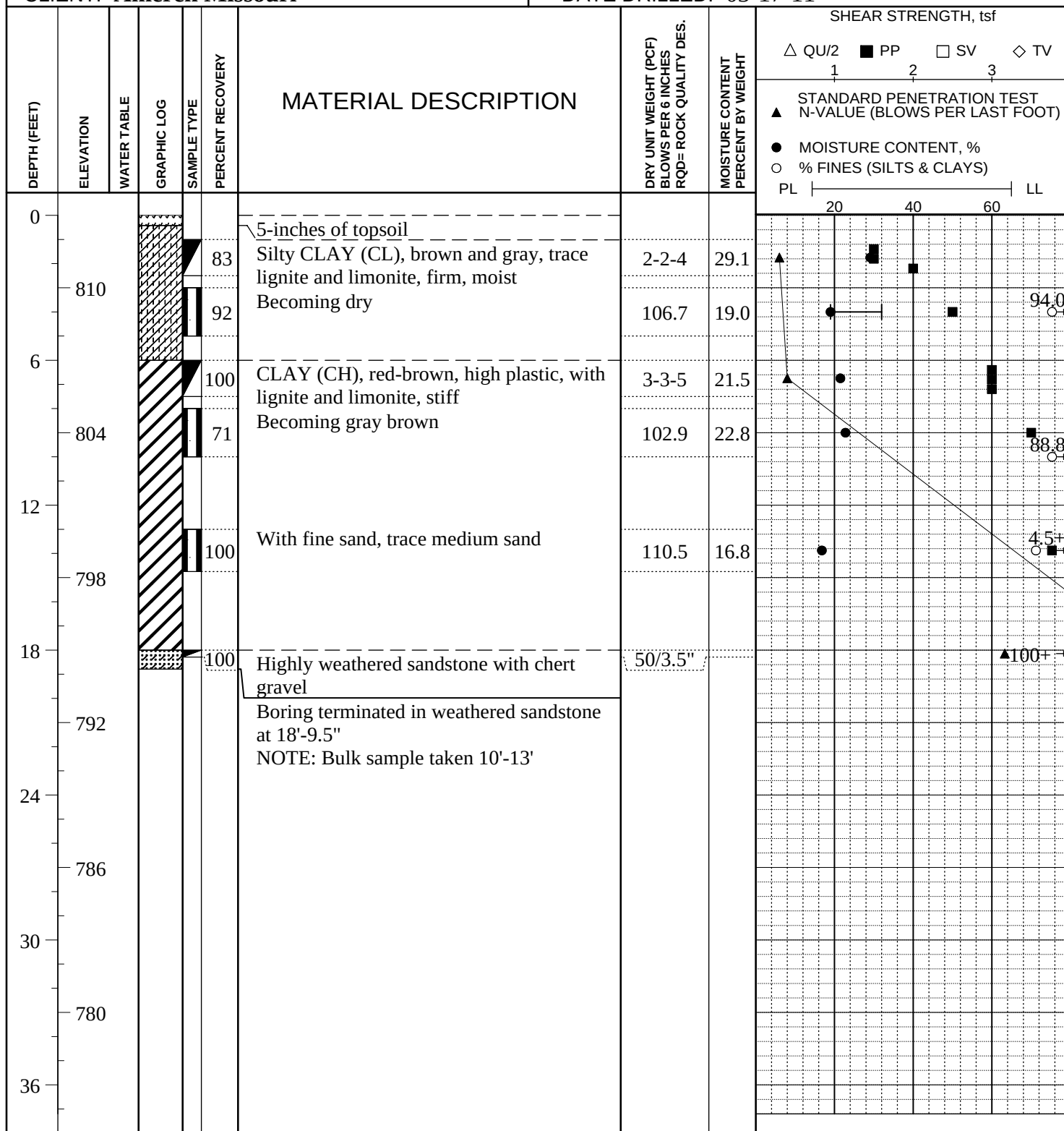
STRATIFICATION LINES ARE
 APPROXIMATE SOIL BOUNDARIES
 ONLY; ACTUAL CHANGES MAY BE
 GRADUAL OR MAY OCCUR BETWEEN
 SAMPLES.

WATER LEVELS: DURING DRILLING _____ FEET
 _____ BORING DRY AT COMPLETION OF DRILLING
 AT _____ FEET AFTER _____ HOURS
 AT _____ FEET AFTER _____ HOURS
 PIEZOMETER: INSTALLED AT _____ FEET

BORING LOG B-2

Labadie Plant Utility Waste Landfill
Potential Clay Borrow at Callaway Plant
 CLIENT: **Ameren Missouri**

LOCATION: N 1069272 E 1852010
 ELEVATION: 813 DATUM:
 DATE DRILLED: 03-17-11



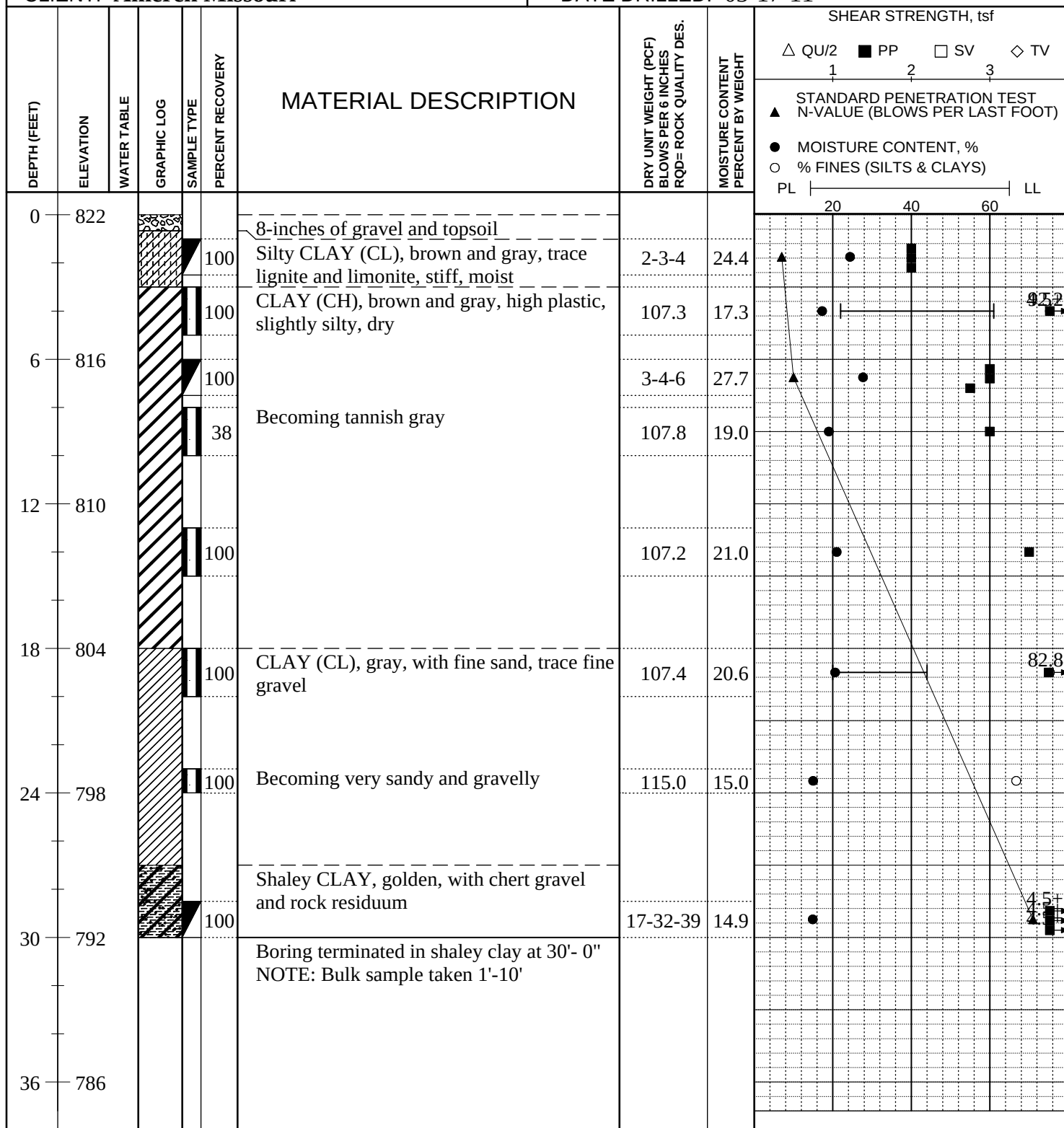
DRILLER: Midwest Drilling
 METHOD: 4.25" CFA
 TYPE OF SPT HAMMER: Automatic
 HAMMER EFFICIENCY (%): _____
 LOGGED BY: J. David

STRATIFICATION LINES ARE
 APPROXIMATE SOIL BOUNDARIES
 ONLY; ACTUAL CHANGES MAY BE
 GRADUAL OR MAY OCCUR BETWEEN
 SAMPLES.

WATER LEVELS: DURING DRILLING _____ FEET
 _____ BORING DRY AT COMPLETION OF DRILLING
 AT _____ FEET AFTER _____ HOURS
 AT _____ FEET AFTER _____ HOURS
 PIEZOMETER: INSTALLED AT _____ FEET

Labadie Plant Utility Waste Landfill
Potential Clay Borrow at Callaway Plant
 CLIENT: **Ameren Missouri**

LOCATION: N 1068835 E 1850564
 ELEVATION: 822 DATUM:
 DATE DRILLED: 03-17-11



DRILLER: Midwest Drilling
 METHOD: 4.25" CFA
 TYPE OF SPT HAMMER: Automatic
 HAMMER EFFICIENCY (%): _____
 LOGGED BY: J. David

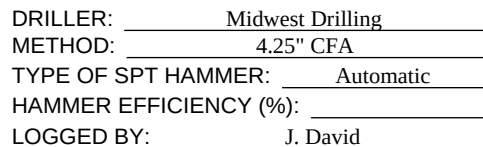
STRATIFICATION LINES ARE
 APPROXIMATE SOIL BOUNDARIES
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 GRADUAL OR MAY OCCUR BETWEEN
 SAMPLES.

WATER LEVELS: DURING DRILLING _____ FEET
 _____ BORING DRY AT COMPLETION OF DRILLING
 AT _____ FEET AFTER _____ HOURS
 AT _____ FEET AFTER _____ HOURS
 PIEZOMETER: INSTALLED AT _____ FEET



**Labadie Plant Utility Waste Landfill
Potential Clay Borrow at Callaway Plant
CLIENT: Ameren Missouri**

LOCATION: N 1068562 E 1852007
ELEVATION: 821 DATUM:
DATE DRILLED: 03-17-11



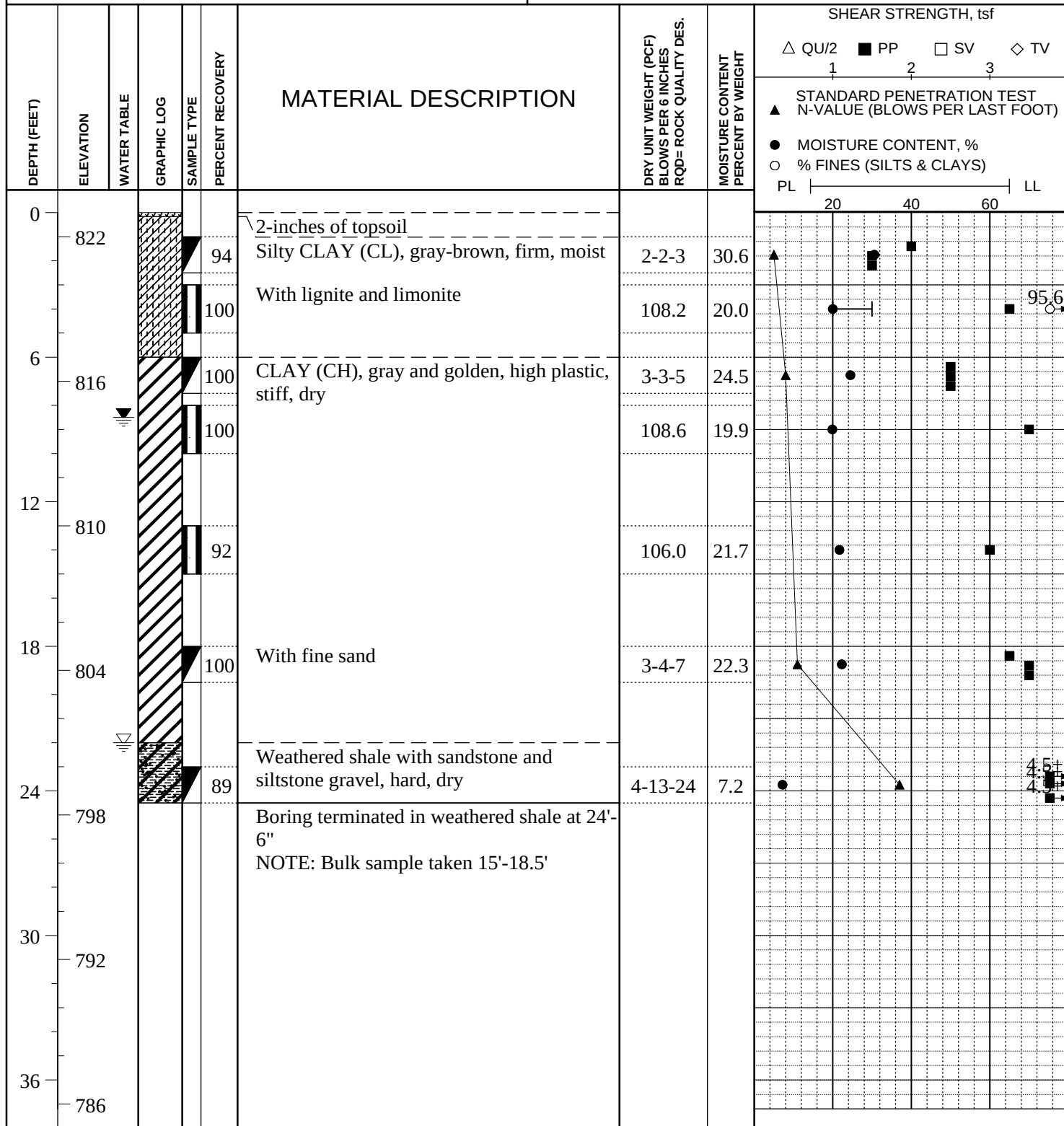
STRATIFICATION LINES ARE APPROXIMATE SOIL BOUNDARIES ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN SAMPLES.

WATER LEVELS: DURING DRILLING ____ FEET
 ____ Y BORING DRY AT COMPLETION OF DRILLING
 AT ____ FEET AFTER ____ HOURS
 AT ____ FEET AFTER ____ HOURS
PIEZOMETER: INSTALLED AT ____ FEET

BORING LOG B-5

Labadie Plant Utility Waste Landfill
Potential Clay Borrow at Callaway Plant
 CLIENT: **Ameren Missouri**

LOCATION: N 1068017 E 1850704
 ELEVATION: 823 DATUM:
 DATE DRILLED: 03-17-11



DRILLER: Midwest Drilling
 METHOD: 4.25" CFA
 TYPE OF SPT HAMMER: Automatic
 HAMMER EFFICIENCY (%): _____
 LOGGED BY: J. David

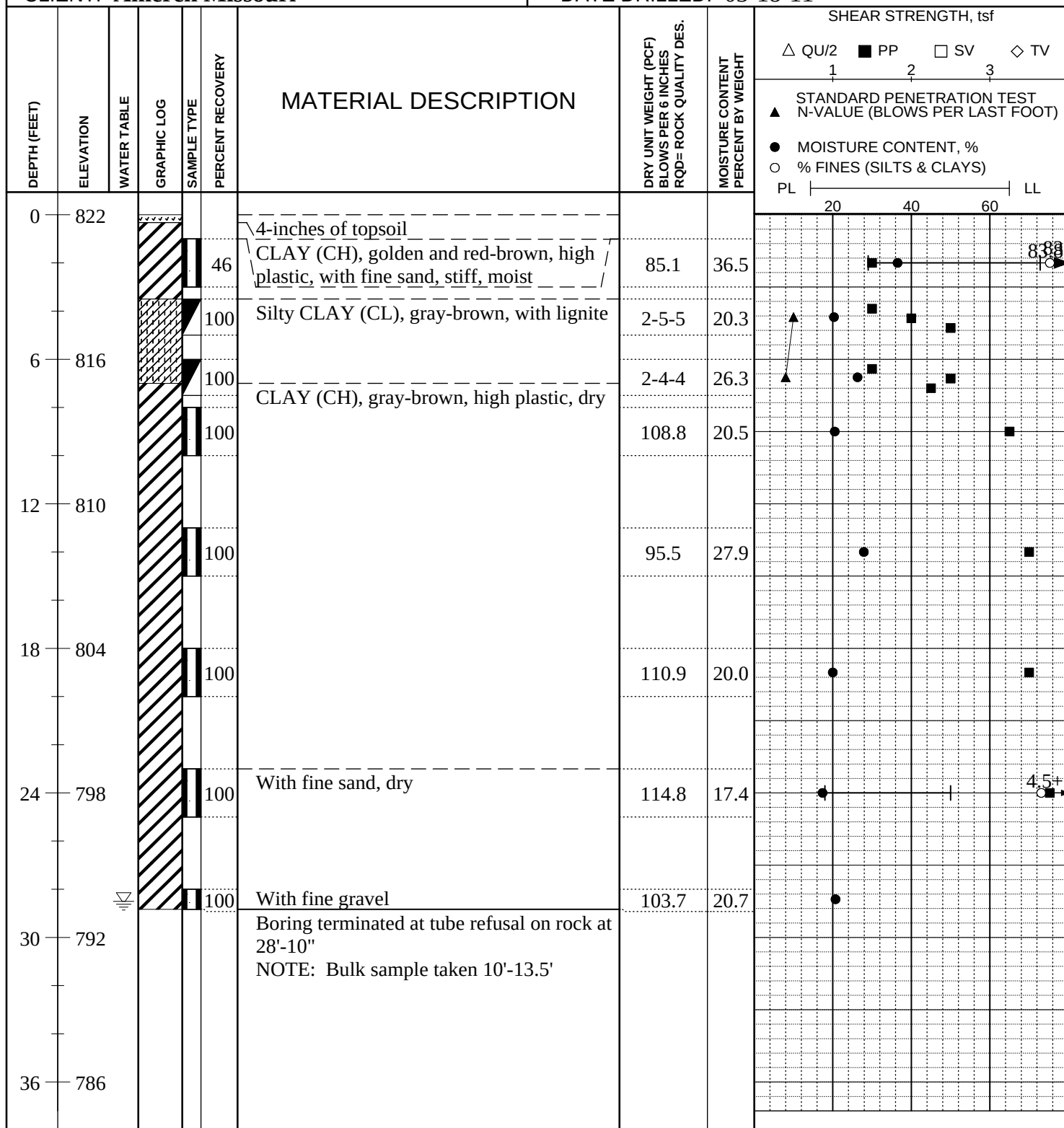
STRATIFICATION LINES ARE
 APPROXIMATE SOIL BOUNDARIES
 ONLY; ACTUAL CHANGES MAY BE
 GRADUAL OR MAY OCCUR BETWEEN
 SAMPLES.

WATER LEVELS: DURING DRILLING 22 FEET
 N BORING DRY AT COMPLETION OF DRILLING
 AT 8.5 FEET AFTER 24 HOURS
 AT _____ FEET AFTER _____ HOURS
 PIEZOMETER: INSTALLED AT _____ FEET

BORING LOG B-6

Labadie Plant Utility Waste Landfill
Potential Clay Borrow at Callaway Plant
 CLIENT: **Ameren Missouri**

LOCATION: N 1067907 E 1852069
 ELEVATION: 822 DATUM:
 DATE DRILLED: 03-18-11



DRILLER: Midwest Drilling
 METHOD: 4.25" CFA
 TYPE OF SPT HAMMER: Automatic
 HAMMER EFFICIENCY (%): _____
 LOGGED BY: J. David

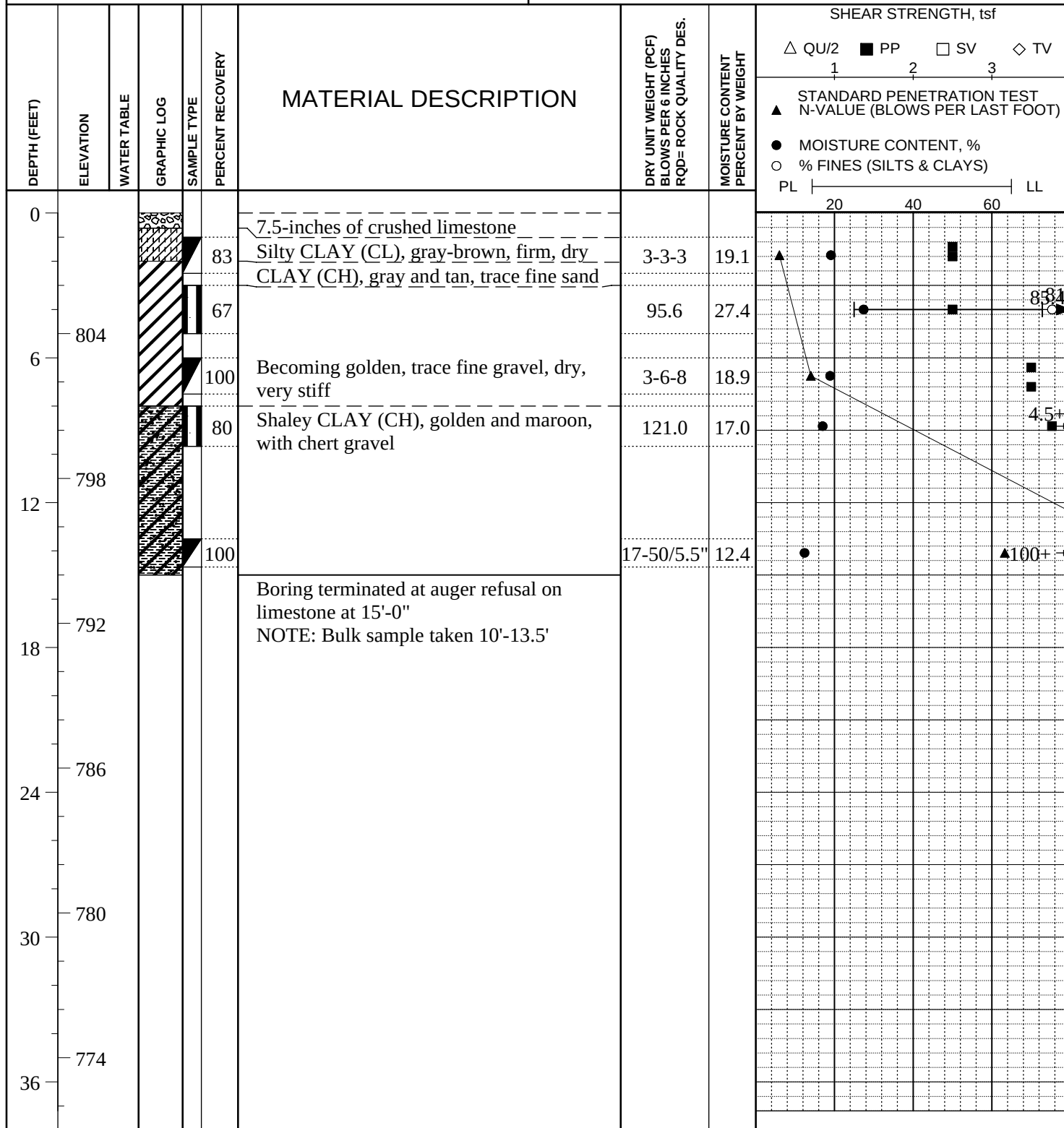
STRATIFICATION LINES ARE
 APPROXIMATE SOIL BOUNDARIES
 ONLY; ACTUAL CHANGES MAY BE
 GRADUAL OR MAY OCCUR BETWEEN
 SAMPLES.

WATER LEVELS: DURING DRILLING 28.5 FEET
 N BORING DRY AT COMPLETION OF DRILLING
 AT _____ FEET AFTER _____ HOURS
 AT _____ FEET AFTER _____ HOURS
 PIEZOMETER: INSTALLED AT _____ FEET

BORING LOG B-7

Labadie Plant Utility Waste Landfill
Potential Clay Borrow at Callaway Plant
 CLIENT: **Ameren Missouri**

LOCATION: N 1068084 E 1852942
 ELEVATION: 809 DATUM:
 DATE DRILLED: 03-18-11



DRILLER: Midwest Drilling
 METHOD: 4.25" CFA
 TYPE OF SPT HAMMER: Automatic
 HAMMER EFFICIENCY (%): _____
 LOGGED BY: J. David

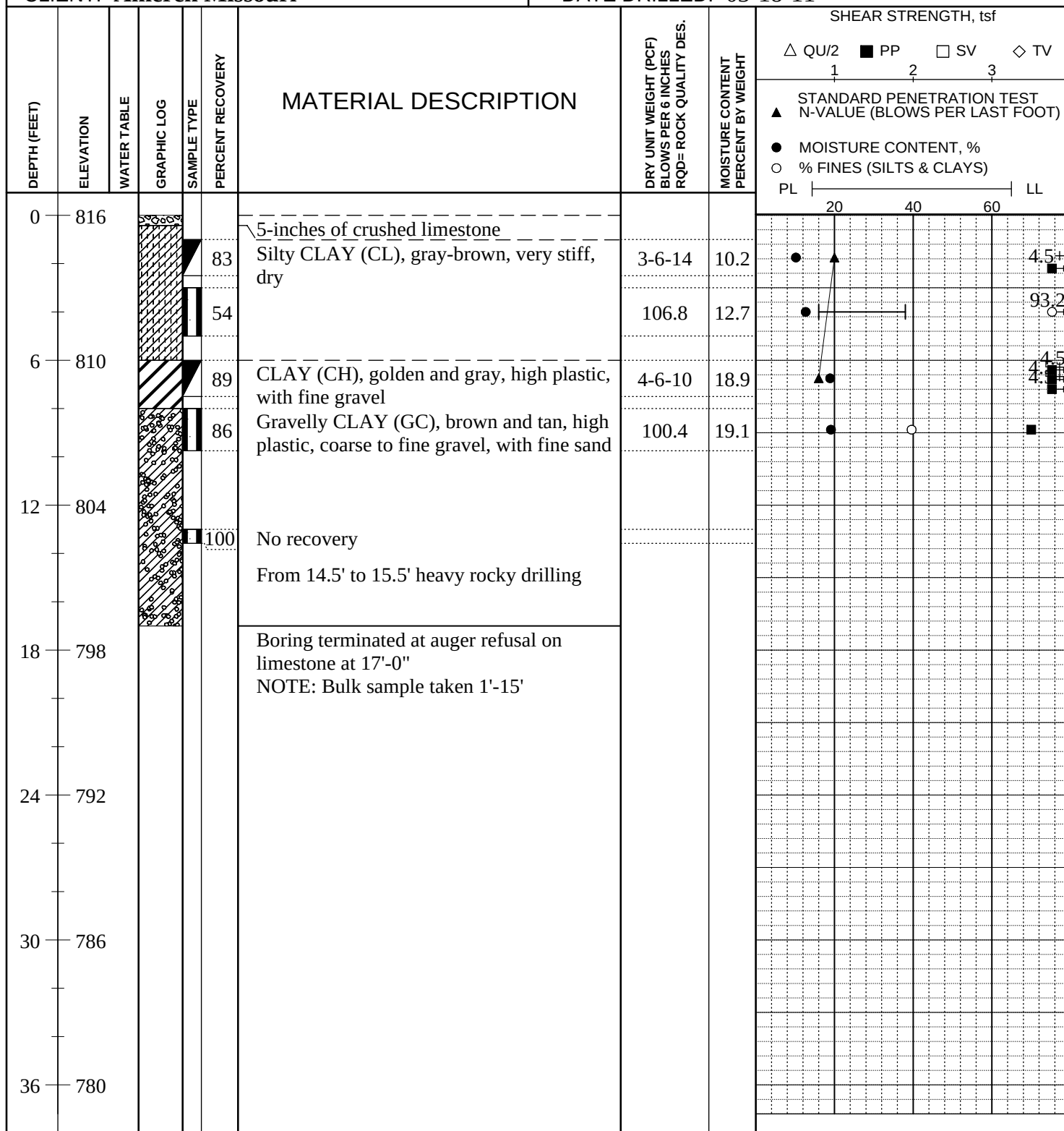
STRATIFICATION LINES ARE
 APPROXIMATE SOIL BOUNDARIES
 ONLY; ACTUAL CHANGES MAY BE
 GRADUAL OR MAY OCCUR BETWEEN
 SAMPLES.

WATER LEVELS: DURING DRILLING _____ FEET
 _____ BORING DRY AT COMPLETION OF DRILLING
 AT _____ FEET AFTER _____ HOURS
 AT _____ FEET AFTER _____ HOURS
 PIEZOMETER: INSTALLED AT _____ FEET

BORING LOG B-8

Labadie Plant Utility Waste Landfill
Potential Clay Borrow at Callaway Plant
 CLIENT: **Ameren Missouri**

LOCATION: N 1067429 E 1853784
 ELEVATION: 816 DATUM:
 DATE DRILLED: 03-18-11



DRILLER: Midwest Drilling
 METHOD: 4.25" CFA
 TYPE OF SPT HAMMER: Automatic
 HAMMER EFFICIENCY (%): _____
 LOGGED BY: J. David

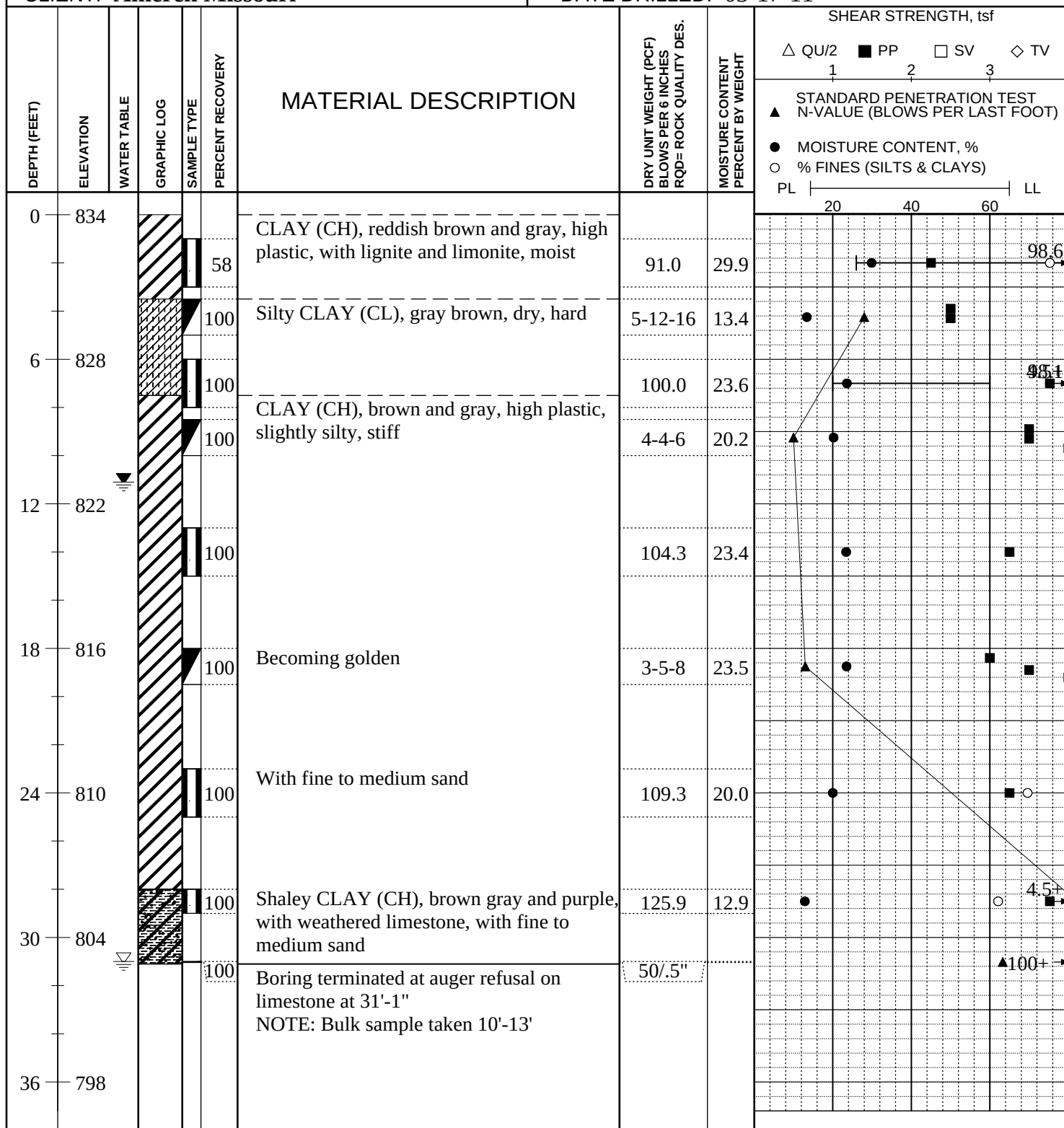
STRATIFICATION LINES ARE
 APPROXIMATE SOIL BOUNDARIES
 ONLY; ACTUAL CHANGES MAY BE
 GRADUAL OR MAY OCCUR BETWEEN
 SAMPLES.

WATER LEVELS: DURING DRILLING _____ FEET
 _____ BORING DRY AT COMPLETION OF DRILLING
 AT _____ FEET AFTER _____ HOURS
 AT _____ FEET AFTER _____ HOURS
 PIEZOMETER: INSTALLED AT _____ FEET

BORING LOG B-9

Labadie Plant Utility Waste Landfill
Potential Clay Borrow at Callaway Plant
 CLIENT: **Ameren Missouri**

LOCATION: N 1067143 E 1850654
 ELEVATION: 834 DATUM:
 DATE DRILLED: 03-17-11



DRILLER: Midwest Drilling
 METHOD: 4.25" CFA
 TYPE OF SPT HAMMER: Automatic
 HAMMER EFFICIENCY (%): _____
 LOGGED BY: J. David

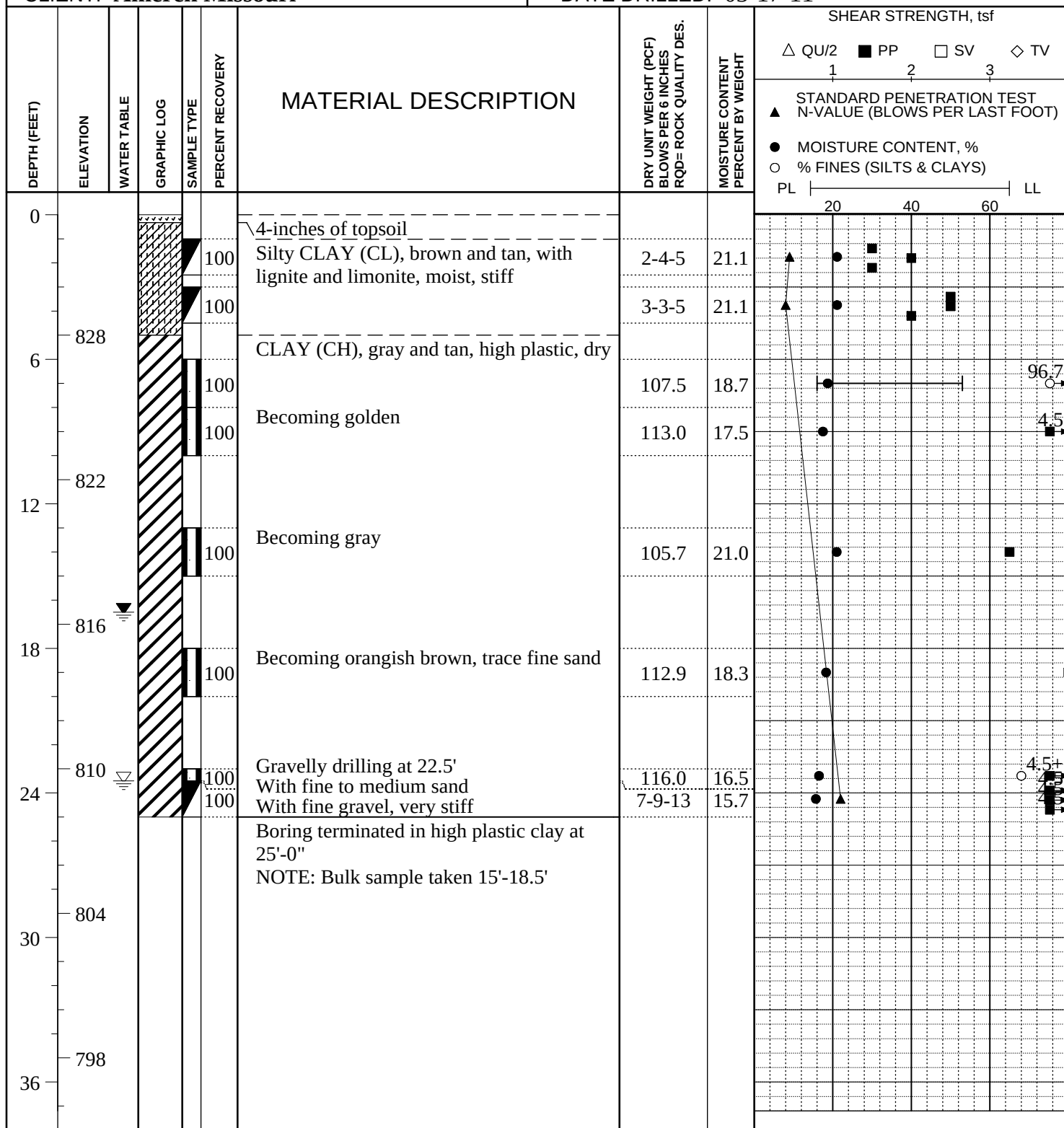
STRATIFICATION LINES ARE
 APPROXIMATE SOIL BOUNDARIES
 ONLY; ACTUAL CHANGES MAY BE
 GRADUAL OR MAY OCCUR BETWEEN
 SAMPLES.

WATER LEVELS: DURING DRILLING 31 FEET
 N BORING DRY AT COMPLETION OF DRILLING
 AT 11.1 FEET AFTER 24 HOURS
 AT _____ FEET AFTER _____ HOURS
PIEZOMETER: INSTALLED AT _____ FEET

BORING LOG B-10

Labadie Plant Utility Waste Landfill
Potential Clay Borrow at Callaway Plant
 CLIENT: **Ameren Missouri**

LOCATION: N 1066225 E 1850478
 ELEVATION: 833 DATUM:
 DATE DRILLED: 03-17-11



DRILLER: Midwest Drilling
 METHOD: 4.25" CFA
 TYPE OF SPT HAMMER: Automatic
 HAMMER EFFICIENCY (%):
 LOGGED BY: J. David

STRATIFICATION LINES ARE
 APPROXIMATE SOIL BOUNDARIES
 ONLY; ACTUAL CHANGES MAY BE
 GRADUAL OR MAY OCCUR BETWEEN
 SAMPLES.

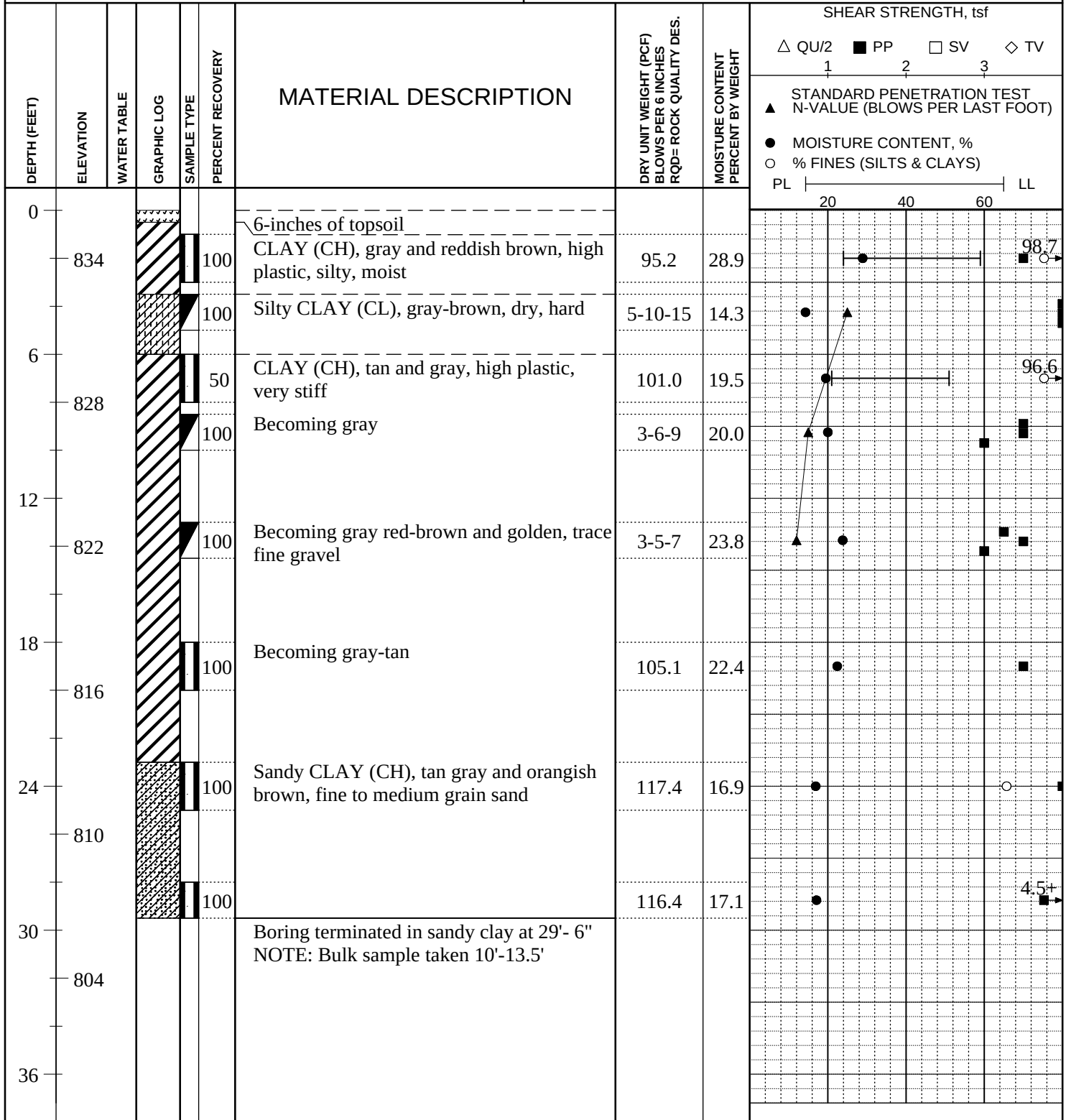
WATER LEVELS: DURING DRILLING 23.5 FEET
 N BORING DRY AT COMPLETION OF DRILLING
 AT 16.5 FEET AFTER 18 HOURS
 AT FEET AFTER HOURS
 PIEZOMETER: INSTALLED AT FEET



BORING LOG B-11

Labadie Plant Utility Waste Landfill
Potential Clay Borrow at Callaway Plant
CLIENT: **Ameren Missouri**

LOCATION: N 1066268 E 1852244
ELEVATION: 836 DATUM:
DATE DRILLED: 03-17-11



DRILLER: Midwest Drilling
METHOD: 4.25" CFA
TYPE OF SPT HAMMER: Automatic
HAMMER EFFICIENCY (%): _____
LOGGED BY: J. David

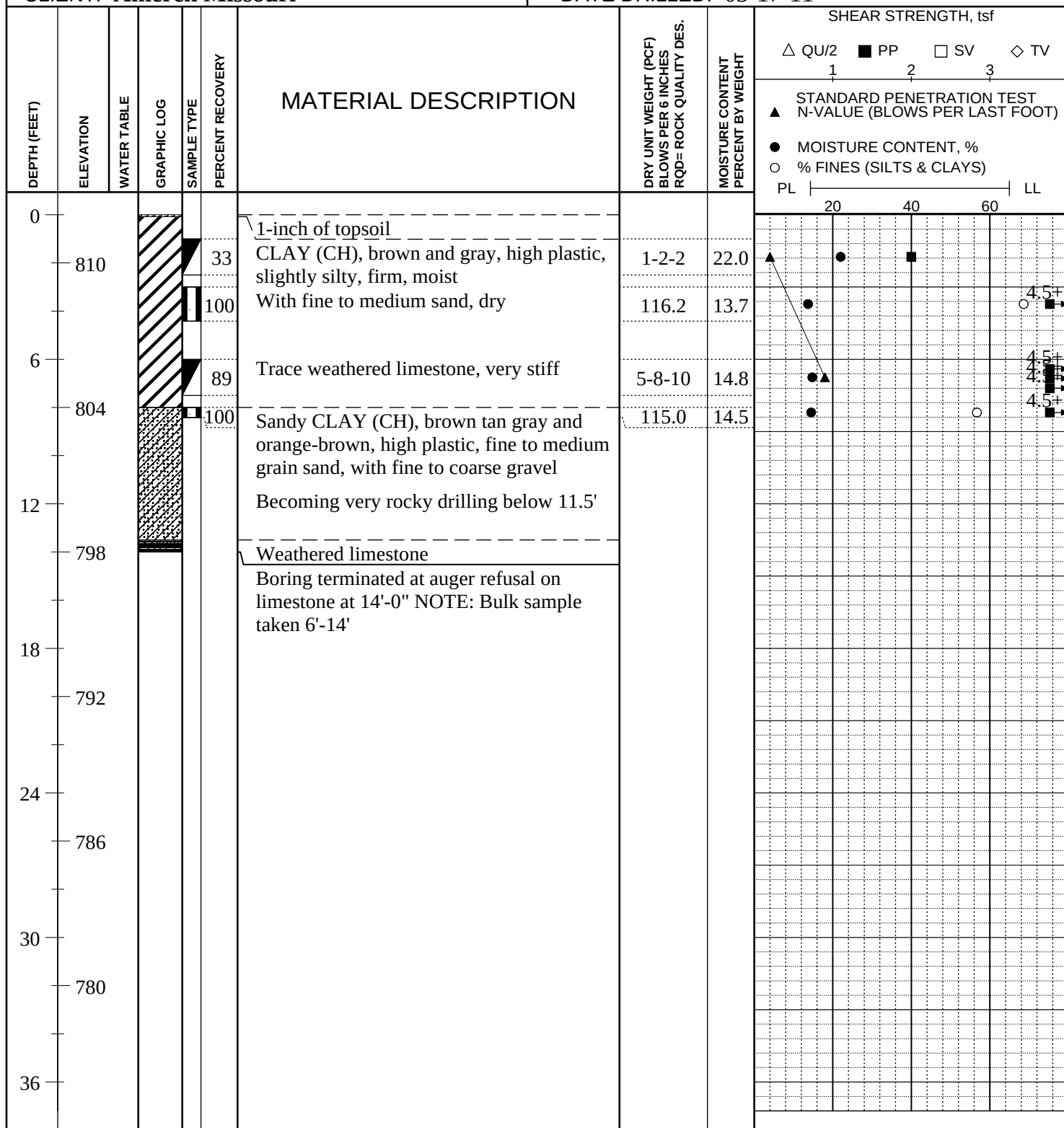
STRATIFICATION LINES ARE
APPROXIMATE SOIL BOUNDARIES
ONLY; ACTUAL CHANGES MAY BE
GRADUAL OR MAY OCCUR BETWEEN
SAMPLES.

WATER LEVELS: DURING DRILLING _____ FEET
_____ BORING DRY AT COMPLETION OF DRILLING
AT _____ FEET AFTER _____ HOURS
AT _____ FEET AFTER _____ HOURS
PIEZOMETER: INSTALLED AT _____ FEET

BORING LOG B-12

Labadie Plant Utility Waste Landfill
Potential Clay Borrow at Callaway Plant
 CLIENT: **Ameren Missouri**

LOCATION: N 1066354 E 1853688
 ELEVATION: 812 DATUM:
 DATE DRILLED: 03-17-11



DRILLER: Midwest Drilling
 METHOD: 4.25" CFA
 TYPE OF SPT HAMMER: Automatic
 HAMMER EFFICIENCY (%): _____
 LOGGED BY: J. David

STRATIFICATION LINES ARE
 APPROXIMATE SOIL BOUNDARIES
 ONLY; ACTUAL CHANGES MAY BE
 GRADUAL OR MAY OCCUR BETWEEN
 SAMPLES.

WATER LEVELS: DURING DRILLING _____ FEET
 _____ BORING DRY AT COMPLETION OF DRILLING
 AT _____ FEET AFTER _____ HOURS
 AT _____ FEET AFTER _____ HOURS
 PIEZOMETER: INSTALLED AT _____ FEET

LABORATORY TEST SUMMARY

Client: Ameren Missouri
 Project: Labadie UWL
 Location: Callaway Borrow Site

Sample Identification				Index Properties							Remarks
Boring Number	Sample Number	Depth (ft)	Sample Recovery (inches)	Visual Classification ASTM D2488	Water Content (%) ASTM D2216	Dry Density (pcf)	Liquid Limit ASTM D4318	Plastic Limit ASTM D4318	#200 Wash (Fines Content %) ASTM D2488. If greater than 10% remains on #200 sieve, dry shake with full nest of sieves	Penetrometer (tsf)	
B-1	SPT-1	1-2.5	14	CL-CH	32.5					2.5	
B-1	ST-2	3-5	20	CL-ML	19.5	110.5	28	21	97.9	4.0	
B-1	SPT-3	6-7.5	18	CH	27.7					2.2	
B-1	SPT-4	8-10	17	CH	26.9					1.8	
B-1	BULK	13-20		CH			69	22	95.7		
B-1	ST-5	13-15	24	CH	19.1	110.3				4.0	
B-1	ST-6	18-20	24	CH, sandy	17.5	113.2			Figure 4-1	4.5+	
B-1	ST-7	23-25	24	CH, sandy	15.1	117.7			Figure 4-2	4.5+	
B-1	SPT-8	28.5-30	18	CH, sandy	13.1					4.5+	
B-2	SPT-1	1-2.5	15	CL, silty	29.1					1.7	
B-2	ST-2	3-5	22	CL, silty	19.0	106.7	32	19	94.0	2.5	
B-2	SPT-3	6-7.5	18	CH	31.5					3.0	
B-2	ST-4	8-10	17	CH	50.6	83.9				3.5	
B-2	BULK	10-13		CH, trace sand			78	22	Figure 4-3		
B-2	ST-5	13-15	24	CH, sandy	16.8	110.5			Figure 4-4	4.5+	Bent Tube
B-2	SPT-6	18.5-20	1.5	Weathered rock							
B-3	SPT-1	1-2.5	18	CL, silty	24.4					2.0	
B-3	ST-2	3-5	24	CH	17.3	107.3	61	22	92.2	4.5+	
B-3	SPT-3	6-7.5	18	CH	27.7					2.9	
B-3	ST-4	8-10	9	CH	19.0	107.8				3.0	
B-3	BULK	1-10		CH			101	33	97.8		
B-3	ST-5	13-15	24	CH	21.0	107.2				3.5	
B-3	ST-6	18-20	24	CL, sandy, trace gravel	20.6	107.4	44	20	Figure 4-5	3.8	
B-3	ST-7	23-25	18	CL, sandy, gravelly	15.0	115.0			Figure 4-6		
B-3	SPT-8	28.5-30	18	Shaley clay	14.9					4.5+	
B-4	ST-1	1-3	22	CL, silty	28.1	95.6				2.5	
B-4	SPT-2	3.5-5	18	CL, silty	19.5					1.8	
B-4	ST-3	6-8	5	CL, silty						2.5	Sample was all fall in, no virgin material
B-4	SPT-4	8.5-10	18	CH	24.7					2.3	
B-4	ST-5	13-15	24	CH, sandy, trace gravel	18.9	111.4				4.0	
B-4	BULK	15-24		CH, sandy			56	21	Figure 4-7		
B-4	ST-6	18-20	21	SM	23.6	100.2				1.5	Not acceptable liner material
B-4	SPT-7	23.5-24	4.5	SHALE	5.3						
B-5	SPT-1	1-2.5	17	CL, silty	30.6					1.7	
B-5	ST-2	3-5	24	CL, silty	20.0	108.2	30	20	95.6	3.3	
B-5	SPT-3	6-7.5	18	CH	24.5					2.5	
B-5	ST-4	8-10	24	CH	19.9	108.6				3.5	
B-5	ST-5	13-15	22	CH	21.7	106.0				3.0	
B-5	BULK	15-18		CH			67	21	93.3		
B-5	SPT-6	18-19.5	18	CH, sandy	22.3					3.4	
B-5	SPT-7	23-24.5	16	Weathered rock	7.2					4.5+	
B-6	ST-1	1-3	11	CH, sandy	36.5	85.1	83	29	Figure 4-8	1.5	
B-6	SPT-2	3.5-5	18	CL	20.3					2.0	
B-6	SPT-3	6-7.5	18	CH	26.3					2.1	
B-6	ST-4	8-10	24	CH	20.5	108.8				3.3	
B-6	BULK	10-13		CH			86	22	96.5		
B-6	ST-5	13-15	24	CH	27.9	95.5				3.5	
B-6	ST-6	18-20	24	CH	20.0	110.9				3.5	
B-6	ST-7	23-25	24	CH, sandy	17.5	114.8	50	18	Figure 4-9	4.5+	
B-6	ST-8	28-30	10	CH, sandy, gravelly	20.7	103.7					Bent Tube

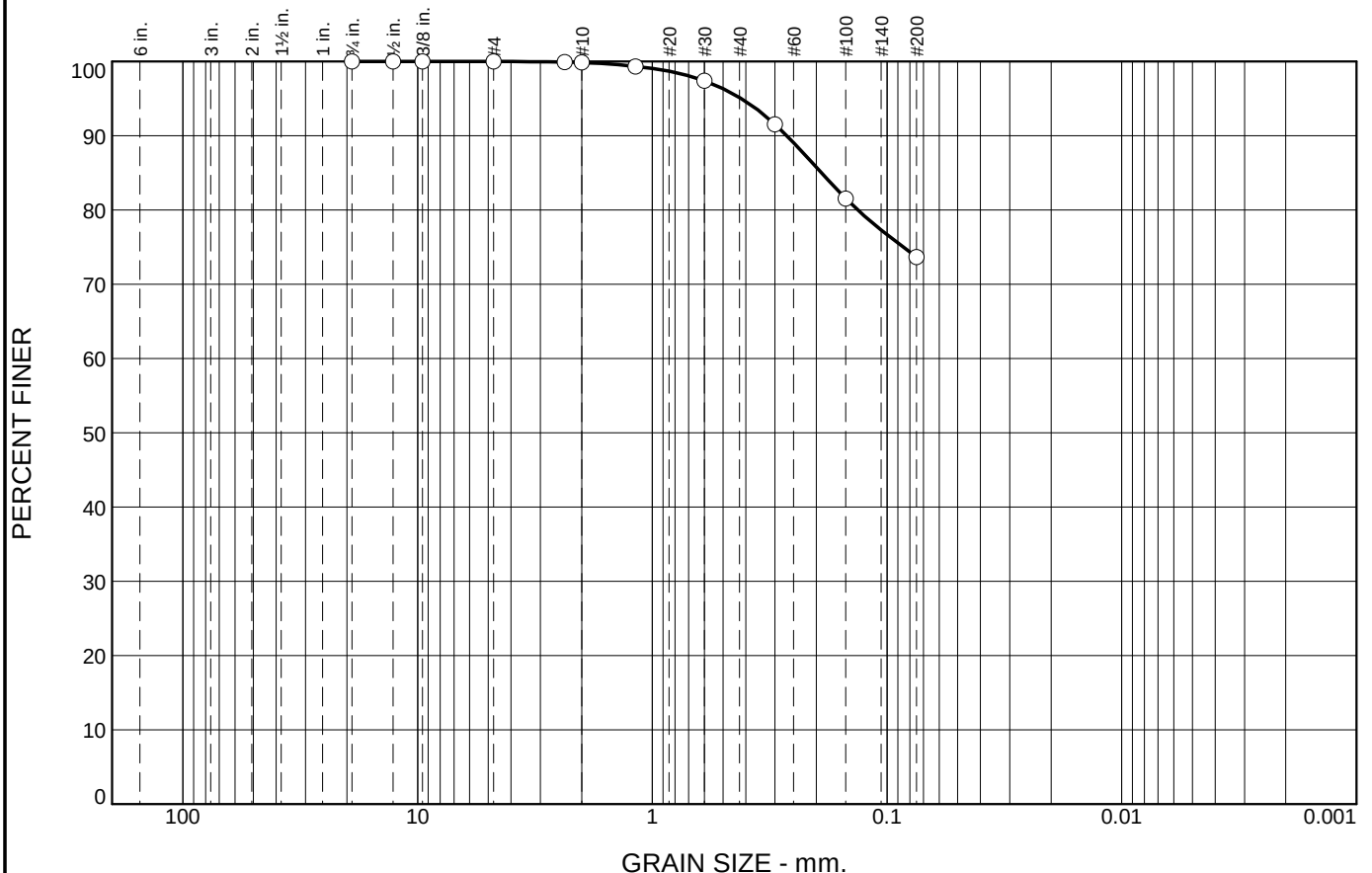
Figure 3

LABORATORY TEST SUMMARY

Client: Ameren Missouri
 Project: Labadie UWL
 Location: Callaway Borrow Site

Sample Identification				Index Properties							Remarks
Boring Number	Sample Number	Depth (ft)	Sample Recovery (inches)	Visual Classification ASTM D2488	Water Content (%) ASTM D2216	Dry Density (pcf)	Liquid Limit ASTM D4318	Plastic Limit ASTM D4318	#200 Wash (Fines Content %) ASTM D2488 If greater than 10% remains on #200 sieve, dry shake with full nest of sieves	Penetrometer (tsf)	
B-7	SPT-1	1-2.5	15	CL, silty	19.2					2.5	
B-7	ST-2	3-5	16	CH, trace sand	27.4	95.6	81	25	Figure 4-10	2.5	
B-7	SPT3	6-7.5	18	CH, trace sand & gravel	19.0					3.7	
B-7	ST-4	8-10	16	Shaley clay	17.0	121.0				4.5+	
B-7	BULK	8-15		CH, sandy, trace gravel			54	20	Figure 4-11		
B-7	SPT-5	13.5-15	14	Shaley clay	12.4						
B-8	SPT-1	1-2.5	15	CL, silty	10.2					4.2	
B-8	ST-2	3-5	13	CL, silty	12.7	106.8	38	16	93.2		
B-8	SPT-3	6-7.5	16	CH, sandy, gravelly	18.9					4.5+	
B-8	ST-4	8-10	18	GC, sandy	19.1	100.4			Figure 4-12	3.5	
B-8	BULK	1-15		CH, sandy			52	17	Figure 4-13		
B-8	ST-5	13-15	9	GC, sandy							Bent Tube, All Fall-in
B-9	ST-1	1-3	14	CH	29.9	91.0	80	26	99.9	2.3	
B-9	SPT-2	3.5-5	18	CL, silty	13.4					2.5	
B-9	ST-3	6-8	24	CL, silty	19.7	100.0	60	20	98.1	4.5+	
B-9	SPT-4	8.5-10	18	CH	20.2					3.7	
B-9	BULK	10-13		CH			52	18	95.7		
B-9	ST-5	13-15	24	CH	23.4	104.3				3.3	
B-9	SPT-6	18-19.5	18	CH	23.5					3.5	
B-9	ST-7	23-25	24	CH, sandy	20.0	109.3			Figure 4-14	3.3	
B-9	ST-8	28-30	15	Shaley clay, sandy	12.9	125.9			Figure 4-15	4.5+	Bent Tube
B-9	SPT-9	31-32.5	0.5	Limestone							
B-10	SPT-1	1-2.5	18	CL, silty	21.1					1.7	
B-10	SPT-2	3-4.5	18	CL, silty	21.1					2.3	
B-10	ST-3	6-8	24	CH	18.7	107.5	53	16	96.7		
B-10	ST-4	8-10	24	CH	17.5	113.0				4.5	
B-10	ST-5	13-15	24	CH	21.0	105.7				3.3	
B-10	BULK	15-18		CH, sandy			65	18	Figure 4-16		
B-10	ST-6	18-20	24	CH, trace sand	18.3	112.9				4.0	
B-10	ST-7	23-23.6	7	CH, sandy	16.5	116.0			Figure 4-17	4.5+	Bent Tube
B-10	SPT-8	23.6-25.1	18	CH, sandy, gravelly	15.7					4.5	
B-11	ST-1	1-3	24	CH	28.9	95.2	59	24	98.7	3.5	
B-11	SPT-2	3.5-5	18	CL, silty	14.3					4.0	
B-11	ST-3	6-8	12	CH	19.5	101.0	51	21	96.5		
B-11	SPT-4	8.5-10	18	CH	20.0					3.3	
B-11	BULK	10-13		CH			63	16	98.5		
B-11	SPT-5	13-15	18	CH, trace gravel	23.8					3.3	
B-11	ST-6	18-20	24	CH	22.4	105.1				3.5	
B-11	ST-7	23-25	24	CH, sandy	16.9	117.4			Figure 4-18	4.0	
B-11	ST-8	28-29.5	18	CH, sandy	17.1	116.4				4.5+	
B-12	SPT-1	1-2.5	6	CH	22.0					2.0	
B-12	BULK	2.5-10		CH, sandy			74	22	Figure 4-19		
B-12	ST-2	3-5	18	CH, sandy	13.7	116.2			Figure 4-20	4.5+	
B-12	SPT-3	6-7.5	16	CH, sandy, trace gravel	14.8					4.5+	
B-12	ST-4	8-10	10	CH, sandy, gravelly	14.5	115.0			Figure 4-21	4.5+	

Particle Size Distribution Report - ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.1	4.8	21.4	73.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4	100.0		
1/2	100.0		
3/8	100.0		
#4	100.0		
#8	99.9		
#10	99.9		
#16	99.3		
#30	97.4		
#50	91.5		
#100	81.6		
#200	73.7		

* (no specification provided)

Material Description
CLAY (CH), gray and orangish brown, high plastic, with fine sand

Atterberg Limits (ASTM D 4318)
PL= LL= PI=

Classification
USCS= AASHTO=

Coefficients
D₈₅= 0.1902 D₆₀= D₅₀=
D₃₀= D₁₅= D₁₀=
C_u= C_c=

Date Tested: 04-07-11 **Tested By:** J. Pruett/C. Cook

Remarks

Sample No.: ST-6 **Source of Sample:** B-1
Location:
Checked By: K. Kocher

Date Sampled:
Elev./Depth: 18

Title: Engineer



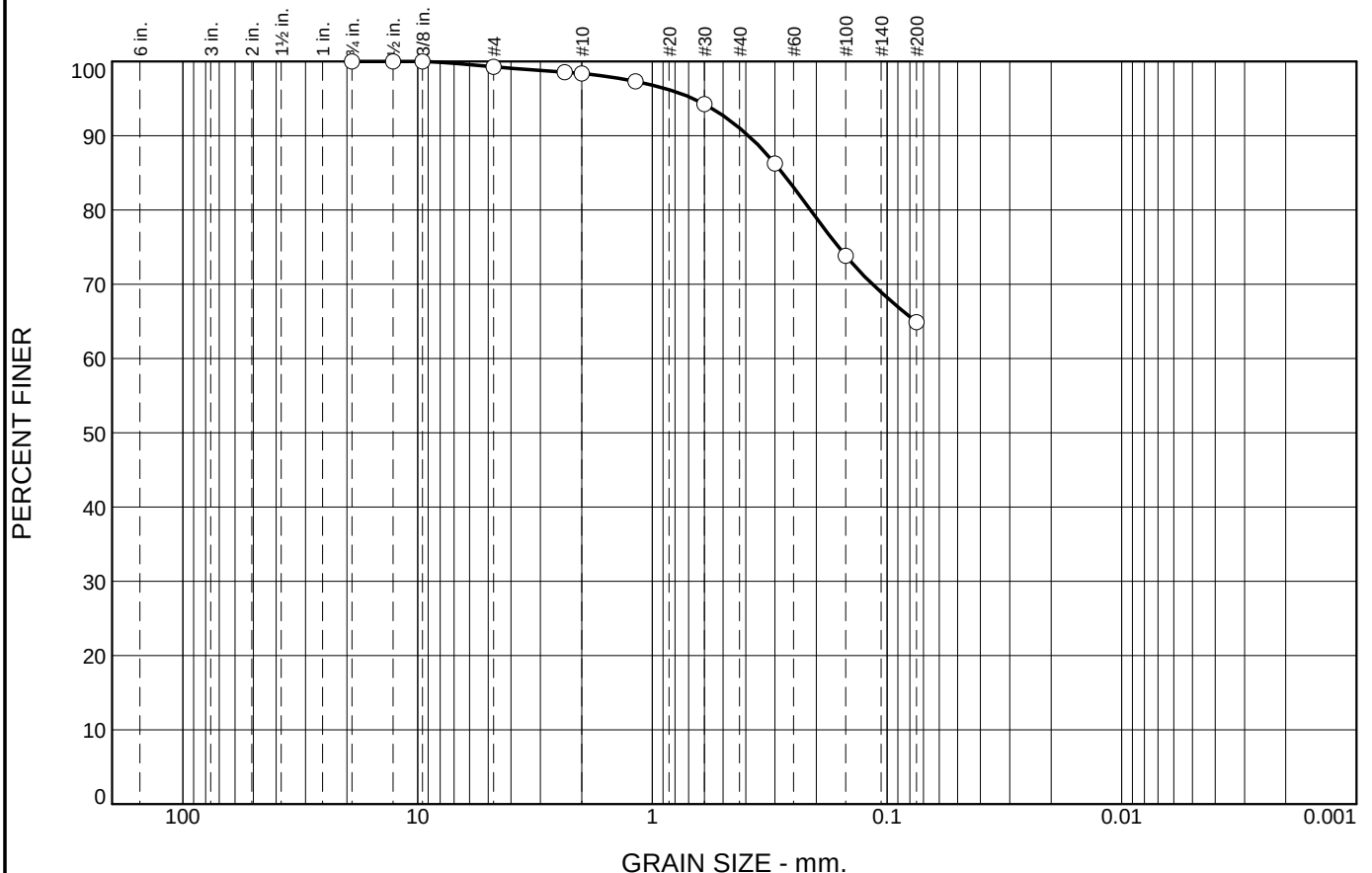
REITZ & JENS, INC.
CONSULTING ENGINEERS

Client: Ameren Missouri
Project: Labadie Plant Utility Waste Landfill

Project No: 2008012455

Figure 4-1

Particle Size Distribution Report - ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.7	0.9	7.4	26.1	64.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4	100.0		
1/2	100.0		
3/8	100.0		
#4	99.3		
#8	98.6		
#10	98.4		
#16	97.3		
#30	94.3		
#50	86.2		
#100	73.8		
#200	64.9		

* (no specification provided)

Material Description
CLAY (CH), gray and orangish brown, high plastic, with medium to fine grain sand

Atterberg Limits (ASTM D 4318)
PL= LL= PI=

Classification
USCS= AASHTO=

Coefficients
D₈₅= 0.2785 D₆₀= D₅₀=
D₃₀= D₁₅= D₁₀=
C_u= C_c=

Date Tested: 04-07-11 **Tested By:** J. Pruett/C. Cook

Remarks

Sample No.: ST-7 **Source of Sample:** B-1
Location:
Checked By: K. Kocher

Date Sampled:
Elev./Depth: 23

Title: Engineer



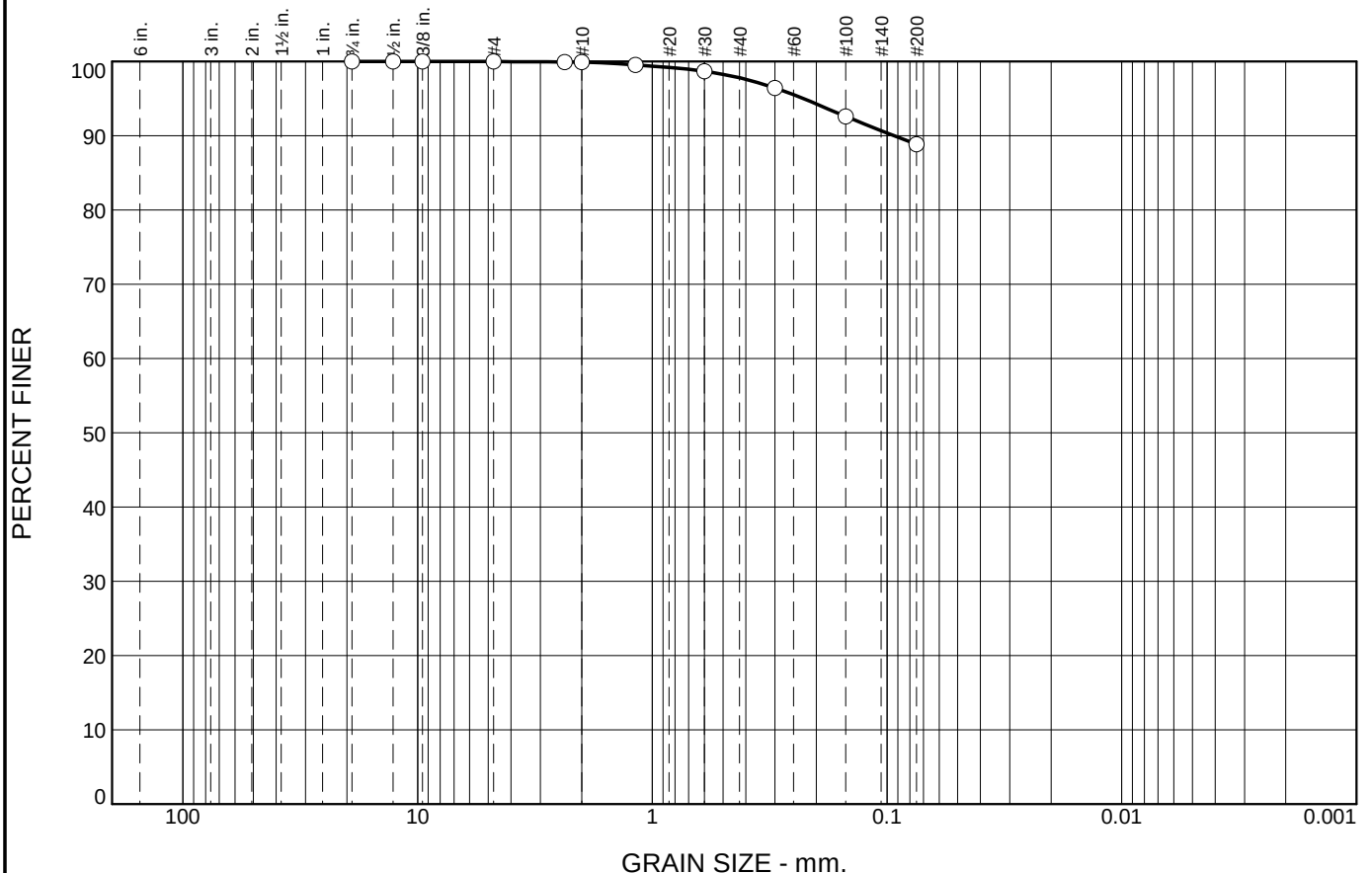
REITZ & JENS, INC.
CONSULTING ENGINEERS

Client: Ameren Missouri
Project: Labadie Plant Utility Waste Landfill

Project No: 2008012455

Figure 4-2

Particle Size Distribution Report - ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.1	2.1	9.0	88.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4	100.0		
1/2	100.0		
3/8	100.0		
#4	100.0		
#8	99.9		
#10	99.9		
#16	99.5		
#30	98.7		
#50	96.4		
#100	92.6		
#200	88.8		

* (no specification provided)

Material Description
CLAY (CH), golden and grayish tan, high plastic, trace fine sand

Atterberg Limits (ASTM D 4318)
PL= 22 LL= 78 PI= 56

Classification
USCS= CH AASHTO=

Coefficients
D₈₅= D₆₀= D₅₀=
D₃₀= D₁₅= D₁₀=
C_u= C_c=

Date Tested: 04-07-11 **Tested By:** J. Pruett/C. Cook

Remarks
Bag Sample
10'-13'

Sample No.: Bulk **Source of Sample:**
Location: B-2
Checked By: K. Kocher

Title: Engineer

Date Sampled:
Elev./Depth: 10-13



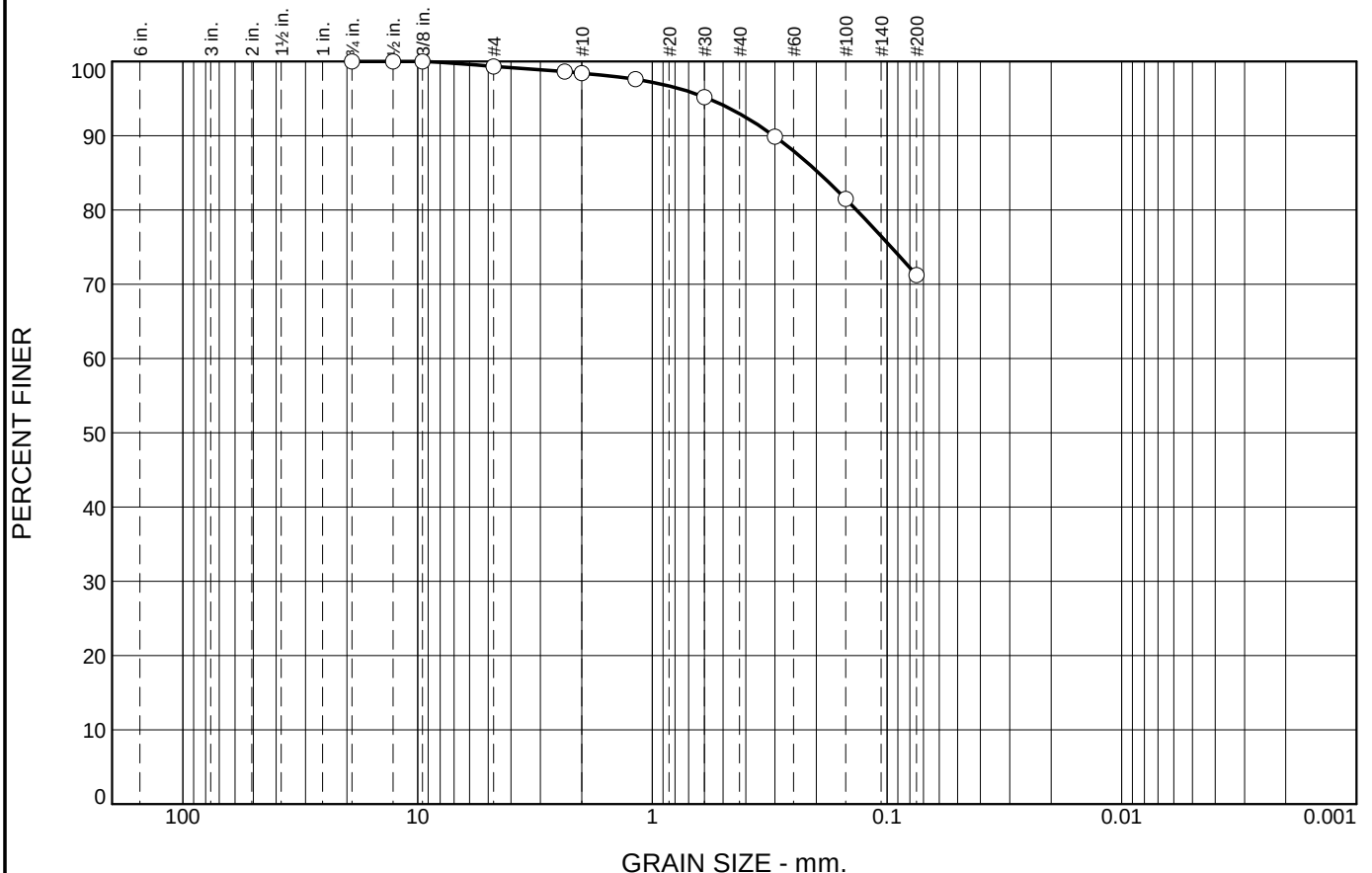
REITZ & JENS, INC.
CONSULTING ENGINEERS

Client: Ameren Missouri
Project: Labadie Plant Utility Waste Landfill

Project No: 2008012455

Figure 4-3

Particle Size Distribution Report - ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.7	0.9	5.4	21.8	71.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4	100.0		
1/2	100.0		
3/8	100.0		
#4	99.3		
#8	98.6		
#10	98.4		
#16	97.6		
#30	95.2		
#50	89.9		
#100	81.5		
#200	71.2		

* (no specification provided)

Material Description

CLAY (CH), brown and tan, high plastic, with fine sand, trace medium sand

Atterberg Limits (ASTM D 4318)

PL= LL= PI=

Classification

USCS= AASHTO=

Coefficients

D₈₅= 0.1953 D₆₀= D₅₀=
D₃₀= D₁₅= D₁₀=
C_u= C_c=

Date Tested: 04-07-11 Tested By: J. Pruett/C. Cook

Remarks

Sample No.: ST-5 Source of Sample: B-2
Location:
Checked By: K. Kocher

Date Sampled:
Elev./Depth: 13

Title: Engineer



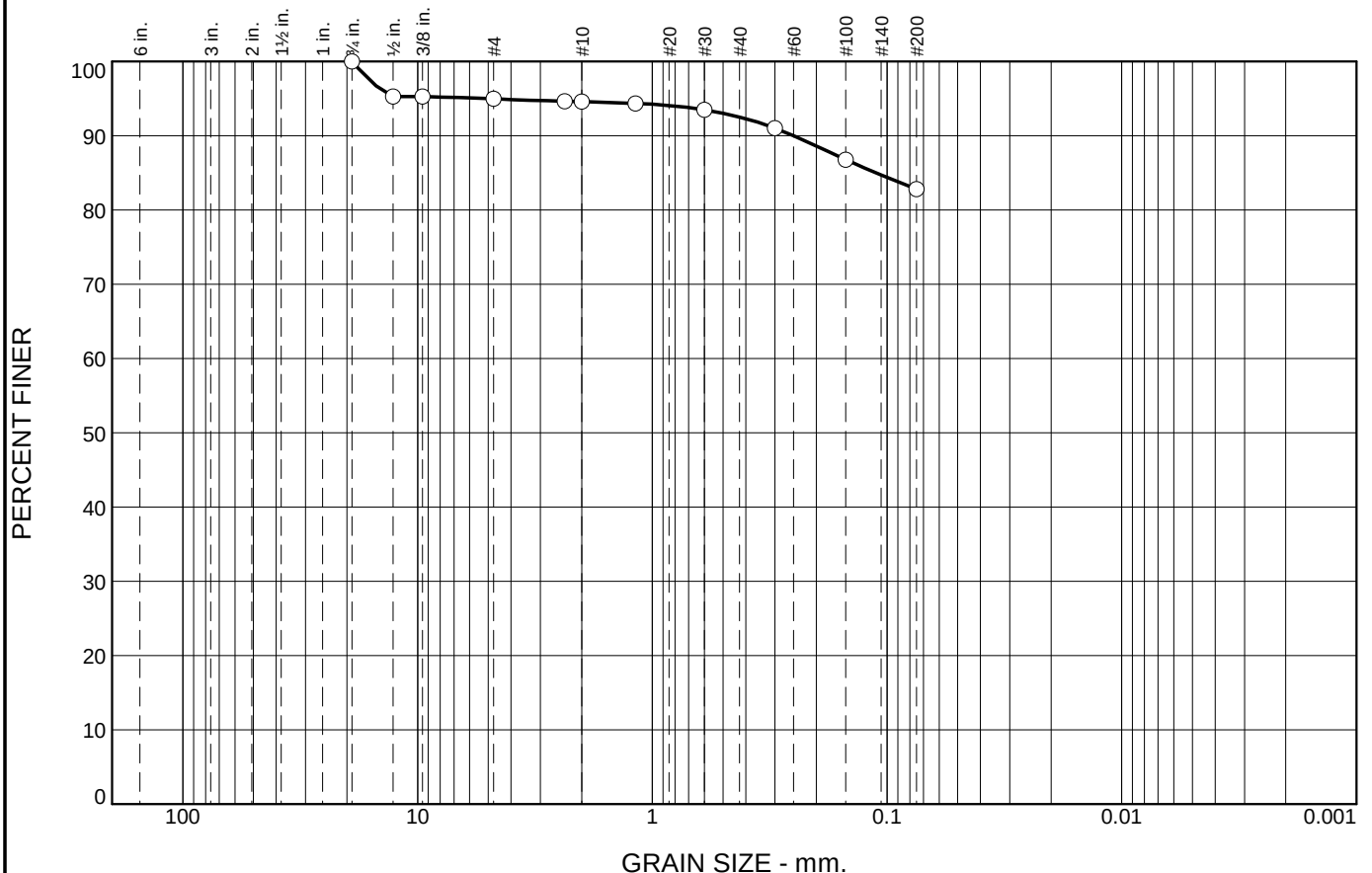
REITZ & JENS, INC.
CONSULTING ENGINEERS

Client: Ameren Missouri
Project: Labadie Plant Utility Waste Landfill

Project No: 2008012455

Figure 4-4

Particle Size Distribution Report - ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	5.0	0.4	2.1	9.7	82.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4	100.0		
1/2	95.3		
3/8	95.3		
#4	95.0		
#8	94.7		
#10	94.6		
#16	94.4		
#30	93.5		
#50	91.0		
#100	86.8		
#200	82.8		

* (no specification provided)

Material Description
 CLAY (CL), gray, with fine sand, trace fine gravel

Atterberg Limits (ASTM D 4318)
 PL= 20 LL= 44 PI= 24

Classification
 USCS= CL AASHTO=

Coefficients
 D₈₅= 0.1111 D₆₀= D₅₀=
 D₃₀= D₁₅= D₁₀=
 C_u= C_c=

Date Tested: 04-07-11 **Tested By:** J. Pruett/C. Cook

Remarks

Sample No.: ST-6 **Source of Sample:** B-3
Location:
Checked By: K. Kocher

Date Sampled:
Elev./Depth: 18

Title: Engineer



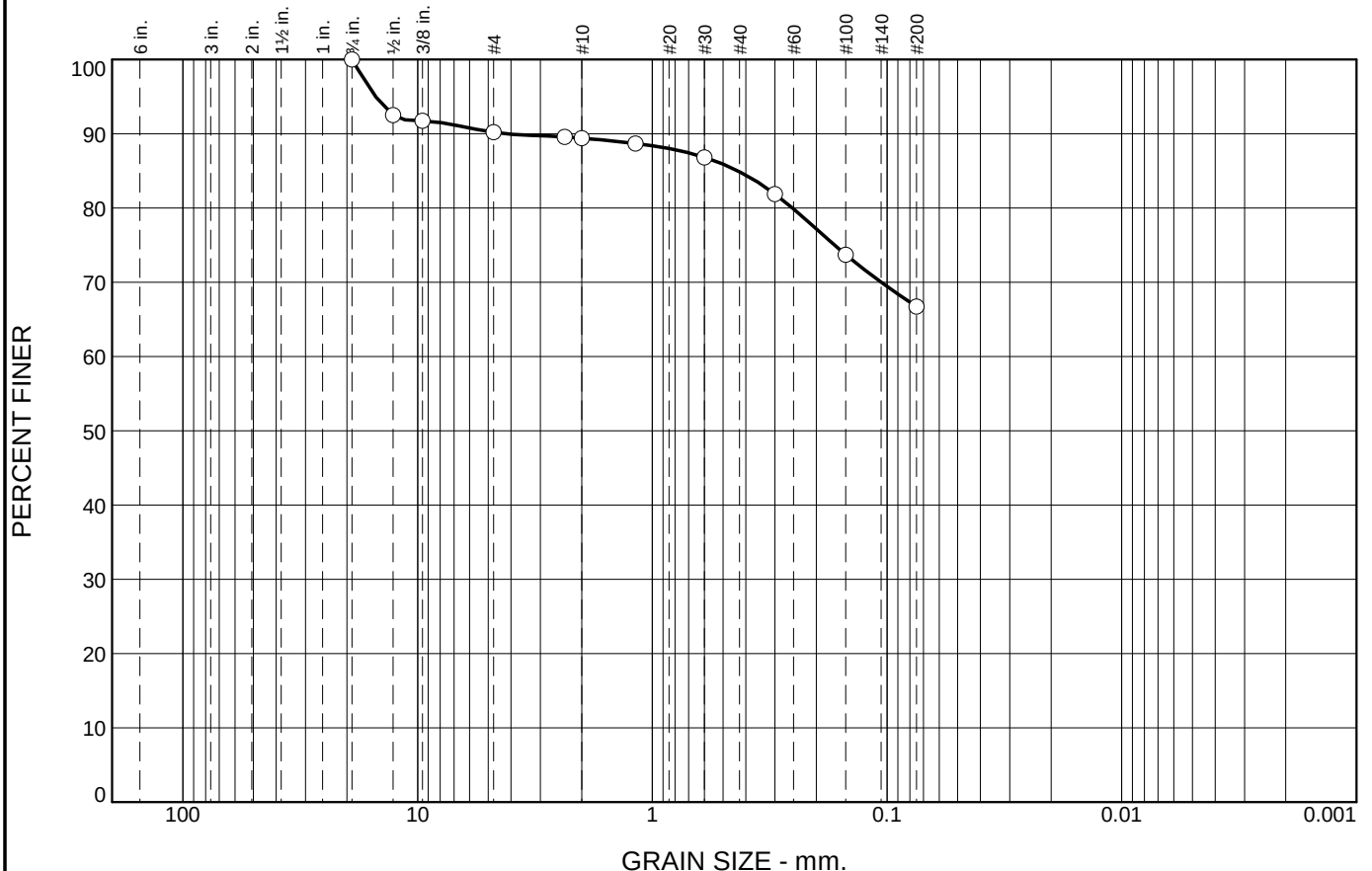
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 CONSULTING ENGINEERS

Client: Ameren Missouri
Project: Labadie Plant Utility Waste Landfill

Project No: 2008012455

Figure 4-5

Particle Size Distribution Report - ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	9.8	0.8	4.5	18.2	66.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4	100.0		
1/2	92.5		
3/8	91.7		
#4	90.2		
#8	89.6		
#10	89.4		
#16	88.7		
#30	86.8		
#50	81.9		
#100	73.7		
#200	66.7		

* (no specification provided)

Material Description

CLAY (CL), golden tan and pinkish gray, with fine sand, trace fine gravel

Atterberg Limits (ASTM D 4318)

PL= LL= PI=

Classification

USCS= AASHTO=

Coefficients

D₈₅= 0.4333 D₆₀= D₅₀=
D₃₀= D₁₅= D₁₀=
C_u= C_c=

Date Tested: 04-07-11 Tested By: J. Pruett/C. Cook

Remarks

Sample No.: ST-7 Source of Sample: B-3
Location:
Checked By: K. Kocher

Date Sampled:
Elev./Depth: 23

Title: Engineer



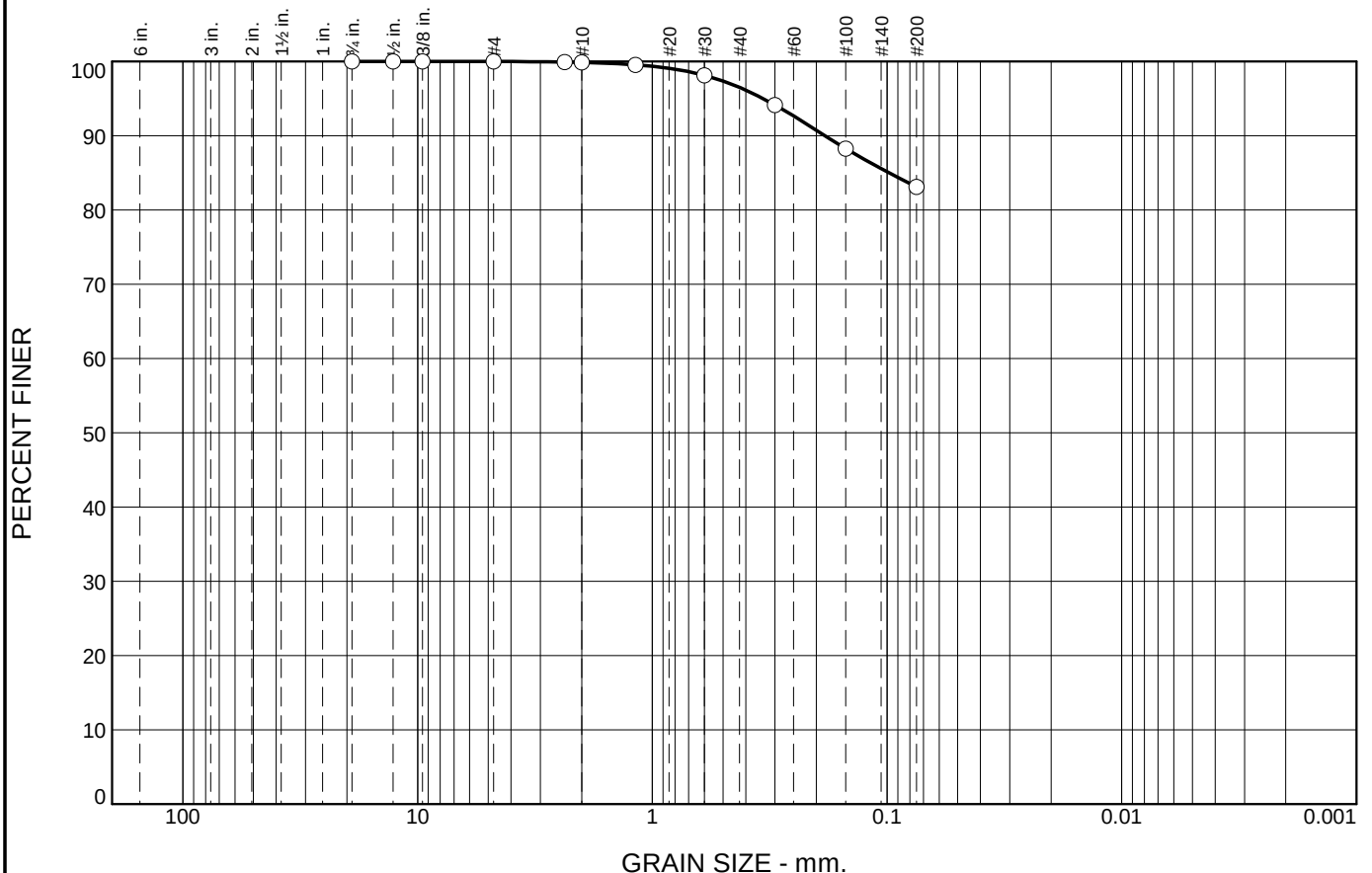
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CONSULTING ENGINEERS

Client: Ameren Missouri
Project: Labadie Plant Utility Waste Landfill

Project No: 2008012455

Figure 4-6

Particle Size Distribution Report - ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.1	3.4	13.4	83.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4	100.0		
1/2	100.0		
3/8	100.0		
#4	100.0		
#8	99.9		
#10	99.9		
#16	99.6		
#30	98.1		
#50	94.2		
#100	88.3		
#200	83.1		

* (no specification provided)

Material Description

CLAY (CH), golden and tan, high plastic, with fine sand

Atterberg Limits (ASTM D 4318)

PL= 21 LL= 56 PI= 35

Classification

USCS= CH AASHTO=

Coefficients

D₈₅= 0.0979 D₆₀= D₅₀=
D₃₀= D₁₅= D₁₀=
C_u= C_c=

Date Tested: 04-07-11 Tested By: J. Pruett/C. Cook

Remarks

Bag Sample
15' - 25'

Sample No.: Bulk Source of Sample:
Location: B-4
Checked By: K. Kocher

Date Sampled:
Elev./Depth: 15-25

Title: Engineer



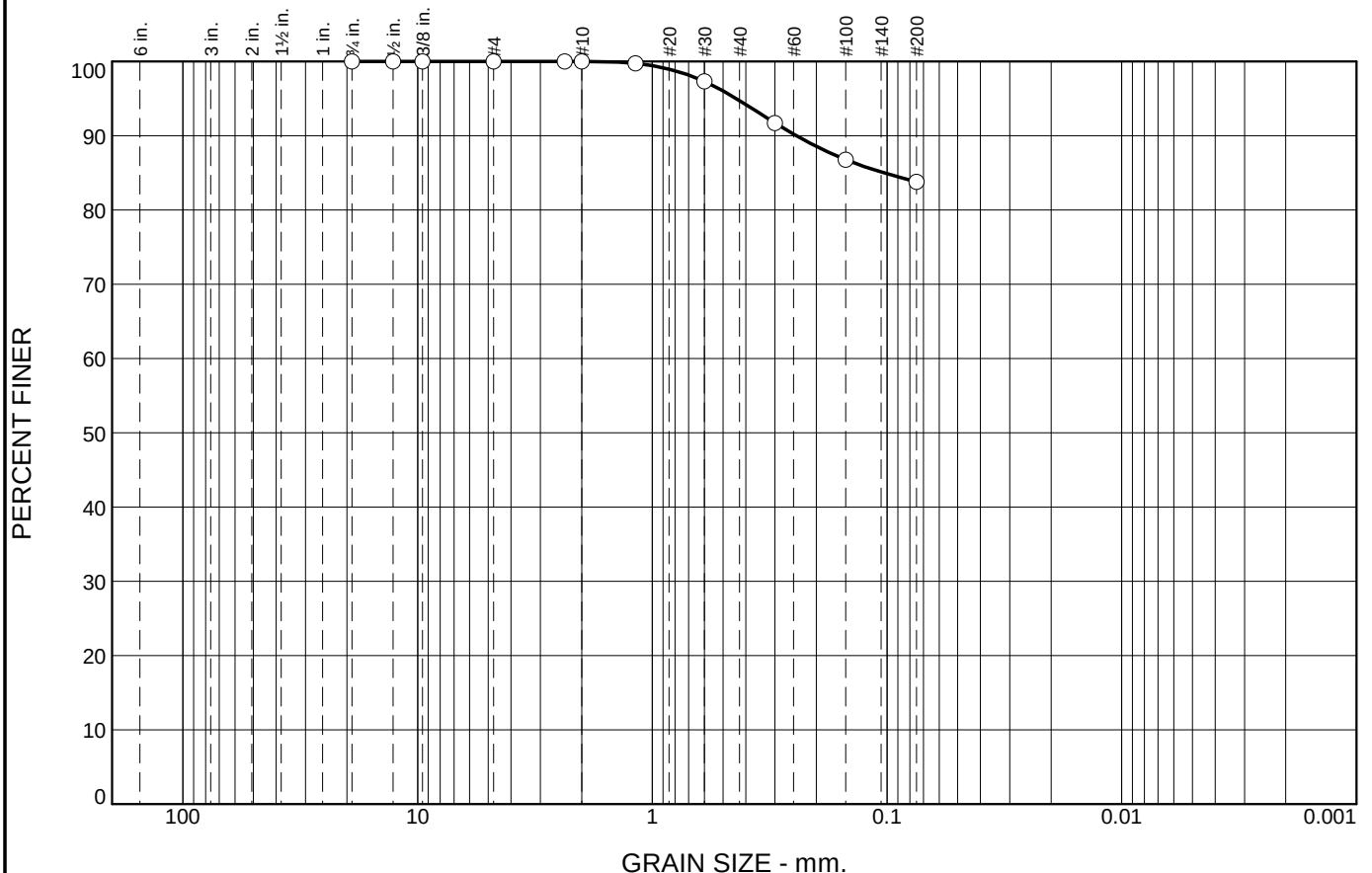
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CONSULTING ENGINEERS

Client: Ameren Missouri
Project: Labadie Plant Utility Waste Landfill

Project No: 2008012455

Figure 4-7

Particle Size Distribution Report - ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	5.3	10.9	83.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4	100.0		
1/2	100.0		
3/8	100.0		
#4	100.0		
#8	100.0		
#10	100.0		
#16	99.7		
#30	97.3		
#50	91.7		
#100	86.8		
#200	83.8		

* (no specification provided)

Material Description

CLAY (CH), golden tan and reddish brown, high plastic, with fine sand

Atterberg Limits (ASTM D 4318)

PL= 29 LL= 83 PI= 58

Classification

USCS= CH AASHTO=

Coefficients

D₈₅= 0.1029 D₆₀= D₅₀=
D₃₀= D₁₅= D₁₀=
C_u= C_c=

Date Tested: 04-07-11 Tested By: J. Crose/C. Cook

Remarks

Sample No.: ST-1 Source of Sample: B-6
Location:
Checked By: K. Kocher

Title: Engineer

Date Sampled:
Elev./Depth: 1



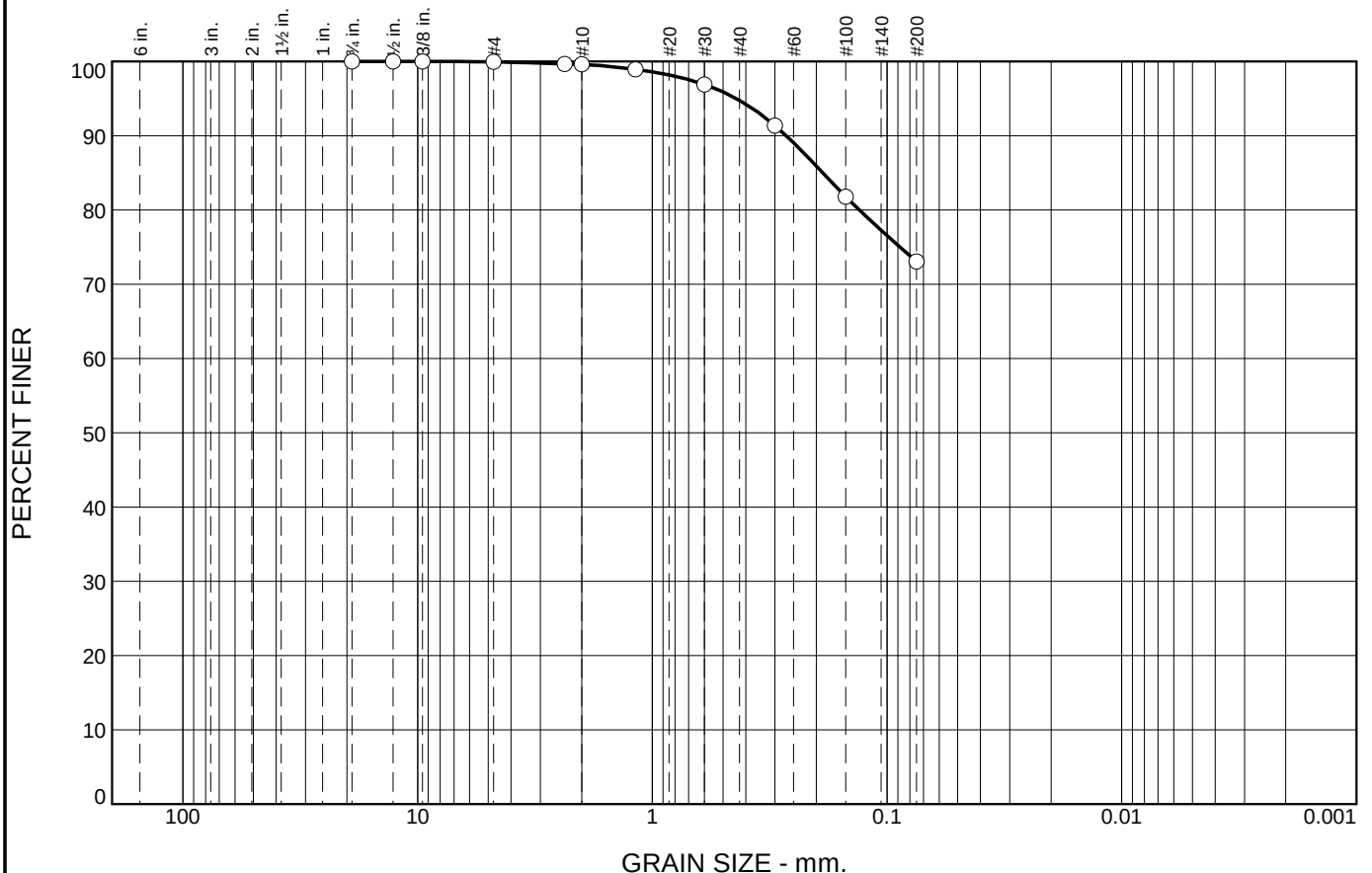
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CONSULTING ENGINEERS

Client: Ameren Missouri
Project: Labadie Plant Utility Waste Landfill

Project No: 2008012455

Figure 4-8

Particle Size Distribution Report - ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.4	4.8	21.7	73.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4	100.0		
1/2	100.0		
3/8	100.0		
#4	100.0		
#8	99.7		
#10	99.6		
#16	98.9		
#30	96.9		
#50	91.4		
#100	81.8		
#200	73.1		

* (no specification provided)

Material Description

CLAY (CH), gray, high plastic, with fine sand

Atterberg Limits (ASTM D 4318)

PL= 18 LL= 50 PI= 34

Classification

USCS= CH AASHTO=

Coefficients

D₈₅= 0.1875 D₆₀= D₅₀=
D₃₀= D₁₅= D₁₀=
C_u= C_c=

Date Tested: 04-07-11 Tested By: J. Crose/C. Cook

Remarks

Sample No.: ST-7 Source of Sample: B-6
Location:
Checked By: K. Kocher

Date Sampled:
Elev./Depth: 23

Title: Engineer



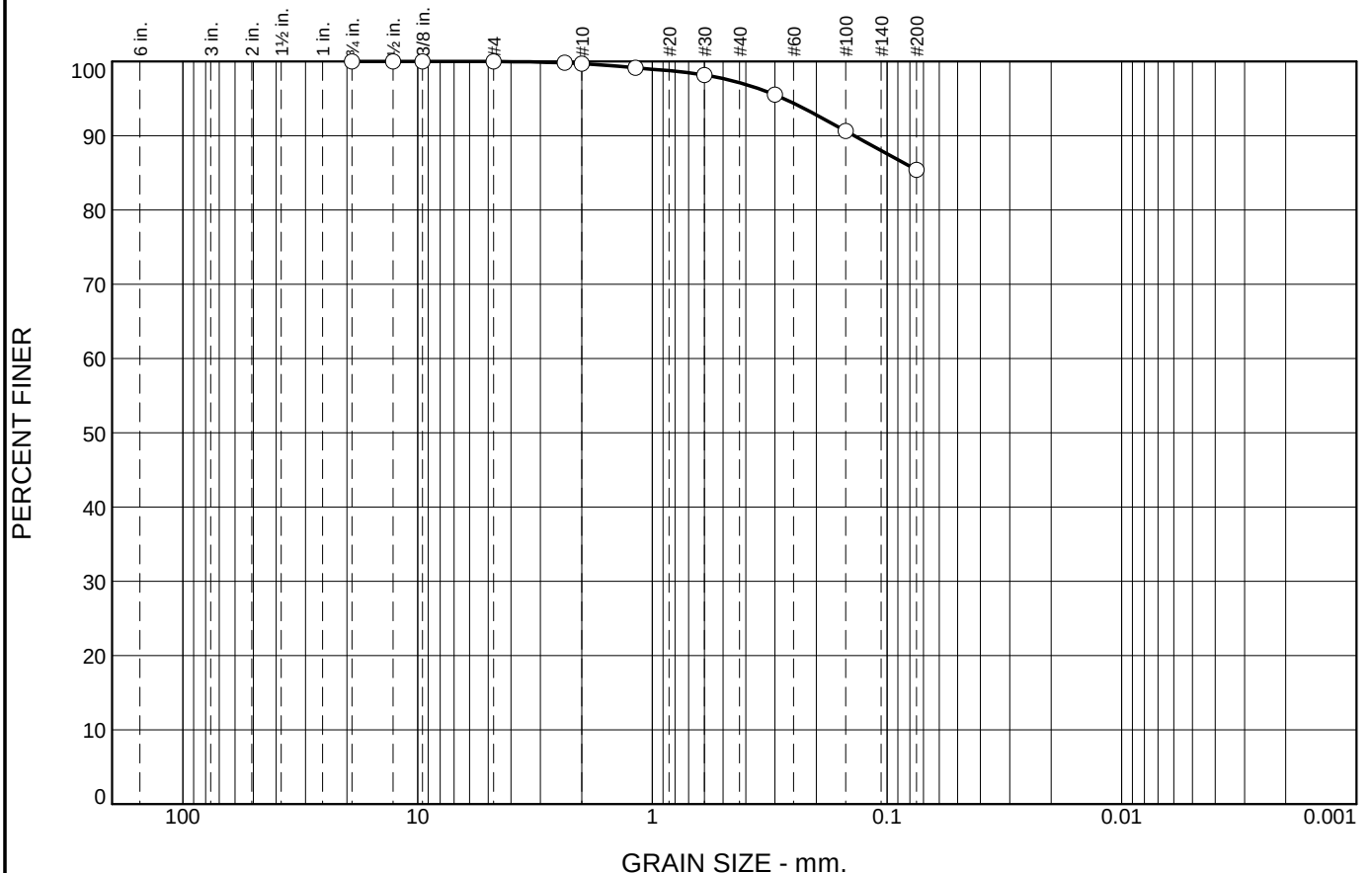
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CONSULTING ENGINEERS

Client: Ameren Missouri
Project: Labadie Plant Utility Waste Landfill

Project No: 2008012455

Figure 4-9

Particle Size Distribution Report - ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.3	2.5	11.8	85.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4	100.0		
1/2	100.0		
3/8	100.0		
#4	100.0		
#8	99.8		
#10	99.7		
#16	99.1		
#30	98.2		
#50	95.5		
#100	90.6		
#200	85.4		

* (no specification provided)

Material Description

CLAY (CH), gray and tan, high plastic, trace fine sand

Atterberg Limits (ASTM D 4318)

PL= 25 LL= 81 PI= 52

Classification

USCS= CH AASHTO=

Coefficients

D₈₅= D₆₀= D₅₀=
D₃₀= D₁₅= D₁₀=
C_u= C_c=

Date Tested: 04-15-11 Tested By: C. Cook

Remarks

Sample No.: ST-2 Source of Sample: B-7
Location:
Checked By: K. Kocher

Title: Engineer

Date Sampled:
Elev./Depth: 3



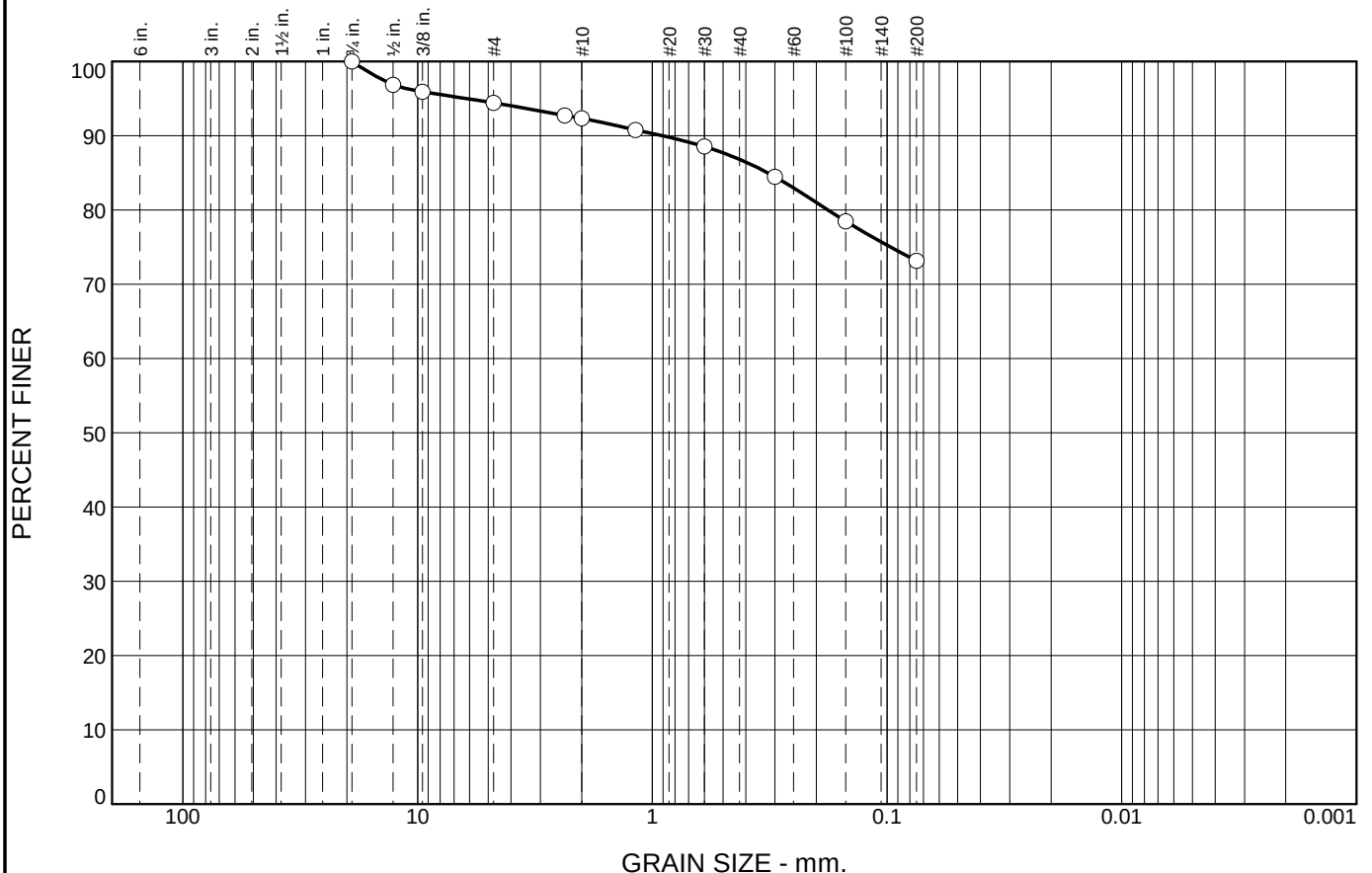
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CONSULTING ENGINEERS

Client: Ameren Missouri
Project: Labadie Plant Utility Waste Landfill

Project No: 2008012455

Figure 4-10

Particle Size Distribution Report - ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	5.6	2.1	5.5	13.6	73.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4	100.0		
1/2	96.9		
3/8	95.9		
#4	94.4		
#8	92.7		
#10	92.3		
#16	90.8		
#30	88.6		
#50	84.5		
#100	78.5		
#200	73.2		

* (no specification provided)

Material Description

CLAY (CH), golden, high plastic, with maroon shaley clay, with fine sand, trace medium sand and fine gravel

Atterberg Limits (ASTM D 4318)

PL= 20 LL= 54 PI= 26

Classification

USCS= CH AASHTO=

Coefficients

D₈₅= 0.3215 D₆₀= D₅₀=
D₃₀= D₁₅= D₁₀=
C_u= C_c=

Date Tested: 04-07-11 Tested By: J. Pruett/C. Cook

Remarks

Sample No.: Bulk Source of Sample:
Location: B-7
Checked By: K. Kocher

Date Sampled:
Elev./Depth: 8-15

Title: Engineer



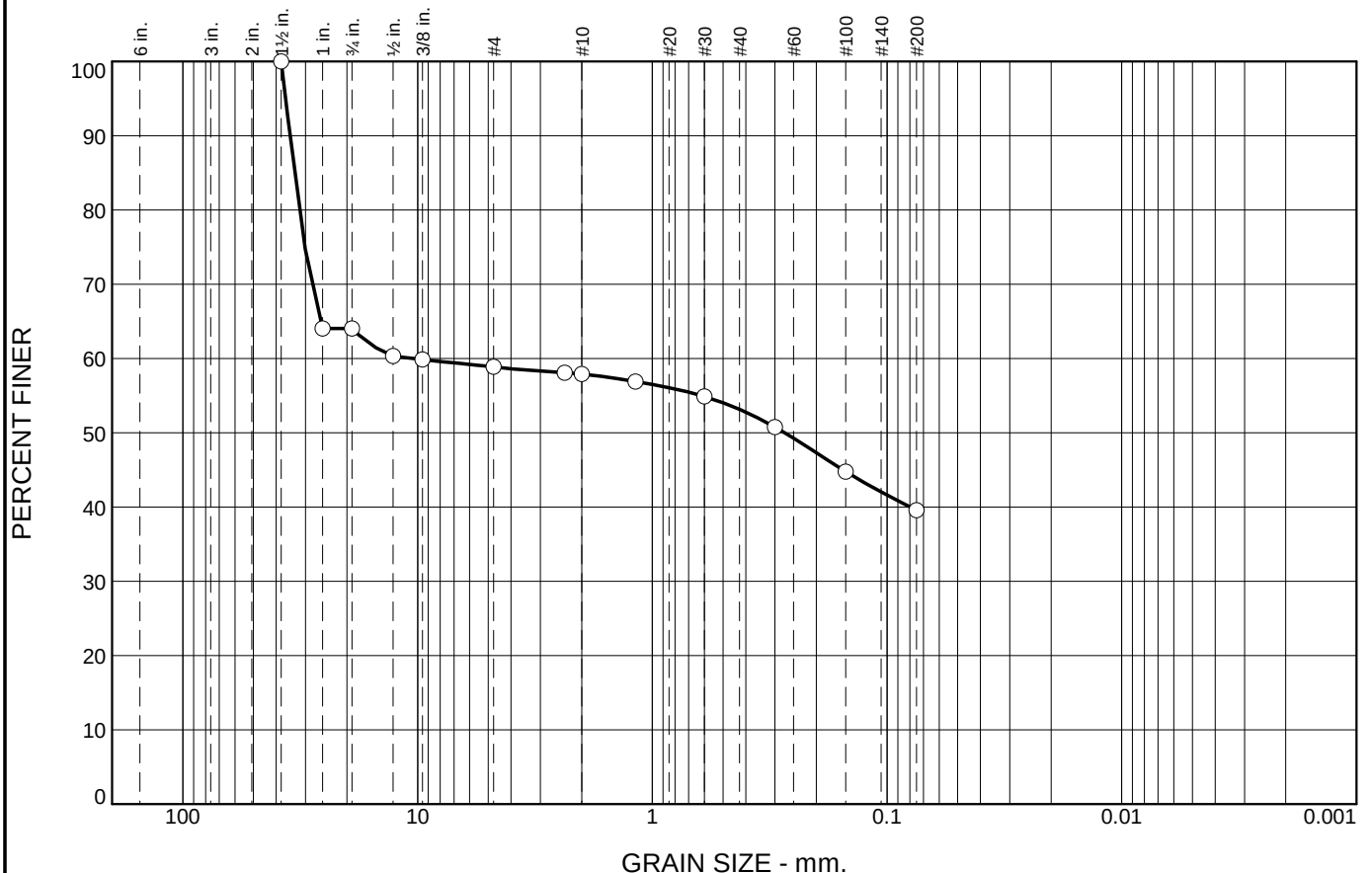
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CONSULTING ENGINEERS

Client: Ameren Missouri
Project: Labadie Plant Utility Waste Landfill

Project No: 2008012455

Figure 4-11

Particle Size Distribution Report - ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	36.0	5.1	1.0	4.7	13.6	39.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	64.0		
3/4	64.0		
1/2	60.3		
3/8	59.9		
#4	58.9		
#8	58.1		
#10	57.9		
#16	56.9		
#30	54.9		
#50	50.8		
#100	44.8		
#200	39.6		

* (no specification provided)

Material Description

Clayey GRAVEL (GC), brown gray and tan, high plastic, coarse grain gravel, with fine grain sand

Atterberg Limits (ASTM D 4318)

PL= LL= PI=

Classification

USCS= AASHTO=

Coefficients

D₈₅= 33.3923 D₆₀= 10.3573 D₅₀= 0.2723
D₃₀= D₁₅= D₁₀=
C_u= C_c=

Date Tested: 04-07-11 Tested By: J. Crose/C. Cook

Remarks

Sample No.: ST-4 Source of Sample: B-8
Location:
Checked By: K. Kocher

Date Sampled:
Elev./Depth: 8

Title: Engineer



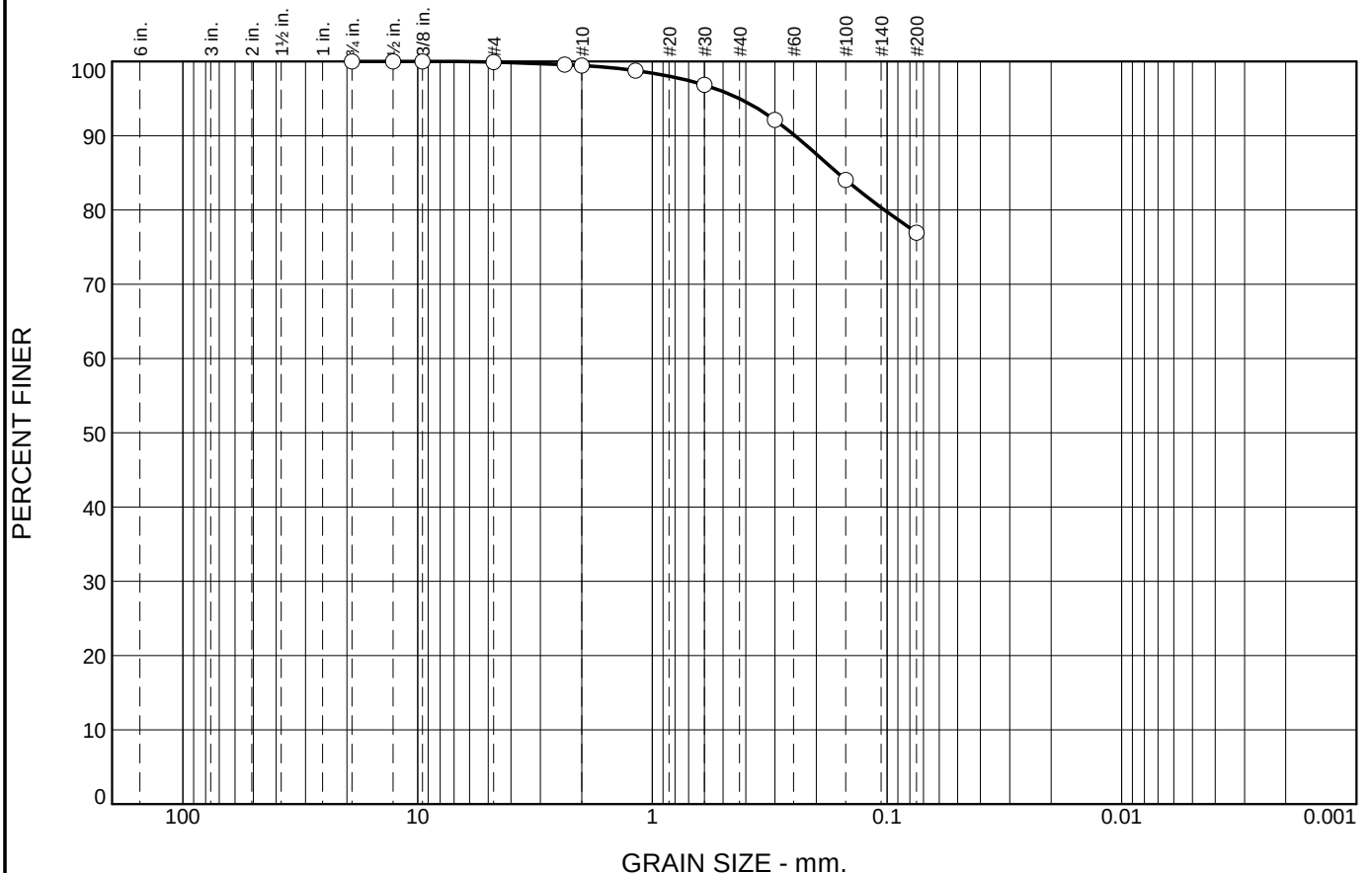
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CONSULTING ENGINEERS

Client: Ameren Missouri
Project: Labadie Plant Utility Waste Landfill

Project No: 2008012455

Figure 4-12

Particle Size Distribution Report - ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.1	0.4	4.5	18.1	76.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4	100.0		
1/2	100.0		
3/8	100.0		
#4	99.9		
#8	99.6		
#10	99.5		
#16	98.8		
#30	96.8		
#50	92.1		
#100	84.1		
#200	76.9		

* (no specification provided)

Material Description
CLAY (CH), golden and tan, high plastic, with fine sand

Atterberg Limits (ASTM D 4318)
PL= 17 LL= 52 PI= 35

Classification
USCS= CH AASHTO=

Coefficients
D₈₅= 0.1625 D₆₀= D₅₀=
D₃₀= D₁₅= D₁₀=
C_u= C_c=

Date Tested: 04-07-11 **Tested By:** J. Pruett/C. Cook

Remarks
Bag Sample
1' - 15'

Sample No.: Bulk **Source of Sample:**
Location: B-8
Checked By: K. Kocher

Date Sampled:
Elev./Depth: 1-15

Title: Engineer



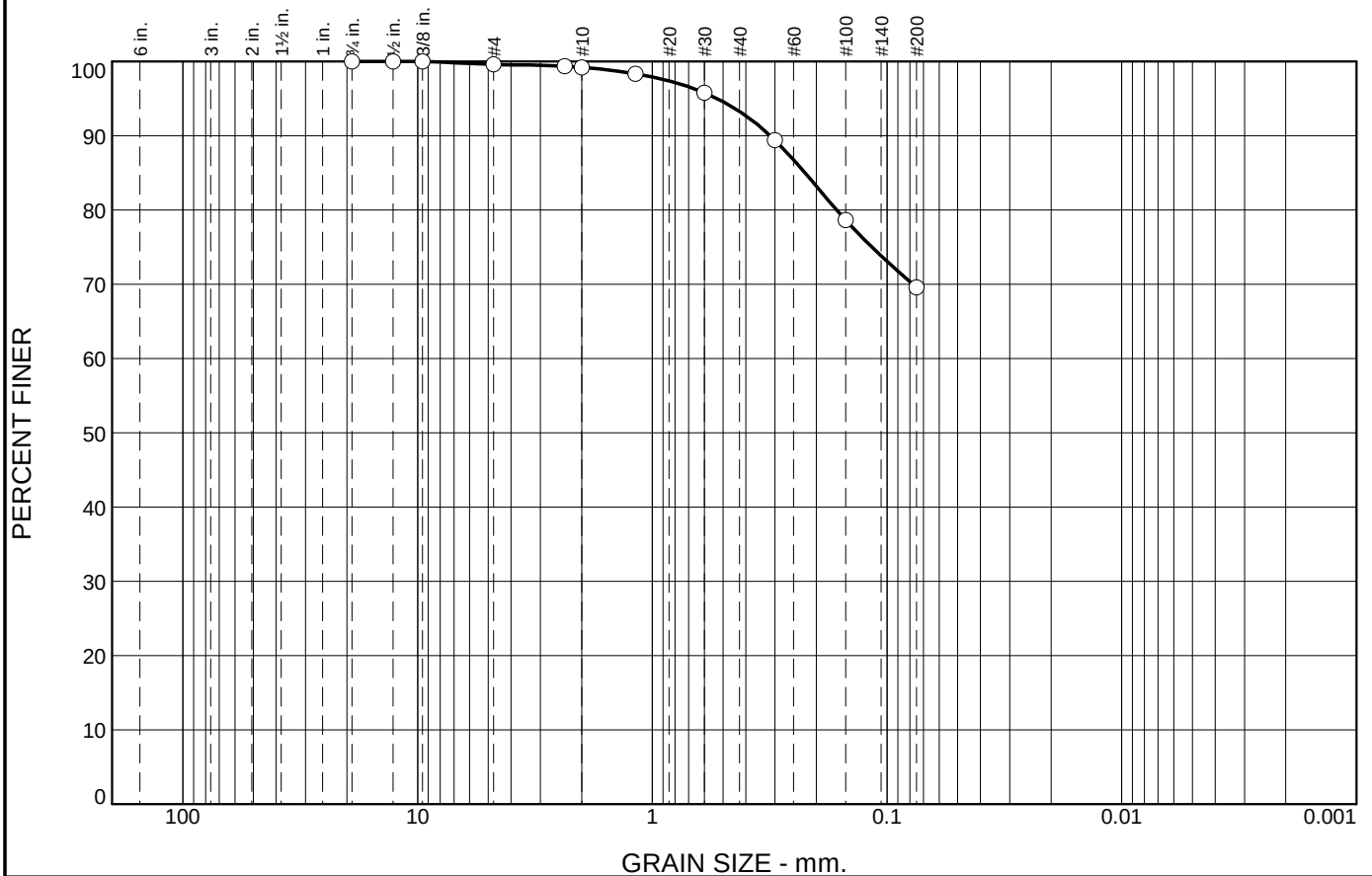
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CONSULTING ENGINEERS

Client: Ameren Missouri
Project: Labadie Plant Utility Waste Landfill

Project No: 2008012455

Figure 4-13

Particle Size Distribution Report - ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.4	0.4	5.9	23.7	69.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4	100.0		
1/2	100.0		
3/8	100.0		
#4	99.6		
#8	99.4		
#10	99.2		
#16	98.3		
#30	95.8		
#50	89.4		
#100	78.6		
#200	69.6		

* (no specification provided)

Material Description
CLAY (CH), gray and orangish brown, with fine to medium grain sand

Atterberg Limits (ASTM D 4318)
PL= LL= PI=

Classification
USCS= AASHTO=

Coefficients
D₈₅= 0.2233 D₆₀= D₅₀=
D₃₀= D₁₅= D₁₀=
C_u= C_c=

Date Tested: 04-11-11 **Tested By:** J. Crose

Remarks

Sample No.: ST-7 **Source of Sample:** B-9
Location:
Checked By: K. Kocher

Date Sampled:
Elev./Depth: 23

Title: Engineer



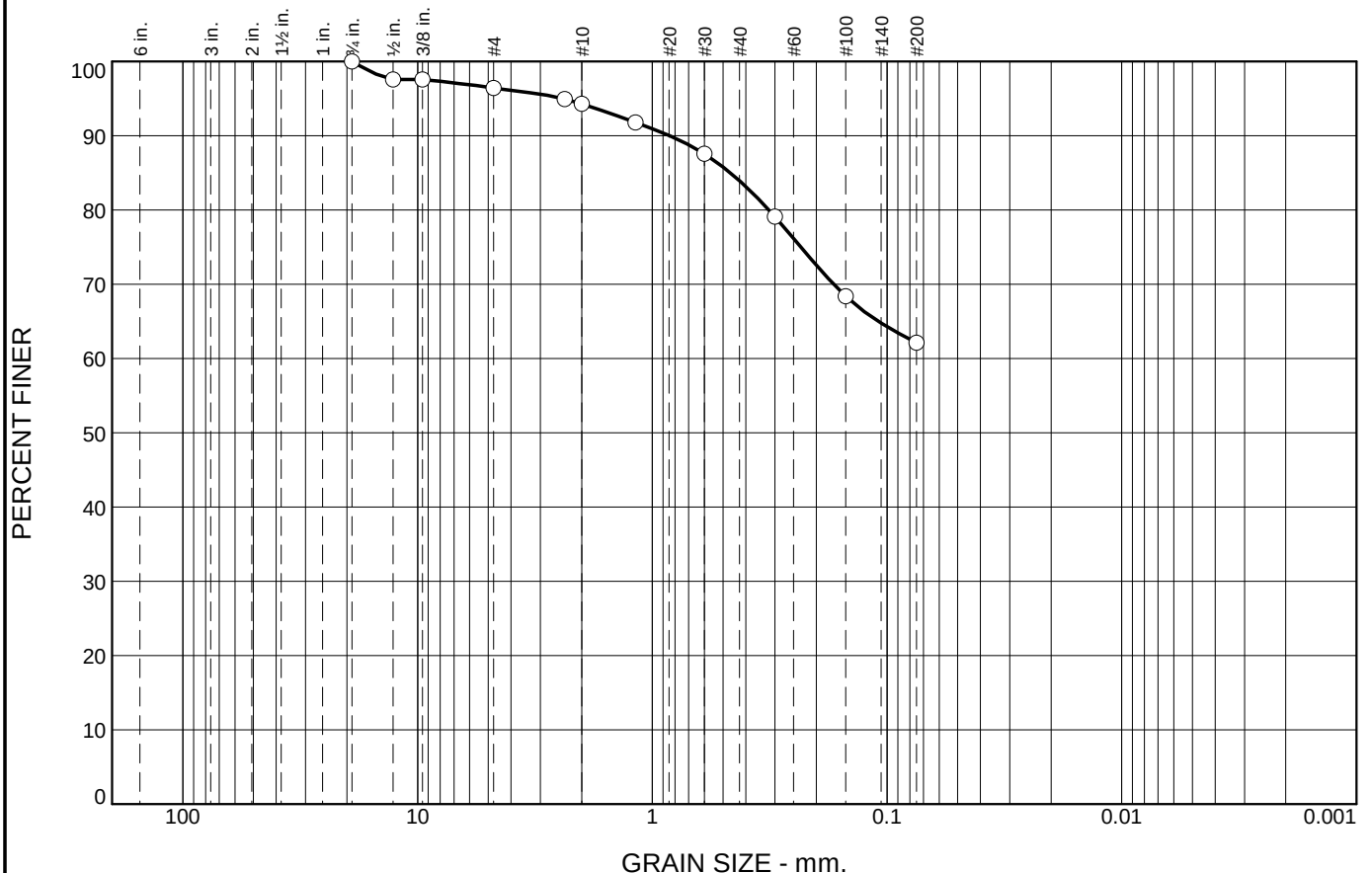
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CONSULTING ENGINEERS

Client: Ameren Missouri
Project: Labadie Plant Utility Waste Landfill

Project No: 2008012455

Figure 4-14

Particle Size Distribution Report - ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	3.6	2.1	10.4	21.8	62.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4	100.0		
1/2	97.6		
3/8	97.6		
#4	96.4		
#8	94.9		
#10	94.3		
#16	91.8		
#30	87.6		
#50	79.1		
#100	68.4		
#200	62.1		

* (no specification provided)

Material Description
 Shaley CLAY (CH), brown gray and purple, with weathered limestone, with fine to medium sand

Atterberg Limits (ASTM D 4318)
 PL= LL= PI=

Classification
 USCS= AASHTO=

Coefficients
 D₈₅= 0.4651 D₆₀= D₅₀=
 D₃₀= D₁₅= D₁₀=
 C_u= C_c=

Date Tested: 04-11-11 **Tested By:** J. Crose

Remarks

Sample No.: ST-8 **Source of Sample:** B-9
Location:
Checked By: K. Kocher

Date Sampled:
Elev./Depth: 28

Title: Engineer



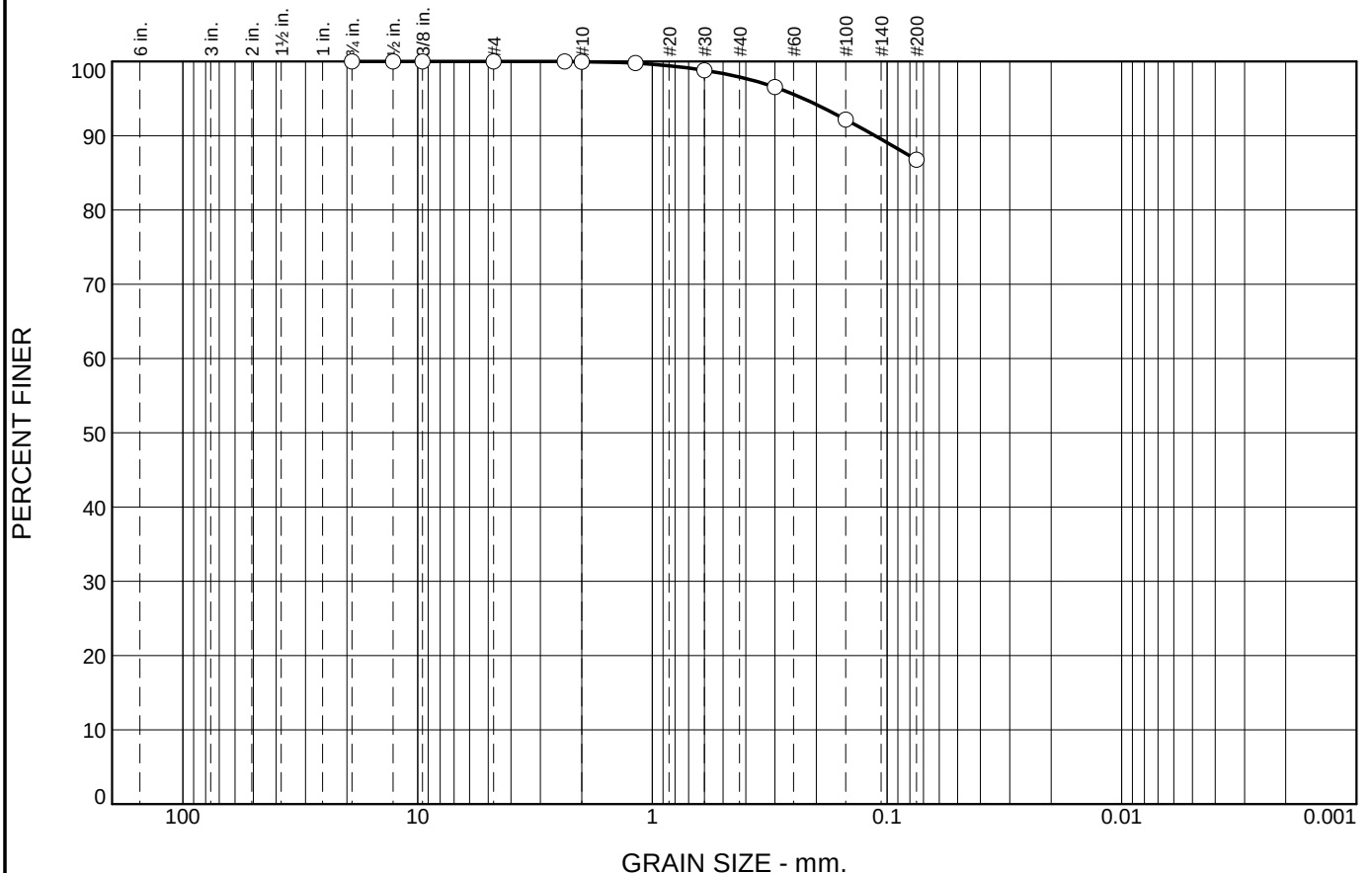
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Client: Ameren Missouri
Project: Labadie Plant Utility Waste Landfill

Project No: 2008012455

Figure 4-15

Particle Size Distribution Report - ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.1	2.0	11.1	86.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4	100.0		
1/2	100.0		
3/8	100.0		
#4	100.0		
#8	100.0		
#10	99.9		
#16	99.8		
#30	98.8		
#50	96.6		
#100	92.2		
#200	86.8		

* (no specification provided)

Material Description
 CLAY (CH), golden and gray brown, high plastic, trace fine sand

Atterberg Limits (ASTM D 4318)
 PL= 18 LL= 65 PI= 46

Classification
 USCS= CH AASHTO=

Coefficients
 D₈₅= D₆₀= D₅₀=
 D₃₀= D₁₅= D₁₀=
 C_u= C_c=

Date Tested: 04-07-11 **Tested By:** J. Pruett/C. Cook

Remarks

Sample No.: Bulk **Source of Sample:**
Location: B-10
Checked By: K. Kocher

Date Sampled:
Elev./Depth: 15-18

Title: Engineer



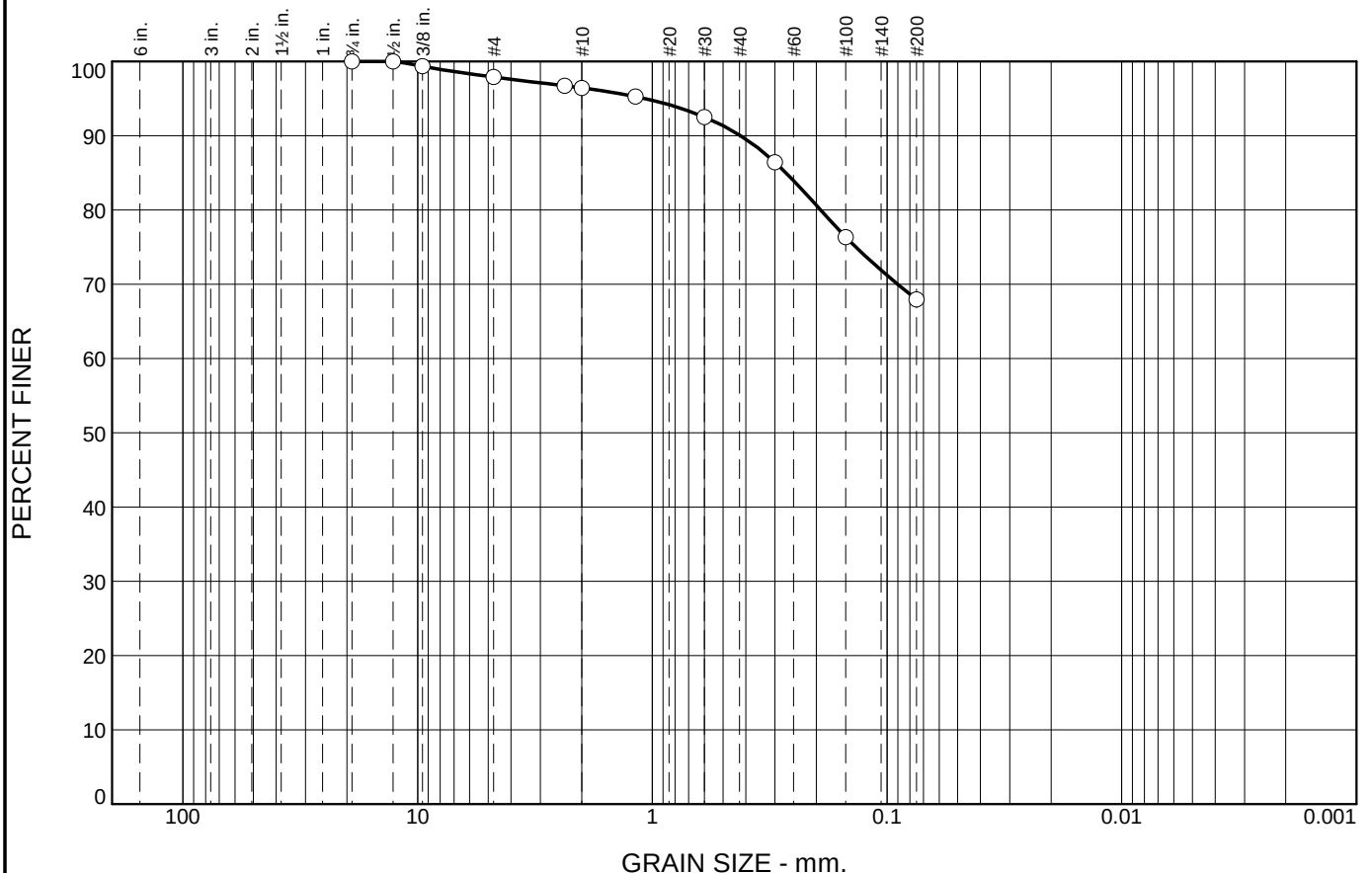
REITZ & JENS, INC.
 CONSULTING ENGINEERS

Client: Ameren Missouri
Project: Labadie Plant Utility Waste Landfill

Project No: 2008012455

Figure 4-16

Particle Size Distribution Report - ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	2.1	1.4	6.4	22.1	68.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4	100.0		
1/2	100.0		
3/8	99.4		
#4	97.9		
#8	96.7		
#10	96.5		
#16	95.3		
#30	92.5		
#50	86.4		
#100	76.3		
#200	68.0		

* (no specification provided)

Material Description
CLAY (CH), golden and gray, with fine to medium sand

Atterberg Limits (ASTM D 4318)
PL= LL= PI=

Classification
USCS= AASHTO=

Coefficients
D₈₅= 0.2690 D₆₀= D₅₀=
D₃₀= D₁₅= D₁₀=
C_u= C_c=

Date Tested: 04-11-11 **Tested By:** J. Crose

Remarks

Sample No.: ST-7 **Source of Sample:** B-10
Location:
Checked By: K. Kocher

Date Sampled:
Elev./Depth: 23

Title: Engineer



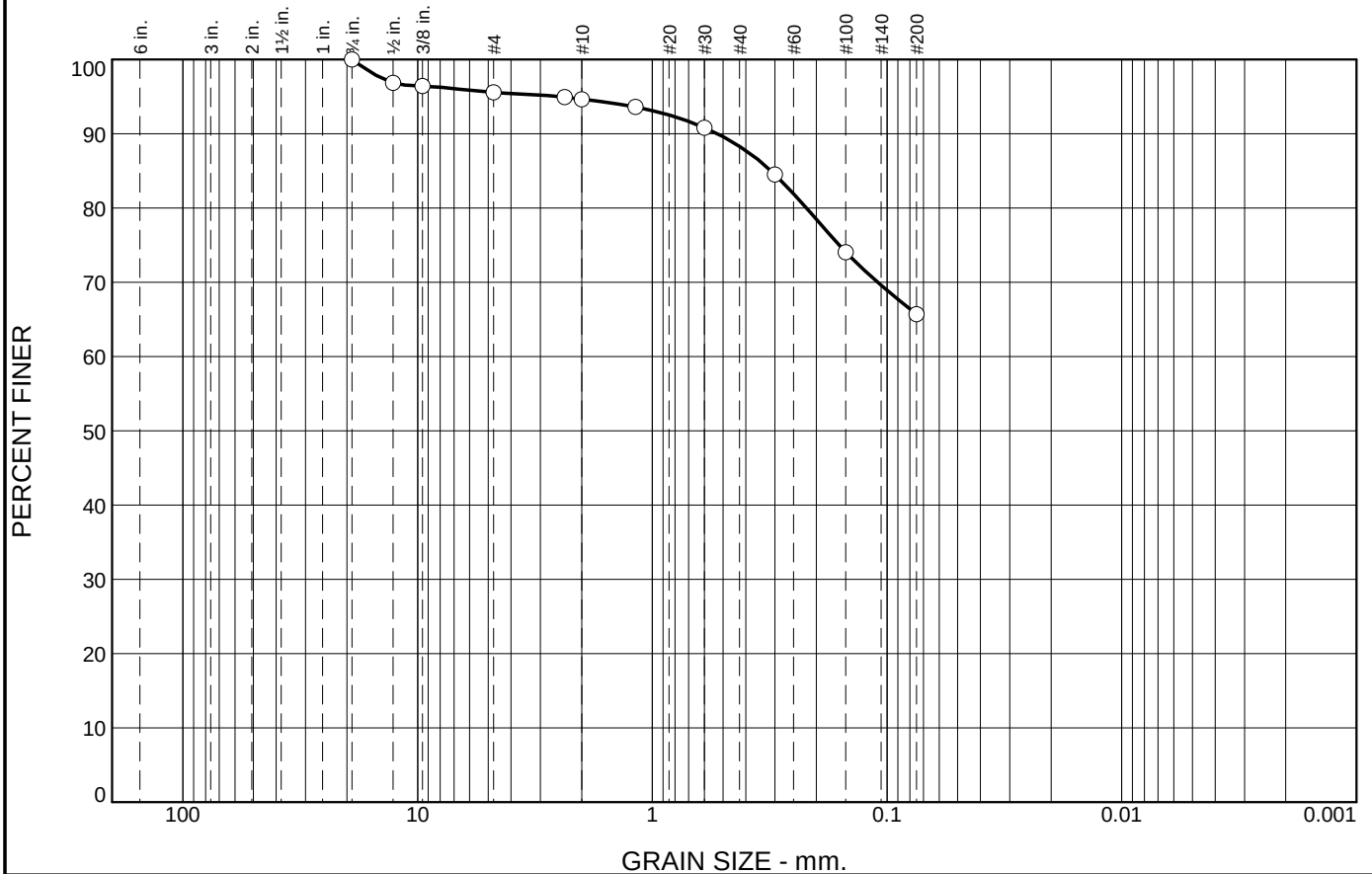
REITZ & JENS, INC.
CONSULTING ENGINEERS

Client: Ameren Missouri
Project: Labadie Plant Utility Waste Landfill

Project No: 2008012455

Figure 4-17

Particle Size Distribution Report - ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	4.4	0.9	6.4	22.6	65.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4	100.0		
1/2	96.9		
3/8	96.4		
#4	95.6		
#8	94.9		
#10	94.7		
#16	93.6		
#30	90.8		
#50	84.5		
#100	74.1		
#200	65.7		

* (no specification provided)

Material Description

Sandy CLAY (CH), brown tan gray and orangish brown, high plastic, fine to medium grain sand

Atterberg Limits (ASTM D 4318)

PL= LL= PI=

Classification

USCS= AASHTO=

Coefficients

D₈₅= 0.3117 D₆₀= D₅₀=
D₃₀= D₁₅= D₁₀=
C_u= C_c=

Date Tested: 04-11-11 Tested By: J. Crose

Remarks

Sample No.: ST-7 Source of Sample: B-11
Location:
Checked By: K. Kocher

Title: Engineer

Date Sampled:
Elev./Depth: 23



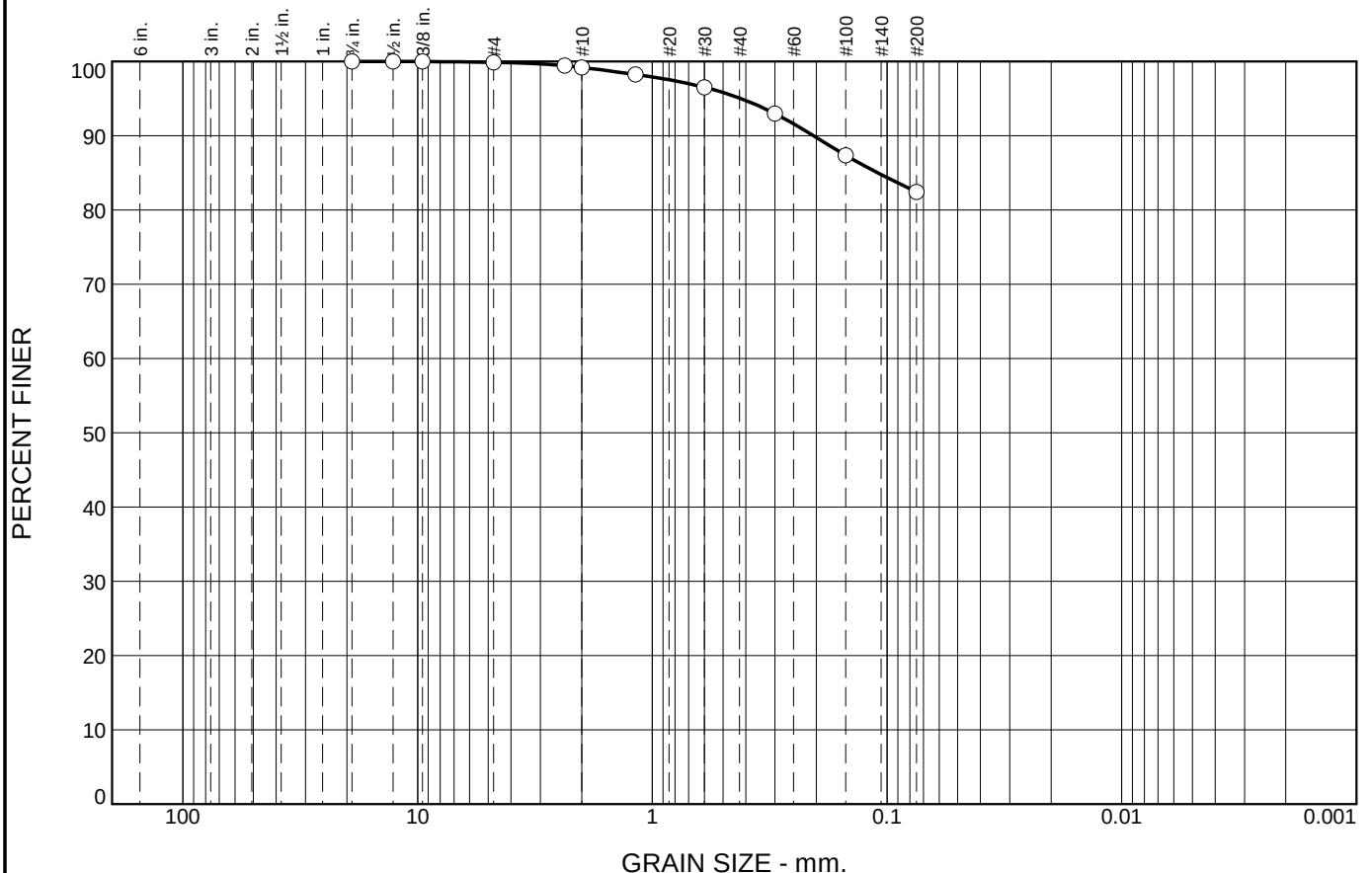
REITZ & JENS, INC.
CONSULTING ENGINEERS

Client: Ameren Missouri
Project: Labadie Plant Utility Waste Landfill

Project No: 2008012455

Figure 4-18

Particle Size Distribution Report - ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.1	0.7	4.1	12.7	82.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4	100.0		
1/2	100.0		
3/8	100.0		
#4	99.9		
#8	99.4		
#10	99.2		
#16	98.2		
#30	96.5		
#50	93.0		
#100	87.4		
#200	82.4		

* (no specification provided)

Material Description
 CLAY (CH), golden, high plastic, trace fine sand

Atterberg Limits (ASTM D 4318)
 PL= 22 LL= 74 PI= 52

Classification
 USCS= CH AASHTO=

Coefficients
 D₈₅= 0.1095 D₆₀= D₅₀=
 D₃₀= D₁₅= D₁₀=
 C_u= C_c=

Date Tested: 04-07-11 **Tested By:** J. Pruett/C. Cook

Remarks

Sample No.: Bulk **Source of Sample:**
Location: B-12
Checked By: K. Kocher

Date Sampled:
Elev./Depth: 2.5-10

Title: Engineer



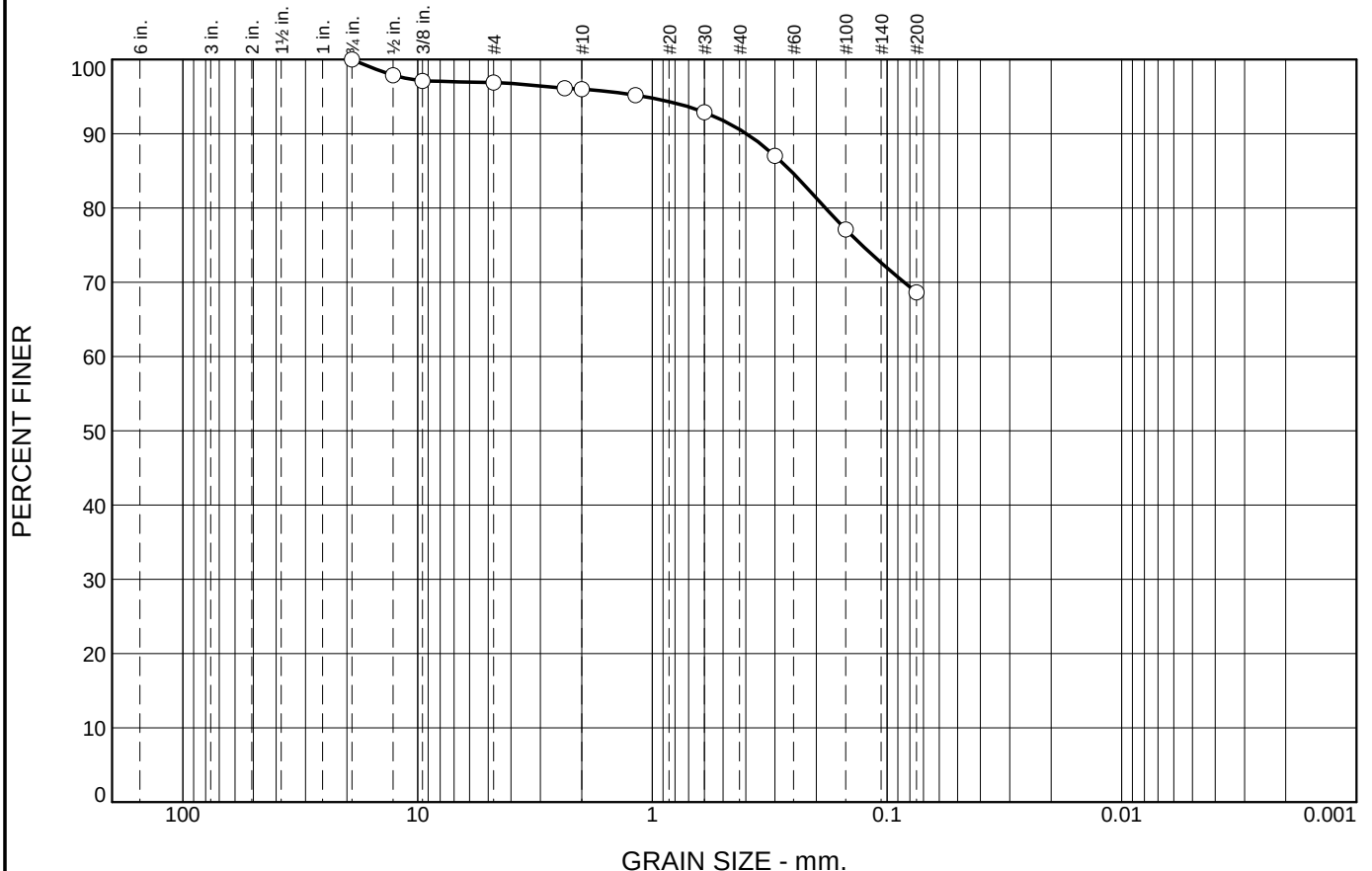
REITZ & JENS, INC.
 CONSULTING ENGINEERS

Client: Ameren Missouri
Project: Labadie Plant Utility Waste Landfill

Project No: 2008012455

Figure 4-19

Particle Size Distribution Report - ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	3.1	0.9	5.4	22.0	68.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4	100.0		
1/2	97.9		
3/8	97.1		
#4	96.9		
#8	96.2		
#10	96.0		
#16	95.2		
#30	92.9		
#50	87.0		
#100	77.1		
#200	68.6		

* (no specification provided)

Material Description
 CLAY (CH), brownish gray and orange-brown, high plastic, with fine to medium grain sand

Atterberg Limits (ASTM D 4318)
 PL= LL= PI=

Classification
 USCS= AASHTO=

Coefficients
 D₈₅= 0.2567 D₆₀= D₅₀=
 D₃₀= D₁₅= D₁₀=
 C_u= C_c=

Date Tested: 04-11-11 **Tested By:** J. Crose

Remarks

Sample No.: ST-2 **Source of Sample:** B-12
Location:
Checked By: K. Kocher

Date Sampled:
Elev./Depth: 3

Title: Engineer



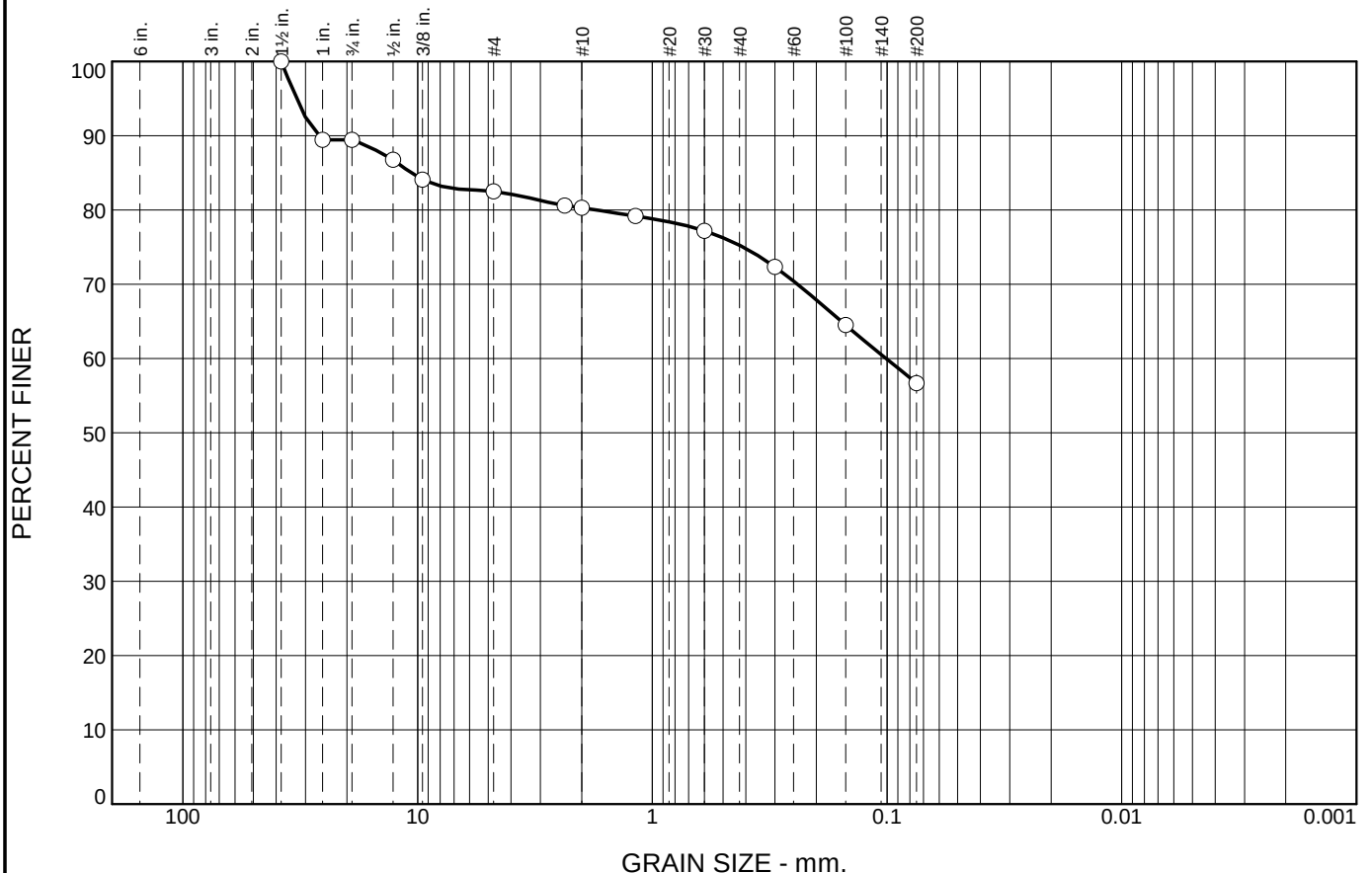
REITZ & JENS, INC.
 CONSULTING ENGINEERS

Client: Ameren Missouri
Project: Labadie Plant Utility Waste Landfill

Project No: 2008012455

Figure 4-20

Particle Size Distribution Report - ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	10.5	7.0	2.2	5.1	18.5	56.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	89.5		
3/4	89.5		
1/2	86.8		
3/8	84.1		
#4	82.5		
#8	80.6		
#10	80.3		
#16	79.2		
#30	77.2		
#50	72.3		
#100	64.5		
#200	56.7		

* (no specification provided)

Material Description
 Sandy CLAY (CH), brown tan gray and orange-brown, high plastic, fine to medium grain sand, with fine to coarse gravel

Atterberg Limits (ASTM D 4318)
 PL= LL= PI=

Classification
 USCS= SC AASHTO=

Coefficients
 D₈₅= 10.6353 D₆₀= 0.1011 D₅₀=
 D₃₀= D₁₅= D₁₀=
 C_u= C_c=

Date Tested: 04-11-11 **Tested By:** J. Crose

Remarks

Sample No.: ST-4 **Source of Sample:** B-12
Location:
Checked By: K. Kocher

Date Sampled:
Elev./Depth: 8

Title: Engineer



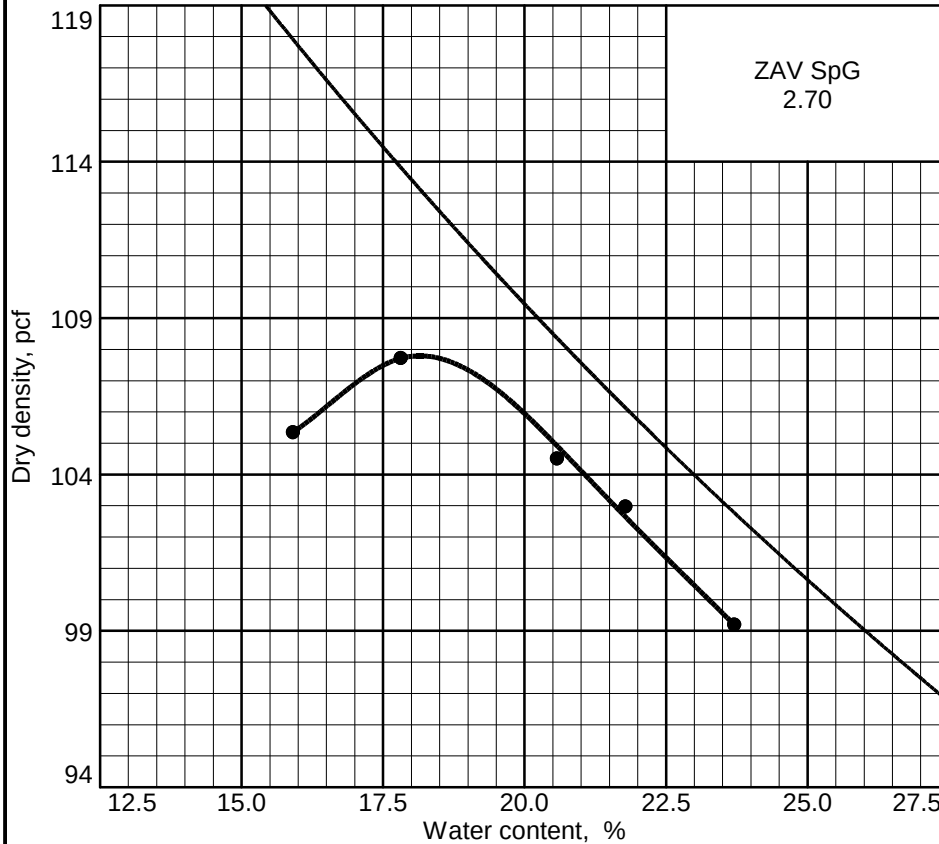
REITZ & JENS, INC.
 CONSULTING ENGINEERS

Client: Ameren Missouri
Project: Labadie Plant Utility Waste Landfill

Project No: 2008012455

Figure 4-21

MOISTURE-DENSITY TEST REPORT



Curve No.

Test Specification:

ASTM D 698-00a Method A Standard

Preparation Method ASTM

Hammer Wt. 5.5 lb.

Hammer Drop 12 in.

Number of Layers three

Blows per Layer 25

Mold Size .03333 cu.ft.

Test Performed on Material

Passing No.4 Sieve

NM LL 37 PI 17

Sp.G. (ASTM D 854)

%>No.4 0.0 %<No.200 93.3

USCS CL AASHTO

Date Sampled

Date Tested 4/28/11

Tested By J. Crose

TESTING DATA

	1	2	3	4	5	6
WM + WS	8.63	8.79	8.76	8.74	8.65	
WM	4.56	4.56	4.56	4.56	4.56	
WW + T #1	247.88	261.81	338.07	328.92	317.90	
WD + T #1	218.69	228.26	286.71	276.49	263.53	
TARE #1	34.62	40.71	36.76	36.34	34.57	
WW + T #2	317.87	309.88	318.73	328.11	328.19	
WD + T #2	279.71	269.28	271.07	276.81	272.52	
TARE #2	40.63	40.50	39.77	40.84	37.25	
MOISTURE	15.9	17.8	20.6	21.8	23.7	
DRY DENSITY	105.4	107.7	104.5	103.0	99.2	

TEST RESULTS

Maximum dry density = 107.8 pcf

Optimum moisture = 18.1 %

Project No. 2008012455 Client: Ameren Missouri

Project: Labadie Plant Utility Waste Landfill

● Location: Composite: silty clay material



Material Description

Silty CLAY (CL), brown to tan

Remarks:

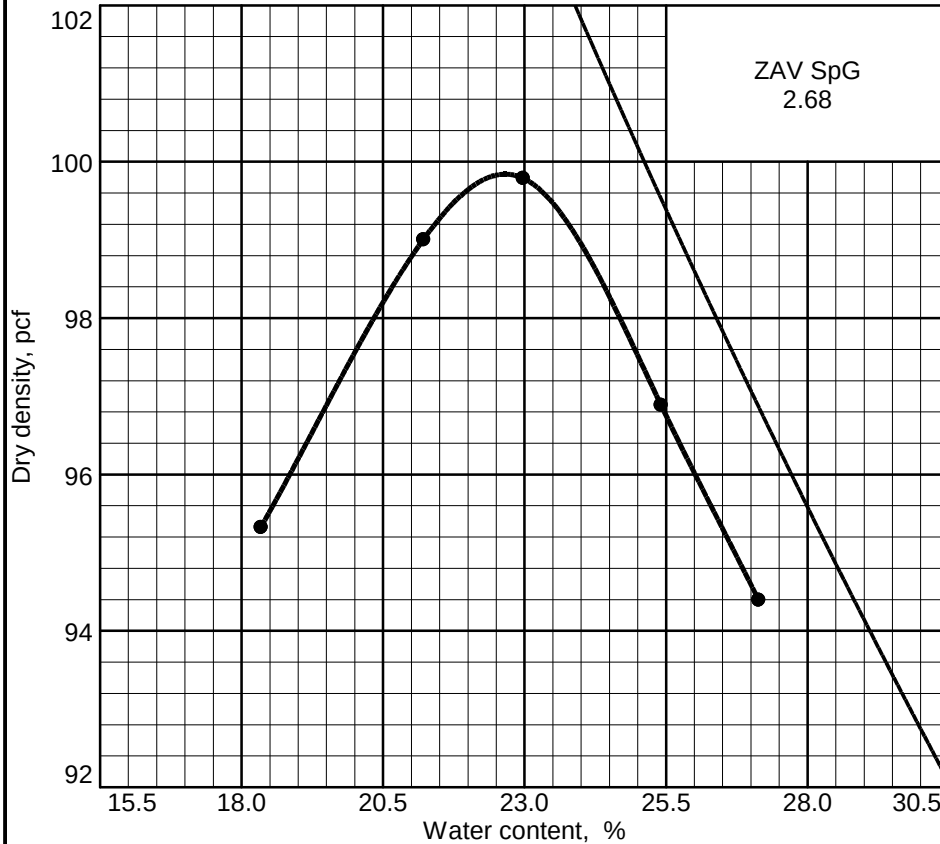
Sample is a composite of material left over from the Shelby tubes. This material was visually classified as silty clay or clayey silt

Checked by: K. Kocher

Title: P.E.

Figure 5-1

MOISTURE-DENSITY TEST REPORT



Curve No.

Test Specification:

ASTM D 698-00a Method A Standard

Preparation Method ASTM

Hammer Wt. 5.5 lb.

Hammer Drop 12 in.

Number of Layers three

Blows per Layer 25

Mold Size .03333 cu.ft.

Test Performed on Material

Passing No.4 Sieve

NM LL 62 PI 43

Sp.G. (ASTM D 854)

%>No.4 %<No.200 91.3

USCS CH AASHTO

Date Sampled

Date Tested 5/3/2011

Tested By J. Crose

TESTING DATA

	1	2	3	4	5	6
WM + WS	8.32	8.56	8.65	8.61	8.56	
WM	4.56	4.56	4.56	4.56	4.56	
WW + T #1	218.80	211.58	293.31	286.21	266.97	
WD + T #1	191.11	181.41	245.76	235.19	217.38	
TARE #1	40.69	40.50	37.73	33.99	32.74	
WW + T #2	254.74	229.19	280.98	300.29	282.30	
WD + T #2	221.77	195.94	235.74	246.67	229.18	
TARE #2	41.32	37.73	39.70	36.07	35.34	
MOISTURE	18.3	21.2	23.0	25.4	27.1	
DRY DENSITY	95.3	99.0	99.8	96.9	94.4	

TEST RESULTS

Maximum dry density = 99.8 pcf

Optimum moisture = 22.7 %

Project No. 2008012455 Client: Ameren Missouri

Project: Labadie Plant Utility Waste Landfill

● Location: Composite: high plastic clay material



Material Description

CLAY (CH), grey-brown-tan-orangish brown, high plastic, with trace fine chert fragments

Remarks:

Sample is a composite of material left over from the Shelby tubes. This material was visually classified as high plastic clay

Checked by:

Title:

Figure 5-2

Ameren Missouri; Labadie Power Plant UWL
Calaway Borrow Site
Silty CLAY Composite
Compacted Proctor point 103.0pcf at 21.8% moisture
Hydraulic Conductivity

Soil Conditions	
Pre-test conditions	Post-test Conditions
Wet Density = 125.7 (lbs/ft ³)	Wet Density = 128.1 (lbs/ft ³)
% Moisture = 21.7%	% Moisture = 22.9%
Dry Density = 103.3 (lbs/ft ³)	Dry Density = 104.2 (lbs/ft ³)

Test Information	
a (cm ²)=	0.1969
L (cm)=	4.8061
A (cm ²)=	19.4194

Trial 1													
Date and Time	Elapsed Time (seconds)	Cell Burette Reading (ml)	Base Burette		Top Burette		Total Head Across Sample (cm of water)	Temperature (°C)	Weighted Average Temp. (°C)	Uncorrected Hydraulic Conductivity (cm/sec)	Correction Factor	Cumulative Time (sec)	Corrected Hydraulic Conductivity (cm/sec)
			Reading (ml)	Distance from Datum (cm)	Reading (ml)	Distance from Datum (cm)							
5/4/11 7:55	0	8.5	10.00	27.200	0.00	78.000	85.979	18.1					
5/4/11 14:25	23400	8.4	9.92	27.606	0.13	77.340	84.912	21.5	19.80	1.30E-08	1.0051515	23400	1.31E-08
5/5/11 9:10	90900	8.7	9.67	28.876	0.44	75.765	82.067	19.8	20.43	1.25E-08	0.9897973	90900	1.24E-08
5/6/11 8:10	173700	8.7	9.38	30.350	0.80	73.936	78.765	19.5	20.06	1.23E-08	0.9988069	173700	1.23E-08
5/9/11 7:15	429600	8.9	8.61	34.261	1.83	68.704	69.621	22.9	20.74	1.20E-08	0.9824633	429600	1.18E-08

Trial 2													
Date and Time	Elapsed Time (seconds)	Cell Burette Reading (ml)	Base Burette		Top Burette		Total Head Across Sample (cm of water)	Temperature (°C)	Weighted Average Temp. (°C)	Uncorrected Hydraulic Conductivity (cm/sec)	Correction Factor	Cumulative Time (sec)	Corrected Hydraulic Conductivity (cm/sec)
			Reading (ml)	Distance from Datum (cm)	Reading (ml)	Distance from Datum (cm)							
5/9/11 7:45	0	8.9	10.00	27.200	0.00	78.000	85.979	22.6					
5/10/11 7:30	85500	9.2	9.67	28.876	0.37	76.120	82.423	22.4	22.50	1.20E-08	0.9421229	85500	1.13E-08
5/11/11 8:30	175500	9.2	9.35	30.502	0.77	74.088	78.765	22.4	22.45	1.22E-08	0.9432589	175500	1.15E-08
5/12/11 8:05	260400	9.3	9.07	31.924	1.10	72.412	75.667	22	22.37	1.20E-08	0.9450598	260400	1.13E-08
5/13/11 8:15	347400	9.3	8.79	33.347	1.42	70.786	72.619	22.1	22.29	1.18E-08	0.9468317	347400	1.12E-08

Trial 3													
Date and Time	Elapsed Time (seconds)	Cell Burette Reading (ml)	Base Burette		Top Burette		Total Head Across Sample (cm of water)	Temperature (°C)	Weighted Average Temp. (°C)	Uncorrected Hydraulic Conductivity (cm/sec)	Correction Factor	Cumulative Time (sec)	Corrected Hydraulic Conductivity (cm/sec)
			Reading (ml)	Distance from Datum (cm)	Reading (ml)	Distance from Datum (cm)							
5/16/11 7:55	0	10.1	10.00	27.200	0.00	78.000	85.979	19					
5/17/11 7:50	86100	9.9	9.71	28.673	0.32	76.374	82.880	19.2	19.10	1.04E-08	1.0226658	86100	1.06E-08
5/18/11 8:00	173100	9.9	9.43	30.096	0.66	74.647	79.731	20.5	19.48	1.06E-08	1.0131690	173100	1.08E-08
5/19/11 8:00	259500	9.9	9.16	31.467	0.98	73.022	76.733	21.7	20.02	1.07E-08	0.9998188	259500	1.07E-08
5/20/11 8:30	347700	10.0	8.91	32.737	1.28	71.498	73.939	21.8	20.46	1.06E-08	0.9891813	347700	1.05E-08
H.C. =												1.1E-08	

CLAY VOLUME CALCULATION

Client: Ameren Missouri
 Project: Labadie UWL
 Location: Callaway Borrow Site

USING ONLY MODERATE TO HIGH PLASTIC CLAY MATERIAL WITH LOW SAND/GRAVEL CONTENT				
Borrow Area No.	Surface Area (acres)	Thickness of Useable Liner Material (feet)	Volume (acre-ft)	Volume (cubic yards)
1	35	20	700	1130000
2	33	11	363	590000
3	22	19	418	670000
4	28	18	504	810000
5	36	22	792	1280000
TOTAL			2777	4480000

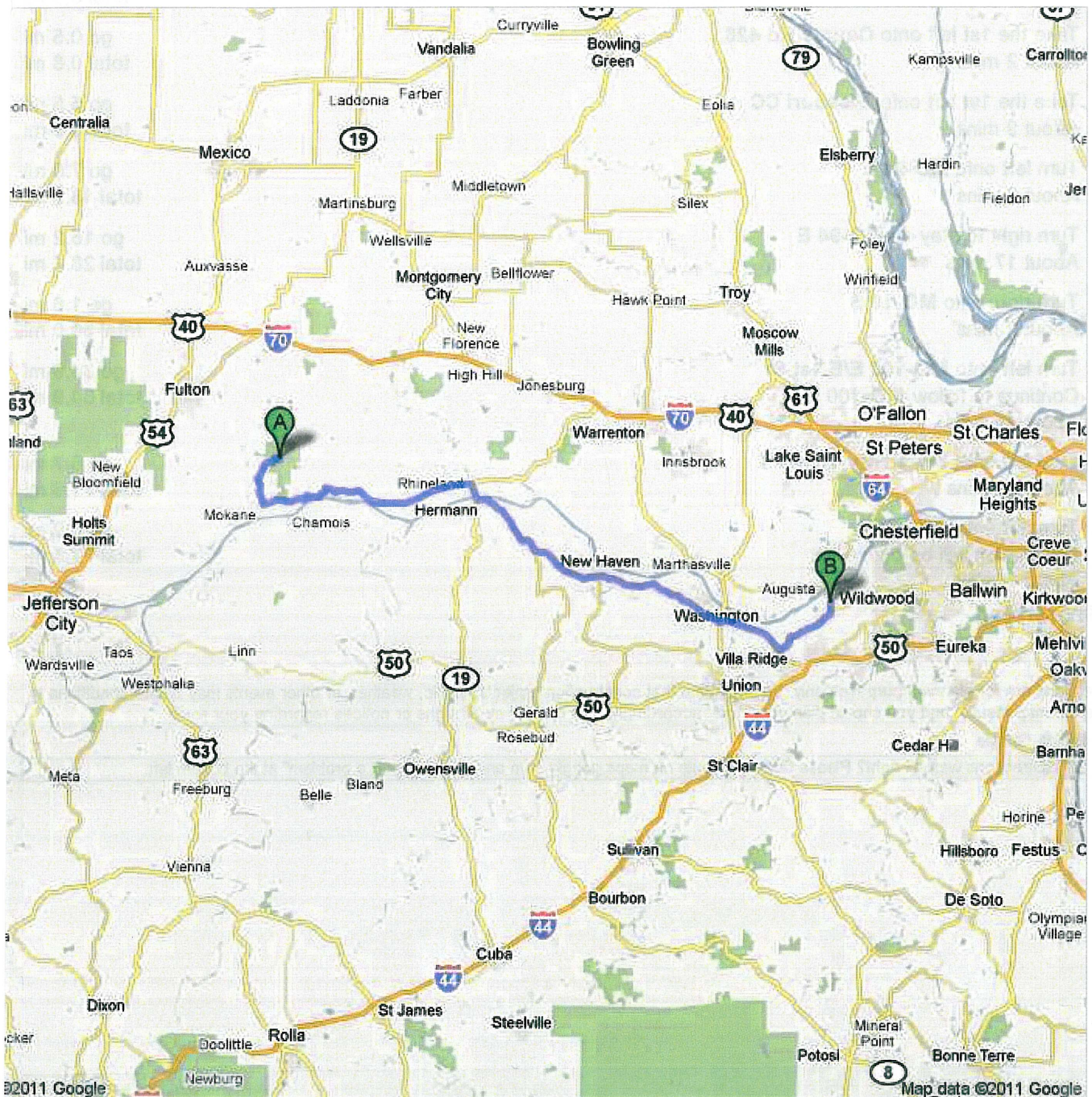
USING ALL SILT, LOW PLASTIC CLAY, AND HIGH PLASTIC CLAY MATERIAL WITH LOW SAND/GRAVEL CONTENT				
Borrow Area No.	Surface Area (acres)	Thickness of Useable Liner Material (feet)	Volume (acre-ft)	Volume (cubic yards)
1	35	27	945	1520000
2	33	17	561	910000
3	22	24	528	850000
4	28	21	588	950000
5	36	25	900	1450000
TOTAL			3522	5680000

Appendix A-1

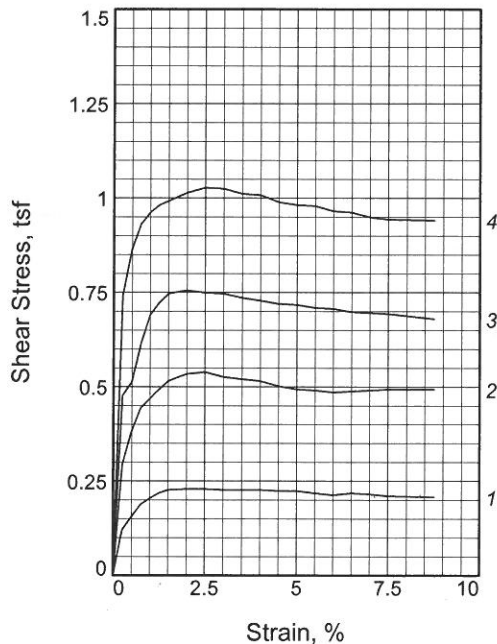
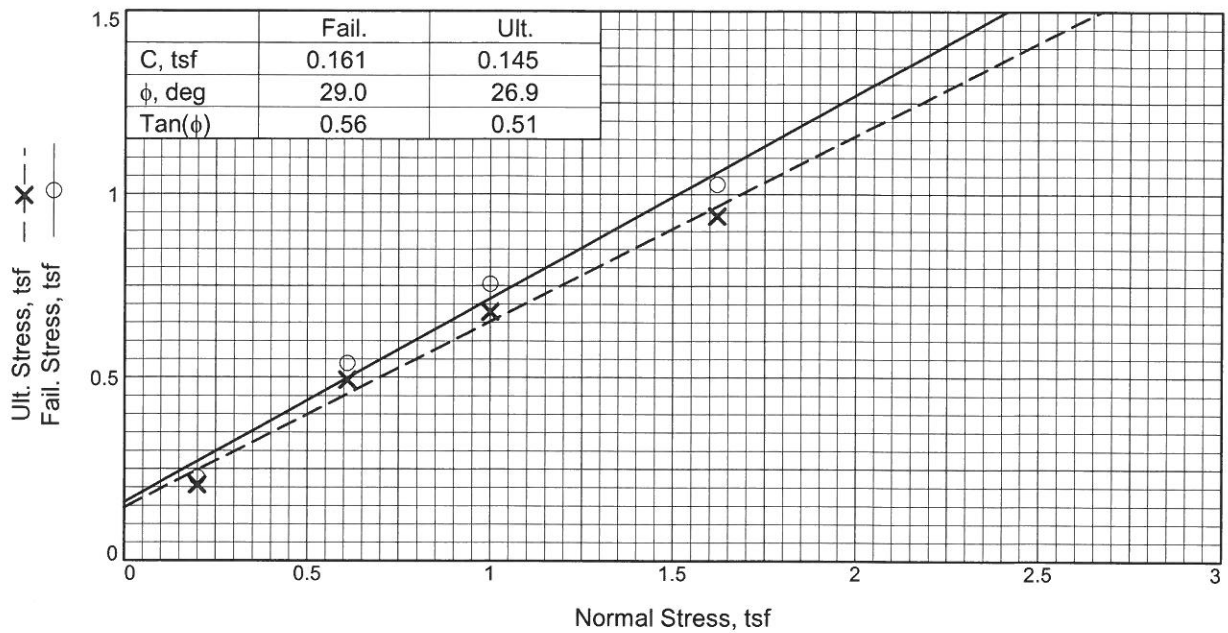
**POTENTIAL HAUL ROUTE FOR CLAY BORROW
AND
SUPPLEMENTAL LABORATORY TESTING**



Directions to Unknown road
72.5 mi – about 1 hour 40 mins
Callaway to UWL (Davis RD at Labadie Bottom Rd)



Ameren Missouri Labadie UWL
POSSIBLE ROUTE FROM CALLAWAY PLANT
CLAY BORROW SITE TO LABADIE UWL



Sample No.		1	2	3	4
Initial	Water Content, %	24.9	24.9	24.9	24.9
	Dry Density, pcf	98.8	98.8	98.8	98.8
	Saturation, %	96.2	96.2	96.2	96.2
	Void Ratio	0.6933	0.6933	0.6933	0.6933
	Diameter, in.	2.00	2.00	2.00	2.00
	Height, in.	1.28	1.28	1.28	1.28
At Test	Water Content, %	24.9	24.9	24.9	24.9
	Dry Density, pcf	98.8	98.8	98.8	98.8
	Saturation, %	96.2	96.2	96.2	96.2
	Void Ratio	0.6933	0.6933	0.6933	0.6933
	Diameter, in.	2.00	2.00	2.00	2.00
	Height, in.	1.28	1.28	1.28	1.28
Normal Stress, tsf		0.200	0.610	1.000	1.620
Fail. Stress, tsf		0.226	0.539	0.755	1.027
Strain, %		1.5	2.5	2.0	2.5
Ult. Stress, tsf		0.208	0.493	0.679	0.941
Strain, %		8.8	8.8	8.8	8.8
Strain rate, %/min.		0.80	0.80	0.80	0.80

Sample Type: Compacted

Description: CLAY (CH), grey-brown-tan-orangish brown, high plastic, with trace fine

LL= 62 PL= 19 PI= 43

Assumed Specific Gravity= 2.68

Remarks: High plastic clay was sheared against the textured liner from Sioux UWL

Client: Ameren Missouri

Project: Labadie Plant Utility Waste Landfill

Location: Composite: high plastic clay material

Proj. No.: 2008012455

Date Sampled:



Figure A1-2

Tested By: J. Crose

Checked By: K. Kocher

DIRECT SHEAR TEST

11/20/2012

Date:
Client: Ameren Missouri
Project: Labadie Plant Utility Waste Landfill
Project No.: 2008012455
Location: Composite: high plastic clay material
Description: CLAY (CH), grey-brown-tan-orangish brown, high plastic, with trace fine chert fragments
Sample is a composite of material left over from Shelby tubes that was visually classified as high plastic clay.
Remarks: High plastic clay was sheared against the textured liner from Sioux UWL
Type of Sample: Compacted
Assumed Specific Gravity=2.68 **LL=**62 **PL=**19 **PI=**43

Parameters for Specimen No. 1

Specimen Parameter	Initial	Consolidated	Final
Moisture content: Moist soil+tare, gms.	329.350		329.350
Moisture content: Dry soil+tare, gms.	271.510		271.510
Moisture content: Tare, gms.	39.160		39.160
Moisture, %	24.9	24.9	24.9
Moist specimen weight, gms.	129.8		
Diameter, in.	2.00	2.00	
Area, in. ²	3.14	3.14	
Height, in.	1.28	1.28	
Net decrease in height, in.		0.00	
Wet density, pcf	123.4	123.4	
Dry density, pcf	98.8	98.8	
Void ratio	0.6933	0.6933	
Saturation, %	96.2	96.2	

Test Readings for Specimen No. 1

Primary load ring constant = .1176 lbs. per input unit

Normal stress = 0.2 tsf

Strain rate, %/min. = 0.80

Fail. Stress = 0.226 tsf at reading no. 6

Ult. Stress = 0.208 tsf at reading no. 19

No.	Horizontal Def. Dial in.	Load Dial	Load lbs.	Strain %	Shear Stress tsf
0	0.0000	0.00	0.0	0.0	0.000
1	0.0050	45.00	5.3	0.3	0.121
2	0.0100	58.00	6.8	0.5	0.156
3	0.0150	70.00	8.2	0.8	0.189
4	0.0200	76.00	8.9	1.0	0.205
5	0.0250	81.00	9.5	1.3	0.218
6	0.0300	84.00	9.9	1.5	0.226
7	0.0400	85.00	10.0	2.0	0.229
8	0.0500	85.00	10.0	2.5	0.229
9	0.0600	84.00	9.9	3.0	0.226
10	0.0700	84.00	9.9	3.5	0.226
11	0.0800	84.00	9.9	4.0	0.226

Test Readings for Specimen No. 1

No.	Horizontal Def. Dial in.	Load Dial	Load lbs.	Strain %	Shear Stress tsf
12	0.0900	83.00	9.8	4.5	0.224
13	0.1000	83.00	9.8	5.0	0.224
14	0.1100	81.00	9.5	5.5	0.218
15	0.1200	79.00	9.3	6.0	0.213
16	0.1300	81.00	9.5	6.5	0.218
17	0.1400	80.00	9.4	7.0	0.216
18	0.1500	78.00	9.2	7.5	0.210
19	0.1750	77.00	9.1	8.8	0.208

Parameters for Specimen No. 2

Specimen Parameter	Initial	Consolidated	Final
Moisture content: Moist soil+tare, gms.	329.350		329.350
Moisture content: Dry soil+tare, gms.	271.510		271.510
Moisture content: Tare, gms.	39.160		39.160
Moisture, %	24.9	24.9	24.9
Moist specimen weight, gms.	129.8		
Diameter, in.	2.00	2.00	
Area, in. ²	3.14	3.14	
Height, in.	1.28	1.28	
Net decrease in height, in.		0.00	
Wet density, pcf	123.4	123.4	
Dry density, pcf	98.8	98.8	
Void ratio	0.6933	0.6933	
Saturation, %	96.2	96.2	

Test Readings for Specimen No. 2

Primary load ring constant = .1176 lbs. per input unit

Normal stress = 0.61 tsf

Strain rate, %/min. = 0.80

Fail. Stress = 0.539 tsf at reading no. 8

Ult. Stress = 0.493 tsf at reading no. 19

No.	Horizontal Def. Dial in.	Load Dial	Load lbs.	Strain %	Shear Stress tsf
0	0.0000	0.00	0.0	0.0	0.000
1	0.0050	109.00	12.8	0.3	0.294
2	0.0100	142.00	16.7	0.5	0.383
3	0.0150	165.00	19.4	0.8	0.445
4	0.0200	174.00	20.5	1.0	0.469
5	0.0250	183.00	21.5	1.3	0.493
6	0.0300	191.00	22.5	1.5	0.515
7	0.0400	198.00	23.3	2.0	0.534
8	0.0500	200.00	23.5	2.5	0.539
9	0.0600	195.00	22.9	3.0	0.526
10	0.0700	193.00	22.7	3.5	0.520
11	0.0800	191.00	22.5	4.0	0.515
12	0.0900	186.00	21.9	4.5	0.501
13	0.1000	183.00	21.5	5.0	0.493
14	0.1100	182.00	21.4	5.5	0.491

Test Readings for Specimen No. 2

No.	Horizontal Def. Dial in.	Load Dial	Load lbs.	Strain %	Shear Stress tsf
15	0.1200	180.00	21.2	6.0	0.485
16	0.1300	181.00	21.3	6.5	0.488
17	0.1400	182.00	21.4	7.0	0.491
18	0.1500	183.00	21.5	7.5	0.493
19	0.1750	183.00	21.5	8.8	0.493

Parameters for Specimen No. 3

Specimen Parameter	Initial	Consolidated	Final
Moisture content: Moist soil+tare, gms.	329.350		329.350
Moisture content: Dry soil+tare, gms.	271.510		271.510
Moisture content: Tare, gms.	39.160		39.160
Moisture, %	24.9	24.9	24.9
Moist specimen weight, gms.	129.8		
Diameter, in.	2.00	2.00	
Area, in. ²	3.14	3.14	
Height, in.	1.28	1.28	
Net decrease in height, in.		0.00	
Wet density, pcf	123.4	123.4	
Dry density, pcf	98.8	98.8	
Void ratio	0.6933	0.6933	
Saturation, %	96.2	96.2	

Test Readings for Specimen No. 3

Primary load ring constant = .1176 lbs. per input unit

Normal stress = 1 tsf

Strain rate, %/min. = 0.80

Fail. Stress = 0.755 tsf at reading no. 7

Ult. Stress = 0.679 tsf at reading no. 19

No.	Horizontal Def. Dial in.	Load Dial	Load lbs.	Strain %	Shear Stress tsf
0	0.0000	0.00	0.0	0.0	0.000
1	0.0050	177.00	20.8	0.3	0.477
2	0.0100	190.00	22.3	0.5	0.512
3	0.0150	228.00	26.8	0.8	0.615
4	0.0200	256.00	30.1	1.0	0.690
5	0.0250	268.00	31.5	1.3	0.722
6	0.0300	277.00	32.6	1.5	0.747
7	0.0400	280.00	32.9	2.0	0.755
8	0.0500	278.00	32.7	2.5	0.749
9	0.0600	277.00	32.6	3.0	0.747
10	0.0700	273.00	32.1	3.5	0.736
11	0.0800	270.00	31.8	4.0	0.728
12	0.0900	267.00	31.4	4.5	0.720
13	0.1000	266.00	31.3	5.0	0.717
14	0.1100	263.00	30.9	5.5	0.709
15	0.1200	262.00	30.8	6.0	0.706
16	0.1300	259.00	30.5	6.5	0.698
17	0.1400	258.00	30.3	7.0	0.695

Test Readings for Specimen No. 3

No.	Horizontal Def. Dial in.	Load Dial	Load lbs.	Strain %	Shear Stress tsf
18	0.1500	257.00	30.2	7.5	0.693
19	0.1750	252.00	29.6	8.8	0.679

Parameters for Specimen No. 4

Specimen Parameter	Initial	Consolidated	Final
Moisture content: Moist soil+tare, gms.	329.350		329.350
Moisture content: Dry soil+tare, gms.	271.510		271.510
Moisture content: Tare, gms.	39.160		39.160
Moisture, %	24.9	24.9	24.9
Moist specimen weight, gms.	129.8		
Diameter, in.	2.00	2.00	
Area, in. ²	3.14	3.14	
Height, in.	1.28	1.28	
Net decrease in height, in.		0.00	
Wet density, pcf	123.4	123.4	
Dry density, pcf	98.8	98.8	
Void ratio	0.6933	0.6933	
Saturation, %	96.2	96.2	

Test Readings for Specimen No. 4

Primary load ring constant = .1176 lbs. per input unit

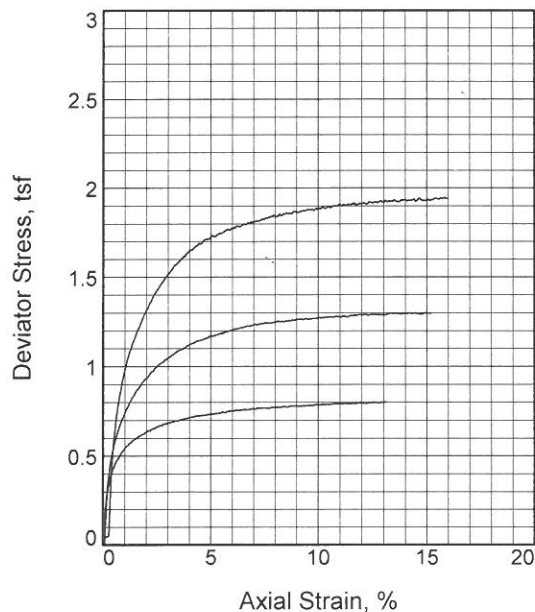
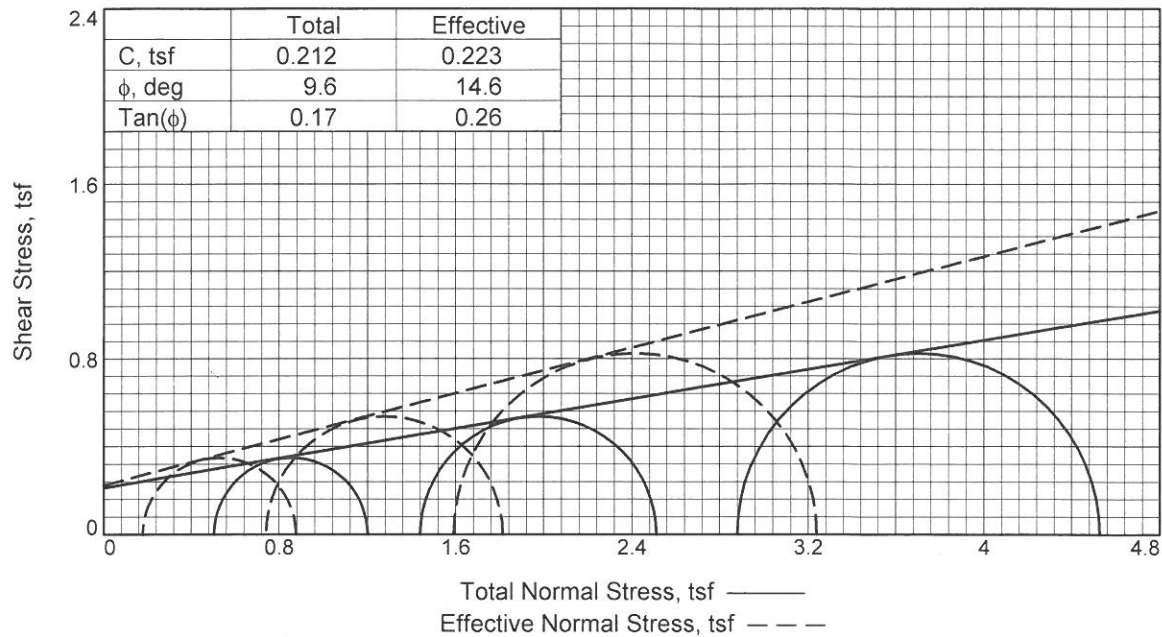
Normal stress = 1.62 tsf

Strain rate, %/min. = 0.80

Fail. Stress = 1.027 tsf at reading no. 7

Ult. Stress = 0.941 tsf at reading no. 18

No.	Horizontal Def. Dial in.	Load Dial	Load lbs.	Strain %	Shear Stress tsf
0	0.0000	0.00	0.0	0.0	0.000
1	0.0050	275.00	32.3	0.3	0.741
2	0.0100	321.00	37.7	0.5	0.865
3	0.0150	346.00	40.7	0.8	0.933
4	0.0200	357.00	42.0	1.0	0.962
5	0.0250	364.00	42.8	1.3	0.981
6	0.0400	376.00	44.2	2.0	1.013
7	0.0500	381.00	44.8	2.5	1.027
8	0.0600	380.00	44.7	3.0	1.024
9	0.0700	375.00	44.1	3.5	1.011
10	0.0800	374.00	44.0	4.0	1.008
11	0.0900	367.00	43.2	4.5	0.989
12	0.1000	364.00	42.8	5.0	0.981
13	0.1100	363.00	42.7	5.5	0.978
14	0.1200	358.00	42.1	6.0	0.965
15	0.1300	357.00	42.0	6.5	0.962
16	0.1400	352.00	41.4	7.0	0.949
17	0.1500	350.00	41.2	7.5	0.943
18	0.1750	349.00	41.0	8.8	0.941



Sample No.		1	2	3
Initial	Water Content, %	26.5	26.6	26.7
	Dry Density, pcf	95.4	95.7	95.8
	Saturation, %	94.4	95.4	95.9
	Void Ratio	0.7535	0.7482	0.7466
	Diameter, in.	2.00	2.00	1.99
	Height, in.	4.08	4.33	4.04
At Test	Water Content, %	27.1	24.4	22.4
	Dry Density, pcf	97.0	101.2	104.6
	Saturation, %	100.0	100.0	100.0
	Void Ratio	0.7252	0.6536	0.6003
	Diameter, in.	1.99	1.96	1.93
	Height, in.	4.06	4.25	3.92
Strain rate, %/min.		0.02	0.02	0.02
Back Pressure, tsf		3.96	3.96	3.96
Cell Pressure, tsf		4.46	5.40	6.84
Fail. Stress, tsf		0.70	1.07	1.65
Total Pore Pr., tsf		4.28	4.66	5.25
Ult. Stress, tsf		0.80	1.29	1.92
Total Pore Pr., tsf		4.15	4.60	5.26
$\bar{\sigma}_1$ Failure, tsf		0.88	1.81	3.24
$\bar{\sigma}_3$ Failure, tsf		0.18	0.74	1.59

Type of Test:

CU with Pore Pressures

Sample Type: Compacted (Standard Proctor)

Description: CLAY (CH), grey-brown-tan-orangish brown, high plastic, with trace fine chert fragments

Assumed Specific Gravity= 2.68

Remarks: Samples were compacted using the standard proctor between the 25% and 27% moisture. Samples were then trimmed to 2" diameter by 4.0"+ length and tested

Figure A1-3

Client: Ameren Missouri

Project: Labadie Plant Utility Waste Landfill

Location: Composite: high plastic clay material (Standard Proctor)

Proj. No.: 2008012455

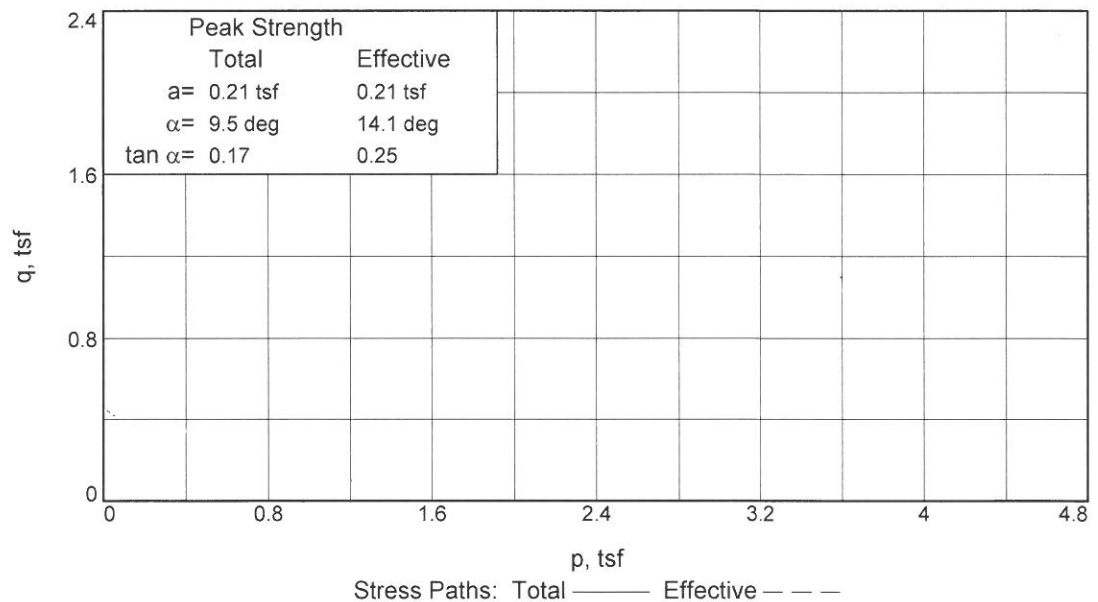
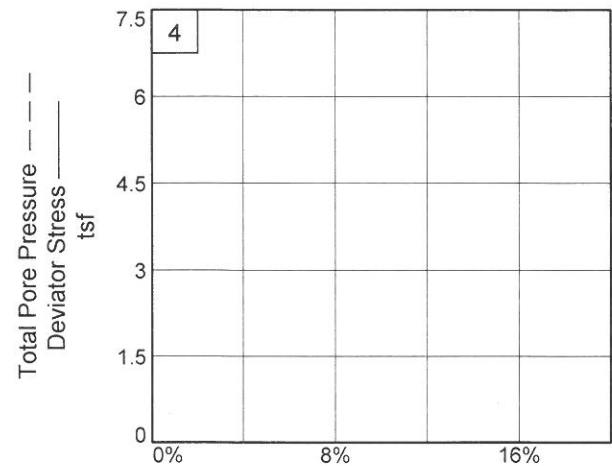
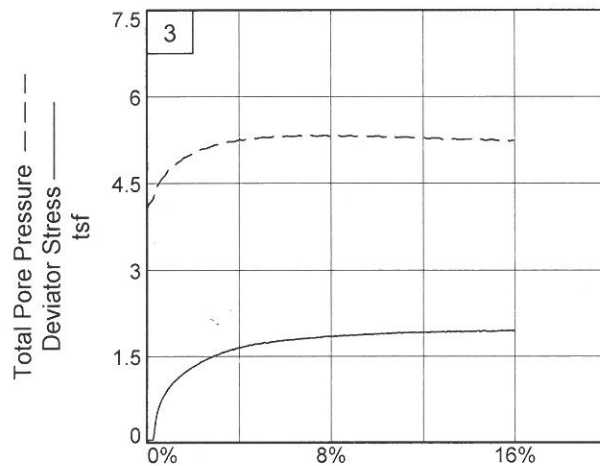
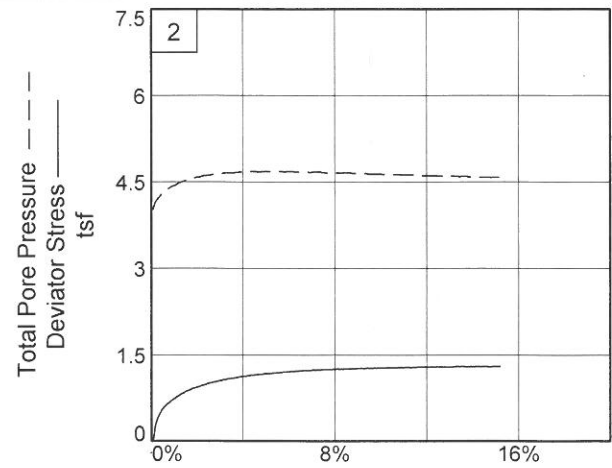
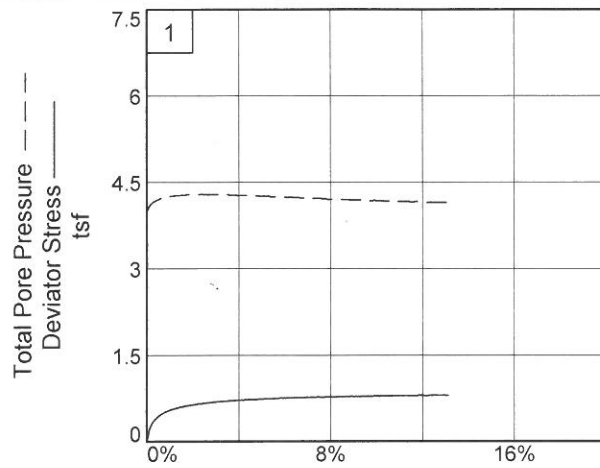
Date Sampled: 7/6/12



REITZ & JENS, INC.
CONSULTING ENGINEERS

Tested By: K. Kocher

Checked By: J. Fouse



Client: Ameren Missouri

Project: Labadie Plant Utility Waste Landfill

Location: Composite: high plastic clay material (Standard Proctor)

Project No.: 2008012455

Figure _____

REITZ & JENS, INC.

Tested By: K. Kocher

Checked By: J. Fouse

TRIAXIAL CELL SETUP & TAKEDOWN

Project Ameren UE - Callaway Clay Date 6/27/12
 Sample ± 25-27% M Depth Compacted using Standard Proctor Method
 Description tan + golden HP clay

Type of Test CU Confining Pressure Differential 7 psi
 Cell Number 1 Saturate before after Consolidation
 Number of Membranes 2 Filter Strips Yes No

MOISTURE CONTENT			
	INITIAL		FINAL
Tare No.	<u>56</u>	<u>22</u>	<u>Bowl 1</u>
Wet Wt. + Tare	<u>117.37</u>	<u>129.51</u>	<u>605.78</u>
Dry Wt. + Tare	<u>97.08</u>	<u>107.10</u>	<u>513.96</u>
Wt. Water			
Tare Wt.	<u>21.55</u>	<u>22.06</u>	<u>195.04</u>
Dry Soil Wt.			
Moisture %	<u>26.863</u>	<u>26.263</u>	<u>28.791</u>
Avg. w %			

SPECIMEN DIMENSIONS in. / mm.				
HEIGHT			DIAMETER	
	Initial	Final	Initial	Final
1	<u>4.0795</u>		T <u>1.9775</u>	
2	<u>4.0825</u>		M <u>1.9920</u>	
3	<u>4.0815</u>		B <u>2.0190</u>	
Avg.	<u>4.08117</u>		<u>1.99617</u>	

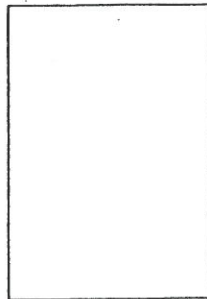
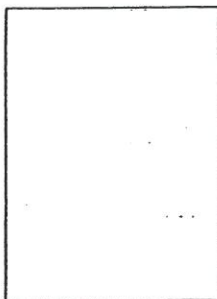
LENGTH CHANGE	
STRAIN GAUGE at setup	<u>500</u>
at saturation start	<u>500</u>
at consolidation start	<u>583</u> (483?)
at axial load start	<u>522</u>

MASS PROPERTIES		
Wt. Tube + Soil		gm.
Wt. Tube		gm.
Wt. Soil	<u>404.81</u>	gm.
Tube Diameter		in.
Sample Length		in.
tube length		in.
top trim		in.
bottom trim		in.
total trim		in.
sample length		in.
Density constant		
$4.85 / (D^2 * L)$		
Wet Density		pcf.
Dry Density		pcf.

Description After Test _____

Remarks _____

Failure Sketch



Trimmed By [Signature]
 Trimmed Date 6/27/12

Setup By [Signature]
 Setup Date 6/27/12

Taken Down By [Signature]
 Take Down Date 6-5-12

TRIAXIAL CELL SATURATION & BETA FACTOR

PROJECT Ameren Callaway Clay borrow

SAMPLE ≈ 25-276 M DEPTH

INITIAL CELL PRESSURE 51.0 START DATE 6/27/12

INITIAL PORE PRESSURE 50.0 CELL NUMBER 1

INITIAL TRANSDUCER READING 51.8 TRANSDUCER NUMBER 1

[illegible]

TRIAXIAL CELL CONSOLIDATION TEST

PROJECT Ameson Callaway Clay Borrow

SAMPLE 25-2720M DEPTH 7 ps

CONSOLIDATION CELL PRESSURE 62.0 CELL NUMBER 1

CONSOLIDATION PORE PRESSURE 55.0

[illegible]

DATE 7-5-12

PROJECT

SAMPLE

DEPTH

INITIAL CELL PRESSURE

CELL NUMBER

INITIAL PORE PRESSURE

START DATE

SAMPLE HEIGHT: AT SETUP

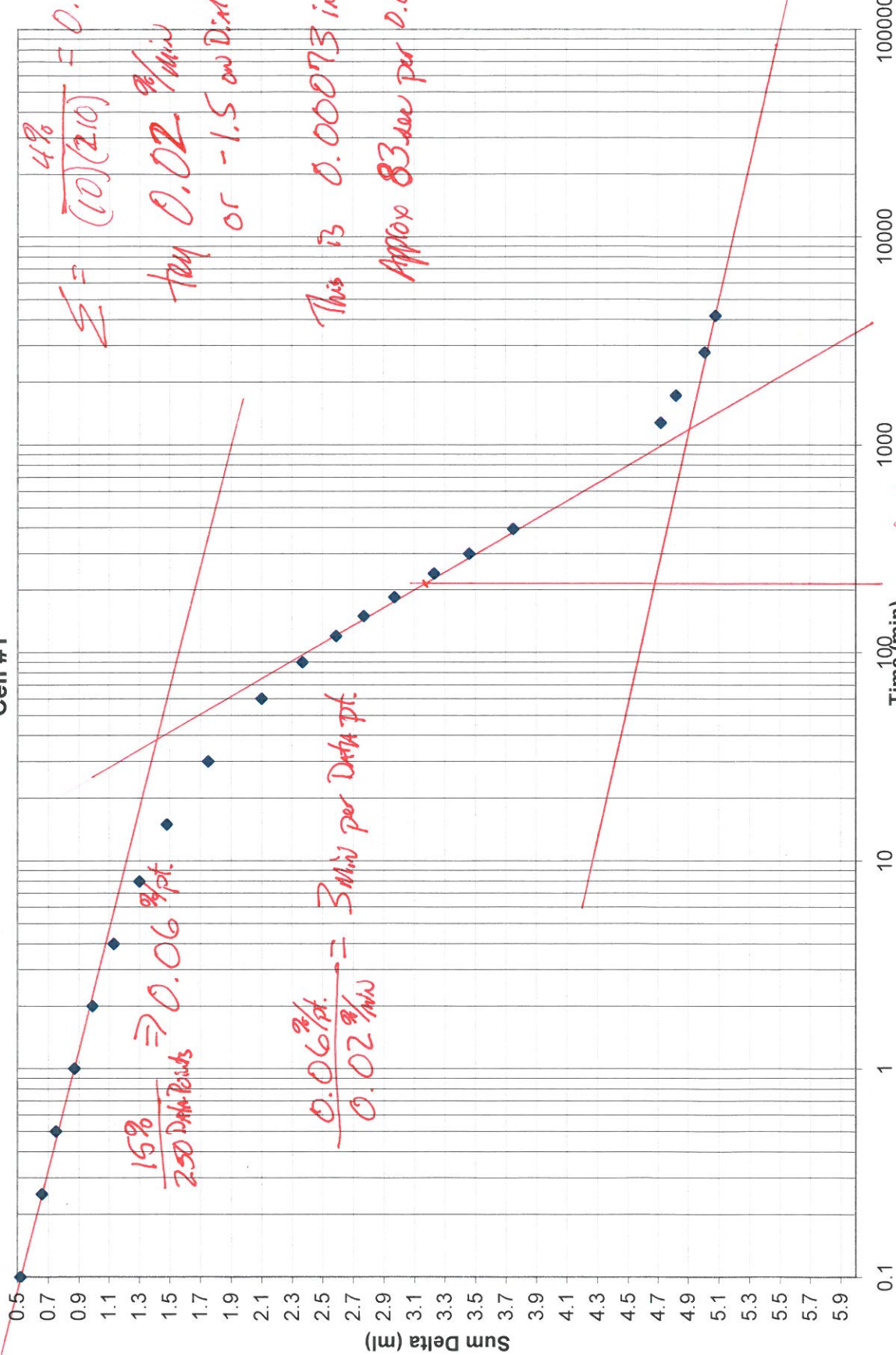
AT START OF LOADING

STRAIN RATE

TYPE OF TEST

MASS OF TOP CAP & POROUS STONE: _____ g.

Cell #1



$$\Sigma = \frac{4\%}{(10)(2.10)} = 0.0019 \text{ \% / min}$$

avg 0.02 \% / min
or -1.5 cm Distance

This is 0.00073 inch / pt
Approx 83 sec per 0.001 inch

$$\frac{15\%}{250 \text{ Data Points}} \Rightarrow 0.06 \text{ \% / pt}$$

$$\frac{0.06 \text{ \% / pt}}{0.02 \text{ \% / min}} = 3 \text{ min per Data pt}$$

$t_{sp} = 210 \text{ min}$

TRIAXIAL CELL SETUP & TAKEDOWN

Project Amelon Callaway Borehole Date 7-6-12
 Sample CLAY @ 25-27% Depth Compacted @ Standard Proctor
 Description HP CLAY Grey to golden tan, Trace lignite & limonite

Type of Test CW Confining Pressure Differential 20 psi
 Cell Number 2 Saturate before after Consolidation
 Number of Membranes 2 Filter Strips Yes No

MOISTURE CONTENT			
	INITIAL		FINAL
Tare No.	<u>R-123</u>	<u>L-77</u>	<u>Bowl C</u>
Wet Wt. + Tare	<u>333.79</u>	<u>307.97</u>	<u>987.93</u>
Dry Wt. + Tare	<u>270.53</u>	<u>250.95</u>	<u>896.46</u>
Wt. Water			
Tare Wt.	<u>33.06</u>	<u>36.78</u>	<u>554.94</u>
Dry Soil Wt.			
Moisture %	<u>26.639</u>	<u>26.624</u>	<u>26.805</u>
Avg. w %			

LENGTH CHANGE	
STRAIN GAUGE at setup	<u>500</u>
at saturation start	<u>500</u>
at consolidation start	<u>491</u>
at axial load start	<u>579</u>

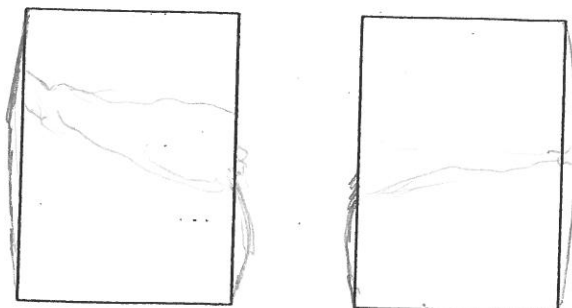
SPECIMEN DIMENSIONS in. / mm.				
HEIGHT			DIAMETER	
	Initial	Final	Initial	Final
1	<u>4.3280</u>		T <u>2.0025</u>	
2	<u>4.3240</u>		M <u>1.9985</u>	
3	<u>4.3310</u>		B <u>2.0065</u>	
Avg.	<u>4.32767</u>		<u>2.0005</u>	

MASS PROPERTIES		
Wt. Tube + Soil		gm.
Wt. Tube		gm.
Wt. Soil	<u>432.73</u>	gm.
Tube Diameter		in.
Sample Length		in.
tube length		in.
top trim		in.
bottom trim		in.
total trim		in.
sample length		in.
Density constant		
$4.85 / (D^2 * L)$		
Wet Density		pcf.
Dry Density		pcf.

Description After Test _____

Remarks _____

Failure Sketch



Trimmed By KEL
 Trimmed Date 7-6-12

Setup By KEL
 Setup Date 7-6-12

Taken Down By KEL
 Take Down Date 7-11-12

TRIAXIAL CELL SATURATION & BETA FACTOR

PROJECT Anderson Callaway Borrow

SAMPLE HP CLAY @ 25% to 27% Moisture DEPTH Computed to Standard Proctor

INITIAL CELL PRESSURE 51.0 START DATE 7-6-12

INITIAL PORE PRESSURE 50.0 CELL NUMBER 2

INITIAL TRANSDUCER READING 51.0 TRANSDUCER NUMBER 2

[illegible]

TRIAXIAL CELL CONSOLIDATION TEST

PROJECT Amreen Callaway Bureau

SAMPLE HP CLAY @ 25% to 27% Moisture DEPTH Compacted to Standard Proctor

CONSOLIDATION CELL PRESSURE 75.0

CELL NUMBER 2

CONSOLIDATION PORE PRESSURE 55.0

[illegible]
$$\begin{array}{r} 120 \\ 20 \\ \hline 140 \end{array}$$
$$\begin{array}{r} 1440 \\ 25 \\ \hline 1465 \end{array}$$

DATE 7-10-12

PROVING RING

PROJECT Ameren Callaway CLAY BORROW

SAMPLE CLAY @ 25% to 27% Compacted @ the Standard Procedure DEPTH

INITIAL CELL PRESSURE 75.0

CELL NUMBER 2

INITIAL PORE PRESSURE 55.0

START DATE

SAMPLE HEIGHT: AT SETUP

- AT START OF LOADING

STRAIN RATE $\approx 0.02\%$ /min

TYPE OF TEST CW

[illegible]

MASS OF TOP CAP & POROUS STONE: _____ g.

TRIAxIAL CELL SETUP & TAKEDOWN

Project Amerson Calaway CLAY Borehole Date 7-6-12
 Sample CLAY @ 25% - 27% M Depth Compacted with Standard Proctor
 Description CLAY (CH), Grey & Golden brown, with lig & lim.

Type of Test CU Confining Pressure Differential 40 psi
 Cell Number 1 Saturate before after Consolidation
 Number of Membranes 2 Filter Strips Yes No

MOISTURE CONTENT			
	INITIAL		FINAL
Tare No.	R 32	B 38	Bowl 3A
Wet Wt. + Tare	311.62	345.24	592.19
Dry Wt. + Tare	254.90	280.92	513.60
Wt. Water			
Tare Wt.	41.30	41.29	197.02
Dry Soil Wt.			
Moisture %	26.554	26.841	
Avg. w %			

SPECIMEN DIMENSIONS in. / mm.				
HEIGHT			DIAMETER	
	Initial	Final	Initial	Final
1	4.0340		T 1.9955	
2	4.0420		M 1.9895	
3	4.0435		B 1.9900	
Avg.	4.03983		1.99167	

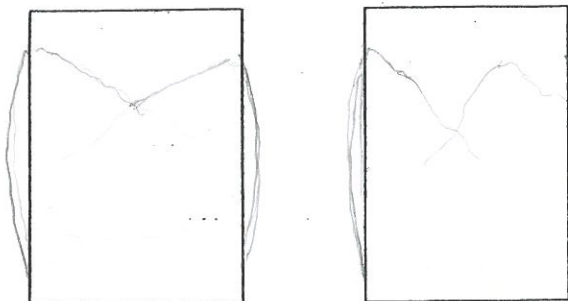
LENGTH CHANGE	
STRAIN GAUGE at setup	500
at saturation start	500
at consolidation start	488
at axial load start	615

MASS PROPERTIES		
Wt. Tube + Soil		gm.
Wt. Tube		gm.
Wt. Soil	400.99	gm.
Tube Diameter		in.
Sample Length		in.
tube length		in.
top trim		in.
bottom trim		in.
total trim		in.
sample length		in.
Density constant		
$4.85 / (D^2 * L)$		
Wet Density		pcf.
Dry Density		pcf.

Description After Test _____

Remarks _____

Failure Sketch



Trimmed By KEK
 Trimmed Date 7-6-12
 Setup By KEK
 Setup Date 7-6-12
 Taken Down By KEK
 Take Down Date 7-12-12

TRIAXIAL CELL SATURATION & BETA FACTOR

PROJECT Colony CLAY

SAMPLE CLAY CH 252-272 Martine DEPTH Compacted with Standard Proctor

INITIAL CELL PRESSURE 51.0 START DATE 7-6-12

INITIAL PORE PRESSURE 50.0 CELL NUMBER 1

INITIAL TRANSDUCER READING 51.4 TRANSDUCER NUMBER 1

[illegible]

TRIAXIAL CELL CONSOLIDATION TEST

PROJECT AMEREN CALLAWAY BORROW

SAMPLE HPCLM@ 25% to 27% Moisture DEPTH Compacted to Standard Proctor

CONSOLIDATION CELL PRESSURE 95.0 CELL NUMBER 1

CONSOLIDATION PORE PRESSURE 55.0

[illegible]

DATE _____

PROJECT

PROVING RING

SAMPLE

DEPTH

INITIAL CELL PRESSURE

CELL NUMBER

INITIAL PORE PRESSURE

START DATE

SAMPLE HEIGHT: AT SETUP

- AT START OF LOADING

STRAIN RATE

TYPE OF TEST

MASS OF TOP CAP & POROUS STONE: _____ g

Appendix B

**LABORATORY TESTING OF
COAL COMBUSTION PRODUCTS
FROM LABADIE ENERGY CENTER
Revised August 2013**

APPENDIX B **LABORATORY TESTING OF LABADIE CCP MATERIALS** **TABLE OF CONTENTS**

NON-PONDED DRY FLY ASH FROM PRECIPITATORS

	<u>Figure</u>
Specific Gravity.....	B-1
Particle Size Distribution; Hydrometer and sieve analysis using SHMP.....	B-2
Particle Size Distribution; Hydrometer and sieve analysis without SHMP	B-3
Moisture Density Test; Standard Proctor with unconfined compression tests on samples cured for 4 days.....	B-4
Hydraulic Conductivity	B-5
Consolidation Test.....	B-6

PONDED FLY ASH FROM EXISTING OPERATION

	<u>Figure</u>
Consolidated Undrained Shear Test.....	B-7
Direct Shear Test with textured HDPE liner	B-8
Direct Shear Test with smooth HDPE liner	B-9
Hydraulic Conductivity	B-10
Consolidation Test.....	B-11

BOTTOM ASH FROM EXISTING OPERATION

	<u>Figure</u>
Specific Gravity.....	B-12
Particle Size Distribution; sieve	B-13
Relative Density Test	B-14
Vacuum Triaxial Shear Test.....	B-15
Constant Head Permeability (loose and densified)	B-16

COMBINATIONS OF FLY ASH, BOTTOM ASH, AND GYPSUM

	<u>Figure</u>
Paint Filter Liquids Test, Fly Ash	B-17
Paint Filter Liquids Test, 46% Fly Ash, 20% Bottom Ash, 34% Gypsum	B-18
Paint Filter Liquids Test, 30% Fly Ash, 25% Bottom Ash, 45% Gypsum	B-19
Paint Filter Liquids Test, 36% Fly Ash, 64% Gypsum	B-20
Maximum and Minimum Dry Density, 46% Fly Ash, 20% Bottom Ash, 34% Gypsum	B-21
Maximum and Minimum Dry Density, 30% Fly Ash, 25% Bottom Ash, 45% Gypsum	B-22
Maximum and Minimum Dry Density, 36% Fly Ash, 64% Gypsum.....	B-23
Set-Up Time and Dry Unit Weight, 46% Fly Ash, 20% Bottom Ash, 34% Gypsum	B-24
Set-Up Time and Dry Unit Weight, 30% Fly Ash, 25% Bottom Ash, 45% Gypsum	B-25
Set-Up Time and Dry Unit Weight, 36% Fly Ash, 64% Gypsum	B-26

SPECIFIC GRAVITY OF SOLIDS

Pycnometer Method

JOB: Ameren; Labadie CCP Testing

DATE: 8/13/10

BORING: Labadie Dry Fly Ash

TEST BY: J. David

SAMPLE: Bulk

COMPUTED BY: K. Kocher

Sample or Specimen No.		1	2	
Flask No.		7	7	
Temperature of water and soil, T, °C		21.5	21.5	
Dish No.				
Weight in Grams	Dish + Dry Soil			
	Dish			
	Dry soil	W_s	50.05	50.05
	Flask + water at T, °C	W_{bw}	679.33	679.28
	$W_s + W_{bw}$		729.38	729.33
	Flask + water + immersed soil	W_{bws}	729.38	711.88
	Displaced water, $W_s + W_{bw} - W_{bws}$		17.50	17.45
Correction factor		K	.99968	.99968
$(W_s K) / (W_s + W_{bw} - W_{bws})$		G_s	2.86	2.87

Sample Description

#1 Dry fly ash, tan, from precipitators

#2 Dry fly ash, tan, from precipitators

Flask Calibration	Trial				
Weight	Completed				
Temp.	Annually				

SPECIFIC GRAVITY OF SOLIDS

Pycnometer Method

JOB: Ameren CCP Ash Study

DATE: 8/13/10

BORING: Labadie

TEST BY: GR

SAMPLE: Fly Ash

COMPUTED BY: K. Kocher & J. David

Sample or Specimen No.

Flask No.

Temperature of water and soil, T, °C

Dish No.

Weight in Grams

Dish + Dry Soil

Dish

Dry soil

W_s

50.05

50.05

Flask + water at T, °C

W_{bw}

679.33

679.28

$W_s + W_{bw}$

729.38

729.33

Flask + water + immersed soil

W_{bws}

711.88

711.88

Displaced water, $W_s + W_{bw} - W_{bws}$

17.50

17.45

17.134

Correction factor

K

999.68

999.68

0.999945

$(W_s K) / (W_s + W_{bw} - W_{bws})$

G_s

2.86

2.873

2.87

2.884

50.03398/

2010

Average

Sample Description

OK

OK

#1

#2

Tan Fly Ash (Non-Powdered)

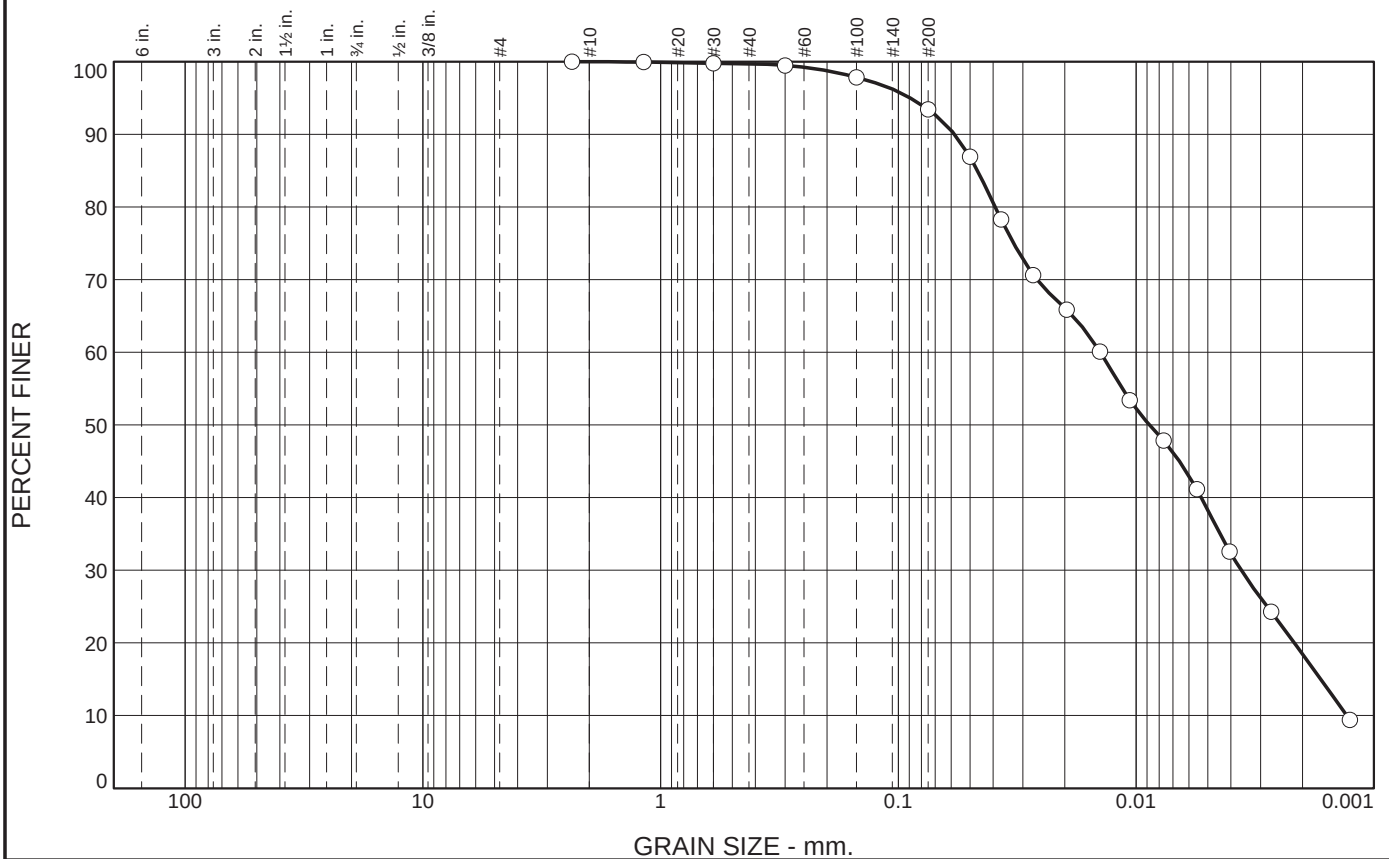
Flask Calibration

Trial

Weight

Temp.

Particle Size Distribution Report - ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.3	6.3	55.1	38.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#8	100.0		
#16	100.0		
#30	99.8		
#50	99.5		
#100	97.9		
#200	93.4		

* (no specification provided)

Material Description

Tan, dry fly ash, with SHMP

Atterberg Limits (ASTM D 4318)

PL= LL= PI=

Classification

USCS= AASHTO=

Coefficients

D₈₅= 0.0464 D₆₀= 0.0141 D₅₀= 0.0088
D₃₀= 0.0036 D₁₅= 0.0017 D₁₀= 0.0013
C_u= 10.86 C_c= 0.71

Date Tested: 1/15/09 Tested By: C. Cook

Remarks

Sample No.: Bulk Source of Sample: Non-Ponded Dry Fly Ash from Precipitator Date Sampled: 12/13/2008
Location: Labadie Fly Ash Elev./Depth:
Checked By: K. Kocher Title: P.E.



Client: Ameren Missouri
Project: CCP Properties, Labadie Plant

Project No: 2008012455

Figure

Tested By: CWC

Checked By: KEK

GRAIN SIZE DISTRIBUTION TEST DATA

5/20/2011

Client: Ameren Missouri

Project: CCP Properties, Labadie Plant

Project Number: 2008012455

Location: Labadie Fly Ash

Sample Number: Bulk

Material Description: Tan, dry fly ash, with SHMP

Sample Date: 12/13/2008

Tested By: C. Cook

Test Date: 1/15/09

Checked By: K. Kocher

Title: P.E.

Sieve opening list: (Default opening sizes)

Sieve Test Data

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 174.51
Tare Wt. = 171.18
Minus #200 from wash = 93.3%

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
49.99	0.00	0.00	#8	0.00	100.0
			#16	0.01	100.0
			#30	0.11	99.8
			#50	0.25	99.5
			#100	1.07	97.9
			#200	3.28	93.4

Hydrometer Test Data

Hydrometer test uses material passing #10

Percent passing #10 based upon complete sample = 100.0

Weight of hydrometer sample = 49.99

Hygroscopic moisture correction:

Moist weight and tare = 0.10

Dry weight and tare = 0.10

Tare weight = 0.00

Hygroscopic moisture = 0.0%

Automatic temperature correction

Composite correction (fluid density and meniscus height) at 20 deg. C = -5

Meniscus correction only = 1.0

Specific gravity of solids = 2.86

Hydrometer type = 152H

Hydrometer effective depth equation: $L = 16.294964 - 0.164 \times R_m$

Elapsed Time (min.)	Temp. (deg. C.)	Actual Reading	Corrected Reading	K	Rm	Eff. Depth	Diameter (mm.)	Percent Finer
0.50	21.9	50.0	45.4	0.0126	51.0	7.9	0.0500	86.9
1.00	21.9	45.5	40.9	0.0126	46.5	8.7	0.0370	78.3
2.00	21.9	41.5	36.9	0.0126	42.5	9.3	0.0271	70.6
4.00	21.9	39.0	34.4	0.0126	40.0	9.7	0.0196	65.9
8.00	21.9	36.0	31.4	0.0126	37.0	10.2	0.0142	60.1
15.00	21.9	32.5	27.9	0.0126	33.5	10.8	0.0107	53.4
30.00	22.3	29.5	25.0	0.0125	30.5	11.3	0.0077	47.8
60.00	22.3	26.0	21.5	0.0125	27.0	11.9	0.0056	41.1
120.00	22.4	21.5	17.0	0.0125	22.5	12.6	0.0040	32.6
278.00	23.4	16.9	12.7	0.0123	17.9	13.4	0.0027	24.3
1439.00	22.0	9.5	4.9	0.0125	10.5	14.6	0.0013	9.4

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.0	0.0	0.0	0.3	6.3	6.6	55.1	38.3	93.4

D ₁₀	D ₁₅	D ₂₀	D ₃₀	D ₅₀	D ₆₀	D ₈₀	D ₈₅	D ₉₀	D ₉₅
0.0013	0.0017	0.0022	0.0036	0.0088	0.0141	0.0392	0.0464	0.0580	0.0889

Fineness Modulus	C _u	C _c
0.03	10.86	0.71

Che 1/15/09

$$\% \text{ finer} = \frac{R_c \times A}{W_o} \times 100$$

Sample description & Remarks SOL: 49.99 Max: 5.03

REITZ & JENS, INC.
GRAIN SIZE ANALYSIS
(Sieve or Screen Method)

Project: Ameren Ash Testing
Boring No. Labadie Ash w/Hex
Sample No. Bulk
Depth _____

Test by CWK 1/16/09
Entered by KEK 1/19/09
Checked by KEK 1/19/09
Testing Date 1/16/09

U.S. Standard Sieve Size	Sieve Opening (mm)	Sieve Wgt. + Soil (grams)	Sieve Weight (grams)	Weight Retained (grams)	Cumulative Weight Retained (grams)	Percent Finer by Weight
3-in.	75					
2-in.	50					
1-1/2 in.	37.5					
1 in	25.4					
3/4-in.	19.0					
1/2-in.	12.7					
3/8-in.	9.5					
#3	6.35					
#4	4.75					
#6	3.35					
#8	2.36				0.00	
#10	2.00					
#16	1.18				0.01	
#18	1.00					
#20	0.85					
#30	0.60				0.11	
#35	0.50					
#40	0.425					
#50	0.300				0.25	
#60	0.250					
#70	0.212					
#100	0.150				1.07	
#120	0.125					
#140	0.106					
#200	0.075				3.28	
Pan					3.33 (total)	
Sample Lost in #200 Wash						
Total Weight in Grams						

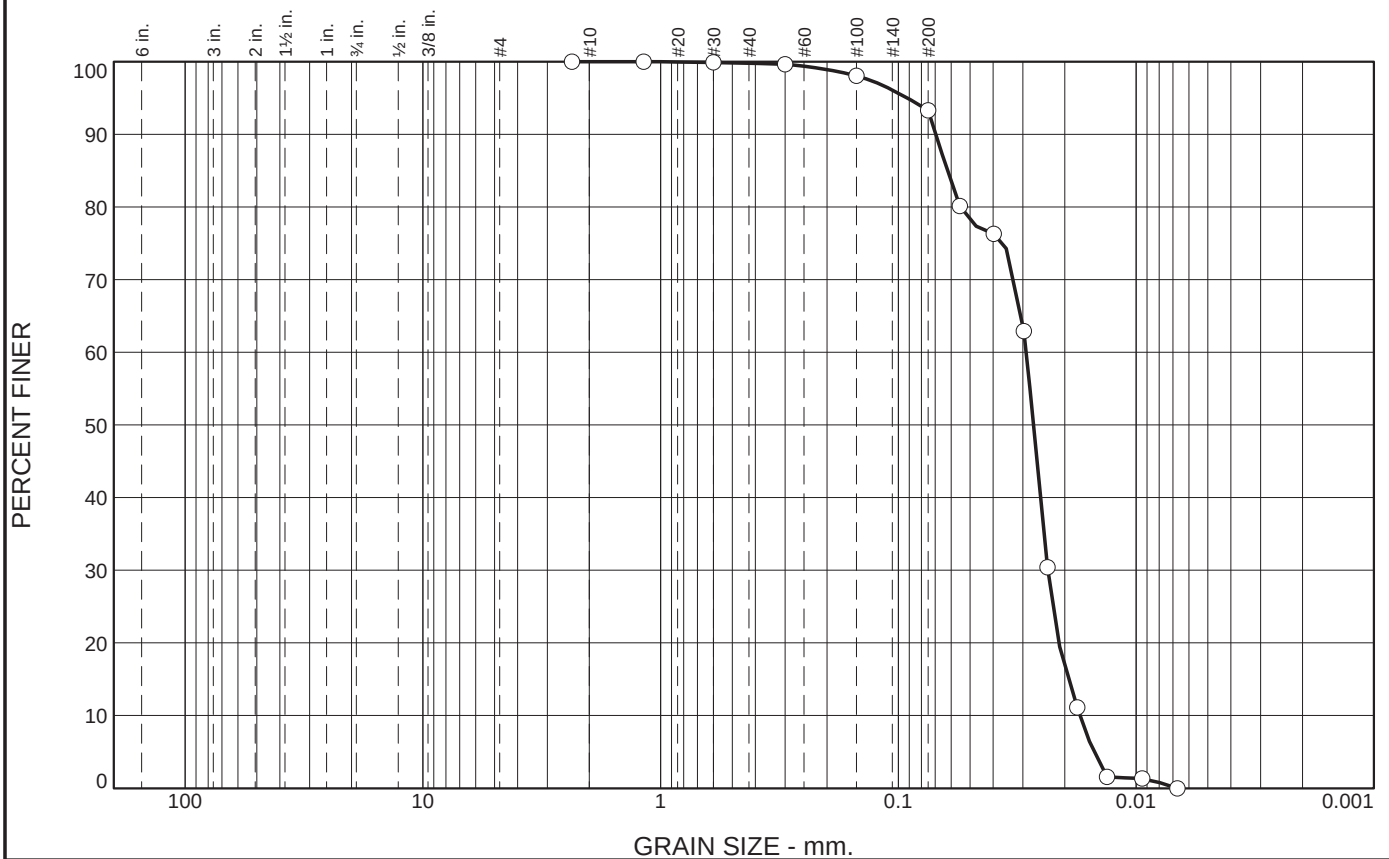
Pre #200 wash Weights	
Soil + Tare	_____
Tare	_____
Soil	_____

5

Post #200 wash Weights	
Soil + Tare	174.51
Tare	171.18
Soil	3.33

Sample Description & Remarks Labadie Dry Fly Ash

Particle Size Distribution Report - ASTM D422



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.2	6.5	93.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#8	100.0		
#16	100.0		
#30	99.9		
#50	99.7		
#100	98.1		
#200	93.3		

* (no specification provided)

Material Description

Tan, dry fly ash, without SHMP

Atterberg Limits (ASTM D 4318)

PL= LL= PI=

Classification

USCS= AASHTO=

Coefficients

D₈₅= 0.0625 D₆₀= 0.0290 D₅₀= 0.0270
D₃₀= 0.0235 D₁₅= 0.0194 D₁₀= 0.0172
C_u= 1.69 C_c= 1.11

Date Tested: 1/15/09 Tested By: C. Cook

Remarks

Sample No.: Bulk Source of Sample: Non-Ponded Dry Fly Ash from Precipitator Date Sampled: 12/13/08
Location: Labadie Fly Ash Elev./Depth:
Checked By: K. Kocher Title: P.E.



Client: Ameren Missouri
Project: CCP Properties, Labadie Plant

Project No: 2008012455

Figure

Tested By: CWC

Checked By: KEK

GRAIN SIZE DISTRIBUTION TEST DATA

5/20/2011

Client: Ameren Missouri

Project: CCP Properties, Labadie Plant

Project Number: 2008012455

Location: Labadie Fly Ash

Sample Number: Bulk

Material Description: Tan, dry fly ash, without SHMP

Sample Date: 12/13/08

Tested By: C. Cook

Test Date: 1/15/09

Checked By: K. Kocher

Title: P.E.

Sieve opening list: (Default opening sizes)

Sieve Test Data

Post #200 Wash Test Weights (grams): Dry Sample and Tare = 173.76
Tare Wt. = 170.11
Minus #200 from wash = 92.7%

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
50.05	0.00	0.00	#8	0.00	100.0
			#16	0.00	100.0
			#30	0.05	99.9
			#50	0.17	99.7
			#100	0.96	98.1
			#200	3.35	93.3

Hydrometer Test Data

Hydrometer test uses material passing #10

Percent passing #10 based upon complete sample = 100.0

Weight of hydrometer sample = 49.99

Hygroscopic moisture correction:

Moist weight and tare = 0.10

Dry weight and tare = 0.10

Tare weight = 0.00

Hygroscopic moisture = 0.0%

Automatic temperature correction

Composite correction (fluid density and meniscus height) at 20 deg. C = 0

Meniscus correction only = 1.0

Specific gravity of solids = 2.87

Hydrometer type = 152H

Hydrometer effective depth equation: $L = 16.294964 - 0.164 \times R_m$

Elapsed Time (min.)	Temp. (deg. C.)	Actual Reading	Corrected Reading	K	Rm	Eff. Depth	Diameter (mm.)	Percent Finer
0.50	19.8	42.0	41.9	0.0129	43.0	9.2	0.0553	80.1
1.00	19.8	40.0	39.9	0.0129	41.0	9.6	0.0398	76.3
2.00	19.8	33.0	32.9	0.0129	34.0	10.7	0.0297	62.9
4.00	19.8	16.0	15.9	0.0129	17.0	13.5	0.0236	30.4
8.00	19.8	5.9	5.8	0.0129	6.9	15.2	0.0177	11.1
15.00	19.8	0.9	0.8	0.0129	1.9	16.0	0.0133	1.6
30.00	19.2	0.9	0.7	0.0129	1.9	16.0	0.0095	1.3
60.00	19.2	0.2	0.0	0.0129	1.2	16.1	0.0067	0.0

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.0	0.0	0.0	0.2	6.5	6.7			93.3

D ₁₀	D ₁₅	D ₂₀	D ₃₀	D ₅₀	D ₆₀	D ₈₀	D ₈₅	D ₉₀	D ₉₅
0.0172	0.0194	0.0211	0.0235	0.0270	0.0290	0.0550	0.0625	0.0694	0.0915

Fineness Modulus	C _u	C _c
0.02	1.69	1.11

REITZ & JENS, INC.
GRAIN SIZE ANALYSIS

(Sieve or Screen Method)

Project

Boring No.

Sample No.

Depth

Ameren

Labadie

Ash

w/o NA Hex

Bulk

Test by CWC 1/16/09

Entered by KEL 1/20/09

Checked by KEL 1/20/09

Testing Date 1/16/09

U.S. Standard Sieve Size	Sieve Opening (mm)	Sieve Wgt. + Soil (grams)	Sieve Weight (grams)	Weight Retained (grams)	Cumulative Weight Retained (grams)	Percent Finer by Weight
3-in.	75					
2-in.	50					
1-1/2 in.	37.5					
1 in.	25.4					
3/4-in.	19.0					
1/2-in.	12.7					
3/8-in.	9.5					
#3	6.35					
#4	4.75					
#6	3.35					
#8	2.36					
#10	2.00					
#16	1.18				0.00	
#18	1.00					
#20	0.85					
#30	0.60				0.05	
#35	0.50					
#40	0.425					
#50	0.300				0.17	
#60	0.250					
#70	0.212					
#100	0.150				0.96	
#120	0.125					
#140	0.106					
#200	0.075				3.35	
Pan					3.65 (total)	
Sample Lost in #200 Wash						
Total Weight in Grams						

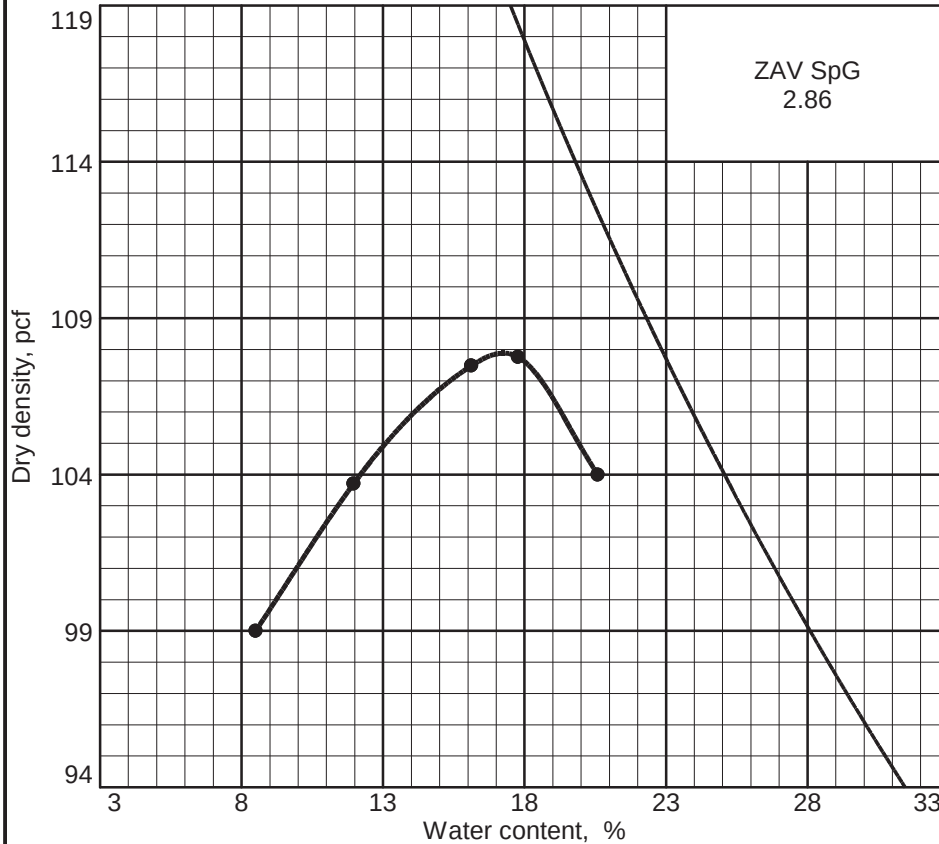
Pre #200 wash Weights	
Soil + Tare	
Tare	170.11
Soil	

11

Post #200 wash Weights	
Soil + Tare	173.76
Tare	170.11
Soil	3.65

Sample Description & Remarks Labadie Dry Fly Ash

MOISTURE-DENSITY TEST REPORT



Curve No.

Test Specification:

ASTM D 698-91 Procedure A Standard

Preparation Method ASTM

Hammer Wt. 5.5 lb.

Hammer Drop 12 in.

Number of Layers three

Blows per Layer 25

Mold Size .03333 cu.ft.

Test Performed on Material

Passing No.4 Sieve

NM LL PI

Sp.G. (ASTM D 854) 2.86

%>No.4 %<No.200

USCS AASHTO

Date Sampled

Date Tested 1/16/2009

Tested By J. David

TESTING DATA

	1	2	3	4	5	6
WM + WS	8.16	8.45	8.74	8.81	8.76	
WM	4.58	4.58	4.58	4.58	4.58	
WW + T #1	194.80	196.98	238.09	252.30	268.45	
WD + T #1	182.39	179.70	210.96	220.27	229.54	
TARE #1	34.62	37.09	41.04	40.28	40.80	
WW + T #2	230.09	240.59	229.53	271.67	355.14	
WD + T #2	215.11	219.44	203.11	236.85	301.54	
TARE #2	40.76	40.18	40.83	40.71	40.82	
MOISTURE	8.5	12.0	16.1	17.8	20.6	
DRY DENSITY	99.0	103.7	107.5	107.8	104.0	

TEST RESULTS

Maximum dry density = 107.9 pcf

Optimum moisture = 17.3 %

Project No. 2008012455 Client: Ameren Missouri

Project: CCP Properties, Labadie Plant

● Location: Labadie Fly Ash



Material Description

Tan, dry fly ash

Remarks:

Checked by: K. Kocher

Title: P.E.

Figure

MOISTURE DENSITY TEST DATA

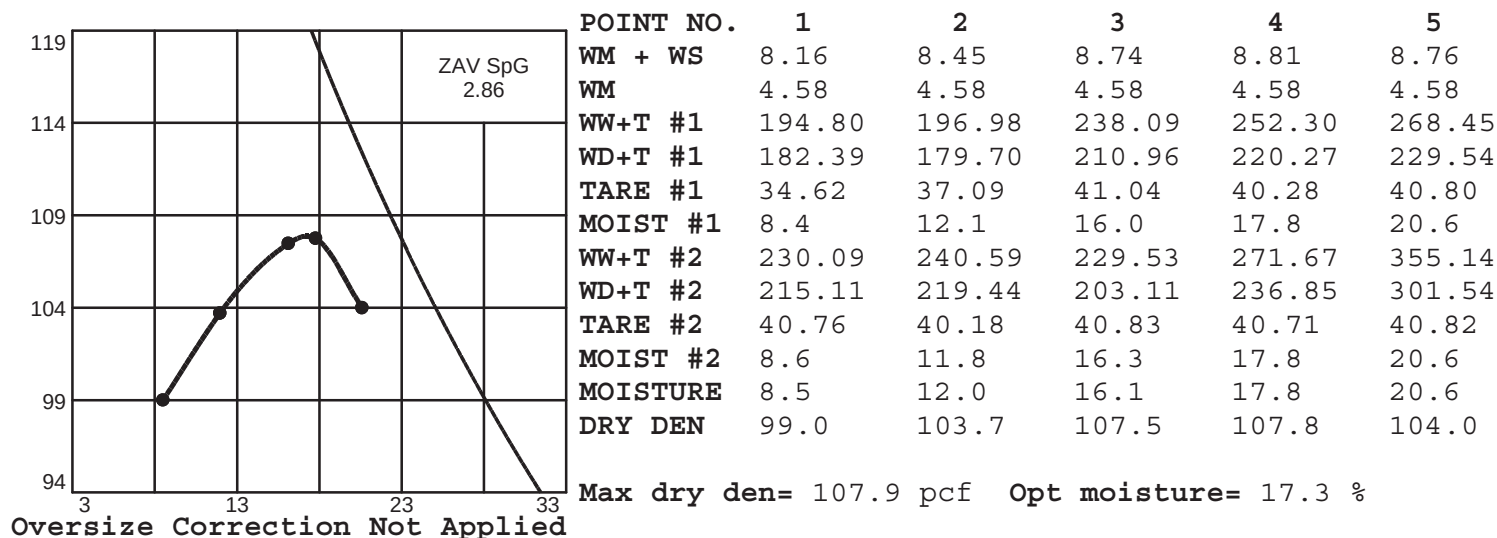
Client: Ameren Missouri
Project: CCP Properties, Labadie Plant
Project Number: 2008012455

Specimen Data

Source: Non-Ponded Dry Fly Ash from Precipitators
Sample No.: Bulk
Elev. or Depth: Sample Length(in./cm.):
Location: Labadie Fly Ash
Description: Tan, dry fly ash
Sample Date:
Preparation Method: ASTM
USCS: AASHTO:
NM: LL: PI:
Testing Remarks:
Tested By: J. David Test Date: 1/16/2009
Checked By: K. Kocher Title: P.E.
Percent retained on No.4 sieve:
Percent passing No. 200 sieve: Specific gravity: 2.86

Test Data And Results

Type of test: ASTM D 698-91 Procedure A Standard
Mold Dia.: 4.00 in. Hammer Wt.: 5.5 lb. Drop: 12 in.
Layers: three Blows per Layer: 25



MOISTURE DENSITY RELATIONSHIP TEST

(Compaction Curve)

Job Ameren UE Ash Study Lab Test by RRJ Date 1/16/09
 Boring No. _____ Computed by KEK & CWC Date 1/19/09
 Depth Bulk Checked by KEK Date 1/19/09
 Sample No. Labadie Fly Ash Mold Diam. 4" (in)
 Mold Vol. 1/30 (cu. ft.) (Vm) Mold Height 6 (in)

Notes on ASTM Procedure:

Method of Compaction Standard ASTM

1. To obtain moisture content sample, slice molded soil vertically through the center, and immediately take moisture content sample from one face of cut by taking a thin slice from top to bottom. See procedure in Quality Manual.
2. Moisture content sample mass to be: $\geq 100\text{g}$ (A/B) or $\geq 500\text{g}$ (C/D).
3. Only use ram with circular face in compactor for tests on soil.

Test No.	+10%	+13	+16%
Weight of Cylinder & Soil	8.16	8.45	8.74
Weight of Cylinder	4.58	4.58	4.58
Wet Weight of Compacted Soil	3.58	3.87	4.16
Wet Unit Weight - PCF	107.4	116.1	124.8

Moisture Content Determination

Tare No.	R140	B37	R50	R70	B32	R61
Weight of Sample Wet + Tare	194.80	230.09	196.98	240.59	238.09	229.5
Weight of Sample Dry + Tare	182.36	215.11	179.70	219.44	210.96	203.11
Weight of Water						
Weight of Tare	34.62	40.76	37.09	40.18	41.04	40.83
Weight of Dry Soil						
Moisture Content (%)	8.4	8.6	12.1	11.8	16.0	16.3
Average Moisture Content (%)	8.5		12.0		16.1	
Dry Unit Weight - PCF	99.0		103.7		107.5	

Sample Description & Remarks Tan Dry Fly Ash From Precipitators

MOISTURE DENSITY RELATIONSHIP TEST

(Compaction Curve)

Job Ammon 4E Ash Study Lab Test by JRD Date 1/14/09
 Boring No. _____ Computed by KCK & CWC Date 1/19/09
 Depth Bulk Checked by KCK Date 1/19/09
 Sample No. Lahadite Fly Ash dry Mold Diam. 4" (in)
 Mold Vol. 1/30 (cu. ft.) (Vm) Mold Height 6" (in)

Notes on ASTM Procedure:

Method of Compaction Standard ASTM

1. To obtain moisture content sample, slice molded soil vertically through the center, and immediately take moisture content sample from one face of cut by taking a thin slice from top to bottom. See procedure in Quality Manual.
2. Moisture content sample mass to be: $\geq 100\text{g}$ (A/B) or $\geq 500\text{g}$ (C/D).
3. Only use ram with circular face in compactor for tests on soil.

Test No.	<u>+19</u>	<u>+22</u>	
Weight of Cylinder & Soil	<u>8.81</u>	<u>8.76</u>	
Weight of Cylinder	<u>4.58</u>	<u>4.58</u>	
Wet Weight of Compacted Soil	<u>4.23</u>	<u>4.18</u>	
Wet Unit Weight - PCF	<u>126.9</u>	<u>125.4</u>	

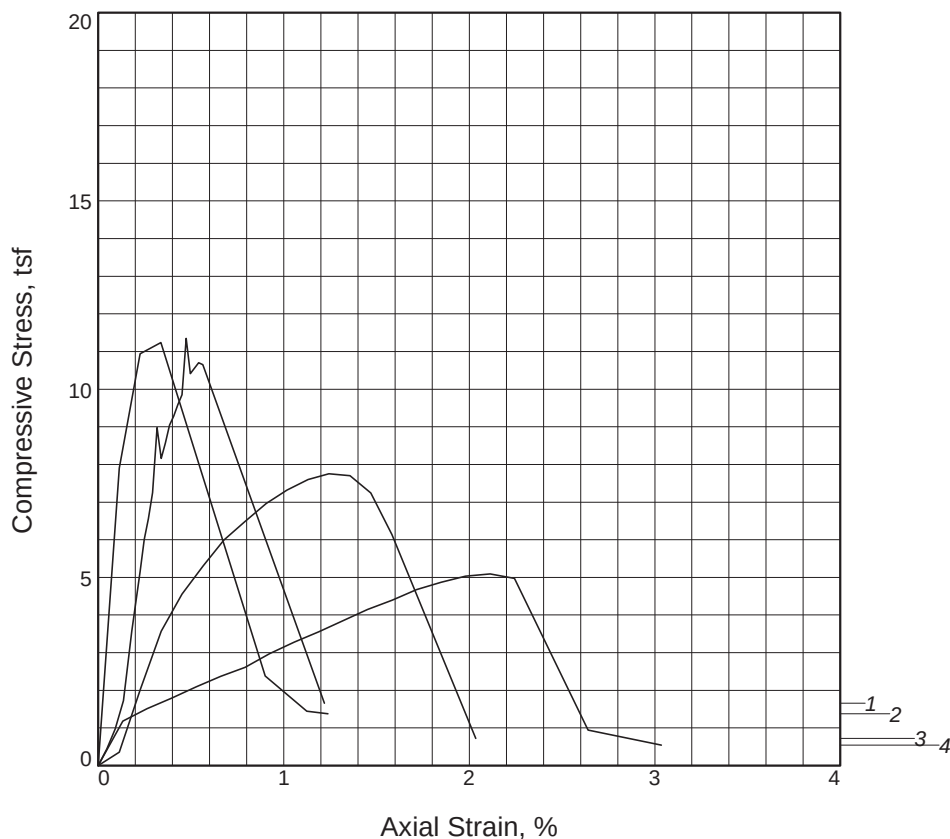
Moisture Content Determination

Tare No.	<u>B-40</u>	<u>B-14</u>	<u>B-19</u>	<u>B-10</u>		
Weight of Sample Wet + Tare	<u>252.30</u>	<u>271.67</u>	<u>268.45</u>	<u>255.14</u>		
Weight of Sample Dry + Tare	<u>220.27</u>	<u>236.85</u>	<u>229.54</u>	<u>201.54</u>		
Weight of Water						
Weight of Tare	<u>40.28</u>	<u>40.71</u>	<u>40.80</u>	<u>40.82</u>		
Weight of Dry Soil						
Moisture Content (%)	<u>17.8</u>	<u>17.8</u>	<u>20.6</u>	<u>20.6</u>		
Average Moisture Content (%)	<u>17.8</u>		<u>20.6</u>			
Dry Unit Weight - PCF	<u>107.8</u>		<u>104.0</u>			

Sample Description & Remarks

oozed out of cylinderTAN Dry Fly Ash from Precipitators

UNCONFINED COMPRESSION TEST



Sample No.	1	2	3	4
Unconfined strength, tsf	11.351	11.235	7.750	5.092
Undrained shear strength, tsf	5.675	5.618	3.875	2.546
Failure strain,	0.5	0.3	1.2	2.1
Strain rate, %/min.	0.51	0.82	0.92	0.85
Water content, %	11.3	15.5	16.3	20.0
Wet density, pcf	116.1	126.8	127.2	126.8
Dry density, pcf	104.3	109.8	109.4	105.6
Saturation, %	50.1	79.4	82.5	91.8
Void ratio	0.6042	0.5239	0.5295	0.5836
Specimen diameter, in.	1.95	1.96	1.99	2.04
Specimen height, in.	4.43	4.45	4.42	3.79
Height/diameter ratio	2.27	2.27	2.22	1.86

Description: Tan, dry fly ash, from precipitators

LL = **PL =** **PI =** **Assumed GS= 2.68** **Type: Lab Molded Samples**

Project No.: 2008012455

Date: 12/13/2008

Remarks:

testing on 01/20/09, samples from standard proctor

Client: Ameren Missouri

Project: CCP Properties, Labadie Plant

Location: Labadie Fly Ash

Sample Number: Bulk



Figure _____

Tested By: CWC & JJP

Checked By: KEK

UNCONFINED COMPRESSION TEST

5/20/2011

Date: 12/13/2008
Client: Ameren Missouri
Project: CCP Properties, Labadie Plant
Project No.: 2008012455
Location: Labadie Fly Ash
Sample Number: Bulk
Description: Tan, dry fly ash, from precipitators
Remarks: testing on 01/20/09, samples from standard proctor
Type of Sample: Lab Molded Samples
Assumed Specific Gravity=2.68 **LL=** **PL=** **PI=**

Parameters for Specimen No. 1

Specimen Parameter	Initial
Moisture content: Moist soil+tare, gms.	261.010
Moisture content: Dry soil+tare, gms.	239.040
Moisture content: Tare, gms.	44.560
Moisture, %	11.3
Moist specimen weight, gms.	404.8
Diameter, in.	1.95
Area, in. ²	3.00
Height, in.	4.43
Wet Density, pcf	116.1
Dry density, pcf	104.3
Void ratio	0.6042
Saturation, %	50.1

Test Readings for Specimen No. 1

Strain rate, %/min. = 0.51

Unconfined compressive strength = 11.351 tsf at reading no. 16

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress tsf
0	0.0000	0.00	0.0	0.0	0.000
1	0.0020	18.50	18.5	0.0	0.444
2	0.0040	40.30	40.3	0.1	0.967
3	0.0060	72.00	72.0	0.1	1.726
4	0.0080	149.00	149.0	0.2	3.571
5	0.0100	215.00	215.0	0.2	5.151
6	0.0110	251.00	251.0	0.2	6.012
7	0.0120	274.00	274.0	0.3	6.561
8	0.0130	303.00	303.0	0.3	7.254
9	0.0140	375.00	375.0	0.3	8.975
10	0.0150	341.00	341.0	0.3	8.160
11	0.0160	358.00	358.0	0.4	8.565
12	0.0170	378.00	378.0	0.4	9.041
13	0.0180	388.00	388.0	0.4	9.278
14	0.0190	401.00	401.0	0.4	9.587
15	0.0200	412.00	412.0	0.5	9.847
16	0.0210	475.00	475.0	0.5	11.351

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Test Readings for Specimen No. 1

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress tsf
17	0.0220	436.00	436.0	0.5	10.416
18	0.0230	442.00	442.0	0.5	10.557
19	0.0240	448.00	448.0	0.5	10.698
20	0.0250	446.00	446.0	0.6	10.648
21	0.0540	70.00	70.0	1.2	1.660

Parameters for Specimen No. 2

Specimen Parameter	Initial
Moisture content: Moist soil+tare, gms.	180.510
Moisture content: Dry soil+tare, gms.	162.270
Moisture content: Tare, gms.	44.790
Moisture, %	15.5
Moist specimen weight, gms.	444.3
Diameter, in.	1.96
Area, in. ²	3.00
Height, in.	4.45
Wet Density, pcf	126.8
Dry density, pcf	109.8
Void ratio	0.5239
Saturation, %	79.4

Test Readings for Specimen No. 2

Strain rate, %/min. = 0.82

Unconfined compressive strength = 11.235 tsf at reading no. 3

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress tsf
0	0.0000	0.00	0.0	0.0	0.000
1	0.0050	330.00	330.0	0.1	7.906
2	0.0100	457.00	457.0	0.2	10.937
3	0.0150	470.00	470.0	0.3	11.235
4	0.0400	100.00	100.0	0.9	2.377
5	0.0500	61.00	61.0	1.1	1.447
6	0.0550	58.00	58.0	1.2	1.374

Parameters for Specimen No. 3

Specimen Parameter	Initial
Moisture content: Moist soil+tare, gms.	194.690
Moisture content: Dry soil+tare, gms.	173.490
Moisture content: Tare, gms.	43.420
Moisture, %	16.3
Moist specimen weight, gms.	460.4
Diameter, in.	1.99
Area, in. ²	3.12
Height, in.	4.42
Wet Density, pcf	127.2
Dry density, pcf	109.4
Void ratio	0.5295
Saturation, %	82.5

Test Readings for Specimen No. 3

Strain rate, %/min. = 0.92

Unconfined compressive strength = 7.750 tsf at reading no. 11

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress tsf
0	0.0000	0.00	0.0	0.0	0.000
1	0.0050	15.50	15.5	0.1	0.358
2	0.0100	87.00	87.0	0.2	2.005
3	0.0150	155.00	155.0	0.3	3.569
4	0.0200	198.00	198.0	0.5	4.554
5	0.0250	231.00	231.0	0.6	5.307
6	0.0300	261.00	261.0	0.7	5.989
7	0.0350	283.00	283.0	0.8	6.486
8	0.0400	304.00	304.0	0.9	6.960
9	0.0450	320.00	320.0	1.0	7.318
10	0.0500	332.80	332.8	1.1	7.602
11	0.0550	339.70	339.7	1.2	7.750
12	0.0600	337.90	337.9	1.4	7.701
13	0.0650	318.00	318.0	1.5	7.239
14	0.0700	270.00	270.0	1.6	6.139
15	0.0900	32.00	32.0	2.0	0.724

Parameters for Specimen No. 4

Specimen Parameter	Initial
Moisture content: Moist soil+tare, gms.	217.920
Moisture content: Dry soil+tare, gms.	189.020
Moisture content: Tare, gms.	44.510
Moisture, %	20.0
Moist specimen weight, gms.	410.0
Diameter, in.	2.04
Area, in. ²	3.25
Height, in.	3.79
Wet Density, pcf	126.8
Dry density, pcf	105.6
Void ratio	0.5836
Saturation, %	91.8

Test Readings for Specimen No. 4

Strain rate, %/min. = 0.85

Unconfined compressive strength = 5.092 tsf at reading no. 15

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress tsf
0	0.0000	0.00	0.0	0.0	0.000
1	0.0050	53.60	53.6	0.1	1.185
2	0.0100	68.70	68.7	0.3	1.517
3	0.0150	81.40	81.4	0.4	1.795
4	0.0200	94.90	94.9	0.5	2.090
5	0.0250	107.90	107.9	0.7	2.373
6	0.0300	118.70	118.7	0.8	2.607
7	0.0350	135.50	135.5	0.9	2.972
8	0.0400	149.70	149.7	1.1	3.279
9	0.0450	162.60	162.6	1.2	3.557
10	0.0550	190.00	190.0	1.5	4.145
11	0.0600	201.90	201.9	1.6	4.399
12	0.0650	214.80	214.8	1.7	4.673
13	0.0700	224.20	224.2	1.8	4.871
14	0.0750	231.80	231.8	2.0	5.030
15	0.0800	235.00	235.0	2.1	5.092
16	0.0850	230.00	230.0	2.2	4.977
17	0.1000	44.00	44.0	2.6	0.948
18	0.1150	25.20	25.2	3.0	0.541

Unconsolidated Undrained or Unconfined Test

Project Am. new LABADIE Test by CWC / JSP
 Boring No. Am Labadie Entered by CWC
 Sample No. Labadie Ash Compacted 1/14/09 Checked by KOK
 Depth +10% H₂O of DRY Testing Date 1/20/09

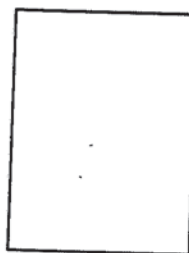
Description of Entire Tube Broken During TRIMMING

Description of Test Sample Compacted Ash sample from Standard Proctor at 99.0 pcf ± 8.5 %m

Moisture Contents		
	Trial 1	Trial 2
Tare #	m-19	m-30
Wet Wt.+Tare	127.52	106.07
Dry Wt.+Tare	119.71	99.83
Wt. of Water		
Tare Wt.	21.66	22.06
Wt. of Soil		
% Moisture	7.97	8.02
Average % Moisture=	7.99	

Sample Density	
Wet Wt. of Sample (grams)	
Diameter of Sample (Inches) D=	
Length of Sample (Inches) L=	
Density Constant $C = (4.85 / (D^2 * L))$	
Wet Density (pcf)	
Dry Density (pcf)	

Failure Sketch



Rate of Load Application 0.5 %/min
 Confining Pressure _____ psi
 Mass of Top Cap _____ gms

Load: #14

Strain (.001")	Load (lbs)
0	
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	

Notes:

Strain (.001")	Load (lbs)
240 17	
280 18	
280 19	
300 20	
350 21	
400 22	
450 23	
500 24	
550 25	
600	
650	
700	
750	
800	
850	
900	
1000	

Notes:

Unconsolidated Undrained or Unconfined Test

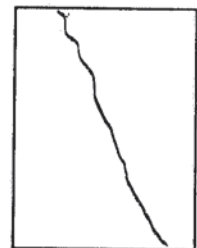
Project Amir - Labadie Test by CWC / JJP
 Boring No. Am - Labadie Entered by CWC
 Sample No. Ash Testing Compacted Checked by KEK
 Depth Mat + 137 1/16/09 Testing Date 1/20/09
 Description of Entire Tube Spec. #1

Description of Test Sample Compacted Ash Sample from Standard Proctor At 103.7 pct + 12.0241

Moisture Contents		
	Trial 1	Trial 2
Tare #	<u>m-27</u>	<u>m-35</u>
Wet Wt.+Tare	<u>127.50</u>	<u>134.01</u>
Dry Wt.+Tare	<u>116.58</u>	<u>122.46</u>
Wt. of Water		
Tare Wt.	<u>22.25</u>	<u>22.31</u>
Wt. of Soil		
% Moisture		
Average % Moisture=		<u>11.3</u>

Sample Density	
Wet Wt. of Sample (grams)	<u>404.76</u>
Diameter of Sample (Inches)	<u>D= 1.954</u>
Length of Sample (Inches)	<u>L= 4.430</u>
Density Constant $C = (4.85 / (D^2 * L))$	
Wet Density (pcf)	<u>116.1</u>
Dry Density (pcf)	<u>104.3</u>

Failure Sketch



Rate of Load Application 0.513 %/min
 Confining Pressure — psi
 Mass of Top Cap — gms

Load: # 14

Strain (.001")	Load (lbs)
0	0
10 2	18.5
20 4	40.3
30 6	72.1
40 8	149
50 10	215
60 11	251
70 12	274
80 13	303
90 14	325
100 15	341
110 16	358
120 17	375
130 18	388
140 19	401
150 20	412
160 21	425

Notes:

Strain (.001")	Load (lbs)
200 22	436
200 23	442
200 24	448
200 25	446
200 26	20
400	
450	
500	
550	
600	
650	
700	
750	
800	
850	
900	
1000	

Notes:

Unconsolidated Undrained or Unconfined Test

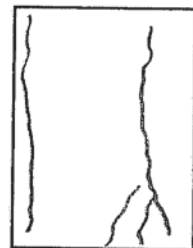
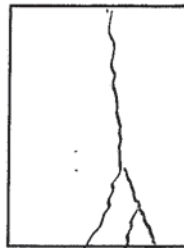
Project Amiarel - LABADIE Test by CWC / JJP
 Boring No. Am Labadie Entered by CWC
 Sample No. Ash Testing COMPACTED Checked by KOK
1/16/09 Testing Date 1/20/09
 Depth at +16'
 Description of Entire Tube Spec #2

Description of Test Sample Compacted Ash Sample from Standard Proctor at 107.5 pct ± 16.1% M

Moisture Contents		
	Trial 1	Trial 2
Tare #	<u>m-17</u>	<u>m-48</u>
Wet Wt.+Tare	<u>79.67</u>	<u>100.84</u>
Dry Wt.+Tare	<u>71.94</u>	<u>90.30</u>
Wt. of Water		
Tare Wt.	<u>22.49</u>	<u>22.30</u>
Wt. of Soil		
% Moisture		
Average % Moisture=	<u>15.5</u>	

Sample Density	
Wet Wt. of Sample (grams)	<u>444.25</u>
Diameter of Sample (Inches)	<u>D= 1.955</u>
Length of Sample (Inches)	<u>L= 4.445</u>
Density Constant $C = (4.85 / (D^2 * L))$	
Wet Density (pcf)	<u>126.8</u>
Dry Density (pcf)	<u>109.8</u>

Failure Sketch



Rate of Load Application 0.8244 %/min
 Confining Pressure 0 psi
 Mass of Top Cap _____ gms

Strain (.001")	Load (lbs)
0	0
40 5	330
20 10	457
30 15	470
40 20	
50 25	
60 30	
70 35	
80 40	100
90 45	
100 50	61.
120 55	58
140 60	
160 65	
180 70	
200 75	
220 80	

Notes:

Peak

Strain (.001")	Load (lbs)
240 85	
260 90	
280 95	
300 100	
350 110	
400	
450	
500	
550	
600	
650	
700	
750	
800	
850	
900	
1000	

Notes:

Unconsolidated Undrained or Unconfined Test

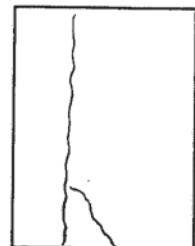
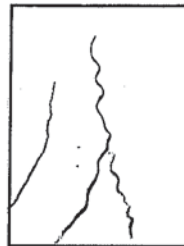
Project AMEREN - LABADIE Test by CWC / J P
 Boring No. Am Labadie Entered by CWC
 Sample No. Ash Testing Compacted 11/16/09 Checked by KDL
 Depth vat +199. Testing Date 1/20/09
 Description of Entire Tube Spec #3

Description of Test Sample Compaction Ash sample from Standard Proctor at 107.8 pct & 117.3% M

Moisture Contents		
	Trial 1	Trial 2
Tare #	<u>m-41</u>	<u>m-20</u>
Wet Wt.+Tare	<u>95.02</u>	<u>99.67</u>
Dry Wt.+Tare	<u>84.78</u>	<u>88.71</u>
Wt. of Water		
Tare Wt.	<u>21.82</u>	<u>21.60</u>
Wt. of Soil		
% Moisture		
Average % Moisture=		<u>10.3</u>

Sample Density	
Wet Wt. of Sample (grams)	<u>460.40</u>
Diameter of Sample (Inches)	<u>D= 1.992</u>
Length of Sample (Inches)	<u>L= 4.424</u>
Density Constant $C = (4.85 / (D^2 * L))$	<u>1</u>
Wet Density (pcf)	<u>127.2</u>
Dry Density (pcf)	<u>109.4</u>

Failure Sketch



Rate of Load Application 0.92 %/min
 Confining Pressure — psi
 Mass of Top Cap — gms

Strain (.001")	Load (lbs)
0	0
20 5	15.5
20 10	87.
20 15	155
40 20	178
60 25	231
60 30	261
70 35	283
80 40	304
90 45	320
100 50	332.8
120 55	339.7
140 60	337.9
160 65	318
180 70	270
200 75	
220 80	

Notes:

Strain (.001")	Load (lbs)
200 85	
260 90	32
280 95	
300 100	
350	
400	
450	
500	
550	
600	
650	
700	
750	
800	
850	
900	
1000	

Notes:

Unconsolidated Undrained or Unconfined Test

Project AMERICAN LABADIE
 Boring No. LABADIE ASH +22% MOISTURE
 Sample No. COMPACTED 1/16/09
 Depth NATURAL +222M

Test by CWC / KFK
 Entered by CWC
 Checked by KFK
 Testing Date 1/20/09

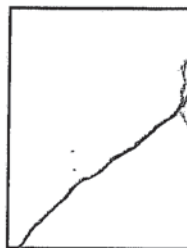
Description of Entire Tube SPEC #4

Description of Test Sample COMPACTED ASH SAMPLE FROM STANDARD PROCTOR AT 104.0 pcf @ 20.6% M

Moisture Contents		
	Trial 1	Trial 2
Tare #	11.8	11.1
Wet Wt.+Tare	104.48	113.44
Dry Wt.+Tare	90.78	98.24
Wt. of Water		
Tare Wt.	22.21	22.30
Wt. of Soil		
% Moisture		
Average % Moisture=	20.70	

Sample Density	
Wet Wt. of Sample (grams)	410.01
Diameter of Sample (Inches)	D= 2.035
Length of Sample (Inches)	L= 3.788
Density Constant $C = (4.85 / (D^2 * L))$	
Wet Density (pcf)	126.8
Dry Density (pcf)	105.6

Failure Sketch



Rate of Load Application 0.85 %/min
 Confining Pressure 0 psi
 Mass of Top Cap _____ gms

Strain (.001")	Load (lbs)
0	0
40.5	53.6
40.10	68.7
40.15	81.4
40.20	94.9
40.25	107.9
60.30	118.7
70.25	135.5
80.40	149.7
90.45	162.6
100.50	175.5
120.55	190.0
140.60	201.9
160.65	214.8
180.70	224.2
200.75	231.8
220.80	235.0

Notes:

Strain (.001")	Load (lbs)
240.85	230.0
260.100	44.0
280.115	25.2
300	
350	
400	
450	
500	
550	
600	
650	
700	
750	
800	
850	
900	
1000	

Notes:

Ameren Missouri; Labadie Power Plant UWL

Utility Waste Landfill, CCP Properties

Material: 100% non-ponded fly ash, material was molded at 22.5% moisture

Hydraulic Conductivity

Soil Conditions	
Pre-test conditions	Post-test Conditions
Wet Density = 124.2 (lbs/ft ³)	Wet Density = 128.8 (lbs/ft ³)
% Moisture = 22.5%	% Moisture = 20.1%
Dry Density = 101.4 (lbs/ft ³)	Dry Density = 107.2 (lbs/ft ³)

Test Information	
a (cm ²)=	0.1969
L (cm)=	4.9043
A (cm ²)=	19.4657

Trial 1													
Date and Time	Elapsed Time (seconds)	Cell Burette Reading (ml)	Base Burette		Top Burette		Total Head Across Sample (cm of water)	Temperature (°C)	Weighted Average Temp. (°C)	Uncorrected Hydraulic Conductivity (cm/sec)	Correction Factor	Cumulative Time (sec)	Corrected Hydraulic Conductivity (cm/sec)
			Reading (ml)	Distance from Datum (cm)	Reading (ml)	Distance from Datum (cm)							
3/11/11 11:05	0	16.5	10.00	27.200	0.40	75.968	83.947	21.2					
3/11/11 11:10	300	16.5	9.18	31.366	1.26	71.599	75.413	21.2	21.20	8.86E-06	0.9716241	300	8.61E-06
3/11/11 11:15	600	16.5	8.45	35.074	1.98	67.942	68.047	21.2	21.20	8.68E-06	0.9716241	600	8.43E-06
3/11/11 11:20	900	16.5	7.78	38.478	2.64	64.589	61.290	21.2	21.20	8.67E-06	0.9716241	900	8.42E-06
3/11/11 11:25	1200	16.5	7.21	41.373	3.20	61.744	55.550	21.2	21.20	8.53E-06	0.9716241	1200	8.29E-06
3/11/11 11:30	1500	16.5	6.66	44.167	3.74	59.001	50.013	21.2	21.20	8.56E-06	0.9716241	1500	8.32E-06
3/11/11 11:35	1800	16.5	6.20	46.504	4.20	56.664	45.339	21.2	21.20	8.49E-06	0.9716241	1800	8.25E-06
H.C.=													8.3E-06

Hydraulic Conductivity (ASTM-D 5084) Flow Rate Calculation

Job----- Labadie uwl
Location- Fly Ash Study
Sample--- Non-Ponded Fly Ash
Depth----- Air Dried
22 1/2 % M added #2

$$\begin{aligned} a &= 0.1969 \\ A &= 4.9043 \\ L &= 19.4657 \end{aligned}$$

Cell No. 3

run water thru 3/10/14

Cell Pressure (p.s.i.)	Base Pressure (p.s.i.)	Top Pressure (p.s.i.)
------------------------------	------------------------------	-----------------------------

(p.s.i.)	(p.s.i.)	(p.s.i.)
56.0	55.0	55.5


Date

Time

Elapsed
Time
Minutes

Cell
Reading
ML

Base
Reading
MI

Top
Reading
MI

Top
Head
CM

Base
Head
CM

h

Temp.

Hyd.
Gradient

		Minutes	ML	ML	ML	CM	CM	CM	Temp.	Hyd. Gradient
3/4/11	11:05	0	16.5	10.00	0.40				21.2	
	11:10	5	16.5	9.18	1.26				21.2	
	11:15	10	16.5	8.45	1.98				21.2	
	11:20	15	16.5	7.78	2.64				21.2	
	11:25	20	16.5	7.21	3.20				21.2	
	11:30	25	16.5	6.66	3.74				21.2	
	11:35	30	16.5	6.20	4.20				21.2	

a x L	t (sec)	2 x A x t	aL/2At	h1	h2	ln(h1/h2)	K	Temp.	Hyd.	
								Cor.	K -Cor.	Gradient

B-5

TRIAXIAL CELL SETUP & TAKEDOWN

Project Laboratory UWL - Fly Ash Study Date 3/9/11

Sample _____ Depth _____

Description Non-Ponded air dried fly ash
0/ 22 1/2 % M added (#2)

Type of Test perm Confining Pressure Differential _____

Cell Number 3 Saturate before after Consolidation _____

Number of Membranes 1 Filter Strips Yes No double

MOISTURE CONTENT		
	INITIAL	FINAL
Tare No.		<u>Box 10 P</u>
Wet Wt. + Tare		<u>394.31</u>
Dry Wt. + Tare	<u>Moisture added</u>	<u>361.32</u>
Wt. Water		<u>32.99</u>
Tare Wt.		<u>197.34</u>
Dry Soil Wt.	<u>22 1/2 %</u>	<u>168.98</u>
Moisture %		<u>20.12</u>
Avg. w %		

LENGTH CHANGE	
STRAIN GAUGE at setup	<u>N/A</u>
at saturation start	
at consolidation start	
at axial load start	<u>↓</u>

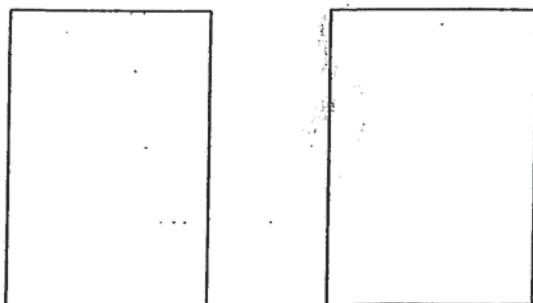
SPECIMEN DIMENSIONS in. / mm.				
HEIGHT			DIAMETER	
	Initial	Final	Initial	Final
1	<u>1.9275</u>	<u>1.9215</u>	<u>1.9505</u>	<u>1.9610</u>
2	<u>1.9310</u>	<u>1.9240</u>	<u>M 1.9515</u>	<u>1.9535</u>
3	<u>1.9285</u>	<u>1.9390</u>	<u>B 1.9665</u>	<u>1.9655</u>
Avg.	<u>1.929</u>	<u>1.930833</u>	<u>1.95783</u>	<u>1.9600</u>

MASS PROPERTIES		
Wt. Tube + Soil		gm.
Wt. Tube		gm.
Wt. Soil	<u>189.39</u>	gm.
Tube Diameter		in.
Sample Length		in.
tube length		in.
top trim		in.
bottom trim		in.
total trim		in.
sample length		in.
Density constant		
$4.85 / (D^2 * L)$		
Wet Density		pcf.
Dry Density		pcf.

Description After Test Initial $\sigma_m = 124.2$ Final $\sigma_m = 128.8$
 $\sigma_{vm} = 22.5$ $\sigma_{vm} = 20.1$
 $\gamma_b = 101.4$ $\gamma_b = 107.2$

Remarks _____

Failure Sketch



Trimmed By _____
Trimmed Date _____

Setup By _____
Setup Date _____

Taken Down By _____
Take Down Date _____

JP
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B-5

TRIAXIAL CELL SATURATION & BETA FACTOR

PROJECT Amazon Labadie Fly Ash Study

SAMPLE 100% New-Powder Fly Ash mixed at 22.5% M DEPTH _____

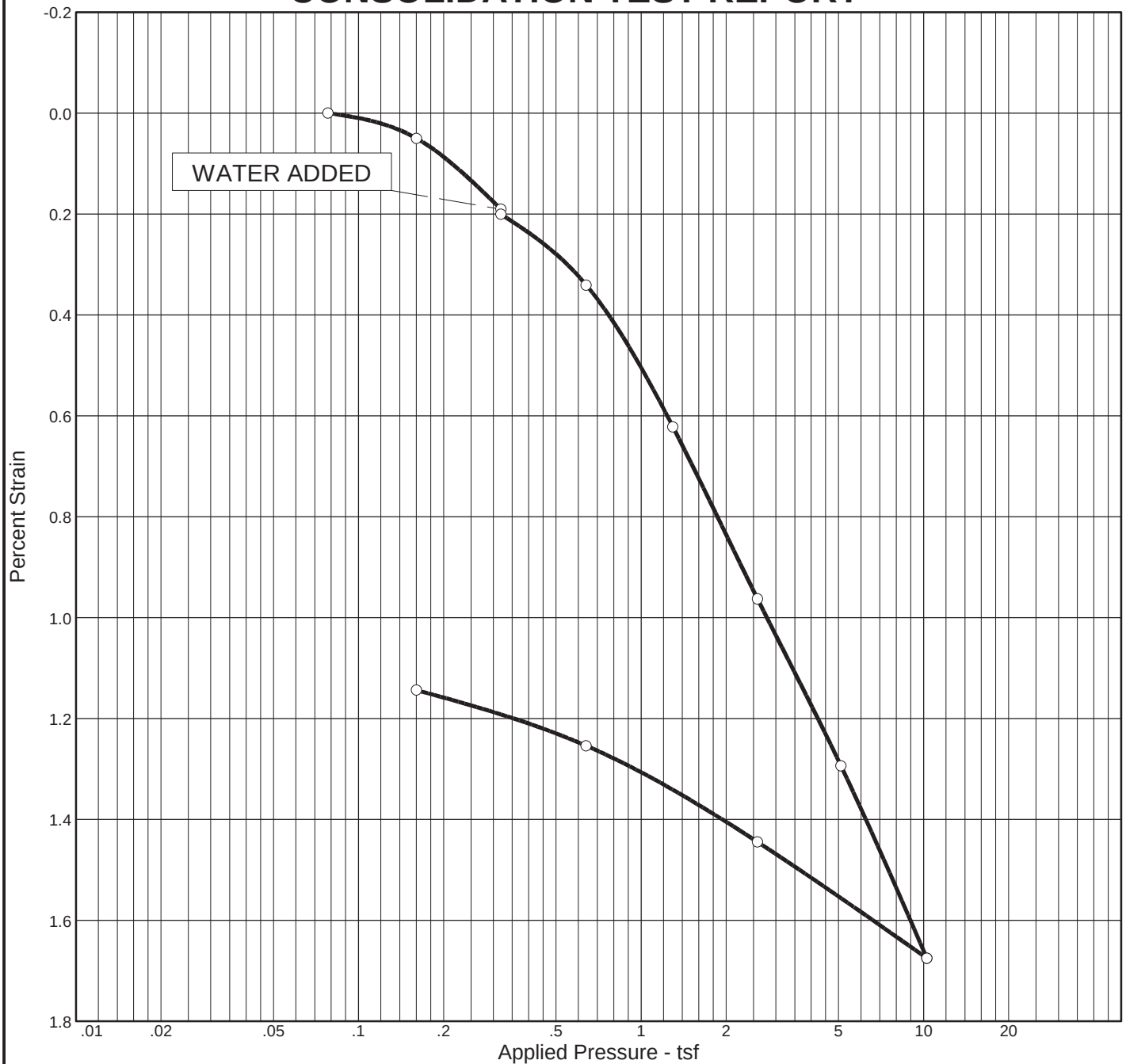
INITIAL CELL PRESSURE 51.0 START DATE 3/1/11

INITIAL PORE PRESSURE 50.0 CELL NUMBER 3

INITIAL TRANSDUCER READING 50.9 TRANSDUCER NUMBER _____

[illegible]

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (tsf)	P_c (tsf)	C_c	C_s	Swell Press. (tsf)	Swell %	e_0
Sat.	Moist.											
33.9 %	8.2 %	108.6			2.87		1.03	0.02	0.00			0.697

MATERIAL DESCRIPTION										USCS	AASHTO
Tan, dry fly ash											

Project No. 2008012455	Client: Ameren Missouri	Remarks: Non-ponded fly ash mixed at 22.5% moisture
Project: CCP Properties, Labadie Plant		
Source: Non-Ponded Dry Fly Ash from		
Sample No.: Bulk		Figure
REITZ & JENS, INC. CONSULTING ENGINEERS		

Figure

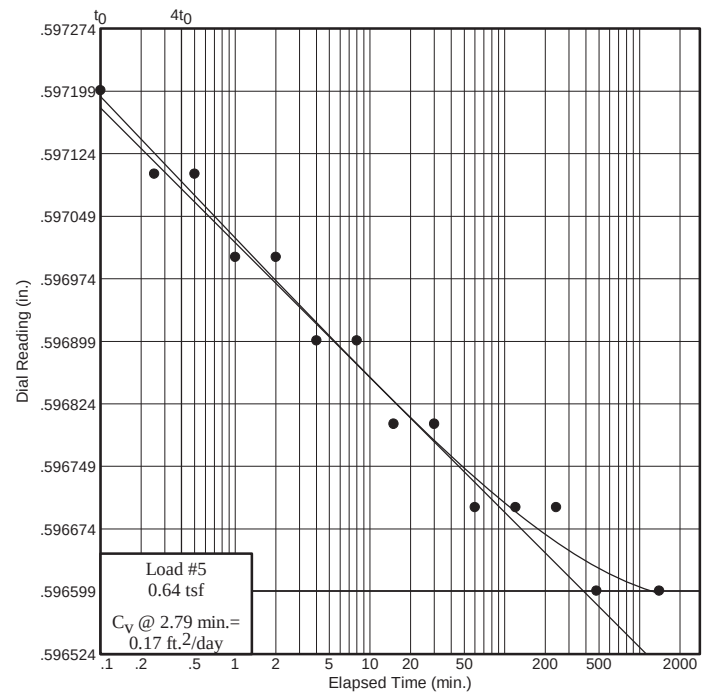
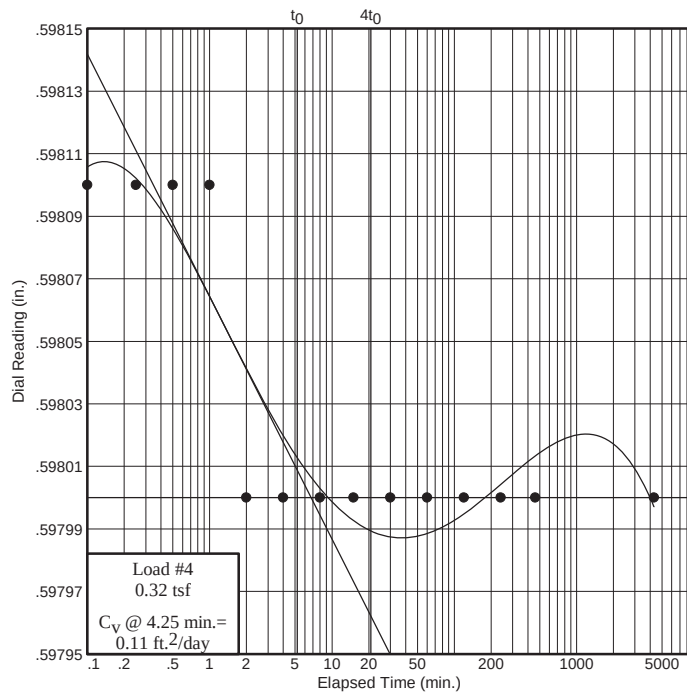
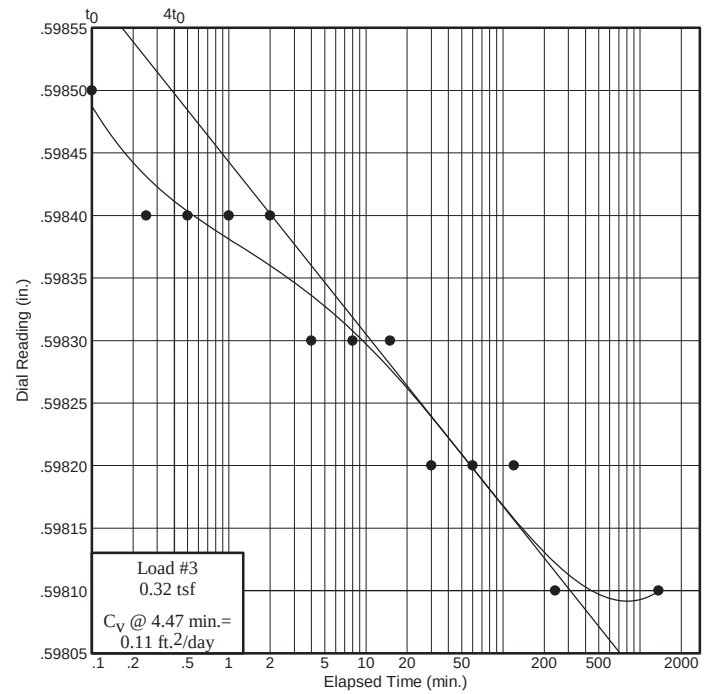
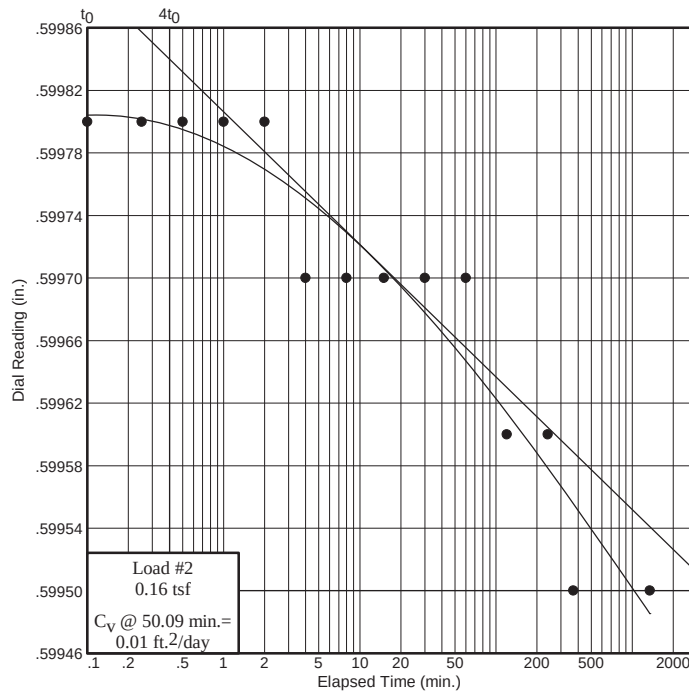
Dial Reading vs. Time

Project No.: 2008012455

Project: CCP Properties, Labadie Plant

Source: Non-Ponded Dry Fly Ash from Precipitators

Sample No.: Bulk



Dial Reading vs. Time

Project No.: 2008012455

Project: CCP Properties, Labadie Plant

Source: Non-Ponded Dry Fly Ash from Precipitators

Sample No.: Bulk

