(Calc. Vol. = 52 q) D = 5.5" D = 10"

GMUIS Dow

DW= 699

Project / Client Reitz & Jus WEATHER: WARM, 75°F, PARTLY SUNDY MILD, WIND FROM SOUTH & 15-25 MPH 1500 - Finished drilling, sand & growing 1293. 1510-Setus on P-95 while Max's washes 145 As and refives the wester tenk. 1517- Dave Hunziker offsitz. 1537- Begindrillingon P-95 1640- Hammer blow rod adapter broke at 34.5 on P-95 No space aclupter to obtain last 12" of SPT. Well Construction Notes: P-95 2" Sch. 40 Prc 10-Slot set base@ 34.9" 20/40 P. Sand to 21.6 use 250 30/70 S. Sand to ZO3 use 60 Bent. Slurry to GS use 28 (Cake. Vol. = \$2 g) 0;=10.5"0=145" PW=604 1740- Scott King offsite, Geosguit pump is not working for him to develop wells 1745- Finished drilling, sand & growthay 1-95 1815 - Mars Enterprises, Scott King and I offsite. 1821- OT Sohn Einer about departure. my sou

Location AmerenUE - Labadic

Date 10/20/09

05 - Chis Vienette, MONE onsite.

21-5PThammelsupport/quide broke on omy Don

Project/Client Reitz & Jens Date 10/21/09 67

Well Construction Notes: A-97 \*348' 2" Sch 40 Puc 10-Slot set base @ 35-1 20/40 P. Sand to 21.5' use 250 16 30/20 S. Sand to 20', use 50 16 Bent. Slury to GS, use 53 (Calc. Vol. = 51 g) 0; = 8" 0; = 11.5" PW = 669 well raised 0.3 while treming sand/semouring 1121-Copy - dilling 1134 - Maris win use manual hammer by using winch until piece can be repaired 1136 - Dave Hunziker onsite. 1145- Dove Hunziker affsite to get the broken quide for the sor hammer cend have it repaired 12 6 - Mike Carlson ons: 70 @ P-99. 1315- Chris Vinetter Offste. 1350 Finished drilling, sand and growthy A 29. 1420-Mike Carlson offsite 1425 Setup on A-71. 1494-Chris Vienether onsite 1448-Begindrilling on P-71.

12g Completed The 11/04/09

Location America UE - Labadie Date 10/21/09

Project / Client Peitz & Jens

WELL Construction Notes: P-71 2 Sch 40 PVC 10-Slot, set base @ 34.9 30/20 9. Sand to 21.7' use 250 Bent Slurry to GS, sise 52 - a) D:=15" O=18.5" [ Calc. Vol = 51 PW = 489 1745 Maxs tinished unloading support trucks and fixed sor hanner. 1802- max's Enferonses and I afforte 1806-CT John Einerabout clepature

grout to existing piezometers.

PZ Grout Comments

309

12a

RANTS

mixing growt.

P-71

P-65

P-93

P-95

P-97

P-99

1757

810

325

331

338

342

146

350

Begin growting and completions after

GROUT Only

Casing, J-Plug

Casing, J-Plug

Casing, J-Plug

Casing, 5-Plug

Completed, needs lock

GROW Casing, J-plug

Completed needs lock

Location Amerina E- Labadie Project / Client Leitz & Jens

Date 10/22/09

0900 - Kyle Kocher and Jason Pruettare onsite w/Reitz & Jens, and Terra Dun is onsAr drilling on C-37 0925- Light to moderate ran is talling, but no lightning. We are going to try drilling on 4-120. Chris Vierether MODE ONSITE. 0937 CT Mike Carlson Informed him the van has let up a little and we see going to trydilling Also intoined Kim that Reitz & Jens is onsite dulling w/ Terra Drill 1007- Begindilling on P-120. 1123-Chils Vienther onethe at 120 1154-Chris Vienether offsite Well Construction Notes: P-120 4" Sel 40 Prc Zo-Slot set base @ 34.9 10/20 A. Send to 21.3' use 375 30/10 S. Sand to 19.7' use 75 75 Bent-Slung to GS, use D:= 13" O== 17" (Calc. Vol. = 68 PW= 54a 2mms

Location AmerenUE-Labadie Date 10/22/09	Location	Date	73
Project / Client <u>Reitz 4 Jens</u>	Project / Client		
WEATHER: COOL GOOF RAIN, WIND FROM EAST AT 10-15MPH			
305 - Finisheddilling Sand & Dantin A 120	\$		
348- Due to rain drilling activities were Stopped. Max's Enterprises tinkhed unloading support truck. 350- Maxis Enterprises offsite and			
Stopped. Max's Enterprises tinkshed			- Land
unloading support truck.			
350- Maris Enterprises offsite and			
Olemphilip in a brick to Ft. Scott KS			
350 - Offsite for the day. 70 - CT John Elmer. Informed him that	4		
70 - CT John E.mer. Intermed him that			
drilling activities have ceased for the			
week due to rain.			
	\$ 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
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( NATA			
			Company of the Compan
	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		

Location Amuen 4E-Labadie Date 10/26/09

Project / Client <u>Peitz & Jens</u>

WEATHER: COOL, 55°F, OVERCAST LIGHT RED, CAM

0920 - Arm's onsite for OSI fieldwark Scott King onsite. Maxis Enterprises onsite. Doug & Ryan thenzike. O. 11 Chastois Observed Term Dvin Mud Rothy viz Dosite. 0925 Asked Bill Dubbis it he completed his 10- hour OSHA training He stated he did but does not have the certificate within. 1000- CT Lase Hunzler Informed him to tax OSHA certificate for Bill Cubols to Mike Carlson 1010-SetuD on P-61 1030 - Conduct tenlegate Safety meeting. 1035 Begin drilling on A-61 Well Construction Notes: P-61 4" Sch 40 PVC 20-Slot set base @ 34.7 use 350 10/20 P. Sand to 21.2 30/105. Sand to 20' use Bent Sluring to GS. use D = 10" D= 14.5" ( Cale. Val. = 69 PW=509 12 MUSS/

Location AmericalE-Labadic

343 - Finisheddrilling sand & growting 1-61. The wet ground conditions are requiring the dr. It is to pull the support truck down the fum access road and to the piczometer locations. 15 - Setupon P-122. Mais back to equipment storage area to fill water families, switch trailers, decon HSAs and load 2" well materials. 15 - Ortling and support truck unable to make it to P-122 because the support truck fransmission is overheating from assisting the drilling during pulling. 19- CT MM : Carlson to ask it we could get the bull dozer from PACE Const. to pull the support truck to the pierumeter/ocations. He sald wehave opproval to request PACE to pull the rig/tack it we are getting stuck but only if they are onsite. Informed MKE that the buildozes is onste, but I an unawwe if PACE personell are onsthe. I asked Mike it we can setup on P-87 and P-14D from the Wavis Rd.

Date 10/2409 Location America UE - Labadie Project / Client <u>Reitz & Jens</u>

1519 - CONT. - R.O.W. He statedyes but that we must sample these since we have not received appoint from Keitz & Jens to log the holes from the cuttings. Intorned Mike that we will attempt pully away From P122 and try setting up on 1615 Begindrilling on 1-87. 1655 - Scott King onsite stated his new Geospert pump stopped workly. Sold he is offsite for the day. Well Construction Notes: P-87 2 Sch 40 PVC 10-Slot set base @ 35 30/10 P. Sand to 21.4' use 310 30/10 S. Sand to 19.6', use 50 Bent Slung to GS use 42 9 (Calc. Vol. = 50g g) 0 = 3" OF= 9"
PW = 50g 1828- Finished dilling sand & growthy 17-87. 1858 Unload trucks and offsite.

WEATHER: COOL, 45°F, OVERCAST, RAINING 015 - Maxis Enterprises support truck has that tire on tront left. They begin to all the tire with their portable Complessol. 045- Follow Max's to tile repair shop. 22- Avise on site w/ Max's Enterprises: Ryun Hunziker and Dubois, B.M. Doug Hunziker getting tire tixed on Support track in St. Clads. 135- Ryan Hunziker spoke wil Doug Hunzikes about support truck and the service repair station indicated the wheel bearings on the trust need replaced due to the "shaking" of the wheels when on the lift. This will require the truck to be in the repair shop most of the day. 155 - Doug Hunzi Ker called and indicated that upon turther inspection of the track it will not require repair of the wheel bearings. only Hightening of the wholl lock nut. 134 - Setupon P-140 woldilling pulling the support trailer.

336- Conduct tailgate Safety meeting

Location AmerenUE-Laborie

Date 10/27/09

Project / Client Keitz & Jens

0900- Doug Hunziller onsite w/ suport towar. 0408 - Begindrilling on P. 140. Well Construction Notes: A-140 2" sch 40 PVC 10-510+ set base @ 34.7" 140 P. Sand to 21.25 30/20 9. Sand to 20.1' use 50 (Cak. Vol. = 51 g) D; = 9.5"0, = 13.5" PW= 449 1146 Finisheddrilling Sand & grouting P-140 1202 - Finished pulling outdollering & France wi Greder GMC Hut is being prived by support truck from Davis Rd. 1212 - ET Mike Carlson. Informed him the rum is causing the tield conditions to be too wet to almand that we are leaving the site 1232 CT Reary Kitte Ameren Safety to inform him we are leaving the sito for the day. 1240 - Max's Enterprise's and I offsite. OMUSS Don

77

Project/Client Reits & Jens Date 10/28/09

WEATHER: COOK 60°F OUERCAST, 5-10 MAH WEND FROM SOUTH

Well Construction Notes: P-187 2" Sch. 40 PVC 10-Slot set base @ 35.1 20/40 P. Sund to 218 use 300 3% 5. Sand to 20.7" Bent. Slung to GS, use 32 (Calc. Vol. = 53 9) 0:= 3" 0,= 75" PW= 609 1315- Setup on A-79 Mike Celson stated to continuosly sample to 10 feet and then HSA down to 35 test without splitspoon samples. 1339 - Mais now to location by ushy dilling to pull support tradler. Very muddy and Slow pulling. 1350- Begindrilling on P-79. ~ 1400 - Bluke Snotherman Chris Vienether & Larry PILLE ONS HE. All WIMONR 1440 - MDN2 leans P-79. 1513 - Einished drilling, send & growting P-79. 1543 - Setup on 12-8581. 1550-Begindillingon P-8581. () Muzz Dou

Location America UE-Labadic Date 10/28/09

Project / Client <u>Leite 4 Jens</u>

Well Completion Notes: 19-79 "Sch. 40 Pre 10-Slot set base@ 35" % + 6 Sand + 0 21.6' use %10 S. Sand to 20.25 Bent. Slurry to GS, use 42 Nag (Calc. Vol. = 52 ) D:=7" OF= 13" PW= 549 513- WEIl Construction Dotes: P-81 "Sch 40 PUC 20-Slot set base@ 34.8" 1/20 P. Sand to 21.25' use 360 16 9/10 S. Sand to 20' use 50 16 Bent. Slury to GS. use 63 g (Cale. Vot. = 69 9) 0: 13" 0= 22" PW=53a 1828 - Frished dr. Hing, send & growthy P-81. 908 - Frished unloading tracks and offsite. Location America UE-Lubudie Date 10/29/09

Project/Client Pett 4 Jens

WEATHER: COOK 50°F, OVERCAST, WIND FROM the NE at 10-15mpH

0652 Anduconsite for OSI Fieldwar Mike Calson sonstr. Maris Enterprises onsite: Doug & Ryan Hunziker, Bill Oubois 0719 - Conduct tailgate sately meeting. 0815 - Setup on P-106. Consect traile to GMC Breded Frick. O.M. rice Proposed to pull/assist GMC to SHELBY TUBE-P-106 1-3 Well Construction Notes: P-106 2" Set 40 PVC 10-Slot setbase p 35 20/10 f. Sund to 21.7' use 260 Bent. Slung to GS, use 39 (Car 11-1- -, use 39 ( Carc. Vol. = 51 q) 0:=4" 0;= 9.5" PW=50 1010 Finishedd: Hing sand i growting P-106. neme 5.7c @ 11:20

WEATHER: COOL, 50°F, CLEARSKIES, MILD 305- Arrive onsite for WSI fieldwork. Max's Enterprises on site performing well head completions: Doug Hunziker, B: 11 Unbois & Ryan Northeutt. Scott King oncite. Down Stated the tields are still very wet and cousing the support fruck and rig to become stuck, which is slowing progress. He Il commended We begin dr. Ming and allow the fields a couple of days to dry and then perturn wellhead completions. 20 - Afternat setting up on P-146; howers, we conditation to the hole location. Drainveter tank and attempt being pulled out to farm access road. 52 - Finished forting up w/ wester and setup on P-108. 05 - Conduct tailgate safety meeting. 27- Begin drilling on P-108. DB- Chieviewether ansite. 35- Spoke W/ Larry "Boot Pierce via Chris Vierrether's cell phone and he stated that we must continously sample to total

depth theretore regulary splitspoons LOCATION America VE-Labradie Date 11/03/09 83 Project / Client WEATHER: WARM, 60°F, CLEARSTEN CALM, MILD

1235-CONT. - every 18 mehrs. I Then instructed the drive even to stop dilling notil we Can jet this resolved 1238- CTM. Ke Carkon Left message ter him to return my call. 1300-CT Gredell Central office to Speak w/ Mike Colson, Mike sole to stop drilling until tuther notice. 1310 - Chris Vierrether offsitetor lunch. 1345 - Support trailer has flut tix. Remove tive from truiter to have repaded. 1410-Chris Vierether called to say he was backonsite. Intermed han that we notice. 1444- Back to P- 108 ce/ second support trailer to begin mixing ofoset for well head completions 1505 Beginadding grout, 5-plugs and low to uncompleted wells 1535- Spoke w/ Larry "Bout" Pierce via Chris Vierrethers cell, phone and he stated to follow work plan as previously followed as we have been doing

PZ Grout Comments

P-9 Og Completed

OS P-1060 Qg Addlock, j-plugand growt

30 P-93 Og Completed

UB P-95 3g Completed

OI P-97 Sg Completed

10 P-99 Sg Completed

22 P-104 Og Completed, walked to P2

1535-CONT. - but that we must sample
every piezometer via continuosity
sampling until non-cohesine muterial
is encountered then split - spoon
sample at 5' intervals. He stated
the CAT drilling crew win bore next
to the 3 piezometers that were not
sumpled via split spoons.
1539- CF Mixe Curson, Verified and
continued Larry Pieze: comments
ducumented above.
1645-Finished well completions. Unload
truck a truiter take trash to

Jumpsted.

1715-0 Hsite for day and u/Maxis
to Union to get the repeated

or support trailer.

Location Ameren UE-Labradie Date 11/04/09 8/ Project / Client <u>Feitz & Jens</u> WEATHER: COOL GOOF, CLEARSLIES 15-20 MPH GUSTING WINS FROM EAST, MILO 0920- Go to equipment storage area to get supplies, 2nd trailer, and water For next 2 wells. 0925-Mike Carlson 015/ty. 1008 - Setup on P-110. 1015 - Begindrilling on P-110. Well Construction Notes: P-110 2" Sch 40 pvc 10-510+, set base @ 35.2" 20/40 P. Sand to 21.75, use 260 16 30/70 S. Sand to 20.25 use 50 16 Bent Slury to GS, use 25 g ( Calc. Vol. = 52 g) 0:= 13" D==16.5" PW= 389 1225 Venicpipe un screwed in side 45As during the addition of sond. 1245 Mars able to reconnect tremie pipe and start the addition of sand 1332 - Finisheddr. Iling, sand & growing 1-110 1355- Begindrilling on P-112 1526 - Chris Vierrether onsite at P412. ~1600-Mile Carlson onsite at P-112 1650 Mike Carlson leaves A-112.

Project/Client <u>Peitz</u> i Jens

WEATHER: COOL, 35°F FOGGY, CALLE, MILD

0605- Arrive onsthe for OSI Fieldware MKC Cadson ons He. Maxis Enterportses onsite. Dave, Doug ? Ryan Hunziker, Bill Outois, and Ryan Northeutt. 0627- Conduct tailgate safety meeting. 0710 - CME 750 Distrig will not start Removestates and preson to leve site w/ Kyan Humikes to Washington to puchase new starter, buy past for support truck. 0715 - Offsite to Washington. 0845 - Beck From Washington States will not be available until 1:30 pm today at O'Reilys Autora H3 in Weshington. Truck bruke dust flange will not be available for pickup until 10:00 km on 11/04/09 at Tood in Weshireter 0445 - Finished preparing supplies and trade to do well completions. 0958 - Ryan Hunziker and I begin was completions! 6 mass Don

10 - Frished with wellhead completions, Ryan
Henziker and I offsite to Washington
to pick up the Starter for the drill
[ig.
25- Back from Washington. State, at O'Reily:
did not have correct mounting position.
Return to site wield starter.

57 - Begin notching wells for surveyers

15- Meetinger/Paul Reitz, Jo Ann Thee Chisis Cook, & Mike Carlson about minimizing Grace Dou Project / Client Rcitz & Jens Date 11/05/09

Notching of Pizzometers P-69 P-12 P. 9 P-67 P-65 P-19 P. 47 I-plug Pap-Off Acsser P-17 P-15 1245 A43 P-20 P59 P-ZZ P-24 P.41 No Joek 9-27 1-203 P-29 5-plug Por-OLF Plesser P-77 P-36 P75 P-31 No Lock P-33 P-35 P-38 P-40 P-42 1.49 A-51 P. 53 P. 35 P.57 P-71 No LOCK

Location Ameren UE - Lubadie	Date 11/06/09	ç
Project / Client Reitz & Jens		-

Wen Construction Notes: A-142  2' Sch HO MVC 10-Slot set base at 35.1'  2'940 A. Sund to 22.1' use 300 16  2'950 S. Sand to 20.1' use 50 16  Bent. Slury to GS, use 21 g  ( Cale, Vol. = 51 g) D: 7' D=10"  PW = 63g  1825 - Finished unloading trailer supplies and assist w/ compared to supplies and assist w/ compared to supplies and I affect.  Mike Carlson May's Enterprises and I affect.		I .	T_		,		·							,		
2 Sch HO AVC 10-Slot schbase at 35.1' 29/40 P. Sund to 22.1' use 300 1b  30/50 S. Sund to 20.1' use 50 1b  Bent. Shury to GS, use 21  ( Calc. Vol. = 51 g) D: 7' D= 10"  PW = 63g  1825 - Finished unloading truiter supplier  and assist w/ repair of support  truck Support truck operating.  Mike Carlson May's Enterprises	W	en	Cor	sti	uct	on	No	tes	: F	- 14	12					
29/40 P. Sund to 22. [ use 300 16  30/50 S. Sand to 20.1' use 50 16  Bent. Slury to GS, use 21  (Calc. Vol. = 51 g) D: 7' D= 10"  PW = 63g  1825 - Finished unloading truiter supplier  and assist w/ repair of support  truck Support truck operating.  Mike Carlson May's Enterprises	2	ے2 ا	h	10 /	VC	10	-50	+	ر م کا	12		-4	3:	5.)	ι	
1825 - Finished unloading truiter supplied and assist w/ repair of support fruck Support fruck operating. Mike Carlson May's Enterprises	20	10	٥	2			77	11	رب ر	Q4	21	21			-	
1825 - Finished unloading truiter supplied and assist w/ repair of support fruck Support fruck operating. Mike Carlson May's Enterprises	30/	-		TUN	ol T	0 -	2	<u></u>	, u	5.C	90	0	- 1	<b>b</b>	-	
1825 - Finished unloading truiter supplied and assist w/ repair of support fruck Support fruck operating. Mike Carlson May's Enterprises	7	50.	<u> </u>	>دمر	1 +	0 3	0.		u	·c	5	0	_ ]	<b>b</b>		
1825 - Finished unloading truiter supplied and assist w/ repair of support fruck Support fruck operating. Mike Carlson May's Enterprises	Be	nt.	SI	um	1+0	G	5.	ч	se	2	-1	_ (	2			
1825 - Finished unloading truiter supplied and assist w/ repair of support fruck Support fruck operating. Mike Carlson May's Enterprises	(	Ca	ele.	Vi	) =	5	51		7		Λ.	7	,	1.	10	c <sub>e</sub>
1825 - Finished unloading truiter supplied and assist w/ repair of support fruck Support fruck operating. Mike Carlson May's Enterprises	D	11-	1	2	-				9.					/ <del>-</del> -	70	
And assist we repaired support  fruck Support truck operating.  Mike Carlson May's Enterprises	1000	0 ,	9.	3												
And assist we repaired support  fruck Support truck operating.  Mike Carlson May's Enterprises	-														_	
And assist we repaired support  fruck Support truck operating.  Mike Carlson May's Enterprises	18	25	-	<i>Hi</i> h	Ish	ed	ur	100	âdi	ny	to	wil	ررم	54	PA	lia
Mike Carlson May's Enterprises	Service of the servic		4	ano	la	55.	st	w/	1	Den.	10	1	Ser,	e. s.	0/1	
Mike Carlson May's Enterprises				La	·V	<				!	<u> </u>		1			
and I offsite.				10	110	<u></u>		0014	7'	uce	- Oy	-	it!	۶.		
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01615 - Arive onsite to DSI Fieldwork Mice Carlson, Nax's Enterprises onsite: Dave, Dosg & Ryan Han Ziller, Bill Dubois, & Ryan Northeutt 0630- Conduct tailgate sofety meeting. 0640 - Ryan Hanziker and I setup on P-128. Begh installin, rebuilt starter. 0705 Resume drilling on P. 128. Well Construction Notes: P-128 4" Sch. 40 PUC 20-Slot, set base @ 34.7" % 50 S. Sand to 19.5 use 400 Bent, Slurry to 65, use 60 g (Calc. Vol. = 68 a) D:= X2" D= 6" Pw=72. 0830- Mike Calson off gife to JC Office. Ground too soft for B-53 to drill. 0847 - Finisheddrilling sand & growting P-128.

SHELBY TUBE SAMPLE + P-128 0.7-2.7'

3 South of Bosehole 15" Rec

Project / Client Reitz 4 Sens Date 11/07/09

义 P-142 P-88 0924 P-73 100 0927 0941- Maris Enterprises and I finished unhocking trailers and unloading supplies. Off site.

17	120 15-	- J	mis	the	de	der	Mary	fo	_	Luc	10	1	0_8	33	
17	45	N	o,	5		100	1		-		m z	<u>                                      </u>	7		-
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Lucation America Labelle Date 11/15/89 Project/Olient Resta & Jens WEATHER: COOL 50°F FOGGY, HUNTO, 610- Alrive onsite for DSI Fieldwork. Mike Culson and Max's Enterpolses: Dave, Doug & Ryan Hunziker; Bill Dubois; and Ryan Northcutt Onsite. 1620-Conduct tail gate satety meeting.
034- Return to P-83 to resume di 11:24. 054- Resumedrilling on P-83 810- Sand and grave inside 1+545 and sand Conten could not be expensed to setwell Pull out HSAS, plug bit, and reamout hule to 35' Well Construction Notes: Sel. 40 PUC 10-910+ set base at 34.8' 40 P. Sund to 21.5" 50 S. Sand to 20' ent. Slung to BS use 32 (Cak. Vol. = 51 0; = 9.5 0 == 14" W: 30g 837- Blake Smotherman MONZ onsite 940 - Finished dilling, sand a growting P-83. 949 - Blake Smotherman leaves P-83 /ocati 05- Mars barelle to equipment storage area

Ameren UE-Labadie 11/10/09
Project/Citionic KLitz & Jens LUEATHER: COOL 55°F CLOUDY WIDD FROM MORTH 10-15 MAY
1024 - Complete photographs of below:
1) SOUTH, ruts made by combine on Form access Road east of P-167. on 11/02/09
2/ 3 p/(1/64.5
3) NORTH ruits made by combine on form  access roudless tot A 167.
access road southeast of P-167.
5) South wether Crossing on tomaces
(6) NORTHWEST, ducks in we-tland,
1036- Setup on P-85 1050 - Maris arrives of P-85 after filling
of 10.25" 45As / piezometer muterials 1108-Blake Smother man arrives at P8=
1109. Begin dilling on P-85 1245- Blake asked to take photographs of
my disting log. Informed him that he is welcome to He is also to the
photographs of soil samples

Location Ameren UE-Labadie Date Miolog Project / Client Feitz 4 Jens 433-CONT: afters Maris cut wood phases for the HSAE. Mso, had to retrieve auge puller and retriever From ene 750 dr.11 1/9 Pell Construction Notes: P.85 "Sch. HD AVE 10-51 of set base at 34" 40 P. Sand to 20.5', use 350 505. Sand to 18.7', use 50 ent. Slury to OS, use 49 Cute. Vol. = 65 a) D: W= 504 547- Blake Smotherman offsite Forday. 601 - Growthose plugged. Cheorout plug and logging routing sand of growting P-85.
145- Unload supplies and materials. Mais, Scott King, Mile Carlson and I offsite

MEATHER: COOL, 45°F CLENE SCIES, MI CAM.  OG15- Arrive onside for DSI fields  Mike Ceclson, Scott King and  Max's Enterprises (Dave Do  Ryan Hunzikes; Bill Dubois of  Northeutf) Onsite.  O635- Dave Hunzikes & Bill Dubois offsite	esok.
0615- Arrive onside for OSI fields Mike Carlson, Scott King and Max's Enterprises (Dave, Do Ryan Hunzikes; Bill Nuloois of 1001thoutf) onsite. 0635- Oan Hunziker & Bill Outois offsite	esok.
Mike Carlson, Scott King and Max's Enterprises (Dave, Do Ryan Hunzilles; Bill Waloois of North cutt) onsite. 0635 Dan Hunziller & Bill Outois offsite	
Mike Carlson, Scott King and Max's Enterprises (Dave, Do Ryan Hunzilles; Bill Dubois of Northcutt) onsite. 2635 Dave Hunziker & Bill Dubois offsite	
Max's Enterprises (Dave, Do Ryan Hunzilles; Bill Dubois 4. Northeuter) onsite.  1635 Dave Hunzilles & Bill Dubois offsite	الم الم
Mortheute ) onsite.  10035 Dave Hunziker & Bill Dubois off site	Eyan
1635 Dare Hunziker & Bill Dukois off site	1
1635 Dare Hunziker & Bill Cubois off site	
	to
It. Scott, KS Bill's une la haul a	501,00
Stroke and authoris grision.	
1640- Conduct tailgate safety meeti.	ep
50 - Take Doug Hunzille, to Mobile 8-53	
119 at 12.85 location to move -	<b>/</b> 5
next location P-124	
705-Putt B-53 on P-124 location as	d
lears on standing until full drille	ren
refuns.	-
715- Sety on P-136 and resume di. Iling w/10.25 145As. 151-Lewe A-136 to get field staking	<del>  </del>
251 ) a NOV	<del>                                     </del>
1 -1 Lewer-134 to get sield stalling	
No Basi Lieu Shi	
Supplier.  Blo Begintield Staking by walking.	to
	السلال
751- Finished Field staking at P-160. S on P-124 Mille Culson leaves +	exup

Location America UE-Labordie Date 11/11/09 Project/Client Reitz & Jens WEATHER: WAILM, 65°F CLEAR SKIES, 5-10 MOIL WEND FROM WORTH, MILD 1406-Setup on P-126 1418 Begindrilling on P-126. 1620 - Ourny the installation of the 4" are prezometer for P-126 The suds infollowed Its to and would not allow the well piczometer to be installed at 35 Well Construction Notes: P-126 4" Sch 40 puc 10-51ot, set buse at 34.2 20/40 P. Sand to 2013, use 4/40 16 39,50 B. Sand to 19 , use 50 Bent Slury to GS, use 45 (Cak. Vol. = 66 a) D:= 7" 0 = 10" PW= 42 a 1715- Inshed clining, sand of growing P. 126 1745- Offste along w/ Mike Carson Scots King & Max's Enterprises mus Dou

Date 11/12/09 10 Parland Change Reitz & Jens DEATHER WALM, LODGE MOSTLY SULVAY, 5MPH WIND ERUM SOUTHEAST Well Construction Notes: P-114 4" Sun 40 PUC 10+5lot set base at 34.8 2940 A. Sand to 21.6, use 450 16 3950 \$ 5 and to 26.1 use Bent Slury to GS, use 53 (Cak, Voi = 70 0:= 10.5" 0=14" PLO = 789 Well Construction Notes: A-152 2" Sch 40 AVC 10-5/04 set baseat 34.8" 20/40 P. Sand to 215' 30/50 5. Squal to 19.5' Bent. Slumy to GS, use 45 ( Calc. Vol. = 50 0,=14"0=17 رو. Pac= 489 1610- Finisheddilling, Sand of growting P-152 1630- CME 750 required to pull support truck from P-152 Then mobilize to P-138 and publ support truck and Mobile B-53 to Davis Rd Chis Vienether onsite. Stated he hasbeen ons te since 1106 hours. 1645 Chris Vienether offsite. ALL OFFSITE 1710. SAMES DOWN

LODATION AMERICA UE - Labadie

Logation America UE - Lubadie Data 11/13/09 Project / Clione Reitz 4 Jeas WEATHER: LOOF WARM MOLTEX SUNDY, 5 MAH WITH FROM SOUTH, MILD Well Construction Notes: P-158 2 Sch 40 AVC 10-5/of set 645e at 34.9 29/10 P. Sand to 21.4'
30/50 S. Sand to 20.25' Bent Slurry to GS, use (Calc. Val. = 52 PW=400 1450 - Finished drilling, sand & growing P-158. 1552 - Begin Fieldstaking. Walk to locations. \* Pierometers Field Staked \* P. 185 Com stubble ground soft to firm P-173 Cornstubble ground soft, in low P-183 Cornstubble, around very soft/wet P-195 Unharvested corn, 6" of weater P-197 Cornstwolle, ground soft, wet areas surrounding location P-175 Cornstubble, ground soft west 1700 - Finished Field Staking. 1725 - Mike Carlson, Muxes Etterprises and I offsite GMIS OPL

Project/Ollient Pett 4 Jens

1105- Mobile B-53 became stack trying to pull out the OME- 750. Use persone truck to pull out Support fruck # Z 115- MIKE Collson Offs Re" 1120- Take Lyan Hunzillar down to .. Tarmers heavesting beens and gell them to pull don't isgs out They said they would; there to, we drove a lumina to get his tractor + I mile away. 1140 - Fainer wo trader ons the and beather pulling out drill 1/45. 1229-Begin well completions PZ Grand Comment Comments Completed, NO LOCK 1239 P-122 Completed No Lock 100 Add temp casing, 100 lock 1257 P-134 1302 P-146 Completed, Notoce 13/2 P.158 Completed NO LOCK 1357 - Fhished unloading trucks and securing site makis Enterprises and z offsite.

316-CONT: are too wet for the disting to setup on any location. A-199 locution access points are extendly soft & wet. Explahed to him that Mais is trying to complete wells but water is intitrating boreholes/pads. Infamed MRC Hat Scott is developing P 39 Currently, and I will give hom a can in a couple of hours w/status. 330- Go to Labe de Maket for burch 343 - Back from Labadie Market. 350- Doug and Eyen Northwell go to equipment storage area to decon. HSAS Jum last week and prepare the Mobile B-53 rig for trans port back to Ft. Scott 512 - CT Mike Calson Interned him Majos i's finished winterizing equipmentand leady to deport to Ft. Scott Mais pertained 2 out of 12 completions (P-154 & P-114) Lowers, the other siezoneters were too wet to complete. Maxsadded temp. casings to Heather 10. 1535 Maris, Scottka, & I offsite.

Location America UE - Labadie Date 11/30/09 11 Project / Client Reitz & Jus WEATHER: COOL, 50°F CLEAR SKIFS, 5-10MALL WIND FROM the SUD, 1055 - Arnu onsite for OSI field ook. 1100 - Scottking onsite @ 1005 plunky mobilization to the site Dare Harker Called and Indicator the Support truck undr. 11 even broke down in Lebenon, mo and will likely not be here until tomorrow 1009- at Mike Culson to inturnative of drill even arrival time. He stated to go to the site and check site conditions 1120 - Kecon 5.70 Speak w/ Jagon Procest WR: J. Jason is till staking today and indicated they was be drilling sometand the week. 1155- Finished loading samples in Kais truck and prepare to develop weeks 1205 - Setup on P-120 to develop w/ ing. 1240 - F.V. shedw/P-120 1244 - Setup on P-126, to develop 1320- F.h. shed w/ 17-126 1323 - Setup on A-114 to develop.

1356- Finished w/ P-114

1439. Finished w/ P-85

1406- Setup on P-85 to develop

Location Americalle - Labadie Date 12/01/09 Project / Client <u>Reitz</u> 1 Jens WEATHER: COLD 304 CLEAR SKEES, SMAR WIND 0625- Arrive onsite for DSI Fielding. Mais Entaprises Dung & Ryan Hunz Ker Ryon North cutt) ansibe 0700 - Conduct tailante safety meeting Maxis finished unloading west construction muterials from syppost 0-750 - Setup on P-201 after filling water tank fuely CME-750, and transpor to location 0810 - Begin drilling on A-201 Well Construction Notes: P-201 2" Sch 40 AVC 10- Slot set base at 35 70/40 P. Sand to 21.3 3950 S. Sand to 20' Bent Slury to GS ( Calc. Vo) = 51 PW= 389 1100 - Inisted dr. Iling, sand & granting P-201 1108 - Offsite to Labodia Market to take 1130- Back onsite. Setus on P-199 Grans Oon

MEATHER: COOL 55°F MOSTLY SUPPLY, 15-20

55-Begharilling on P-199

Dell Construction Notes: P-199

Sch 40 AVC 10-Slot set base at 34.9' 10 P. Sand to 21.6 use 450

50 S. Send to 19.8

ert. Slury to GS. use Cale Vol = 69 a) N = 10" 0=17"

W. 569

47 - Finished dilling, Sanda growting A-199 00 - Check ocutions for ground conditions.

P-169 4. P-171 maybe able to be

accessed in the morning it no rain. 28- Mais prepars RAJ Manclus Car to begin well completions as Scott

King is posite using other Club Car.

00- Finished scowling access conditions to P-164. The ground between Davis Rd. 4

P-164 is a drainage low and soft. Scouted access from B-153+0P-164; Lower ground

stillsoft. The best augs spoint to the

Diezuneters P-1100 A-173, P-183 A-185, P-195

P-175 may be off of Davis Rol directly

Location AmerenUE-Labadie

Date /2/01/69

Project/Client Leitz Sens

1600-CONT: South of A-187. 1630 - Scorted A-17 and it should report Mich be accessed from C-168 to the north since the first 100 feet from the turn access road is extrende 1639 - Scouted P-19). Able to dile to the lucation w/ Bredell 12 ton GMC but ground is very soft. Well's Completed by Eyan Hunziker & Ryan Mohat P-124 - Completed P-126 - Completed P-134 - Completed Needs growt Completed P-148 -Under Standly water -150 -Needs Growt Completed P-136 - Completed P-165- Completed P122 - Patched concrete paddue to collapse. 1735 Unload supplies. All offsite

Location AMULAUE - Labadie	Date 12/02/09
Project / Client Reitza Jens	West
	<u> </u>
WEATHER. COID, 40°F OUER CAST, 10- FROM THE NORTH	ZOMPH WEIGHT
1155 Setup on P-171	
1205 - Begindilling on 1	0-171
11/21/09-64-1- 10-1	
Well Construction Notes: P.	-161
2" 9th. 40 puc 10-510+ set 6	ase at 35
2940 A. Sand to 21.6 , use	275 16
30/	70
309. Sand to 20' use	30 . lb
Bent Shing to GS use	6
(Cak. Vol = 51 )	- 10511 - 17"
(Cake Vol. = 51 g) 0	, E C, D D F = ##
PW=40g	
1422 - Finished drilling, sand ?	1000 His P-171
11110 1 1 1 1 1 1	greening 1 - 11.
1445 - Parkdrill rig on tama	
PIVA. Onetothe la	thre needly
repair, we are going +	
1 2 2 2 2 3	
to make it to St. Class,	110 by 4:30 pm
today to have the the	reported and
placed back on the truck	tolo Real
	1111
Hunziker to Labadie M.	ence to get
Turel.	
1500 - Back on site and it's beg	inning to rack.
Maris	
Max's preparing suppl	ies was equipment
tor tomorrow.	
1538- Maxis Enterplises of	Fisite.
GMV55 DOLL	<u> </u>

Project/Client Reitz & Jens Date 12/03/09

Project/Client Reitz & Jens

WEATHER: COLD, 300 F, OUERCAST, CALM

0631- Arrive onsite for DSI Fieldwark 0635 Mars Enterprises onsite (Doug a Rya Hanziker Ryan Northaute 0700- Recon the Held conditions w/ Rigen Hunzike due to yesterday softeno Valu (snow mix It aspects + 1/4" of precipitation fell. P. 179 agran to be accessible so we will after setting my at that location. 0725 - Concluct tailgate safety meeting 0741- Maxs begins airing Conf. 750 the and support trailer times 0824 Setup on A-179. 0832 Bagin drilling on A-179 Well Construction Notes: A- 179 2" Set 40 AVE 10-5/01 Set 6450 24 34.9 20/40 P. Sond to \$20.7' 250 use 30/50 \$. Sand to 19.3' Best Slung to GS use 32 (Calc. Vol. = 49 PW= 47a P. Sand avoid not fall out of HSAs

Project/Client Reitz & Jens Date 12/03/09 127

Well Construction Notes: P-191 2" Set. 40 AVC 10-3/0+ 5et logse at 34.8 290 P Sand to 21.3 30/50 S. Soud to 19.6 Bent, Slum to BS use 32 g) D:= 10" D= 14.5 (Calc. Vol = 50 PW = 449 1805 Finished securing site and windering equipment. max's Enterprises and I are ofts to

be moved 75' to the south across curtand P-195 should be moved 100° North out of low, and P-173 may meed to be moved east or west.

Location AmerenuE-Labodie Date 12/05/09 131 Project / Client Reiten Jens

1108 - Finished diilling, sand a growting 1-197. 1242 - Finished unlocating supplies, Maris
loads a trailer and prepares the B-53 rig to travel back to Ft. Scott and offsite. The bock to scoffice

Location Ame	KAUE-Lab	adic	Date 12/09/09	133
Project / Client	Reitz & J	ens	Wed.	-

1040-CONT: to send Scott Lowe Also ic formed Mile that about 1/2 sust started but we are still planning on setting up on 10-162. 1120- Una 1/4 /64 part become stuck/walle to pull to P-12. Grand: SHU SOF 1141 - Unhook rig from support truck and Sull support truck fraile back to Davis Rd. Support traile now has a Hut Hic. 1210- Park drilling off of Dovis Rol. Drive support truck w/ Plat the on truller buck to construct un staging area. Dump water tank to lighter the load on the trailer 1230- CT MIKE Calsen, Informed him adout attempt to access P-162 Wout succes and that trailed was that, and that we are going to unload nuted remove the and take it to get repaired. He stated to leaves to the day & try again tomorrue 1309- Leave site forday. May's Entergrises offsth. GIVES Don

Location America WE-Labadie Date 12/10/09 Project / Client Leite 1 Jens WEACHER: COLD, 10°F, CLEAR SKIES, SMPH WIND 615 - Arrive onsite for OSI Fieldwork May's Enterprises onsite ( Doug Hunziker, Bill Unlois Ryan Northcutt) 025- Maris begins installing new the onto '040- Conduct tailgate satisfy meeting. oss Setup and dr. 11 rig in the Field near P. 187 and plug into oil "warmage" plug and direct heuter/bluer towards Enghe block. 142 - Come 750 dilling started 153 - Setupon P-162 Move location ~ 75 feet south of wetland to place on higher elevation out of topographic low that holds water 825- Begin drilling on 1-162 Nell Construction Notes: P-162 'Sch 40 Puc 10-510t, set base out 34.6' 50 S. Sand to 19.5' use 425 15 ent. Surgto GS, use D& Calc. Vol = 68 g) D; 5" DE=13" W= 69a JMUIS DOW

Location Ameren UE - Inbadie Date 12/10/04 135 Project / Client Reits Ters WEATHER: COLD, 25°F CLEARSKIES, 10-15 MPH WIND FROM WEST 1418 - Finished sanding dr. Ming and growthy P-762. much Selficulty with threats treezing on dr.M string bolts to 145/25 and freme pipes, Diso tremie pipe become discunnected and tell hoto 145As, which regulared refriend. The generater can and of gas which required refueling and the growthand to be mixed Growthose became Clagged during the mixing of growt that rained disconnecting and treeing clas. The plutch on the lig also had to be blad 1435 - Setup on P- 140. 1455-Begandrillagon P-160. 1653- Enished dinking to 25' on A140 For 1725 Finished unloading supplies. Maxis and I offette

Project/Client Reitz & Jens Date 12/11/09 WEATHER: COLD, 15°F, PARTLY CLOUDY CALM 015- Anhe onsite for OST Fieldwork. Maxis Enterprises onsite ( Voug Hunziker Bill Onbois Ryan Northeutt) 100 - Conduct tailgate safety meeting. Setup on P-160 728 - Resume dilling on P-160. Well Construction Motes: P- 400 "Sch 40 PVC 10-Shot setbase at 35" 340 P. Sand to 21.5', use 275 505. Sund to 20 use 40 Bent. Slurry to GS use 28 ( Calc. Vol. = 51 g) 0:= 3" 0= 7" W= 50g 348 - Emisheddinling sand a growthy P. 160. 210- Setup on P-183 25- Begon drilling on P183 14- Finished drilling, sand & growthy P- 183 15- Finished getting lunch and filling water tank on support trailer Setup on P-195 More the staked location ~ 50 north to stay out of topographic low that holds water 145- Begindi, Illing on P-195. Comes Doll

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Location Americal Date 12/14/09

Mon. Project / Client Reitz 4 Jens WEATHER: COOL 55% MOSTEY CLOUDY BREEZY TEMP. DEOPPING TO 35 OF BY 1400 HOURS 123 - Arrive onsite for DSI fieldwork Mile Calzona Frank Phillips already onsthe performing aguiter tests. 40 - Maxis Enterprises onsite ( Doug Hunziller Bin Onbois & Ryan Northeutt) 05- Max's begins growting wells whoulets using the Chile Car for + ransportation, and decon of the HSAs Good Comments P-199 10g None P-201 59 145 Max's stated the ground is too soft For them to grant any more wells. Theretire, they begin drilling weep holes 1. the protective casing Also, empty growt-tank to remove pieces of ice that are clogging the 30 - Maris Enterprises of site for day. 105- Mike Carlson, Frank Phillips and I are offsite

Location Amelant Labadic Date 12/15/69 139

Project / Client Pett 4 Jens Project / Client <u>Reitz 4 Jens</u> WEATHER: COLD 20°F PARTW CLOUDY 5-10MAH WING FROM THE WORTH 0628- Arive onsite for DSI Jeldwork Mike Carson & Masis Enterprises Long Hunziker Bill Duba's, & Kyan Northeutfors, te. 0700- Conductal gate sately meeting. 0828- Attertually in Starting 14 and pulling support frech & trate we are sety on P-175. Moved the stalled location 18' south due to a topographic low with starlle water at the location. 0954-Beginarilling on P-175. Well Construction Notes: P-175. 2" Sch. 40 PVC 10-3/0+ set base at 35" 29/40 P. Sand to 20.3\* use 250 16 39/50 S. Sand to 19.3 use 40 U Bent. Slurry to GS, use 32 9 (Calc. Vol = 49 g) 0:=12" 0=165 \* Heavingsands Intiltrated HSA- during the tremie of the fitter pack. SHELBY TUBT P-175 1-3'
GMNIS DOLL 26 Rec.

Location Amelenue - Labadie Date 12/15/09
Tues Location America UE-Labadie Project / Client Leitz & Jens 140- Finished dilling, sand of growting P-175 38- Setup on P-185. Use Gredell Truck Conc to load hand water Pick up Tunch in Lubadie white getting water 58- Begindilling on P-185. Jell Construction Notes: P-185 Sch 40 Puc 10-Stot set base at 35.1 40 P. Sand to 21.75, use 275 16 1505. Sand to 20.6', use 40 16 ent. Slumy to GS, use \_ 35 g Calc Vol = 53 q) D = 16" D= 21" We 509 '04D-Mile Carlson i Frank Philips offsite. 734-Finished di. Many sand a groupting P-185. 130- Finish pulling support tinck/trailer out of field and move drill via to Farm access road. Max & Enterprises and I offsite.

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Location Ancie UE - Labadie Date 12/16/09 Location America 4E-Labardic Project / Client Reitz & Jans Project / Client Reitza Jens WEATHER: COOL 40°F CLEAR SKIES, 5MPHFROM Piczometers & Grout Amount 1-150 -160 -162 250 onsite -164 -169 -171 100 -173 Wells Completed -175 -179 120 -181 -183 197, P- 199, P-201 -185 109 -191 10g Wells Developed 159 -193 -195 104 -197 -199 -201 622 - Finished secusing site. Maris Enterprises and I off site and I offsite OMVIS DOW

WEATHER: COLD, 25%, PARTLY CLOUDY CRLA Maris Enters ises ( Doug Hurske BIN Oubos, & Ryan Mortheuts 0705- Maxis begins well campletions and I begin well development P150 P-160 P-162, P-164, P-169 71, P-173, P-175 P-179, A-181 183, P-185, P-191, P-193 P-195 Best Chips Adda \* 12/22/09-TAO-P-138 1 P. 152 Completed \* P-171 P-174 P-181 P-191 P-201 1630-Max: Enterprises stated the CViolet on the RAT MAN Pental Club Cax Broke. Secure site Max's Enterprises

Location Americant Laboration Date 12/22/09  Project / Client Paits & Jeans Tues.	145
Project/Client Reitz & Jens Tues.	
WEATHER: COLD 30°F, OUERCAST, FOGOT	

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## **Appendix 4**

# Piezometer Boring Logs and Temporary Boring Descriptions

Detailed Site Investigation Proposed Utility Waste Disposal Area Ameren Labadie Power Plant

### **KEY TO SYMBOLS**

Symbol Description

Strata symbols

Silt

Very Fine to Fine Sand

Coarse to Very Coarse

Medium Sand



Clay



Silty Clay



"Gley" Facies (Except for 100% Sand)



Large Gravel
(Pebbles and Cobbles)



Small Gravel (Granules)

Misc. Symbols

\_\_\_\_\_

Boring continues

끝

Water table during drilling

Soil Samplers

Bulk/Grab sample

Standard penetration test

 $\bigvee$ 

Bulk sample taken from 6 in. auger

Monitor Well Details

T

capped riser with locking cover

Symbol Description



protective casing set in concrete



bentonite slurry



silica sand, blank PVC



slotted pipe w/ sand



endcap on pipe packed in sand

#### **GREDELL** BORING LOG P-9 ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant **LOCATION:** Heisel-NW, N of LBR, W of farm access Rd. Proposed Utility Waste Disposal Area G.S. ELEVATION: 469,90' T.O.C. ELEVATION: 473,26' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 996108.40 **EASTING:** 726981.78 LITHOLOGY PERCENT RECOVERY WELL CONSTRUCTION DIAGRAM CLAY SAMPLE TYPE SM GRAVEL GRAVEL WATER TABL DESCRIPTION VC SAND VF SAND FACIES I.D. M SAND SAND SAND SILTY CLAY 470 0 0.0-1.1 ft; Sandy Silt, brown, 10YR 4/3, damp, FB \loose. 1.1-2.0 ft; Silty Sand, dark brown, 10YR 3/3, 100 damp, soft, mottles (10YR 4/6). 2.0-2.4 ft; Fine Sand, with very fine sand, brown, 10YR 4/3, damp, loose. 465 2.4-5.0 ft; Clayey Silt, trace very fine sand below 3.1 ft, dark brown and brown, 10YR 3/3 and 4/3, slightly plastic, damp, soft. FP/ 60 5.0-7.0 ft; Poor recovery, probable Clayey Silt Lev 7.0-15.5 ft; Fine Sand grading to Silty Sand, 10 -460 thin beds, dark brown, 10YR 3/3; dark grayish 100 brown, 10YR 4/2, and herringbone laminated at 7.9 ft; mottles (10YR 4/6), trace clay and wet below 10.0 ft. - 455 15 15.5-31.3 ft; Fine Sand, with very fine sand, brown, 10YR 4/3, wet, soft, trace coarse sand (<1%) at 20.2 ft. 450 20 100 445 25 STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. WATER LEVELS: **DURING DRILLING** APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE DRILLER: AFTER DRILLING: \_\_\_ Ryan Hunziker GRADUAL OR MAY OCCUR BETWEEN LOGGED BY: DATE: T. Doll SAMPLES. DATE DRILLED: 10/20/09 PIEZOMETER: INSTALLED AT +/- 34.8 FEET NOTES: S. King (Gredell) onsite **VERTICAL DATUM: NAVD 88** START TIME: 8:02AM developing piezometers. END TIME: HORIZONTAL DATUM: NAD 83 11:22AM WEATHER: Cool, 50°F, Partly Cloudy, Mild, Calm. **BOREHOLE DIA.:** 10.25"

#### GREDELL **BORING LOG P-9** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant **LOCATION:** Heisel-NW, N of LBR, W of farm access Rd. Proposed Utility Waste Disposal Area G.S. ELEVATION: 469.90' T.O.C. ELEVATION: 473.26' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 996108.40 **EASTING:** 726981.78 **LITHOLOGY** CLAY SAMPLE TYPE SM GRAVEL **DESCRIPTION** VC SAND VF SAND FACIES 1.D. M SAND F SAND တို $\mathbf{C}$ 30 -94 31.3-36.1 ft; Coarse Sand, with medium sand and fine sand, dark grayish brown 10YR 4/2, wet, soft to loose. - 435 35 -100 36.1-36.5 ft; Medium to Coarse Sand, dark gray 10YR 4/1, trace fine gravel, 15 mm clasts, subrounded quartz and feldspars, (fine sand slough probable in top of 35.0 ft S.S.). BORING TERMINATED IN MEDIUM TO - 430 40 COARSE SAND @36.5 FT 425 45 50 - 420 -415 55 STRATIFICATION LINES ARE APPROXIMATE LITHOLOGIC BOUNDARIES DRILLING CO.: Max's Enterprises, Inc. WATER LEVELS: DURING DRILLING \_\_\_\_\_ 10 \_\_\_ FEET AFTER DRILLING: DRILLER: ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN Ryan Hunziker DATE: LOGGED BY: T. Doll SAMPLES. PIEZOMETER: INSTALLED AT +/- 34.8 FEET DATE DRILLED: 10/20/09 NOTES: S. King (Gredell) onsite **VERTICAL DATUM: NAVD 88** START TIME: 8:02AM developing piezometers. END TIME: 11:22AM **HORIZONTAL DATUM: NAD 83** BOREHOLE DIA.: WEATHER: Cool, 50°F, Partly Cloudy, Mild, Calm. 10.25"

#### GREDELL **BORING LOG P-12** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant **LOCATION:** Heisel-NW, N of LBR, E of farm access Rd. Proposed Utility Waste Disposal Area G.S. ELEVATION: 468.95' T.O.C. ELEVATION: 472.14' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 996215.71 **EASTING:** 728171.12 LITHOLOGY WELL CONSTRUCTION DIAGRAM CLAY SM GRAVEL G GRAVEL SAMPLE TYPE **JEPTH (FEET) NATER TABL DESCRIPTION** /C SAND VF SAND FACIES I.D. M SAND SAND SAND SILTY CLAY 470 0 0.0-0.8 ft; Clayey Silt grading to silt. FB 0.8-1.3 ft; Clay, very dark gray, 10YR 3/1, highly plastic, firm, damp, trace roots, mottles 100 \(10YR 4/6). 1.3-3.5 ft; Clayey Silt, dark grayish brown, 465 10YR 4/2, with clay laminae, damp, plastic. 5 3.5-4.8 ft; Clayey Silty Sand, yellowish brown, grading moist. 4.8-5.9 ft; Silty Clay, brown, plastic, damp. 53 \5.9-6.7 ft; Clay, dark brown, plastic. 6.7-10.0 ft; Silt grading to Clay grading to Very 460 Fine Sand, interlaminated, light brown. 10 10.0-33.3 ft; Fine Sand grading to Medium FP/ Sand, dark gray to brown, 10YR 4/1 to 4/3, Lev (Gley) 1 3/N in 25 ft S.S., wet below 15 ft, 20 some clay below 20 ft, (clay slough probable in 30.0 ft S.S.). 455 15 72 450 20 CO/ BS 445 25 33 STRATIFICATION LINES ARE WATER LEVELS: DRILLING CO.: Max's Enterprises, Inc. **DURING DRILLING** APPROXIMATE LITHOLOGIC BOUNDARIES AFTER DRILLING: DRILLER: Dave Hunziker ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN LOGGED BY: M. Carlson SAMPLES. PIEZOMETER: INSTALLED AT +/- 33.8 FEET DATE DRILLED: 09/16/09 NOTES: Chris Vierrether, MDNR, **VERTICAL DATUM: NAVD 88** START TIME: 1:40PM onsite observing drilling **HORIZONTAL DATUM: NAD 83** END TIME: 4:15PM activities. WEATHER: Clear, 70s°F, Dry. BOREHOLE DIA .: 8.25"

#### **GREDELL BORING LOG P-12** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Heisel-NW, N of LBR, E of farm access Rd. **Proposed Utility Waste Disposal Area G.S. ELEVATION:** 468.95' **T.O.C. ELEVATION:** 472.14' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 996215.71 **EASTING:** 728171.12 LITHOLOGY PERCENT RECOVERY WELL CONSTRUCTION DIAGRAM CLAY SM GRAVEL SAMPLE TYPE G GRAVEL **NATER TABL** DESCRIPTION VC SAND VF SAND FACIES I.D. M SAND F SAND SAND CLAY FP/ 10.0-32.5 ft; Fine Sand grading to Medium Sand, dark gray to brown, 10YR 4/1 to 4/3, Lev 440 (Gley) 1 3/N in 25 ft S.S., wet below 15 ft, some clay below 20 ft, (clay slough probable in 30 30.0 ft S.S.). 61 32.5-36.5 ft; Medium to Coarse Sand, gray, C 10YR 5/1, wet, medium consistency. 435 35 100 BORING TERMINATED IN MEDIUM TO COARSE SAND @36.5 FT 430 40 425 45 420 50 415 55 STRATIFICATION LINES ARE APPROXIMATE LITHOLOGIC BOUNDARIES WATER LEVELS: DURING DRILLING \_\_\_\_15\_\_ FEET DRILLING CO.: Max's Enterprises, Inc. AFTER DRILLING: \_\_ ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN DRILLER: Dave Hunziker DATE: LOGGED BY: M. Carlson SAMPLES. PIEZOMETER: INSTALLED AT +/- 33.8 FEET DATE DRILLED: 09/16/09 NOTES: Chris Vierrether, MDNR. START TIME: **VERTICAL DATUM: NAVD 88**

onsite observing drilling

activities.

END TIME:

BOREHOLE DIA.:

1:40PM

4:15PM

8.25"

**HORIZONTAL DATUM: NAD 83** 

WEATHER: Clear, 70s°F, Dry.

#### **GREDELL BORING LOG P-15** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Heisel-NW, W of farm access Rd. **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 469,35' T.O.C. ELEVATION: 472.40' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 995802.44 **EASTING:** 727271.36 LITHOLOGY RECOVERY CONSTRUCTION CLAY SM GRAVEL -G GRAVEL SAMPLE TYPE DEPTH (FEET) **DESCRIPTION** VC SAND VF SAND FACIES I.D. SAND M SAND SILTY CLAY 470 0 0.0-1.5 ft; Fine Sand, light brown. FB 1.5-1.8 ft; Very Fine Sand grading to silt, 100 \laminated. 1.8-3.4 ft; Clayey Silt, thinly bedded, olive 465 \gray. 5 3.4-4.2 ft; Clay, dark brown, plastic, firm. \4.2-5.0 ft; Silty Clay, medium brown. 5.0-10.0 ft; Silt, Clay, and Very Fine Sand, 18 interlaminated. 460 10 10.0-13.3 ft; Silt and Very Fine Sand, FP/ 100 interlaminated, with clay laminae. Lev 13.3-28.3 ft; Fine Sand grading to Silty Sand 455 grading to Medium Sand; fine sand bed to 18.3 15 ft, clay seams; silty sand bed to 23.3 ft, clay laminae; medium sand bed below 25.0 ft, clay balls; olive gray. 450 20 44 445 25 61 STRATIFICATION LINES ARE WATER LEVELS: DURING DRILLING 10.5 DRILLING CO.: Max's Enterprises, Inc. APPROXIMATE LITHOLOGIC BOUNDARIES AFTER DRILLING: \_\_\_ DRILLER: Dave Hunziker ONLY: ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN LOGGED BY: M. Carlson PIEZOMETER: INSTALLED AT +/- 35.0 FEET DATE DRILLED: 09/16/09 NOTES: Chris Vierrether, MDNR, **VERTICAL DATUM: NAVD 88** START TIME: 4:40PM onsite observing drilling **HORIZONTAL DATUM: NAD 83** END TIME: 8:50AM 9/17 activities.

**BOREHOLE DIA.:** 

8.25"

WEATHER: Clear, 70s°F, Dry.

#### **GREDELL BORING LOG P-15** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Heisel-NW, W of farm access Rd. **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 469.35' T.O.C. ELEVATION: 472.40' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 995802.44 **EASTING:** 727271.36 **LITHOLOGY** SAMPLE TYPE CLAY DEPTH (FEET) SM GRAVEL GRAVEL **DESCRIPTION** VF SAND VC SAND FACIES 1.D. M SAND C SAND F SAND တို FP/ Lev 28.3-36.5 ft; Medium to Coarse Sand, with $\mathbf{C}$ 440 trace gravel, clean below 35.0 ft. 30 61 CM/ Sp 435 35 100 BORING TERMINATED IN MEDIUM SAND @36.5 FT 430 40 425 45 420 50 415 55 STRATIFICATION LINES ARE **WATER LEVELS:** DRILLING CO.: Max's Enterprises, Inc. DURING DRILLING 10.5 FEET APPROXIMATE LITHOLOGIC BOUNDARIES DRILLER: AFTER DRILLING: Dave Hunziker FEET ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN LOGGED BY: DATE: M. Carlson DATE DRILLED: PIEZOMETER: INSTALLED AT +/- 35.0 FEET 09/16/09 START TIME: NOTES: Chris Vierrether, MDNR, **VERTICAL DATUM: NAVD 88** 4:40PM onsite observing drilling END TIME: **HORIZONTAL DATUM: NAD 83** 8:50AM 9/17 activities. **BOREHOLE DIA.:** 8.25" WEATHER: Clear, 70s°F, Dry.

#### **GREDELL BORING LOG P-17** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant **LOCATION:** Heisel-NE- E of farm access Rd, N of LBR **Proposed Utility Waste Disposal Area G.S. ELEVATION:** 469.30' **T.O.C. ELEVATION:** 472.19' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 995789.75 **EASTING:** 727851.61 **LITHOLOGY** PERCENT RECOVERY CONSTRUCTION DIAGRAM CLAY GRAPHIC LOG SM GRAVEL **JEPTH (FEET)** G GRAVEL DESCRIPTION ELEVATION VC SAND VF SAND FACIES I.D. M SAND SAND SAND SILTY CLAY 470 0 0.0-0.9 ft; Clayey Silt grading to Silt. FB 0.9-1.8 ft; Silt and Very Fine Sand, interlaminated, clay laminae, light to medium 100 \1.8-3.1 ft; Silty Clay, dark brown, plastic. 465 3.1-4.6 ft; Silt grading to Silty Clay, laminated, 5 4.6-5.0 ft; Very Fine Sand grading to Fine FP/ Sand, light brown. Lev 5.0-10.0 ft; Very Fine Sand, wet at base. 30 460 10 10.0-15.0 ft; Fine Sand, light gray, dry, clean. 37 455 15 15.0-28.3 ft; Very Fine Sand to Fine Sand, thin beds, trace clay, silty sand laminae at 21.0 ft. 450 20 78 445 25 56 STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. **WATER LEVELS:** DURING DRILLING APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE DRILLER: AFTER DRILLING: \_\_\_ Dave Hunziker GRADUAL OR MAY OCCUR BETWEEN LOGGED BY: DATE: M. Carlson SAMPLES. DATE DRILLED: 09/16/09 PIEZOMETER: INSTALLED AT +/- 35.0 FEET NOTES: Chris Vierrether, MDNR, **VERTICAL DATUM: NAVD 88** START TIME: 11:00AM onsite observing drilling **HORIZONTAL DATUM: NAD 83** END TIME: 1:15PM activities. BOREHOLE DIA.: WEATHER: Clear, 70s°F, Dry. 8.25"

#### **GREDELL BORING LOG P-17** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Heisel-NE- E of farm access Rd, N of LBR Proposed Utility Waste Disposal Area G.S. ELEVATION: 469.30' T.O.C. ELEVATION: 472.19' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 995789.75 **EASTING:** 727851.61 LITHOLOGY WELL CONSTRUCTION DIAGRAM CLAY SM GRAVEL SAMPLE TYPE G GRAVEL DESCRIPTION VF SAND VC SAND M SAND F SAND C SAND CLAY 28.3-36.5 ft; Fine Sand, trace coarse sand at FP/ 440 31.5 ft, brown, firm, dense. Lev 30 100 435 35 100 BORING TERMINATED IN FINE SAND @36.5 FT 430 40 425 45 420 50 415 55 STRATIFICATION LINES ARE APPROXIMATE LITHOLOGIC BOUNDARIES DRILLING CO.: Max's Enterprises, Inc. WATER LEVELS: DURING DRILLING 15 FEET DRILLER: AFTER DRILLING: ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN SAMPLES. Dave Hunziker LOGGED BY: DATE: M. Carlson PIEZOMETER: INSTALLED AT +/- 35.0 FEET DATE DRILLED: 09/16/09 NOTES: Chris Vierrether, MDNR, **VERTICAL DATUM: NAVD 88** START TIME: 11:00AM onsite observing drilling END TIME: 1:15PM **HORIZONTAL DATUM: NAD 83** activities. **BOREHOLE DIA.:** 8.25" WEATHER: Clear, 70s°F, Dry.

#### **GREDELL BORING LOG P-19** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Heisel-NE, N of LBR, E of farm access Rd. **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 467.90' T.O.C. ELEVATION: 470.84' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 995768.95 **EASTING:** 728438.40 LITHOLOGY RECOVERY WELL CONSTRUCTION DIAGRAM CLA√ SM GRAVEL G GRAVEL **DESCRIPTION** VF SAND VC SAND FACIES 1.D. M SAND SAND SAND SILTY CLAY 470 0 0.0-0.5 ft; Clayey Sandy Silt, dark brown, FB 10YR 3/3, wet, soft. 0.5-1.5 ft; Silty Sand, dark yellowish brown, 100 10YR 4/4, moist, loose. 465 1.5-3.2 ft; Silty Clay grading to Fine Sand, trace very fine sand, thin beds; silty clay, very 5 dark grayish brown, 10YR 3/2, plastic, moist, stiff, mottles (10YR 4/6); fine sand, dark yellowish brown, 10YR 4/4, moist, loose. 75 FP/ 3.2-6.3 ft; Clayey Silt, dark brown, 10YR 3/3. 460 Lev medium plasticity, moist, stiff. 6.3-7.1 ft; Clayey Silty Sand, dark brown, 10 10YR 3/3, moist, soft. 7.1-9.6 ft; Fine Sand, clean, brown, 10YR 4/3, laminated, damp, soft. 9.6-30.8 ft; Fine Sand, with medium sand, trace 455 very fine sand, brown, 10YR 4/3, wet, soft (clay slough probable in top of 10.0 and 15.0 ft 15 S.S.). 78 450 20 445 25 STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. WATER LEVELS: DURING DRILLING APPROXIMATE LITHOLOGIC BOUNDARIES AFTER DRILLING: \_ DRILLER: Ryan Hunziker ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN LOGGED BY: T. Doll PIEZOMETER: INSTALLED AT +/- 34.8 DATE DRILLED: 10/16/09 NOTES: Mr. Turnstall onsite to bid/ **VERTICAL DATUM: NAVD 88** START TIME: 9:20AM observe needed repairs of farm **HORIZONTAL DATUM: NAD 83** END TIME: 11:55AM access road. BOREHOLE DIA.: WEATHER: Cold, 45°F, Overcast, Intermittent Lt. Rain, 10 MPH Wind from N. 10.25"

#### GREDELL **BORING LOG P-19** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Heisel-NE, N of LBR, E of farm access Rd. **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 467.90' T.O.C. ELEVATION: 470.84' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 995768.95 **EASTING:** 728438.40 **LITHOLOGY** CLAY SAMPLE TYPE SM GRAVEL **DESCRIPTION** VC SAND **VF SAND** M SAND C SAND SAND 9.6-30.8 ft; Fine Sand, with medium sand, trace FP/ 440 very fine sand, brown, 10YR 4/3, wet, soft Lev (clay slough probable in top of 10.0 and 15.0 ft S.S.). 30 72 30.8-36.5 ft; Medium to Coarse Sand grading to Gravelly Sand, dark gray, 10YR 4/1, 25 mm subrounded clasts, loose, wet. 435 35 **BORING TERMINATED IN GRAVELLY** SAND @36.5 FT 430 40 425 45 420 50 415 55 STRATIFICATION LINES ARE **WATER LEVELS:** DRILLING CO.: Max's Enterprises, Inc. DURING DRILLING 10 FEET APPROXIMATE LITHOLOGIC BOUNDARIES ONLY, ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN SAMPLES. AFTER DRILLING: DRILLER: Ryan Hunziker DATE: LOGGED BY: T. Doll PIEZOMETER: INSTALLED AT +/- \_\_ DATE DRILLED: 10/16/09 START TIME: NOTES: Mr. Turnstall onsite to bid/ **VERTICAL DATUM: NAVD 88** 9:20AM observe needed repairs of farm HORIZONTAL DATUM: NAD 83 END TIME:

BOREHOLE DIA.:

11:55AM

10.25"

#### GREDELL **BORING LOG P-20** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Heisel-NW, N of LBR, W of farm access Rd. **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 469.35' T.O.C. ELEVATION: 472.28' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 995510.59 **EASTING:** 726856.24 **LITHOLOGY** CONSTRUCTION DIAGRAM PERCENT RECOV CLAY SM GRAVEL GRAVEL SAMPLE TYPE WATER TABL **DESCRIPTION** VC SAND VF SAND FACIES I.D. M SAND F SAND C SAND SILTY CLAY Ö 470 0 0.0-1.0 ft; Silt grading to Clayey Silt. FB1.0-2.0 ft; Very Fine Sand grading to Fine \Sand, light brown, dry. 2.0-5.0 ft; Clayey Silt with Very Fine Sand. 465 5 5.0-10.0 ft; Very Fine Sand grading to Silt grading to Clay, very thinly bedded, ripple laminations. 18 460 10 10.0-13.3 ft; Silty Clay, interlaminated with silt 100 and clay thin beds, moist. 13.3-18.3 ft; Silty Clay grading to Very Fine 455 Sand, grading to Fine Sand at 16.2 ft, wet. 15 FP/ 56 Lev 18.3-28.3 ft; Clayey Silt grading to Very Fine 450 and Fine Sand, (No sample recovery from 25.0-20 26.5 ft). 67 445 25 0 STRATIFICATION LINES ARE DURING DRILLING DRILLING CO.: Max's Enterprises, Inc. WATER LEVELS: APPROXIMATE LITHOLOGIC BOUNDARIES AFTER DRILLING: \_ DRILLER: Dave Hunziker ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN DATE: LOGGED BY: M. Carlson PIEZOMETER: INSTALLED AT +/- 34.8 FEET DATE DRILLED: 09/17/09 NOTES: Chris Vierrether, MDNR, **VERTICAL DATUM: NAVD 88** START TIME: 9:30AM onsite observing drilling **HORIZONTAL DATUM: NAD 83** END TIME: 11:30AM activities. **BOREHOLE DIA.:** WEATHER: Not recorded. 8.25"

#### **GREDELL BORING LOG P-20** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Heisel-NW, N of LBR, W of farm access Rd. **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 469.35' T.O.C. ELEVATION: 472.28' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 995510.59 **EASTING:** 726856.24 **LITHOLOGY** CLAY SAMPLE TYPE SM GRAVEL G GRAVEL DEPTH (FEET) WATER TABL DESCRIPTION VC SAND VF SAND FACIES 1.D. M SAND GRAPHIC PERCENT F SAND C SAND SILTY CLAY 18.3-28.3 ft; Clayey Silt grading to Very Fine FP/ and Fine Sand, (No sample recovery from 25.0-26.5 ft). 440 30 100 33.3-36.5 ft; Very Fine Sand grading to Fine FP/ 435 Sand, grading to Coarse Sand at 36.2 ft. Lev 35 C 100 **BORING TERMINATED IN COARSE SAND** @36.5 FT 430 40 425 45 420 50 415 55 STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. **WATER LEVELS:** DURING DRILLING 15 FEET APPROXIMATE LITHOLOGIC BOUNDARIES DRILLER: AFTER DRILLING: FEET Dave Hunziker ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN LOGGED BY: DATE: M. Carlson PIEZOMETER: INSTALLED AT +/- 34.8 FEET DATE DRILLED: 09/17/09 NOTES: Chris Vierrether, MDNR, **VERTICAL DATUM: NAVD 88** START TIME: 9:30AM onsite observing drilling **HORIZONTAL DATUM: NAD 83** END TIME: 11:30AM activities. **BOREHOLE DIA.:** WEATHER: Not recorded.

#### **GREDELL BORING LOG P-22** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Heisel-NW, N of LBR, W of farm access Rd. **Proposed Utility Waste Disposal Area G.S. ELEVATION:** 468.40' **T.O.C. ELEVATION:** 471.27' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 995503.03 **EASTING:** 727579.54 LITHOLOGY WELL CONSTRUCTION DIAGRAM CLAY SM GRAVEL SAMPLE TYPE G GRAVEL GRAPHIC LOG **JEPTH (FEET) WATER TABI** DESCRIPTION VC SAND VF SAND FACIES I.D. SAND SAND SAND SILTY CLAY 470 0 0.0-1.3 ft; Silty Sand, brown, 10YR 4/3, moist, FB soft, stiff below 1.9 ft. 1.3-2.5 ft; Clayey Sandy Silt, very dark grayish 100l brown, 10YR 3/2, moist, stiff. 465 2.5-3.0 ft; Fine Sand, with very fine sand, brown, 10YR 4/3, moist, soft. 5 3.0-5.0 ft; Sandy Silty Clay, dark brown, 10YR 3/3, slightly plastic, stiff. 5.0-6.0 ft; Clayey Sandy Silt grading to Silty Sand, thin beds, dark brown, 10YR 3/3, moist, FP/ 460 Lev 6.0-7.9 ft; Silty Clay, very dark grayish brown 10 10YR 3/2, plastic, stiff, moist, mottles (10YR 4/6). 7.9-13.2 ft; Silty Sand and Fine Sand, thin 65 beds, gravish brown and brown, 10YR 5/2 and 455 4/3, wet below 10.0 ft, laminated below 10.8 ft, CO/ stiff below 13.0 ft. BS 15 13.2-28.3 ft; Sandy Silt, alternating thin beds of 100 Clayey Silt and Fine Sand, very dark gray (Gley) 1 3/N to 20.7 ft, wet, soft, laminated from 13.2-13.3 ft and 15.3-16.5 ft, dark gray, 450 10YR 4/1, below 20.7 ft, trace coarse sand below 25.8 ft, (clayey silt and fine sand slough probable in top of 20.0-30.0 ft S.S.). 20 FP/ 89 Lev 445 25 61 STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. **WATER LEVELS:** DURING DRILLING APPROXIMATE LITHOLOGIC BOUNDARIES AFTER DRILLING: \_\_ DRILLER: Ryan Hunziker ONLY: ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN LOGGED BY: DATE: T. Doll PIEZOMETER: INSTALLED AT +/- 35.0 FEET DATE DRILLED: 10/07/09 NOTES: Chris Vierrether (MDNR), M. **VERTICAL DATUM: NAVD 88** START TIME: 8:15AM Carlson & S. King (Gredell) **HORIZONTAL DATUM: NAD 83** END TIME: 11:42AM onsite observing drilling BOREHOLE DIA.: 10.25" WEATHER: Cold, 45°F, Clear Skies, Calm. activities. MO Gas onsite.

#### **GREDELL BORING LOG P-22** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Heisel-NW, N of LBR, W of farm access Rd. Proposed Utility Waste Disposal Area G.S. ELEVATION: 468.40' T.O.C. ELEVATION: 471.27' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 995503.03 **EASTING:** 727579.54 LITHOLOGY CONSTRUCTION DIAGRAM CLAY SM GRAVEL G GRAVEL DESCRIPTION VF SAND VC SAND FACIES I.D. M SAND F SAND C SAND SILTY FP/ 440 Lev 28.3-36.5 ft; Medium to Coarse Sand, trace fine CM/ sand and gravel, dark gray, 10YR 4/1, 20 mm 30 Sp subrounded clasts, wet, (fine sand and clay 100 slough probable in top of 35.0 ft S.S.). C 435 35 100 BORING TERMINATED IN COARSE SAND @36.5 FT 430 40 425 45 420 50 415 55 STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. WATER LEVELS: DURING DRILLING \_\_\_\_\_10\_\_ FEET APPROXIMATE LITHOLOGIC BOUNDARIES DRILLER: AFTER DRILLING: ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN Ryan Hunziker LOGGED BY: DATE: T. Doll PIEZOMETER: INSTALLED AT +/- 35.0 FEET DATE DRILLED: 10/07/09 NOTES: Chris Vierrether (MDNR), M. **VERTICAL DATUM: NAVD 88** START TIME: 8:15AM Carlson & S. King (Gredell) **HORIZONTAL DATUM: NAD 83** END TIME: 11:42AM onsite observing drilling BOREHOLE DIA.: 10.25" WEATHER: Cold, 45°F, Clear Skies, Calm. activities. MO Gas onsite.

Figure P-22 Sheet 2 of 2

#### **GREDELL BORING LOG P-24** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Heisel-Northeast. East of farm access Rd. **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 468.50' T.O.C. ELEVATION: 471.44' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 995476.21 **EASTING:** 728133.29 LITHOLOGY RECOVERY CLAY WATER TABLE SAMPLE TYPE SM GRAVEI GRAVEL DEPTH (FEET) DESCRIPTION VC SAND VF SAND FACIES I.D. M SAND SAND SAND SILTY CLAY 470 0 0-1.3 ft; Silt and Clayey Silt, wind blown. FB 1.3-2.3 ft; Clay, pale yellowish brown, 10YR 6/ 100 $\setminus$ 2, plastic. 2.3-3.1 ft; Silt and Clayey Silt, light brown, 465 non-cohesive, dry. 5 3.1-4.2 ft; As above, laminated, moist. 4.2-7.0 ft; Silt and Clay, highly interlaminated to cross-laminated, pale yellowish orange, FP/ 27 10YR 8/6, base poorly defined due to lack of Lev 460 7.0-15.0 ft; Very Fine to Fine Sand, grayish orange, 10YR 7/4, poor recovery, saturated 10 below 13 ft. 17 455 15 15.0-31.0 ft; Fine Sand, grayish orange, 10YR 100 7/4, laminated, well sorted, trace clay (slough), grading to medium sand. 450 20 445 25 39 STRATIFICATION LINES ARE **WATER LEVELS:** DRILLING CO.: Max's Enterprises, Inc. DURING DRILLING APPROXIMATE LITHOLOGIC BOUNDARIES AFTER DRILLING: \_ FEET DRILLER: Dave Hunziker ONLY: ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN LOGGED BY: DATE: M. Carlson PIÉZOMETER: INSTALLED AT +/- 35.0 FEET DATE DRILLED: 09/16/09 NOTES: Chris Vierrether, MDNR, **VERTICAL DATUM: NAVD 88** START TIME: 7:25AM onsite observing drilling **HORIZONTAL DATUM: NAD 83** END TIME: 10:20AM activities. BOREHOLE DIA.: 8.25" WEATHER: Clear, 70s°F, Dry.

### **GREDELL BORING LOG P-24** ENGINEERING RESOURCES, INC.

Ameren Missouri Labadie Power Plant **Proposed Utility Waste Disposal Area Detailed Site Investigation** 

CLIENT: Reitz & Jens, Inc.

LOCATION: Heisel-Northeast. East of farm access Rd. G.S. ELEVATION: 468.50' T.O.C. ELEVATION: 471.44'

**NORTHING:** 995476.21 **EASTING:** 728133.29

OLIL			T			NORTHING: 393470	7,21	<u> </u>	-/-\			HO					$\dashv$
ОЕРТН (FEET)	ELEVATION	WELL CONSTRUCTION DIAGRAM WATER TABLE	GRAPHIC LOG	SAMPLE TYPE	PERCENT RECOVERY	DESCRIPTION	FACIES I.D.	CLAY	SILTY CLAY	SILT	VF SAND	F SAND	M SAND	C SAND	VC SAND	SM GRAVEL	LG GRAVEL
30 —	- 440 				44	15.0-31.0 ft; Fine Sand, grayish orange, 10YR 7/4, laminated, well sorted, trace clay (slough), grading to medium sand.	FP/ Lev										
35 —	- - 435 -					31.0-36.5 ft; Fine to Medium Sand, grayish orange, 10YR 7/4, well sorted, sparse coarsevery coarse sand toward base.	FP/ Lev	:									
40 —	- - 430 -				100	BORING TERMINATED IN COARSE TO VERY COARSE SAND AT 36.5 FT											
45 —	- - - 425 - -																
50 —	- - 420 - -																
55	- <b>415</b>																
DDII I IN	G CO : May	r's Enternrises	Inc	L		STRATIFICATION LINES ARE WATER LE	VFI S:	DI	IRIN	G DE	211 1 1	NG		3	FE	FT	

DRILLING CO.: Max's Enterprises, Inc. DRILLER: Dave Hunziker LOGGED BY: M. Carlson DATE DRILLED: 09/16/09 START TIME: 7:25AM END TIME: 10:20AM BOREHOLE DIA.: 8.25"

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

NOTES: Chris Vierrether, MDNR, onsite observing drilling activities.

WATER LEVELS: DURING DRILLING \_\_\_13\_\_ FEET

AFTER DRILLING: \_\_\_\_\_ FEET

DATE:

PIEZOMETER: INSTALLED AT +/- 35.0 FEET

**VERTICAL DATUM: NAVD 88 HORIZONTAL DATUM: NAD 83** WEATHER: Clear, 70s°F, Dry.

#### **GREDELL BORING LOG P-27** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Heisel-NW, W of farm access Rd Proposed Utility Waste Disposal Area **G.S. ELEVATION:** 469.07' **T.O.C. ELEVATION:** 471.99' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 995206.06 **EASTING:** 727247.55 **LITHOLOGY** RECOVERY WELL CONSTRUCTION DIAGRAM CLAY SAMPLE TYPE SM GRAVEL GRAVEL WATER TABL **DESCRIPTION** VC SAND VF SAND FACIES I.D. SAND SAND M SAND SILTY CLAY 470 0 0.0-0.6 ft; Silt FB \0.6-1.0 ft; Very Fine Sand 1.0-2.0 ft; Silt and Very Fine Sand, 100 interlaminated. 2.0-10.0 ft; Clay grading to Silty Clay, with 1-2 465 inch silt and very fine sand seams, dark brown. 5 28 460 10 10.0-23.3 ft; Very Fine Sand grading to Fine FP/ Sand, cross-laminated to 11.5 ft, clay balls Lev from 15.0-16.5 ft, clay seam at 20.7 ft. 455 15 22 450 20 61 23.3-28.3 ft; Fine Sand with clay balls, lignite 445 and coarse sand at 26.0 ft; grading to fine sand, 25 clean. 67 STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. WATER LEVELS: DURING DRILLING APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE DRILLER: AFTER DRILLING: \_\_\_\_ Dave Hunziker GRADUAL OR MAY OCCUR BETWEEN LOGGED BY: M. Carlson SAMPLES. DATE DRILLED: PIEZOMETER: INSTALLED AT +/- \_\_\_35.2 FEET 09/17/09 NOTES: Chris Vierrether (MDNR), START TIME: **VERTICAL DATUM: NAVD 88** 12:20AM Dan Binz (R&J), John Eimer **HORIZONTAL DATUM: NAD 83** END TIME: 2:25PM (Ameren) & T. Doll (Gredell) WEATHER: Not recorded. **BOREHOLE DIA.:** 8.25" onsite observing drilling,

#### **GREDELL BORING LOG P-27** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Heisel-NW, W of farm access Rd Proposed Utility Waste Disposal Area G.S. ELEVATION: 469.07' T.O.C. ELEVATION: 471.99' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 995206.06 **EASTING:** 727247.55 **LITHOLOGY** CLAY SM GRAVEL G GRAVEL WATER TABL DESCRIPTION VC SAND VF SAND M SAND C SAND F SAND SILTY 28.3-36.5 ft; Fine Sand, clean, grayish green at FP/ 440 Lev 30 100 435 35 100 **BORING TERMINATED IN FINE SAND** @36.5 FT 430 40 425 45 420 50 415 55 STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. **WATER LEVELS:** DURING DRILLING \_\_\_\_\_10\_\_\_ FEET APPROXIMATE LITHOLOGIC BOUNDARIES DRILLER: AFTER DRILLING: Dave Hunziker ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN LOGGED BY: DATE: M. Carlson DATE DRILLED: PIEZOMETER: INSTALLED AT +/- 35.2 FEET 09/17/09 NOTES: Chris Vierrether (MDNR), START TIME: **VERTICAL DATUM: NAVD 88** 12:20AM Dan Binz (R&J), John Eimer END TIME: HORIZONTAL DATUM: NAD 83 2:25PM (Ameren) & T. Doll (Gredell) **BOREHOLE DIA.:** 8.25" WEATHER: Not recorded. onsite observing drilling.

#### **GREDELL BORING LOG P-29** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant **LOCATION:** Heisel-NW- N of LBR, W of farm access Rd. Proposed Utility Waste Disposal Area G.S. ELEVATION: 467.73' T.O.C. ELEVATION: 470.83' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 995188.03 **EASTING:** 727844.69 **LITHOLOGY** CLAY SAMPLE TYPE SM GRAVE! GRAVEL WATER TABI DESCRIPTION VC SAND VF SAND FACIES I.D. M SAND SAND C SAND SILTY 470 0 0.0-1.3 ft; Clayey Silt grading to Silt, medium FBbrown grading to light brown, cross-laminated below 0.9 ft. 100 465 1.3-3.6 ft; Clay, olive gray, plastic. 3.6-5.9 ft; Silty Clay, olive gray. 5 5.9-10.2 ft; Silt and Clay, alternating thin beds, laminated, wet at 6.9 ft. 460 10 10.2-13.0 ft; Clay, very dark gray, (Gley), iron CO/ concretions. BS 52 455 13.0-15.0 ft; Very Fine Sand grading to Silt FP/ grading to Clay, thin beds, medium brown. Lev 15 22 450 20 61 20.6-28.3 ft; Fine Sand grading to Medium and Coarse Sand, clay seam at 26.5 ft. 445 25 STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. **WATER LEVELS:** DURING DRILLING \_\_\_\_\_6.9 FEET APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE DRILLER: Dave Hunziker AFTER DRILLING: \_\_\_ GRADUAL OR MAY OCCUR BETWEEN LOGGED BY: M. Carlson SAMPLES. PIEZOMETER: INSTALLED AT +/- 35.2 FEET DATE DRILLED: 09/15/09 NOTES: T. Doll (Gredell) onsite **VERTICAL DATUM: NAVD 88** START TIME: 10:56AM observing drilling activities. END TIME: HORIZONTAL DATUM: NAD 83 2:15PM **BOREHOLE DIA.:** WEATHER: Clear, 70s°F, Dry. 8.25"

## GREDELL ENGINEERING RESOURCES, INC.

## **BORING LOG P-29**

Ameren Missouri Labadie Power Plant Proposed Utility Waste Disposal Area Detailed Site Investigation

 $\textbf{LOCATION:} \ \ Heisel-NW-\ N\ of\ LBR,\ W\ of\ farm\ access\ Rd.$ 

**G.S. ELEVATION:** 467.73' **T.O.C. ELEVATION:** 470.83'

**NORTHING:** 995188.03 **EASTING:** 727844.69

DESCRIPTION  DESCR	CLIENT: R	eitz & J	ens,	ln	c.	NORTHING: 99518	8.03	<u> </u>	<u>AS</u>			72				
28.3-36.5 ft; Medium to Coarse Sand, trace clay at contact, trace gravel, gray, 10YR 5/1 Sp clasts.  100  BORING TERMINATED IN MEDIUM TO COARSE SAND @36.5 FT  SHELBY TUBE SAMPLE COLLECTED AT 2.0-4.0 FT DEPTH AT COMPLETION OF DRILLING.					ER						LIT	HO	<u>LO</u>	GΥ		
28.3-36.5 ft; Medium to Coarse Sand, trace clay at contact, trace gravel, gray, 10YR 5/1 clasts.  28.3-36.5 ft; Medium to Coarse Sand, trace clay at contact, trace gravel, gray, 10YR 5/1 clasts.  Do a solution of the state of	DEPTH (FEET)	WELL CONSTRUCTION DIAGRAM WATER TABLE	GRAPHIC LOG	SAMPLE TYPE	PERCENT RECOV	DESCRIPTION	FACIES 1.D.	CLAY	SILTY CLAY	SILT	VF SAND	F SAND	M SAND	C SAND	VC SAND	SM GRAVEL
clay at contact, trace gravel, gray, 10YR 5/1    100	440															
clasts.  100  BORING TERMINATED IN MEDIUM TO COARSE SAND @36.5 FT SHELBY TUBE SAMPLE COLLECTED AT 2.0-4.0 FT DEPTH AT COMPLETION OF DRILLING.	-															
BORING TERMINATED IN MEDIUM TO COARSE SAND @36.5 FT  SHELBY TUBE SAMPLE COLLECTED AT 2.0-4.0 FT DEPTH AT COMPLETION OF DRILLING.					100		•									
BORING TERMINATED IN MEDIUM TO COARSE SAND @36.5 FT  SHELBY TUBE SAMPLE COLLECTED AT 2.0-4.0 FT DEPTH AT COMPLETION OF DRILLING.	435		•••													
BORING TERMINATED IN MEDIUM TO COARSE SAND @36.5 FT SHELBY TUBE SAMPLE COLLECTED AT 2.0-4.0 FT DEPTH AT COMPLETION OF DRILLING.	5															
COARSE SAND @36.5 FT  SHELBY TUBE SAMPLE COLLECTED AT 2.0-4.0 FT DEPTH AT COMPLETION OF DRILLING.					100											
2.0-4.0 FT DEPTH AT COMPLETION OF DRILLING.	430															
DRILLING.  DRILLING.	) <del> </del>														,.,,,,,	
5	-															
-420 415	425															
	5 5															
-415	-						,									
415	420															
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DRILLING CO.: Max's Enterprises, Inc.
DRILLER: Dave Hunziker
LOGGED BY: M. Carlson
DATE DRILLED: 09/15/09
START TIME: 10:56AM
END TIME: 2:15PM
BOREHOLE DIA.: 8.25"

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

NOTES: T. Doll (Gredell) onsite observing drilling activities.

WATER LEVELS: DURING DRILLING 6.9 FEET AFTER DRILLING: FEET DATE:

PIEZOMETER: INSTALLED AT +/- 35.2 FEET VERTICAL DATUM: NAVD 88

VERTICAL DATUM: NAVD 88
HORIZONTAL DATUM: NAD 83
WEATHER: Clear, 70s°F, Dry.

#### **GREDELL BORING LOG P-31** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant **LOCATION:** Heisel-Northeast. East of farm access Rd. Proposed Utility Waste Disposal Area G.S. ELEVATION: 467.67' T.O.C. ELEVATION: 470.22' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING**: 994921.76 **EASTING:** 726950.89 LITHOLOGY PERCENT RECOVERY WELL CONSTRUCTION DIAGRAM CLAY GRAPHIC LOG SAMPLE TYPE SM GRAVEL G GRAVEL WATER TABL DESCRIPTION ELEVATION VF SAND VC SAND M SAND SAND SAND SILTY CLAY 470 0 0-0.9 ft; Clayey Silt, dark brown. FB 0.9-1.4 ft; Silt and Very Fine Sand, light brown, laminated. 100 465 1.4-4.4 ft; Clay, light olive gray, 5Y 6/1. scattered very thin beds of silt, plastic, firm. 4.4-9.2 ft; Silty Clay, light olive gray, 5Y 6/1, 5 plastic, moist. 100 460 9.2-12.0 ft; Very Fine Sand, Silt and Clay, FP/ 10 highly interlaminated, pale yellowish brown, Lev 12.0-21.0 ft; Fine Sand, grayish orange, 10YR 100 455 7/4, well sorted, carbonaceous fragments at 14.3 ft, saturated, sharp lower contact. 15 450 20 89 21.0-32.5 ft; Silty Sand, distinct very dark gray CO/ (Gley) 1 3/N, scattered plastic clay layers up to BS 445 0.5 ft thick, interbedded with fine sand noted above (fine sand slough probable in top S.S.). 25 100 STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. **WATER LEVELS:** DURING DRILLING APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE DRILLER: AFTER DRILLING: \_ Ryan Hunziker GRADUAL OR MAY OCCUR BETWEEN LOGGED BY: M. Carlson DATE: \_ SAMPLES. PIEZOMETER: INSTALLED AT +/- 34.5 FEET DATE DRILLED: 10/12/09 START TIME: NOTES: T. Doll (Gredell) onsite to **VERTICAL DATUM: NAVD 88** 12:00AM relieve M. Carlson. S. King END TIME: 3:10PM **HORIZONTAL DATUM: NAD 83** (Gredell) onsite developing **BOREHOLE DIA.:** 10.25" WEATHER: Cool, 50°F, Overcast, Mild, 5 MPH Wind from E. piezometers.

#### **GREDELL BORING LOG P-31** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Heisel-Northeast. East of farm access Rd. Proposed Utility Waste Disposal Area G.S. ELEVATION: 467.67' T.O.C. ELEVATION: 470.22' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 994921.76 **EASTING:** 726950.89 PERCENT RECOVERY **LITHOLOGY** WELL CONSTRUCTION DIAGRAM WATER TABLE CLAY SAMPLE TYPE SM GRAVEL G GRAVEL **DESCRIPTION** ELEVATION VC SAND FACIES I.D. VF SAND M SAND SAND SAND 21.0-32.5 ft; Silty Sand, distinct very dark gray CO/ 440 (Gley) 1 3/N, scattered plastic clay layers up to BS 0.5 ft thick, interbedded with fine sand noted above (fine sand slough probable in top S.S.). 30 100 435 32.5-36.5 ft; Medium to Coarse Sand, grayish CM/ orange, 10YR 7/4, trace gravel, (fine sand Sp slough in top S.S.). 35 100 **BORING TERMINATED IN MEDIUM** 430 SAND @36.5 FT 40 425 45 420 50 415 55 STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. **WATER LEVELS:** DURING DRILLING APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE DRILLER: Ryan Hunziker AFTER DRILLING: \_ GRADUAL OR MAY OCCUR BETWEEN LOGGED BY: M. Carlson DATE: SAMPLES DATE DRILLED: 10/12/09 PIEZOMETER: INSTALLED AT +/- 34.5 FEET START TIME: NOTES: T. Doll (Gredell) onsite to **VERTICAL DATUM: NAVD 88** 12:00AM relieve M. Carlson, S. King END TIME: **HORIZONTAL DATUM: NAD 83** 3:10PM (Gredell) onsite developing **BOREHOLE DIA.:** 10.25" WEATHER: Cool, 50°F, Overcast, Mild, 5 MPH Wind from E. piezometers.

#### **GREDELL BORING LOG P-33** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Heisel-Northeast. East of farm access Rd. **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 468.44' T.O.C. ELEVATION: 471.18' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 994910.34 **EASTING:** 727559.71 LITHOLOGY PERCENT RECOV CONSTRUCTION DIAGRAM CLAY SM GRAVEL SAMPLE TYPE G GRAVEL DESCRIPTION VC SAND ELEVATION VF SAND M SAND ACIES I.D. SAND C SAND SILTY CLAY 470 0 0-1.4 ft; Clayey Silt, light brown. FB1.4-2.3 ft; Silt, light olive gray, 5Y 6/1, \laminated, sparse clay lamina, friable. 465 2.3-6.8 ft; Clay to Silty Clay, very thin to thin bedded, light olive gray, 5Y 6/1, scattered silt 5 lamina, contorted beds-scour contact at 6.0 ft, lower contact scoured, erosional. 6.8-8.2 ft; Clay, laminated, olive gray, 5Y 4/1, 100 trace silt, plastic. 460 8.2-11.6 ft; Silt and Clay, highly interlaminated, pale yellowish brown, 10YR 6/ 10 2, saturated. 11.6-26.0 ft; Fine Sand, grayish orange, 10YR FP/ 50 7/4, trace clay and silt, sharp lower contact. Lev 455 15 94 450 20 56 445 25 39 26.0-30.0 ft; Coarse Sand, grayish orange, $\mathbf{C}$ STRATIFICATION LINES ARE **WATER LEVELS:** DRILLING CO.: Max's Enterprises, Inc. DURING DRILLING APPROXIMATE LITHOLOGIC BOUNDARIES AFTER DRILLING: FEET ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN DRILLER: Doug Hunziker DATE: LOGGED BY: M. Carlson SAMPLES. PIEZOMETER: INSTALLED AT +/- 34.8 DATE DRILLED: 09/14/09 NOTES: Chris Vierrether, MDNR. VERTICAL DATUM: NAVD 88 START TIME: 9:42AM onsite observing drilling HORIZONTAL DATUM: NAD 83 END TIME: 3:50PM activities. WEATHER: Clear, Sunny, 70s°F, Dry. **BOREHOLE DIA.:** 8.25"

#### **GREDELL BORING LOG P-33** ENGINEERING RESOURCES, INC.

Ameren Missouri Labadie Power Plant Proposed Utility Waste Disposal Area **Detailed Site Investigation** 

CLIENT: Reitz & Jens, Inc.

LOCATION: Heisel-Northeast. East of farm access Rd.

G.S. ELEVATION: 468.44' T.O.C. ELEVATION: 471.18'

**NORTHING:** 994910.34 **EASTING:** 727559.71

OLILIAT. 1	Kenz & Jens,	111		NORTHING: 994910	J.3 <del>4</del>		40		THC	2/3 LO				-
DEPTH (FEET) ELEVATION	WELL CONSTRUCTION DIAGRAM WATER TABLE GRAPHIC LOG	SAMPLE TYPE	PERCENT RECOVERY	DESCRIPTION	FACIES I.D.	CLAY	SILTY CLAY	VE SAND			C SAND	VC SAND	SM GRAVEL	
- 440				10YR 7/4, common lignite fragments.								-		
435			72	30.0-36.5 ft; Medium to Coarse Sand, grayish orange, 10YR 7/4, gravelly with 2-10 mm clasts (granules-small pebbles), (fine sand slough in last S.S.).	С									
35 –			44	BORING TERMINATED IN MEDIUM										
430				SAND @36.5 FT										
40														
425														
45 –														
420														
50														
415														
55 –														

DRILLER: LOGGED BY: DATE DRILLED: START TIME: END TIME: BOREHOLE DIA.:

Doug Hunziker

M. Carlson

09/14/09

9:42AM

3:50PM

8.25"

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

NOTES: Chris Vierrether, MDNR,

onsite observing drilling activities.

WATER LEVELS: DURING DRILLING 8.2 FEET AFTER DRILLING: \_\_\_\_\_ FEET

DATE: \_ PIEZOMETER: INSTALLED AT +/- 34.8 FEET

**VERTICAL DATUM: NAVD 88 HORIZONTAL DATUM: NAD 83** WEATHER: Clear, Sunny, 70s°F, Dry.

#### **GREDELL BORING LOG P-35** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Heisel-NE-E of farm access Rd, N of LBR **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 467.61' T.O.C. ELEVATION: 470.61' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **EASTING:** 728125.58 **NORTHING:** 994886.38 LITHOLOGY WELL CONSTRUCTION DIAGRAM CLAY SM GRAVEL SAMPLE TYPE GRAVEL **JEPTH (FEET) NATER TABL DESCRIPTION** /C SAND VF SAND M SAND SAND SAND SILTY CLAY 470 0 0.0-1.3 ft; Silt and Clayey Silt, thin beds, light FB 1.3-3.2 ft; Clay, plastic, olive gray. 100 465 3.2-4.3 ft; Silty Clay and Clay, olive gray. 4.3-4.8 ft; Silt, light gray 5 4.8-6.2 ft; Clay, olive gray, plastic, firm. 6.2-10.2 ft; Silt and Clay, alternating thin beds, wet below 8.5 ft. 47 460 10 10.2-15.0 ft; Clayey Silt, wet. 30 455 15 15.0-18.3 ft; Fine Sand, with clay laminae, FP/ 50 olive gray, clean. Lev 450 18.3-28.3 ft; Fine Sand grading to Medium-Coarse Sand, with clay laminae. 20 67 445 25 $\mathbf{C}$ 100 STRATIFICATION LINES ARE WATER LEVELS: **DURING DRILLING** DRILLING CO.: Max's Enterprises, Inc. APPROXIMATE LITHOLOGIC BOUNDARIES AFTER DRILLING: \_ DRILLER: Doug Hunziker ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN LOGGED BY: M. Carlson SAMPLES. PIEZOMETER: INSTALLED AT +/- 33.0 FEET DATE DRILLED: 9/15/09 NOTES: T. Doll (Gredell) onsite **VERTICAL DATUM: NAVD 88** START TIME: 4:20PM 9/14 observing drilling activities. **HORIZONTAL DATUM: NAD 83** END TIME: 10:25AM

**BOREHOLE DIA.:** 

8,25"

WEATHER: Clear, Sunny, 70s°F, Dry.

### **GREDELL** ENGINEERING RESOURCES, INC.

## **BORING LOG P-35**

Ameren Missouri Labadie Power Plant LOCATION: Heisel-NE-E of farm access Rd, N of LBR **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 467.61' T.O.C. ELEVATION: 470.61' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc.

**EASTING:** 728125.58 **NORTHING:** 994886.38 **LITHOLOGY** SP SM GRAVEI GRAVEL DEPTH (FEET) WATER TABL DESCRIPTION VC SAND ELEVATION VF SAND M SAND FACIES I.D. C SAND SAND SILTY g 440 28.3-33.3 ft; Medium-Coarse Sand grading to  $\mathbf{C}$ Very Coarse-Gravelly Sand, medium gray. 30 8 435 33.3-36.5 ft; Medium-Coarse Sand  $\mathbf{C}$ 35 BORING TERMINATED IN COARSE SAND 430 @36.5 FT 40 425 45 420 50 415 55

DRILLING CO.: Max's Enterprises, Inc. DRILLER: Doug Hunziker LOGGED BY: M. Carlson DATE DRILLED: 9/15/09 START TIME: 4:20PM 9/14 END TIME: 10:25AM **BOREHOLE DIA.:** 8.25"

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

NOTES: T. Doll (Gredell) onsite observing drilling activities. WATER LEVELS: DURING DRILLING 8.5 FEET AFTER DRILLING: \_\_ FEET DATE:

PIEZOMETER: INSTALLED AT +/- 33.0 FEET

**VERTICAL DATUM: NAVD 88 HORIZONTAL DATUM: NAD 83** WEATHER: Clear, Sunny, 70s°F, Dry.

#### GREDELL **BORING LOG P-36** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Heisel-NE-E of farm access Rd, N of LBR **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 468.20' T.O.C. ELEVATION: 471.23' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 995058.28 **EASTING:** 728509.44 LITHOLOGY WELL CONSTRUCTION DIAGRAM CLAY SM GRAVEL G GRAVEL SAMPLE TYPE **WATER TABLE** DESCRIPTION VC SAND VF SAND FACIES 1.D. M SAND SAND F SAND SILTY CLAY 470 0 0.0-1.0 ft; Clayey Silt, dark grayish brown, FB \10YR 4/2, firm, dry. \1.0-1.6 ft; Clay, dark brown, plastic, firm. 1.6-2.6 ft; Silty Clay, dark brown. 465 2.6-6.6 ft; Silt and Clayey Silt, laminated, yellowish brown. 5 6.6-10.0 ft; grading to Clay and Silt, laminated, 40 wet. 460 10 FP/ 10.0-32.5 ft; Very Fine Sand grading to Fine Sand, thin beds, trace clay, wet. Lev 10 455 15 100 450 20 39 445 25 61 STRATIFICATION LINES ARE WATER LEVELS: DURING DRILLING DRILLING CO.: Max's Enterprises, Inc. APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE AFTER DRILLING: \_ DRILLER: Dave Hunziker GRADUAL OR MAY OCCUR BETWEEN DATE: LOGGED BY: M. Carlson SAMPLES. PIEZOMETER: INSTALLED AT +/- 35.3 FEET DATE DRILLED: 9/15/09 **VERTICAL DATUM: NAVD 88** NOTES: T. Doll (Gredell) onsite START TIME: 3:11AM observing drilling activities. **HORIZONTAL DATUM: NAD 83** END TIME: 5:00PM WEATHER: Cloudy, Spotty Rain, 70s°F, Dry. **BOREHOLE DIA.:** 8.25"

## GREDELL ENGINEERING RESOURCES, INC.

## **BORING LOG P-36**

Ameren Missouri Labadie Power Plant Proposed Utility Waste Disposal Area Detailed Site Investigation

CLIENT: Reitz & Jens, Inc.

LOCATION: Heisel-NE-E of farm access Rd, N of LBR

G.S. ELEVATION: 468.20' T.O.C. ELEVATION: 471.23'

NORTHING: 995058.28 EASTING: 728509.44

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<b>DEPTH (FEET)</b>	ELEVATION	WELL CONSTRUCTION DIAGRAM WATER TABLE	GRAPHIC LOG	SAMPLE TYPE	PERCENT RECOVERY	DESCRIPTION	FACIES I.D.	CLAY	SILTY CLAY	SILT	VF SAND	F SAND	M SAND	C SAND	VC SAND	SM GRAVEL	LG GRAVEL
				П		·											
	440					10.0-32.5 ft; Very Fine Sand grading to Fine Sand, thin beds, trace clay, wet.	FP/ Lev										
30 -	_																
-	_				39												
-	- 435					32.5-36.5 ft; Fine Sand grading to Medium	CO/										
35	_					Sand, greenish gray clayey sand at base.	BS										
-					72										-,,,		
-	- 430					BORING TERMINATED IN CLAYEY SAND @36.5 FT											
-	- 430																
40 -	_																
	_																
-	<del>-</del> 425								-				,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,				
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DRILLING CO.: Max's Enterprises, Inc.
DRILLER: Dave Hunziker
LOGGED BY: M. Carlson
DATE DRILLED: 9/15/09
START TIME: 3:11AM
END TIME: 5:00PM

8.25"

BOREHOLE DIA.:

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

observing drilling activities.

NOTES: T. Doll (Gredell) onsite

WATER LEVELS: DURING DRILLING \_\_\_\_\_\_ FEET AFTER DRILLING: \_\_\_\_\_\_ FEET DATE:

PIEZOMETER: INSTALLED AT +/- 35.3 FEET

VERTICAL DATUM: NAVD 88
HORIZONTAL DATUM: NAD 83
WEATHER: Cloudy, Spotty Rain, 70s°F, Dry.

#### GREDELL **BORING LOG P-38** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Heisel-West-S. in ROW of Labadie Bottom Rd Proposed Utility Waste Disposal Area G.S. ELEVATION: 467.15' T.O.C. ELEVATION: 470.11' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 994618.74 **EASTING:** 727238.62 LITHOLOGY RECOVERY WELL CONSTRUCTION DIAGRAM **NATER TABLE** CLAY SM GRAVEL SAMPLE TYPE G GRAVEL **DESCRIPTION** VC SAND VF SAND FACIES I.D. M SAND SAND SAND SILTY CLAY 470 0 0-0.5 ft; Silt, dark grayish brown, 10YR 4/2, FB 0.5-1.0 ft; Very fine sand, brown, 10YR 4/3, 465 100 dry, soft. 1.0-4.1 ft; Clay, very dark grayish brown, 10YR 3/2, moist, plastic, very firm, mottles 5 (10YR 4/6). 4.1-5.0 ft; Clayey Silt, dark grayish brown, 10YR 4/2, moist, soft. 460 100 5.0-6.3 ft; Poor recovery, probable Clay slough. 6.3-9.1 ft; Clay and Sandy Silt, alternating thin beds, dark grayish brown, 10YR 4/2; clay beds 10 highly plastic, very firm, mottles 10YR 4/6; sandy silt beds moist, soft. 9.1-12.5 ft; Fine Sand, brown, 10YR 4/3, 455 90 ripple laminated grading to laminated, wood CO/ fragments below 12 ft, iron oxide staining BS (10YR 5/6), moist grading to wet, very soft. 15 12.5-28.3 ft; Fine Sand, very dark gray (Gley) 1 100 3/N, trace very fine sand, grading to medium sand below 25.6 ft, saturated, non-cohesive 450 (fine sand and clay slough probable in top of S.S.). 20 445 25 89 STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. **WATER LEVELS: DURING DRILLING** APPROXIMATE LITHOLOGIC BOUNDARIES AFTER DRILLING: DRILLER: Doug Hunziker ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN DATE: LOGGED BY: T. Doll PIEZOMETER: INSTALLED AT +/-DATE DRILLED: 9/22/09 NOTES: Chris Vierrether (MDNR) and **VERTICAL DATUM: NAVD 88** START TIME: 7:35AM John Eimer & Rich Hill **HORIZONTAL DATUM: NAD 83** END TIME: 10:35AM (Ameren) onsite observing BOREHOLE DIA.: WEATHER: Warm, 65°F, Mostly Cloudy, Humid, Calm, Rained Last Evening. 8.25" drilling activities,

#### GREDELL **BORING LOG P-38** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Heisel-West-S. in ROW of Labadie Bottom Rd **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 467.15' T.O.C. ELEVATION: 470.11' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 994618.74 **EASTING:** 727238.62 **LITHOLOGY** WELL CONSTRUCTION DIAGRAM CLAY SAMPLE TYPE GRAPHIC LOG G GRAVEL SM GRAVEI DESCRIPTION ELEVATION VF SAND VC SAND FACIES I.D. M SAND C SAND SAND 440 28.3-36.5 ft; Medium Sand grading to Coarse CO/ Sand, very dark to dark gray (Gley) 1 3/N and BS 30 4/N, (fine sand noted at total depth based on 100 cuttings sample collected from auger bit). 435 35 100 **BORING TERMINATED IN FINE SAND** 430 @36.5 ft 40 425 45 420 50 415 55 STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. **WATER LEVELS:** DURING DRILLING 10 FEET APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE DRILLER: AFTER DRILLING: Doug Hunziker GRADUAL OR MAY OCCUR BETWEEN LOGGED BY: DATE: T. Doll SAMPLES. PIEZOMETER: INSTALLED AT +/- 34.6 FEET DATE DRILLED: 9/22/09 START TIME: 7:35AM NOTES: Chris Vierrether (MDNR) and **VERTICAL DATUM: NAVD 88** John Eimer & Rich Hill END TIME: **HORIZONTAL DATUM: NAD 83** 10:35AM (Ameren) onsite observing BOREHOLE DIA.: 8.25" WEATHER: Warm, 65°F, Mostly Cloudy, Humid, Calm, Rained Last Evening. drilling activities.

#### GREDELL **BORING LOG P-40** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Heisel-South, Edge of LBR **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 467.05' T.O.C. ELEVATION: 469.93' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 994582.15 **EASTING:** 727832.47 LITHOLOGY RECOVERY CONSTRUCTION DIAGRAM CLAY SAMPLE TYPE SM GRAVEL **JEPTH (FEET)** -G GRAVEL **DESCRIPTION** ELEVATION VC SAND ACIES I.D. VF SAND SAND SAND M SAND CLAY 470 0 0-1.2 ft; Silty Clay and Silt, alternating thin FBbeds, olive gray, 5Y 4/1, moist, slightly plastic. 465 1.2-2.2 ft; Silty Clay, olive gray, 5Y 4/1, moist, 90 \plastic. 2.2-4.0 ft; Clay, olive gray, 5Y 4/1, plastic, 5 4.0-6.1 ft; Silty Clay, olive gray, 5Y 4/1, plastic. 460 6.1-6.5 ft; Clayey Silt, olive gray, 5Y 4/1. 80 6.5-6.9 ft; Silt, light brown, laminated. 6.9-8.8 ft; Clay and Silt, alternating thin beds, CO/ grayish orange, 10YR 7/4, laminated, moist, 10 BS soft. 8.8-14.5 ft; As above except for distinct color change across sharp contact to very dark gray 455 57 (Gley) 1 3/N. 15 14.5-21.0 ft; Fine Sand to Medium Sand, FP/ 100 grayish orange, 10YR 7/4, trace clay (slough), Lev saturated, non-cohesive, sharp contact with 450 below. 20 67 21.0-27.5 ft; Medium to Coarse Sand, gravish CM/ 445 orange, 10YR 7/4, sparse gravel. Sp 25 STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. WATER LEVELS: **DURING DRILLING** APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE DRILLER: AFTER DRILLING: \_ Doug Hunziker GRADUAL OR MAY OCCUR BETWEEN LOGGED BY: M. Carlson DATE: SAMPLES. DATE DRILLED: 10/12/09 PIEZOMETER: INSTALLED AT +/- 34.8 FEET START TIME: NOTES: S. King (Gredell) onsite **VERTICAL DATUM: NAVD 88** 7:57AM developing piezometers. END TIME: HORIZONTAL DATUM: NAD 83 10:59AM **BOREHOLE DIA.:** WEATHER: Cool, 40s°F, Partly Cloudy, Muddy. 8.25"

## **GREDELL BORING LOG P-40** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Heisel-South. Edge of LBR **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 467.05' T.O.C. ELEVATION: 469.93' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 994582.15 **EASTING:** 727832.47 LITHOLOGY PERCENT RECOVERY CLAY SM GRAVEL DEPTH (FEET) -G GRAVEL **DESCRIPTION** VF SAND VC SAND ELEVATION M SAND C SAND F SAND SILTY CLAY 440 27.5-32.0 ft; Fine to Medium Sand, grayish CM/ orange, 10YR 7/4, trace gravel and coarse Sp sand. 30 28 435 32.0-36.5 ft; Coarse to Very Coarse Sand, $\mathbf{C}$ grayish orange, 10YR 7/4, gravelly. 35 100 BORING TERMINATED IN VERY COARSE 430 SAND @36.5 FT 40 425 45 420 50 415 55 STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. WATER LEVELS: DURING DRILLING APPROXIMATE LITHOLOGIC BOUNDARIES DRILLER: FEET AFTER DRILLING: Doug Hunziker ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN LOGGED BY: DATE: M. Carlson DATE DRILLED: PIEZOMETER: INSTALLED AT +/- 34.8 FEET 10/12/09 NOTES: S. King (Gredell) onsite START TIME: 7:57AM **VERTICAL DATUM: NAVD 88** developing piezometers. END TIME: HORIZONTAL DATUM: NAD 83 10:59AM **BOREHOLE DIA.:** 8.25" WEATHER: Cool, 40s°F, Partly Cloudy, Muddy.

#### GREDELL **BORING LOG P-42** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Heisel-West-S of LBR, W of farm access Rd. Proposed Utility Waste Disposal Area G.S. ELEVATION: 467,74' T.O.C. ELEVATION: 470.60' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 994538.42 **EASTING:** 728420.83 **LITHOLOGY** RECOV CLAY SAMPLE TYPE SM GRAVEL GRAVEL DEPTH (FEET) **NATER TABL DESCRIPTION** /C SAND VF SAND FACIES I.D. SAND F SAND M SAND CLAY ō 470 0 0.0-0.5 ft; Clayey Silt, dark brown, 10YR 3/3, FB wet, soft. 0.5-1.5 ft; Silty Sand, dark grayish brown, 80 465 10YR 4/2, moist, soft. 1.5-3.0 ft; Silty Clay, very dark grayish brown, \10YR 3/2, plastic, stiff. 5 3.0-7.1 ft; Silty Clay and Clayey Silt, thin beds, dark grayish brown to brown, 10YR 4/2 and 4/ 3, slightly plastic, wet below 5.9 ft, soft, (clay FP/ 460 \slough probable in top of 5.0 ft C.S.). Lev 7.1-7.8 ft; Silty Sand, dark grayish brown, 10YR 4/2, laminated, wet, soft. 10 7.8-11.3 ft; Fine Sand grading to with very fine sand, grayish brown, 10YR 5/2, laminated above 10.0 ft, dry to 8.3 ft; wet below 8.3 ft, 40 455 loose to soft. 11.3-15.0 ft; grading to Fine Sand, with medium sand. 15 15.0-20.2 ft; Fine Sand, with very fine sand, brown, 10YR 4/3, wet, soft. 450 20 20.2-36.5 ft; Medium to Coarse Sand, with fine sand, alternating thin beds, dark yellowish brown and brown, 10YR 4/4 and 4/3, wet, soft 445 to loose, interbedded layers of fine sand, subrounded quartz and feldspar clasts, becoming dark gray, 10YR 4/1, below 35.6 ft. 25 100 STRATIFICATION LINES ARE WATER LEVELS: DRILLING CO .: Max's Enterprises, Inc. DURING DRILLING APPROXIMATE LITHOLOGIC BOUNDARIES DRILLER: AFTER DRILLING: Ryan Hunziker ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN LOGGED BY: DATE: T. Doll PIEZOMETER: INSTALLED AT +/-DATE DRILLED: 10/06/09 NOTES: Chris Vierrether, MDNR, **VERTICAL DATUM: NAVD 88** START TIME: 12:58AM onsite observing drilling **HORIZONTAL DATUM: NAD 83** END TIME: 5:09PM activities. **BOREHOLE DIA.:** 10.25" WEATHER: Warm, 70°F, Overcast, 25 MPH Gusting Wind from SW, Humid.

## **GREDELL BORING LOG P-42** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Heisel-West-S of LBR, W of farm access Rd. **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 467.74' T.O.C. ELEVATION: 470.60' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 994538.42 **EASTING:** 728420.83 LITHOLOGY WELL CONSTRUCTION DIAGRAM CLAY SAMPLE TYPE SM GRAVEL **JEPTH (FEET)** G GRAVEL DESCRIPTION VF SAND VC SAND FACIES I.D. M SAND C SAND SAND CLAY 20.2-36.5 ft; Medium to Coarse Sand, with fine 440 sand, alternating thin beds, dark yellowish brown and brown, 10YR 4/4 and 4/3, wet, soft to loose, interbedded layers of fine sand, 30 subrounded quartz and feldspar clasts, 61 becoming dark gray, 10YR 4/1, below 35.6 ft. 435 35 **BORING TERMINATED IN MEDIUM** 430 SAND @36.5 FT 40 425 45 420 50 415 55 STRATIFICATION LINES ARE APPROXIMATE LITHOLOGIC BOUNDARIES DRILLING CO.: Max's Enterprises, Inc. WATER LEVELS: DURING DRILLING 10 FEET DRILLER: AFTER DRILLING: ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN Rvan Hunziker LOGGED BY: DATE: T. Doll PIEZOMETER: INSTALLED AT +/- 34.8 FEET DATE DRILLED: 10/06/09 NOTES: Chris Vierrether, MDNR. **VERTICAL DATUM: NAVD 88** START TIME: 12:58AM onsite observing drilling END TIME: 5:09PM **HORIZONTAL DATUM: NAD 83** activities. BOREHOLE DIA.: 10.25" WEATHER: Warm, 70°F, Overcast, 25 MPH Gusting Wind from SW, Humid.

## **GREDELL BORING LOG P-43** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Heisel-West-S of LBR, W of farm access Rd **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 466,07' T.O.C. ELEVATION: 469.20' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 994333.02 **EASTING:** 726945.21 LITHOLOGY WELL CONSTRUCTION DIAGRAM ς¥ SM GRAVEL SAMPLE TYPE G GRAVEL DESCRIPTION VC SAND VF SAND FACIES 1.D. C SAND F SAND M SAND CLAY 0 0.0-1.0 ft; Silt, brown. FB465 \1.0-1.3 ft; Very Fine Sand, dry, light brown. 1.3-5.0 ft; Silty Clay grading to Clayey Silt, 53 with clay seams, dark brown. 5 5.0-7.0 ft; Clayey Silt and Clay, thin beds. 460 7.0-10.0 ft; Very Fine Sand. FP/ 45 Lev 10 10.0-13.3 ft; Silt, brown grading to (Gley), wet. CO/ 455 BS13.3-28.3 ft; Sandy Clay grading to Fine and Medium Sand, (Gley); with clay balls and clay 15 seams below 20.0 ft, medium brown. 450 20 100 25 100 440 STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. WATER LEVELS: DURING DRILLING 11.5 FEET APPROXIMATE LITHOLOGIC BOUNDARIES DRILLER: AFTER DRILLING: \_ Dave Hunziker ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN DATE: LOGGED BY: M. Carlson PIEZOMETER: INSTALLED AT +/- 34.8 FEET DATE DRILLED: 9/17/09 NOTES: Chris Vierrether (MDNR) and **VERTICAL DATUM: NAVD 88** START TIME: 3:05PM Dan Binz (R&J) onsite HORIZONTAL DATUM: NAD 83 END TIME: 5:20PM observing drilling activities.

BOREHOLE DIA.:

8.25"

WEATHER: Not recorded.

# **GREDELL BORING LOG P-43** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Heisel-West-S of LBR, W of farm access Rd Proposed Utility Waste Disposal Area G.S. ELEVATION: 466.07' T.O.C. ELEVATION: 469.20' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 994333.02 **EASTING:** 726945.21 LITHOLOGY CLAY SAMPLE TYPE SM GRAVEI G GRAVEL DESCRIPTION VF SAND VC SAND FACIES I.D. M SAND C SAND SAND 28.3-36.5 ft; Medium Sand grading to Coarse CO/ Sand, some gravel, (Gley-colored fine sand at BS 30 total depth based on cuttings sample collected 435 from auger bit). 35 100 430 **BORING TERMINATED IN FINE SAND** @36.5 FT 40 425 45 420 50 415 55 410 STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. WATER LEVELS: DURING DRILLING \_\_\_\_11.5\_\_ FEET APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE AFTER DRILLING: \_ FEET DRILLER: Dave Hunziker GRADUAL OR MAY OCCUR BETWEEN DATE: LOGGED BY: M. Carlson SAMPLES. PIEZOMETER: INSTALLED AT +/- 34.8 FEET DATE DRILLED: 9/17/09

NOTES: Chris Vierrether (MDNR) and

Dan Binz (R&J) onsite

observing drilling activities.

START TIME:

BOREHOLE DIA.:

END TIME:

3:05PM

5:20PM

8.25"

**VERTICAL DATUM: NAVD 88** 

HORIZONTAL DATUM: NAD 83

WEATHER: Not recorded.

#### **GREDELL BORING LOG P-45** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Heisel-West-S and adj to LBR Proposed Utility Waste Disposal Area G.S. ELEVATION: 467.12' T.O.C. ELEVATION: 470.07' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING: 994324.97 EASTING:** 727532.26 LITHOLOGY CLAY SAMPLE TYPE SM GRAVEL G GRAVEL WATER TABI DESCRIPTION VF SAND VC SAND ELEVATION M SAND FACIES I.D. C SAND SAND SILTY CLAY 470 0 0.0-1.2 ft; Silt grading to Very Fine Sand, FB cross-laminated, light brown. 465 1.2-10.0 ft; Clay, Silty Clay, and Clayey Silt, 100 alternating thin beds, dark brown, wet at 9.0 ft. 5 460 88 10 10.0-18.3 ft; Silty Sand, medium brown, FP/ laminated, wet, (clay slough noted in top of Lev 15.0 ft S.S.). 455 15 61 450 18.3-33.3 ft; Silty Sand grading to Fine Sand at 21.0 ft, gray; Gley-colored from 21.0-24.0 ft; 20 clay seam at 30.0 ft, medium brown. CO/ BS 445 FP/ 25 Lev 78 STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. **WATER LEVELS:** DURING DRILLING \_\_\_\_9\_\_ APPROXIMATE LITHOLOGIC BOUNDARIES DRILLER: ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN AFTER DRILLING: Doug Hunziker LOGGED BY: M. Carlson PIEZOMETER: INSTALLED AT +/- 34.8 DATE DRILLED: 9/18/09 NOTES: JoAnn Thee (Ameren) and T. **VERTICAL DATUM: NAVD 88** START TIME: 7:35AM Doll (Gredell) onsite **HORIZONTAL DATUM: NAD 83** END TIME: 10:10AM observing drilling activities.

**BOREHOLE DIA.:** 

8.25"

WEATHER: Clear, 70s°F, Dry.

## GREDELL **BORING LOG P-45** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Heisel-West-S and adj to LBR **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 467.12' T.O.C. ELEVATION: 470.07' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 994324.97 **EASTING:** 727532.26 LITHOLOGY CLAY SM GRAVEL SAMPLE TYPE GRAVEL **JEPTH (FEET)** WATER TABL DESCRIPTION VC SAND VF SAND M SAND F SAND C SAND 440 18.3-33.3 ft; Silty Sand grading to Fine Sand at FP/ 21.0 ft, gray; Gley-colored from 21.0-24.0 ft; Lev clay seam at 30.0 ft, medium brown. 30 100 435 33.3-36.5 ft; Fine to Medium Sand, grading to Fine Sand and Clay at 36.0 ft, alternating thin 35 beds; coarse to very coarse sand at base. $\mathbf{C}$ BORING TERMINATED IN COARSE SAND 430 @36.5 FT SHELBY TUBE SAMPLE COLLECTED AT 40 3.0-5.0 FT DEPTH AT COMPLETION OF DRILLING. 425 45 420 50 415 55 STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. **WATER LEVELS:** DURING DRILLING 9 FEET APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN DRILLER: Doug Hunziker AFTER DRILLING: \_\_ LOGGED BY: M. Carlson DATE: SAMPLES. PIEZOMETER: INSTALLED AT +/- 34.8 FEET DATE DRILLED: 9/18/09 NOTES: JoAnn Thee (Ameren) and T. **VERTICAL DATUM: NAVD 88** START TIME: 7:35AM Doll (Gredell) onsite **HORIZONTAL DATUM: NAD 83** END TIME: 10:10AM observing drilling activities. WEATHER: Clear, 70s°F, Dry. **BOREHOLE DIA.:** 8.25"

## **GREDELL BORING LOG P-47** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Heisel-West-W of farm access Rd, S of LBR **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 467.10' T.O.C. ELEVATION: 469.86' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 994320.66 **EASTING:** 728124.52 LITHOLOGY WELL CONSTRUCTION DIAGRAM CLAY SM GRAVEL -G GRAVEL **WATER TABLE** SAMPLE TYPE DEPTH (FEET) **DESCRIPTION** VC SAND VF SAND F SAND M SAND C SAND GRAPHIC CLAY 470 0 FB 0.0-1.3 ft; Silt, light brown. 1.3-2.2 ft; Silty Clay, olive gray. 465 2.2-4.2 ft; Clay, dark brown, lean, stiff. 4.2-5.0 ft; Sandy Silt, light brown. 5 5.0-7.2 ft; Clay grading to Silty Clay, dark brown. 460 7.2-10.0 ft; Very Fine Sand, light brown, dry. FP/ Lev 10 10.0-21.0 ft; Silty Sand, Sandy Silt, and Very

Fine Sand, alternating thin beds; clay seams to 11.5 ft; gray, sharp lower contact. 455 15 450 20 21.0-28.3 ft; Fine Sand to Coarse Sand, trace 445 gravel, alternating thin beds, sharp contact with above. 25 STRATIFICATION LINES ARE WATER LEVELS: DURING DRILLING DRILLING CO.: Max's Enterprises, Inc.

DRILLER: Doug Hunziker LOGGED BY: M. Carlson DATE DRILLED: 9/18/09 START TIME: 10:30AM END TIME: 1:15PM BOREHOLE DIA.: 8.25"

APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN SAMPLES.

NOTES: Dan Binz (R&J) and T. Doll (Gredell) onsite observing drilling activities.

AFTER DRILLING:

DATE: PIEZOMETER: INSTALLED AT +/- 34.9 FEET

**VERTICAL DATUM: NAVD 88 HORIZONTAL DATUM: NAD 83** WEATHER: Clear, 70s°F, Dry.

## **GREDELL BORING LOG P-47** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Heisel-West-W of farm access Rd, S of LBR Proposed Utility Waste Disposal Area G.S. ELEVATION: 467.10' T.O.C. ELEVATION: 469.86' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 994320.66 **EASTING:** 728124.52 LITHOLOGY PERCENT RECOVERY CLAY SM GRAVEL G GRAVEL DEPTH (FEET) DESCRIPTION VC SAND VF SAND FACIES I.D. M SAND F SAND C SAND CLAY 440 28.3-36.5 ft; Coarse Sand, gravelly C 30 67 435 35 39 **BORING TERMINATED IN COARSE SAND** 430 @36.5 FT 40 425 45 420 50 415 55 STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. WATER LEVELS: DURING DRILLING 6.5 FEET APPROXIMATE LITHOLOGIC BOUNDARIES DRILLER: AFTER DRILLING: FEET Doug Hunziker ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN LOGGED BY: DATE: M. Carlson DATE DRILLED: PIEZOMETER: INSTALLED AT +/- 34.9 FEET 9/18/09 NOTES: Dan Binz (R&J) and T. Doll START TIME: **VERTICAL DATUM: NAVD 88** 10:30AM (Gredell) onsite observing END TIME: **HORIZONTAL DATUM: NAD 83** 1:15PM drilling activities. **BOREHOLE DIA.:** 8.25" WEATHER: Clear, 70s°F, Dry.

#### **GREDELL BORING LOG P-49** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant **LOCATION:** Heisel-NW-Adj. to LBR and farm access Rd. **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 467,58' T.O.C. ELEVATION: 470.56' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 994499.84 **EASTING:** 728938.97 **LITHOLOGY** WELL CONSTRUCTION DIAGRAM GRAVEL CLAY SAMPLE TYPE GRAVEL **DESCRIPTION** VC SAND VF SAND FACIES 1.D. M SAND SAND PERCENT F SAND CLAY S Ō 470 0 0.0-0.5 ft; Clayey Silt, dark brown, 10YR 3/3, FB 0.5-1.5 ft; Clayey Silt, very dark grayish 100465 brown, 10YR 3/2, moist, stiff 1.5-6.3 ft; Silty Sand, Clayey Sandy Silt, and Clayey Silt, alternating thin beds, dark grayish 5 brown, 10YR 4/2, moist, loose grading to soft, herringbone cross-bedding and brown (10YR FP/ 4/3) below 3.8 ft, clayey silt below 5.9 ft. 460 Lev 6.3-8.8 ft; Fine Sand, trace very fine sand, dark yellowish brown, 10YR 4/4, herringbone cross-CO/ bedding, interbedded silt layers 1 mm thick and 10 BS dark grayish brown (10YR 4/2) below 6.9 ft. 100 8.8-15.3 ft; Silty Clay, dark to very dark gray, (Gley) 1 4/N to 3/N, iron concretions to 10.8 ft, 455 plastic, firm, trace very fine sand from 10.8 to 11.5 ft, soft below 10.8 ft, (clay slough probable in top of 15.0 ft S.S.). 15 100 15.3-23.3 ft; Fine Sand, trace very fine sand, FP/ dark grayish brown, 10YR 4/2, wet, soft, (clay Lev slough probable in top of 20.0 ft S.S.). 450 20 23.3-28.3 ft; Fine Sand, trace medium to coarse sand and gravel, brown, 10YR 4/2, wet, loose. 25 STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. **WATER LEVELS:** DURING DRILLING APPROXIMATE LITHOLOGIC BOUNDARIES DRILLER: AFTER DRILLING: \_ Ryan Hunziker ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN LOGGED BY: DATE: T. Doll PIEZOMETER: INSTALLED AT +/-DATE DRILLED: 10/14/09 NOTES: M. Carlson (Gredell), John **VERTICAL DATUM: NAVD 88** START TIME: 3:08PM Eimer (Ameren) and Jeff **HORIZONTAL DATUM: NAD 83 END TIME:** 5:08PM Fouse (R&J) onsite observing **BOREHOLE DIA.:** WEATHER: Cold, 45°F, Overcast, Intermittent Lt. Rain, 10-15 MPH NE Wind. 8,25" drilling activities. S. King,

## **GREDELL BORING LOG P-49** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Heisel-NW-Adj. to LBR and farm access Rd. Proposed Utility Waste Disposal Area G.S. ELEVATION: 467.58' T.O.C. ELEVATION: 470.56' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 994499.84 **EASTING:** 728938.97 **LITHOLOGY** WELL CONSTRUCTION DIAGRAM CLAY SM GRAVEL G GRAVEL **DESCRIPTION** VF SAND VC SAND FACIES I.D. M SAND C SAND F SAND SILTY FP/ 440 Lev 28.3-36.5 ft; Coarse Sand, with medium sand, trace gravel, subrounded 12 mm clasts, very 30 dark gray (Gley) 1 3/N below 35.6 ft. 50 435 35 61 BORING TERMINATED IN FINE SAND 430 @36.5 FT 40 425 45 420 50 415 55 STRATIFICATION LINES ARE APPROXIMATE LITHOLOGIC BOUNDARIES DRILLING CO.: Max's Enterprises, Inc. WATER LEVELS: DURING DRILLING \_\_\_ DRILLER: AFTER DRILLING: FEET ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN Ryan Hunziker LOGGED BY: DATE: T. Doll PIEZOMETER: INSTALLED AT +/- 35.0 DATE DRILLED: 10/14/09 NOTES: M. Carlson (Gredell), John **VERTICAL DATUM: NAVD 88** START TIME: 3:08PM Eimer (Ameren) and Jeff **HORIZONTAL DATUM: NAD 83** END TIME: . 5:08PM Fouse (R&J) onsite observing BOREHOLE DIA.: 8.25" WEATHER: Cold, 45°F, Overcast, Intermittent Lt. Rain, 10-15 MPH NE Wind. drilling activities. S. King.

#### **GREDELL BORING LOG P-51** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Newman-N-Adj. to LBR near AUELBE-004 **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 466.25' T.O.C. ELEVATION: 469.06' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 994463.37 **EASTING:** 729490.00 LITHOLOGY WELL CONSTRUCTION DIAGRAM GRAVEL CLAY WATER TABLE SM GRAVEL SAMPLE TYPE **JEPTH (FEET)** GRAPHIC LOG DESCRIPTION VC SAND VF SAND ACIES 1.D. F SAND SAND M SAND SILTY CLAY တု 0 0.0-1.0 ft; Clayey Silt, dark brown, 10YR 3/3, FB 465 \slightly plastic, wet, soft. 1.0-3.3 ft; Silty Clay, very dark grayish brown, 10YR 3/2, plastic, moist, stiff, mottles (10YR 3.3-4.5 ft; Silty Sand, brown, 10YR 4/3, damp, 5 \soft. 4.5-6.0 ft; Poor recovery, probable Silty Clay 460 FP/ \slough. Lev 80 6.0-8.4 ft; Clayey Silty Sand grading to Fine Sand, thin beds, brown, 10YR 4/3, soft, laminated to 7.5 ft, wet below 6.0 ft. 10 8.4-20.8 ft; Sandy Silt and Fine Sand, thin beds, brown, 10YR 4/3, wet, soft, laminated to 455 9.0 ft, (clay slough probable in top of 10.0 to 20.0 ft S.S.) 15 100 450 20 100 20.8-28.3 ft; Fine Sand, trace very fine sand 445 and coarse sand, dark gray, 10YR 4/1, wet, soft, (clay slough probable in top of 25.0 and 30.0 ft S.S.). 25 56 440 STRATIFICATION LINES ARE APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN WATER LEVELS: DURING DRILLING DRILLING CO.: Max's Enterprises, Inc. AFTER DRILLING: DRILLER: Ryan Hunziker DATE: LOGGED BY: T. Doll SAMPLES. PIEZOMETER: INSTALLED AT +/- \_\_ 35.0 FEET DATE DRILLED: 10/14/09 NOTES: S. King (Gredell) onsite. **VERTICAL DATUM: NAVD 88** START TIME: 8:13AM **HORIZONTAL DATUM: NAD 83** END TIME: 10:45AM WEATHER: Cold, 40°F, Overcast, Light Rain, Calm. BOREHOLE DIA .: 8.25"

## GREDELL **BORING LOG P-51** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Newman-N-Adj. to LBR near AUELBE-004 **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 466.25' T.O.C. ELEVATION: 469.06' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 994463.37 **EASTING:** 729490.00 **LITHOLOGY** CLAY SM GRAVEL G GRAVEL DEPTH (FEET) WATER TABL DESCRIPTION VF SAND VC SAND M SAND FACIES I.D. C SAND SAND SILTY 28.3-36.5 ft; Fine Sand, trace medium sand and FP/ coarse sand, trace fine gravel, dark gray matrix, Lev 30 10YR 4/1, wet, loose to soft, subrounded clasts, (fine sand and clay slough probable in top of 435 30.0 and 35.0 ft S.S.) 35 -100 430 BORING TERMINATED IN FINE SAND @36.5 FT 40 425 45 420 50 415 55 - 410 STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. WATER LEVELS: DURING DRILLING \_\_\_\_6\_\_ FEET APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE AFTER DRILLING: \_ DRILLER: Ryan Hunziker GRADUAL OR MAY OCCUR BETWEEN DATE: LOGGED BY: T. Doll SAMPLES. PIEZOMETER: INSTALLED AT +/- \_\_\_35.0 FEET DATE DRILLED: 10/14/09 NOTES: S. King (Gredell) onsite. **VERTICAL DATUM: NAVD 88** START TIME: 8:13AM END TIME: **HORIZONTAL DATUM: NAD 83** 10:45AM WEATHER: Cold, 40°F, Overcast, Light Rain, Calm. BOREHOLE DIA.: 8.25"

#### **GREDELL BORING LOG P-53** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Newman-N-Adj. to LBR **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 466.46' T.O.C. ELEVATION: 469.10' **Detailed Site Investigation EASTING:** 730049.96 CLIENT: Reitz & Jens, Inc. **NORTHING:** 994428.21 LITHOLOGY CONSTRUCTION DIAGRAM CLAY SM GRAVEL GRAVEL SAMPLE TYPE ЭЕРТН (FEET) **WATER TABI** DESCRIPTION VC SAND VF SAND ACIES I.D. SAND F SAND M SAND SILTY CLAY ō 0 0.0-0.5 ft; Clayey Silt, dark brown, 10YR 3/3, FB slightly plastic, wet, soft. 465 0.5-1.4 ft; Fine Sand, with very fine sand, dark 100 grayish brown, 10YR 4/2, moist, soft, grading with clay and stiff below 1.4 ft. 1.4-5.8 ft; Silty Clay and Sandy Silt, alternating 5 thin beds, very dark gravish brown to dark brown, 10YR 3/2 to 3/3; sandy silt, soft; silty 460 FP/ clay, plastic, stiff, mottled (10YR 4/6), moist. Lev 5.8-6.3 ft; Clayey Silty Sand, dark yellowish brown, 10YR 3/4, moist, soft. 6.3-20.8 ft; Fine Sand, trace very fine sand, 10 dark yellowish brown, 10YR 4/4, moist, loose, 72 trace coarse sand below 20.0 ft, (clay slough 455 probable in top of 10.0 ft S.S.). 15 100 450 20 20.8-35.9 ft; Very Fine Sand to Fine Sand, thin CO/ 445 BS beds, trace medium sand and coarse sand, very dark gray, (Gley) 1 3/N, wet, soft; dark gray, 10YR 4/1, below 30.0 ft. 25 67 440 STRATIFICATION LINES ARE DURING DRILLING DRILLING CO.: Max's Enterprises, Inc. WATER LEVELS: APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN AFTER DRILLING: DRILLER: Rvan Hunziker DATE: LOGGED BY: T. Doll SAMPLES. PIEZOMETER: INSTALLED AT +/- 35.0\_\_ DATE DRILLED: 10/15/09 NOTES: John Eimer (Ameren) and **VERTICAL DATUM: NAVD 88** START TIME: 3.50PM Kyle Kocher (R&J) onsite 10/ **HORIZONTAL DATUM: NAD 83** END TIME: 9:02AM 10/16 16 to observe drilling WEATHER: Cold, 45°F, Overcast, Drizzle. **BOREHOLE DIA.:** 8.25" activities.

## **GREDELL BORING LOG P-53** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Newman-N-Adj. to LBR **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 466.46' T.O.C. ELEVATION: 469.10' **Detailed Site Investigation EASTING:** 730049.96 CLIENT: Reitz & Jens, Inc. **NORTHING:** 994428.21 LITHOLOGY CLAY SM GRAVEL G GRAVEL VC SAND DESCRIPTION VF SAND WATER TAB M SAND FACIES I.D. C SAND SAND 20.8-35.9 ft; Very Fine Sand to Fine Sand, thin CO/ beds, trace medium sand and coarse sand, very BS dark gray, (Gley) 1 3/N, wet, soft; dark gray, 10YR 4/1, below 30.0 ft. 30 FP 100 435 35 $\mathbf{C}$ 35.9-36.5 ft; Medium to Coarse Sand, dark 430 gray matrix, 10YR 4/1, gravelly, 5 mm subrounded clasts, wet, soft. BORING TERMINATED IN MEDIUM TO COARSE SAND @36.5 FT 40 425 45 420 50 415 55 410 STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. WATER LEVELS: DURING DRILLING \_\_\_\_\_ 10\_\_\_ FEET APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN AFTER DRILLING: \_ DRILLER: Ryan Hunziker DATE: LOGGED BY: T. Doll SAMPLES. PIEZOMETER: INSTALLED AT +/- 35.0 FEET DATE DRILLED: 10/15/09 NOTES: John Eimer (Ameren) and **VERTICAL DATUM: NAVD 88** START TIME: 3:50PM Kyle Kocher (R&J) onsite 10/ **HORIZONTAL DATUM: NAD 83** END TIME: 9:02AM 10/16 16 to observe drilling

BOREHOLE DIA.:

8.25"

WEATHER: Cold, 45°F, Overcast, Drizzle.

#### GREDELL **BORING LOG P-55** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Newman-N-Adj. to LBR **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 467.33' T.O.C. ELEVATION: 470.02' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **EASTING:** 730584.11 **NORTHING:** 994395.43 LITHOLOGY CLAY SM GRAVEL G GRAVEL SAMPLE TYPE ЭЕРТН (FEET) WATER TABL DESCRIPTION VC SAND VF SAND M SAND ACIES I.D. F SAND C SAND SILTY CLAY 470 0 0.0-0.5 ft; Clayey Silt, dark brown, 10YR 3/3, FB wet, soft. 0.5-2.3 ft; Silty Clay, very dark grayish brown, 465 plastic, stiff, moist, mottles (10YR 4/6). 2.3-2.7 ft; Sandy Silt, dark grayish brown, 10YR 4/2, moist, soft. 5 2.7-4.5 ft; Fine Sand, trace very fine sand, brown, 10YR 5/3, laminated, damp, loose. 4.5-6.8 ft; Poor recovery, probable Silty Clay FP/ 460 and Fine Sand slough. Lev 6.8-33.3 ft; Fine Sand, trace very fine sand, brown, 10YR 5/3, damp, loose; laminated to 10 25.3 ft; wet and brown, 10YR 4/3, below 10.0 100 ft; trace coarse sand below 30.8 ft, (No sample recovery from 20.0-21.5 ft), (clay slough 455 probable in top of 25.0 and 30.0 ft S.S.). 15 100 450 20 0 25 89 STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. WATER LEVELS: DURING DRILLING APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE AFTER DRILLING: DRILLER: Ryan Hunziker GRADUAL OR MAY OCCUR BETWEEN DATE: LOGGED BY: T. Doll SAMPLES. PIEZOMETER: INSTALLED AT +/- 34.8 FEET DATE DRILLED: 10/14/09 NOTES: M. Carlson and S. King **VERTICAL DATUM: NAVD 88** START TIME: 11:20AM (Gredell) onsite. END TIME: **HORIZONTAL DATUM: NAD 83** 1:25PM BOREHOLE DIA.: WEATHER: Cold, 45°F, Overcast, Intermittent Lt. Rain, 10-15 MPH NE Wind. 8.25"

## **GREDELL BORING LOG P-55** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Newman-N-Adj. to LBR **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 467.33' T.O.C. ELEVATION: 470.02' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **EASTING:** 730584.11 **NORTHING:** 994395.43 **LITHOLOGY** CLAY SAMPLE TYPE SM GRAVEL **MATER TABLE** G GRAVEL DEPTH (FEET) DESCRIPTION **VF SAND** VC SAND M SAND SAND C SAND 440 6.8-33.3 ft; Fine Sand, trace very fine sand, FP/ brown, 10YR 5/3, damp, loose; laminated to Lev 25.3 ft; wet and brown, 10YR 4/3, below 10.0 ft; trace coarse sand below 30.8 ft, (No sample 30 recovery from 20.0-21.5 ft), (clay slough probable in top of 25.0 and 30.0 ft S.S.). 435 CM/ 33.3-36.5 ft; Medium Sand, with fine sand, trace coarse sand, dark grayish brown, 10YR 4/ Sp 35 2, wet, soft, (gravelly sand noted at total depth 100 based on cuttings sample collected from auger 430 **BORING TERMINATED IN GRAVELLY** SAND @36.5 FT 40 425 45 420 50 415 55 STRATIFICATION LINES ARE WATER LEVELS: DURING DRILLING \_\_\_\_\_\_ 10\_\_\_ FEET DRILLING CO.: Max's Enterprises, Inc. APPROXIMATE LITHOLOGIC BOUNDARIES AFTER DRILLING: \_ DRILLER: Ryan Hunziker ONLY: ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN LOGGED BY: T. Doll DATE: SAMPLES PIEZOMETER: INSTALLED AT +/- 34.8 FEET DATE DRILLED: 10/14/09 NOTES: M. Carlson and S. King **VERTICAL DATUM: NAVD 88** START TIME: 11:20AM (Gredell) onsite. **HORIZONTAL DATUM: NAD 83** END TIME: 1:25PM WEATHER: Cold, 45°F, Overcast, Intermittent Lt. Rain, 10-15 MPH NE Wind. **BOREHOLE DIA.:** 8.25"

#### **GREDELL BORING LOG P-57** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Newman-NE-Adj. to LBR **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 465,99' T.O.C. ELEVATION: 468.87' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 994356.77 **EASTING:** 731212.53 LITHOLOGY CLAY SAMPLE TYPE SM GRAVE GRAVEL WATER TABI **DESCRIPTION** /C SAND VF SAND FACIES 1.D. M SAND F SAND C SAND 0 0.0-0.5 ft; Clayey Silt, dark brown, 10YR 3/3, FB 465 wet, soft. 0.5-2.0 ft; Silty Clay, very dark grayish brown, 80 10YR 3/2, plastic, moist, stiff, mottles (10YR) 2.0-2.4 ft; Sandy Silt, dark grayish brown, 5 10YR 4/2, moist, soft. 460 2.4-4.5 ft; Fine Sand, trace very fine sand, brown, 10YR 4/3, damp, loose. FP/ 4.5-6.5 ft; Poor recovery, probable Silty Clay Lev slough. 6.5-15.9 ft; Fine Sand, trace very fine sand, 10 brown, 10YR 4/3, damp, loose; clay interbeds 455 < 1 inch thick to 7.1 ft; wet below 10.0 ft, (sand) and clay slough probable in top of 10.0 and 15.0 ft S.S.). 15 450 15.9-21.1 ft; Fine to Coarse Sand, trace very CM/ fine sand, alternating thin beds, dark gray, Sp 10YR 4/1, wet, soft; dark yellowish brown, 10YR 4/6, below 20.6 ft. 20 21.1-36.5 ft; Medium to Coarse Sand, with very fine sand and gravel, alternating thin beds, dark gray to dark grayish brown, 10YR 4/1 to 4/2, wet, loose, 20 mm quartz and feldspar subrounded clasts, sporadic clay balls. 25 94 440 STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. **WATER LEVELS:** DURING DRILLING \_\_\_\_\_10\_\_\_ FEET APPROXIMATE LITHOLOGIC BOUNDARIES DRILLER: AFTER DRILLING: \_\_\_ Ryan Hunziker ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN LOGGED BY: T. Doll DATE: SAMPLES. PIEZOMETER: INSTALLED AT +/- 34.8 FEET DATE DRILLED: 10/15/09 START TIME: NOTES: S. King (Gredell) onsite. **VERTICAL DATUM: NAVD 88** 11:25AM **HORIZONTAL DATUM: NAD 83** END TIME: 2:51PM **BOREHOLE DIA.:** 10.25" WEATHER: Cold, 45°F, Overcast, Drizzle.

## **GREDELL BORING LOG P-57** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Newman-NE-Adi. to LBR **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 465.99' T.O.C. ELEVATION: 468.87' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 994356.77 **EASTING:** 731212.53 **LITHOLOGY** CLAY SM GRAVEI VC SAND WATER TABI DESCRIPTION VF SAND FACIES I.D. SAND M SAND C SAND SILTY CLAY 21.1-36.5 ft; Medium to Coarse Sand, with very fine sand and gravel, alternating thin beds, dark gray to dark grayish brown, 10YR 4/1 to 4/2, wet, loose, 20 mm quartz and feldspar 30 subrounded clasts, sporadic clay balls. 435 35 430 BORING TERMINATED IN GRAVELLY SAND @36.5 FT SHELBY TUBE SAMPLE COLLECTED AT 40 1.0-3.0 FT DEPTH AT COMPLETION OF DRILLING. 425 45 420 50 415 55 410 STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. WATER LEVELS: DURING DRILLING \_\_\_\_\_10\_\_\_ FEET APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN AFTER DRILLING: \_\_ DRILLER: Ryan Hunziker DATE: LOGGED BY: T. Doll SAMPLES. PIEZOMETER: INSTALLED AT +/- 34.8 FEET DATE DRILLED: 10/15/09 NOTES: S. King (Gredell) onsite. **VERTICAL DATUM: NAVD 88** START TIME: 11:25AM HORIZONTAL DATUM: NAD 83 END TIME: 2:51PM WEATHER: Cold, 45°F, Overcast, Drizzle. BOREHOLE DIA.: 10.25"

#### GREDELL **BORING LOG P-59** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Heisel-West-S. of LBR & W. of farm Rd **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 465.36' T.O.C. ELEVATION: 467.94' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **EASTING:** 727225.40 **NORTHING:** 994039.34 LITHOLOGY WELL CONSTRUCTION DIAGRAM CLAY SM GRAVEL SAMPLE TYPE .G GRAVEL **JEPTH (FEET)** DESCRIPTION VF SAND VC SAND ACIES I.D. M SAND SAND SAND SILTY CLAY 0 465 0-0.3 ft; Silt, dark grayish brown, 10YR 4/2, FB dry, soft. 0.3-0.6 ft; Very Fine Sand, brown, 10YR 4/3, dry, soft. 0.6-4.1 ft; Clay, very dark grayish brown, 10YR 3/2, moist, highly plastic, firm, mottles 5 460 10YR 4/6. 4.1-5.0 ft; Clayey Silt, dark gray, 10YR 4/1, moist, soft. 100 5.0-5.9 ft; Poor recovery, probable Clay slough. 5.9-10.0 ft; Fine Sand, Silty Clay, Sandy Silt, Clay and Clayey Silty Sand, alternating thin 10 beds, very dark gray and dark grayish brown, 455 FP/ 10YR 3/1 and 4/2, moist; clay beds highly Lev plastic, firm; sandy silt and clayey silty sand beds soft. 10.0-18.3 ft; Fine Sand, trace very fine sand, dark grayish brown and dark gray, 10YR 4/2 15 and 4/1, wet, soft, laminated and iron staining 450 100 to 12.5 ft. 18.3-20.6 ft; Silty Clayey Sand, dark grayish brown, 10YR 4/2, wet, very soft. 20 445 20.6-25.3 ft; Fine Sand, very dark gray, (Gley) CO/ 1 3/N, wet, soft. BS 25 440 25.3-30.3 ft; Silty Very Fine to Fine Sand and CO/ Medium to Coarse Sand, trace gravel, BS STRATIFICATION LINES ARE WATER LEVELS: DRILLING CO.: Max's Enterprises, Inc. DURING DRILLING 8.4 FEET APPROXIMATE LITHOLOGIC BOUNDARIES AFTER DRILLING: DRILLER: Doug Hunziker ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN DATE: LOGGED BY: T. Doll SAMPLES. PIEZOMETER: INSTALLED AT +/- 35.3 FEET DATE DRILLED: 9/21/09 **VERTICAL DATUM: NAVD 88** START TIME: NOTES: Chris Vierrether, MDNR, 3:00PM onsite observing drilling HORIZONTAL DATUM: NAD 83 END TIME: 5:27PM activities. **BOREHOLE DIA.:** WEATHER: Warn, 80°F, Mostly Sunny, Humid, 5 MPH Wind from E. 8.25"

## **GREDELL BORING LOG P-59** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Heisel-West-S. of LBR & W. of farm Rd **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 465,36' T.O.C. ELEVATION: 467.94' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **EASTING:** 727225.40 **NORTHING:** 994039.34 **LITHOLOGY** CLAY SAMPLE TYPE SM GRAVEI G GRAVEL **JEPTH (FEET)** DESCRIPTION WATER TAB VF SAND VC SAND FACIES I.D. M SAND C SAND F SAND alternating thin beds, dark gray, (Gley) 1 4/N, CO/ mottles yellowish brown (10YR 5/8). BS 30 435 $\mathbf{C}$ 30.3-36.2 ft; Coarse Sand, with medium sand and gravel, trace fine sand, thin beds, dark gray, 10YR 4/1, wet, soft grading to loose, (fine sand noted at total depth based on cuttings sample collected from auger bit). 35 430 50 36.2-36.5 ft; Fine Sand FP/ BORING TERMINATED IN FINE SAND Lev @36.5 FT 40 425 45 420 50 415 55 410 STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. WATER LEVELS: DURING DRILLING \_\_\_\_\_8.4\_\_\_ FEET APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE AFTER DRILLING: \_ DRILLER: Doug Hunziker GRADUAL OR MAY OCCUR BETWEEN DATE: LOGGED BY: T. Doll SAMPLES. PIEZOMETER: INSTALLED AT +/- 35.3 FEET DATE DRILLED: 9/21/09 NOTES: Chris Vierrether, MDNR, **VERTICAL DATUM: NAVD 88** START TIME: 3:00PM onsite observing drilling **HORIZONTAL DATUM: NAD 83**

activities.

END TIME:

BOREHOLE DIA.:

5:27PM

8.25"

WEATHER: Warn, 80°F, Mostly Sunny, Humid, 5 MPH Wind from E.

#### GREDELL **BORING LOG P-61** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Heisel-West-S. of LBR & W. of farm Rd **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 465.92' T.O.C. ELEVATION: 468.87' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING**: 994020.22 **EASTING:** 727813.31 LITHOLOGY WELL CONSTRUCTION DIAGRAM PERCENT RECOV CLAY SAMPLE TYPE SM GRAVEL GRAVEL **JEPTH (FEET) WATER TABL** DESCRIPTION VC SAND VF SAND FACIES I.D. SAND F SAND M SAND SILTY CLAY ğ 0 0.0-0.9 ft; Clayey Silt, dark brown, 10YR 3/3, FB 465 slightly plastic, roots, moist grading to wet, \soft. 100 0.9-1.2 ft; Silty Sand, brown, 10YR 4/3, moist, 1.2-2.3 ft; Silty Clay, very dark grayish brown, 5 10YR 3/2, plastic, very stiff, mottles (10YR 4/ 460 6), sandy silt thin bed at 2.2 ft. 2.3-6.4 ft; Silty Clay, very dark grayish brown, 100l 10YR 3/2, plastic, moist, very stiff, mottles (10YR 4/6), very fine sand thin bed below 6.3 10 6.4-7.0 ft; Silty Clay, very dark grayish brown, 455 10YR 3/2, plastic, moist, very stiff. CO/ 7.0-8.1 ft; Clayey Silt, brown, 10YR 4/3, wet, BS 85 8.1-8.6 ft; Silty Clay, dark grayish brown, 10YR 4/2, plastic, moist, soft, mottles (10YR 3/ 15 94 450 8.6-10.5 ft; Sandy Clayey Silt, dark grayish brown, 10YR 4/2, laminated, wet, soft; grading with clay below 10.3 ft. 10.5-11.1 ft; Silty Sand, Clayey Silt, and Sandy Clayey Silt, alternating thin beds, wet, soft; 20 silty sand, brown, 10YR 4/3; clayey silt and sandy clayey silt, dark gray, 10YR 4/1. 445 11.1-21.3 ft; Silty Clay, Silty Sand, Clayey Silt, CM/ Sandy Clayey Silt, Sandy Silt and Fine Sand, Sp alternating thin beds, dark gray, (Gley) 1 4/N, wet, soft; laminated fine organic debris to 20.5 ft; fine sand below 20.5 ft, (clay slough 25 probable in top of 15.0 and 20.0 ft S.S.). 100 440 21.3-28.3 ft, Medium Sand grading to Coarse STRATIFICATION LINES ARE APPROXIMATE LITHOLOGIC BOUNDARIES DRILLING CO.: Max's Enterprises, Inc. WATER LEVELS: DURING DRILLING AFTER DRILLING: \_ DRILLER: Ryan Hunziker ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN DATE: LOGGED BY: T. Doll PIEZOMETER: INSTALLED AT +/- \_\_\_\_34.7\_\_\_ FEET DATE DRILLED: 10/26/09 **VERTICAL DATUM: NAVD 88** NOTES: S. King (Gredell) onsite. START TIME: 10:35AM HORIZONTAL DATUM: NAD 83 END TIME: 1:43PM BOREHOLE DIA.: WEATHER: Cool, 55°F, Overcast, Light Rain, Calm. 10.25"

## **GREDELL BORING LOG P-61** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Heisel-West-S. of LBR & W. of farm Rd **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 465.92' T.O.C. ELEVATION: 468.87' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 994020.22 **EASTING:** 727813.31 **LITHOLOGY** PERCENT RECOVERY WELL CONSTRUCTION DIAGRAM CLAY SM GRAVEL **JEPTH (FEET)** G GRAVEL DESCRIPTION VF SAND VC SAND FACIES I.D. M SAND CSAND F SAND CLAY Sand, with fine sand, trace very fine sand, thin beds, dark gray matrix, 10YR 4/1, 30 mm black $\mathbf{C}$ coalified wood matter (clay slough probable in \25.0 ft S.S.). 30 28.3-36.5 ft; Medium to Coarse Sand, trace fine 89 435 sand, and fine to coarse gravel, dark gray matrix, 10YR 4/1, clay ball (plastic), (fine sand slough probable in top of 30.0 and 35.0 ft S.S.). 35 CM/ 100 430 Sp **BORING TERMINATED IN MEDIUM** SAND @36.5 FT 40 425 45 420 50 415 55 410 STRATIFICATION LINES ARE WATER LEVELS: DRILLING CO.: Max's Enterprises, Inc. DURING DRILLING APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE AFTER DRILLING: FEET DRILLER: Ryan Hunziker GRADUAL OR MAY OCCUR BETWEEN SAMPLES. DATE: LOGGED BY: T. Doll PIEZOMETER: INSTALLED AT +/- 34.7 FEET DATE DRILLED: 10/26/09 **VERTICAL DATUM: NAVD 88** START TIME: NOTES: S. King (Gredell) onsite. 10:35AM **HORIZONTAL DATUM: NAD 83** END TIME: 1:43PM WEATHER: Cool, 55°F, Overcast, Light Rain, Calm. **BOREHOLE DIA.:** 10.25"

#### **GREDELL BORING LOG P-63** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Heisel-West-S. of LBR & W. of farm Rd **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 466,20' T.O.C. ELEVATION: 469,10' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 994004.98 **EASTING:** 728407.71 LITHOLOGY CLAY SAMPLE TYPE SM GRAVEL GRAVEL WATER TABL DESCRIPTION VC SAND ELEVATION FACIES I.D. VF SAND M SAND DIAGRAM SAND SILTY CLAY Ō 0 0.0-1.1 ft; Sandy Clayey Silt, dark brown, FB 465 $\10$ YR 3/3, moist, soft. 1.1-4.1 ft; Very Fine Sand, grayish brown, 100 10YR 5/2, damp, loose. 4.1-4.5 ft; Silty Clay, very dark grayish brown, 5 10YR 3/2, plastic, firm, moist. 4.5-5.0 ft; Silt, dark grayish brown, 10YR 4/2, 460 soft, wet. 57 FP/ 5.0-6.4 ft; Poor recovery, probable Silty Clay Lev 6.4-11.8 ft; Sandy Silt, Clay and Clayey Silty 10 Sand, alternating thin beds, very dark grayish brown to brown, 10YR 3/2 and 4/3, moist to 455 wet; clay beds highly plastic, firm; sandy silt CO/ 57 and clayey silty sand beds soft, iron oxide BS staining below 10.0 ft. 11.8-16.0 ft; Fine Sand, very dark gray, (Gley) 15 1 3/N, wet, soft, (clay, fine sand and silt slough) probable in top of 15.0 ft S.S.). 450 16.0-18.3 ft; Very Fine Sand, very dark gray, (Gley) 1 3/N, wet, soft. 18.3-25.8 ft; Medium to Coarse Sand, dark CO/ gray, (Gley) 1 3/N, wet, soft to firm (clay, fine BS/C 20 sand and silt slough noted in top of 15.0 ft 78 S.S.). 445 25 100 440 25.8-36.5 ft; Coarse Sand, with gravel, STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. WATER LEVELS: **DURING DRILLING** APPROXIMATE LITHOLOGIC BOUNDARIES DRILLER: AFTER DRILLING: Doug Hunziker ONLY: ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN LOGGED BY: DATE: T. Doll DATE DRILLED: PIEZOMETER: INSTALLED AT +/- 34.9 FEET 9/21/09 START TIME: NOTES: John Eimer (Ameren) onsite **VERTICAL DATUM: NAVD 88** 11:31AM observing drilling activities. **HORIZONTAL DATUM: NAD 83** END TIME: 2:22PM **BOREHOLE DIA.:** 8.25" WEATHER: Warm, 70°F, Heavy Fog, Calm, Humid.

## **GREDELL BORING LOG P-63** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Heisel-West-S. of LBR & W. of farm Rd **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 466,20' T.O.C. ELEVATION: 469,10' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING: 994004.98 EASTING:** 728407.71 **LITHOLOGY** WELL CONSTRUCTION DIAGRAM CLAY SAMPLE TYPE DEPTH (FEET) SM GRAVEL G GRAVEL **DESCRIPTION** VF SAND VC SAND FACIES I.D. M SAND C SAND F SAND alternating thin beds, dark gray to dark grayish brown, 10YR 4/1 and 4/2, wet, soft. 30 89 435 35 430 BORING TERMINATED IN COARSE SAND @36.5 FT 40 425 45 420 50 415 55 410 STRATIFICATION LINES ARE APPROXIMATE LITHOLOGIC BOUNDARIES DRILLING CO.: Max's Enterprises, Inc. WATER LEVELS: DURING DRILLING 8 FEET AFTER DRILLING: \_ DRILLER: ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN Doug Hunziker LOGGED BY: DATE: T. Doll SAMPLES. PIEZOMETER: INSTALLED AT +/- 34.9 FEET DATE DRILLED: 9/21/09 NOTES: John Eimer (Ameren) onsite START TIME: 11:31AM **VERTICAL DATUM: NAVD 88** observing drilling activities. END TIME: 2:22PM **HORIZONTAL DATUM: NAD 83** BOREHOLE DIA.: WEATHER: Warm, 70°F, Heavy Fog, Calm, Humid.

#### **GREDELL BORING LOG P-65** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Newman-West-S. of LBR & E. of farm Rd **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 468.06' T.O.C. ELEVATION: 471.31' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 993990.81 **EASTING:** 729165.61 LITHOLOGY RECOVERY CLAY SAMPLE TYPE SM GRAVEL SRAPHIC LOG GRAVEL DEPTH (FEET) WATER TABL DESCRIPTION VC SAND ELEVATION FACIES I.D. VF SAND SAND M SAND SAND DIAGRAM SILTY CLAY 470 0 0.0-0.7 ft; Sandy Clayey Silt, very dark grayish FBbrown, 10YR 3/2, moist, soft. 0.7-2.0 ft; Clayey Silt, very dark grayish 90 brown, moist, soft, mottles (10YR 4/6). 465 2.0-3.0 ft; Silty Sand, brown, 10YR 4/3, moist, 5 3.0-5.6 ft; Clayey Sandy Silt, dark grayish brown, 10YR 4/2, laminated, wet, soft, mottles \(10YR 4/6). 5.6-8.5 ft; Very Fine Sand, Clavey Silt, Clavey 460 Sandy Silt, alternating thin beds; very fine sand to 5.8 ft, brown, 10YR 4/3, moist, loose; clayey 10 silt below 5.8 ft, very dark grayish brown, 10YR 3/2, non-plastic, moist, soft; clayey sandy silt below 6.0 ft, dark yellowish brown, 65 10YR 4/2, laminated, moist, soft, mottles 455 (10YR 4/6). 8.5-12.5 ft; Silty Clay, dark gray, 10YR 4/1, 15 plastic, laminated, iron concretions with prominent staining (10YR 4/6), moist, soft. FP/ 12.5-15.6 ft; Clayey Sandy Silt, brown and Lev dark gray, 10YR 4/3 and 4/1, laminated, 450 mottles (10YR 4/6), wet. 15.6-25.6 ft; Fine Sand, trace very fine sand, dark grayish brown, 10YR 4/2, wet, soft, (clay 20 slough probable in top of 15.0 and 20.0 ft S.S.). 445 25 25.6-36.5 ft; Coarse Sand to Gravelly Sand, STRATIFICATION LINES ARE **WATER LEVELS:** DRILLING CO.: Max's Enterprises, Inc. DURING DRILLING APPROXIMATE LITHOLOGIC BOUNDARIES AFTER DRILLING: \_ DRILLER: Rvan Hunziker ONLY: ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN LOGGED BY: T. Doll PIEZOMETER: INSTALLED AT +/- 34.9 FEET DATE DRILLED: 10/13/09 NOTES: S. King (Gredell) onsite **VERTICAL DATUM: NAVD 88** START TIME: 8:43AM developing piezometers. END TIME: **HORIZONTAL DATUM: NAD 83** 11:25AM BOREHOLE DIA.: 8.25" WEATHER: Cold, 45°F, Overcast, Breezy.

## **GREDELL BORING LOG P-65** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Newman-West-S. of LBR & E. of farm Rd Proposed Utility Waste Disposal Area G.S. ELEVATION: 468.06' T.O.C. ELEVATION: 471.31' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 993990.81 **EASTING:** 729165.61 **LITHOLOGY** WELL CONSTRUCTION DIAGRAM CLAY SAMPLE TYPE SM GRAVEI -G GRAVEL DESCRIPTION VC SAND VF SAND FACIES I.D. M SAND C SAND F SAND SILTY CLAY with medium sand, trace fine sand, alternating ್ಷಿಕ್ಕಾರಿ ಇ $\mathbf{C}$ 440 thin beds, dark gray, 10YR 4/1, subrounded quartz and feldspar clasts, coalified wood fragments below 30.3 ft, wet, loose. 30 39 80% 435 000 35 **BORING TERMINATED IN COARSE SAND** @36.5 FT 430 40 425 45 420 50 415 55 STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. WATER LEVELS: DURING DRILLING 12.5 FEET APPROXIMATE LITHOLOGIC BOUNDARIES DRILLER: AFTER DRILLING: FEET Ryan Hunziker ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN LOGGED BY: DATE: T. Doll SAMPLES. PIEZOMETER: INSTALLED AT +/- 34.9 FEET DATE DRILLED: 10/13/09 NOTES: S. King (Gredell) onsite **VERTICAL DATUM: NAVD 88** START TIME: 8:43AM developing piezometers. **HORIZONTAL DATUM: NAD 83** END TIME: 11:25AM **BOREHOLE DIA.:** WEATHER: Cold, 45°F, Overcast, Breezy. 8.25"

#### **GREDELL BORING LOG P-67** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Newman-West-S. of LBR & E. of farm Rd **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 465.52' T.O.C. ELEVATION: 468.28' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 993985.65 **EASTING:** 729758.28 LITHOLOGY RECOVERY WELL CONSTRUCTION DIAGRAM CLAY SAMPLE TYPE SM GRAVEL WATER TABL **DESCRIPTION** ELEVATION FACIES I.D. VF SAND VC SAND C SAND F SAND M SAND CLAY 0 465 0.0-0.5 ft; Clayey Silt, dark brown, 10YR 3/3, FB \moist, soft. 0.5-0.8 ft; Silty Sand, dark yellowish brown, 95 10YR 4/4, moist, loose. 0.8-2.3 ft; Clayey Silt, very dark grayish brown, 10YR 3/2, slightly plastic, firm, moist, 5 mottles (10YR 4/6). 460 2.3-3.6 ft; Silty Clay, very dark grayish brown, 10YR 3/2, plastic, firm, moist. FP/ 3.6-3.8 ft; Silty Sand, dark yellowish brown, Lev 10YR 4/4, moist, loose. 3.8-5.0 ft; Silty Clay, very dark grayish brown 10 10YR 3/2, plastic, moist, stiff, mottles (10YR 455 5.0-6.8 ft; Poor recovery, probable Silty Clay 95 slough. 6.8-7.3 ft; Silty Clayey Sand, dark gray to dark CO/ grayish brown, 10YR 4/1 and 4/2, moist, soft BS 15 7.3-12.3 ft; Fine Sand, with very fine sand, 450 brown, 10YR 4/3, iron staining (10YR 4/6), FP/ wet, soft. Lev 12.3-13.1 ft; Clavey Silt, Silty Clay and Fine Sand, alternating thin beds; dark gray, 10YR 4 1, wet, soft; silty clay bed, plastic; fine sand 20 below 12.8 ft, brown, 10YR 4/3, loose. 445 100 13.1-15.7 ft; Silty Clay and Very Fine Sand, thin beds, (Gley) 1 4/N; silty clay to 13.3 ft, plastic, firm; very fine sand below 13.3 ft, laminated, wet, soft. 15.7-25.6 ft; Fine Sand, with very fine sand, dark gray, 10YR 4/1, wet, soft, (clay slough 25 440 100 probable in top of 15.0 though 25.0 ft S.S.). CM/ 25.6-36.5 ft; Medium Sand, with fine and STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. WATER LEVELS: DURING DRILLING APPROXIMATE LITHOLOGIC BOUNDARIES DRILLER: AFTER DRILLING: Rvan Hunziker ONLY: ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN LOGGED BY: DATE: T. Doll DATE DRILLED: PIEZOMETER: INSTALLED AT +/- 35.0 FEET 10/13/09 NOTES: S. King (Gredell) onsite START TIME: **VERTICAL DATUM: NAVD 88** 12:20PM developing piezometers. END TIME: **HORIZONTAL DATUM: NAD 83** 2:57PM **BOREHOLE DIA.:** 8.25" WEATHER: Cold, 45°F, Overcast, Raining, Lt. Wind.

# **GREDELL** ENGINEERING RESOURCES, INC.

# **BORING LOG P-67**

Ameren Missouri Labadie Power Plant **Proposed Utility Waste Disposal Area** 

**Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. LOCATION: Newman-West-S. of LBR & E. of farm Rd

G.S. ELEVATION: 465.52' T.O.C. ELEVATION: 468.28'

**EASTING:** 729758.28 **NORTHING:** 993985.65

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ОЕРТН (FEET)	ELEVATION	WELL CONSTRUCTION DIAGRAM	GRAPHIC LOG	SAMPLE TYPE	PERCENT RECOVERY	DESCRIPTION	FACIES 1.D.	CLAY	SILTY CLAY	SILT	VF SAND	F SAND	M SAND	C SAND	VC SAND	SM GRAVEL	LG GRAVEL
-	-					coarse sand, alternating thin beds, dark gray matrix, 10YR 4/1, wet, loose, (clay slough	Sp										
_	-					probable in 30.0 and 35.0 ft S.S.).	CM/										
30 –	<del>-</del> 435			7	100		Sp										
-	-																
_	_																
35 -	<b>- 43</b> 0				56												
	-		la l			BORING TERMINATED IN MEDIUM SAND @36.5 FT											
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40 –	<del>-</del> 425																***********
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45 –	- 420																
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DBILLIN				Ш		STRATIFICATION LINES ARE WATER LE	VEL 0:	L								_	$\dashv$

DRILLING CO.: Max's Enterprises, Inc. DRILLER: Ryan Hunziker LOGGED BY: T. Doll DATE DRILLED: 10/13/09 START TIME: 12:20PM END TIME: 2:57PM BOREHOLE DIA.: 8.25"

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

NOTES: S. King (Gredell) onsite developing piezometers. DATE:

WATER LEVELS: DURING DRILLING \_\_\_\_7\_\_ FEET AFTER DRILLING: \_\_\_\_\_ FEET

PIEZOMETER: INSTALLED AT +/- 35.0 FEET

**VERTICAL DATUM: NAVD 88 HORIZONTAL DATUM: NAD 83** WEATHER: Cold, 45°F, Overcast, Raining, Lt. Wind.

#### **GREDELL BORING LOG P-69** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Newman-East-S. of LBR & E. of farm Rd Proposed Utility Waste Disposal Area G.S. ELEVATION: 465.05' T.O.C. ELEVATION: 467.73' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 993965.46 **EASTING:** 730346.87 LITHOLOGY RECOVERY CONSTRUCTION DIAGRAM CLAY SM GRAVEL GRAVEL DESCRIPTION ELEVATION VC SAND VF SAND M SAND SAND SAND CLAY 0 -465 0.0-0.5 ft; Clayey Silt, dark brown, 10YR 3/3, FB \slightly plastic, wet, soft. 0.5-1.8 ft; Silty Clay, very dark grayish brown, 100 10YR 3/2, plastic, stiff, moist, mottles (10YR 1.8-2.2 ft; Clayey Silt, dark gray, 10YR 4/1, 5 460 slightly plastic, stiff, moist, mottles (10YR 4/ 2.2-4.5 ft; Silty Clay, very dark grayish brown, 10YR 3/2, plastic, stiff, moist, mottles (10YR) FP/ Lev 4.5-5.0 ft; Clayey Silt, brown, 10YR 4/3, 10 - 455 laminated, wet, soft. 100 5.0-7.5 ft; Poor recovery, probable Silty Clay slough. 7.5-30.5 ft; Fine Sand, trace very fine sand and medium sand, dark grayish brown, 10YR 4/2, wet, loose to soft; iron staining to 15.0 ft; dark 15 - 450 gray, 10YR 4/1, below 20.3 ft, (clay slough probable in 10.0 and 25.0 ft S.S.). 20 - 445 100 25 440 100 STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. WATER LEVELS: DURING DRILLING APPROXIMATE LITHOLOGIC BOUNDARIES AFTER DRILLING: \_ DRILLER: Rvan Hunziker ONLY: ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN LOGGED BY: DATE: T. Doll DATE DRILLED: PIEZOMETER: INSTALLED AT +/- 35.0 FEET 10/13/09 NOTES: S. King (Gredell) onsite START TIME: **VERTICAL DATUM: NAVD 88** 3:25PM developing piezometers. HORIZONTAL DATUM: NAD 83 END TIME: 5:37PM **BOREHOLE DIA.:** 8.25" WEATHER: Cold, 45°F, Overcast, Raining, Lt. Wind.

## **GREDELL BORING LOG P-69** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Newman-East-S. of LBR & E. of farm Rd Proposed Utility Waste Disposal Area G.S. ELEVATION: 465.05' T.O.C. ELEVATION: 467.73' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **EASTING:** 730346.87 **NORTHING:** 993965.46 LITHOLOGY SILTY CLAY SM GRAVEI DEPTH (FEET) WATER TABI **DESCRIPTION** VF SAND VC SAND FACIES I.D. M SAND F SAND C SAND FP/ Lev 30 - 435 30.5-36.5 ft; Coarse Sand and Fine Sand, with medium sand, trace gravel, dark gray, 10YR 4/ 1, 5 mm subangular clasts, wet, loose, (clay slough probable in 30.0 ft S.S.). 35 -- 430 100 **BORING TERMINATED IN COARSE SAND** @36.5 FT 40 -425 45 420 50 - 415 55 <del>-</del> 410 STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. WATER LEVELS: DURING DRILLING \_\_\_\_\_\_ FEET APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN AFTER DRILLING: \_\_ DRILLER: Ryan Hunziker DATE: LOGGED BY: T. Doll SAMPLES. PIEZOMETER: INSTALLED AT +/- 35.0 FEET DATE DRILLED: 10/13/09 START TIME: NOTES: S. King (Gredell) onsite **VERTICAL DATUM: NAVD 88** 3:25PM

developing piezometers.

END TIME:

**BOREHOLE DIA.:** 

5:37PM

8.25"

**HORIZONTAL DATUM: NAD 83** 

WEATHER: Cold, 45°F, Overcast, Raining, Lt. Wind.

#### GREDELL **BORING LOG P-71** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Newman-East-S, of LBR & E. of farm Rd **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 467.42' T.O.C. ELEVATION: 470.70' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 993948.36 **EASTING:** 730927.90 **LITHOLOGY** WELL CONSTRUCTION DIAGRAM PERCENT RECOV CLAY SAMPLE TYPE SM GRAVEI G GRAVEL **JEPTH (FEET)** NATER TABL DESCRIPTION ELEVATION JF SAND VC SAND C SAND SAND M SAND SILTY CLAY 470 0 0.0-0.5 ft; Clayey Silt, very dark grayish FB brown, 10YR 3/2, slightly plastic, moist, soft. 0.5-1.8 ft; Silty Clay, very dark grayish brown, 465 10YR 3/2, plastic, very stiff, moist, mottles (10YR 4/6). 1.8-2.0 ft; Sandy Clayey Silt, dark brown, 5 10YR 3/3, moist, soft. 2.0-2.6 ft; Silty Clay, very dark grayish brown FP/ 10YR 3/2, plastic, very stiff, moist. 460 35 Lev 2.6-4.5 ft; Very Fine Sand, trace fine sand, brown, 10YR 4/3, laminated, damp, loose. 4.5-6.2 ft; Poor recovery, probable Silty Clay 10 slough. 83 FB 6.2-10.3 ft; Fine Sand, trace very fine sand, brown, 10YR 4/3, laminated, damp, loose. 455 10.3-16.0 ft; Silty Clay, Clayey Silt and Sandy Silt, alternating thin beds; silty clay to 10.6 ft, dark gray to dark grayish brown, 10YR 4/1 and 15 4/2, slightly plastic, soft, wet; sandy silt below 10.6 ft, alternating beds < 1 inch thick of dark CO/ gray and brown, 10YR 4/1 and 4/3, and strong 450 brown, 7.5YR 4/6, black finely laminated plant debris below 10.6 ft; silty clay below 15.0 ft, dark gray, 10YR 4/1, laminated, plastic, moist, 20 soft; sandy silt below 15.2 ft, brown, 10YR 4/3. laminated, wet, soft. 16.0-36.5 ft; Sandy Silt and Fine Sand, with very fine sand, thin beds, very dark gray, 445 (Glev) 1 3/N, laminated to 21.3 ft, wet, soft, black plant debris at 26.4 ft, (clay slough probable in top of 25.0 ft S. S.). 25 83 STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. WATER LEVELS: DURING DRILLING APPROXIMATE LITHOLOGIC BOUNDARIES AFTER DRILLING: DRILLER: Ryan Hunziker ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN DATE: LOGGED BY: T. Doll SAMPLES. PIEZOMETER: INSTALLED AT +/- 34.9 DATE DRILLED: 10/21/09 START TIME: NOTES: Chris Vierrether, MDNR, **VERTICAL DATUM: NAVD 88** 2:48PM onsite observing drilling **HORIZONTAL DATUM: NAD 83** END TIME: 4:54PM activities BOREHOLE DIA .: WEATHER: Warm, 70°F, Overcast, 10-15 MPH Wind from S., Mild. 8.25"

# **GREDELL BORING LOG P-71** ENGINEERING RESOURCES, INC.

Ameren Missouri Labadie Power Plant Proposed Utility Waste Disposal Area **Detailed Site Investigation** 

CLIENT: Reitz & Jens, Inc.

LOCATION: Newman-East-S. of LBR & E. of farm Rd

G.S. ELEVATION: 467.42' T.O.C. ELEVATION: 470.70'

**NORTHING:** 993948.36 **EASTING:** 730927.90

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DEPTH (FEET)	ELEVATION	WELL CONSTRUCTION DIAGRAM WATER TARIF	GRAPHIC LOG	SAMPLE TYPE	PERCENT RECOVERY	DESCRIPTION	FACIES I.D.	CLAY	SILTY CLAY	SILT	VF SAND	F SAND	M SAND	C SAND	VC SAND	SM GRAVEL	LG GRAVEL
_	<b>44</b> 0					16.0-36.5 ft; Sandy Silt and Fine Sand, with	CO/										
-	-					very fine sand, thin beds, very dark gray, (Gley) 1 3/N, laminated to 21.3 ft, wet, soft,	BS										
30 -	_				50	black plant debris at 26.4 ft, (clay slough probable in top of 25.0 ft S. S.).											
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35 -	_			7	100												
÷	- 430			7		BORING TERMINATED IN FINE SAND @36.5 FT											
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DRILLIN	IG CO.: Ma	x's Enterprise	s, Inc.			STRATIFICATION LINES ARE  APPROVINATE LITHOLOGIC BOUNDARIES  WATER LE	AET2:	Dί	JKIN	G D	KILLI	NG.	i	īŪ	FE	⊏ I	

DRILLING CO.: Max's Enterprises, Inc. DRILLER: Ryan Hunziker LOGGED BY: T. Doll DATE DRILLED: 10/21/09 START TIME: 2:48PM END TIME: 4:54PM BOREHOLE DIA.: 8.25"

APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN SAMPLES.

NOTES: Chris Vierrether, MDNR, onsite observing drilling

DATE: PIEZOMETER: INSTALLED AT +/- 34.9 FEET

AFTER DRILLING: \_\_\_\_\_ FEET

**VERTICAL DATUM: NAVD 88 HORIZONTAL DATUM: NAD 83** WEATHER: Warm, 70°F, Overcast, 10-15 MPH Wind from S., Mild.

#### **GREDELL BORING LOG P-73** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Bean Field-West Margin Project Area **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 467.06' T.O.C. ELEVATION: 469.94' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 993742.59 **EASTING:** 726924.60 LITHOLOGY WELL CONSTRUCTION DIAGRAM CLAY SM GRAVEL LG GRAVEL SAMPLE TYPE WATER TABL DESCRIPTION ELEVATION VC SAND VF SAND FACIES I.D. SAND M SAND SILTY CLAY 470 0 0-1.6 ft; Clayey Silt, light olive gray, 5Y 6/1, FB soft, plastic. 465 1.6-2.2 ft; Silt, light brown, non-cohesive, dry. 85 2.2-3.5 ft; Clay, olive gray, 5Y 4/1, plastic, 3.5-4.4 ft; Silty Clay and Silt, light olive gray, 5 5Y 6/1, soft, wet. 4.4-6.3 ft; Very Fine Sand, grayish orange, 86 460 10YR 7/4, silty, indistinct bedding, saturated. FP/ 6.3-6.6 ft; Silty Clay, olive gray, 5Y 4/1, Lev 6.6-31.2 ft; Fine Sand, grayish orange, 10YR 7/ 10 4, scattered clay streaks (slough) and silt, sharp 78 lower contact. 455 15 100 450 20 100 445 25 100 STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. WATER LEVELS: **DURING DRILLING** APPROXIMATE LITHOLOGIC BOUNDARIES DRILLER: AFTER DRILLING: Doug Hunziker ONLY: ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN LOGGED BY: M. Carlson PIEZOMETER: INSTALLED AT +/- 34.0 DATE DRILLED: 11/06/09 START TIME: 7:54AM NOTES: Chris Vierrether and Blake **VERTICAL DATUM: NAVD 88** Smotherman (MDNR) onsite END TIME: 2:04PM **HORIZONTAL DATUM: NAD 83** observing drilling activities. T. BOREHOLE DIA.: 10.25" WEATHER: Sunny, 50s°F, Lt. Wind.

### GREDELL **BORING LOG P-73** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Bean Field-West Margin Project Area Proposed Utility Waste Disposal Area G.S. ELEVATION: 467.06' T.O.C. ELEVATION: 469.94' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 993742.59 **EASTING:** 726924.60 LITHOLOGY CLAY SAMPLE TYPE SM GRAVEL G GRAVEL WATER TABL DESCRIPTION VF SAND ELEVATION VC SAND M SAND FACIES I.D. C SAND SAND 440 6.6-31.2 ft; Fine Sand, grayish orange, 10YR 7/ FP/ 4, scattered clay streaks (slough) and silt, sharp Lev lower contact. 30 100 31.2-36.5 ft; Medium to Coarse Sand, grayish 435 orange, 10YR 7/4, common granules and black carbonaceous fragments, (very coarse sand noted at total depth based on cuttings sample collected from auger bit) (fine sand slough in 35 100 top S.S.). BORING TERMINATED IN VERY COARSE 430 SAND @ 36.5 FT 40 425 45 420 50 415 55 STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. WATER LEVELS: DURING DRILLING 4 FEET APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN DRILLER: Doug Hunziker AFTER DRILLING: FEET DATE: LOGGED BY: M. Carlson SAMPLES. PIEZOMETER: INSTALLED AT +/- 34.0 FEET DATE DRILLED: 11/06/09 NOTES: Chris Vierrether and Blake **VERTICAL DATUM: NAVD 88** START TIME: 7:54AM Smotherman (MDNR) onsite END TIME: **HORIZONTAL DATUM: NAD 83** 2:04PM observing drilling activities. T. **BOREHOLE DIA.:** WEATHER: Sunny, 50s°F, Lt. Wind. 10.25" Doll (Gredell) onsite.

#### GREDELL **BORING LOG P-75** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Heisel-Bean Field-West Margin Project Area Proposed Utility Waste Disposal Area G.S. ELEVATION: 466.12' T.O.C. ELEVATION: 468.75' **Detailed Site Investigation EASTING:** 727511.13 CLIENT: Reitz & Jens, Inc. **NORTHING:** 993730.50 **LITHOLOGY** CLAY SM GRAVEL **NATER TABLE** SAMPLE TYPE SRAPHIC LOG EPTH (FEET) DESCRIPTION VC SAND VF SAND M SAND FACIES 1.D. C SAND F SAND SILTY CLAY 0 0.0-0.6 ft; Silt, very dark grayish brown, 10YR FB 465 3/2, damp, soft. 0.6-1.0 ft; Silty Sand, dark grayish brown, 100 10YR 4/2, soft, damp. 1.0-6.0 ft; Clay, very dark grayish brown, 10YR 3/2, highly plastic, very firm, moist, 5 mottles (10YR 4/6). 460 6.0-9.1 ft; Silty Sand, Silty Clay, Sandy Silt and Clay, alternating thin beds, dark gray to 100 dark yellowish brown, 10YR 4/1 to 4/4, damp grading to moist, wet below 6.9 ft; clay below FP/ \8.8 ft, highly plastic, firm, mottled (10YR 4/6). 10 9.1-28.3 ft; Fine Sand, dark grayish brown, Lev 455 10YR 4/2, wet, soft, wood fragments at 11.7 and 25.7 ft; very dark gray, (Gley) 1 3/N, 45 below 15.3 ft, (clay slough probable in top of 15.0-30.0 S.S.). 15 CO/ 56 450 BS 20 78 25 78 440 STRATIFICATION LINES ARE DURING DRILLING DRILLING CO.: Max's Enterprises, Inc. WATER LEVELS: APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE AFTER DRILLING: FEET DRILLER: Doug Hunziker GRADUAL OR MAY OCCUR BETWEEN DATE: LOGGED BY: T. Doll SAMPLES. PIEZOMETER: INSTALLED AT +/- 34.8 FEET DATE DRILLED: 09/28/09 NOTES: **VERTICAL DATUM: NAVD 88** START TIME: 7:50AM END TIME: **HORIZONTAL DATUM: NAD 83** 10:35AM WEATHER: Cool, 55°F, Overcast, Light Rain, Calm. BOREHOLE DIA.: 8.25"

#### **GREDELL BORING LOG P-75** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Heisel-Bean Field-West Margin Project Area **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 466.12' T.O.C. ELEVATION: 468.75' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 993730.50 **EASTING:** 727511.13 LITHOLOGY CONSTRUCTION DIAGRAM CLAY SAMPLE TYPE SM GRAVEL GRAVEL DEPTH (FEET) DESCRIPTION VC SAND ELEVATION VF SAND M SAND FACIES 1.D. C SAND F SAND SILTY 28.3-32.5 ft; Fine to Medium Sand, very dark CO/ gray, (Gley) 1 3/N, wet, soft, (clay slough BS 30 probable in top of 35.0 ft S.S.). 435 32.5-36.5 ft; Coarse Sand, with medium sand, $\mathbf{C}$ trace fine sand and gravel, dark gray, 10YR 4/ 1, subrounded clasts, wet, soft. 35 100 - 430 BORING TERMINATED IN COARSE SAND @36.5 FT 40 425 45 420 50 415 55 410 STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. **WATER LEVELS:** DURING DRILLING \_\_\_\_\_\_\_ FEET APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN DRILLER: Doug Hunziker AFTER DRILLING: \_\_\_ LOGGED BY: T. Doll DATE: SAMPLES. PIEZOMETER: INSTALLED AT +/- 34.8 FEET DATE DRILLED: 09/28/09 **VERTICAL DATUM: NAVD 88** START TIME: NOTES: 7:50AM **HORIZONTAL DATUM: NAD 83** END TIME: 10:35AM BOREHOLE DIA.: WEATHER: Cool, 55°F, Overcast, Light Rain, Calm. 8.25"

#### GREDELL **BORING LOG P-77** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Heisel-West-S of LBR, W of farm access Rd. **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 465.41' T.O.C. ELEVATION: 468.05' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 993714.81 **EASTING:** 728102.38 LITHOLOGY CLAY SAMPLE TYPE SM GRAVEL G GRAVEL EPTH (FEET) WATER TABL DESCRIPTION VF SAND VC SAND ACIES 1.D. M SAND C SAND CONSTRUC DIAGRAM SAND SILTY CLAY 0 465 0.0-1.0 ft; Clayey Silt, very dark grayish FB \brown, 10YR 3/2, moist, soft. 1.0-1.9 ft; Silty Sand, dark grayish brown, 10YR 4/2, moist, soft. 1.9-3.8 ft; Silty Clay, very dark grayish brown, 10YR 3/2, plastic, very firm, mottles (10YR 4/ 5 460 3.8-5.9 ft; Poor recovery, probable Silty Clay \slough. 100 5.9-10.5 ft; Clayey Silt, Silty Clay, Sandy Silt and Fine Sand, alternating thin beds, dark grayish brown, 10YR 4/2, wet, soft; silty clay 10 at 6.8 ft, dark brown, 10YR 3/3, plastic, firm, 455 CO/ moist; sandy silt, iron staining and mottles BS (10YR 4/6) below 7.7 ft, laminated below 8.3 72 FP/ 10.5-12.3 ft; Clayey Silt, Silty Clay and Fine Lev Sand, alternating thin beds, very dark gray, 15 (Gley) 1 3/N, laminated, wet, soft, plant 450 67 material below 11.3 ft. 12.3-20.3 ft; Fine Sand, trace very fine sand, dark gray, 10YR 4/1, wet, soft, laminated to 13.6 ft; thin clay interbeds from 15.0-15.5 ft, dark grayish brown, 10YR 4/2. 20 445 20.3-31.2 ft; Fine Sand grading to Medium CM/ Sand grading to Coarse Sand, thin beds, trace Sp gravel below 20.7 ft, dark gray and gray, 10YR 4/1 and 5/1, wet, alternating soft and loose consistency; subrounded clasts; clayey silty sand below 31.1 ft. 25 440 STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. WATER LEVELS: DURING DRILLING 8.5 FEET APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE AFTER DRILLING: DRILLER: Doug Hunziker GRADUAL OR MAY OCCUR BETWEEN DATE: LOGGED BY: T. Doll SAMPLES. PIEZOMETER: INSTALLED AT +/- 35.0 DATE DRILLED: 09/28/09 NOTES: Chris Vierrether, MDNR, **VERTICAL DATUM: NAVD 88** START TIME: 11:10AM onsite observing drilling END TIME: **HORIZONTAL DATUM: NAD 83** 1:45PM activities. WEATHER: Warm, 60°F, Clear Skies, Mild, 30 MPH Gusting Wind. **BOREHOLE DIA.:** 8.25"

#### GREDELL **BORING LOG P-77** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Heisel-West-S of LBR, W of farm access Rd. Proposed Utility Waste Disposal Area G.S. ELEVATION: 465.41' T.O.C. ELEVATION: 468.05' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 993714.81 **EASTING:** 728102.38 LITHOLOGY CLAY SM GRAVEL **WATER TABLE** SAMPLE TYPE GRAVEL **DESCRIPTION** VC SAND VF SAND C SAND FACIES I.D. F SAND M SAND SILTY Q 20.3-31.2 ft; Fine Sand grading to Medium CM/ Sand grading to Coarse Sand, thin beds, trace Sp gravel below 20.7 ft, dark gray and gray, 10YR 4/1 and 5/1, wet, alternating soft and loose 30 435 consistency: subrounded clasts; clayey silty ್ಯಾ \sand below 31.1 ft. <sub>0</sub>0 0 8 31.2-36.5 ft; Gravelly Sand, with fine to coarse gg. sand, alternating thin beds, dark gray, 10YR 4/ 1, wet, soft grading to loose, black angular coalified wood fragments to 31.3 ft. 35 ഹ 430 100 **BORING TERMINATED IN COARSE SAND** @36.5 FT 40 425 45 420 50 415 55 410 STRATIFICATION LINES ARE WATER LEVELS: DURING DRILLING \_\_\_\_8.5\_\_ FEET DRILLING CO.: Max's Enterprises, Inc. APPROXIMATE LITHOLOGIC BOUNDARIES AFTER DRILLING: \_\_\_ FEET DRILLER: ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN Doug Hunziker LOGGED BY: T. Doll PIEZOMETER: INSTALLED AT +/- 35.0 DATE DRILLED: 09/28/09 NOTES: Chris Vierrether, MDNR, **VERTICAL DATUM: NAVD 88** START TIME: 11:10AM onsite observing drilling **HORIZONTAL DATUM: NAD 83** END TIME: 1:45PM activities. BOREHOLE DIA.: WEATHER: Warm, 60°F, Clear Skies, Mild, 30 MPH Gusting Wind. 8.25"

#### **GREDELL BORING LOG P-79** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Heisel-West-S of LBR, Adj. farm access Rd. **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 467.01' T.O.C. ELEVATION: 469.84' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **EASTING:** 728850.48 **NORTHING:** 993695.02 LITHOLOGY S. P. V. SAMPLE TYPE SM GRAVEL G GRAVEL **JEPTH** (FEET) WATER TABL DESCRIPTION ELEVATION VF SAND VC SAND ACIES I.D. C SAND SAND M SAND SILTY 470 0 0.0-0.9 ft, Clayey Silt, dark brown, 10YR 3/3, FB wet, soft, roots, trace very fine sand below 0.5 465 100 0.9-2.7 ft; Silty Clay, very dark grayish brown, 10YR 3/2, plastic, very stiff, moist, mottles (10YR 4/6). 5 2.7-3.9 ft; Clayev Silt and Silty Clay, thin beds. dark yellowish brown to dark brown, 10YR 3/4 to 3/3, moist; silty clay bed, plastic, very stiff. 460 FP/ 3.9-5.5 ft, Clayey Sandy Silt, dark grayish Lev brown, 10YR 4/2, laminated, wet, soft. 5.5-6.8 ft, Silty Clay, dark brown, 10YR 3/2, 10 plastic, very stiff, moist. 100 6.8-7.4 ft; Clayey Silt, dark brown, 10YR 3/3, laminated, moist, soft. 455 7.4-12.5 ft; Sandy Silt, dark grayish brown, 10YR 4/2, herringbone laminae, wet, soft. 12.5-28.3 ft; Sandy Silt, dark brown, 10YR 3/3, 15 100 450 20 100 25 100 STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. WATER LEVELS: DURING DRILLING 7.5 FEET APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE AFTER DRILLING: DRILLER: Ryan Hunziker GRADUAL OR MAY OCCUR BETWEEN DATE: LOGGED BY: T. Doll SAMPLES. PIEZOMETER: INSTALLED AT +/- 35.0 FEET DATE DRILLED: 10/28/09 NOTES: Chris Vierrether, Blake **VERTICAL DATUM: NAVD 88** START TIME: 1:50PM Smotherman, & Larry Pierce END TIME: **HORIZONTAL DATUM: NAD 83** 3:13PM (MDNR) onsite observing BOREHOLE DIA.: WEATHER: Cool, 60°F, Overcast, 5-10 MPH Wind from S. 10.25" drilling activities.

#### GREDELL **BORING LOG P-79** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Heisel-West-S of LBR, Adj. farm access Rd. Proposed Utility Waste Disposal Area G.S. ELEVATION: 467.01' T.O.C. ELEVATION: 469.84' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **EASTING:** 728850.48 **NORTHING:** 993695.02 LITHOLOGY CLAY SM GRAVEL G GRAVEL DEPTH (FEET **DESCRIPTION** VC SAND VF SAND ELEVATION FACIES I.D. F SAND C SAND M SAND 440 FP/ 28.3-36.5 ft; Fine Sand, trace medium sand, coarse sand and gravel, dark gray matrix, 10YR Lev 30 4/1, 10 mm subrounded clasts. 100 435 35 100 430 **BORING TERMINATED IN FINE SAND** @36.5 FT 40 425 45 420 50 415 55 STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. WATER LEVELS: DURING DRILLING \_\_\_\_\_\_\_ FEET APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN DRILLER: AFTER DRILLING: \_ Ryan Hunziker DATE: LOGGED BY: T. Doll SAMPLES. PIEZOMETER: INSTALLED AT +/- \_\_\_\_35.0\_\_ FEET DATE DRILLED: 10/28/09 NOTES: Chris Vierrether, Blake **VERTICAL DATUM: NAVD 88** START TIME: 1:50PM

Smotherman, & Larry Pierce

(MDNR) onsite observing

drilling activities.

END TIME:

**BOREHOLE DIA.:** 

3:13PM

10.25"

WEATHER: Cool, 60°F, Overcast, 5-10 MPH Wind from S.

**HORIZONTAL DATUM: NAD 83** 

#### GREDELL **BORING LOG P-81** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Newman-NE-Central-S of LBR **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 467.64' T.O.C. ELEVATION: 470.31' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **EASTING:** 729444.97 **NORTHING:** 993679.30 LITHOLOGY SFA SAMPLE TYPE **JEPTH (FEET)** SM GRAVEI G GRAVEL WATER TABL DESCRIPTION ELEVATION VF SAND /C SAND M SAND ACIES 1.D. SAND C SAND GRAPHIC SILTY ( 470 0 0.0-0.9 ft, Clavey Silt, dark brown, 10YR 3/3, FB wet, soft, roots, with very fine sand below 0.8 ft, moist. 90 465 0.9-2.1 ft; Silty Clay, dark brown, 10YR 3/2, plastic, very stiff, moist, mottles (10YR 4/6). 2.1-2.9 ft; Silty Sand, brown, 10YR 4/3, moist, 5 2.9-4.8 ft; Sandy Silt, Sandy Clayey Silt, and Silty Clay, alternating thin beds, moist; sandy 460 silt, brown to dark yellowish brown, 10YR 4/3 and 4/4; sandy clayey silt and silty clay, dark FP/ gray and dark grayish brown, 10YR 4/1 and 4/ Lev 10 2, mottles (10YR 4/6) below 2.9 ft; clayey silt, laminated at 2.9 ft; silty clay plastic and stiff. 4.8-6.1 ft; Silty Sand, brown, 10YR 4/3, laminated, wet, soft. 455 6.1-8.7 ft; Sandy Silty Clay grading to Silty Clayey Sand, thin beds, dark brown, 10YR 3/3; 15 sandy silty clay, plastic, stiff, moist; silty 100 clayey sand, laminated, wet. 8.7-13.1 ft; Silty Sand, dark brown, 10YR 3/3, wet, soft. 450 13.1-13.9 ft; Clayey Silt, Silty Sand and Silty Clay, alternating thin beds, wet; clayey silt, 20 dark gray, 10YR 4/1, slightly plastic, soft, 100 laminated, sharp contact with below; silty sand, dark yellowish brown, 10YR 4/6, iron concretions, wet, stiff; silty clay below 13.7 ft, 445 dark gray, (Gley) 1 4/N, plastic, moist, soft. 13.9-18.3 ft; Very Fine Sand, trace fine sand, dark yellowish brown, 10YR 4/4, iron staining, 25 100 wet, loose. 18.3-28.3 ft; Very Fine Sand to Fine Sand, STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. WATER LEVELS: DURING DRILLING \_\_\_\_\_6.5 FEET APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE AFTER DRILLING: DRILLER: Rvan Hunziker GRADUAL OR MAY OCCUR BETWEEN DATE: LOGGED BY: T. Doll SAMPLES. PIEZOMETER: INSTALLED AT +/- 34.8 FEET DATE DRILLED: 10/28/09 NOTES: M. Carlson and F. Phillps **VERTICAL DATUM: NAVD 88** START TIME: 3:50PM (Gredell) onsite performing **HORIZONTAL DATUM: NAD 83** END TIME: 6:28PM pilot aquifer test. **BOREHOLE DIA.:** WEATHER: Cool, 60°F, Overcast, 5-10 MPH Wind from S. 10.25"

#### **GREDELL BORING LOG P-81** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Newman-NE-Central-S of LBR **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 467.64' T.O.C. ELEVATION: 470.31' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 993679.30 **EASTING:** 729444.97 LITHOLOGY WELL CONSTRUCTION DIAGRAM CLAY SAMPLE TYPE SM GRAVEI GRAVEL DEPTH (FEET) **DESCRIPTION** VC SAND VF SAND ELEVATION M SAND FACIES I.D. C SAND SILTY trace coarse sand, alternating thin beds, dark 440 grayish brown and dark gray, 10YR 4/2 and 4/2 C 1, wet. 28.3-36.5 ft; Medium Sand, with fine sand and 30 coarse sand, dark gray, 10YR 4/1, wet. 100 435 35 100 BORING TERMINATED IN MEDIUM 430 SAND @36.5 FT 40 425 45 420 50 415 55 STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. WATER LEVELS: DURING DRILLING \_\_\_\_6.5\_\_ FEET APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN DRILLER: AFTER DRILLING: \_\_\_ Rvan Hunziker LOGGED BY: T. Doll SAMPLES. PIEZOMETER: INSTALLED AT +/- 34.8 FEET DATE DRILLED: 10/28/09 NOTES: M. Carlson and F. Phillps **VERTICAL DATUM: NAVD 88** START TIME: 3:50PM (Gredell) onsite performing **HORIZONTAL DATUM: NAD 83** END TIME: 6:28PM pilot aquifer test.

BOREHOLE DIA.:

10.25"

WEATHER: Cool, 60°F, Overcast, 5-10 MPH Wind from S.

#### GREDELL **BORING LOG P-83** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Newman-N-Central-S of LBR, W of David Rd **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 464.74' T.O.C. ELEVATION: 467.55' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 993664.23 **EASTING:** 730089.18 PERCENT RECOVERY **LITHOLOGY** WELL CONSTRUCTION DIAGRAM CLAY GRAPHIC LOG SAMPLE TYPE SM GRAVEL -G GRAVEL WATER TABL DESCRIPTION VF SAND VC SAND FACIES I.D. SAND SAND SILTY CLAY 465 0 0.0-0.7 ft; Clayey Silt, very dark grayish brown FB and dark brown, 10YR 3/2 and 3/3, slightly plastic, soft, moist, roots. 100 0.7-1.8 ft; Sandy Clayey Silt, dark brown, 10YR 3/3, slightly plastic, stiff, moist. 1.8-4.3 ft; Silty Clay, very dark grayish brown, 460 5 10YR 3/2, plastic, very stiff, moist, mottles (10YR 4/6); dark grayish brown, 10YR 4/2, below 3.4 ft. 90 4.3-15.8 ft; Sandy Clayey Silt, Silty Clay and Very Fine Sand, alternating thin beds, dark gray and dark grayish brown, 10YR 4/1 and 4/ 455 10 2, moist to 5.7 ft; sandy clayey silt beds, FP/ laminated; silty clay beds generally mottled Lev 42 (10YR 4/6); iron staining and iron concretions in sandy clayey silt and silty clay beds from 6.8 to 8.5 ft and again below 9.3 ft; silty clay beds, plastic; very fine sand beds below 8.5 ft, 450 15 brown, 10YR 4/3, (clay slough probable in top 89 of 15.0 ft S.S.). 15.8-25.7 ft; Very Fine Sand and Fine Sand. alternating thin beds, dark gray to brown, 10YR 4/1 to 4/3, wet, trace coarse sand below 21.2 ft, soft grading to loose consistency. 445 20 100 440 25 25.7-36.5 ft; Medium to Coarse Sand, with CM/ DRILLING CO.: Max's Enterprises, Inc. STRATIFICATION LINES ARE WATER LEVELS: **DURING DRILLING** APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE DRILLER: Dave Hunziker AFTER DRILLING: GRADUAL OR MAY OCCUR BETWEEN LOGGED BY: T. Doll DATE: DATE DRILLED: 11/10/09 PIEZOMETER: INSTALLED AT +/- 34.8 START TIME: NOTES: Blake Smotherman, MDNR, **VERTICAL DATUM: NAVD 88** 4:34PM 11/9 onsite observing drilling END TIME: 9:40AM HORIZONTAL DATUM: NAD 83 activities. **BOREHOLE DIA.:** 8.25" WEATHER: Cool, 50°F, Foggy, Mostly Cloudy, Humid.

#### GREDELL **BORING LOG P-83** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Newman-N-Central-S of LBR, W of David Rd **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 464.74' T.O.C. ELEVATION: 467.55' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **EASTING:** 730089.18 **NORTHING:** 993664.23 LITHOLOGY CLAY SAMPLE TYPE SM GRAVEI G GRAVEL DESCRIPTION VF SAND VC SAND M SAND FACIES I.D. C SAND very fine to fine sand, alternating thin beds, Sp trace clay, dark grayish brown and dark gray, $\mathbf{C}$ 10YR 4/2 and 4/1, 5-20 mm subrounded clasts, medium sand from 30.6 to 30.8 ft is dark gray, 435 30 (Gley) 1 4/N, (fine sand noted at total depth based on cuttings sample collected from auger 430 35 FP/ Lev BORING TERMINATED IN FINE SAND @36.5 FT 425 40 420 45 415 410 STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. **WATER LEVELS:** DURING DRILLING \_\_\_\_\_\_5.6\_\_\_ FEET APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN AFTER DRILLING: \_ DRILLER: Dave Hunziker LOGGED BY: T. Doll DATE: SAMPLES. PIEZOMETER: INSTALLED AT +/- 34.8 DATE DRILLED: 11/10/09 NOTES: Blake Smotherman, MDNR, START TIME: **VERTICAL DATUM: NAVD 88** 4:34PM 11/9 onsite observing drilling **HORIZONTAL DATUM: NAD 83** END TIME: 9:40AM

**BOREHOLE DIA.:** 

8.25"

WEATHER: Cool, 50°F, Foggy, Mostly Cloudy, Humid.

#### GREDELL **BORING LOG P-85** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Newman-N-Central-S of LBR, W of David Rd **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 464.41' T.O.C. ELEVATION: 466.75' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 993647.31 **EASTING:** 730619.20 **LITHOLOGY** WELL CONSTRUCTION DIAGRAM CLAY SAMPLE TYPE G GRAVEL SM GRAVEI **JEPTH (FEET)** WATER TABL DESCRIPTION **VF SAND** VC SAND M SAND C SAND SAND SILTY 465 0 0.0-0.8 ft, Clayey Silt grading to Silty Clay, FB very dark grayish brown, 10YR 3/2, moist, soft, roots, slightly plastic below 0.5 ft. 65 0.8-4.2 ft; Silty Clay, very dark grayish brown, 10YR 3/2, plastic, stiff, mottles (10YR 4/6), 460 becoming highly plastic and very stiff below 5 1.8 ft; silt bed from 2.3-2.4 ft, brown, 10YR 4/ 3, moist, soft. FP/ 4.2-5.8 ft; Poor recovery, probable Silty Clay Lev and Sandy Clayey Silt. 5.8-28.3 ft; Silty Sand grading to Fine Sand, thin beds, dark yellowish brown and brown, 455 10 10YR 4/4 and 4/3, wet, soft; laminated black 100 coalified wood matter and fine muscovite mica flakes from 6.9-7.5 ft; becoming dark grayish brown, 10YR 4/2 below 20.0 ft, (clay slough probable in top of 10.0-20.0 ft S.S.). 450 15 100 445 20 100 440 25 100 STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. WATER LEVELS: DURING DRILLING \_\_\_\_\_ 5.5\_\_ FEET APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE AFTER DRILLING: DRILLER: Dave Hunziker GRADUAL OR MAY OCCUR BETWEEN DATE: LOGGED BY: T. Doll SAMPLES. PIEZOMETER: INSTALLED AT +/- 34.0 FEET DATE DRILLED: 11/10/09 START TIME: NOTES: Blake Smotherman, MDNR, **VERTICAL DATUM: NAVD 88** 11:09AM onsite observing drilling HORIZONTAL DATUM: NAD 83 END TIME: 4:28PM activities. **BOREHOLE DIA.:** WEATHER: Cool, 55°F, Cloudy, 10-15 MPH Wind from N. 10.25"

#### **GREDELL BORING LOG P-85** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Newman-N-Central-S of LBR, W of David Rd **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 464.41' T.O.C. ELEVATION: 466.75' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 993647.31 **EASTING:** 730619.20 LITHOLOGY CLAY SM GRAVEL GRAVEL **DESCRIPTION** WATER TABI VF SAND /C SAND F SAND C SAND M SAND 28.3-36.5 ft; Medium Sand grading to Sandy 435 Gravel, thin beds, trace gravel, dark gray 30 matrix, 10YR 4/1, wet, 10-15 mm subrounded clasts to 30.9 ft, 5-30 mm subangular clasts below 35.3 ft, (fine sand and clay slough probable in top of 30.0 and 35.0 ft S.S.). 430 35 **BORING TERMINATED IN SANDY** GRAVEL SAND @36.5 FT 425 40 420 45 415 50 410 55 STRATIFICATION LINES ARE WATER LEVELS: DURING DRILLING \_\_\_\_\_\_ 5.5 \_\_ FEET DRILLING CO.: Max's Enterprises, Inc. APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN DRILLER: AFTER DRILLING: \_\_\_ Dave Hunziker LOGGED BY: T Doll DATE: SAMPLES PIEZOMETER: INSTALLED AT +/- 34.0 FEET DATE DRILLED: 11/10/09 NOTES: Blake Smotherman, MDNR, START TIME: **VERTICAL DATUM: NAVD 88** 11:09AM onsite observing drilling **HORIZONTAL DATUM: NAD 83** END TIME: 4:28PM

**BOREHOLE DIA.:** 

10.25"

WEATHER: Cool, 55°F, Cloudy, 10-15 MPH Wind from N.

# GREDELL ENGINEERING RESOURCES, INC.

# **BORING LOG P-87**

Ameren Missouri Labadie Power Plant LOCATION: Newman-East-S of LBR, Adj to Davis Rd **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 466.69' T.O.C. ELEVATION: 469.64' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 993693.54 **EASTING:** 731420.88 LITHOLOGY WELL CONSTRUCTION DIAGRAM CLAY SM GRAVEL WATER TABLE SAMPLE TYPE G GRAVEL **JEPTH (FEET)** VC SAND DESCRIPTION VF SAND M SAND SAND C SAND PERCENT SILTY CLAY 0 0.0-0.8 ft; Clayey Silt, dark brown, 10YR 3/3, FB \slightly plastic, soft, moist to wet, roots. 465 0.8-3.2 ft; Silty Clay, very dark grayish brown, 75 10YR 3/2, plastic, very stiff, moist, mottles \(10YR 4/6). 3.2-4.4 ft; Silty Sand, dark yellowish brown, 5 10YR 4/4, moist, loose. 4.4-6.7 ft; Poor recovery, probable Silty Clay 460 \slough. 75 6.7-13.3 ft; Sandy Silt, Clayey Sandy Silt, Sandy Silty Clay, Fine Sand and Very Fine Sand, alternating thin beds, wet; sandy silt and 10 silty sand beds, brown to dark grayish brown, 10YR 3/4, 4/2, 4/3; sandy silty clay beds, dark 455 gray, 10YR 4/1, plastic, soft; sandy silt and clavey sandy silt beds, laminated; very fine sand bed laminated below 12.0 ft; iron staining CO/ in clayey sandy silt bed from 11.1-11.7 ft. BS 15 13.3-20.6 ft; Sandy Silt grading to Clayey 100 Sandy Silt, thin beds, dark gray, (Gley) 1 4/N, wet, soft; laminated to 16.5 ft; slightly plastic 450 below 20.5 ft, (clay slough probable in top of 20.0 ft S.S.). 20 67 20.6-36.5 ft; Medium Sand, with fine and CM/ 445 coarse sand; alternating thin beds, dark gray, Sp 10YR 4/1, wet, loose to soft, trace gravel, 5 mm subrounded clasts to 21.0 ft; 20 mm subrounded clasts below 36.1 ft, (fine sand 25 noted at total depth based on cuttings sample collected from auger bit). 440 STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. WATER LEVELS: DURING DRILLING 7.0 FEET APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE AFTER DRILLING: DRILLER: Ryan Hunziker GRADUAL OR MAY OCCUR BETWEEN DATE: LOGGED BY: T. Doll SAMPLES. PIEZOMETER: INSTALLED AT +/- 35.0 FEET DATE DRILLED: 10/26/09 NOTES: S. King (Gredell) onsite **VERTICAL DATUM: NAVD 88** START TIME: 4-15PM developing piezometers. **HORIZONTAL DATUM: NAD 83** END TIME: 6:28PM **BOREHOLE DIA.:** WEATHER: Cool, 55°F, Overcast, Lt. Rain, Calm. 8.25"

#### GREDELL **BORING LOG P-87** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Newman-East-S of LBR, Adj to Davis Rd Proposed Utility Waste Disposal Area G.S. ELEVATION: 466.69' T.O.C. ELEVATION: 469.64' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 993693.54 **EASTING:** 731420.88 LITHOLOGY PERCENT RECOVERY CLAY GRAVEL WATER TABLE SAMPLE TYPE SM GRAVEL DEPTH (FEET) DESCRIPTION VC SAND VF SAND FACIES I.D. M SAND F SAND GRAPHIC C SAND 20.6-36.5 ft; Medium Sand, with fine and CM/ coarse sand; alternating thin beds, dark gray, Sp 10YR 4/1, wet, loose to soft, trace gravel, 5 mm subrounded clasts to 21.0 ft; 20 mm 30 subrounded clasts below 36.1 ft, (fine sand noted at total depth based on cuttings sample 435 collected from auger bit). 35 FP/ Lev 430 BORING TERMINATED IN FINE SAND @36.5 FT 40 425 45 420 50 415 55 410 STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. **WATER LEVELS:** DURING DRILLING \_\_\_\_\_\_ FEET APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN DRILLER: Ryan Hunziker AFTER DRILLING: \_\_\_ LOGGED BY: T. Doll DATE: SAMPLES PIEZOMETER: INSTALLED AT +/- 35.0 DATE DRILLED: 10/26/09 NOTES: S. King (Gredell) onsite **VERTICAL DATUM: NAVD 88** START TIME: 4:15PM developing piezometers. **HORIZONTAL DATUM: NAD 83** END TIME: 6:28PM WEATHER: Cool, 55°F, Overcast, Lt. Rain, Calm. **BOREHOLE DIA.:** 8.25"

### GREDELL ENGINEERING RESOURCES, INC.

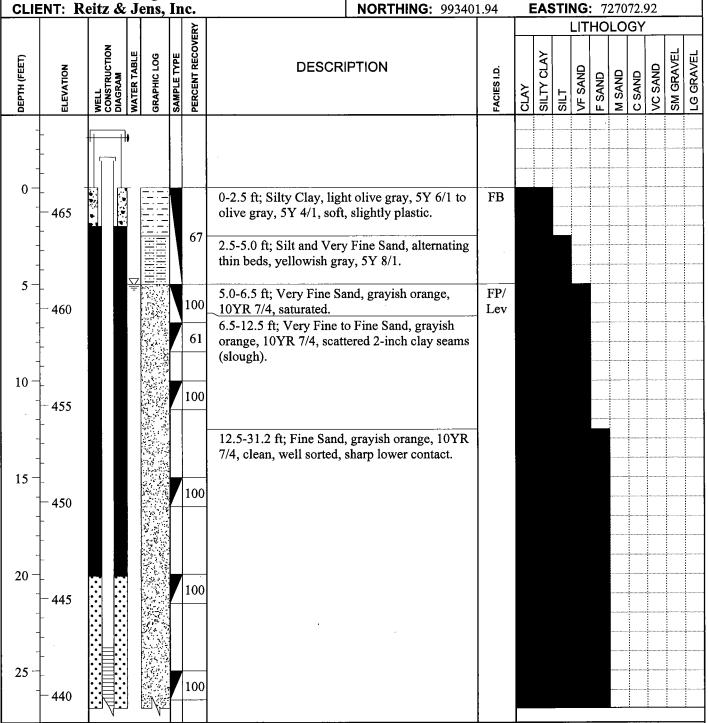
# **BORING LOG P-88**

Ameren Missouri Labadie Power Plant Proposed Utility Waste Disposal Area **Detailed Site Investigation** 

LOCATION: Bean Field-West Margin Project Area

G.S. ELEVATION: 466.25' T.O.C. ELEVATION: 469.13'

**EASTING:** 727072.92 **NORTHING:** 993401.94



DRILLER: Dave Hunziker LOGGED BY: M. Carlson DATE DRILLED: 11/06/09 START TIME: 3:00PM END TIME:

8.25"

**BOREHOLE DIA.:** 

DRILLING CO.: Max's Enterprises, Inc.

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

NOTES: Paul Reitz, Jason Pruett, Chris Cook (R&J), T.Doll (Gredell) and JoAnn Thee (Ameren)

WATER LEVELS: DURING DRILLING \_\_\_\_5 FEET AFTER DRILLING:

DATE: PIEZOMETER: INSTALLED AT +/- 34.8 FEET

**VERTICAL DATUM: NAVD 88 HORIZONTAL DATUM: NAD 83** WEATHER: Warm, 60°F, Clear Skies, Calm.

## **GREDELL** ENGINEERING RESOURCES, INC.

# **BORING LOG P-88**

Ameren Missouri Labadie Power Plant Proposed Utility Waste Disposal Area **Detailed Site Investigation** 

LOCATION: Bean Field-West Margin Project Area

G.S. ELEVATION: 466.25' T.O.C. ELEVATION: 469.13'

**EASTING:** 727072 92

CLIE	ENT: R	eitz & .	<u>Jen</u>	ıs, I	nc	<b>:</b> .	NORTHING	<b>3:</b> 99340:	1.94	<u>E</u>	<u>AS</u>	<u>IIT</u>	<u> </u>	72	270'	72.9	92		
		[				Ή						_	LITH	Ю	LO	GΥ			$\square$
БЕРТН (FEET)	ELEVATION	WELL CONSTRUCTION DIAGRAM	WATER TABLE	GRAPHIC LOG	SAMPLE ITPE	PERCENT RECOVERY	DESCRIPTION		FACIES I.D.	CLAY	SILTY CLAY	SILT	VF SAND	F SAND	M SAND	C SAND	VC SAND	SM GRAVEL	LG GRAVEL
_				Age:							i								
-							12.5-31.2 ft; Fine Sand, grayish orange 7/4, clean, well sorted, sharp lower con		FP/ Lev										
30 -	_				/	89													
-	<del>-</del> 435						31.2-36.5 ft; Medium to Coarse Sand, yellowish orange, 10YR 6/2, gravelly		С										
-	-					•	sand slough in top of S.S.).	` .											
35 -	100					67			-										
-	430		نندا	/	$\dagger$		BORING TERMINATED IN MEDIU COARSE SAND @36.5 FT	м то											
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40 -	425																		
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45 -	- <b>42</b> 0													a ea 1962 es e					-
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DRILLIN DRILLE LOGGE		x's Enterprise Dave Hunzil M. Carlson	ker	с,	•	_	STRATIFICATION LINES ARE APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN SAMPLES.	WATER LE	VELS:	AF	TER	DR	RILLIN	G: _					

2010	
11/8/	
Printed:	
Jate	

START TIME:

END TIME:

DATE DRILLED:

BOREHOLE DIA.:

11/06/09

3:00PM

8.25"

**VERTICAL DATUM: NAVD 88 HORIZONTAL DATUM: NAD 83** 

PIEZOMETER: INSTALLED AT +/- 34.8 FEET

#### **GREDELL BORING LOG P-90** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant **LOCATION:** Heisel-West, W of farm access Rd, S of LBR **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 465.38' T.O.C. ELEVATION: 468.10' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **EASTING:** 727804.04 **NORTHING:** 993427.80 **LITHOLOGY** PERCENT RECOVERY WELL CONSTRUCTION DIAGRAM CLAY SAMPLE TYPE SM GRAVEL G GRAVEL WATER TABL **DESCRIPTION** VC SAND VF SAND ACIES I.D. M SAND C SAND SAND SILTY CLAY 0 465 0.0-0.5 ft; Clayey Silt, dark brown, 10YR 3/3, FB damp, soft. 0.5-1.3 ft; Fine Sand and Silty Sand, thin beds, 100 dark grayish brown, 10YR 4/2, damp, soft. 1.3-5.0 ft; Clay, very dark grayish brown, 10YR 3/2, highly plastic, very firm, moist, 5 460 mottles (10YR 4/6), interbeds of silt <1 inch thick. 5.0-10.0 ft; Silty Clay and Clayey Silt, dark 100 brown and dark grayish brown, 10YR 3/3 and 4/2, soft; moist to 7.3 ft; wet below 8.0 ft; silty clay, plastic; firm to very firm below 6.6 ft. 10 -455 10-13.5 ft; Medium Sand, trace fine sand and CO/ clay, dark yellowish brown, 10YR 3/6, wet, BS soft; clay, very dark gray, (Gley) 1 3/N, plastic, 40 moist grading to wet. 13.5-31.3 ft; Very Fine to Fine Sand, thin beds, FP/ dark gray, 10YR 4/1, wet, soft, (fine sand and Lev 15 450 clay slough probable in top of 15.0-30.0 ft 100 S.S.). 20 445 100 25 100 STRATIFICATION LINES ARE APPROXIMATE LITHOLOGIC BOUNDARIES DRILLING CO.: Max's Enterprises, Inc. WATER LEVELS: DURING DRILLING 8 FEET AFTER DRILLING: \_\_ DRILLER: Doug Hunziker ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN LOGGED BY: DATE: T. Doll SAMPLES. PIEZOMETER: INSTALLED AT +/- 35.0 FEET DATE DRILLED: 09/28/09 NOTES: Chris Vierrether, MDNR, **VERTICAL DATUM: NAVD 88** START TIME: 2:20PM onsite observing drilling END TIME: 5:00PM **HORIZONTAL DATUM: NAD 83** activities. BOREHOLE DIA.: 8.25" WEATHER: Warm, 60°F, Clear Skies, Mild, 30 MPH Gusting Wind.

# GREDELL ENGINEERING RESOURCES, INC.

# **BORING LOG P-90**

Ameren Missouri Labadie Power Plant Proposed Utility Waste Disposal Area Detailed Site Investigation CLIENT: Reitz & Jens. Inc.

 $\textbf{LOCATION:} \ \ He is el-West, W \ of farm \ access \ Rd, \ S \ of \ LBR$ 

**G.S. ELEVATION:** 465.38' **T.O.C. ELEVATION:** 468.10'

**NORTHING:** 993427.80 **EASTING:** 727804.04

CLIENT: J	keitz & Jens	, 1110	<u>c.                                    </u>	<b>NORTHING:</b> 993427	7.80		45	1111	IG:	12	/81	<i>J</i> 4.(	<i>1</i> 4		
			ES				<del></del>	L	<u>IT</u>	<u>IOL</u>	<u>,0</u>	<u>GY</u>			
DEPTH (FEET) ELEVATION	WELL CONSTRUCTION DIAGRAM WATER TABLE GRAPHIC LOG	SAMPLE TYPE	PERCENT RECOVERY	DESCRIPTION	FACIES I.D.	CLAY	SILTY CLAY	SILT	VF SAND	F SAND	M SAND	C SAND	VC SAND	SM GRAVEL	LG GRAVEL
30 - 435			100	13.5-31.3 ft; Very Fine to Fine Sand, thin beds, dark gray, 10YR 4/1, wet, soft, (fine sand and clay slough probable in top of 15.0-30.0 ft S.S.).	FP/ Lev										
35 - 430			100	31.3-36.5 ft; Medium to Coarse Sand, thin beds, with fine sand, trace very fine sand and gravel, dark gray, 10YR 4/1, subrounded clasts, wet; loose to 35.0 ft; firm below 35.0 ft, (fine sand and clay slough probable in top of 30.0 ft S.S.).	CM/ Sp										
40				BORING TERMINATED IN MEDIUM SAND @36.5 FT											
45 - 420															
50 - 415															
55 - 410															
DRILLING CO.: N	ax's Enterprises, Inc.			STRATIFICATION LINES ARE APPROXIMATE LITHOLOGIC BOUNDARIES  WATER LE	VELS:				ILLIN				FEI		

Date Printed: 11/8/2010

DRILLER:

LOGGED BY:

START TIME:

END TIME:

DATE DRILLED:

BOREHOLE DIA.:

Doug Hunziker

T. Doll

09/28/09

2:20PM

5:00PM

8.25"

NOTES: Chris Vierrether, MDNR, onsite observing drilling

SAMPLES.

APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN

onsite observing drilling activities.

WATER LEVELS: DURING DRILLING 8 FEET AFTER DRILLING: FEET

DATE: \_

PIEZOMETER: INSTALLED AT +/- 35.0 FEET

**VERTICAL DATUM:** NAVD 88 **HORIZONTAL DATUM:** NAD 83

WEATHER: Warm, 60°F, Clear Skies, Mild, 30 MPH Gusting Wind.

#### GREDELL **BORING LOG P-93** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Newman-West, E of farm access Rd Proposed Utility Waste Disposal Area G.S. ELEVATION: 465.91' T.O.C. ELEVATION: 468.82' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 993388.35 **EASTING:** 729062.32 LITHOLOGY CLAY SM GRAVEL G GRAVEL SAMPLE TYPE **WATER TABLE** ЭЕРТН (FEET) GRAPHIC LOG DESCRIPTION VF SAND VC SAND SAND M SAND C SAND SILTY 0.0-0.9 ft; Clayev Silt, dark brown, 10YR 3/3, FB 465 moist, soft; silty sand below 0.8 ft, brown, 10YR 4/3, damp, loose. 100 0.9-6.8 ft; Silty Clay, very dark grayish brown, 10YR 3/2, plastic, stiff, moist, mottles (10YR 4/6); very stiff below 3.9 ft; dark brown, 10YR 5 3/3, stiff below 6.1 ft. 460 6.8-8.0 ft; Clayey Silt grading to Silty Clay; dark grayish brown, 10YR 4/2, wet grading to moist; silty clay, highly plastic. 8.0-16.3 ft; Silty Sand and Fine Sand, thin 10 beds, dark grayish brown and dark gray, 10YR FP/ 455 4/2 and 4/1, wet, soft, mottles (10YR 4/6) to Lev 8.8 ft; laminated to 11.3 ft; laminations from 10.3-11.3 ft are very dark gray (10YR 3/1), (fine sand and clay slough probable in top of 10.0 and 15.0 ft S.S.). 15 450 16.3-23.3 ft, Fine Sand and Coarse Sand, CM/ alternating thin beds, dark gray, 10YR 4/1, wet, soft, (clay slough probable in top of 25.0 ft S.S.). 20 445 23.3-36.5 ft; Coarse Sand, with fine and C medium sand, thin beds, trace gravel, dark 25 gray, 10YR 4/1, 10-15 mm rounded to 440 subrounded clasts, wet, soft grading to loose, STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. WATER LEVELS: DURING DRILLING 10 FEET APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE AFTER DRILLING: \_\_ DRILLER: Rvan Hunziker GRADUAL OR MAY OCCUR BETWEEN DATE: LOGGED BY: T. Doll SAMPLES. PIEZOMETER: INSTALLED AT +/- 35.0 FEET DATE DRILLED: 10/20/09 NOTES: M. Carlson (Gredell), John **VERTICAL DATUM: NAVD 88** START TIME: 12:35PM

Eimer and Kenny Kintz

drilling activities.

(Ameren) onsite observing

END TIME:

BOREHOLE DIA.:

3:00PM

8.25"

**HORIZONTAL DATUM: NAD 83** 

#### **GREDELL BORING LOG P-93** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Newman-West, E of farm access Rd **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 465.91' T.O.C. ELEVATION: 468.82' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 993388.35 **EASTING:** 729062.32 **LITHOLOGY** CONSTRUCTION CLAY SAMPLE TYPE SM GRAVEL GRAVEL DEPTH (FEET) **DESCRIPTION** WATER TABI VC SAND VF SAND M SAND FACIES I.D. C SAND SAND (fine sand and clay slough in top of 35.0 ft $\mathbf{C}$ 23.3-36.5 ft; Coarse Sand, with fine and medium sand, thin beds, trace gravel, dark 30 gray, 10YR 4/1, 10-15 mm rounded to 435 subrounded clasts, wet, soft grading to loose, (fine sand and clay slough in top of 35.0 ft S.S.). 35 430 BORING TERMINATED IN COARSE SAND @36.5 FT 40 425 45 420 50 415 55 410 STRATIFICATION LINES ARE WATER LEVELS: DURING DRILLING \_\_\_\_\_10\_\_ FEET DRILLING CO.: Max's Enterprises, Inc. APPROXIMATE LITHOLOGIC BOUNDARIES AFTER DRILLING: \_\_ FEET DRILLER: Ryan Hunziker ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN LOGGED BY: T. Doll SAMPLES. PIEZOMETER: INSTALLED AT +/-DATE DRILLED: 10/20/09 NOTES: M. Carlson (Gredell), John **VERTICAL DATUM: NAVD 88** START TIME: 12:35PM Eimer and Kenny Kintz HORIZONTAL DATUM: NAD 83 END TIME: 3:00PM (Ameren) onsite observing WEATHER: Warm, 65°F, Mostly Sunny, Mild, 10-15 MPH Wind from E-SE. BOREHOLE DIA.: 8.25" drilling activities.

#### **GREDELL BORING LOG P-95** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Newman-Central, E of farm access Rd **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 467.22' T.O.C. ELEVATION: 469.92' **Detailed Site Investigation EASTING:** 729725.06 CLIENT: Reitz & Jens, Inc. **NORTHING:** 993368.45 LITHOLOGY CLAY SM GRAVEL SAMPLE TYPE G GRAVEL WATER TABI DESCRIPTION VC SAND VF SAND ELEVATION ACIES I.D. C SAND SAND M SAND CLAY 470 0 0.0-0.8 ft; Clayey Silt, dark brown, 10YR 3/3, FB non-plastic, soft, moist, trace clay below 0.6 ft. 0.8-1.9 ft; Silty Clay, very dark grayish brown, 465 10YR 3/2, plastic, stiff, moist, mottles (10YR) 1.9-10.7 ft; Silty Sand, Clayey Silty Sand, and 5 Silty Clay, alternating thin beds, dark grayish brown to brown, 10YR 4/3 and 4/2, wet; silty sand bed from 3.5-4.0 ft, laminated; silty clay 460 bed, plastic, dark brown, 10YR 3/3; silty sand below 10.0 ft, iron staining (10YR 4/6). 10 10.7-20.0 ft; Sandy Silt, Silty Clay, and Very CO/ Fine Sand, alternating thin beds, very dark BS 455 gray, (Gley) 1 3/N, wet, soft; silty clay bed from 11.4-12.7 ft, black mottles (Gley 1 2.5/N); (fine sand and clay slough probable in top of 15 15.0 S.S.). 89 450 20 20.0-30.8 ft; Fine sand, with medium sand, 89 trace coarse sand, very dark gray, (Gley) 1 3/N; with coarse sand below 23.3 ft, (clay slough 445 probable in top of 25.0 ft S.S.) 25 89 STRATIFICATION LINES ARE WATER LEVELS: DURING DRILLING \_\_\_\_8\_\_ FEET DRILLING CO.: Max's Enterprises, Inc. APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN DRILLER: AFTER DRILLING: Ryan Hunziker LOGGED BY: DATE: T. Doll SAMPLES. PIEZOMETER: INSTALLED AT +/- 34.9 DATE DRILLED: 10/20/09 NOTES: S. King (Gredell) onsite **VERTICAL DATUM: NAVD 88** START TIME: 3:37PM developing piezometers.

END TIME:

**BOREHOLE DIA.:** 

5:45PM

8.25"

WEATHER: Warm, 75°F, Partly Sunny, Mild, 15-25 MPH Wind from S.

**HORIZONTAL DATUM: NAD 83** 

#### **GREDELL BORING LOG P-95** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Newman-Central, E of farm access Rd Proposed Utility Waste Disposal Area G.S. ELEVATION: 467.22' T.O.C. ELEVATION: 469.92' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 993368.45 **EASTING:** 729725.06 LITHOLOGY CLAY SM GRAVEL SAMPLE TYPE **DESCRIPTION** VC SAND VF SAND M SAND F SAND C SAND 440 CO/ 20.0-30.8 ft; Fine sand, with medium sand, BS trace coarse sand, very dark gray, (Gley) 1 3/N; with coarse sand below 23.3 ft, (clay slough probable in top of 25.0 ft S.S.) 30 30.8-36.5 ft; Medium Sand to Coarse Sand, alternating thin beds, trace very fine sand and 435 gravel, dark gray, 10YR 4/1, wet, loose, 10 mm subrounded clasts. 35 BORING TERMINATED IN COARSE SAND 430 @36.5 FT 40 425 45 420 50 415 55 STRATIFICATION LINES ARE WATER LEVELS: DURING DRILLING \_\_\_\_8\_\_ DRILLING CO.: Max's Enterprises, Inc. APPROXIMATE LITHOLOGIC BOUNDARIES AFTER DRILLING: \_\_ FEET DRILLER: Ryan Hunziker ONLY; ACTUAL CHANGES MAY BE LOGGED BY: T. Doll

DATE DRILLED:

**BOREHOLE DIA.:** 

START TIME:

END TIME:

10/20/09

3:37PM

5:45PM

8.25"

GRADUAL OR MAY OCCUR BETWEEN SAMPLES.

PIEZOMETER: INSTALLED AT +/- 34.9

NOTES: S. King (Gredell) onsite developing piezometers.

**VERTICAL DATUM: NAVD 88 HORIZONTAL DATUM: NAD 83** 

WEATHER: Warm, 75°F, Partly Sunny, Mild, 15-25 MPH Wind from S.

#### **GREDELL BORING LOG P-97** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Newman-Central, E of farm access Rd Proposed Utility Waste Disposal Area G.S. ELEVATION: 467.05' T.O.C. ELEVATION: 469.67' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 993349.44 **EASTING:** 730302.43 LITHOLOGY CLAY SM GRAVEL SAMPLE TYPE **DEPTH (FEET)** WATER TABI DESCRIPTION VF SAND VC SAND ELEVATION SAND M SAND C SAND SILTY 470 0 0.0-0.9 ft; Clayey Silt, dark brown, 10YR 3/3, FB \non-plastic, moist, soft. 465 0.9-1.8 ft; Silty Clay, very dark grayish brown, 100 10YR 3/2, slightly plastic, stiff, moist, mottles 1.8-3.7 ft; Silty Sand, brown, 10YR 4/3, moist, 5 soft; silty sand below 3.0 ft, wet, mottles (10YR 4/6). 3.7-4.5 ft; Silty Clay, dark brown, 10YR 3/3, 460 moist, stiff, mottles (10YR 4/6). 4.5-10.3 ft; Silty Sand and Clayey Silt, thin beds; silty sand, dark yellowish brown and 10 brown, 10YR 4/4 and 4/3, loose grading to CO/ stiff, moist; laminated, mottles (10YR 4/6) and BS wet below 7.1 ft; clayey silt, dark brown, 10YR 455 75 3/3, slightly plastic, moist, soft. 10.3-15.9 ft; Silty Clay and Silty Sand, thin beds, very dark gray, (Gley) 1 3/N, moist, soft; 15 silty clay to 11.4 ft, highly plastic, moist, iron 72 concretions (10YR 4/6); silty clay to 11.9 ft, FP/ plant detritus, coalified wood; silty sand to 13.8 450 Lev ft, laminations of fibrous plant detritus; silty sand to 15.0 ft; wet below 11.9 ft; (clay slough probable in top of 15.0 ft S.S.). 15.9-30.5 ft; Fine to Coarse Sand, alternating 20 thin beds, dark gray, 10YR 4/1, wet, alternating loose and soft beds, (clay slough probable in 445 top of 20.0 ft S.S.). 25 61 STRATIFICATION LINES ARE WATER LEVELS: DURING DRILLING \_\_\_\_7\_\_ FEET DRILLING CO.: Max's Enterprises, Inc. APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN AFTER DRILLING: DRILLER: Ryan Hunziker DATE: LOGGED BY: T Doll SAMPLES. PIEZOMETER: INSTALLED AT +/- 34.8 DATE DRILLED: 10/21/09 NOTES: Chris Vierrether, MDNR, **VERTICAL DATUM: NAVD 88** START TIME: 7:45AM onsite observing drilling **HORIZONTAL DATUM: NAD 83** END TIME: 10:40AM WEATHER: Warm, 55°F, Partly Cloudy, Mild, Calm. BOREHOLE DIA.: 8.25"

#### **GREDELL BORING LOG P-97** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Newman-Central, E of farm access Rd **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 467.05' T.O.C. ELEVATION: 469.67' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **EASTING:** 730302.43 **NORTHING:** 993349.44 LITHOLOGY PERCENT RECOVERY CLAY SAMPLE TYPE SM GRAVEL G GRAVEL DESCRIPTION ELEVATION VC SAND VF SAND M SAND FACIES I.D. SAND C SAND SILTY 440 15.9-30.5 ft; Fine to Coarse Sand, alternating FP/ thin beds, dark gray, 10YR 4/1, wet, alternating Lev loose and soft beds, (clay slough probable in top of 20.0 ft S.S.). 30 30.5-36.5 ft; Coarse Sand, with medium sand, trace fine sand and gravel, dark gray, 10YR 4/ 435 1, wet, soft, 5 mm subrounded clasts, (clay slough probable in top of 35.0 ft S.S.). 35 61 **BORING TERMINATED IN COARSE SAND** 430 @36.5 FT 40 425 45 420 50 415 55 STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. **WATER LEVELS:** DURING DRILLING \_\_\_\_\_7 FEET APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE DRILLER: Ryan Hunziker AFTER DRILLING: GRADUAL OR MAY OCCUR BETWEEN LOGGED BY: T. Doll

DATE DRILLED:

BOREHOLE DIA.:

START TIME:

END TIME:

10/21/09

7:45AM

10:40AM

8.25"

NOTES: Chris Vierrether, MDNR, onsite observing drilling activities.

SAMPLES.

DATE:

PIEZOMETER: INSTALLED AT +/- 34.8 FEET

**VERTICAL DATUM: NAVD 88 HORIZONTAL DATUM: NAD 83** WEATHER: Warm, 55°F, Partly Cloudy, Mild, Calm.

#### **GREDELL BORING LOG P-99** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Newman-East, Adj to Davis Rd Proposed Utility Waste Disposal Area G.S. ELEVATION: 464.38' T.O.C. ELEVATION: 467.21' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 993336.45 **EASTING:** 730887.27 LITHOLOGY CONSTRUCTION DIAGRAM CLAY SM GRAVEL SAMPLE TYPE G GRAVEL **JEPTH (FEET)** WATER TABL VC SAND DESCRIPTION VF SAND ELEVATION SAND M SAND C SAND CLAY 465 0 0.0-0.7 ft; Clayey Silt, dark brown, 10YR 3/3, FB \moist, soft. 0.7-2.3 ft; Silty Clay, very dark grayish brown, 75 10YR 3/2, plastic, very firm, moist, mottles 460 2.3-2.8 ft; Clayey Silt, dark yellowish brown, 5 10YR 3/4, slightly plastic, moist, soft. 2.8-3.9 ft; Silty Clay, very dark grayish brown FP/ 10YR 3/2, plastic, very stiff, moist. Lev 40 3.9-6.1 ft; Poor recovery, Silty Clay slough probable. 455 6.1-13.3 ft; Clayey Silt grading to Fine Sand; 10 clayey silt to 6.2 ft, dark grayish brown, 10YR 4/2, slightly plastic, laminated, moist, soft; fine sand, dark yellowish brown, 10YR 4/4, wet, loose, (clay slough probable in top of 10.0 ft \S.S.). 13.3-18.3 ft, Fine Sand, with very fine sand, 450 15 trace medium sand and coarse sand, dark gray, 100 10YR 4/1, wet, soft, trace clay ball. 18.3-23.3 ft; Fine Sand and Clayey Sand, alternating thin beds, trace medium sand, dark 20 gray, 10YR 4/1, wet, soft, trace clay balls. 100 23.3-36.5 ft; Coarse Sand, with fine sand and C 440 gravel, trace medium sand, alternating thin 25 beds, dark gray, 10YR 4/1, wet, loose, 10-20 100 mm subangular clasts, (fine sand and clay STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. WATER LEVELS: DURING DRILLING APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE AFTER DRILLING: \_ DRILLER: Ryan Hunziker GRADUAL OR MAY OCCUR BETWEEN DATE: LOGGED BY: T. Doll SAMPLES. PIEZOMETER: INSTALLED AT +/-DATE DRILLED: 10/21/09 NOTES: Chris Vierrether (MDNR) and **VERTICAL DATUM: NAVD 88** START TIME: 10:53AM M. Carlson (Gredell) onsite **HORIZONTAL DATUM: NAD 83** END TIME: 1:50PM observing drilling activities. WEATHER: Warm, 70°F, Overcast, Mild, 10-15 MPH Wind from S. **BOREHOLE DIA.:** 8.25"

#### **GREDELL BORING LOG P-99** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant **LOCATION:** Newman-East, Adj to Davis Rd Proposed Utility Waste Disposal Area G.S. ELEVATION: 464.38' T.O.C. ELEVATION: 467.21' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 993336.45 **EASTING:** 730887.27 LITHOLOGY CLAY SM GRAVEL SAMPLE TYPE G GRAVEL DEPTH (FEET) WATER TABI VC SAND DESCRIPTION VF SAND FACIES I.D. M SAND SAND C SAND \slough probable in top of 25.0 ft S.S.). C 23.3-36.5 ft; Coarse Sand, with fine sand and gravel, trace medium sand, alternating thin 435 beds, dark gray, 10YR 4/1, wet, loose, 10-20 30 mm subangular clasts, (fine sand and clay 100 slough probable in top of 25.0 ft S.S.). 430 35 100 **BORING TERMINATED IN COARSE SAND** @36.5 FT 425 40 420 45 415 50 410 55 STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. WATER LEVELS: DURING DRILLING 6 FEET APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE AFTER DRILLING: \_ DRILLER: Ryan Hunziker FEET GRADUAL OR MAY OCCUR BETWEEN LOGGED BY: T. Doll DATE: SAMPLES. PIEZOMETER: INSTALLED AT +/- 34.1 DATE DRILLED: 10/21/09 START TIME: NOTES: Chris Vierrether (MDNR) and **VERTICAL DATUM: NAVD 88** 10:53AM M. Carlson (Gredell) onsite END TIME: 1:50PM **HORIZONTAL DATUM: NAD 83** observing drilling activities. **BOREHOLE DIA.:** WEATHER: Warm, 70°F, Overcast, Mild, 10-15 MPH Wind from S. 8.25"

#### GREDELL **BORING LOG P-102** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Heisel-West, S of LBR, W of farm access Rd Proposed Utility Waste Disposal Area G.S. ELEVATION: 464.29' T.O.C. ELEVATION: 467.27' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 993140.49 **EASTING:** 727503.68 **LITHOLOGY** SAMPLE TYPE CLAY SM GRAVEL **JEPTH** (FEET) G GRAVEL **DESCRIPTION** VF SAND VC SAND FACIES I.D. M SAND CONSTRUC DIAGRAM SAND SAND CLAY 465 0 0.0-1.6 ft; Clayey Silt, dark brown, 10YR 3/3, FB moist, soft; silt below 1.5 ft, dark grayish brown, 10YR 4/2, moist, soft. 1.6-4.8 ft; Clay and Silty Clay, thin beds, very dark grayish brown, 10YR 3/2, plastic, firm, 460 moist; mottles (10YR 4/6) below 2.5 ft; 5 interbeds of silt from 2.5-4.0 ft; clay bed, 4.0-\5.0 ft, dark brown, 10YR 3/3, highly plastic. 4.8-7.2 ft; Poor recovery, probable Clay slough. 7.2-9.0 ft; Very Fine Sand and Silty Clay, thin beds, dark grayish brown, 10YR 4/2, wet, soft, 455 clay interbeds <1 inch thick, silty clay below CO/ 10 8.3 ft, plastic. BS 9.0-10.0 ft; Silty Clay, very dark gray, (Gley) FP/ 3/N, highly plastic, wet, soft. Lev 60 10.0-13.3 ft; Fine Sand, trace very fine sand, dark yellowish brown, 10YR 4/4, wet, soft. CO/ 450 13.3-18.3 ft; Silty Clay, very dark gray, (Gley) BS 15 1 3/N, highly plastic, soft, wet, (clay slough 67 probable in top of 15.0 and 20.0 ft S.S.). 18.3-28.3 ft; Fine to Medium Sand, thin beds. CM/ 445 trace coarse sand below 25.3 ft, dark gray, Sp 20 10YR 4/1, wet, soft, (clay slough probable in 72 top of 25.0 ft S.S.). 440 25 STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. WATER LEVELS: DURING DRILLING APPROXIMATE LITHOLOGIC BOUNDARIES DRILLER: Ryan Hunziker AFTER DRILLING: FEET ONLY: ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN LOGGED BY: DATE: T. Doll DATE DRILLED: PIEZOMETER: INSTALLED AT +/- 34.7 FEET 09/29/09 START TIME: NOTES: Chris Vierrether, MDNR, **VERTICAL DATUM: NAVD 88** 5:15PM 9/28 onsite observing drilling END TIME: **HORIZONTAL DATUM: NAD 83** 9:45AM activities. **BOREHOLE DIA.:** 8.25" WEATHER: Cool, 50°F, Clear Skies, Mild, Breezy.

## **GREDELL** ENGINEERING RESOURCES, INC.

# **BORING LOG P-102**

Ameren Missouri Labadie Power Plant LOCATION: Heisel-West, S of LBR, W of farm access Rd **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 464.29' T.O.C. ELEVATION: 467.27' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 993140.49 **EASTING:** 727503.68 **LITHOLOGY** CLAY SAMPLE TYPE SM GRAVEL GRAVEL DEPTH (FEET) **DESCRIPTION** /C SAND VF SAND FACIES 1.D. M SAND F SAND C SAND ø CM/ 28.3-36.5 ft; Medium Sand, trace gravel, dark 435 gray, 10YR 4/1, clasts subrounded, (fine sand Sp 30 and clay slough probable in 35.0 ft S.S.). 430 35 100 **BORING TERMINATED IN MEDIUM** SAND @36.5 FT 425 40 420 45 415 50 410 55 STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. **WATER LEVELS:** DURING DRILLING \_\_\_\_\_8 FEET APPROXIMATE LITHOLOGIC BOUNDARIES AFTER DRILLING: DRILLER: ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN Ryan Hunziker LOGGED BY: DATE: T. Doll

SAMPLES.

NOTES: Chris Vierrether, MDNR,

activities.

onsite observing drilling

DATE DRILLED:

BOREHOLE DIA.:

START TIME:

END TIME:

09/29/09

5:15PM 9/28

9:45AM

8.25"

WEATHER: Cool, 50°F, Clear Skies, Mild, Breezy.

**VERTICAL DATUM: NAVD 88** 

**HORIZONTAL DATUM: NAD 83** 

PIEZOMETER: INSTALLED AT +/- 34.7 FEET

#### GREDELL **BORING LOG P-104** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Heisel-West, S of LBR, W of farm access Rd **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 465.00' T.O.C. ELEVATION: 467.78' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 993125.75 **EASTING:** 728085.40 LITHOLOGY PERCENT RECOVERY CLAY SM GRAVEI SAMPLE TYPE VC SAND WATER TABI DESCRIPTION VF SAND M SAND C SAND FACIES I.D. SILTY 465 0.0-1.0 ft; Clayey Silt, dark brown, 10YR 3/3, FB plastic, stiff, moist. 1.0-3.5 ft; Clay, very dark grayish brown, 95 10YR 3/2, plastic, stiff, moist. 3.5-4.9 ft; Silty Clay, dark grayish brown, 10YR 4/2, low plasticity, soft, moist, mottles 460 \(10YR 4/6). 4.9-8.2 ft; Poor recovery, probable Silty Clay slough. 8.2-11.3 ft; Silty Sand, dark grayish brown, 10YR 4/2, wet, soft, mottles (10YR 4/6). 10 455 11.3-11.8 ft, Silty Clay, dark gray, 10YR 4/1, FP/ 55 \plastic, soft, wet. Lev 11.8-13.9 ft; Silty Sand, dark gray, 10YR 4/1, laminations of black coalified wood matter, 15 450 wet, soft. 13.9-33.3 ft; Fine Sand, dark gray, 10YR 4/1, 67 wet, soft; with very fine sand below 25.3 ft, (fine sand and clay slough probable at top of 20.0-30.0 ft S.S.). 445 20 78 25 440 STRATIFICATION LINES ARE WATER LEVELS: DURING DRILLING 10 FEET DRILLING CO.: Max's Enterprises, Inc. APPROXIMATE LITHOLOGIC BOUNDARIES AFTER DRILLING: \_\_\_ DRILLER: ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN Dave Hunziker LOGGED BY: T. Doll PIEZOMETER: INSTALLED AT +/- 34.8 DATE DRILLED: 10/05/09 NOTES: Chris Vierrether (MDNR) and **VERTICAL DATUM: NAVD 88** START TIME: 5:00PM 9/30 M. Carlson (Gredell) onsite **HORIZONTAL DATUM: NAD 83** END TIME: 9:35AM 10/5 observing drilling activities. WEATHER: Warm, 70°F, Mostly Sunny, Mild, 5 MPH Wind from SE. **BOREHOLE DIA.:** 10,25"

## GREDELL ENGINEERING RESOURCES, INC.

# **BORING LOG P-104**

Ameren Missouri Labadie Power Plant LOCATION: Heisel-West, S of LBR, W of farm access Rd **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 465.00' T.O.C. ELEVATION: 467.78' **Detailed Site Investigation** CLIENT: Reitz & Jens. Inc. **NORTHING:** 993125.75 **EASTING:** 728085.40

CLIE	:NT: K	eitz & J	ens,	m	ic.	NORTHING: 99312	5.75		:A3	)	NG:	1/2	<u> 280</u>	85.4	<u>+U</u>		
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ОЕРТН (FEET)	ELEVATION	WELL CONSTRUCTION DIAGRAM WATER TABLE	GRAPHIC LOG	SAMPLE TYPE	PERCENT RECOVERY	DESCRIPTION	FACIES I.D.	CLAY	SILTY CLAY	SILT	VF SAND	F SAND	M SAND	C SAND	VC SAND	SM GRAVEL	LG GRAVEL
				П													
30 -	- - - 435 - -			7	78	13.9-33.3 ft; Fine Sand, dark gray, 10YR 4/1, wet, soft; with very fine sand below 25.3 ft, (fine sand and clay slough probable at top of 20.0-30.0 ft S.S.).	FP/ Lev										
	_		3. 3.			33.3-36.5 ft; Fine Sand to Coarse Sand, trace											
35 -	<b>- 43</b> 0					medium sand, dark gray, 10YR 4/1, wet, loose.											
	- <del>1</del> 30			7	78												
-	-		_ • _ •			BORING TERMINATED IN COARSE SAND											<u> </u>
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DELLIN	G CO · Ma	r's Enternrises	e Inc			STRATIFICATION LINES ARE WATER LE	VELS:	DU	JRIN	G DE	RILLI	NG	1	10	FE	ΕT	

DRILLING CO.: Max's Enterprises, Inc. DRILLER: Dave Hunziker LOGGED BY: T. Doll DATE DRILLED: 10/05/09 START TIME: 5:00PM 9/30 END TIME: 9:35AM 10/5 **BOREHOLE DIA.:** 10.25"

STRATIFICATION LINES ARE APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN

SAMPLES.

NOTES: Chris Vierrether (MDNR) and M. Carlson (Gredell) onsite observing drilling activities.

WATER LEVELS: DURING DRILLING \_\_\_\_\_ 10\_\_\_ FEET AFTER DRILLING: \_\_\_\_\_ FEET

DATE:

PIEZOMETER: INSTALLED AT +/- 34.8 FEET

**VERTICAL DATUM: NAVD 88 HORIZONTAL DATUM: NAD 83** WEATHER: Warm, 70°F, Mostly Sunny, Mild, 5 MPH Wind from SE.

# **GREDELL** ENGINEERING RESOURCES, INC.

# **BORING LOG P-106**

Ameren Missouri Labadie Power Plant **Proposed Utility Waste Disposal Area Detailed Site Investigation** CLIENT: Reitz & Jens. Inc.

LOCATION: Heisel-West, S of LBR, W of farm access Rd G.S. ELEVATION: 465.11' T.O.C. ELEVATION: 468.10'

**NORTHING:** 993103.56 **EASTING:** 728837.82

CLIENT: K	tenz & Jens, 1	HC.	NORTHING: 99310.	3.30												
		ER					LIT	HO	LO	<u>GY</u>			_			
DEPTH (FEET)  ELEVATION	WELL CONSTRUCTION DIAGRAM WATER TABLE GRAPHIC LOG	SAMPLE TYPE PERCENT RECOVERY	DESCRIPTION	FACIES I.D.	CLAY SII TY CI AY	SILT	VF SAND	F SAND	M SAND	C SAND	VC SAND	SM GRAVEL	LG GRAVEL			
-						-										
+																
+							-					i				
0 465			0.0-1.0 ft; Clayey Silt grading to Clayey Sandy Silt, thin beds, dark brown and dark yellowish	FB												
		65	brown, 10YR 3/3 and 4/4, slightly plastic, moist, soft.													
		1	1.0-4.2 ft; Silty Clay, very dark grayish brown,													
5 - 460			10YR 3/2, plastic, very stiff, moist, mottles			<u></u>	<u> </u>						· 			
			\(\(\((10\)\)YR 4/6\)). 4.2-6.8 ft; Poor recovery, probable Silty Clay										;			
+		30	∖slough.													
+	12.00 V	50	6.8-14.5 ft; Silty Sand, dark grayish brown and brown, 10YR 4/2 and 4/3, herringbone laminae													
10 - 455	1.00		to 9.0 ft, wet, soft grading to loose.													
10 - 455																
	52444 24 52															
1 +		80														
1 +																
15 - 450		100	14.5-23.3 ft, Very Fine Sand, trace fine sand and coarse sand, dark grayish brown, 10YR 4/	FP/ Lev												
		100	2, wet.	201												
	2.4															
20 - 445		1														
+		100														
†																
			23.3-28.3 ft; Fine Sand, trace medium sand and													
25 - 440		$\downarrow \downarrow \downarrow$	coarse sand, dark gray, 10YR 4/1, wet.						ļ							
		(100							ļ							
PDI I INO 00 - 14	1.5		STRATIFICATION LINES ARE WATER I E	VEI 6.	DUBI	NG DI					EEI		$\neg$			

DRILLING CO.: Max's Enterprises, Inc. DRILLER: Ryan Hunziker LOGGED BY: T. Doll DATE DRILLED: 10/29/09 START TIME: 8:15AM END TIME: 10:10AM BOREHOLE DIA.: 10.25"

STRATIFICATION LINES ARE APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN

NOTES: M. Carlson (Gredell) onsite aquifer testing piezometers.

WATER LEVELS: DURING DRILLING \_\_\_\_\_\_6.8\_\_\_ FEET AFTER DRILLING: \_\_\_\_\_ FEET DATE:

PIEZOMETER: INSTALLED AT +/- 35.0 FEET

**VERTICAL DATUM: NAVD 88 HORIZONTAL DATUM: NAD 83** 

WEATHER: Cool, 50°F, Overcast, 10-15 MPH Wind from NE.

# GREDELL ENGINEERING RESOURCES, INC.

# **BORING LOG P-106**

Ameren Missouri Labadie Power Plant Proposed Utility Waste Disposal Area Detailed Site Investigation CLIENT: Reitz & Jens. Inc.

**LOCATION:** Heisel-West, S of LBR, W of farm access Rd G.S. ELEVATION: 465.11' T.O.C. ELEVATION: 468.10'

**NORTHING:** 993103.56 **EASTING:** 728837.82

CLIEN	1: K	enz &	Je	ms,	Ш	c.	NORTHING: 99310	3.30		MO			<u> /</u>			_		
			T			海			L.,			LIT	НО	LO	GY	· · · · · ·		
DEPTH (FEET)	ELEVATION	WELL CONSTRUCTION DIAGRAM	WATER TABLE	GRAPHIC LOG	SAMPLE TYPE	PERCENT RECOVERY	DESCRIPTION	FACIES I.D.	CLAY	SILTY CLAY	SILT	VF SAND	F SAND	M SAND	C SAND	VC SAND	SM GRAVEL	LG GRAVEL
30	435				X	100	28.3-36.5 ft; Fine Sand to Medium Sand, trace coarse sand and gravel, dark gray, 10YR 4/1, wet, 10 mm subrounded clasts.	FP/ Lev CM/ Sp										
35	430				X	100	BORING TERMINATED IN MEDIUM											
40	425						SAND @36.5 FT  SHELBY TUBE SAMPLE COLLECTED AT 1.0-3.0 FT DEPTH AT COMPLETION OF DRILLING.	:										
45 -	420																	
50 -	415																	
55 —	410						•							Y				
DRILLING (	CO.: Max	c's Enterpris	ses,	Inc.			STRATIFICATION LINES ARE APPROXIMATE LITHOLOGIC BOUNDARIES  WATER LE	VELS:				RILLI	ING		5.8	FE FE		

APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN

SAMPLES.

Date Printed: 11/17/2010

DRILLER:

LOGGED BY:

START TIME:

END TIME:

DATE DRILLED:

BOREHOLE DIA.:

Ryan Hunziker

T. Doll

10/29/09

8:15AM

10:10AM

10.25"

DATE:

PIEZOMETER: INSTALLED AT +/- 35.0 FEET

AFTER DRILLING: \_\_\_\_\_ FEET

#### **GREDELL BORING LOG P-108** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant **LOCATION:** Newman-Central, S of LBR, E of farm access Proposed Utility Waste Disposal Area G.S. ELEVATION: 465.71' T.O.C. ELEVATION: 468.55' **Detailed Site Investigation EASTING:** 729427.93 CLIENT: Reitz & Jens, Inc. **NORTHING:** 993084.09 LITHOLOGY PERCENT RECOVERY CONSTRUCTION DIAGRAM CLAY GRAPHIC LOG SAMPLE TYPE SM GRAVEI G GRAVEL **JEPTH (FEET) WATER TAB** DESCRIPTION VC SAND VF SAND ACIES 1.D. C SAND SAND M SAND SILTY CLAY 0 0.0-0.8 ft; Clayey Silt, dark brown, 10YR 3/3, FB 465 moist, soft, roots. 0.8-2.3 ft; Silty Clay, very dark grayish brown, 90 10YR 3/2, plastic, stiff, moist, mottles (10YR 4/6), becoming very stiff below 1.4 ft. 2.3-2.8 ft; Clayey Silt, dark brown, 10YR 3/3, 5 slightly plastic, soft, moist, mottles (10YR 4/6). 460 2.8-3.5 ft; Silty Clay, dark brown, 10YR 3/3, plastic, soft, moist, mottles (10YR 4/6). 3.5-4.1 ft; Clayey Silt grading to Silty Clay, FP/ thin beds, dark brown, 10YR 3/3, moist, soft, Lev plastic below 3.8 ft. 10 4.1-7.5 ft; Clayey Silt, dark gray and dark 455 grayish brown, 10YR 4/1 and 4/2, moist, soft, laminated, mottles (10YR 4/6), (No recovery from 5.0-10.0 ft). 7.5-15.7 ft; Silty Sand, Clayey Silty Sand and Sandy Silt, alternating thin beds, brown, 10YR 15 4/3, wet, soft grading to very soft, laminations 450 common; clayey silty sand from 12.3-12.6 ft, dark gray, 10YR 4/1; dark gray below 14.1 ft, 10YR 4/1; mottles (10YR 4/6) from 12.6-13.3 15.7-18.3 ft; Very Fine Sand grading to 20 Medium Sand, thin beds, trace coarse sand and 445 100 gravel, dark gray, 10YR 4/1, wet, soft to stiff, trace fine wood fragments, 5-50 mm coalified wood fragments, 10 mm subrounded clast. 18.3-26.0 ft; Very Fine Sand and Sandy Silty Clay, thin beds, dark gray, 10YR 4/1, trace coarse sand and fine sand, wet; sandy silty clay, 25 plastic. 26.0-36.5 ft; Very Fine Sand to Medium Sand, CM/ STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. **WATER LEVELS:** DURING DRILLING 10 FEET APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE DRILLER: AFTER DRILLING: Rvan Hunziker GRADUAL OR MAY OCCUR BETWEEN LOGGED BY: T. Doll DATE: SAMPLES. PIEZOMETER: INSTALLED AT +/-DATE DRILLED: 11/04/09 NOTES: Chris Vierrether, MDNR, **VERTICAL DATUM: NAVD 88** START TIME: 11:07AM 11/3 onsite observing drilling END TIME: HORIZONTAL DATUM: NAD 83 9:05AM activities. S. King onsite WEATHER: Cool, 50°F, Clear Skies, Mild, 5 MPH Wind from S. **BOREHOLE DIA.:** 8.25" developing piezometers.

# GREDELL ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant

# **BORING LOG P-108**

**LOCATION:** Newman-Central, S of LBR, E of farm access Proposed Utility Waste Disposal Area G.S. ELEVATION: 465.71' T.O.C. ELEVATION: 468.55' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 993084.09 **EASTING:** 729427.93 LITHOLOGY PERCENT RECOVERY CLAY SM GRAVEL G GRAVEL SAMPLE TYPE **DESCRIPTION** VC SAND VF SAND FACIES I.D. F SAND M SAND C SAND WATER . SILTY alternating thin beds, trace coarse sand and Sp gravel, dark gray, 10YR 4/1; 5-18 mm subrounded grading to subangular clasts; 5-50 mm coalified wood matter below 31.1 ft; clay 30 balls below 35.8 ft, dark grayish brown, 10YR 100 435 4/2, plastic. 35 430 100 **BORING TERMINATED IN MEDIUM** SAND @36.5 FT 40 425 45 420 50 415 55 410 STRATIFICATION LINES ARE **WATER LEVELS:** DURING DRILLING \_\_\_\_\_\_ 10\_\_\_ FEET DRILLING CO.: Max's Enterprises, Inc. APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE AFTER DRILLING: \_\_ DRILLER: Ryan Hunziker GRADUAL OR MAY OCCUR BETWEEN DATE: LOGGED BY: T. Doll PIEZOMETER: INSTALLED AT +/- \_\_\_\_35.0 FEET DATE DRILLED: 11/04/09 NOTES: Chris Vierrether, MDNR, START TIME: 11:07AM 11/3 **VERTICAL DATUM: NAVD 88** onsite observing drilling **HORIZONTAL DATUM: NAD 83** END TIME: 9:05AM activities. S. King onsite WEATHER: Cool, 50°F, Clear Skies, Mild, 5 MPH Wind from S. BOREHOLE DIA.: 8.25" developing piezometers.

# GREDELL ENGINEERING RESOURCES, INC.

# **BORING LOG P-110**

Ameren Missouri Labadie Power Plant LOCATION: Newman-E Central, S of LBR, W of Davis Rd **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 466.14' T.O.C. ELEVATION: 468.99' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 993066.85 **EASTING:** 730012.30 LITHOLOGY CLAY SAMPLE TYPE SM GRAVEL GRAVEL DESCRIPTION **WATER TAB** VC SAND VF SAND M SAND FACIES 1.D. C SAND F SAND PERCENT SILTY 0.0-1.3 ft; Clayey Silt, dark brown, 10YR 3/3, FB465 moist, soft, roots. 1.3-2.0 ft; becoming stiff, slightly plastic, damp, mottles (10YR 4/6); trace clay below 1.7 ft, dark yellowish brown, 10YR 3/4, non-plastic soft, moist. 5 2.0-2.5 ft; Silty Clay, very dark grayish brown, 10YR 3/2, plastic, stiff, damp, mottles (10YR) 460 100 2.5-3.6 ft; Silt and Clay, trace very fine sand, interbedded, dark grayish brown and dark yellowish brown, 10YR 3/2 and 3/4; silt, soft; 10 clay, stiff, plastic, moist to wet. CO/ 3.6-4.5 ft; Silty Clay, dark brown, 10YR 3/3, 455 BS stiff, plastic, moist, mottles (10YR 4/6). 4.5-5.0 ft; Sandy Silt, brown, 10YR 4/3, laminated, wet, mottles (10YR 4/6). 5.0-8.1 ft; Poor recovery, probable Silty Clay 15 slough. 78 FP/ 8.1-8.6 ft; Sandy Silt, dark gray and brown, 450 Lev 10YR 4/1 and 4/3, laminated, wet, soft. 8.6-9.3 ft; Silty Clay, dark gray, 10YR 4/1, plastic, soft, laminated, iron concretions. mottles (10YR 4/6). 9.3-10.2 ft; Silty Sand, dark gray and brown, 20 10YR 4/1 and 4/3, laminated, wet, soft. 445 10.2-15.4 ft; Silty Clay, Clayey Silt, Sandy Silt and Silty Sand, alternating thin beds, dark gray, (Gley) 1 4/N, laminations common; silty clay beds, highly plastic, very dark gray (Gley 1 3/ N) mottles, laminated; black organic fibrous 25 (bog) material from 12.3 to 12.4 ft. 440 15.4-18.3 ft; Very Fine Sand, dark gray, 10YR STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. **WATER LEVELS:** DURING DRILLING 4.5 FEET APPROXIMATE LITHOLOGIC BOUNDARIES DRILLER: Doug Hunziker AFTER DRILLING: \_\_ ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN LOGGED BY: DATE: T. Doll SAMPLES. PIEZOMETER: INSTALLED AT +/- 35.2 DATE DRILLED: 11/04/09 NOTES: M. Carlson (Gredell) onsite to **VERTICAL DATUM: NAVD 88** START TIME: 10:15AM observe drilling activities. **HORIZONTAL DATUM: NAD 83** END TIME: 1:32PM WEATHER: Cool, 60°F, Clear Skies, Mild, 15-20 MPH Gusting Wind from E. **BOREHOLE DIA.:** 8.25"

#### GREDELL **BORING LOG P-110** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant **LOCATION:** Newman-E Central, S of LBR, W of Davis Rd Proposed Utility Waste Disposal Area G.S. ELEVATION: 466,14' T.O.C. ELEVATION: 468.99' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 993066.85 **EASTING:** 730012.30 LITHOLOGY PERCENT RECOVERY CLAY SAMPLE TYPE SM GRAVEL GRAVEL WATER TABL **DESCRIPTION** VF SAND VC SAND M SAND F SAND C SAND SILTY 4/1, wet, soft, (clay slough probable in top of FP/ 15.0 ft S.S.). Lev 18.3-36.5 ft; Very Fine to Fine Sand, trace clay, medium sand, alternating thin beds, dark gray 30 and dark grayish brown, 10YR 4/1 and 4/2, 8 100 435 mm subrounded clasts, 10 mm pieces coalified wood matter, wet, loose grading to stiff, (coarse sand noted at total depth based on cuttings sample collected from auger bit), (clay slough probable in top of 20.0-30.0 ft S.S.). 35 $\mathbf{C}$ 430 BORING TERMINATED IN COARSE SAND @36.5 FT 40 425 45 420 50 415 55 410 STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. **WATER LEVELS:** DURING DRILLING 4.5 FEET APPROXIMATE LITHOLOGIC BOUNDARIES DRILLER: AFTER DRILLING: \_\_\_ Doug Hunziker ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN LOGGED BY: T. Doll PIEZOMETER: INSTALLED AT +/- 35.2 DATE DRILLED: 11/04/09 NOTES: M. Carlson (Gredell) onsite to START TIME: 10:15AM **VERTICAL DATUM: NAVD 88** observe drilling activities. **HORIZONTAL DATUM: NAD 83** END TIME: 1:32PM

**BOREHOLE DIA.:** 

8.25"

#### **GREDELL BORING LOG P-112** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Newman-E Central, S of LBR, W of Davis Rd **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 465.92' T.O.C. ELEVATION: 468.92' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 993051.48 **EASTING:** 730620.74 LITHOLOGY CLAY SM GRAVEL G GRAVEL **JEPTH (FEET)** WATER TABL DESCRIPTION VC SAND VF SAND FACIES I.D. C SAND SAND M SAND SILTY 0 0.0-1.2 ft; Clayey Silt, dark brown, 10YR 3/3, FB 465 moist, soft, roots; with clay below 0.8 ft, brown, 10YR 4/3, laminated, moist, soft, 90 mottles (10YR 4/6). 1.2-1.9 ft; Sandy Silt, dark brown, 10YR 3/3, laminated, moist, soft, faint mottles (10YR 4/ 5 460 1.9-2.5 ft; Silty Sand, brown, 10YR 4/3, laminated, moist, soft. 100 2.5-4.1 ft; Silty Clay, dark brown, 10YR 3/3, plastic, iron concretions, mottles (10YR 4/6), moist, soft; stiff with blocky structure below 10 4.1 ft. 455 4.1-4.8 ft; Clayey Sandy Silt, brown, 10YR 4/3, CO/ laminated, moist, soft. BS 100 4.8-8.8 ft; Poor recovery, probable Silty Clay slough. 8.8-9.5 ft; Silty Clay, dark brown, 10YR 3/3, 15 plastic, soft, moist. 72 450 9.5-10.6 ft; Silty Sand, brown, 10YR 4/3, FP/ laminated, moist grading to wet, soft. Lev 10.6-15.9 ft; Clayey Silt, Silty Clay and Silty Sand, alternating thin beds, dark gray, (Gley) 4/N, wet, soft, laminations common; silty clay 20 beds, highly plastic, mottles (Gley 1 3/N). 100 15.9-33.3 ft; Very Fine to Fine Sand, thin beds, 445 trace medium sand, dark gray, 10YR 4/1, wet, soft. 25 100 440 STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. WATER LEVELS: DURING DRILLING 5 APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN DRILLER: Doug Hunziker AFTER DRILLING: \_ LOGGED BY: T. Doll DATE: SAMPLES. PIEZOMETER: INSTALLED AT +/- \_\_ DATE DRILLED: 11/04/09 NOTES: Chris Vierrether (MDNR) and START TIME: **VERTICAL DATUM: NAVD 88** 1:55PM M. Carlson (Gredell) onsite HORIZONTAL DATUM: NAD 83 END TIME: 5:27PM observing drilling activities. BOREHOLE DIA.: WEATHER: Cool, 60°F, Clear Skies, Mild, 15-20 MPH Gusting Wind from E. 8.25"

# **BORING LOG P-112**

Ameren Missouri Labadie Power Plant **Proposed Utility Waste Disposal Area Detailed Site Investigation** CLIENT: Reitz & Jens, Inc.

LOCATION: Newman-E Central, S of LBR, W of Davis Rd **G.S. ELEVATION:** 465.92' **T.O.C. ELEVATION:** 468.92'

**NORTHING:** 993051.48 **EASTING:** 730620.74

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ОЕРТН (FEET)	ELEVATION	WELL CONSTRUCTION DIAGRAM	WATER TABLE	GRAPHIC LOG	SAMPLE TYPE	PERCENT RECOVERY	DESCRIPTION	FACIES I.D.	CLAY	SILTY CLAY	SILT	VF SAND	F SAND	M SAND	C SAND	VC SAND	SM GRAVEL	LG GRAVEL
		I N	-	Λ	Ť					- !								
30 -							15.9-33.3 ft; Very Fine to Fine Sand, thin beds, trace medium sand, dark gray, 10YR 4/1, wet, soft.	FP/ Lev										
-	- 435					89												********
-	- -																	
35 -	-  -			•••			33.3-36.5 ft; Very Fine to Coarse Sand, thin beds, dark gray, 10YR 4/1, 5-20 mm subrounded and subangular clasts, wet, soft.	С										
-	<del>-</del> 430			•••	•	100	subtouried and subangular orabis, well, some											
-	<u>-</u>		•				BORING TERMINATED IN COARSE SAND @36.5 FT											
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RILLIN	IG CO.: Ma	x's Enterpri Doug Hun:	-				APPROXIMATE LITHOLOGIC BOUNDARIES	VELS:							5			
KILLEI		Doug Hun					ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN			TE	-11						- •	

GRADUAL OR MAY OCCUR BETWEEN

NOTES: Chris Vierrether (MDNR) and

M. Carlson (Gredell) onsite

observing drilling activities.

SAMPLES.

LOGGED BY:

START TIME:

END TIME:

DATE DRILLED:

BOREHOLE DIA.:

T. Doll

11/04/09

1:55PM

5:27PM

8.25"

**VERTICAL DATUM: NAVD 88** 

PIEZOMETER: INSTALLED AT +/- 35.3 FEET

DATE:

#### **GREDELL BORING LOG P-114** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Newman-East, S of LBR, Adj to Davis Rd **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 463.94' T.O.C. ELEVATION: 466.78' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 993026.22 **EASTING:** 731203.72 LITHOLOGY PERCENT RECOVERY WELL CONSTRUCTION DIAGRAM CLAY SAMPLE TYPE SM GRAVEL **GRAPHIC LOG** GRAVEL **JEPTH (FEET)** WATER TABL **DESCRIPTION** VF SAND VC SAND FACIES 1.D. M SAND F SAND C SAND SILTY ď 465 0 0.0-0.7 ft; Clayey Silt, very dark grayish FB brown, 10YR 3/2, moist, soft, roots. 0.7-2.3 ft; Silty Clay, very dark grayish brown, 10YR 3/2, plastic, stiff, moist, mottles (10YR 4/6), white 2 mm gastropod (snail). 460 2.3-4.0 ft; Sandy Silty Clay, dark grayish 5 brown, 10YR 4/2, moist, soft, mottles (10YR 4/ 6); clay from 3.1-3.2 ft, slightly plastic, stiff. 4.0-4.7 ft; Silty Sand, brown, 10YR 4/3, moist, FP/ 45 Lev 4.7-15.8 ft; Sandy Silt, Clayey Silt, Sandy 455 Clayey Silt, Silty Clay, Very Fine Sand and 10 Fine Sand, alternating thin beds, wet, soft; 89 laminations common to 6.9 ft; dark brown, 10YR 3/3 to 5.4 ft; dark grayish brown, 10YR 4/2, from 5.4- 6.9 ft; dark gray, 10YR 4/1, and dark grayish brown, 10YR 4/2, below 6.9 ft; 450 very fine sand, 7.0-7.3 ft dark reddish brown, 15 2.5YR 3/4, iron concretions; iron staining and mottles (10YR 4/6) common from 5.0-6.0 ft and 6.9-7.0 ft; silty clay from 10.6-11.2 ft, blastic, stiff. 15.8-25.7 ft; Silty Clay, Very Fine Sand and 445 Fine Sand, alternating thin beds, trace coarse sand, dark gray and brown, 10YR 4/1 and 4/3, 20 wet, soft grading to loose; silty clay bed, plastic, stiff, (fine sand and clay slough probable in top of 20.0 ft S.S.). 440 25 25.7-36.5 ft; Gravelly Sand, with very fine to $\mathbf{C}$ STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. WATER LEVELS: DURING DRILLING 5 FEET APPROXIMATE LITHOLOGIC BOUNDARIES AFTER DRILLING: DRILLER: Ryan Hunziker ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN DATE: LOGGED BY: T. Doll SAMPLES. PIEZOMETER: INSTALLED AT +/- 34.8 FEET DATE DRILLED: 11/12/09 START TIME: NOTES: **VERTICAL DATUM: NAVD 88** 7:57AM **HORIZONTAL DATUM: NAD 83** END TIME: 12:09PM

**BOREHOLE DIA.:** 

10.25"

WEATHER: Cold, 35°F, Clear Skies, Calm, Frost.

## **GREDELL BORING LOG P-114** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant **LOCATION:** Newman-East, S of LBR, Adj to Davis Rd **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 463.94' T.O.C. ELEVATION: 466.78' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 993026.22 **EASTING:** 731203.72 **LITHOLOGY** WELL CONSTRUCTION DIAGRAM SAMPLE TYPE CLAY SM GRAVEL G GRAVEL DESCRIPTION VC SAND VF SAND M SAND FACIES I.D. C SAND F SAND CLAY medium sand, alternating thin beds, trace $\mathbf{C}$ gravel, dark gray, 10YR 4/1, wet, loose grading to soft, 5-20 mm subangular and subrounded 435 clasts, coarse black (glossy) coalified wood 30 matter, (3-inch well-rounded, prolate cobbles retrieved from base of auger), (clay slough in 35.0 ft S.S.). 430 35 **BORING TERMINATED IN GRAVELLY** SAND @36.5 FT 425 40 420 45 415 50 410 55 STRATIFICATION LINES ARE **WATER LEVELS:** DURING DRILLING \_\_\_\_5 FEET DRILLING CO.: Max's Enterprises, Inc. APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE AFTER DRILLING: \_\_\_ \_\_ FEET DRILLER: Ryan Hunziker GRADUAL OR MAY OCCUR BETWEEN SAMPLES. DATE: LOGGED BY: T. Doll PIEZOMETER: INSTALLED AT +/- 34.8 FEET DATE DRILLED: 11/12/09 NOTES: **VERTICAL DATUM: NAVD 88** START TIME: 7:57AM END TIME: 12:09PM **HORIZONTAL DATUM: NAD 83** BOREHOLE DIA.: 10.25" WEATHER: Cold, 35°F, Clear Skies, Calm, Frost.

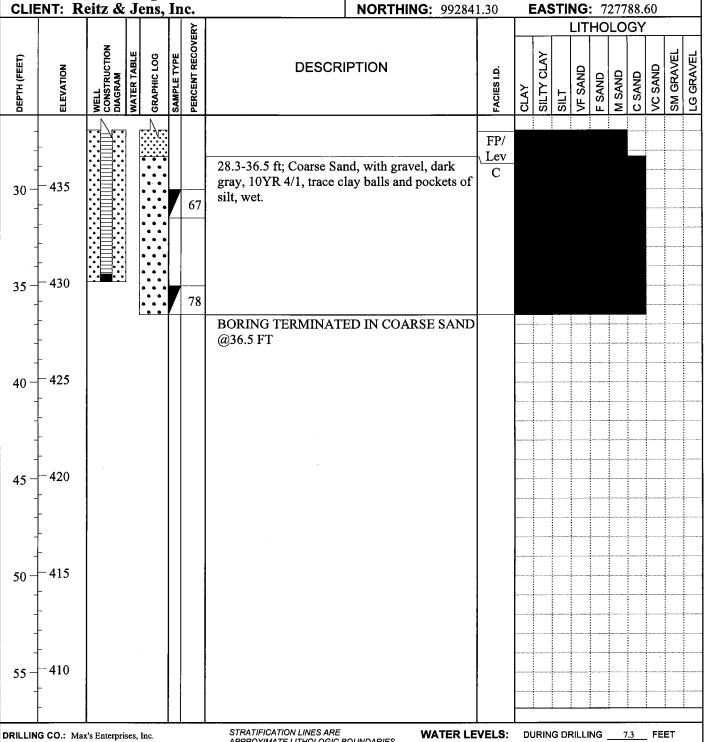
#### GREDELL **BORING LOG P-116** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Heisel-West-S of LBR, W of farm access Rd **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 464.82' T.O.C. ELEVATION: 467.55' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 992841.30 **EASTING:** 727788.60 LITHOLOGY PERCENT RECOVERY CLAY SAMPLE TYPE SM GRAVE GRAVEL EPTH (FEET) WATER TABI DESCRIPTION /C SAND VF SAND M SAND F SAND SAND SILTY CLAY SILT 465 0 FB 0.0-0.8 ft; Clayey Silt, 10YR 3/3, damp, soft. 0.8-4.8 ft; Clay, very dark grayish brown, 10YR 3/2, plastic, firm, moist, mottles (10YR 100l 4/6), silt interbeds <1 inch thick. 460 5 4.8-5.0 ft; Clayey Silt, grayish brown, 10YR 5/ $\2$ , moist, soft. 5.0-6.8 ft; Poor recovery, probable Clay slough. FP/ 6.8-7.3 ft; Clayey Silt and Silty Clay, thin beds, Lev dark grayish brown, 10YR 4/2, moist; clayey silt to 7.0 ft, soft; silty clay below 7.0 ft, plastic, 455 10 firm, moist, gray mottles (10YR 5/1). 7.3-11.8 ft; Silty Sand, dark yellowish brown, 10YR 4/4, wet, soft, becoming dark gray below CO/ $100 \mid 10.0 \text{ ft}$ , 10 YR 4/1, <1-inch thick silty clay bed BS \at 11.0 ft. 11.8-12.4 ft; grading to very dark gray, (Gley) 450 15 1 3/N, wet. 100 12.4-13.0 ft; Silty Clay, very dark gray, (Gley) 1 3/N, plastic, soft, wet. 13.0-15.0 ft; Sandy Silt, very dark gray, (Gley) 1 3/N, laminated, plant detritus laminae, wet, soft. 445 15.5-23.3 ft; Fine Sand, trace very fine sand, 20 dark gray, (Gley) 1 3/N, wet, soft, small wood fragments, (clay slough probable in top of 15.0 ft S.S). FP/ 23.3-28.3 ft; Fine to Medium Sand, trace gravel, alternating thin beds, dark gray, 10YR Lev 440 25 4/1, wet, soft, (clay slough probable in top of 25.0 ft S.S.). STRATIFICATION LINES ARE **WATER LEVELS:** DURING DRILLING 7.3 FEET DRILLING CO.: Max's Enterprises, Inc. APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE AFTER DRILLING: \_\_ DRILLER: Doug Hunziker GRADUAL OR MAY OCCUR BETWEEN DATE: LOGGED BY: T. Doll SAMPLES. PIEZOMETER: INSTALLED AT +/- 35.0 DATE DRILLED: 09/29/09 NOTES: Chris Vierrether, MDNR. **VERTICAL DATUM: NAVD 88** START TIME: 10:38AM onsite observing drilling **HORIZONTAL DATUM: NAD 83** END TIME: 1:25PM activities. WEATHER: Cool, 65°F, Clear Skies, Mild, 15-20 MPH NW Gusting Wind. **BOREHOLE DIA.:** 8.25"

# **BORING LOG P-116**

Ameren Missouri Labadie Power Plant **Proposed Utility Waste Disposal Area Detailed Site Investigation** 

LOCATION: Heisel-West-S of LBR, W of farm access Rd G.S. ELEVATION: 464.82' T.O.C. ELEVATION: 467.55'

**NORTHING:** 992841.30 **EASTING:** 727788.60



DRILLER:

LOGGED BY:

START TIME:

END TIME:

DATE DRILLED:

BOREHOLE DIA.:

T. Doll

09/29/09

10:38AM

1:25PM

8.25"

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

NOTES: Chris Vierrether, MDNR,

onsite observing drilling activities.

WATER LEVELS: DURING DRILLING \_\_\_\_\_\_7.3\_\_\_ FEET

AFTER DRILLING: \_\_ DATE:

PIEZOMETER: INSTALLED AT +/- 35.0 FEET

**VERTICAL DATUM: NAVD 88 HORIZONTAL DATUM: NAD 83** WEATHER: Cool, 65°F, Clear Skies, Mild, 15-20 MPH NW Gusting Wind.

# **BORING LOG P-118**

Ameren Missouri Labadie Power Plant LOCATION: Heisel-West-S of LBR, W of farm access Rd **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 464.81' T.O.C. ELEVATION: 467.70' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 992825.03 **EASTING:** 728377.28 LITHOLOGY WELL CONSTRUCTION DIAGRAM CLAY SM GRAVEL SAMPLE TYPE DEPTH (FEET) WATER TABI **DESCRIPTION** VC SAND VF SAND ELEVATION M SAND FACIES I.D. SAND SAND SILTY CLAY 465 0 0.0-0.7 ft; Clayey Silt, dark brown, 10YR 3/3, FB damp, soft; without clay below 0.5 ft, dark yellowish brown, 10YR 3/4, very soft. 100 0.7-5.0 ft; Silty Clay, dark brown, plastic, firm, mottles (10YR 4/6), silt interbeds <1-inch thick at 1.8 ft; becoming dark grayish brown below 460 5 \4.3 ft, 10YR 4/2. 5.0-6.2 ft; Poor recovery, probable Silty Clay \slough. 100 6,2-9.8 ft; Clayey Silt, Silty Clay and Sandy Silt, alternating thin beds; clayey silt to 7.1 ft, dark grayish brown, 10YR 4/2, moist to wet, 455 10 soft, clay and silt interbeds <1-inch thick; clay CO/ below 7.1 ft, dark grayish brown and dark gray, BS 10YR 4/1 and 4/2, highly plastic, soft, moist; sandy silt below 7.8 ft, brown, 10YR 4/2, wet. soft, clay and silt interbeds <1-inch thick; becoming dark gray below 8.3 ft, 10YR 4/1, 450 15 iron/manganese concretions. FP/ 94 9.8-14.7 ft; Sandy Silt, Clayey Silt, and Silty Lev Clay, alternating thin beds, very dark gray, (Gley) 1 3/N, wet, soft; clayey silt from 10.0-11.5 ft, dark gray and dark grayish brown, 10YR 4/1 and 4/2, iron/manganese concretions, iron staining; silty clay, plastic, soft; laminated 445 20 below 12.5 ft in clayey silt and sandy silt beds. 14.7-28.3 ft; Fine Sand, trace very fine sand, dark gray, 10YR 4/1, wet, soft, (fine sand and clay slough probable in top of 15.0 and 20.0 ft S.S.). 78 STRATIFICATION LINES ARE **WATER LEVELS:** DRILLING CO.: Max's Enterprises, Inc. APPROXIMATE LITHOLOGIC BOUNDARIES AFTER DRILLING: DRILLER: ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN Doug Hunziker DATE: LOGGED BY: T. Doll SAMPLES PIEZOMETER: INSTALLED AT +/-DATE DRILLED: 09/29/09 NOTES: Chris Vierrether (MDNR) and **VERTICAL DATUM: NAVD 88** START TIME: 2:05PM John Eimer (Ameren) onsite **HORIZONTAL DATUM: NAD 83** END TIME: 4:38PM observing drilling activities. WEATHER: Cool, 65°F, Clear Skies, Mild, 15-20 MPH NW Gusting Wind. **BOREHOLE DIA.:** 8.25"

# **BORING LOG P-118**

Ameren Missouri Labadie Power Plant **Proposed Utility Waste Disposal Area Detailed Site Investigation** CLIENT: Reitz & Jens, Inc.

LOCATION: Heisel-West-S of LBR, W of farm access Rd **G.S. ELEVATION:** 464.81' **T.O.C. ELEVATION:** 467.70'

**NORTHING:** 992825.03 **EASTING:** 728377.28

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<b>ДЕРТН (FEET)</b>	ELEVATION	WELL CONSTRUCTION DIAGRAM	WATER TABLE	GRAPHIC LOG	SAMPLE TYPE	PERCENT RECOVERY	DESCRIPTION	FACIES 1.D.	CLAY	SILTY CLAY	SILT	VF SAND	F SAND	M SAND	C SAND	VC SAND	SM GRAVEL	LG GRAVEL
				7_	П													
30	- - 435				72	28.3-36.5 ft; Fine to Medium Sand, thin beds, trace very fine sand, coarse sand and gravel, dark gray, 10YR 4/1, wet, soft, (fine sand and clay slough probable in top of 30.0 and 35.0 ft S.S.).	FP/ Lev											
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DRILLIN	G CO.: Ma	x's Enterprise	s, In	l 1c.			STRATIFICATION LINES ARE WATER LE	VELS:	DL.	JRING	G DF	RILLII	NG	7.	.8	FEI		
DRILLER		Doug Hunzik					ONLY; ACTUAL CHANGES MAY BE						_					
		T Dall					GRADUAL OR MAY OCCUR BETWEEN		ПΔ	TE.								

LOGGED BY:

START TIME:

END TIME:

DATE DRILLED:

BOREHOLE DIA.:

T. Doll

09/29/09

2:05PM

4:38PM

8.25"

GRADUAL OR MAY OCCUR BETWEEN

NOTES: Chris Vierrether (MDNR) and John Eimer (Ameren) onsite observing drilling activities.

AFTER DRILLING: \_\_\_\_\_ FEET DATE:

PIEZOMETER: INSTALLED AT +/- 35.2 FEET

**VERTICAL DATUM: NAVD 88 HORIZONTAL DATUM: NAD 83** WEATHER: Cool, 65°F, Clear Skies, Mild, 15-20 MPH NW Gusting Wind.

# **BORING LOG P-120**

Ameren Missouri Labadie Power Plant Proposed Utility Waste Disposal Area Detailed Site Investigation CLIENT: Reitz & Jens. Inc.

**LOCATION:** Newman-West-S of LBR, E of farm access Rd G.S. ELEVATION: 464.75' T.O.C. ELEVATION: 467.65'

**NORTHING:** 992787.68 **EASTING:** 729145.90

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						놅			LITHOLOGY											
ОЕРТН (FEET)	ELEVATION	WELL CONSTRUCTION DIAGRAM	WATER TABLE	GRAPHIC LOG	SAMPLE TYPE	PERCENT RECOVERY	DESCRIPTION	FACIES I.D.	CLAY	SILTY CLAY	SILT	VF SAND	F SAND	M SAND	C SAND	VC SAND	SM GRAVEL	LG GRAVEL		
- 0	465		<del>]</del>																	
-						70	0.0-0.9 ft; Clayey Silt, dark brown, 10YR 3/3, slightly plastic, moist, soft. 0.9-4.4 ft; Silty Clay, very dark grayish brown, plastic, very stiff, moist, mottles (10YR 4/6).	FB												
5	- 460 - - -					100	4.4-6.8 ft; Poor recovery, probable Silty Clay slough.  6.8-8.0 ft; Sandy Silt, brown, 10YR 4/3, moist, soft, becoming wet below 7.2 ft with llaminations.													
10 -	455		-			78	8.0-8.8 ft; Sandy Clayey Silt, dark grayish brown, 10YR 4/2, slightly plastic, soft, laminated, mottles (10YR 4/6). 8.8-28.3 ft; Fine Sand, with very fine sand, brown, 10YR 4/3, wet, soft; trace coarse sand	FP/ Lev												
15 -	450					83	(<1%) below 10.7 ft; becoming dark gray, 10YR 4/1, below 15.0 ft, (clay slough probable in top of 10.0-20.0 ft S.S.).													
20 -	445				7	94	·													
25 -	- 440					94														
				· · ·			STRATIFICATION LINES ARE WATER LE	VELS	<u></u>	UDIN					R 8	FF				

DRILLING CO.: Max's Enterprises, Inc.
DRILLER: Ryan Hunziker
LOGGED BY: T. Doll
DATE DRILLED: 10/22/09
START TIME: 10:07AM
END TIME: 1:05PM

10.25"

BOREHOLE DIA.:

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

NOTES: Chris Vierrether, MDNR, onsite observing drilling activities.

WATER LEVELS: DURING DRILLING 8.8 FEET

AFTER DRILLING: \_\_\_\_\_ FEET
DATE: \_\_\_\_\_

PIEZOMETER: INSTALLED AT +/- 34.9 FEET

VERTICAL DATUM: NAVD 88
HORIZONTAL DATUM: NAD 83
WEATHER: Cool, 65°F, Clear Skies, Mild, 15-20 MPH NW Gusting Wind.

# **BORING LOG P-120**

Ameren Missouri Labadie Power Plant LOCATION: Newman-West-S of LBR, E of farm access Rd **Proposed Utility Waste Disposal Area G.S. ELEVATION:** 464.75' **T.O.C. ELEVATION:** 467.65' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 992787.68 **EASTING:** 729145.90 **LITHOLOGY** CLAY SM GRAVEL SAMPLE TYPE LG GRAVEL WATER TABL DESCRIPTION VF SAND VC SAND FACIES I.D. M SAND F SAND C SAND CLAY 28.3-35.0 ft; Coarse Sand, grading to fine sand, CM/ with medium sand, very fine sand and gravel, Sp 435 30 dark gray matrix, 10YR 4/1, wet, loose to soft, 100 5 mm subrounded clasts, trace clay balls, (clay slough and fine sand slough probable in top of 35.0 ft S.S.). 430 35 35.0-36.5 ft; Fine Sand, with very fine to FP/ 100 medium sand, dark gray, 10YR 4/1, wet, soft, Lev (clay slough and fine sand slough probable in \top of 35.0 ft S.S.). BORING TERMINATED IN FINE SAND @36.5 FT 425 40 420 45 415 50 410 55 DRILLING CO.: Max's Enterprises, Inc. STRATIFICATION LINES ARE **WATER LEVELS:** DURING DRILLING \_\_\_\_\_8.8\_\_\_ FEET APPROXIMATE LITHOLOGIC BOUNDARIES DRILLER: AFTER DRILLING: Ryan Hunziker ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN LOGGED BY: DATE: T. Doll SAMPLES. DATE DRILLED: PIEZOMETER: INSTALLED AT +/- 34.9 FEET 10/22/09 NOTES: Chris Vierrether, MDNR. START TIME: 10:07AM **VERTICAL DATUM: NAVD 88** onsite observing drilling END TIME: 1:05PM **HORIZONTAL DATUM: NAD 83** activities. BOREHOLE DIA.: WEATHER: Cool, 65°F, Clear Skies, Mild, 15-20 MPH NW Gusting Wind. 10.25"

# **BORING LOG P-122**

Ameren Missouri Labadie Power Plant LOCATION: Bean Field-Newman Central **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 464.74' T.O.C. ELEVATION: 467.71' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 992758.84 **EASTING:** 729781.01 LITHOLOGY CLAY SM GRAVEI **GRAVEL** DEPTH (FEET) DESCRIPTION VC SAND VF SAND M SAND ACIES I.D. SAND SAND CLAY 465 0 0-1.2 ft; Clayey Silt, dark brown, soft. FB 1.2-4.6 ft; Clay, olive gray, 5Y 4/1, plastic, 100 460 5 4.6-9.7 ft; Very Fine Sand, Silt and Clay, highly interlaminated, pale yellowish brown, 10YR 6/2, soft, saturated below 5 ft. 100 455 10 9.7-11.5 ft; Clay, distinct very dark gray (Gley) CO/ 1 3/N, highly plastic, "gumbo". 11.5-13.0 ft; Very Fine to Fine Sand, Silt and Clay, highly interlaminated, distinct very dark \gray (Gley) 1 3/N, fine sand at base. 13.0-17.5 ft; Silty Sand, distinct very dark gray 450 15 (Gley) 1 3/N. 94 17.5-32.5 ft; Very Fine to Fine Sand, grayish FP/ orange, 10YR 7/4, becoming coarser toward Lev 445 20 100 440 25 100 STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. **WATER LEVELS:** DURING DRILLING \_\_\_\_5 FEET APPROXIMATE LITHOLOGIC BOUNDARIES ONLY, ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN DRILLER: AFTER DRILLING: \_\_\_ Rvan Hunziker LOGGED BY: M Carlson SAMPLES. PIEZOMETER: INSTALLED AT +/- 35.2 DATE DRILLED: 11/10/09

NOTES:

START TIME:

BOREHOLE DIA.:

END TIME:

11:22AM

2:16PM

8.25"

WEATHER: Cool, 55°F, Cloudy, Mild, 10-15 MPH Wind from N.

VERTICAL DATUM: NAVD 88

**HORIZONTAL DATUM: NAD 83** 

# GREDELL

# **BORING LOG P-122**

ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Bean Field-Newman Central **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 464.74' T.O.C. ELEVATION: 467.71' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 992758.84 **EASTING:** 729781.01 **LITHOLOGY** CONSTRUCTION DIAGRAM CLAY SM GRAVEI LG GRAVEL WATER TABL **DESCRIPTION** VF SAND VC SAND FACIES I.D. M SAND SAND 17.5-32.5 ft; Very Fine to Fine Sand, grayish FP/ orange, 10YR 7/4, becoming coarser toward Lev 435 30 100 32.5-36.5 ft; Coarse Sand, grayish orange,  $\mathbf{C}$ 10YR 7/4, gravelly with abundant granules 2-4 mm in size, (fine sand slough in top S.S.). 430 35 72 **BORING TERMINATED IN COARSE SAND** AND @36.5 FT - 425 40 -420 45 415 50 -410 55 STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. WATER LEVELS: DURING DRILLING \_\_\_\_5 FEET APPROXIMATE LITHOLOGIC BOUNDARIES DRILLER: Ryan Hunziker AFTER DRILLING: ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN LOGGED BY: M. Carlson DATE: SAMPLES. PIEZOMETER: INSTALLED AT +/- 35.2 FEET DATE DRILLED: 11/10/09 **VERTICAL DATUM: NAVD 88** START TIME: NOTES: 11:22AM END TIME: 2:16PM **HORIZONTAL DATUM: NAD 83** 

BOREHOLE DIA.:

8.25"

WEATHER: Cool, 55°F, Cloudy, Mild, 10-15 MPH Wind from N.

#### GREDELL **BORING LOG P-124** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Newman-East Central-S of LBR W of Davis Rd **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 464.92' T.O.C. ELEVATION: 467.99' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 992775.57 **EASTING:** 730303.49 LITHOLOGY RECOV CONSTRUCTION DIAGRAM CLAY SM GRAVEL DESCRIPTION VC SAND VF SAND ACIES I.D. C SAND F SAND M SAND SILTY CLAY 465 0 0.0-0.6 ft; Clayey Silt, very dark grayish FB brown, 10YR 3/2, moist, soft, roots. 0.6-1.7 ft; Silty Clay, very dark grayish brown, 75 10YR 3/2, plastic, very stiff, moist, faint mottles (10YR 4/6). 1.7-2.8 ft; Clayey Silt, dark grayish brown, 460 5 10YR 4/2, moist, soft, mottles (10YR 4/6). 2.8-3.6 ft; Silty Clay, very dark gravish brown. 10YR 3/2, plastic, stiff, moist. 3.6-4.4 ft; Clayey Silt, dark grayish brown, 10YR 4/2, moist, soft, mottles (10YR 4/6). 4.4-7.6 ft; Poor recovery, probable Silty Clay - 455 10 -CO/ slough noted. BS 7.6-8.5 ft; Silty Clay, dark gray and dark grayish brown, 10YR 4/1 and 4/2, plastic, soft 85 moist, iron concretions (10YR 4/6). 8.5-9.7 ft; Clayey Sandy Silt and Silty Sand, thin beds, soft; clayey sandy silt, dark gray and 450 15 dark grayish brown, 10YR 4/1 and 4/2, moist, 100 mottles (10YR 4/6); silty sand, brown, 10YR 4/ 3, wet, laminated. 9.7-20.5 ft; Clavey Silt, Silty Clay, Sandy Silt, Sandy Clayey Silt, Clayey Silty Sand, Fine Sand and Very Fine Sand, alternating thin beds, 445 20 very dark gray, (Gley) 1 3/N, moist to wet; silty clay, plastic; black mottles (Gley 1 2.5/N) in FP/ clay bed from 10.5-11.3 ft; laminations Lev common in "silt" and very fine sand beds below 12.8 ft. 20.5-25.6 ft; Very Fine Sand, with clay and silt, dark yellowish brown laminations, 10YR 4/6, 25 - 440 wet, stiff, becoming dark gray, 10YR 4/1 below 25.0 ft. STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. **WATER LEVELS: DURING DRILLING 8.8 FEET** APPROXIMATE LITHOLOGIC BOUNDARIES DRILLER: AFTER DRILLING: Ryan Hunziker ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN LOGGED BY: DATE: T. Doll PIEZOMETER: INSTALLED AT +/- 35.3 FEET DATE DRILLED: 11/11/09 NOTES: M. Carlson and S. King START TIME: **VERTICAL DATUM: NAVD 88** 10:46AM (Gredell) onsite. **HORIZONTAL DATUM: NAD 83** END TIME: 1:52PM BOREHOLE DIA.: WEATHER: Cool, 45°F, Clear Skies, Mild, Calm. 8.25"

## GREDELL **BORING LOG P-124** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Newman-East Central-S of LBR W of Davis Rd **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 464.92' T.O.C. ELEVATION: 467.99' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 992775.57 **EASTING:** 730303.49 LITHOLOGY CLAY SM GRAVEL G GRAVEL DESCRIPTION VC SAND VF SAND M SAND C SAND SAND 25.6-35.0 ft; Coarse Sand, with fine to medium sand, alternating thin beds, trace fine gravel, possibly fine sand toward base, dark gray, 10YR 4/1, 5-20 mm subrounded clasts, wet, 435 30 loose to soft, (fine sand noted at total depth based on cuttings sample collected from auger 25.6-35.0 ft; Coarse Sand, with fine to medium sand, alternating thin beds, trace fine gravel, possibly fine sand toward base, dark gray, 430 35 -10YR 4/1, 5-20 mm subrounded clasts, wet, FP/ 100 loose to soft, (fine sand noted at total depth Lev based on cuttings sample collected from auger 35.0-36.5 ft; Fine Sand, with very fine to coarse sand, trace gravel, 5-30 mm subangular clasts, - 425 40 dark gray, 10YR 4 1. **BORING TERMINATED IN FINE SAND** @36.5 FT -420 45 50 -- 415 410 55 STRATIFICATION LINES ARE APPROXIMATE LITHOLOGIC BOUNDARIES DRILLING CO.: Max's Enterprises, Inc. **WATER LEVELS:** DURING DRILLING 8.8 FEET AFTER DRILLING: \_\_ DRILLER: Ryan Hunziker ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN LOGGED BY: T. Doll DATE: SAMPLES. PIEZOMETER: INSTALLED AT +/- 35,3 DATE DRILLED: 11/11/09 START TIME: NOTES: M. Carlson and S. King **VERTICAL DATUM: NAVD 88** 10:46AM (Gredell) onsite. END TIME: HORIZONTAL DATUM: NAD 83 1:52PM **BOREHOLE DIA.:** 8,25" WEATHER: Cool, 45°F, Clear Skies, Mild, Calm.

#### **GREDELL BORING LOG P-126** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Newman-East Central-S of LBR Adj Davis Rd **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 465.77' T.O.C. ELEVATION: 468.83' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 992667.51 **EASTING:** 730879.77 LITHOLOGY PERCENT RECOVERY WELL CONSTRUCTION DIAGRAM CLAY SM GRAVEL G GRAVEL SAMPLE TYPE **WATER TABL** DESCRIPTION VF SAND VC SAND M SAND ACIES I.D. SAND F SAND SILTY CLAY 0 0.0-0.8 ft; Clayey Silt grading to Silty Clay, FΒ 465 thin beds; silty clay, dark brown, 10YR 3/3, moist, soft, roots; silty clay below 0.6 ft, very 50 dark grayish brown, 10YR 3/2, plastic, stiff, moist, mottles (10YR 4/6). 0.8-3.8 ft; Clayey Silt, dark brown, 10YR 3/3, 5 moist, soft, mottles (10YR 4/6), roots, 460 becoming stiff below 1.7 ft. 3.8-5.4 ft; Poor recovery, probable Silty Clay 50 slough. 5.4-8.8 ft; Silty Sand, brown, 10YR 4/3, wet, CO/ soft, stiff from 7.1-7.3 ft, without silt below 7.3 10 BS 455 100 8.8-13.3 ft; Clayey Sandy Silt, very dark gray, (Gley) 1 3/N, laminated, wet, soft, with clay below 10.5 ft, trace clay below 10.9 ft. 13.3-22.5 ft; Silty Sand, very dark gray, (Gley) 1 3/N, laminated, wet, soft; stiff below 16.1 ft; 15 trace fine sand below 20.0 ft, dark gray, (Gley) 450 1 4/N. 20 445 94 22.5-28.3 ft; Very Fine Sand, trace very fine FP/ sand, dark gray, 10YR 4/1, wet, soft, (clay Lev slough probable in 25.0 ft S.S.). 25 440 78 STRATIFICATION LINES ARE APPROXIMATE LITHOLOGIC BOUNDARIES DRILLING CO.: Max's Enterprises, Inc. **WATER LEVELS:** DURING DRILLING AFTER DRILLING: \_ DRILLER: ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN Ryan Hunziker DATE: LOGGED BY: T. Doll PIEZOMETER: INSTALLED AT +/- 34.2 FEET DATE DRILLED: 11/11/09 NOTES: M. Carlson and S. King **VERTICAL DATUM: NAVD 88** START TIME: 2:18PM (Gredell) onsite. END TIME: **HORIZONTAL DATUM: NAD 83** 5:15PM BOREHOLE DIA.: WEATHER: Warm, 65°F, Clear Skies, Mild, 5-10 MPH Wind from N. 10.25"

## **GREDELL BORING LOG P-126** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Newman-East Central-S of LBR Adj Davis Rd **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 465.77' T.O.C. ELEVATION: 468.83' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **EASTING:** 730879.77 **NORTHING:** 992667.51 LITHOLOGY WELL CONSTRUCTION DIAGRAM CLAY SM GRAVEL WATER TABLE -G GRAVEL ЭЕРТН (FEET) DESCRIPTION VF SAND VC SAND FACIES I.D. M SAND SAND C SAND SILTY FP/ Lev 28.3-36.5 ft; Medium Sand, thin beds, trace CM/ fine sand, coarse sand and gravel, dark gray, Sp 30 10YR 4/1, 5-12 mm subangular clasts, wet, 100 435 soft. 35 430 100 **BORING TERMINATED IN MEDIUM** SAND @36.5 FT 40 425 45 420 50 415 55 410 STRATIFICATION LINES ARE WATER LEVELS: DRILLING CO.: Max's Enterprises, Inc. DURING DRILLING \_\_\_\_5\_ FEET APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE AFTER DRILLING: DRILLER: Ryan Hunziker GRADUAL OR MAY OCCUR BETWEEN SAMPLES. DATE: LOGGED BY: T. Doll PIEZOMETER: INSTALLED AT +/- 34.2 FEET DATE DRILLED: 11/11/09 NOTES: M. Carlson and S. King **VERTICAL DATUM: NAVD 88** START TIME: 2:18PM (Gredell) onsite. **HORIZONTAL DATUM: NAD 83** END TIME: 5:15PM WEATHER: Warm, 65°F, Clear Skies, Mild, 5-10 MPH Wind from N. BOREHOLE DIA.: 10.25"

### GREDELL **BORING LOG P-128** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Heisel-W Central-Adi to Ameren Power Lines Proposed Utility Waste Disposal Area G.S. ELEVATION: 465.74' T.O.C. ELEVATION: 468.60' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 992561.87 **EASTING:** 727385.52 LITHOLOGY CONSTRUCTION DIAGRAM CLAY SM GRAVEL G GRAVEL WATER TABL DESCRIPTION VC SAND VF SAND ACIES I.D. F SAND M SAND SILTY 0 0.0-0.6 ft; Clayey Silt, dark brown, 10YR 3/3, FB 465 moist, soft, roots, becoming dark yellowish brown, 10YR 3/4, below 0.5 ft. 0.6-2.7 ft; Silty Clay, very dark grayish brown, \10YR 3/2, plastic, stiff, moist. 2.7-4.2 ft; Clayey Silt, brown, 10YR 4/3, moist, 5 soft, mottles (10YR 4/6). 460 4.2-6.8 ft; Poor recovery, probable Silty Clay \slough noted. FP/ 6.8.0-15.7 ft; Very Fine to Fine Sand, thin beds, Lev brown and dark grayish brown, 10YR 4/3 and 4/2, wet below 6.8 ft, loose grading to soft; 10 trace clay below 11.3 ft. 100 455 15 450 15.7-20.8 ft; Silty Sand, dark gray, 10YR 4/1, wet, soft, (very fine sand and clay slough probable in top of 20.0 S.S.). 20 100 445 20.8-31.3 ft; Very Fine to Medium Sand, CM/ alternating thin beds, trace coarse sand, dark Sp gray, 10YR 4/1, (very fine sand and clay slough probable in top of 25.0 ft S.S.). 25 440 STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. WATER LEVELS: DURING DRILLING \_\_\_\_4\_\_ FEET APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN DRILLER: Ryan Hunziker AFTER DRILLING: DATE: LOGGED BY: T. Doll SAMPLES. PIEZOMETER: INSTALLED AT +/- 34.7 DATE DRILLED: 11/07/09 START TIME: NOTES: M. Carlson (Gredell) onsite. **VERTICAL DATUM: NAVD 88** 3:49PM 11/6 END TIME: **HORIZONTAL DATUM: NAD 83** 8:47AM WEATHER: Warm, 60°F, Clear Skies, Mild. **BOREHOLE DIA.:** 10.25"

## GREDELL **BORING LOG P-128** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant **LOCATION:** Heisel-W Central-Adj to Ameren Power Lines Proposed Utility Waste Disposal Area G.S. ELEVATION: 465.74' T.O.C. ELEVATION: 468.60' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 992561.87 **EASTING:** 727385.52 **LITHOLOGY** CLAY SAMPLE TYPE SM GRAVEL GRAVEL WATER TABI **DESCRIPTION** VC SAND VF SAND M SAND F SAND CM/ 20.8-31.3 ft; Very Fine to Medium Sand, alternating thin beds, trace coarse sand, dark Sp gray, 10YR 4/1, (very fine sand and clay slough probable in top of 25.0 ft S.S.). 30 100 435 31.3-36.5 ft; Very Fine to Fine Sand grading to Medium Sand, dark gray and dark grayish brown, 10YR 4/1 and 4/2, 20-35 mm subrounded clasts, brown and black wood detritus thin bed from 36.1-36.2 ft, 20 mm 35 430 100l wood piece below 36.2 ft, wet, soft grading to **BORING TERMINATED IN MEDIUM** SAND @36.5 FT SHELBY TUBE SAMPLE COLLECTED AT 40 0.7-2.7 FT DEPTH AT COMPLETION OF 425 DRILLING. 45 420 50 415 55 410 STRATIFICATION LINES ARE WATER LEVELS: DURING DRILLING \_\_\_\_4 FEET DRILLING CO.: Max's Enterprises, Inc. APPROXIMATE LITHOLOGIC BOUNDARIES DRILLER: AFTER DRILLING: \_\_\_ ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN Ryan Hunziker LOGGED BY: DATE: T. Doll PIEZOMETER: INSTALLED AT +/- 34.7 FEET DATE DRILLED: 11/07/09

NOTES: M. Carlson (Gredell) onsite.

START TIME:

**BOREHOLE DIA.:** 

END TIME:

3:49PM 11/6

8:47AM

10.25"

**VERTICAL DATUM: NAVD 88** 

WEATHER: Warm, 60°F, Clear Skies, Mild.

**HORIZONTAL DATUM: NAD 83** 

#### **GREDELL BORING LOG P-130** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Heisel-West-S of LBR, W of farm access Rd **Proposed Utility Waste Disposal Area G.S. ELEVATION:** 465.15' **T.O.C. ELEVATION:** 468.13' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 992537.68 **EASTING:** 728075.04 LITHOLOGY CONSTRUCTION DIAGRAM CLAY SAMPLE TYPE SM GRAVEL G GRAVEL **DESCRIPTION** VC SAND VF SAND SAND SAND CLAY 0 465 0.0-0.8 ft; Clayey Silt, dark brown, 10YR 3/3, FB \damp, soft. 0.8-2.6 ft; Silty Clay, very dark grayish brown, 100 \10YR 3/2, plastic, firm, damp. 2.6-5.0 ft; becoming with silt, mottles (10YR 4/ 5 460 5.0-6.5 ft; Poor recovery, probable Silty Clay slough. 6.5-7.5 ft; Clayey Silt, dark gray, 10YR 4/1, \wet, soft. 7.5-8.0 ft; Silty Clay, dark gray, 10YR 4/1, plastic, moist, soft. FP/ 10 - 455 8.0-9.4 ft; Clayey Silt, dark gray, 10YR 4/1, Lev mottles and iron concretions (10YR 4/6), wet, soft. 30 9.4-13.3 ft; Fine Sand, dark grayish brown, 10YR 4/2, wet, soft. 13.3-15.6 ft; Sandy Silty Clay, dark grayish 15 - 450 brown, 10YR 42, low plasticity, wet, soft./ 15.6-25.8 ft; Fine Sand, with very fine sand, dark gray, 10YR 4/1, with coalified wood matter laminae from 20.9-25.3 ft, wet, soft; trace very fine sand below 20.9 ft, (clay and fine sand slough probable in top of 20.0 and 20 445 25.0 ft S.S.). 100 25 440 25.8-30.6 ft; Coarse Sand, thin beds, with fine STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. **WATER LEVELS: DURING DRILLING** APPROXIMATE LITHOLOGIC BOUNDARIES DRILLER: AFTER DRILLING: Doug Hunziker ONLY: ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN LOGGED BY: T. Doll DATE DRILLED: PIEZOMETER: INSTALLED AT +/- 34.9 FEET 09/30/09 **VERTICAL DATUM: NAVD 88** START TIME: NOTES: Chris Vierrether, MDNR, 10:18AM onsite observing drilling **HORIZONTAL DATUM: NAD 83** END TIME: 12:50PM **BOREHOLE DIA.:** 8.25" WEATHER: Cool, 50°F, Heavy Fog, Humid, Calm.

## GREDELL **BORING LOG P-130** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Heisel-West-S of LBR, W of farm access Rd **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 465.15' T.O.C. ELEVATION: 468.13' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **EASTING:** 728075.04 **NORTHING:** 992537.68 **LITHOLOGY** PERCENT RECOVERY WELL CONSTRUCTION DIAGRAM CLAY SAMPLE TYPE -G GRAVEL SM GRAVEI **DESCRIPTION** VC SAND VF SAND FACIES I.D. M SAND C SAND SAND SILTY to medium sand, trace very fine sand, dark Sp gray, 10YR 4/1, wet, loose to soft. 30 -- 435 78 30.6-36.5 ft; Medium to Coarse Sand, with fine C sand, grading to gravelly sand, alternating thin beds, dark gray, 10YR 4/1, subrounded clasts, wet, loose to soft, (fine sand and clay slough in top of 35.0 ft S.S.). 35 -- 430 BORING TERMINATED IN GRAVELLY SAND @36.5 FT 40 -425 45 420 50 415 55 -410 STRATIFICATION LINES ARE APPROXIMATE LITHOLOGIC BOUNDARIES DRILLING CO.: Max's Enterprises, Inc. **WATER LEVELS:** DURING DRILLING 8 FEET AFTER DRILLING: DRILLER: Doug Hunziker ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN DATE: LOGGED BY: T. Doll SAMPLES. PIEZOMETER: INSTALLED AT +/- 34.9 FEET DATE DRILLED: 09/30/09 NOTES: Chris Vierrether, MDNR, START TIME: 10:18AM **VERTICAL DATUM: NAVD 88** onsite observing drilling END TIME: **HORIZONTAL DATUM: NAD 83** 12:50PM

activities.

**BOREHOLE DIA.:** 

8.25"

WEATHER: Cool, 50°F, Heavy Fog, Humid, Calm.

#### **GREDELL BORING LOG P-132** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Newman-Central West-Adj to farm access Rd **Proposed Utility Waste Disposal Area G.S. ELEVATION:** 465.36' **T.O.C. ELEVATION:** 468.47' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 992536.17 **EASTING:** 728817.00 LITHOLOGY RECOVERY CONSTRUCTION DIAGRAM CLA SM GRAVEL G GRAVEL SAMPLE TYPE WATER TABL DESCRIPTION ELEVATION VF SAND VC SAND FACIES I.D. SAND M SAND SAND CLAY 0 465 0.0-0.7 ft; Clayey Silt, dark brown, 10YR 3/3, FB 0.7-2.5 ft; Silty Clay, very dark grayish brown, 100 10YR 3/2, plastic, stiff, mottles (10YR 4/6), 2.5-5.0 ft; Sandy Clayey Silt grading to Fine 5 Sand, thin beds, dark grayish brown, 10YR 4/2, 460 moist, stiff, wet and soft below 3.3 ft, laminated below 4.3 ft. 85 5.0-7.3 ft; Silty Clay, very dark grayish brown, 10YR 3/2, highly plastic, stiff, moist, silt interbeds <2 mm. 10 7.3-11.0 ft; Sandy Clayey Silt grading to Fine 455 FP/ 83 Sand, thin beds, dark gray to brown, 10YR 4/1 Lev to 4/3, moist, wet below 8.8 ft; sandy clayey silt, slightly plastic; iron concretions and staining (10YR 4/6) from 8.3-8.8 ft; laminations from 8.8-9.3 ft, (fine sand and clay 15 slough probable in top of 10.0 ft S.S.) 450 100 11.0-13.3 ft; Fine Sand, trace coarse sand and gravel, dark grayish brown, 10YR 4/2, subrounded clasts. 13.3-16.3 ft; Fine Sand, trace very fine sand, dark grayish brown, 10YR 4/2, wet, soft grading to firm, (fine sand slough probable in 20 445 top of 15.0 ft S.S.). 16.3-18.3 ft; Coarse Sand, trace very fine to fine sand, dark grayish brown, 10YR 4/2, wet. 18.3-28.3 ft; Fine Sand, trace very fine to coarse sand, dark grayish brown, 10YR 4/2, wet, soft grading to firm, trace clay balls, (fine 25 440 sand and clay slough probable in top of 20.0 ft 100 S.S.). STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. WATER LEVELS: DURING DRILLING APPROXIMATE LITHOLOGIC BOUNDARIES AFTER DRILLING: \_ DRILLER: Ryan Hunziker ONLY: ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN LOGGED BY: T. Doll DATE DRILLED: PIEZOMETER: INSTALLED AT +/- 35.0 10/15/09 NOTES: S. King (Gredell) onsite **VERTICAL DATUM: NAVD 88** START TIME: 8:00AM developing piezometers. END TIME: **HORIZONTAL DATUM: NAD 83** 10:06AM BOREHOLE DIA.: 8.25" WEATHER: Cold, 45°F, Overcast, Drizzle.

## GREDELL **BORING LOG P-132** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Newman-Central West-Adj to farm access Rd Proposed Utility Waste Disposal Area G.S. ELEVATION: 465.36' T.O.C. ELEVATION: 468.47' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **EASTING:** 728817.00 **NORTHING:** 992536.17 **LITHOLOGY** CLAY SM GRAVEI G GRAVEL **DESCRIPTION** VF SAND VC SAND FACIES I.D. M SAND C SAND F SAND FP/ 28.3-33.3 ft; Fine to Medium Sand, thin beds, trace very fine sand, dark grayish brown, 10YR Lev 30 -435 4/2, 5-10 mm subrounded clasts, 10 mm black 100 coalified wood matter piece, wet, soft. 33.3-36.5 ft; Coarse Sand, with fine to medium sand and gravel, dark grayish brown, 10YR 4/ 35 430 2, 5-30 mm subangular clasts. 100 **BORING TERMINATED IN COARSE SAND** @36.5 FT 40 425 45 420 50 415 55 410 STRATIFICATION LINES ARE APPROXIMATE LITHOLOGIC BOUNDARIES DRILLING CO.: Max's Enterprises, Inc. WATER LEVELS: DURING DRILLING 8.8 FEET AFTER DRILLING: \_\_ DRILLER: ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN Ryan Hunziker LOGGED BY: DATE: T. Doll SAMPLES. PIEZOMETER: INSTALLED AT +/- 35.0 FEET DATE DRILLED: 10/15/09 NOTES: S. King (Gredell) onsite **VERTICAL DATUM: NAVD 88** START TIME: 8:00AM developing piezometers. END TIME: 10:06AM **HORIZONTAL DATUM: NAD 83** BOREHOLE DIA.: WEATHER: Cold, 45°F, Overcast, Drizzle.

### **GREDELL BORING LOG P-134** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Bean Field-Newman Central **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 464.10' T.O.C. ELEVATION: 466.82' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 992491.31 **EASTING:** 729438.21 **LITHOLOGY** WELL CONSTRUCTION DIAGRAM S[A S] SM GRAVEL G GRAVEL DESCRIPTION VC SAND VF SAND FACIES I.D. F SAND M SAND SAND SILTY CLAY 465 0 0-1.0 ft; Clayey Silt, olive gray, 5Y 4/1, soft. FB 1.0-2.8 ft; Clay, olive gray, 5Y 4/1, plastic, 100 2.8-3.5 ft; Silty Clay, olive gray, 5Y 4/1, 460 \slightly plastic, soft. 3.5-6.8 ft; Clay, light olive gray, 5Y 6/1, 5 plastic. 6.8-7.8 ft; Very Fine Sand, Silt and Clay, interlaminated, pale yellowish brown, 10YR 6 FP/ 2, saturated. 455 Lev 7.8-20.7 ft; Very Fine to Fine Sand, grayish 10 orange, 10YR 7/4, clean, gradational lower 100 contact. 450 15 100 445 20 20.7-26.0 ft; Very Coarse Sand, grayish orange, 10YR 7/4. 440 25 26.0-36.5 ft; Gravelly Sand to Sandy Gravel, $\mathbf{C}$ STRATIFICATION I INFS ARE DRILLING CO.: Max's Enterprises, Inc. WATER LEVELS: DURING DRILLING APPROXIMATE LITHOLOGIC BOUNDARIES AFTER DRILLING: \_ DRILLER: Ryan Hunziker ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN LOGGED BY: DATE: M. Carlson PIEZOMETER: INSTALLED AT +/- \_ DATE DRILLED: 11/10/09 NOTES: Blake Smotherman, MDNR, **VERTICAL DATUM: NAVD 88** START TIME: 8:30AM onsite observing drilling **HORIZONTAL DATUM: NAD 83** END TIME: 10:35AM activities. BOREHOLE DIA.: 8.25" WEATHER: Cool, 55°F, Cloudy, Mild, 20-25 MPH Wind from W.

## **GREDELL BORING LOG P-134** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Bean Field-Newman Central **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 464.10' T.O.C. ELEVATION: 466.82' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 992491.31 **EASTING:** 729438.21 LITHOLOGY SM GRAVEL SAMPLE TYPE SLA V DEPTH (FEET) WATER TABL G GRAVEL DESCRIPTION VC SAND VF SAND FACIES I.D. M SAND C SAND SAND SILTY CLAY \_8 grayish orange, 10YR 7/4, (3-inch well- $\mathbf{C}$ ું જુ કે કો કે કે કો rounded, prolate cobbles retrieved from base of auger), (fine sand slough in top of S.S.). 435 800 P 30 78 90 % 000 430 35 BORING TERMINATED IN GRAVELLY SAND @36.5 FT 425 40 420 45 415 50 410 55 STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. WATER LEVELS: DURING DRILLING FEET APPROXIMATE LITHOLOGIC BOUNDARIES DRILLER: AFTER DRILLING: FEET Ryan Hunziker ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN LOGGED BY: DATE: M. Carlson DATE DRILLED: PIEZOMETER: INSTALLED AT +/- 34.9 FEET 11/10/09 START TIME: NOTES: Blake Smotherman, MDNR, **VERTICAL DATUM: NAVD 88** 8:30AM onsite observing drilling END TIME: **HORIZONTAL DATUM: NAD 83** 10:35AM activities. **BOREHOLE DIA.:** 8.25" WEATHER: Cool, 55°F, Cloudy, Mild, 20-25 MPH Wind from W.

#### GREDELL **BORING LOG P-136** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant **LOCATION:** Bean Field-Newman Central **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 463.71' T.O.C. ELEVATION: 466.73' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 992488.64 **EASTING:** 730004.49 LITHOLOGY WELL CONSTRUCTION DIAGRAM CLAY WATER TABLE SM GRAVEL **GRAPHIC LOG** SAMPLE TYPE G GRAVEL **DESCRIPTION** VC SAND FACIES I.D. VF SAND M SAND SAND SILTY 465 0 0.0-1.5 ft; Clay, olive gray, 5Y 4/1, plastic, FB stiff. 1.5-6.7 ft; Silt and Clay, alternating very thinly 100 bedded, clayey silt in places, light olive gray 460 (5Y 6/1) to pale yellowish brown (10YR 6/2), soft, saturated below 5 ft. 5 6.7-9.2 ft; Very Fine to Fine Sand, Silt and FP/ 100 Clay, interlaminated to very thinly bedded, Lev 455 light olive gray (5Y 6/1) to pale yellowish brown (10YR 6/2), common rust-colored CO/ 10 mottles and nodules, sharp contact w/below. BS 9.2-12.2 ft; Silt and Clay, interlaminated, very dark gray (Gley) 1 3/N, clay highly plastic. 12.2-13.5 ft; Very Fine Sand, laminated, silty, 450 \gley-colored as above. 13.5-18.3 ft; Very Fine to Fine Sand, dark gray 15 (Gley) 1 3/N. 89 445 18.3-27.5 ft; Medium to Coarse Sand, gleycolored as above, trace granules and small 20 pebbles. 100 440 25 100 STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. DURING DRILLING WATER LEVELS: APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE DRILLER: AFTER DRILLING: Ryan Hunziker GRADUAL OR MAY OCCUR BETWEEN LOGGED BY: M. Carlson SAMPLES. DATE DRILLED: 11/11/09 PIEZOMETER: INSTALLED AT +/-35.0 FEET **VERTICAL DATUM: NAVD 88** START TIME: 3:48PM 11/10 NOTES: T. Doll (Gredell) onsite field staking piezometer locations. HORIZONTAL DATUM: NAD 83 END TIME: 9:06AM BOREHOLE DIA.: WEATHER: Cool, 55°F, Cloudy, Mild, 10-15 MPH Wind from N. 10.25"

## GREDELL **BORING LOG P-136** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Bean Field-Newman Central **Proposed Utility Waste Disposal Area G.S. ELEVATION:** 463,71' **T.O.C. ELEVATION:** 466.73' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 992488.64 **EASTING:** 730004.49 **LITHOLOGY** WELL CONSTRUCTION DIAGRAM CLAY SAMPLE TYPE SM GRAVEL -G GRAVEL WATER TABL **DESCRIPTION** VC SAND VF SAND M SAND C SAND SAND 27.5-32.5 ft; Very Coarse Sand, grayish orange, $\mathbf{C}$ 435 10YR 7/4, common granule to small pebblesized clasts up to 5 mm dia (fine sand slough in 30 top of S.S.). 89 32.5-36.5 ft; Medium Sand, grayish orange, CM/ 430 10YR 7/4, based marked by 15 mm gravel Sp fragment, (fine sand noted at total depth based 35 on cuttings sampled collected from auger bit). 100 BORING TERMINATED IN FINE SAND @36.5 FT 425 40 420 45 415 50 410 55 STRATIFICATION LINES ARE APPROXIMATE LITHOLOGIC BOUNDARIES DRILLING CO.: Max's Enterprises, Inc. WATER LEVELS: DURING DRILLING \_\_\_\_5 FEET DRILLER: ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN AFTER DRILLING: \_\_ Rvan Hunziker LOGGED BY: DATE: M. Carlson SAMPLES. PIEZOMETER: INSTALLED AT +/- 35.0 FEET DATE DRILLED: 11/11/09 NOTES: T. Doll (Gredell) onsite field START TIME: **VERTICAL DATUM: NAVD 88** 3:48PM 11/10 staking piezometer locations. END TIME: 9:06AM HORIZONTAL DATUM: NAD 83 **BOREHOLE DIA.:** WEATHER: Cool, 55°F, Cloudy, Mild, 10-15 MPH Wind from N.

### **GREDELL BORING LOG P-138** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Bean Field-Newman-East Central **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 464.10' T.O.C. ELEVATION: 466.99' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 992469.33 **EASTING:** 730675.26 LITHOLOGY RECOVERY WELL CONSTRUCTION DIAGRAM CLAY GRAVEL **WATER TABLE** SM GRAVEL SAMPLE TYPE **DESCRIPTION** /C SAND VF SAND M SAND FACIES I.D. SAND SAND CLAY 465 0 0-6.5 ft; Clay, olive gray, 5Y 4/1, sparse streaks FB silty clay, plastic, stiff. 100 460 5 6.5-8.4 ft; Silt and Clay, alternating very thinly bedded to laminated, some silty clay, light olive gray (5Y 6/1) to pale yellowish brown (10YR CO/ 455 6/2), saturated below 6 ft, sharp contact w/ BS 10 below. 8.4-11.0 ft; Clay, very dark gray (Gley) 1 3/N, sparse silt laminae, highly plastic. 11.0-17.5 ft; Very Fine Sand, silty, gleycolored as above. 450 15 39 17.5-36.0 ft; Very Fine to Fine Sand, very dark gray (Gley) 1 3/N, abundant black 445 carbonaceous matter throughout, some clay rip-20 ups, sparse silty laminae above 25 ft, sharp 100 contact with below. 440 25 56 STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. **WATER LEVELS:** DURING DRILLING APPROXIMATE LITHOLOGIC BOUNDARIES AFTER DRILLING: DRILLER: Dave Hunziker ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN LOGGED BY: M. Carlson PIEZOMETER: INSTALLED AT +/-35.0 FEET DATE DRILLED: 11/12/09 NOTES: Chris Vierrether, MDNR, **VERTICAL DATUM: NAVD 88** START TIME: 11:10AM onsite observing drilling **HORIZONTAL DATUM: NAD 83** END TIME: 4:00PM activities. BOREHOLE DIA.: WEATHER: Warm, 60°F, Mostly Sunny, 5 MPH Wind from SE. 8.25"

### **GREDELL BORING LOG P-138** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Bean Field-Newman-East Central **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 464.10' T.O.C. ELEVATION: 466.99' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 992469.33 **EASTING:** 730675.26 LITHOLOGY PERCENT RECOVERY CONSTRUCTION DIAGRAM SM GRAVEL S S S S S SAMPLE TYPE **JEPTH (FEET)** -G GRAVEL DESCRIPTION VF SAND VC SAND M SAND FACIES I.D. F SAND C SAND SILTY 17.5-36.0 ft; Very Fine to Fine Sand, very dark CO/ gray (Gley) 1 3/N, abundant black BS carbonaceous matter throughout, some clay rip-435 ups, sparse silty laminae above 25 ft, sharp 30 contact with below. 72 430 35 61 $\mathbf{C}$ 36.0-36.5 ft; Medium to Coarse Sand, gleycolored as above, trace granules and small pebbles less than 5 mm dia., (coarse sand noted at total depth based on cuttings sample 425 collected from auger bit). 40 BORING TERMINATED IN COARSE SAND @36.5 FT 420 45 415 50 410 55 STRATIFICATION LINES ARE WATER LEVELS: DURING DRILLING \_ DRILLING CO.: Max's Enterprises, Inc. APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE AFTER DRILLING: FEET DRILLER: Dave Hunziker GRADUAL OR MAY OCCUR BETWEEN DATE: LOGGED BY: M. Carlson SAMPLES. PIEZOMETER: INSTALLED AT +/- 35.0 FEET DATE DRILLED: 11/12/09 NOTES: Chris Vierrether, MDNR, **VERTICAL DATUM: NAVD 88** START TIME: 11:10AM onsite observing drilling **HORIZONTAL DATUM: NAD 83** END TIME: 4:00PM activities. WEATHER: Warm, 60°F, Mostly Sunny, 5 MPH Wind from SE. **BOREHOLE DIA.:** 8.25"

#### GREDELL **BORING LOG P-140** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Newman-East-S of LBR, Adj to Davis Rd **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 465.72' T.O.C. ELEVATION: 468.57' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 992404.70 **EASTING:** 731394.93 **LITHOLOGY** CLAY SAMPLE TYPE SM GRAVEL G GRAVEL **JEPTH (FEET) NATER TABL DESCRIPTION** VC SAND FACIES I.D. VF SAND M SAND SAND SAND CLAY 0 0.0-0.8 ft; Clayey Silt, dark brown, 10YR 3/3, FB 465 \slightly plastic, moist, soft. 0.8-2.0 ft; Silty Clay, very dark grayish brown, 90 10YR 3/2, plastic, stiff, mottles (10YR 4/6), moist. 2.0-3.4 ft; Clayey Silt, dark grayish brown and 5 brown, 10YR 4/2 and 4/3, slightly plastic, 460 moist, soft, trace very fine sand and wet 2.3-3.2 80 3.4-7.1 ft; Silty Clay, dark grayish brown, 10YR 4/2, plastic, soft, moist; stiff from 3.8-4.5 ft; trace very fine sand below 6.9 ft. 10 7.1-8.4 ft; Clayey Silt, brown, 10YR 4/3, CO/ 455 laminated, moist, soft; trace very fine and BS mottles (10YR 4/6) below 7.3 ft; with clay 40 below 8.2 ft. 8.4-20.7 ft; Very Fine Sand, Silty Sand, Silty Clay and Clayey Silty Sand, alternating thin 15 beds, wet, soft; brown to 9.0 ft, 10YR 4/3, iron FP/ 450 61 staining (10YR 4/6); dark gray from 10.0-10.9 Lev ft and 15.2-15.9 ft, (Gley) 1 4/N; silty clay bed from 10.7-10.9 ft, plastic; dark yellowish brown from 10.9-12.0 ft, 10YR 4/4; dark grayish brown below 20.0 ft, 10YR 4/2. 20 445 20.7-26.0 ft; Very Fine Sand, trace fine to medium sand, dark gray, 10YR 4/1, wet, soft. 25 440 26.0-30.8 ft; Medium to Coarse Sand, with fine STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. **WATER LEVELS:** DURING DRILLING APPROXIMATE LITHOLOGIC BOUNDARIES AFTER DRILLING: DRILLER: Ryan Hunziker ONLY: ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN LOGGED BY: T. Doll PIEZOMETER: INSTALLED AT +/- 34.7 FEET DATE DRILLED: 10/27/09 **VERTICAL DATUM: NAVD 88** NOTES: START TIME: 9:08AM HORIZONTAL DATUM: NAD 83 END TIME: 11:46AM BOREHOLE DIA.: 8.25" WEATHER: Cool, 45°F, Overcast, Raining.

## **GREDELL BORING LOG P-140** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Newman-East-S of LBR, Adj to Davis Rd Proposed Utility Waste Disposal Area G.S. ELEVATION: 465.72' T.O.C. ELEVATION: 468.57' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 992404.70 **EASTING:** 731394.93 **LITHOLOGY** WELL CONSTRUCTION DIAGRAM CLAY SM GRAVEL GRAVEL SAMPLE TYPE DEPTH (FEET) **DESCRIPTION** VC SAND VF SAND FACIES I.D. M SAND C SAND F SAND CLAY ပ္ sand, dark gray, 10YR 4/1, wet, soft to stiff. Sp 30 435 100 30.8-36.5 ft; Very Fine to Medium Sand grading to Gravelly Sand, alternating thin beds, 4 mm subrounded and subangular quartz and φ φφοβο βο 3 ο δο βο 8 ο βο βο βο feldspar clasts, 40 mm single wood fragment, wet. 35 & & 430 61 **BORING TERMINATED IN GRAVELLY** SAND @36.5 FT 40 425 45 420 50 415 55 410 STRATIFICATION LINES ARE APPROXIMATE LITHOLOGIC BOUNDARIES **WATER LEVELS:** DURING DRILLING 8.5 FEET DRILLING CO.: Max's Enterprises, Inc. AFTER DRILLING: \_ ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN SAMPLES. DRILLER: Ryan Hunziker DATE: LOGGED BY: T. Doll PIEZOMETER: INSTALLED AT +/- 34.7 FEET DATE DRILLED: 10/27/09 NOTES: **VERTICAL DATUM: NAVD 88** START TIME: 9:08AM HORIZONTAL DATUM: NAD 83 END TIME: 11:46AM BOREHOLE DIA.: WEATHER: Cool, 45°F, Overcast, Raining. 8.25"

#### GREDELL **BORING LOG P-142** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Bean Field-West Margin Project Area **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 464.83' T.O.C. ELEVATION: 467.66' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 992250.72 **EASTING:** 727764.69 LITHOLOGY CLAY SM GRAVEL GRAVEL SAMPLE TYPE WATER TABL **DESCRIPTION** VC SAND FACIES I.D. VF SAND M SAND SAND CLAY 465 0 0-0.7 ft; Silty Clay, olive gray, 5Y 4/1, slightly FB \plastic. 0.7-2.3 ft; Clay, olive gray, 5Y 4/1, trace silt, 100 \plastic. 2.3-3.2 ft; Silty Clay and Clayey Silt, alternating very thin beds, Clay, olive gray, 5Y 460 5 4/1, mottled, soft. 3.2-5.9 ft; Clay, olive gray, 5Y 4/1, orangish CO/ overtones below 4.5 ft, plastic. BS 5.9-8.3 ft; Silt and Clay, alternating very thin to thin beds, silt laminated, marked by VF sand FP/ interlaminae and thicker layers "gley"-colored Lev 455 10 clay, clay beds highly plastic, light olive gray 5Y 6/1, contacts between silt and clay beds sharp. 8.3-26.5 ft; Fine Sand, grayish orange, 10YR 7/ 4, saturated, clean, 2-inch clay seam noted at 11.3 ft (possible slough), base marked by large 450 15 (15 mm) pebble, sharp contact w/below. 67 445 20 100 440 25 100 STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. WATER LEVELS: DURING DRILLING APPROXIMATE LITHOLOGIC BOUNDARIES AFTER DRILLING: \_ DRILLER: Doug Hunziker ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN LOGGED BY: M. Carlson PIEZOMETER: INSTALLED AT +/- 35.1 DATE DRILLED: 11/06/09 NOTES: T. Doll (Gredell) onsite field **VERTICAL DATUM: NAVD 88** START TIME: 10:56AM staking piezometer locations **HORIZONTAL DATUM: NAD 83** END TIME: 3:00PM and observing drilling **BOREHOLE DIA.:** WEATHER: Warm, 65°F, Mostly Sunny, Mild, 10-15 MPH Wind from S. 8.25" activities.

## GREDELL **BORING LOG P-142** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Bean Field-West Margin Project Area **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 464.83' T.O.C. ELEVATION: 467.66' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **EASTING:** 727764.69 **NORTHING:** 992250.72 **LITHOLOGY** CLAY SM GRAVEL DEPTH (FEET) DESCRIPTION VF SAND VC SAND FACIES I.D. C SAND F SAND M SAND SILTY CLAY $\mathbf{C}$ 26.5-36.5 ft; Medium to Coarse Sand, grayish orange, 10YR 7/4, gravelly w/abundant granule to small pebble-sized felsitic clasts, (gravelly sand consisting of 2-inch well-rounded to 435 30 subangular clasts noted at total depth based on 78 cuttings sample collected from auger bit), (fine sand slough in top of S.S.). 430 35 56 **BORING TERMINATED IN SANDY** GRAVEL @36.5 FT 425 40 420 45 415 50 -410 55 STRATIFICATION LINES ARE WATER LEVELS: DRILLING CO.: Max's Enterprises, Inc. DURING DRILLING \_\_\_\_5\_ FEET APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE AFTER DRILLING: DRILLER: Doug Hunziker GRADUAL OR MAY OCCUR BETWEEN DATE: LOGGED BY: M. Carlson SAMPLES. PIEZOMETER: INSTALLED AT +/- 35.1 DATE DRILLED: 11/06/09 START TIME: NOTES: T. Doll (Gredell) onsite field **VERTICAL DATUM: NAVD 88** 10:56AM staking piezometer locations **HORIZONTAL DATUM: NAD 83** END TIME: 3:00PM and observing drilling

activities.

**BOREHOLE DIA.:** 

8.25"

WEATHER: Warm, 65°F, Mostly Sunny, Mild, 10-15 MPH Wind from S.

#### GREDELL **BORING LOG P-144** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Heisel-West-S of LBR, W of farm access Rd **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 464.56' T.O.C. ELEVATION: 467.74' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **EASTING:** 728361.22 **NORTHING:** 992236.95 LITHOLOGY PERCENT RECOVERY CLAY SM GRAVEL G GRAVEL ЭЕРТН (FEET) WATER TABL DESCRIPTION VC SAND VF SAND ACIES I.D. C SAND SAND MSAND SAMPLE SILTY CLAY 465 0 0.0-1.0 ft; Clavey Silt, dark brown, 10YR 3/3, FB \damp, soft. 1.0-4.5 ft; Silty Clay, very dark grayish brown, 10YR 3/2, plastic, stiff, moist, mottles (10YR 4/6) from 3.0 to 4.0 ft. 460 4.5-6.0 ft; Poor recovery, probable Silty Clay 5 slough. 6.0-10.8 ft; Silty Clay and Clayey Silt; dark 60 gravish brown to 6.8 ft, 10YR 4/2, moist, soft; dark gray below 6.8 ft, 10YR 4/1, iron/ manganese concretions and staining. 455 10 10.8-18.3 ft; Fine Sand and Silty Clay, trace FP/ very fine sand, alternating thin beds, dark Lev yellowish brown to 12.0 ft, 10YR 4/4; dark gray below 12.0 ft, 10YR 4/1; silty clay bed 100 from 12.0-12.4 ft, slightly plastic, (clay slough 450 15 probable in top of 15.0-25.0 ft S.S.). 18.3-31.0 ft; Very Fine to Fine Sand, CO/ alternating thin beds, very dark gray, (Gley) 1 BS 20 3/N, and dark gray, 10YR 4/1, black and brown 28 fine wood fragments, wet, soft, (fine sand and clay slough probable in top of 30.0 ft S.S.). 440 25 72 STRATIFICATION LINES ARE DRILLING CO .: Max's Enterprises, Inc. WATER LEVELS: DURING DRILLING APPROXIMATE LITHOLOGIC BOUNDARIES AFTER DRILLING: DRILLER: Dave Hunziker ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN DATE: LOGGED BY: T. Doll SAMPLES. PIEZOMETER: INSTALLED AT +/- 34.7 DATE DRILLED: 09/30/09 NOTES: Chris Vierrether (MDNR) and **VERTICAL DATUM: NAVD 88** START TIME: 1:30PM M. Carlson (Gredell) onsite HORIZONTAL DATUM: NAD 83 END TIME: 4:40PM observing drilling activities. BOREHOLE DIA.: WEATHER: Weather, 70°F, Mostly Sunny, Mild, 5 MPH Wind from SE.

10,25"

## **GREDELL BORING LOG P-144** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Heisel-West-S of LBR, W of farm access Rd **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 464.56' T.O.C. ELEVATION: 467.74' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **EASTING:** 728361.22 **NORTHING:** 992236.95 LITHOLOGY CONSTRUCTION CLAY SM GRAVEL SAMPLE TYPE -G GRAVEL DESCRIPTION VF SAND VC SAND M SAND C SAND FACIES I.D. F SAND SILTY CLAY 18.3-31.0 ft; Very Fine to Fine Sand, CO/ alternating thin beds, very dark gray, (Gley) 1 BS 3/N, and dark gray, 10YR 4/1, black and brown 435 fine wood fragments, wet, soft, (fine sand and 30 clay slough probable in top of 30.0 ft S.S.). 100 $\mathbf{C}$ 31.0-36.5 ft; Coarse Sand, alternating thin beds, with fine and medium sand, trace very fine sand and gravel, dark gray, 10YR 4/1, subrounded clasts, 20 mm wood piece, clay 430 ball. 35 72 **BORING TERMINATED IN COARSE SAND** @36.5 FT 425 40 420 45 415 50 410 55 STRATIFICATION LINES ARE APPROXIMATE LITHOLOGIC BOUNDARIES WATER LEVELS: DRILLING CO.: Max's Enterprises, Inc. DURING DRILLING AFTER DRILLING: FEET DRILLER: Dave Hunziker ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN DATE: LOGGED BY: T. Doll SAMPLES. PIEZOMETER: INSTALLED AT +/- 34.7 FEET DATE DRILLED: 09/30/09 NOTES: Chris Vierrether (MDNR) and **VERTICAL DATUM: NAVD 88** START TIME: 1:30PM M. Carlson (Gredell) onsite END TIME: **HORIZONTAL DATUM: NAD 83** 4:40PM observing drilling activities. BOREHOLE DIA.:

10.25"

WEATHER: Weather, 70°F, Mostly Sunny, Mild, 5 MPH Wind from SE.

#### GREDELL **BORING LOG P-146** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Bean Field-Newman-Central Project Area Proposed Utility Waste Disposal Area G.S. ELEVATION: 464.80' T.O.C. ELEVATION: 467.48' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **EASTING:** 729102.62 **NORTHING:** 992265.54 LITHOLOGY CLAY SM GRAVEL SAMPLE TYPE GRAVEL **JEPTH (FEET) NATER TABL** DESCRIPTION VC SAND VF SAND M SAND C SAND CONSTRUC DIAGRAM SAND SILTY CLAY ő 465 0 0-2.8 ft; Clay, light olive gray, 5Y 6/1, plastic, FB stiff. 80 2.8-4.3 ft; Clayey Silt, light olive gray, 5Y 6/1, slightly plastic, soft, wet at base. FP/ 460 4.3-10.4 ft; Very Fine Sand, grayish orange, 5 Lev 10YR 7/4, silty, faint laminae, common black carbonaceous fragments, clean, saturated. 50 455 10 CO/ 10.4-15.0 ft; Very Fine Sand, Silt and Clay, interlaminated, very dark greenish gray (Gley) BS 1.3/1, gradational contact with below. 450 15 15.0-21.0 ft; Very Fine to Fine Sand, pale FP/ yellowish brown, 10YR 6/2, with some Gley-Lev colored overtones, clean. 445 20 21.0-25.0 ft; Medium to Coarse Sand, pale yellowish brown, 10YR 6/2, gravelly with clasts up to 5 mm dia, common black carbonaceous fragments (fine sand slough in top of S.S.). 440 25 25.0-36.5 ft; Coarse Sand, pale yellowish brown, 10YR 6/2, pebble sized clasts up to 20 STRATIFICATION LINES ARE WATER LEVELS: DURING DRILLING DRILLING CO.: Max's Enterprises, Inc. APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE AFTER DRILLING: DRILLER: Ryan Hunziker GRADUAL OR MAY OCCUR BETWEEN DATE: LOGGED BY: M. Carlson SAMPLES. PIEZOMETER: INSTALLED AT +/- 34.8 FEET DATE DRILLED: 11/09/09 NOTES: **VERTICAL DATUM: NAVD 88** START TIME: 11:13AM **HORIZONTAL DATUM: NAD 83** END TIME: 1:28PM

BOREHOLE DIA.:

8.25"

WEATHER: Warm, 65°F, Overcast, Mild, Calm.

## **GREDELL BORING LOG P-146** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Bean Field-Newman-Central Project Area **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 464.80' T.O.C. ELEVATION: 467.48' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 992265.54 **EASTING:** 729102.62 LITHOLOGY CLAY SM GRAVEL DEPTH (FEET) **DESCRIPTION** VC SAND VF SAND FACIES 1.D. M SAND C SAND F SAND CLAY ŏ mm dia, poorly sorted, common fine sand, (3- $\mathbf{C}$ inch well-rounded, prolate cobbles retrieved from base of auger), (fine sand slough in top of S.S.). 435 30 100 -430 35 **BORING TERMINATED IN SANDY** GRAVEL @36.5 FT 425 40 420 45 - 415 50 -410 55 STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. **WATER LEVELS:** DURING DRILLING 4.5 FEET APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN DRILLER: AFTER DRILLING: Ryan Hunziker LOGGED BY: DATE: M. Carlson SAMPLES. PIEZOMETER: INSTALLED AT +/- 34.8 FEET DATE DRILLED: 11/09/09 NOTES: **VERTICAL DATUM: NAVD 88** START TIME: 11:13AM HORIZONTAL DATUM: NAD 83 END TIME: 1:28PM **BOREHOLE DIA.:** 8.25" WEATHER: Warm, 65°F, Overcast, Mild, Calm.

#### **GREDELL BORING LOG P-148** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Bean Field-Newman-Central Project Area **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 463.86' T.O.C. ELEVATION: 466.84' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 992252.64 **EASTING:** 729630.10 **LITHOLOGY** PERCENT RECOVERY CLAY SAMPLE TYPE GRAPHIC LOG SM GRAVEL G GRAVEL DESCRIPTION SAND. VC SAND M SAND C SAND SAND CLAY 465 0 0-3.5 ft; Clay, olive gray, 5Y 4/1, plastic, stiff. FB 100 460 3.5-4.8 ft; Silty Clay and Clayey Silt, alternating very thin beds grading downward 5 FP/ into more silt and sparse very fine sand with 100 Lev faint laminations, greenish gray grading downward to dark yellowish orange, 10YR 6/6, 4.8-7.0 ft; Very Fine Sand, grayish orange, 455 10YR 7/4, silty, saturated. 10 7.0-15.4 ft; Very Fine to Fine Sand, gravish orange, 10YR 7/4, sparse granules, saturated, sharp contact with below. 450 15 100 15.4-22.5 ft; As above, but with sharp color CO/ change to very dark gray (Gley) 1 3/1, silty BS toward base (some fine sand slough noted in top of S.S.). 445 20 100 22.5-36.5 ft; Gravelly Sand, pale yellowish brown, 10YR 6/2, w/abundant granule to small 440 pebble-sized clasts up to 20 mm dia (fine sand 25 slough in top of S.S.). 72 DRILLING CO.: Max's Enterprises, Inc. STRATIFICATION LINES ARE WATER LEVELS: DURING DRILLING APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE DRILLER: AFTER DRILLING: \_ Ryan Hunziker LOGGED BY: GRADUAL OR MAY OCCUR BETWEEN M. Carlson DATE: SAMPLES. DATE DRILLED: PIEZOMETER: INSTALLED AT +/- 34.7 FEET 11/09/09 START TIME: NOTES: 3:00PM **VERTICAL DATUM: NAVD 88** END TIME: HORIZONTAL DATUM: NAD 83 5:15PM **BOREHOLE DIA.:** WEATHER: Weather, 65°F, Overcast, Mild, Calm. 8.25"

## **GREDELL BORING LOG P-148** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Bean Field-Newman-Central Project Area **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 463.86' T.O.C. ELEVATION: 466.84' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 992252.64 **EASTING:** 729630.10 **LITHOLOGY** PERCENT RECOVERY WELL CONSTRUCTION DIAGRAM CLAY SM GRAVEL G GRAVEL DESCRIPTION ELEVATION VC SAND VF SAND FACIES I.D. M SAND SAND SAND SILTY CLAY 22.5-36.5 ft; Gravelly Sand, pale yellowish & 81 & 81 brown, 10YR 6/2, w/abundant granule to small 435 pebble-sized clasts up to 20 mm dia (fine sand 8000 slough in top of S.S.). 30 رم وه ري مومير مومير 00000 430 35 100 **BORING TERMINATED IN GRAVELLY** SAND @36.5 FT 425 40 420 45 415 50 410 55 STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. **WATER LEVELS:** DURING DRILLING APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE DRILLER: Ryan Hunziker AFTER DRILLING: \_\_\_ GRADUAL OR MAY OCCUR BETWEEN LOGGED BY: M. Carlson SAMPLES. PIEZOMETER: INSTALLED AT +/- 34.7 FEET DATE DRILLED: 11/09/09 START TIME: NOTES: **VERTICAL DATUM: NAVD 88** 3:00PM END TIME: **HORIZONTAL DATUM: NAD 83** 5:15PM BOREHOLE DIA.: WEATHER: Weather, 65°F, Overcast, Mild, Calm. 8.25"

#### **GREDELL BORING LOG P-150** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Newman-Central-S of LBR, W of Davis Rd **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 463.22' T.O.C. ELEVATION: 465.91' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 992189.21 **EASTING:** 730256.27 LITHOLOGY PERCENT RECOVERY CLAY SAMPLE TYPE SM GRAVEI GRAVEL GRAPHIC LOG DEPTH (FEET) WATER TABL **DESCRIPTION** /C SAND ELEVATION VF SAND M SAND SAND C SAND 465 0 FB 0.0-0.7 ft; Clayey Silt, very dark grayish brown, 10YR 3/2, slightly plastic, soft, moist, 60 0.7-5.1 ft; Silty Clay, very dark grayish brown, 460 10YR 3/2, plastic, stiff, moist, faint mottles (10YR 4/6), roots, grading soft to stiff below 5 2.6 ft with mottles (10YR 4/6); becoming dark grayish brown below 5.0 ft, 10YR 4/2, laminated, soft. 5.1-8.3 ft; Sandy Silt and Silty Sand, thin beds, 455 dark gray and dark grayish brown, 10YR 4/1 CO/ and 4/2, laminated, iron staining in channels BS 10 (10YR 4/6) and herringbone laminae below 5.5 8.3-20.8 ft, Clayey Silt, Silty Clay, Sandy Silt 80 and Very Fine to Fine Sand, alternating thin 450 beds, dark gray, (Gley) 1 4/N, wet, soft; silty clay beds, plastic; very fine sand bed at 11.8 ft, dark yellowish brown, 10YR 4/4; fibrous plant 15 detritus at 13.5 ft, 2 mm thick; fine sand bed at 20.0 ft with medium sand. 100 445 20 100 CM 20.8-32.5 ft; Medium Sand, with very fine sand, trace medium to coarse sand and gravel, alternating thin beds, dark gray, 10YR 4/1, 5-440 10 mm subrounded clasts, wet, soft grading to loose. 25 100 STRATIFICATION LINES ARE **WATER LEVELS:** DURING DRILLING \_\_\_\_\_5.1\_\_\_ FEET DRILLING CO.: Max's Enterprises, Inc. APPROXIMATE LITHOLOGIC BOUNDARIES AFTER DRILLING: \_\_\_ DRILLER: ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN Ryan Hunziker LOGGED BY: T. Doll SAMPLES. PIEZOMETER: INSTALLED AT +/- 35.1 DATE DRILLED: 11/14/09 **VERTICAL DATUM: NAVD 88** START TIME: NOTES: 7:20AM **HORIZONTAL DATUM: NAD 83** END TIME: 10:00AM WEATHER: Cool, 45°F, Mostly Cloudy, Calm, Mild. **BOREHOLE DIA.:** 8.25"

# **GREDELL** ENGINEERING RESOURCES, INC.

# **BORING LOG P-150**

Ameren Missouri Labadie Power Plant Proposed Utility Waste Disposal Area **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc.

LOCATION: Newman-Central-S of LBR, W of Davis Rd

G.S. ELEVATION: 463.22' T.O.C. ELEVATION: 465.91'

**NORTHING:** 992189.21 **EASTING:** 730256.27

<u> </u>	: Reitz	<u> </u>	l ens,			NORTHING: 992189	.21		.Ac			HO	LO	- /		
<b>DEPTH (FEET)</b>	ELEVATION WELL	DIAGRAM WATER TABLE	GRAPHIC LOG	SAMPLE TYPE	PERCENT RECOVERY	DESCRIPTION	FACIES I.D.	CLAY	SILTY CLAY	SILT	VF SAND	F SAND		VC SAND	SM GRAVEL	LG GRAVEL
30 -	35				100	20.8-32.5 ft; Medium Sand, with very fine sand, trace medium to coarse sand and gravel, alternating thin beds, dark gray, 10YR 4/1, 5-10 mm subrounded clasts, wet, soft grading to loose.	CM									
35 -	30				100	32.5-36.5 ft; Coarse Sand, trace medium sand and gravel, dark gray, 10YR 4/1, 5-15 mm subrounded clasts, wet, loose.	С									
40 -	25			<u>y</u>	100	BORING TERMINATED IN COARSE SAND @36.5 FT  SHELBY TUBE SAMPLE COLLECTED AT 1.0-3.0 FT DEPTH AT COMPLETION OF DRILLING.										
45 -	20															
50 -	15															
55 -	10															

DRILLER: LOGGED BY: DATE DRILLED: START TIME: END TIME: **BOREHOLE DIA.:** 

Ryan Hunziker

T. Doll

11/14/09

7:20AM

10:00AM

8,25"

APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN SAMPLES. NOTES:

AFTER DRILLING: DATE:

PIEZOMETER: INSTALLED AT +/- 35.1

**VERTICAL DATUM: NAVD 88 HORIZONTAL DATUM: NAD 83** 

WEATHER: Cool, 45°F, Mostly Cloudy, Calm, Mild.

#### GREDELL **BORING LOG P-152** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Newman-SE-S of LBR, W of Davis Rd **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 463.55' T.O.C. ELEVATION: 466.31' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 992168.58 **EASTING:** 730889.93 **LITHOLOGY** PERCENT RECOVERY WELL CONSTRUCTION DIAGRAM CLAY SM GRAVEL WATER TABLE SAMPLE TYPE **SRAPHIC LOG** G GRAVEL DESCRIPTION VC SAND ELEVATION VF SAND ACIES I.D. SAND SAND M SAND SILTY CLAY 465 0 0.0-0.6 ft; Clayey Silt, very dark grayish FB brown, 10YR 3/2, moist, soft, roots. 0.6-3.8 ft; Silty Clay grading to Clayey Silt, 90 alternating thin beds, very dark gravish brown, 460 10YR 3/2, plastic, stiff, moist; dark gray and dark grayish brown, 10YR 4/1 and 4/2 below 5 1.5 ft, mottles (10YR 4/6); silty clay below 1.8 ft, brown, 10YR 4/3; very dark grayish brown, 10YR 3/2, plastic, stiff, faint mottles (10YR 4/ 45 6); wet below 2.9 ft; brown below 3.5 ft, 10YR 4/3, iron concretions and mottles (10YR 4/6). 455 3.8-5.3 ft; Sandy Silt grading to Silty Clay, thin 10 beds, dark grayish brown, 10YR 4/2, mottles 100 (10YR 4/6), wet, soft grading to stiff. 5.3-13.3 ft; Sandy Clayey Silt, Silty Clay and Silty Sand, alternating thin beds, dark gray to brown, 10YR 4/1 to 4/3, wet, soft, laminated 450 FP/ and iron staining to 6.1 ft, iron concretions Lev 15 (10YR 4/6) from 6.1-7.3 ft, trace fine sand 100 from 10.0-11.5 ft. 13.3-23.3 ft; Very Fine Sand, trace fine sand and medium sand, brown, 10YR 4/3, wet, soft, becoming stiff below 20.0 ft, abrupt color 445 change to dark gray (10YR 4/1) at 20.8 ft. 20 100 440 23.3-36.5 ft; Fine Sand to Medium Sand, alternating thin beds, with very fine sand, trace 25 coarse sand and gravel, dark gray, 10YR 4/1, 83 10 mm subrounded clasts, black coalified wood STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. **WATER LEVELS:** DURING DRILLING APPROXIMATE LITHOLOGIC BOUNDARIES AFTER DRILLING: DRILLER: Rvan Hunziker ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN LOGGED BY: DATE: T. Doll PIEZOMETER: INSTALLED AT +/-DATE DRILLED: 11/12/09 NOTES: Chris Vierrether, MDNR, **VERTICAL DATUM: NAVD 88** START TIME: 1:35PM onsite observing drilling **HORIZONTAL DATUM: NAD 83** END TIME: 4:10PM activities. **BOREHOLE DIA.:** WEATHER: Warm, 60°F, Mostly Sunny, 5 MPH Wind from SE. 8.25"

### **GREDELL BORING LOG P-152** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Newman-SE-S of LBR, W of Davis Rd **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 463.55' T.O.C. ELEVATION: 466.31' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **EASTING:** 730889.93 **NORTHING:** 992168.58 LITHOLOGY WELL CONSTRUCTION DIAGRAM CLAY SM GRAVEL G GRAVEL SAMPLE TYPE **JEPTH (FEET)** DESCRIPTION VF SAND VC SAND FACIES I.D. M SAND C SAND F SAND matter below 35.9 ft, wet, soft grading to stiff. 435 CM/ 23.3-36.5 ft: Fine Sand to Medium Sand. alternating thin beds, with very fine sand, trace Sp 30 coarse sand and gravel, dark gray, 10YR 4/1, 100 10 mm subrounded clasts, black coalified wood matter below 35.9 ft, wet, soft grading to stiff. FP/ 430 Lev 35 100 BORING TERMINATED IN FINE SAND @36.5 FT 425 40 420 45 415 50 410 55 STRATIFICATION LINES ARE WATER LEVELS: DURING DRILLING 2.9 FEET DRILLING CO.: Max's Enterprises, Inc. APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE AFTER DRILLING: DRILLER: Ryan Hunziker GRADUAL OR MAY OCCUR BETWEEN DATE: LOGGED BY: T. Doll SAMPLES. PIEZOMETER: INSTALLED AT +/- 34.8 FEET DATE DRILLED: 11/12/09 START TIME: NOTES: Chris Vierrether, MDNR, **VERTICAL DATUM: NAVD 88** 1:35PM onsite observing drilling END TIME: **HORIZONTAL DATUM: NAD 83** 4:10PM activities. WEATHER: Warm, 60°F, Mostly Sunny, 5 MPH Wind from SE. **BOREHOLE DIA.:** 8.25"

#### GREDELL **BORING LOG P-155** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Heisel-West-S of LBR, W of farm access Rd Proposed Utility Waste Disposal Area **G.S. ELEVATION:** 463.44' **T.O.C. ELEVATION:** 466.27' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 991943.98 **EASTING:** 728065.97 PERCENT RECOVERY LITHOLOGY WELL CONSTRUCTION DIAGRAM CLAY SAMPLE TYPE GRAPHIC LOG **БЕРТН (FEET)** SM GRAVEL GRAVEL **DESCRIPTION** /C SAND JF SAND M SAND SAND SAND SILTY CLAY 465 0 0.0-0.5 ft; Clayey Silt, dark brown, 10YR 3/3, FB damp, soft. 0.5-4.0 ft; Silty Clay, very dark grayish brown, 60 10YR 3/2, highly plastic, firm, moist, silt 460 interbed at 1.8 ft <1 inch thick, mottles (10YR \4/6) below 2.7 ft. 5 4.0-6.9 ft; Poor recovery, probable Silty Clay slough. 6.9-9.2 ft; Clayey Silt grading to Silty Clay, 100 dark gray, 10YR 4/1, highly plastic, soft, moist, 455 iron staining, iron staining more prominent below 8.6 ft. 10 9.2-9.8 ft; Silty Sand, dark gray, 10YR 4/1, CO/ wet, soft. BS 9.8-10.3 ft; Silty Clay, dark gray, 10YR 4/1, highly plastic, soft, moist to wet. 450 10.3-12.0 ft; Clayey Sandy Silt and Silty Clay, thin beds, very dark gray, (Gley) 1 3/N, wet, 15 soft; laminated to 11.6 ft; silty clay, highly 33 plastic. 12.0-23.2 ft; Fine Sand, with very fine sand, very dark gray, (Gley) 1 3/N, wet, soft; dark 445 gray below 25.3 ft, 10YR 4/1, (clay slough probable in top of 15.0-25.0 ft S.S.). 20 33 440 23.2-33.3 ft; Medium Sand, with coarse sand, CM/ trace fine sand, dark gray, 10YR 4/1, wet, soft. Sp 25 72 DRILLING CO.: Max's Enterprises, Inc. STRATIFICATION LINES ARE WATER LEVELS: **DURING DRILLING** APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE DRILLER: Doug Hunziker AFTER DRILLING: \_\_\_ GRADUAL OR MAY OCCUR BETWEEN LOGGED BY: T. Doll DATE: DATE DRILLED: PIEZOMETER: INSTALLED AT +/- 34.8 FEET 09/30/09 START TIME: NOTES: Chris Vierrether (MDNR), 5:04PM 9/29 **VERTICAL DATUM: NAVD 88** Jeff Fouse (R&J) and M. END TIME: 9:41AM **HORIZONTAL DATUM: NAD 83** Carlson (Gredell) onsite **BOREHOLE DIA.:** WEATHER: Cool, 50°F, Heavy Fog, Humid, Calm. 8.25" observing drilling activities

# **GREDELL** ENGINEERING RESOURCES, INC.

# **BORING LOG P-155**

Ameren Missouri Labadie Power Plant **Proposed Utility Waste Disposal Area Detailed Site Investigation** CLIENT: Reitz & Jens, Inc.

LOCATION: Heisel-West-S of LBR, W of farm access Rd G.S. ELEVATION: 463.44' T.O.C. ELEVATION: 466.27'

**NORTHING:** 991943.98 **EASTING:** 728065.97

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DEPTH (FEET)	ELEVATION	WELL CONSTRUCTION DIAGRAM	WATER TABLE	GRAPHIC LOG	SAMPLE TYPE	PERCENT RECOVERY	DESCRIPTION	FACIES I.D.	CLAY	SILTY CLAY	SILT	VF SAND	F SAND	MSAND	C SAND	VC SAND	SM GRAVEL	LG GRAVEL
-			<u>.</u>	<u> </u>			23.2-33.3 ft; Medium Sand, with coarse sand,	CM/										
-	<b>- 435</b>						trace fine sand, dark gray, 10YR 4/1, wet, soft.	Sp										
30 -	-																	
-	=					100												
-	=																	
-	<b>43</b> 0		1				33.3-36.5 ft; Fine sand, with medium sand, trace coarse sand and gravel, subrounded clasts,											
35 –	_		150		7	83	trace clay balls, wet, soft.											
-	-		<u> 183</u>	in the F			BORING TERMINATED IN FINE SAND											
]	<b>- 425</b>						@36.5 FT											
40 -	_																	
-	_			!														
]	-																	
-	420 									<u> </u>								
45	_																	:
-	-																	
-	- 415						•											
50	-																	
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	- 410																	
	<b>410</b> 																	
55 –	_			-														
	_									<u> </u>								
DRILLIN	G CO.: Ma	x's Enterpris	ses, In	ıc.			STRATIFICATION LINES ARE APPROXIMATE LITHOLOGIC BOUNDARIES  WATER LE	VELS:		URIN			NG .	9	.2	FEE		

APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE

Jeff Fouse (R&J) and M.

Carlson (Gredell) onsite

observing drilling activities.

GRADUAL OR MAY OCCUR BETWEEN

NOTES: Chris Vierrether (MDNR),

SAMPLES.

DRILLER:

LOGGED BY:

START TIME:

END TIME:

DATE DRILLED:

BOREHOLE DIA.:

Doug Hunziker

T. Doll

09/30/09

5:04PM 9/29

9:41AM

8.25"

DATE:

**VERTICAL DATUM: NAVD 88** 

WEATHER: Cool, 50°F, Heavy Fog, Humid, Calm.

**HORIZONTAL DATUM: NAD 83** 

PIEZOMETER: INSTALLED AT +/- 34.8 FEET

AFTER DRILLING: \_\_\_\_\_ FEET

#### GREDELL **BORING LOG P-156** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Newman-W Central-Adj to farm access Rd **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 464.89' T.O.C. ELEVATION: 467.70' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 991964.30 **EASTING:** 728791.30 **LITHOLOGY** CLAY SM GRAVEL G GRAVEL DEPTH (FEET) WATER TABL **DESCRIPTION** /C SAND VF SAND ACIES I.D. M SAND SAND F SAND SILTY CLA≺ 465 0 FΒ 0.0-1.0 ft; Clayey Silt, very dark grayish brown, 10YR 3/2, slightly plastic, soft, moist, roots. 70 1.0-2.3 ft; Silty Clay, very dark grayish brown, 10YR 3/2, plastic, stiff, moist, faint mottles (10YR 4/6). 460 2.3-5.6 ft; Clayey Silt, dark grayish brown, FP/ 10YR 4/2, moist, soft, mottles (10YR 4/6) to Lev 3.5 ft; wet, loose and with clay below 5.0 ft. 50 5.6-13.3 ft; Silty Sand, dark grayish brown, 10YR 4/2, laminated, wet, soft. - 455 10 33 CO/ 13.3-20.8 ft; Sandy Silt, dark gray, (Gley) 1 4/ N, laminated, wet, soft; becoming dark gray BS 450 15 and dark grayish brown, 10YR 4/1 and 4/2 72 below 20.7 ft. (sand and clay slough probable in top of 15.0 and 20.0 ft S.S.). 445 20 78 20.8-25.9 ft; Very Fine to Fine Sand, thin beds, FP/ dark gray and dark grayish brown, 10YR 4/1 Lev and 4/2, wet, alternating loose to soft consistency, (fine sand and clay slough probable in top of 25.0 ft S.S.). 440 25 25.9-36.5 ft; Coarse Sand grading to Gravelly CM/ STRATIFICATION LINES ARE **WATER LEVELS:** DURING DRILLING DRILLING CO .: Max's Enterprises, Inc. APPROXIMATE LITHOLOGIC BOUNDARIES AFTER DRILLING: \_\_ DRILLER: Dave Hunziker ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN DATE: LOGGED BY: T. Doll SAMPLES. PIEZOMETER: INSTALLED AT +/- 34.8 FEET DATE DRILLED: 11/09/09 **VERTICAL DATUM: NAVD 88** NOTES: START TIME: 11:30AM **HORIZONTAL DATUM: NAD 83** END TIME: 3:17PM WEATHER: Warm, 65°F, Overcast, Mild, Calm. **BOREHOLE DIA.:** 8.25"

# GREDELL ENGINEERING RESOURCES, INC.

# **BORING LOG P-156**

Ameren Missouri Labadie Power Plant **Proposed Utility Waste Disposal Area Detailed Site Investigation** CLIENT: Daitz & Jane Inc

LOCATION: Newman-W Central-Adj to farm access Rd

G.S. ELEVATION: 464.89' T.O.C. ELEVATION: 467.70'

NODTHING: 001064.20 EASTING: 729701 20

CLIENT: Reitz & Jens, Inc.							NORTHING: 99196	4.30	EASTING: 728791.30											
						ERY			L.,			LIT	НО	LO	GΥ			_		
DEPTH (FEET)	ELEVATION	WELL CONSTRUCTION DIAGRAM	WATER TABLE	GRAPHIC LOG	SAMPLE TYPE	PERCENT RECOVERY	DESCRIPTION	FACIES I.D.	CLAY	SILTY CLAY	SILT	VF SAND	F SAND	M SAND	C SAND	VC SAND	SM GRAVEL	LG GRAVEL		
30 -	- 435			-\-			Sand, with medium sand, trace gravel and fine sand, dark gray, 10YR 4/1, 5-40 mm subangular and subrounded clasts, wet, loose, (fine sand and clay slough probable in top of	Sp												
- - -	-			800		100	30.0 and 35.0 ft S.S.).	С												
35 -	430			6 6 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8		56														
-	. <del>-</del> 						BORING TERMINATED IN GRAVELLY SAND @36.5 FT	•												
40 -	- 425 -																			
45 –	- - <b>42</b> 0									,										
-	- - -																			
50 -	415					į														
-	  -  -																			
55 -	410									***************************************										

DRILLING CO.: Max's Enterprises, Inc. DRILLER: Dave Hunziker LOGGED BY: T. Doll DATE DRILLED: 11/09/09 START TIME: 11:30AM END TIME: 3:17PM

8.25"

BOREHOLE DIA.:

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

**VERTICAL DATUM: NAVD 88 HORIZONTAL DATUM: NAD 83** 

WEATHER: Warm, 65°F, Overcast, Mild, Calm.

DATE:

AFTER DRILLING: \_\_\_\_\_ FEET

#### GREDELL **BORING LOG P-158** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Newman-SW-E of farm access Rd, S of LBR **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 464.72' T.O.C. ELEVATION: 467.63' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **EASTING:** 729368.05 **NORTHING:** 991945.43 **LITHOLOGY** WELL CONSTRUCTION DIAGRAM CLAY SM GRAVEL DEPTH (FEET) **WATER TABL** DESCRIPTION VC SAND VF SAND FACIES I.D. C SAND SAND M SAND SILTY CLAY 465 0 0.0-0.8 ft; Clavey Silt, very dark grayish FB brown, 10YR 3/2, moist, soft, roots. 0.8-2.4 ft; Silty Clay, very dark grayish brown, 10YR 3/2, plastic, stiff, moist, roots, becoming soft with mottles (10YR 4/6) below 2.0 ft. FP/ 2.4-3.8 ft; Clayey Silt, dark gray and dark 460 5 Lev grayish brown, 10YR 4/1 and 4/2, moist, soft, mottles (10YR 4/6). 3.8-10.5 ft; Silty Sand, brown, 10YR 4/3, 35 laminated, iron staining in layers (10YR 4/6), muscovite mica flakes, wet, soft. 455 10 10.5-12.3 ft; Sandy Silt and Silty Sand, thin beds, wet, soft; dark gray, 10YR 4/1, to 11.1 ft, black coalified wood matter and plant detritus; black, (Glev) 1 2.5/N from 11.1-11.2 ft; dark grayish brown below 11.2 ft, 10YR 4/2, 450 laminated, iron staining in layers (10YR 4/6); 15 CO/ dark yellowish brown, 10YR 4/4, below 12.0 ft. BS 12.3-15.0 ft; Fine Sand, with very fine sand, trace coarse sand, dark grayish brown, 10YR 4/ 2, laminated, wet; dark gray below 12.8 ft, 10YR 4/1, trace brown wood fragments. 445 15.0-23.3 ft; Fine Sand, with very fine sand, 20 trace coarse sand and gravel, dark gray, (Gley) 1 2.5/N, wet, 20 mm x 40 mm wood fragments (sticks). 23.3-33.3 ft; Very Fine Sand, trace fine sand, dark gray, (Gley) 1 4/N, muscovite mica flakes, 440 25 wet, soft. 50 STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. WATER LEVELS: DURING DRILLING APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE AFTER DRILLING: DRILLER: Ryan Hunziker GRADUAL OR MAY OCCUR BETWEEN DATE: LOGGED BY: T. Doll SAMPLES. PIEZOMETER: INSTALLED AT +/-DATE DRILLED: 11/13/09 START TIME: NOTES: **VERTICAL DATUM: NAVD 88** 12:30PM **HORIZONTAL DATUM: NAD 83** END TIME: 2:50PM BOREHOLE DIA .: WEATHER: Warm, 60°F, Mostly Sunny, Mild, 5 MPH Wind from S. 8.25"

### **GREDELL BORING LOG P-158** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Newman-SW-E of farm access Rd, S of LBR **Proposed Utility Waste Disposal Area G.S. ELEVATION:** 464.72' **T.O.C. ELEVATION:** 467.63' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 991945.43 **EASTING:** 729368.05 **LITHOLOGY** WELL CONSTRUCTION DIAGRAM CLAY SAMPLE TYPE SM GRAVEL WATER TABL DESCRIPTION VF SAND VC SAND FACIES 1.D. CSAND F SAND M SAND ő 23.3-33.3 ft; Very Fine Sand, trace fine sand, CO/ dark gray, (Gley) 1 4/N, muscovite mica flakes, BS wet, soft. 435 30 83 33.3-36.5 ft; FROM BIT: Coarse Sand, with CM/ fine sand, trace medium sand and gravel, very Sp 430 35 dark gray, (Gley) 1 3/N, 5-40 mm subrounded clasts, 40 mm wood fragment, wet. BORING TERMINATED IN COARSE SAND @36.5 FT 425 40 - 420 45 415 50 410 55 STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. WATER LEVELS: DURING DRILLING \_\_\_\_5 FEET APPROXIMATE LITHOLOGIC BOUNDARIES DRILLER: AFTER DRILLING: \_ Ryan Hunziker ONLY: ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN LOGGED BY: T. Doll DATE: SAMPLES. DATE DRILLED: 11/13/09 PIEZOMETER: INSTALLED AT +/- 34.9 FEET START TIME: 12:30PM NOTES: **VERTICAL DATUM: NAVD 88** END TIME: 2:50PM **HORIZONTAL DATUM: NAD 83** BOREHOLE DIA.: 8.25" WEATHER: Warm, 60°F, Mostly Sunny, Mild, 5 MPH Wind from S.

#### **GREDELL BORING LOG P-160** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Newman-SE-W of Davis Rd, S of LBR **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 463.70' T.O.C. ELEVATION: 466.42' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **EASTING:** 729979.25 **NORTHING:** 991884.45 LITHOLOGY WELL CONSTRUCTION DIAGRAM CLAY **WATER TABLE** SAMPLE TYPE G GRAVEL SM GRAVEI **JEPTH (FEET)** GRAPHIC LOG DESCRIPTION VC SAND VF SAND M SAND FACIES I.D. F SAND SAND SILTY CLAY 465 0 0.0-0.5 ft; Clavey Silt, dark brown, 10YR 3/3, FB \non-plastic, moist, soft, roots. 0.5-2.4 ft; Silty Clay, very dark grayish brown, 10YR 3/2, plastic, stiff, few faint mottles 460 (10YR 4/6), moist, roots. 2.4-3.5 ft; Clayey Silt, brown, 10YR 4/3, non-5 plastic, moist, soft, many mottles (10YR 4/6). 3.5-6.1 ft; Silty Clay, very dark grayish brown FP/ 10YR 3/2, plastic, stiff, moist, few mottles Lev 30 (10YR 4/6). 455 6.1-13.3 ft; Very Fine Sand, brown, 10YR 4/3, laminated, trace brown wood fragments, wet, 10 loose, trace fine sand below 10.0 ft with 5 mm 100 black coalified wood matter. 450 13.3-26.4 ft; Very Fine to Medium Sand, alternating thin beds, with coarse sand, trace 15 gravel, dark gray to brown, 10YR 4/1 to 4/3, 5-10 mm subangular clasts, wet, loose. 445 20 100 CM/ 440 Sp 25 100 STRATIFICATION LINES ARE DURING DRILLING \_ DRILLING CO.: Max's Enterprises, Inc. WATER LEVELS: APPROXIMATE LITHOLOGIC BOUNDARIES AFTER DRILLING: DRILLER: Doug Hunziker ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN DATE: LOGGED BY: T. Doll SAMPLES. PIEZOMETER: INSTALLED AT +/- 35.0 FEET DATE DRILLED: 12/11/09 START TIME: NOTES: **VERTICAL DATUM: NAVD 88** 2:55PM 12/10 **HORIZONTAL DATUM: NAD 83** END TIME: 9:48AM WEATHER: Cold, 15°F, Partly Cloudy, Calm. **BOREHOLE DIA.:** 8.25"

## **GREDELL** ENGINEERING RESOURCES, INC.

# **BORING LOG P-160**

Ameren Missouri Labadie Power Plant **Proposed Utility Waste Disposal Area Detailed Site Investigation** CLIENT: Reitz & Jens, Inc.

LOCATION: Newman-SE-W of Davis Rd, S of LBR

G.S. ELEVATION: 463.70' T.O.C. ELEVATION: 466.42'

**NORTHING:** 991884.45 **EASTING:** 729979.25

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ОЕРТН (FEET)	ELEVATION	WELL CONSTRUCTION DIAGRAM WATER TABLE	GRAPHIC LOG	SAMPLE TYPE	PERCENT RECOVERY	DESCRIPTION	FACIES I.D.	CLAY	SILTY CLAY	SILT	VF SAND	F SAND	M SAND	C SAND	VC SAND	SM GRAVEL	LG GRAVEL
30	- 435  -		N.	7	0	26.4-36.5 ft; Medium Sand, with fine to coarse sand, trace very fine sand and gravel, alternating thin beds, dark gray, 10YR 4/1, 5-15 mm subrounded and subangular clasts, soft grading to loose, wet, black organic residue below 36.2 ft.	CM/ Sp										
35 –	430 				100		C										-
40 -	- 425 					BORING TERMINATED IN MEDIUM SAND @36.5 FT											
45	<b>420</b>																
50 -	- - 415 -																
55 -	- - 410 - -																
	G CO + Mar	's Enternrises	T	Ц		STRATIFICATION LINES ARE WATER LE	VELS:	L	IDIN	C DE	311 I I	NG		5	FF		$\dashv$

END TIME:

BOREHOLE DIA.:

DRILLING CO.: Max's Enterprises, Inc. DRILLER: Doug Hunziker LOGGED BY: T. Doll DATE DRILLED: 12/11/09 **START TIME**: 2;55PM 12/10

9:48AM

8.25"

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

NOTES:

WATER LEVELS: DURING DRILLING \_\_\_\_5\_\_ FEET AFTER DRILLING: \_\_\_\_\_ FEET

DATE:

PIEZOMETER: INSTALLED AT +/- 35.0 FEET

**VERTICAL DATUM: NAVD 88 HORIZONTAL DATUM: NAD 83** WEATHER: Cold, 15°F, Partly Cloudy, Calm.

#### GREDELL **BORING LOG P-162** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Newman-SE-W of Davis Rd, S of LBR **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 463.28' T.O.C. ELEVATION: 465.98' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **EASTING:** 730561.78 **NORTHING:** 991801.20 LITHOLOGY PERCENT RECOVERY CONSTRUCTION CLAY SAMPLE TYPE SM GRAVEL WATER TABLE G GRAVEL **SRAPHIC LOG** DEPTH (FEET) DESCRIPTION ELEVATION VF SAND VC SAND ACIES I.D. M SAND C SAND SAND SILTY CLAY 465 0 0.0-0.5 ft; Clavey Silt, very dark gravish FB brown, 10YR 3/2, slightly plastic, soft, moist, roots. 55 0.5-7.1 ft; Silty Clay, very dark grayish brown, 460 10YR 3/2, plastic, stiff, moist, many mottles (10YR 4/6) below 2.3 ft, with silt and iron 5 concretions below 5.0 ft. 6.1-9.3 ft; Clayey Silt, Silty Sand, and Silty Clay, alternating thin beds, wet, soft; clayey CO/ silt, dark grayish brown, 10YR 4/2, slightly 455 BS plastic, iron concretions (10YR 4/6); silty sand, FP/ dark brown, 10YR 3/3, iron staining; dark 10 yellowish brown (10YR 4/3) from 7.1-7.2 ft; Lev dark gray, (Gley) 1 4/N below 7.2 ft, plastic; mottles (10YR 4/6) from 7.2-7.5 ft. 80 9.3-23.3 ft; Fine Sand, with very fine sand, 450 brown, 10YR 4/3, wet, loose; silty clay thin bed from 13.4-13.5 ft, very dark gray, (Gley) 1 3/N, 15 plastic, (clay slough probable in top of 15.0 ft 94 S.S.). 445 20 100 440 23.3-33.2 ft; Very Fine to Medium Sand, alternating thin beds, with coarse sand, trace 25 fine gravel, brown, 10YR 4/3; black coalified 100 matter laminated at 26.4 ft; 10 mm angular STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. **WATER LEVELS:** DURING DRILLING 6.1 APPROXIMATE LITHOLOGIC BOUNDARIES AFTER DRILLING: FEET DRILLER: Doug Hunziker ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN DATE: LOGGED BY: T. Doll SAMPLES. PIEZOMETER: INSTALLED AT +/- 34.6 DATE DRILLED: 12/10/09 NOTES: **VERTICAL DATUM: NAVD 88** START TIME: 8:25AM **HORIZONTAL DATUM: NAD 83** END TIME: 2-18PM

**BOREHOLE DIA.:** 

10.25"

WEATHER: Cold, 10°F, Clear Skies, 5 MPH Wind from W.

### GREDELL **BORING LOG P-162** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Newman-SE-W of Davis Rd, S of LBR **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 463.28' T.O.C. ELEVATION: 465.98' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **EASTING:** 730561.78 **NORTHING:** 991801.20 LITHOLOGY WELL CONSTRUCTION DIAGRAM CLAY ЭЕРТН (FEET) SAMPLE TYPE SM GRAVEI -G GRAVEL **DESCRIPTION** VC SAND VF SAND M SAND FACIES I.D. F SAND C SAND clasts below 25.0 ft. FP/ 23.3-33.2 ft; Very Fine to Medium Sand, Lev 435 alternating thin beds, with coarse sand, trace fine gravel, brown, 10YR 4/3; black coalified 30 matter laminated at 26.4 ft; 10 mm angular 83 clasts below 25.0 ft. 430 $\mathbf{C}$ 33.2-36.5 ft; Medium Sand, with coarse sand and gravel, dark gray 10YR 4/1, 5-30 mm 35 subrounded and subangular clasts, wet. 100 **BORING TERMINATED IN MEDIUM** SAND @36.5 FT 425 40 420 45 415 50 410 55 STRATIFICATION LINES ARE WATER LEVELS: DRILLING CO.: Max's Enterprises, Inc. DURING DRILLING 6.1 FEET APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE AFTER DRILLING: DRILLER: Doug Hunziker GRADUAL OR MAY OCCUR BETWEEN SAMPLES. DATE: LOGGED BY: T. Doll PIEZOMETER: INSTALLED AT +/- 34.6 FEET DATE DRILLED: 12/10/09 START TIME: NOTES: **VERTICAL DATUM: NAVD 88** 8:25AM HORIZONTAL DATUM: NAD 83 END TIME: 2:18PM WEATHER: Cold, 10°F, Clear Skies, 5 MPH Wind from W. **BOREHOLE DIA.:** 10.25"

#### **GREDELL BORING LOG P-164** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant **LOCATION:** Newman-SE-W of Davis Rd, S of LBR **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 463.42' T.O.C. ELEVATION: 465.83' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 991871.12 **EASTING:** 731169.33 **LITHOLOGY** RECOVERY CLAY SAMPLE TYPE SM GRAVEL G GRAVEL WATER TABL **DESCRIPTION** VC SAND FACIES 1.D. VF SAND CONSTRUC SAND SAND M SAND PERCENT SILTY CLAY 465 0 0.0-0.5 ft; Clayey Silt, very dark grayish FB brown, 10YR 3/2, slightly plastic, soft, moist, roots. 100 0.5-2.3 ft; Silty Clay, very dark grayish brown, 460 10YR 3/2, plastic, stiff, moist, few faint mottles (10YR 4/6). 5 2.3-3.2 ft; Clayey Silt and Silty Sand, thin beds, FP/ brown, 10YR 4/3, moist, soft; silty clay bed Lev below 2.9 ft, plastic, wet. 40 3.2-5.2 ft; Clayey Silt, brown, 10YR 4/3, 455 slightly plastic, moist, soft, laminated and many mottles (10YR 4/6) below 3.5 ft. 10 5.2-13.3 ft; Fine Sand, with very fine sand. 72 dark grayish brown, 10YR 4/2, laminated, iron staining (10YR 4/6), 10 mm thin bed of silty clay at 6.1 ft with prominent iron staining, wet, 450 (fine sand slough in top of 15.0 ft S.S.). CO/ 13.3-28.3 ft; Silty Sand, dark gray, (Gley) 1 4/ BS 15 N, laminations of brown wood and black 89 coalified wood matter repeating sequence every 10-22 mm; black (Gley 1 2.5/N) fibrous plant detritus with muscovite mica flakes from 20.5-20.8 ft and 25.6-25.9 ft; very dark gray from 445 20.8-21.3 and 25.9-26.4 ft, (Gley 1 3/N), laminated, (very fine sand slough probable in 20 89 top of 20.0 ft S.S.). 440 25 94 STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. WATER LEVELS: DURING DRILLING APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE DRILLER: AFTER DRILLING: Ryan Hunziker GRADUAL OR MAY OCCUR BETWEEN LOGGED BY: DATE: T. Doll SAMPLES. DATE DRILLED: PIEZOMETER: INSTALLED AT +/-34.8 FEET 12/04/09 **VERTICAL DATUM: NAVD 88** START TIME: 1:32PM NOTES: END TIME: **HORIZONTAL DATUM: NAD 83** 4:18PM BOREHOLE DIA.: WEATHER: Cold, 30°F, Mostly Sunny, 10 MPH Wind from W. 10,25"

## **GREDELL BORING LOG P-164** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant **LOCATION:** Newman-SE-W of Davis Rd, S of LBR **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 463.42' T.O.C. ELEVATION: 465.83' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 991871.12 **EASTING:** 731169.33 LITHOLOGY CONSTRUCTION CLAY SM GRAVEL G GRAVEL **DESCRIPTION** VC SAND FACIES I.D. VF SAND M SAND F SAND SAND SILTY 435 CO/ 28.3-36.5 ft; Medium to Gravelly Sand, alternating thin beds, dark gray (Gley) 1 4/N BS 30 and 10YR 4/1, 5-30 mm rounded and well-39 rounded clasts consisting of basalt, quartz and feldspar, wet, loose, (fine sand slough in top of 35.0 ft S.S.). 430 35 67 BORING TERMINATED IN GRAVELLY SAND @36.5 FT 425 40 420 45 415 50 - 410 55 STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. **WATER LEVELS:** DURING DRILLING 5.2 FEET APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE DRILLER: AFTER DRILLING: \_\_ Ryan Hunziker GRADUAL OR MAY OCCUR BETWEEN LOGGED BY: T. Doll SAMPLES. DATE DRILLED: PIEZOMETER: INSTALLED AT +/- 34.8 FEET 12/04/09 **VERTICAL DATUM: NAVD 88** START TIME: **NOTES:** 1:32PM **HORIZONTAL DATUM: NAD 83** END TIME: 4:18PM **BOREHOLE DIA.:** WEATHER: Cold, 30°F, Mostly Sunny, 10 MPH Wind from W. 10.25"

#### GREDELL **BORING LOG P-165** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Heisel-SW- Adj to Power Lines, S of LBR **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 464,05' T.O.C. ELEVATION: 466.80' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 991660.67 **EASTING:** 727734.64 **LITHOLOGY** RECOVERY WELL CONSTRUCTION DIAGRAM CLAY SM GRAVEL G GRAVE DESCRIPTION VF SAND VC SAND C SAND SAND M SAND CLAY 465 0 0.0-0.5 ft; Clayey Silt, very dark gray, 10YR 3/ FB \1, slightly plastic, soft, moist. 0.5-1.8 ft; Silty Clay, very dark gray, 10YR 3/ 40 \1, plastic, stiff, moist, roots. 1.8-5.4 ft; Clayey Silt, dark gray and dark 460 grayish brown, 10YR 4/1 and 4/2, moist, soft, 5 mottles (10YR 4/6). 5.4-8.4 ft; Sandy Silt, brown, 10YR 4/3, herringbone laminae, muscovite mica flakes, 35 moist, soft, wet below 5.8 ft. 8.4-20.8 ft; Very Fine Sand, with fine sand, FP/ 455 alternating color changes, brown and dark gray, Lev 10 10YR 4/3 and 4/1; very dark gray (Gley) 1 3/N, 20-30 mm brown wood fragments below 15.4 ft, wet, soft. CO/ BS 450 15 67 445 20 20.8-25.9 ft; Fine to Medium Sand, alternating FP/ thin beds, dark gray, 10YR 4/1, 15 mm Lev subangular clasts, wet, alternating loose and soft consistency. 440 25 25.9-28.3 ft; Coarse Sand, trace medium sand $\mathbf{C}$ STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. WATER LEVELS: DURING DRILLING APPROXIMATE LITHOLOGIC BOUNDARIES DRILLER: AFTER DRILLING: \_ Ryan Hunziker ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN DATE: LOGGED BY: T. Doll SAMPLES. PIEZOMETER: INSTALLED AT +/- 34.9 DATE DRILLED: 11/13/09 **NOTES: VERTICAL DATUM: NAVD 88** START TIME: 7:48AM HORIZONTAL DATUM: NAD 83 END TIME: 11:00AM **BOREHOLE DIA.:** WEATHER: Cold, 40°F, Mostly Cloudy, Mild, Calm. 10.25"

### **GREDELL BORING LOG P-165** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant **LOCATION:** Heisel-SW- Adj to Power Lines, S of LBR **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 464.05' T.O.C. ELEVATION: 466.80' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING: 991660.67 EASTING:** 727734.64 **LITHOLOGY** CONSTRUCTION DIAGRAM CLAY SM GRAVEL DEPTH (FEET) G GRAVEL **DESCRIPTION** VF SAND VC SAND -ACIES I.D. C SAND SAND M SAND SILTY CLAY and gravel, 10 mm clasts, dark gray, 10YR 4/1, 80 C 28.3-36.5 ft; Gravelly Sand, with medium sand, 435 8888 3 5-40 mm subrounded clasts, dark gray and 30 gray, 10YR 4/1 and 5/1, wet. 990 100 0000 œ 430 000 35 **BORING TERMINATED IN GRAVELLY** SAND @36.5 FT 425 40 420 45 415 50 410 55 STRATIFICATION LINES ARE APPROXIMATE LITHOLOGIC BOUNDARIES DRILLING CO.: Max's Enterprises, Inc. WATER LEVELS: DURING DRILLING 5.8 FEET DRILLER: AFTER DRILLING: Ryan Hunziker ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN LOGGED BY: DATE: T. Doll SAMPLES. PIEZOMETER: INSTALLED AT +/- 34.9 FEET DATE DRILLED: 11/13/09 NOTES: START TIME: 7:48AM **VERTICAL DATUM: NAVD 88** END TIME: 11:00AM **HORIZONTAL DATUM: NAD 83 BOREHOLE DIA.:** 10.25" WEATHER: Cold, 40°F, Mostly Cloudy, Mild, Calm.

#### **GREDELL BORING LOG P-167** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Heisel-South-S of LBR, W farm access Rd Proposed Utility Waste Disposal Area **G.S. ELEVATION:** 463.60' **T.O.C. ELEVATION:** 466.56' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 991646.82 **EASTING:** 728350.01 LITHOLOGY PERCENT RECOVERY WELL CONSTRUCTION DIAGRAM CLAY SAMPLE TYPE SM GRAVEL GRAPHIC LOG G GRAVEL WATER TABL DESCRIPTION SAND VC SAND FACIES I.D. C SAND SAND M SAND SILTY 465 0 0.0-1.0 ft; Clayey Silt, dark brown, 10YR 3/3, FB \damp, firm. 1.0-4.2 ft; Silty Clay, very dark grayish brown, 65 10YR 3/2, plastic, stiff, moist; mottles (10YR 460 4/6) below 2.0 ft; dark yellowish brown, 10YR 3/4, below 3.0 ft. 5 4.2-8.5 ft; Poor recovery, probable Silty Clay slough. 40 455 8.5-11.9 ft; Clayey Silt, dark gray, 10YR 4/1, wet, soft. 10 11.9-12.7 ft; Silty Sand, dark gray, 10YR 4/1, black plant detritus laminated, wet, soft. 450 FP/ 12.7-13.3 ft; Silty Clay, dark gray, 10YR 4/1, Lev plastic, soft, wet. 15 13.3-18.3 ft; Silty Sand, dark gray, 10YR 4/1, wet, soft, (clay slough probable in top of 15.0 and 20.0 ft S.S.). 445 20 83 20.7-28.3 ft; Medium Sand, trace fine sand and coarse sand, dark gray, 10YR 4/1, wet, loose, coalified wood matter, (fine sand and clay slough probable in top of 25.0 and 30.0 ft S.S.). 440 25 78 STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. **WATER LEVELS:** DURING DRILLING \_\_\_ APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE DRILLER: AFTER DRILLING: \_ Ryan Hunziker GRADUAL OR MAY OCCUR BETWEEN LOGGED BY: DATE: T. Doll SAMPLES. PIEZOMETER: INSTALLED AT +/- 35,0 FEET DATE DRILLED: 10/05/09 START TIME: NOTES: John Eimer (Ameren) onsite 10:23AM 10/5 **VERTICAL DATUM: NAVD 88** observing field activities, END TIME: 6:43PM **HORIZONTAL DATUM: NAD 83 BOREHOLE DIA.:** WEATHER: Warm, 65°F, Clear Skies, Mild, 5-10 MPH Wind from SE. 8.25"

### **GREDELL BORING LOG P-167** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Heisel-South-S of LBR, W farm access Rd **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 463.60' T.O.C. ELEVATION: 466.56' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 991646.82 **EASTING:** 728350.01 LITHOLOGY PERCENT RECOVERY WELL CONSTRUCTION DIAGRAM CF A√ SM GRAVEI DEPTH (FEET) G GRAVEL DESCRIPTION VF SAND VC SAND FACIES I.D. SAND M SAND C SAND SAMPLE SILTY CLAY 435 CM/ 28.3-36.5 ft; Medium Sand grading to Coarse Sand, trace fine sand and gravel, dark gray, Sp 30 10YR 4/1, clasts subangular to angular, wet, loose, (fine sand and clay slough probable in top of 35.0 ft S.S.). 430 35 C 83 **BORING TERMINATED IN COARSE SAND** @36.5 FT 425 40 420 45 415 50 410 55 STRATIFICATION LINES ARE WATER LEVELS: DRILLING CO.: Max's Enterprises, Inc. DURING DRILLING \_\_\_\_8 FEET APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE FEET AFTER DRILLING: \_ DRILLER: Ryan Hunziker GRADUAL OR MAY OCCUR BETWEEN DATE: LOGGED BY: T. Doll SAMPLES. PIEZOMETER: INSTALLED AT +/- 35.0 FEET DATE DRILLED: 10/05/09 START TIME: NOTES: John Eimer (Ameren) onsite **VERTICAL DATUM: NAVD 88** 10:23AM 10/5 observing field activities. **HORIZONTAL DATUM: NAD 83** END TIME: 6:43PM

BOREHOLE DIA.:

8.25"

WEATHER: Warm, 65°F, Clear Skies, Mild, 5-10 MPH Wind from SE.

#### GREDELL **BORING LOG P-169** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Newman-SE-S of LBR, E of farm access Rd **Proposed Utility Waste Disposal Area G.S. ELEVATION:** 464.75' **T.O.C. ELEVATION:** 467.42' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 991653.97 **EASTING:** 729053.82 LITHOLOGY PERCENT RECOVERY CLAY SAMPLE TYPE SM GRAVEL G GRAVEL **NATER TABL** DESCRIPTION VC SAND ELEVATION VF SAND CONSTRUC DIAGRAM M SAND SAND SAND CLAY 465 0 0.0-0.8 ft; Silty Clay, very dark grayish brown, FB \10YR 3/2, slightly plastic, soft, moist, roots. 0.8-4.0 ft; Silty Clay, very dark grayish brown, 10YR 3/2, plastic, stiff, moist, few faint mottles (10YR 4/6), becoming stiff and many mottles \below 2.1 ft. 460 4.0-10.5 ft; Clayey Silty Sand, brown, 10YR 4/ 3, laminated, wet, soft; with clay and mottles (10YR 4/6) from 5.3-5.6 ft; herringbone laminae from 5.6-6.3 ft; muscovite mica flakes below 5.6 ft. 455 10 10.5-13.3 ft; Sandy Silt, dark gray, (Gley) 1 4/ CO/ N, laminated, muscovite mica flakes, fibrous BS plant detritus to 11.0 ft, wet, soft. 13.3-20.9 ft; Fine Sand, with very fine sand, FP/ dark gray, 10YR 4/1, wet, soft. Lev 450 15 100 20 100 20.9-23.3 ft; Fine Sand grading to Coarse Sand, with medium sand and very fine sand, trace gravel, thin beds, dark gray, 10YR 4/1, 20 mm subangular clast, wet. 23.3-33.3 ft; Fine Sand, with very fine sand and 440 25 medium sand, dark gray, (Gley) 1 4/N and 10YR 4/1, 5-10 mm pieces of coalified wood STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. WATER LEVELS: **DURING DRILLING** APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE DRILLER: AFTER DRILLING: \_\_ Ryan Hunziker GRADUAL OR MAY OCCUR BETWEEN LOGGED BY: T. Doll SAMPLES. DATE DRILLED: 12/02/09 PIEZOMETER: INSTALLED AT +/- 35.0 FEET **VERTICAL DATUM: NAVD 88** START TIME: NOTES: 7:45AM **HORIZONTAL DATUM: NAD 83** END TIME: 11:44AM WEATHER: Cold, 35°F, Overcast, Calm. **BOREHOLE DIA.:** 10.25"

# GREDELL ENGINEERING RESOURCES, INC.

# **BORING LOG P-169**

Ameren Missouri Labadie Power Plant LOCATION: Newman-SE-S of LBR, E of farm access Rd **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 464.75' T.O.C. ELEVATION: 467.42' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 991653.97 **EASTING:** 729053.82 LITHOLOGY WELL CONSTRUCTION DIAGRAM CLAY SM GRAVEL SAMPLE TYPE G GRAVEL **DESCRIPTION** VC SAND VF SAND FACIES 1.D. M SAND C SAND SAND matter below 30.3 ft with 5 mm bed of FP/ coalified wood matter at 30. 6 ft. Lev 23.3-33.3 ft; Fine Sand, with very fine sand and 435 medium sand, dark gray, (Gley) 1 4/N and 30 10YR 4/1, 5-10 mm pieces of coalified wood 67 matter below 30.3 ft with 5 mm bed of coalified wood matter at 30, 6 ft. 33.3-36.5 ft; Fine Sand, with very fine sand, trace coarse sand and gravel, 22 mm 430 35 subangular clast, wet, soft. BORING TERMINATED IN FINE SAND @36.5 FT 425 40 420 45 415 50 - 410 55 STRATIFICATION LINES ARE APPROXIMATE LITHOLOGIC BOUNDARIES WATER LEVELS: DURING DRILLING DRILLING CO.: Max's Enterprises, Inc. AFTER DRILLING: ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN DRILLER: Ryan Hunziker DATE: LOGGED BY: T. Doll SAMPLES. PIEZOMETER: INSTALLED AT +/- 35.0 FEET DATE DRILLED: 12/02/09 START TIME: NOTES: **VERTICAL DATUM: NAVD 88** 7:45AM END TIME: **HORIZONTAL DATUM: NAD 83** 11:44AM

BOREHOLE DIA.:

10.25"

WEATHER: Cold, 35°F, Overcast, Calm.

### **GREDELL BORING LOG P-171** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Newman-South Central-E of farm access Rd Proposed Utility Waste Disposal Area **G.S. ELEVATION:** 463.97' **T.O.C. ELEVATION:** 466.87' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING: 991629.80 EASTING:** 729636.72 PERCENT RECOVERY LITHOLOGY WELL CONSTRUCTION DIAGRAM CLAY SAMPLE TYPE SM GRAVEL GRAVEL WATER TABL **DESCRIPTION** ELEVATION /F SAND /C SAND SAND M SAND SAND SILTY CLAY 465 0 0.0-0.6 ft; Silty Clay, very dark grayish brown, FB 10YR 3/2, slightly plastic, soft, moist, roots. 0.6-3.4 ft; Silty Clay, very dark gravish brown, 10YR 3/2, plastic, stiff, moist, many mottles \(10YR 4/6) below 1.4 ft. FP/ 460 3.4-10.9 ft; Silty Sand, brown, 10YR 4/3, Lev 5 herringbone laminae, wet, soft. 35 455 10 10.9-30.7 ft; Fine Sand, with very fine sand, alternating beds of dark gray to brown, 10YR 4/1 to 4/3, fine black coalified wood matter from 15.0-16.5 ft, (fine sand slough noted in 450 top of 15.0 ft S.S.). 15 445 20 100 440 25 100 STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. **WATER LEVELS: DURING DRILLING** APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE DRILLER: AFTER DRILLING: \_ Ryan Hunziker LOGGED BY: GRADUAL OR MAY OCCUR BETWEEN T. Doll DATE: \_ SAMPLES. DATE DRILLED: PIEZOMETER: INSTALLED AT +/- 35.0 FEET 12/02/09 NOTES: START TIME: 12:05PM **VERTICAL DATUM: NAVD 88** END TIME: 2:22PM HORIZONTAL DATUM: NAD 83 **BOREHOLE DIA.:** WEATHER: Cold, 40°F, Overcast, 10-20 MPH Wind from N. 8.25"

### GREDELL **BORING LOG P-171** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Newman-South Central-E of farm access Rd Proposed Utility Waste Disposal Area G.S. ELEVATION: 463.97' T.O.C. ELEVATION: 466.87' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **EASTING:** 729636.72 **NORTHING:** 991629.80 LITHOLOGY CLAY SAMPLE TYPE G GRAVEL SM GRAVEI WATER TABI **DESCRIPTION** VF SAND VC SAND M SAND FACIES 1.D. C SAND SAND 10.9-30.7 ft; Fine Sand, with very fine sand, FP/ alternating beds of dark gray to brown, 10YR Lev 435 4/1 to 4/3, fine black coalified wood matter from 15.0-16.5 ft, (fine sand slough noted in 30 top of 15.0 ft S.S.). 30.7-35.8 ft; Fine to Medium Sand, trace coarse sand, dark gray, 10YR 4/1, wet, soft, black coalified wood matter from 30.7-30.9 ft. 430 35 78 35.8-36.5 ft; Coarse Sand, with medium sand, C trace fine sand and gravel, dark gray, 10YR 4/ 1, 5 mm subrounded and subangular clasts, wet, loose. 425 BORING TERMINATED IN COARSE SAND 40 @36.5 FT 420 45 415 50 410 55 STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. WATER LEVELS: DURING DRILLING \_\_\_\_5\_\_ FEET APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE AFTER DRILLING: \_ DRILLER: Ryan Hunziker GRADUAL OR MAY OCCUR BETWEEN DATE: LOGGED BY: T. Doll SAMPLES. PIEZOMETER: INSTALLED AT +/- 35.0 FEET DATE DRILLED: 12/02/09 NOTES: **VERTICAL DATUM: NAVD 88** START TIME: 12:05PM **HORIZONTAL DATUM: NAD 83** END TIME: 2:22PM WEATHER: Cold, 40°F, Overcast, 10-20 MPH Wind from N. BOREHOLE DIA .: 8.25"

#### **GREDELL BORING LOG P-173** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant **LOCATION:** Corn Field-Newman-SE Project Area **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 463,40' T.O.C. ELEVATION: 466,33' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 991592.90 **EASTING:** 730278.01 LITHOLOGY WELL CONSTRUCTION DIAGRAM PERCENT RECOV CLAY SM GRAVEL G GRAVEL DEPTH (FEET) WATER TABL DESCRIPTION ELEVATION VC SAND VF SAND FACIES I.D. M SAND SAND CLAY 465 0 0-3.0 ft; Poor sample recovery, possible clay FB and silty clay. 40 460 3.0-3.9 ft; Clay, dark brown, plastic, stiff. 3.9-4.2 ft; Silt, light olive gray, 5Y 6/1. 5 4.2-7.4 ft; Silty Clay and Clayey Silt, alternating thin beds grading downward into clay, pale yellowish brown, moist. 52 7.4-9.7 ft; Very Fine Sand, Silt and Clay, 455 alternating very thin beds, pale yellowish brown, 10YR 6/2, saturated below 7.8 ft, sharp 10 FP/ contact with below. Lev 9.7-10.0 ft; As above, but very dark gray (Gley) 1 3/N with common black carbonaceous 450 10.0-15.8 ft; Fine Sand, gravish orange, 10YR 7/4, moderately sorted with sparse to common 15 medium to coarse sand and granules, sharp 100 contact with below. CO/ 15.8-17.5 ft; Very Fine to Fine Sand, very dark BS gray (Gley) 1 3/1. 445 17.5-27.5 ft; Fine to Medium Sand, very dark gray (Gley) 1 3/N, common small gravel 20 (granules) (fine sand slough in top of S.S.). 100 440 25 100 STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. WATER LEVELS: DURING DRILLING \_\_\_\_\_\_7.8\_\_\_ APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE DRILLER: AFTER DRILLING: \_\_\_\_\_ FEET Doug Hunziker GRADUAL OR MAY OCCUR BETWEEN LOGGED BY: M. Carlson DÀTE: \_ SAMPLES. PIEZOMETER: INSTALLED AT +/- \_\_\_35.0\_\_ FEET DATE DRILLED: 12/12/09 START TIME: NOTES: **VERTICAL DATUM: NAVD 88** 7:30AM END TIME: HORIZONTAL DATUM: NAD 83 11:27AM **BOREHOLE DIA.:** 8.25" WEATHER: Cold, 30°F, Partly Cloudy.

## GREDELL **BORING LOG P-173** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Corn Field-Newman-SE Project Area **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 463.40' T.O.C. ELEVATION: 466.33' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 991592.90 **EASTING:** 730278.01 LITHOLOGY CLAY SAMPLE TYPE WATER TABLE SM GRAVEI G GRAVEL DESCRIPTION VF SAND VC SAND M SAND FACIES I.D. C SAND F SAND SILTY 27.5-32.5 ft; Very Fine to Fine Sand, dark gray CO/ 435 (Gley) 1 3/N, trace carbonized wood fragments. BS 30 100 32.5-36.5 ft; Fine to Medium Sand, dark gray 430 (Gley) 1 3/N, base marked by large (>30 mm) angular limestone fragment (fine sand slough in 35 top of S.S.). 100 BORING TERMINATED IN MEDIUM SAND @36.5 FT 425 40 420 45 415 50 410 55 STRATIFICATION LINES ARE APPROXIMATE LITHOLOGIC BOUNDARIES DRILLING CO.: Max's Enterprises, Inc. WATER LEVELS: DURING DRILLING \_\_\_\_\_\_\_\_\_ FEET AFTER DRILLING: FEET ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN DRILLER: Doug Hunziker DATE: LOGGED BY: M. Carlson SAMPLES. PIEZOMETER: INSTALLED AT +/- 35.0 FEET DATE DRILLED: 12/12/09 NOTES: **VERTICAL DATUM: NAVD 88** START TIME: 7:30AM END TIME: **HORIZONTAL DATUM: NAD 83** 11:27AM **BOREHOLE DIA.:** WEATHER: Cold, 30°F, Partly Cloudy. 8,25"

# GREDELL ENGINEERING RESOURCES, INC.

# **BORING LOG P-175**

Ameren Missouri Labadie Power Plant **LOCATION:** Newman-Southeast- W of Davis Rd, S of LBR **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 463.57' T.O.C. ELEVATION: 466.06' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 991556.51 **EASTING:** 730873.59 LITHOLOGY CLAY SM GRAVEI GRAVEL **ЗЕРТН (FEET)** WATER TABL **DESCRIPTION** VC SAND ELEVATION VF SAND FACIES I.D. M SAND SAND F SAND SILTY 465 0 0.0-0.8 ft; Clayey Silt, very dark grayish FB brown, 10YR 3/2, slightly plastic, soft, moist, 0.8-3.4 ft; Silty Clay, very dark grayish brown, 460 10YR 3/2, plastic, stiff, moist, few faint mottles \(10YR 4/6). 5 3.4-5.6 ft; Silty Clay grading to Clayey Silt, FP/ thin beds, brown, 10YR 4/3, wet, soft; silty Lev clay, plastic, common mottles (10YR 4/6); clayey silt, iron staining (10YR 4/6). 455 5.6-28.3 ft; Fine Sand, with very fine sand, dark grayish brown, 10YR 4/2, herringbone 10 laminae to 8.3 ft, wet, soft. 100 450 15 100 445 20 100 440 25

DRILLING CO.: Max's Enterprises, Inc.
DRILLER: Doug Hunziker
LOGGED BY: T. Doll
DATE DRILLED: 12/15/09
START TIME: 8:54AM
END TIME: 1:40PM

8.25"

**BOREHOLE DIA.:** 

100

STRATIFICATION LINES ARE APPROXIMATE LITHOLOGIC BOUNDARIES ONLY, ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN

NOTES: M. Carlson and F. Phillips (Gredell) onsite aquifer testing piezometers. WATER LEVELS: DURING D
AFTER DE

DURING DRILLING \_\_\_\_\_5 FEET
AFTER DRILLING: \_\_\_\_\_ FEET
DATE:

PIEZOMETER: INSTALLED AT +/- 35.0 FEE

M. Carlson and F. Phillips
(Gredell) onsite aquifer testing piezometers.

VERTICAL DATUM: NAVD 88
HORIZONTAL DATUM: NAD 83
WEATHER: Cold, 20°F, Partly Cloudy, 5-10 MPH Wind from N.

## **GREDELL BORING LOG P-175** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant **LOCATION:** Newman-Southeast- W of Davis Rd, S of LBR **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 463.57' T.O.C. ELEVATION: 466.06' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 991556.51 **EASTING:** 730873.59 LITHOLOGY CLAY GRAVEL WATER TABLE SM GRAVEI DESCRIPTION VC SAND VF SAND M SAND C SAND SAND 435 28.3-35.9 ft; Fine Sand, with very fine sand, FP/ Lev trace medium and coarse sand, dark grayish 30 brown, 10YR 4/2, wet, soft. C 430 35 35.9-36.5 ft; Coarse Sand, with medium sand, trace gravel, dark gray, 10YR 4/1, 5-25 mm subrounded and subangular clasts, clay balls 425 (plastic, dark brown, 10YR 3/3). BORING TERMINATED IN COARSE SAND 40 @36.5 FT SHELBY TUBE SAMPLE COLLECTED AT 1.0-3.0 FT DEPTH AT COMPLETION OF 420 DRILLING. 45 415 50 410 55 STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. WATER LEVELS: DURING DRILLING \_\_\_\_5 FEET APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE AFTER DRILLING: DRILLER: Doug Hunziker GRADUAL OR MAY OCCUR BETWEEN DATE: LOGGED BY: T. Doll SAMPLES. PIEZOMETER: INSTALLED AT +/- 35.0 FEET DATE DRILLED: 12/15/09 NOTES: M. Carlson and F. Phillips **VERTICAL DATUM: NAVD 88** START TIME: 8:54AM (Gredell) onsite aquifer testing HORIZONTAL DATUM: NAD 83 END TIME: 1:40PM WEATHER: Cold, 20°F, Partly Cloudy, 5-10 MPH Wind from N. **BOREHOLE DIA.:** 8.25"

#### GREDELL **BORING LOG P-177** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Bean Field-Heisel-SW Project Area **Proposed Utility Waste Disposal Area G.S. ELEVATION:** 464.07' **T.O.C. ELEVATION:** 466.87' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 991336.76 **EASTING:** 728049.81 LITHOLOGY PERCENT RECOVERY WELL CONSTRUCTION DIAGRAM CLAY SAMPLE TYPE SM GRAVEL WATER TABLE GRAPHIC LOG DEPTH (FEET) DESCRIPTION VC SAND VF SAND FACIES I.D. M SAND C SAND F SAND SILT 465 0 0-3.3 ft; Clay, olive gray, 5Y 4/1, plastic, stiff. FB 100 3.3-5.1 ft; Silty Clay, light olive gray, 5Y 6/1, 460 slightly plastic, soft, saturated below 4 feet. 5 5.1-8.1 ft; Silt, Clayey Silt, and Clay, alternating very thin beds to laminated, pale yellowish brown, 10YR 6/2, gradational contact with below. CO/ 8.1-12.5 ft; Silt and Clay, alternating thin beds, 455 BS very dark gray (Gley) 1 3/N, clay very plastic, 10 sharp contact with below. 77 12.5-13.5 ft; Very Fine Sand, very dark gray (Gley) 1 3/N, silty, faint laminae. 450 13.5-22.5 ft; Very Fine to Fine Sand, very dark 15 gray (Gley) 1 3/N, well sorted. 83 445 20 100 22.5-27.5 ft; Medium Sand, grayish orange, CM/ 10YR 7/4, common gravel 2-10 mm dia. (fine Sp 440 sand slough in top of S.S.). 25 83 STRATIFICATION LINES ARE DURING DRILLING \_\_\_\_4\_\_ FEET DRILLING CO.: Max's Enterprises, Inc. WATER LEVELS: APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN AFTER DRILLING: \_\_\_ FEET DRILLER: Doug Hunziker DATE: LOGGED BY: M. Carlson SAMPLES. PIEZOMETER: INSTALLED AT +/- 34.6 FEET DATE DRILLED: 11/13/09 **VERTICAL DATUM: NAVD 88** START TIME: 1:05PM NOTES: **HORIZONTAL DATUM: NAD 83** END TIME: 4:30PM WEATHER: Warm, 60°F, Mostly Sunny, Mild, 5 MPH Wind from S. **BOREHOLE DIA.:** 8,25"

# GREDELL

# **BORING LOG P-177**

ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Bean Field-Heisel-SW Project Area **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 464.07' T.O.C. ELEVATION: 466.87' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 991336.76 **EASTING:** 728049.81 LITHOLOGY PERCENT RECOVERY CLAY SM GRAVEL SAMPLE TYPE ОЕРТН (FEET) GRAPHIC LOG **DESCRIPTION** VC SAND VF SAND ELEVATION M SAND C SAND 27.5-36.5 ft; Coarse Sand grading to Gravelly Sand, grayish orange, 10YR 7/4, pebbles up to 435 20 mm dia, (fine sand slough in top of S.S.). 30 100 430 35 BORING TERMINATED IN GRAVELLY SAND @36.5 FT 425 SHELBY TUBE SAMPLE COLLECTED AT 40 2.0-4.0 FT DEPTH AT COMPLETION OF DRILLING. 420 45 415 50 410

DRILLING CO.: Max's Enterprises, Inc. DRILLER: Doug Hunziker LOGGED BY: M. Carlson DATE DRILLED: 11/13/09 START TIME: 1:05PM END TIME: 4:30PM

8.25"

STRATIFICATION LINES ARE APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN

SAMPLES.

NOTES:

**WATER LEVELS:** 

DURING DRILLING \_\_\_\_4\_ AFTER DRILLING: \_\_ FEET

PIEZOMETER: INSTALLED AT +/-

**VERTICAL DATUM: NAVD 88 HORIZONTAL DATUM: NAD 83** WEATHER: Warm, 60°F, Mostly Sunny, Mild, 5 MPH Wind from S.

55

**BOREHOLE DIA.:** 

#### **GREDELL BORING LOG P-179** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant **LOCATION:** Newman-Southwest-Adj to farm access Rd **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 464.19' T.O.C. ELEVATION: 466.93' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 991350.86 **EASTING:** 728780.92 **LITHOLOGY** PERCENT RECOVERY WELL CONSTRUCTION DIAGRAM CLAY SAMPLE TYPE SM GRAVEL G GRAVEL WATER TABL DESCRIPTION VC SAND VF SAND FACIES I.D. M SAND SAND SAND SILTY CLAY 465 0 0.0-0.7 ft; Silty Clay, very dark grayish brown, FB \10YR 3/2, slightly plastic, soft, moist, roots. 0.7-4.4 ft; Silty Clay, very dark grayish brown, 75 10YR 3/2, plastic, stiff, moist, few faint mottles, (10YR 4/6); brown, 10YR 4/3, and 460 many mottles below 2.9 ft. 5 4.4-7.9 ft; Poor recovery, probable Silty Clay slough. 95 7.9-9.8 ft; Clayey Silt and Clayey Sandy Silt; 455 thin beds, dark grayish brown and dark gray, 10 10YR 4/1 and 4/2, many mottles (10YR 4/6), FP/ laminated, herringbone laminae and iron Lev staining below 8.2 ft 9.8-21.5 ft; Very Fine to Fine Sand, thin beds, 80 CO/ wet; brown, 10YR 4/3 to 11.7 ft, loose; with BS clay below 12.2 ft, dark gray, (Gley) 1 4/N, 450 plastic, soft, herringbone laminae, soft; without 15 FP/ clay below 12.2 ft; dark gray (Gley) 1 4/N to 100 14.0 ft; dark gray, 10YR 4/1 below 15.0 ft. Lev 445 20 100 21.5-31.1 ft; Fine Sand, with medium to coarse sand and gravel, alternating thin beds, dark gray, 10YR 4/1, alternating thin beds of coalified wood matter from 25.6-26.5 ft; clay 25 balls (dark gray, Gley 1 4/N, plastic) from 100 30.8-31.1 ft, wet, loose to soft. STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. WATER LEVELS: DURING DRILLING 8.2 APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE DRILLER: AFTER DRILLING: Ryan Hunziker GRADUAL OR MAY OCCUR BETWEEN LOGGED BY: T. Doll DATE: \_ SAMPLES PIEZOMETER: INSTALLED AT +/- 34.9 FEET DATE DRILLED: 12/03/09 START TIME: NOTES: S. King (Gredell) onsite **VERTICAL DATUM: NAVD 88** 8:32AM developing piezometers. END TIME: **HORIZONTAL DATUM: NAD 83** 11:04AM BOREHOLE DIA.: 8.25" WEATHER: Cold, 30°F, Overcast, Calm.

### GREDELL **BORING LOG P-179** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Newman-Southwest-Adj to farm access Rd Proposed Utility Waste Disposal Area G.S. ELEVATION: 464.19' T.O.C. ELEVATION: 466.93' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **EASTING:** 728780.92 **NORTHING:** 991350.86 LITHOLOGY CLAY SM GRAVEL G GRAVEL VC SAND **DESCRIPTION** VF SAND M SAND FACIES I.D. C SAND F SAND DIAGRAM 21.5-31.1 ft; Fine Sand, with medium to coarse FP/ sand and gravel, alternating thin beds, dark Lev gray, 10YR 4/1, alternating thin beds of 435 coalified wood matter from 25.6-26.5 ft; clay 30 balls (dark gray, Gley 1 4/N, plastic) from 100 30.8-31.1 ft, wet, loose to soft. 31.1-36.5 ft; Coarse Sand, with fine to medium sand and gravel, trace very fine sand, dark gray, 430 10YR 4/1 wet, loose, 20-30 mm subrounded 35 quartz clasts. 100 BORING TERMINATED IN COARSE SAND @36.5 FT 425 40 420 45 415 50 410 55 STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. WATER LEVELS: DURING DRILLING 8.2 FEET APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE AFTER DRILLING: \_ DRILLER: Ryan Hunziker GRADUAL OR MAY OCCUR BETWEEN DATE: LOGGED BY: T. Doll SAMPLES. PIEZOMETER: INSTALLED AT +/- 34.9 FEET DATE DRILLED: 12/03/09 NOTES: S. King (Gredell) onsite **VERTICAL DATUM: NAVD 88** START TIME: 8:32AM developing piezometers. **HORIZONTAL DATUM: NAD 83** END TIME: 11:04AM WEATHER: Cold, 30°F, Overcast, Calm. BOREHOLE DIA.: 8.25"

#### GREDELL **BORING LOG P-181** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Newman-Southwest-E of farm access Rd Proposed Utility Waste Disposal Area G.S. ELEVATION: 464.42' T.O.C. ELEVATION: 467.35' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 991334.49 **EASTING:** 729380.23 LITHOLOGY PERCENT RECOVERY CLAY GRAVEL SM GRAVEL SAMPLE TYPE **NATER TABLE** GRAPHIC LOG DEPTH (FEET) DESCRIPTION /C SAND VF SAND ELEVATION F SAND M SAND SAND CLA SILT 465 0 FB 0.0-0.6 ft; Clayey Silt, very dark grayish brown, 10YR 3/2, slightly plastic, soft, moist, 60 0.6-4.0 ft; Silty Clay, very dark grayish brown, 10YR 3/2, plastic, stiff, moist, few faint mottles 460 (10YR 4/6), dark brown, 10YR 3/3, below 2.6 5 ft, soft grading to stiff, many mottles. 4.0-6.7 ft; Sandy Clayev Silt and Sandy Silt, thin beds, brown, 10YR 4/3, wet, soft, non-FP/ plastic, laminated below 5.3 ft. Lev 6.7-18.3 ft; Silty Sand, dark grayish brown, 10YR 4/2, laminated, wet, soft; black fibrous 455 10 plant detritus from 10.6-10.8 ft; black coalified wood matter and muscovite mica flakes from 10.8-11.8 ft; dark gray below 11.8 ft, (Gley) 1 CO/ 4/N, interbeds of black coalified wood matter BS and muscovite mica flakes. 450 15 100 18.3-35.8 ft; Very Fine Sand, Fine Sand, Medium Sand, and Coarse Sand, alternating 20 thin beds, with gravel, very dark gray and dark 100 gray, (Glev 1 3/N) and 10YR 4/1, fine coalified wood matter and wood fragments, 5-20 mm subrounded and subangular clasts, wet, loose grading to soft, clay balls (brown, 10YR 3/3, 440 plastic) at 35.5 ft. 25 C 94 STRATIFICATION LINES ARE **WATER LEVELS:** DURING DRILLING 5 FEET DRILLING CO.: Max's Enterprises, Inc. APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE AFTER DRILLING: \_\_ DRILLER: Ryan Hunziker GRADUAL OR MAY OCCUR BETWEEN DATE: LOGGED BY: T. Doll SAMPLES. PIEZOMETER: INSTALLED AT +/-DATE DRILLED: 12/03/09 NOTES: S. King (Gredell) onsite START TIME: **VERTICAL DATUM: NAVD 88** 11:31AM developing piezometers. **HORIZONTAL DATUM: NAD 83** END TIME: 2:14PM

**BOREHOLE DIA.:** 

8.25"

WEATHER: Cold, 35°F, Mostly Sunny, 10-15 MPH Wind from SW.

### **GREDELL BORING LOG P-181** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Newman-Southwest-E of farm access Rd **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 464.42' T.O.C. ELEVATION: 467.35' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **EASTING:** 729380.23 **NORTHING:** 991334.49 LITHOLOGY WELL CONSTRUCTION DIAGRAM CLAY SM GRAVEL G GRAVEL ОЕРТН (FEET) DESCRIPTION VC SAND JF SAND M SAND SAND C SAND SILTY 18.3-35.8 ft; Very Fine Sand, Fine Sand, CM/ Medium Sand, and Coarse Sand, alternating Sp thin beds, with gravel, very dark gray and dark 435 gray, (Gley 1 3/N) and 10YR 4/1, fine coalified 30 wood matter and wood fragments, 5-20 mm 100 subrounded and subangular clasts, wet, loose grading to soft, clay balls (brown, 10YR 3/3, plastic) at 35.5 ft. 430 35 78 35.8-36.5 ft; Fine Sand, with very fine sand, CO/ trace medium sand, black organic material BS (Gley 1 2.5/N) and muscovite mica flakes below 35.8 ft. BORING TERMINATED IN FINE SAND 425 40 @36.5 FT SHELBY TUBE SAMPLE COLLECTED AT 1.0-3.0 FT DEPTH AT COMPLETION OF DRILLING. 420 45 415 50 410 55 STRATIFICATION LINES ARE WATER LEVELS: DURING DRILLING \_\_\_\_5\_ FEET DRILLING CO.: Max's Enterprises, Inc. APPROXIMATE LITHOLOGIC BOUNDARIES DRILLER: Ryan Hunziker AFTER DRILLING: ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN DATE: LOGGED BY: T. Doll SAMPLES. PIEZOMETER: INSTALLED AT +/- 34.7 FEET DATE DRILLED: 12/03/09 NOTES: S. King (Gredell) onsite **VERTICAL DATUM: NAVD 88** START TIME: 11:31AM developing piezometers. **HORIZONTAL DATUM: NAD 83** END TIME: 2:14PM WEATHER: Cold, 35°F, Mostly Sunny, 10-15 MPH Wind from SW. **BOREHOLE DIA.:** 8.25"

#### GREDELL **BORING LOG P-183** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant **LOCATION:** Newman-Southeast-W of Davis Rd, S of LBR **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 463,40' T.O.C. ELEVATION: 465,96' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 991309.56 **EASTING:** 729980.89 PERCENT RECOVERY LITHOLOGY WELL CONSTRUCTION DIAGRAM CLAY GRAPHIC LOG SAMPLE TYPE SM GRAVEL G GRAVEL DESCRIPTION VF SAND ELEVATION VC SAND M SAND SAND SAND SILTY CLAY SILT 465 0 0.0-0.5 ft; Clayey Silt, very dark grayish FB brown, 10YR 3/2, slightly plastic, soft, moist, roots. 75 0.5-2.5 ft; Silty Clay, very dark grayish brown, 460 10YR 3/2, plastic, stiff, moist, roots, few faint mottles (10YR 4/6), many mottles below 1.8 ft. 5 2.5-3.8 ft; Silty Clay, very dark gravish brown. 10YR 3/2, highly plastic, stiff, moist. 3.8-6.7 ft; Silty Clay, dark grayish brown, 80 10YR 4/2, plastic, stiff, moist, many mottles FP/ 455 (10YR 4/6), iron concretions (10YR 4/6) below Lev 5.3 ft. 10 6.7-7.8 ft; Clayey Silt and Silty Clay, thin beds, dark gray and dark grayish brown, 10YR 4/2, moist, soft; slightly plastic, common mottles (10YR 4/6) and muscovite mica flakes to 7.2 ft; 450 plastic and iron concretions (10YR 4/6) below 7.2 ft. 15 7.8-26.2 ft; Very Fine to Fine Sand, thin beds, trace medium and coarse sand, dark gray to dark yellowish brown, 10YR 4/1 to 4/4, wet, loose grading to soft, trace fine black coalified wood matter. 445 20 100 440 25 100 26.2-36.5 ft; Very Fine Sand, Fine Sand, and STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. **WATER LEVELS:** DURING DRILLING \_\_\_\_\_\_\_\_\_ FEET APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE DRILLER: Ryan Hunziker AFTER DRILLING: \_\_\_\_\_ GRADUAL OR MAY OCCUR BETWEEN LOGGED BY: T. Doll DATE: SAMPLES PIEZOMETER: INSTALLED AT +/- 35.2 FEET DATE DRILLED: 12/11/09 NOTES: START TIME: **VERTICAL DATUM: NAVD 88** 10:25AM **HORIZONTAL DATUM: NAD 83** END TIME: 1:14PM BOREHOLE DIA.: 8.25" WEATHER: Cold, 15°F, Partly Cloudy, Calm.

#### **GREDELL BORING LOG P-183** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant **LOCATION:** Newman-Southeast-W of Davis Rd, S of LBR Proposed Utility Waste Disposal Area G.S. ELEVATION: 463.40' T.O.C. ELEVATION: 465.96' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 991309.56 **EASTING:** 729980.89 **LITHOLOGY** CLA SM GRAVEL G GRAVEL **DESCRIPTION** VC SAND VF SAND FACIES 1.D. SAND C SAND F SAND Medium Sand, alternating thin beds, with FP/ coarse sand, trace gravel, dark gray, 10YR 4/1, Lev 435 5-20 mm subangular clasts, black coalified wood matter and trace clay balls (brown, 10YR 30 3/3, plastic), wet, soft. CM/ 100 Sp FP/ 430 Lev 35 100 BORING TERMINATED IN FINE SAND @36.5 FT 425 40 420 45 415 50 410 55 STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. WATER LEVELS: DURING DRILLING 7.8 FEET APPROXIMATE LITHOLOGIC BOUNDARIES AFTER DRILLING: \_\_ DRILLER: Ryan Hunziker ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN LOGGED BY: DATE: T. Doll DATE DRILLED: PIEZOMETER: INSTALLED AT +/- 35.2 FEET 12/11/09 START TIME: NOTES: **VERTICAL DATUM: NAVD 88** 10:25AM END TIME: 1:14PM **HORIZONTAL DATUM: NAD 83**

**BOREHOLE DIA.:** 

8.25"

WEATHER: Cold, 15°F, Partly Cloudy, Calm.

#### GREDELL **BORING LOG P-185** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Newman-Southeast-W of Davis Rd, S of LBR **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 463,75' T.O.C. ELEVATION: 466,26' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **EASTING:** 730564.03 **NORTHING:** 991289.70 **LITHOLOGY** WELL CONSTRUCTION DIAGRAM CLAY SM GRAVEL G GRAVEL WATER TABL DESCRIPTION VF SAND VC SAND M SAND SAND C SAND SILTY CLAY 465 0 0.0-0.5 ft; Silty Clay, dark brown, 10YR 3/3, FΒ \plastic, soft, moist. 0.5-3.5 ft; Silty Clay, dark brown, 10YR 3/3, 40 plastic, stiff, moist, mottles common (10YR 4/ 460 3.5-5.9 ft; Poor recovery, probable Silty Clay 5 slough. 5.9-6.6 ft; Sandy Silt, brown, 10YR 4/3, FP/ \laminated, wet, soft. Lev 6.6-36.5 ft; Very Fine Sand, with fine sand, 455 laminated, wet, soft; brown to 15.7 ft, 10YR 4/ 3; dark gray and dark grayish brown, 10YR 4/1 10 and 4/2, below 15.7 ft; trace clay and coarse 100 sand from 11.0-11.1 ft; 35 mm rounded coalified wood fragment at 15.6 ft; trace medium sand and coarse sand from 20.0-21.5 450 15 94 445 20 100 440 25 STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. **WATER LEVELS: DURING DRILLING** APPROXIMATE LITHOLOGIC BOUNDARIES DRILLER: Doug Hunziker AFTER DRILLING: FEET ONLY: ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN LOGGED BY: T. Doll DATE: PIEZOMETER: INSTALLED AT +/-DATE DRILLED: 12/15/09 FEET START TIME: 2:58PM NOTES: Chris Vierrether, MDNR, **VERTICAL DATUM: NAVD 88** onsite observing drilling END TIME: 5:34PM **HORIZONTAL DATUM: NAD 83** activities. BOREHOLE DIA.: 8.25" WEATHER: Cold, 20°F, Partly Cloudy, 5-10 MPH Wind from N.

### **GREDELL** ENGINEERING RESOURCES, INC.

### **BORING LOG P-185**

Ameren Missouri Labadie Power Plant Proposed Utility Waste Disposal Area **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc.

LOCATION: Newman-Southeast-W of Davis Rd, S of LBR G.S. ELEVATION: 463.75' T.O.C. ELEVATION: 466.26'

**NORTHING:** 991289.70 **EASTING:** 730564.03

			11.5,	SAMPLE TYPE	OVERY	DESCRIPTION	.,, 0	LITHOLOGY									
DEPTH (FEET)	ELEVATION	WELL CONSTRUCTION DIAGRAM WATER TABLE	GRAPHIC LOG				FACIES I.D.	CLAY	SILTY CLAY	SILT	VF SAND	F SAND	M SAND	C SAND	VC SAND	SM GRAVEL	LG GRAVEL
_		-A :															
30 —	- 435 				72	6.6-36.5 ft; Very Fine Sand, with fine sand, laminated, wet, soft; brown to 15.7 ft, 10YR 4/3; dark gray and dark grayish brown, 10YR 4/1 and 4/2, below 15.7 ft; trace clay and coarse sand from 11.0-11.1 ft; 35 mm rounded	FP/ Lev										
35 —	- 430 					coalified wood fragment at 15.6 ft; trace medium sand and coarse sand from 20.0-21.5 ft.							,,,,,	a 1 h a 1 ha a a a a a a a			
-	_	,			100												<u> </u>
_i -	425					BORING TERMINATED IN VERY FINE SAND @36. 5 FT											
40 -	-											· · · · · · · · · · · · · · · · · · ·					
-	- - 420																
45 —	- - -		ı										: : : : : : :				
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50 -	-																
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55	-																
DRILLIN	G CO.: Ma	x's Enterprises, I	Inc.	Ш		STRATIFICATION LINES ARE APPROVIMATE LITHOLOGIC BOLINDARIES WATER LE	VELS:	D	URIN	IG DF	RILLI	NG	5	i,9	_ FE	 ET	

DRILLER:

LOGGED BY:

START TIME:

END TIME:

DATE DRILLED:

BOREHOLE DIA.:

Doug Hunziker

T. Doll

12/15/09

2:58PM

5:34PM

8.25"

NOTES: Chris Vierrether, MDNR,

SAMPLES.

APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN

onsite observing drilling HORIZONTAL DATUM: NAD 83

DATE: PIEZOMETER: INSTALLED AT +/- 35.1 FEET **VERTICAL DATUM: NAVD 88** 

WEATHER: Cold, 20°F, Partly Cloudy, 5-10 MPH Wind from N.

AFTER DRILLING: \_\_\_\_\_ FEET

#### **GREDELL BORING LOG P-187** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant **LOCATION:** Newman-SE-Adj to Davis Rd, S of LBR Proposed Utility Waste Disposal Area G.S. ELEVATION: 462.85' T.O.C. ELEVATION: 465.67' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 991308.51 **EASTING:** 731386.11 PERCENT RECOVERY LITHOLOGY WATER TABLE CLAY GRAPHIC LOG SAMPLE TYPE SM GRAVEL -G GRAVEL DESCRIPTION VF SAND VC SAND M SAND SAND SAND CLAY 465 0 0.0-0.5 ft; Silty Sand, dark brown, 10YR 3/3, FB wet, soft. 0.5-3.5 ft; Silty Clay, very dark grayish brown, 40 460 10YR 3/2, plastic, stiff, moist, mixture of dark \grayish brown (10YR 4/2) below 5.0 ft. 3.5-7.5; Poor recovery, probable Silty Clay and 5 Fine Sand slough. 100 455 7.5-10.0 ft; Silty Clay, thin beds, dark gray and dark grayish brown, 10YR 4/1 and 4/2, mottles (10YR 4/6) to 8.3 ft, highly plastic; laminated CO/ 10 from 8.3-8.6 ft; iron concretions and vertical BS staining (10YR 4/6) below 8.6 ft; dark gray, (Gley) 1 4/N, below 9.1 ft. 10.0-15.4 ft; Clayey Silt, Clayey Sandy Silt and 450 Silty Clay, alternating thin beds, dark gray, (Gley) 1 4/N, wet, soft, laminated below 10.5 15 ft; clayey silt, slightly plastic, (clay slough 50 probable in top of 15.0 ft S.S.). 15.4-36.5 ft; Very Fine to Fine Sand. alternating thin beds, dark gray, (Gley) 1 4/N, 445 wet, loose to soft, 30 mm x 15 mm wood fragments, (clay slough in top of 30.0 and 35.0 20 ft S.S.). 67 440 25 78 STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. **WATER LEVELS: DURING DRILLING** APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE DRILLER: Ryan Hunziker AFTER DRILLING: \_\_\_ LOGGED BY: GRADUAL OR MAY OCCUR BETWEEN T. Doll DATE: DATE DRILLED: PIEZOMETER: INSTALLED AT +/- 35.1 FEET 10/28/09 START TIME: NOTES: Chris Vierrether (MDNR), M. 9:09AM **VERTICAL DATUM: NAVD 88** Carlson and F. Phillips END TIME: 11:41AM **HORIZONTAL DATUM: NAD 83** (Gredell) onsite. BOREHOLE DIA.: 8.25" WEATHER: Cold, 50°F, Overcast, Drizzle, Calm.

#### GREDELL **BORING LOG P-187** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Newman-SE-Adj to Davis Rd, S of LBR **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 462.85' T.O.C. ELEVATION: 465.67' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **EASTING:** 731386.11 **NORTHING:** 991308.51 **LITHOLOGY** CLAY SM GRAVEL SAMPLE TYPE G GRAVEL DEPTH (FEET) WATER TABL DESCRIPTION VC SAND VF SAND FACIES I.D. M SAND SAND 15.4-36.5 ft; Very Fine to Fine Sand, CO/ 435 alternating thin beds, dark gray, (Gley) 1 4/N, BS wet, loose to soft, 30 mm x 15 mm wood fragments, (clay slough in top of 30.0 and 35.0 30 ft S.S.). 56 430 35 100 BORING TERMINATED IN VERY FINE SAND @36. 5 FT 425 40 420 45 415 50 410 55 STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. WATER LEVELS: DURING DRILLING \_\_\_\_\_10\_\_\_ FEET APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN FEET DRILLER: Ryan Hunziker AFTER DRILLING: DATE: LOGGED BY: T. Doll SAMPLES. PIEZOMETER: INSTALLED AT +/- \_\_\_ 35.1 FEET DATE DRILLED: 10/28/09 NOTES: Chris Vierrether (MDNR), M. **VERTICAL DATUM: NAVD 88** START TIME: 9:09AM Carlson and F. Phillips **HORIZONTAL DATUM: NAD 83** END TIME: 11:41AM (Gredell) onsite. WEATHER: Cold, 50°F, Overcast, Drizzle, Calm. BOREHOLE DIA.: 8.25"

#### **GREDELL BORING LOG P-189** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Heisel-SW-S of LBR, W of farm access Rd **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 464,91' T.O.C. ELEVATION: 467.93' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 991059.00 **EASTING:** 728325.94 **LITHOLOGY** RECOV CONSTRUCTION DIAGRAM CLAY SM GRAVEL GRAVEL SAMPLE TYPE DESCRIPTION ELEVATION VF SAND VC SAND M SAND C SAND F SAND CLAY Ö 465 0 0.0-0.5 ft; Clayey Silt, dark brown, 10YR 3/3, FB 0.5-1.0 ft; Silty Clay, very dark grayish brown, 75 10YR 3/3, plastic, soft, wet. 1.0-1.3 ft; Clayey Silt, dark grayish brown, 10YR 4/2, wet, soft, mottles (10YR 4/6 and 4/ 460 5 1.3-2.8 ft; Clayey Silty Sand, dark grayish brown, 10YR 4/2, silt and clay interbeds <1 inch thick, wet, soft. 2.8-6.5 ft; Sandy Silt, dark grayish brown, 10YR 4/2, laminated, wet, soft, mottles (10YR 455 10 4/6); thin clay bed below 6.3 ft, plastic. CO/ 6.5-11.4 ft; Sandy Silt, dark grayish brown, BS 10YR 4/2, laminated, wet, soft; dark gray, 100 10YR 4/1, below 7.5 ft; very dark gray, (Gley) 1 3/N, below 10.0 ft. 11.4-13.0 ft; Clayey Silt, very dark gray, (Gley) 450 15 1 3/N, slightly plastic, laminated, clay and silt 100 interbeds <1 inch thick, wet, soft. 13.0-14.2 ft; Silty Clay and Silty Sand, thin FP/ beds, very dark gray, (Gley) 1 3/N, wet, soft; Lev silty clay beds, highly plastic, black mottles (Gley 1 2.5/N) below 13.8. 445 20 -14.2-26.2 ft; Fine Sand, trace very fine sand, very dark gray, (Gley) 1 3/N, wet, soft; dark gray, 10YR 4/1, below 16.5 ft. 440 25 100 26.2-36.5 ft; Medium Sand and Coarse Sand, STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. WATER LEVELS: DURING DRILLING APPROXIMATE LITHOLOGIC BOUNDARIES DRILLER: AFTER DRILLING: \_ Rvan Hunziker ONLY: ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN LOGGED BY: DATE: T. Doll DATE DRILLED: PIEZOMETER: INSTALLED AT +/- 34.8 FEET 10/12/09 START TIME: NOTES: S. King (Gredell) onsite **VERTICAL DATUM: NAVD 88** 4:32AM developing piezometers. END TIME: HORIZONTAL DATUM: NAD 83 7:00PM BOREHOLE DIA.: 8.25" WEATHER: Cool, 50°F, Overcast, Mild, 5 MPH Wind from E.

### **GREDELL BORING LOG P-189** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Heisel-SW-S of LBR, W of farm access Rd **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 464.91' T.O.C. ELEVATION: 467.93' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 991059.00 **EASTING:** 728325.94 LITHOLOGY WELL CONSTRUCTION DIAGRAM CLAY SAMPLE TYPE SM GRAVEI -G GRAVEL DESCRIPTION VC SAND VF SAND FACIES I.D. M SAND C SAND SAND SILTY thin beds, trace fine sand and gravel, dark gray, 10YR 4/1, subrounded clasts, wet, loose, (fine sand and clay slough probable in top of 30.0 and 35.0 ft S.S.). 435 30 100 - 430 35 -100 **BORING TERMINATED IN COARSE SAND** @36.5 FT -42540 --420 45 50 -- 415 -410 55 STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. **WATER LEVELS:** DURING DRILLING \_\_\_\_5\_ FEET APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE DRILLER: AFTER DRILLING: Ryan Hunziker FEET GRADUAL OR MAY OCCUR BETWEEN SAMPLES. LOGGED BY: DATE: T. Doll PIEZOMETER: INSTALLED AT +/- 34.8 FEET DATE DRILLED: 10/12/09 START TIME: NOTES: S. King (Gredell) onsite **VERTICAL DATUM: NAVD 88** 4:32AM developing piezometers.

END TIME:

**BOREHOLE DIA.:** 

7:00PM

8.25"

WEATHER: Cool, 50°F, Overcast, Mild, 5 MPH Wind from E.

**HORIZONTAL DATUM: NAD 83** 

#### **GREDELL BORING LOG P-191** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant **LOCATION:** Newman-SW-E of farm access Rd. S of LBR Proposed Utility Waste Disposal Area G.S. ELEVATION: 464.41 T.O.C. ELEVATION: 467.10' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 991032.57 **EASTING:** 729099.94 **LITHOLOGY** RECOVERY WELL CONSTRUCTION DIAGRAM WATER TABLE SAMPLE TYPE CLAY SM GRAVEL GRAPHIC LOG .G GRAVEL DESCRIPTION ELEVATION SAND VC SAND M SAND PERCENT SAND CSAND CLAY 465 0 0.0-0.8 ft; Clayey Silt, very dark grayish FB brown, 10YR 3/2, moist, soft, roots. 0.8-4.2 ft; Silty Clay, very dark grayish brown, 65 10YR 3/2, stiff, moist, few faint mottles (10YR 4/6); dark grayish brown, 10YR 4/2, below 2.6 460 ft, soft grading to stiff, many mottles; highly 5 plastic below 6.8 ft, very stiff, few mottles. 4.2-7.8 ft; Poor recovery, probable Silty Clay slough. 60 7.8-9.0 ft; Sandy Clayey Silt, dark gray, 10YR 4/1, laminated, iron staining (10YR 4/6), wet, 455 FP/ 10 Lev 9.0-13.5 ft; Silty Sand and Fine Sand, dark gray and dark grayish brown, 10YR 4/1 and 4/2, iron staining (10YR 4/6), wet, loose, iron concretions below 12.9 ft. 13.5-15.0 ft; Silty Clay, Sandy Silt, and Silty CO/ 450 Sand, alternating thin beds, dark gray, (Gley) 1 BS 15 4/N, wet, soft; silty clay bed, plastic, mottles 100 FP/ (Gley 1 2.5/N); sandy silt bed, laminated; silty Lev sand bed, black coalified wood matter and wood fragments. 15.0-20.4 ft; Fine Sand, trace very fine sand, 445 dark gray, 10YR 4/1, wet, soft. 20 100 20.4-28.3 ft; Medium to Coarse Sand, alternating thin beds, trace gravel, dark gray, 10YR 4/1, wet, loose to soft, 5-20 mm subangular and subrounded clasts, (clay slough probable in top of 25.0 ft S.S.). 440 25 100 STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. WATER LEVELS: APPROXIMATE LITHOLOGIC BOUNDARIES DRILLER: Rvan Hunziker AFTER DRILLING: ONLY; ACTUAL CHANGES MAY BI GRADUAL OR MAY OCCUR BETWEEN LOGGED BY: T. Doll DATE: SAMPLES. DATE DRILLED: 12/03/09 PIEZOMETER: INSTALLED AT +/- \_\_\_34.8 START TIME: NOTES: S. King (Gredell) onsite 3:00PM **VERTICAL DATUM: NAVD 88** END TIME: developing piezometers. 5:07PM HORIZONTAL DATUM: NAD 83 BOREHOLE DIA.: 8.25" WEATHER: Cold, 35°F, Mostly Sunny, 10-15 MPH Wind from SW.

#### **GREDELL BORING LOG P-191** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Newman-SW-E of farm access Rd, S of LBR Proposed Utility Waste Disposal Area G.S. ELEVATION: 464.41 T.O.C. ELEVATION: 467.10' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 991032.57 **EASTING:** 729099.94 **LITHOLOGY** CONSTRUCTION DIAGRAM CLAY SM GRAVEL G GRAVEL **JEPTH (FEET)** WATER TABL DESCRIPTION VC SAND VF SAND M SAND FACIES I.D. SAND C SAND $\mathbf{C}$ 28.3-36.5 ft; Fine to Medium Sand, alternating CM/ 435 thin beds, trace coarse sand and gravel, dark Sp 30 gray, 10YR 4/1, wet, loose to soft, 5-20 mm 100 subrounded clasts, 10 mm coalified wood matter below 30.9 ft. FP/ Lev 430 35 100 BORING TERMINATED IN FINE SAND @36.5 FT 425 40 420 45 415 50 410 55 STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. WATER LEVELS: DURING DRILLING \_\_\_\_\_\_ 7.8\_\_ FEET APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN AFTER DRILLING: DRILLER: Ryan Hunziker DATE: LOGGED BY: T. Doll SAMPLES. PIEZOMETER: INSTALLED AT +/- 34.8 FEET DATE DRILLED: 12/03/09 NOTES: S. King (Gredell) onsite **VERTICAL DATUM: NAVD 88** START TIME: 3:00PM developing piezometers.

END TIME:

BOREHOLE DIA.:

5:07PM

8.25"

WEATHER: Cold, 35°F, Mostly Sunny, 10-15 MPH Wind from SW.

**HORIZONTAL DATUM: NAD 83** 

#### GREDELL **BORING LOG P-193** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Newman-South Central-E of farm access Rd **Proposed Utility Waste Disposal Area G.S. ELEVATION: 464.11 T.O.C. ELEVATION: 467.00' Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 991026.43 **EASTING:** 729688.59 LITHOLOGY CONSTRUCTION DIAGRAM CLAY SM GRAVEL GRAPHIC LOG SAMPLE TYPE **JEPTH (FEET)** DESCRIPTION VF SAND M SAND C SAND F SAND CLAY Ő 465 0 0.0-0.5 ft; Clayey Silt, dark brown, 10YR 3/3, FB \slightly plastic, soft, moist, roots. 0.5-3.8 ft; Silty Clay, very dark grayish brown, 50 10YR 3/2, plastic, stiff, few faint mottles (10YR 4/6), moist, common mottles below 1.9 460 5 3.8-5.9 ft; Clayey Silt and Silty Clay, thin beds, brown, 10YR 4/3, common mottles (10YR 4/ FP/ 6), laminated to 5.5 ft, iron concretions at 5.5 Lev 40 ft, wet below 5.6 ft, silty clay is plastic. 5.9-15.3 ft; Silty Sand, brown, 10YR 4/3, wet, 455 soft, laminated to 7.0 ft; muscovite mica flakes 10 to 7.0 ft and below 15.0 ft; dark grayish brown (10YR 4/2) from 10.0-15.0 ft; with silt below 15.0 ft. 65 450 15 15.3-20.6 ft; Silty Sand and Fine Sand, thin 100 CO/ beds, dark gray, (Gley) 1 4/N, wet, loose to BS soft; black coalified wood matter and brown wood laminae repeating sequence every 10-20 mm to 16.5 ft; very dark gray (Gley 1 3/N) 445 below 20.3 ft. 20 20.6-28.3 ft; Very Fine to Coarse Sand, alternating thin beds, with gravel, dark grav. (Gley) 1 4/N, 5-20 mm subrounded and subangular clasts; 30 mm black coalified wood 440 matter below 25.0 ft; trace clay balls (brown, 25 plastic) below 26.4 ft. 100 STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. **WATER LEVELS:** DURING DRILLING APPROXIMATE LITHOLOGIC BOUNDARIES AFTER DRILLING: \_ DRILLER: Ryan Hunziker ONLY: ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN LOGGED BY: DATE: T. Doll SAMPLES. DATE DRILLED: PIEZOMETER: INSTALLED AT +/- 34.9 FEET 12/04/09 **VERTICAL DATUM: NAVD 88** START TIME: NOTES: 8:04AM **HORIZONTAL DATUM: NAD 83** END TIME: 11:29AM BOREHOLE DIA.: 10.25" WEATHER: Cold, 20°F, Clear Skies, Calm.

#### GREDELL **BORING LOG P-193** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Newman-South Central-E of farm access Rd Proposed Utility Waste Disposal Area G.S. ELEVATION: 464.11 T.O.C. ELEVATION: 467.00' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING: 991026.43 EASTING:** 729688.59 **LITHOLOGY** CLAY SM GRAVEI G GRAVEL **JEPTH (FEET)** DESCRIPTION ELEVATION VF SAND VC SAND FACIES I.D. M SAND C SAND F SAND SILTY CO/ BS 28.3-36.5 ft; Fine to Medium Sand, alternating 435 CM/ thin beds, trace very fine and coarse sand, trace Sp 30 gravel, dark gray, 10YR 4/1, 5-20 mm 100 subrounded and subangular clasts; trace clay balls (brown, plastic) below 26.4 ft; dark gray, 10YR 4/1, below 30.0 ft, (fine sand noted at total depth based on cuttings sample collected 430 from auger bit). 35 FP/ 100 Lev **BORING TERMINATED IN FINE SAND** @36.5 FT 425 40 420 45 415 50 410 55 STRATIFICATION LINES ARE **WATER LEVELS:** DRILLING CO.: Max's Enterprises, Inc. DURING DRILLING 5.6 FEET APPROXIMATE LITHOLOGIC BOUNDARIES AFTER DRILLING: DRILLER: Ryan Hunziker ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN DATE: LOGGED BY: T. Doll SAMPLES. PIEZOMETER: INSTALLED AT +/- 34,9 FEET DATE DRILLED: 12/04/09 NOTES: START TIME: **VERTICAL DATUM: NAVD 88** 8:04AM END TIME: **HORIZONTAL DATUM: NAD 83** 11:29AM BOREHOLE DIA.: WEATHER: Cold, 20°F, Clear Skies, Calm. 10.25"

#### GREDELL **BORING LOG P-195** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Newman-SE-W of Davis Rd, S of LBR **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 463.44 T.O.C. ELEVATION: 466.07' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 991065.81 **EASTING:** 730256.04 LITHOLOGY CONSTRUCTION DIAGRAM CLAY SM GRAVEL LG GRAVEL **SEPTH (FEET)** WATER TABL DESCRIPTION ELEVATION VC SAND VF SAND FACIES I.D. M SAND C SAND F SAND SILTY 465 0 0.0-0.6 ft; Silty Sand, very dark grayish brown, FB 10YR 3/2, moist, soft. 0.6-4.5 ft; Silty Clay, very dark grayish brown, 10YR 3/2, plastic, stiff, moist, common mottles 460 (10YR 4/6), roots; soft to stiff from 2.2-2.9 ft and many mottles; stiff below 2.9 ft; highly 5 plastic below 3.3 ft and common mottles. 4.5-6.0 ft; Clayey Silt, brown, 10YR 4/3, non-FP/ plastic, soft, moist; with clay below 5.3 ft, Lev common mottles (10YR 4/6), iron concretions. 455 6.0-10.8 ft; Silty Sand, brown, 10YR 4/3, wet, loose, dark yellowish brown (10YR 4/4) below 10 10.0 ft; trace fine sand at 10.8 ft, 10YR 4/6. 83 10.8-20.9 ft; Very Fine Sand, with fine sand, CO/ very dark gray, (Gley) 1 3/N, wet, loose to soft, BS sharp contact with above; black very fine 450 coalified wood matter and muscovite mica flakes to 15.0 ft; dark gray and dark grayish 15 brown, 10YR 4/1 and 4/2, from 15.0-16.1 ft 100 and 20.0-20.9 ft; dark gray (Gley 1 4/N) from 16.1-20.0 ft, (clay slough probable in 20.0 ft S.S.). 445 20 83 20.9-36.5 ft; Very Fine to Fine Sand, thin beds, trace medium and coarse sand, dark gray and very dark gray (Gley) 1 3/N and 4/N, wet, soft; 440 laminated black coalified wood matter and muscovite mica flakes below 30.9 ft, (very fine 25 sand and clay slough probable in top of 25.0-100 35.0 ft S.S.). STRATIFICATION LINES ARE DRILLING CO .: Max's Enterprises, Inc. **WATER LEVELS:** DURING DRILLING 6 FEET APPROXIMATE LITHOLOGIC BOUNDARIES DRILLER: Doug Hunziker AFTER DRILLING: \_\_\_ ONLY: ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN LOGGED BY: T. Doll SAMPLES. PIEZOMETER: INSTALLED AT +/- 35.1 FEET DATE DRILLED: 12/11/09 **VERTICAL DATUM: NAVD 88** START TIME: NOTES: 2:45PM END TIME: 5:50PM **HORIZONTAL DATUM: NAD 83**

**BOREHOLE DIA.:** 

8.25"

WEATHER: Cold, 40°F, Mostly Sunny, 5-10 MPH Wind from W.

#### GREDELL **BORING LOG P-195** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Newman-SE-W of Davis Rd, S of LBR Proposed Utility Waste Disposal Area G.S. ELEVATION: 463.44 T.O.C. ELEVATION: 466.07' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 991065.81 **EASTING:** 730256.04 **LITHOLOGY** SF SAMPLE TYPE SM GRAVEI G GRAVEL PEPTH (FEET) WATER TABL **DESCRIPTION** VF SAND VC SAND FACIES I.D. M SAND SAND C SAND 20.9-36.5 ft; Very Fine to Fine Sand, thin beds, CO/ trace medium and coarse sand, dark gray and BS 435 very dark gray (Gley) 1 3/N and 4/N, wet, soft; laminated black coalified wood matter and 30 muscovite mica flakes below 30.9 ft, (very fine 100 sand and clay slough probable in top of 25.0-35.0 ft S.S.). 430 35 100 **BORING TERMINATED IN VERY FINE** SAND @36.5 FT 425 SHELBY TUBE SAMPLE COLLECTED AT 40 2.0-4.0 FT DEPTH AT COMPLETION OF DRILLING. 420 45 415 50 410 55 STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. WATER LEVELS: DURING DRILLING \_\_\_\_6\_\_ FEET APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN AFTER DRILLING: \_ DRILLER: Doug Hunziker DATE: LOGGED BY: T. Doll SAMPLES. PIEZOMETER: INSTALLED AT +/- 35.1 FEET DATE DRILLED: 12/11/09 **NOTES: VERTICAL DATUM: NAVD 88** START TIME: 2:45PM **HORIZONTAL DATUM: NAD 83** END TIME: 5:50PM

**BOREHOLE DIA.:** 

8.25"

WEATHER: Cold, 40°F, Mostly Sunny, 5-10 MPH Wind from W.

#### **GREDELL BORING LOG P-197** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Newman-SE-W of Davis Rd, S of LBR **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 463.54 T.O.C. ELEVATION: 466.10' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 990891.95 **EASTING:** 730883.14 LITHOLOGY WELL CONSTRUCTION DIAGRAM CLAY SM GRAVEL SAMPLE TYPE WATER TABL G GRAVEL DESCRIPTION **VF SAND** /C SAND SAND SAND M SAND SILTY CLAY 465 0 0.0-0.5 ft; Sandy Silt, dark grayish brown, FB 10YR 4/2, non-plastic, soft, moist, roots. 0.5-1.3 ft; Silty Clay and Clayey Silt, thin beds, dark brown and brown, 10YR 3/3 and 4/3, stiff, 460 moist, plastic to 0.9 ft, many mottles (10YR 4/ 6) below 0.9 ft. 5 1.3-4.0 ft; Silty Clay, very dark grayish brown, 10YR 3/2, plastic, stiff, moist, common mottles FP/ (10YR 4/6). Lev 4.0-5.8 ft; Clayey Silt, dark grayish brown, 455 10YR 4/2, laminated, wet, soft. 5.8-8.5 ft; Silty Sand, dark gravish brown, 10 10YR 4/2, herringbone laminae, wet, soft; trace 83 clay 5 mm thin bed at 6.4 ft. 8.5-18.3 ft; Fine Sand, with very fine sand, brown, 10YR 4/3, wet, soft; dark gray, 10YR 4/ 450 1, below 15.3 ft. 15 78 445 18.3-23.3 ft; Fine Sand, with very fine sand, trace medium and coarse sand, dark gray, 20 10YR 4/1, wet, loose, (fine sand slough noted 100 in top of 20.0 ft S.S.). 440 23.3-28.3 ft; Fine Sand, with medium sand, trace coarse sand and gravel, dark gray, 10YR 25 4/1, 10-15 mm subangular clasts, one piece of black coalified wood matter. STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. WATER LEVELS: DURING DRILLING APPROXIMATE LITHOLOGIC BOUNDARIES DRILLER: AFTER DRILLING: FEET Ryan Hunziker ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN LOGGED BY: DATE: T. Doll SAMPLES. DATE DRILLED: PIEZOMETER: INSTALLED AT +/- 34.7 FEET 12/05/09 NOTES: START TIME: **VERTICAL DATUM: NAVD 88** 7:42AM **HORIZONTAL DATUM: NAD 83** END TIME: 11:08AM **BOREHOLE DIA.:** WEATHER: Cold, 20°F, Clear Skies, Calm. 10.25"

#### **GREDELL BORING LOG P-197** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Newman-SE-W of Davis Rd, S of LBR Proposed Utility Waste Disposal Area G.S. ELEVATION: 463.54 T.O.C. ELEVATION: 466.10' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **EASTING:** 730883.14 **NORTHING:** 990891.95 LITHOLOGY CONSTRUCTION DIAGRAM CLAY SM GRAVEL G GRAVEL WATER TABI DESCRIPTION VF SAND ELEVATION VC SAND FACIES I.D. M SAND C SAND F SAND CLAY 435 28.3-33.3 ft; Fine to Medium Sand, with coarse CM/ sand, trace gravel, dark gray, 10YR 4/1, 10-15 Sp 30 mm subangular clasts, wet, 10-20 mm flat 83 pieces of black coalified wood matter. 430 FP/ 33.3-36.5 ft; Very Fine Sand, with fine sand, dark gray, 10YR 4/1, wet, soft to stiff, 15-30 Lev 35 mm black angular and rounded coalified wood 100 matter **BORING TERMINATED IN VERY FINE** SAND @36.5 FT 425 40 420 45 415 50 410 55 STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. **WATER LEVELS:** DURING DRILLING \_\_\_\_5 FEET APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN \_ FEET DRILLER: Ryan Hunziker AFTER DRILLING: \_\_ DATE: LOGGED BY: T. Doll SAMPLES. PIEZOMETER: INSTALLED AT +/- 34.7 FEET 12/05/09 DATE DRILLED: NOTES: **VERTICAL DATUM: NAVD 88** START TIME: 7:42AM **HORIZONTAL DATUM: NAD 83** END TIME: 11:08AM WEATHER: Cold, 20°F, Clear Skies, Calm. **BOREHOLE DIA.:** 10.25"

#### GREDELL **BORING LOG P-199** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Newman-SW-E of farm access Rd, S of LBR **Proposed Utility Waste Disposal Area** G.S. ELEVATION: 465.28 T.O.C. ELEVATION: 468.13' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **EASTING:** 728782.05 **NORTHING:** 990738.72 LITHOLOGY GRAVEL CLAY G GRAVEL WATER TABLE DESCRIPTION VC SAND VF SAND FACIES I.D. M SAND C SAND SAND SILTY CLAY SK 0 465 0.0-3.9 ft; Silty Clay, very dark grayish brown, FB 10YR 3/2, plastic, soft, moist, roots, stiff below 0.5 ft, very stiff and few mottles (10YR 4/6) 55 below 1.8 ft. 3.9-6.3 ft; Poor recovery, probable Silty Clay 5 slough. 460 6.3-7.5 ft; Clayey Silt, brown, 10YR 4/3, muscovite mica flakes, wet, soft, few mottles FP/ (10YR 4/6); trace clay below 6.8 ft; with clay Lev and laminated below 7.3 ft. 10 7.5-18.3 ft; Very Fine Sand, trace fine sand, 455 dark grayish brown, 10YR 4/2, wet, loose; clayey silt thin bed at 6.3 ft, dark gray, (Gley) 1 4/N, laminated, sharp contact; brown, 10YR 4/ 3, below 10.3 ft; dark gray, 10YR 4/1, below 15.3 ft, (clay slough probable in top of 15.0 ft S.S.). 15 450 100 18.3-28.0 ft; Fine Sand, with very fine sand, dark gray and dark grayish brown, 10YR 4/1 20 445 and 4/2, wet, soft; silty clay and very fine sand thin beds below 25.7 ft, dark gray, (Gley) 1 4/ N. CO/ BS 25 440 89 STRATIFICATION LINES ARE APPROXIMATE LITHOLOGIC BOUNDARIES DRILLING CO.: Max's Enterprises, Inc. DURING DRILLING \_\_\_\_\_6.3\_\_\_ FEET WATER LEVELS: AFTER DRILLING: DRILLER: ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN Ryan Hunziker DATE: LOGGED BY: T. Doll SAMPLES. PIEZOMETER: INSTALLED AT +/- 34.9 FEET DATE DRILLED: 12/01/09 NOTES: S. King (Gredell) onsite START TIME: 11:55AM **VERTICAL DATUM: NAVD 88** developing piezometers. END TIME: **HORIZONTAL DATUM: NAD 83** 2:47PM **BOREHOLE DIA.:** WEATHER: Cool, 55°F, Mostly Sunny, 15-20 MPH Wind from SW. 10.25"

#### GREDELL **BORING LOG P-199** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant **LOCATION:** Newman-SW-E of farm access Rd, S of LBR **Proposed Utility Waste Disposal Area G.S. ELEVATION:** 465.28 **T.O.C. ELEVATION:** 468.13' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 990738.72 **EASTING:** 728782.05 LITHOLOGY WELL CONSTRUCTION DIAGRAM CLAY DEPTH (FEET) SM GRAVEI GRAVEL DESCRIPTION VC SAND VF SAND FACIES 1.D. M SAND F SAND C SAND 28.0-36.5 ft; Medium to Coarse Sand, with $\mathbf{C}$ very fine to fine sand, alternating thin beds, 30 trace gravel, dark gray and dark grayish brown, - 435 100 10YR 4/1 and 10YR 4/2, 5-20 mm subangular and subrounded clasts, wet, loose. 35 -- 430 83 **BORING TERMINATED IN COARSE SAND** @36.5 FT 40 425 45 420 50 415 55 410 DRILLING CO.: Max's Enterprises, Inc. STRATIFICATION LINES ARE WATER LEVELS: DURING DRILLING 6.3 FEET APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN DRILLER: AFTER DRILLING: \_ Ryan Hunziker FEET LOGGED BY: DATE: T. Doli SAMPLES. PIEZOMETER: INSTALLED AT +/- 34.9 FEET DATE DRILLED: 12/01/09 START TIME: 11:55AM NOTES: S. King (Gredell) onsite **VERTICAL DATUM: NAVD 88** developing piezometers. END TIME: **HORIZONTAL DATUM: NAD 83** 2:47PM **BOREHOLE DIA.:** WEATHER: Cool, 55°F, Mostly Sunny, 15-20 MPH Wind from SW. 10.25"

#### GREDELL **BORING LOG P-201** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant LOCATION: Newman-SW-E of farm access Rd, S of LBR **Proposed Utility Waste Disposal Area G.S. ELEVATION:** 464.65 **T.O.C. ELEVATION:** 467.08' **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **EASTING:** 729279.14 **NORTHING:** 990567.70 **LITHOLOGY** WELL CONSTRUCTION DIAGRAM CLAY SM GRAVEL SAMPLE TYPE **JEPTH (FEET)** G GRAVEL WATER TABL DESCRIPTION VF SAND /C SAND ACIES I.D. F SAND M SAND SAND SILTY CLAY 465 0 0.0-4.0 ft; Silty Clay, very dark gravish brown. FB 10YR 3/2, plastic, soft, moist, roots, stiff below 0.5 ft, very stiff and mottles (10YR 4/6) below 60 2.5 ft. 4.0-6.3 ft; Poor recovery, probable Silty Clay 460 5 slough. 6.3-11.9 ft; Clayey Silt, Silty Clay, and Sandy 80 Clayey Silt, alternating thin beds, wet, mottles (10YR 4/6) to 10.5 ft; clayey silt to 6.9 ft, brown, 10YR 4/3, slightly plastic, soft to stiff, 455 10 muscovite mica flakes; dark gravish brown and dark gray, 10YR 4/2 and 4/1, below 7.7 ft; trace very fine sand and iron concretions from 8.8-10.5 ft; silty clay below 10.5 ft, dark gray, CO/ 70 (Gley) 1 4/N, plastic, soft, laminated, silt BS interbeds with muscovite mica flakes <1 inch 450 thick, iron staining. 15 11.9-18.3 ft; Silty Sand, dark gray, (Gley) 1 4/ N, laminated, iron staining, muscovite mica flakes, wet, soft, (clay slough noted in 15.0 and 20.0 ft S.S.). 18.3-31.3 ft; Very Fine to Fine Sand, thin beds, with medium sand, trace clay and coarse sand, 20 dark gray (Gley) 1 4/N and 10YR 4/1, wet, 100 soft. FP/ Lev 440 25 100 STRATIFICATION LINES ARE DRILLING CO.: Max's Enterprises, Inc. WATER LEVELS: DURING DRILLING 6.3 FEET APPROXIMATE LITHOLOGIC BOUNDARIES AFTER DRILLING: DRILLER: Ryan Hunziker ONLY; ACTUAL CHANGES MAY BE GRADUAL OR MAY OCCUR BETWEEN DATE: LOGGED BY: T. Doll SAMPLES. PIEZOMETER: INSTALLED AT +/- 35.0 FEET DATE DRILLED: 12/01/09 NOTES: S. King (Gredell) onsite **VERTICAL DATUM: NAVD 88** START TIME: 8:10AM developing piezometers. **HORIZONTAL DATUM: NAD 83** END TIME: 11:00PM

BOREHOLE DIA.:

8.25"

WEATHER: Cold, 30°F, Clear Skies, 5 MPH Wind from S.

#### **GREDELL BORING LOG P-201** ENGINEERING RESOURCES, INC. Ameren Missouri Labadie Power Plant **LOCATION:** Newman-SW-E of farm access Rd, S of LBR Proposed Utility Waste Disposal Area G.S. ELEVATION: 464.65 T.O.C. ELEVATION: 467.081 **Detailed Site Investigation** CLIENT: Reitz & Jens, Inc. **NORTHING:** 990567.70 **EASTING:** 729279.14 **LITHOLOGY** PERCENT RECOVERY WELL CONSTRUCTION DIAGRAM WATER TABLE CLAY SAMPLE TYPE SM GRAVEL G GRAVEL **DESCRIPTION** SAND SAND M SAND C SAND SAND 18.3-31.3 ft; Very Fine to Fine Sand, thin beds, FP/ with medium sand, trace clay and coarse sand. Lev dark gray (Gley) 1 4/N and 10YR 4/1, wet, 435 soft. 30 100 31.3-36.5 ft; Fine to Medium Sand, thin beds, CM/ trace gravel, dark gray, 10YR 4/1, 10 mm Sp subrounded and subangular clasts, wet. 430 35 78 **BORING TERMINATED IN MEDIUM** SAND @36.5 FT 425 40 420 45 415 50 - 410 55 DRILLING CO.: Max's Enterprises, Inc. STRATIFICATION LINES ARE **WATER LEVELS:** DURING DRILLING \_\_\_ 6.3 APPROXIMATE LITHOLOGIC BOUNDARIES ONLY; ACTUAL CHANGES MAY BE DRILLER: Ryan Hunziker AFTER DRILLING: \_\_ LOGGED BY: GRADUAL OR MAY OCCUR BETWEEN T. Doll DATE: \_ SAMPLES. DATE DRILLED: PIEZOMETER: INSTALLED AT +/- 35.0 FEET 12/01/09 START TIME: NOTES: S. King (Gredell) onsite 8:10AM **VERTICAL DATUM: NAVD 88** developing piezometers. END TIME: 11:00PM **HORIZONTAL DATUM: NAD 83 BOREHOLE DIA.:** 8.25" WEATHER: Cold, 30°F, Clear Skies, 5 MPH Wind from S.

## GREDELL Engineering Resources, Inc. Geologic Descriptions of Temporary Borings

### Log Description for B-10

0-4.8 ft; Clay to Silty Clay, pale yellowish brown, 10YR 6/2, w/light brown mottles, sparse silt layers (Facies I.D. – Flood Basin).

4.8-9.3 ft; Silt to Clayey Silt, pale yellowish brown, 10YR 6/2 (Facies I.D. – Flood Basin).

9.3-16.8 ft; Very Fine Sand, grayish orange, 10YR 7/4, common clay and silt layers above 12 ft, slightly silty below (Facies I.D. – Floodplain/Levee).

16.8-26.8 ft; Very Fine to Fine Sand, grayish orange, 10YR 7/4, clean, well sorted (Facies I.D. – Floodplain/Levee).

26.8-35.0 ft; Gravelly Sand, grayish orange, 10YR 7/4, common granules and rounded pebbles up to 10 mm dia (Facies I.D. – Channel).

## GREDELL Engineering Resources, Inc. Geologic Descriptions of Temporary Borings

- 0-13.5 ft; Sample not available.
- 13.5-27.8 ft; Fine Sand, grayish orange, 10YR 7/4, clean, well sorted (Facies I.D. Floodplain/Levee).
- 27.8-31.8 ft; Coarse to Very Coarse Sand, grayish orange, 10YR 7/4, gravelly w/common granules to fine pebbles up to 5 mm dia (Facies I.D. Channel).
- 31.8-36.8 ft; Gravel, mostly 5-10 mm (poor sample recovery) (Facies I.D. Channel).
- 36.8-41.8 ft; Coarse Sand, pale yellowish brown, 10YR 6/2, sparse granules and fine pebbles up to 5 mm dia (Facies I.D. Channel).
- 41.8-50.0 ft; Gravel, angular limestone fragments to rounded pebbles up to 15 mm dia, very poorly sorted, poor sample recovery below 45 ft (Facies I.D. Channel).

## GREDELL Engineering Resources, Inc. Geologic Descriptions of Temporary Borings

- 0-3.3 ft; Fine Sand interbedded with clay and silt, moderate yellowish brown, 10YR 5/4 (Facies I.D. Flood Basin).
- 3.3-6.5 ft; Very Fine to Fine Sand, moderate yellowish brown, 10YR 5/4, silty (Facies I.D. Flood Basin).
- 6.5-9.3 ft; Silt, pale yellowish brown, 10YR 6/2, sparse very fine sand (Facies I.D. Flood Basin).
- 9.3-12.5 ft; Very Fine Sand, Silt and Clay, alternating very thin beds, pale yellowish brown, 10YR 6/2 (Facies I.D. Flood Basin).
- 12.5-16.8 ft; Very Fine Sand, pale yellowish brown, 10YR 6/2, silty, trace fine sand (Facies I.D. Floodplain/Levee).
- 16.8-26.8 ft; Very Fine to Fine Sand, pale yellowish brown, 10YR 6/2, clean, well sorted, slight downward increase in grain size (Facies I.D. Floodplain/Levee).
- 26.8-35.0 ft; Gravelly Sand, grayish orange (10YR 7/4) to dark yellowish orange (10YR 6/6), abundant granules and pebbles up to 25 mm dia (Facies I.D. Floodplain/Levee).

## GREDELL Engineering Resources, Inc. Geologic Descriptions of Temporary Borings

- 0-4.8 ft; Clayey Silt to Silt, pale yellowish brown, 10YR 6/2 (Facies I.D. Flood Basin).
- 4.8-9.3 ft; Silt, pale yellowish brown, 10YR 6/2, trace clay (Facies I.D. Flood Basin).
- 9.3-12.5 ft; Very Fine Sand, pale yellowish brown, 10YR 6/2, trace silt (Facies I.D. Floodplain/Levee).
- 12.5-26.8 ft; Very Fine to Fine Sand, pale yellowish brown (10YR 6/2) to grayish orange (10YR 7/4) (Facies I.D. Floodplain/Levee).
- 26.8-41.8 ft; Coarse to Very Coarse Sand, grayish orange, 10YR 7/4, common granules and pebbles up to 10 mm dia (Facies I.D. Channel).
- 41.8-45.0 ft; Gravel, pale yellowish brown, 10YR 6/2, angular to well-rounded pebbles up to 30 mm dia (Facies I.D. Channel).

## GREDELL Engineering Resources, Inc. Geologic Descriptions of Temporary Borings

- 0-5.8 ft; Very Fine Sand, pale yellowish brown, 10YR 6/2, slightly silty (Facies I.D. Flood Basin).
- 5.8-12.0 ft; Silt and Very Fine Sand, alternating thin beds, pale yellowish brown, 10YR 6/2 (Facies I.D. Flood Basin).
- 12.0-16.8 ft; Very Fine Sand, grayish orange, 10 YR 7/4, slightly silty (Facies I.D. Floodplain/Levee).
- 16.8-21.8 ft; Fine Sand, pale yellowish brown, 10YR 6/2, sparse silt and very fine sand (Facies I.D. Floodplain/Levee).
- 21.8-37.5 ft; Medium to Coarse Sand, dark yellowish brown (10YR 4/2) to grayish orange (10YR 7/4), abundant black coalified wood fragments up to 30 mm dia above 25 ft, sparse elsewhere, sparse to common granules (Facies I.D. Channel, Channel Margin/Splay).
- 37.5-50.0 ft; Coarse Sand, pale yellowish brown, 10YR 6/2, gravelly, very poorly sorted, common granules and pebbles up to 10 mm dia (Facies I.D. Channel).

## GREDELL Engineering Resources, Inc. Geologic Descriptions of Temporary Borings

- 0-4.8 ft; Clay to Silty Clay, pale yellowish brown, 10YR 6/2 (Facies I.D. Flood Basin).
- 4.8-12.5 ft; Fine Sand, grayish orange, 10 YR 7/4, scattered clay layers above 9 ft, clean, well sorted below (Facies I.D. Floodplain/Levee).
- 12.5-16.8 ft; Very Fine to Fine Sand, pale yellowish brown (10YR 6/2) to dark yellowish brown (10YR 4/2), scattered layers silt and clay (Facies I.D. Floodplain/Levee).
- 16.8-21.8 ft; Fine Sand, grayish orange, 10 YR 7/4, well sorted to moderately well sorted, common medium sand, clean (Facies I.D. Floodplain/Levee).
- 21.8-26.8 ft; Coarse to Very Coarse Sand, grayish orange, 10 YR 7/4, gravelly w/common granules and pebbles up to 10 mm dia (Facies I.D. Channel).
- 26.8-35.0 ft; Medium Sand, pale yellowish brown, 10YR 6/2, trace granules, well sorted toward base (Facies I.D. Channel Margin/Splay).

## GREDELL Engineering Resources, Inc. Geologic Descriptions of Temporary Borings

- 0-4.0 ft; No sample available.
- 4.0-6.3 ft; Fine Sand, grayish orange, 10YR 7/4, clean, well sorted (Facies I.D. Floodplain/Levee).
- 6.3-12.5 ft; Very Fine Sand, Silt and Clay, alternating very thin beds, dark yellowish orange, 10YR 6/6, becoming more sandy, pale yellowish brown, 10YR 6/2 below 10 ft (Facies I.D. Flood Basin).
- 12.5-16.8 ft; Very Fine Sand, very dark greenish gray (Gley) 1 3/1, silty, saturated (Facies I.D. Cut-Off/Backswamp).
- 16.8-21.8 ft; Very Fine Sand, Silt and Clay, alternating very thin beds, pale yellowish brown, 10YR 6/2, no obvious gley coloration (Facies I.D. Floodplain/Levee).
- 21.8-35.0 ft; Medium Sand, grayish orange, 10YR 7/4, clean, well sorted, trace black carbonaceous matter at base (Facies I.D. Floodplain/Levee).

## GREDELL Engineering Resources, Inc. Geologic Descriptions of Temporary Borings

- 0-4.8 ft; Silty Clay to Clayey Silt, dark yellowish brown, 10YR 4/2 (Facies I.D. Flood Basin).
- 4.8-16.8 ft; Very Fine to Fine Sand, pale yellowish brown, 10YR 6/2, slightly silty, saturated (Facies I.D. Floodplain/Levee).
- 16.8-21.8 ft; Medium Sand, grayish orange, 10YR 7/4, moderately sorted, common fine and coarse-sized sand, sparse very coarse sand and granules (Facies I.D. Channel Margin/Splay).
- 21.8-26.8 ft; Very Fine to Fine Sand, very dark greenish gray (Gley) 1 3/1, silty, common black carbonaceous matter (Facies I.D. Cutoff/Back Swamp).
- 26.8-41.8 ft; Medium Sand, grayish orange (10YR 7/4) to pale yellowish brown (10YR 6/2), well sorted, grading to moderately sorted, base marked by coarse wood fragments and pebbles up to 30 mm dia., probable scour contact (Facies I.D. Floodplain/Levee).
- 41.8-46.8 ft; Coarse Sand, grayish orange, 10YR 7/4, common granules and fine pebbles up to 5 mm dia (Facies I.D. Channel).
- 46.8-50.0 ft; Coarse to Very Coarse Sand, pale yellowish brown (10YR 6/2), common granules and pebbles up to 10 mm dia (Facies I.D. Channel).

## GREDELL Engineering Resources, Inc. Geologic Descriptions of Temporary Borings

### Log Description for B-58

0-7.8 ft; Clay to Silty Clay, light olive gray, 5Y 6/1 (Facies I.D. – Flood Basin).

7.8-12.5 ft; Clay, Silt, and Very Fine Sand, alternating very thin beds, pale yellowish brown, 10YR 6/2 (Facies I.D. – Flood Basin).

12.5-26.8 ft; Fine to Medium Sand, pale yellowish brown, 10YR 6/2, well sorted grading to moderately sorted w/common granules and pebbles up to 10 mm dia (Facies I.D. – Floodplain/Levee, Channel Margin/Splay).

26.8-35.0 ft; Medium to Coarse Sand, grayish orange, 10YR 7/4, sparse gravel grading to gravelly w/common rounded to angular pebbles up to 30 mm dia (Facies I.D. – Channel).

## GREDELL Engineering Resources, Inc. Geologic Descriptions of Temporary Borings

- 0-4.8 ft; Silt to Clayey Silt, dark brown, 10YR 3/2, slightly plastic, stiff, damp (Facies I.D. Flood Basin).
- 4.8-12.5 ft; Silt to Very Fine Sand, alternating very thin beds to laminated, light brown, 10YR 4/3, clay layers above 10 ft, moist to wet (Facies I.D. Flood Basin).
- 12.5-16.8 ft; Silt to Very Fine Sand, as above except Gley colored (1 4/N) (Facies I.D. Cutoff/Back Swamp).
- 16.8-26.8 ft; Fine to Medium Sand, brownish gray, 10YR 4/1 to 10YR 4/3, trace coarse sand and fine pebbles up to 5 mm dia (Facies I.D. Floodplain/Levee).
- 26.8-31.8 ft; Very Fine Sand, light brown to gray (10YR 4/2) to Gley colored (1 4/N), saturated (Facies I.D. Cutoff/Back Swamp).
- 31.8-35.0 ft; Very Fine to Fine Sand, brown and gray (10YR 4/1 and 10YR 4/2), no Gley coloration, trace medium to coarse sand (Facies I.D. Floodplain/Levee).

## GREDELL Engineering Resources, Inc. Geologic Descriptions of Temporary Borings

### Log Description for B-92

0-4.5 ft; Silt and Clay, brown, 10YR 3/3, plastic, stiff, damp (Facies I.D. – Flood Basin).

4.5-8.3 ft; Silt, light brown, 10YR 4/2, sandy, wet (Facies I.D. – Flood Basin).

8.3-31.8 ft; Very Fine to Fine Sand, light brown to gray, 10YR 4/1 to 10YR 4/2, silty above 10 ft, trace medium to coarse sand and fine pebbles at 20 ft and 30 ft, wood fragments noted at 30 ft (Facies I.D. – Floodplain/Levee).

31.8-45.0 ft; Medium to Coarse Sand, gray, 10YR 4/1, gravelly w/sparse to abundant subangular to subrounded pebbles up to 40 mm dia (Facies I.D. – Channel).

## GREDELL Engineering Resources, Inc. Geologic Descriptions of Temporary Borings

### Log Description for B-100

0-5.0 ft; Silt and Clay, brownish gray (Facies I.D. - Flood Basin).

5.0-29.0 ft; Very Fine to Fine Sand, light brown, 10YR 4/2, silty above 12 ft, trace medium to coarse sand below (Facies I.D. – Floodplain/Levee).

29.0-37.5 ft; Medium to Coarse Sand, gray, 10YR 4/1, trace to common gravel consisting of subrounded to angular pebbles up to 35 mm dia (Facies I.D. – Channel).

37.5-100.0 ft; Gravelly Sand to Gravel, gray, 10YR 4/1, varying proportions of subrounded to angular pebbles of quartz, feldspathic and basaltic rock fragments, and limestone up to 30 mm dia, mostly in medium to coarse sand matrix (Facies I.D. – Channel).

## GREDELL Engineering Resources, Inc. Geologic Descriptions of Temporary Borings

### Log Description for B-101

0-4.8 ft; Silty Clay to Clay, light olive gray, 5Y 6/1 (Facies I.D. – Flood Basin).

4.8-16.8 ft; Very Fine to Fine Sand, grayish orange (10YR 7/4) to pale yellowish brown (10YR 6/2), clean w/fine sized black carbonaceous matter grading to poorly sorted w/silt and medium sand, grading to clean, well sorted at base (Facies I.D. – Floodplain/Levee).

16.8-21.8 ft; Medium to Coarse Sand, grayish orange, 10YR 7/4, grading to very fine to fine sand (Facies I.D. – Channel Margin/Splay).

21.8-31.8 ft; Gravelly Sand, grayish orange, 10YR 7/4, abundant granules and pebbles up to 10 mm dia., in poorly sorted matrix of fine to very coarse sand (Facies I.D. – Channel).

31.8-36.8 ft; Coarse Sand, dark yellowish brown, 10YR 4/2, common black carbonized wood fragments up to 20 mm dia., trace granules and pebbles (Facies I.D. – Channel).

36.8-46.8 ft; Gravelly Sand, grayish orange, 10YR 7/4, abundant pebbles up to 30 mm dia. in coarse sand matrix (Facies I.D. – Channel).

46.8-50.0 ft; Medium to Coarse Sand, pale yellowish brown (10YR 6/2), sparse granules and pebbles up to 10 mm dia (Facies I.D. – Channel Margin/Splay).

## GREDELL Engineering Resources, Inc. Geologic Descriptions of Temporary Borings

### Log Description for B-115

0-8.5 ft; Clay, olive gray, 5Y 4/1 (Facies I.D. - Flood Basin).

8.5-15.0 ft; Clay and Silt, interlaminated, dark yellowish orange, 10YR 6/6 (Facies I.D. – Flood Basin).

15.0-26.8 ft; Fine to Medium Sand, grayish orange, 10YR 7/4, moderately sorted, trace granules (Facies I.D. – Floodplain/Levee).

26.8-31.8 ft; Fine Sand, grayish orange, 10YR 7/4, trace very fine sand and silt laminae (Facies I.D. – Floodplain/Levee).

31.8-45.0 ft; Gravelly Sand, dark yellowish brown (10YR 4/2) to pale yellowish brown (10YR 6/2), abundant granules and fine pebbles up to 5 mm dia. with pebble size increasing to 40 mm toward base (Facies I.D. – Channel).

## GREDELL Engineering Resources, Inc. Geologic Descriptions of Temporary Borings

- 0-6.3 ft; Clay, brown 10YR 3/3, silty, mottles, 10YR 4/6, plastic, stiff, moist (Facies I.D. Flood Basin).
- 6.3-9.5 ft; Silt, gray to brown, 10YR 4/1 and 4/2, trace clay, mottled, 10YR 4/6, wet (Facies I.D. Flood Basin).
- 9.5-21.8 ft; Very Fine Sand, light brown to gray, 10YR 4/2 and 4/1, trace fine sand and carbonized wood fragments, wet (Facies I.D. Floodplain/Levee).
- 21.8-35.0 ft; Medium to Coarse Sand, gray, 10YR 4/1, common granules and subrounded pebbles of limestone, feldspathic rock fragments, and quartz up to 10 mm dia, trace larger pebbles up to 30 mm dia (Facies I.D. Channel).

## GREDELL Engineering Resources, Inc. Geologic Descriptions of Temporary Borings

- 0-4.8 ft; Silty Clay to Clay, pale yellowish brown, 10YR 6/2 (Facies I.D. Flood Basin).
- 4.8-16.8 ft; Very Fine to Fine Sand, grayish orange (10YR 7/4) to pale yellowish brown (10YR 6/2), silty at top, grading to clean w/common medium sand and black carbonaceous fragments at base, saturated (Facies I.D. Floodplain/Levee).
- 16.8-21.8 ft; Fine to Medium Sand, grayish orange, 10YR 7/4, trace silt, moderately sorted to poorly sorted (Facies I.D. Floodplain/Levee).
- 21.8-26.8 ft; Medium to Coarse Sand, pale yellowish brown, 10YR 6/2, sparse granules and small pebbles up to 10 mm dia (Facies I.D. Channel).
- 26.8-35.0 ft; Gravelly Sand, grayish orange 10YR 7/4, abundant granules and small pebbles up to 10 mm dia. in medium to very coarse sand matrix, poorly sorted (Facies I.D. Channel).

## GREDELL Engineering Resources, Inc. Geologic Descriptions of Temporary Borings

### Log Description for B-153

0-4.8 ft; Clay, dark brown, 10YR 3/2, trace silt, plastic, stiff, damp (Facies I.D. – Flood Basin).

4.8-11.0 ft; Silt, light brown, 10YR 4/2, trace clay, mottles, 10YR 4/6, non cohesive, moist (Facies I.D. – Flood Basin).

11.0-26.8 ft; Very Fine Sand, light brown, 10YR 4/2, grading to gray, 10YR 4/1, trace fine sand (Facies I.D. – Floodplain/Levee).

26.8-36.8 ft; Gravel, granule to cobble-sized, angular to subrounded clasts of quartz, feldspathic and basaltic rock fragments, and limestone up to 30 mm dia in fine to coarse sand matrix (Facies I.D. – Channel).

36.8-41.8 ft; Medium to Coarse Sand, gray, 10YR 4/1, common gravel, subrounded to subangular granules and pebbles up to 10 mm dia., trace cobbles (Facies I.D. – Channel).

41.8-45.0 ft; Gravel, light brown, 10YR 4/2, subrounded to subangular granules and pebbles up to 10 mm dia in coarse sand matrix (Facies I.D. – Channel).

### GREDELL Engineering Resources, Inc. Geologic Descriptions of Temporary Borings

- 0-4.8 ft; Clay, dark brown, 10YR 3/2, silty, plastic, stiff, moist (Facies I.D. Flood Basin).
- 4.8-16.8 ft; Very Fine Sand, light brown, 10YR 4/2, grading to grayish, 10YR 4/1 toward base, trace silt and clay, common black carbonaceous material toward base, saturated (Facies I.D. Floodplain/Levee).
- 16.8-21.8 ft; Fine Sand, light brown, 10YR 4/1 and 4/2, moderately sorted w/common very fine sand and trace coarse sand and fine gravel, saturated (Facies I.D. Floodplain/Levee).
- 21.8-36.8 ft; Medium to Coarse Sand, light brown, 10YR 4/1, common granules and fine pebbles up to 5 mm dia (Facies I.D. Channel).
- 36.8-40.0 ft; Gravelly Sand, dark brown, 10YR 3/1, common granules and fine pebbles up to 5 mm dia., trace larger pebbles up to 30 mm dia (Facies I.D. Channel).

### GREDELL Engineering Resources, Inc. Geologic Descriptions of Temporary Borings

- 0-3.3 ft; Clay, olive black, 5Y 2/1, plastic, moist (Facies I.D. Flood Basin).
- 3.3-7.8 ft; Clay to Silty Clay, dark yellowish brown, 10YR 4/2, plastic, mottled (Facies I.D. Flood Basin).
- 7.8-15.0 ft; Clay, dark yellowish brown, 10YR 4/2, plastic (Facies I.D. Flood Basin).
- 15.0-36.8 ft; Fine Sand, grayish orange, 10YR 7/4, clean, trace black carbonaceous matter 28 feet, becoming abundant below (Facies I.D. Floodplain/Levee).
- 36.8-41.8 ft; Gravel, pale yellowish brown, 10YR 6/2, poorly sorted, subrounded to angular pebbles up to 20 mm dia. in coarse sand matrix, possible scoured contact w/below (Facies I.D. Channel).
- 41.8-46.8 ft; Clay, very dark greenish gray (Gley) 1 3/1, silty, trace very fine sand, no obvious bedding (Facies I.D. Cutoff/Back Swamp).
- 46.8-50.0 ft; Very Fine Sand, light olive gray, 5Y 6/1, possible Gley-colored, common black carbonaceous matter (Facies I.D. Cutoff/Back Swamp).

### GREDELL Engineering Resources, Inc. Geologic Descriptions of Temporary Borings

- 0-7.8 ft; Silt, light brown, 10YR 4/3, trace clay, moist, non cohesive, soft (Facies I.D. Flood Basin).
- 7.8-12.5 ft; Very Fine Sand, light brown, 10YR 4/2, saturated (Facies I.D. Floodplain/Levee).
- 12.5-16.8 ft; As above, except color change to Gley, 1 4/N (Facies I.D. Cutoff/Back Swamp).
- 16.8-26.8 ft; Very Fine to Fine Sand, light brown, 10YR 4/2, trace medium to coarse sand (Facies I.D. Floodplain/Levee).
- 26.8-31.8 ft; Medium to Coarse Sand, gray, 10YR 4/1, common granules and subrounded pebbles up to 15 mm dia (Facies I.D. Channel).
- 31.8-35.0 ft; Gravelly Sand, gray, 10YR 4/1, mostly subrounded pebbles of quartz, feldspathic and basaltic rock fragments up to 10 mm dia, in medium to coarse sand matrix, trace coarser pebbles up to 25 mm dia (Facies I.D. Channel).

### GREDELL Engineering Resources, Inc. Geologic Descriptions of Temporary Borings

- 0-4.5 ft; Silty Clay, olive black, 5Y 2/1, slightly plastic, stiff (Facies I.D. Flood Basin).
- 4.5-7.8 ft; Silt, pale yellowish orange, 10YR 8/6, laminated, non cohesive (Facies I.D. Flood Basin).
- 7.8-11.5 ft; Clay, very dark greenish gray (Gley) 1 3/1, light brown mottles, 5YR 5/6, plastic, soft (Facies I.D. Cutoff/Back Swamp).
- 11.5-26.8 ft; Very Fine to Fine Sand, pale yellowish brown, 10YR 6/2, well sorted, clean, possibly Gley coloration toward base (Facies I.D. Floodplain/Levee).
- 26.8-36.8 ft; Coarse Sand, grayish orange (10YR 7/4) to dark yellowish orange (10YR 6/6), common subangular to subrounded pebbles up to 20 mm dia, becoming more abundant toward base (Facies I.D. Channel).
- 36.8-46.8 ft; Fine Sand, grayish orange, 10YR 7/4, moderately well sorted, trace granules (Facies I.D. Floodplain/Levee).
- 46.8-54.3 ft; Gravelly Sand, grayish orange (10YR 7/4) to dark yellowish orange (10YR 6/6), poorly sorted, rounded to subangular pebbles up to 20 mm dia (Facies I.D. Channel).
- 54.3-60.0 ft; Medium Sand, grayish orange, 10YR 7/4, trace granules (Facies I.D. Channel Margin/Splay).

### GREDELL Engineering Resources, Inc. Geologic Descriptions of Temporary Borings

- 0-4.8 ft; Clay to Silty Clay, dark yellowish brown, 10YR 4/2, plastic, firm (Facies I.D. Flood Basin).
- 4.8-11.5 ft; Clay, pale yellowish brown, 10YR 6/2, plastic, soft (Facies I.D. Flood Basin).
- 11.5-21.8 ft; Very Fine to Fine Sand, grayish orange, 10YR 7/4, well sorted, clean, grading to fine sand w/ trace black carbonaceous fragments toward base (Facies I.D. Floodplain/Levee).
- 21.8-35.0 ft; Fine to Medium Sand, grayish orange, 10YR 7/4, possible Gley coloration at top, trace granules and fine pebbles up to 5 mm dia (Facies I.D. Channel Margin/Splay).

## **Appendix 5**

### Piezometer Construction Details

Detailed Site Investigation Proposed Utility Waste Disposal Area Ameren Labadie Power Plant

Prepared by: GREDELL Engineering Resources, Inc.

<del>*************************************</del>	<del></del>	r			·	
	Top Casing Elev: 473.26 ft			/	Concrete Pad	
Ground Su	urface Elev: 469.90 ft	1		/ 		
				•		
May	Convenient Planetters and a second					
	Groundwater Elevation: 464.60 ft Groundwater Elevation: 456.43 ft					
	1					
						•
Pieze	ometer Construction Quantities;					
Ting	onition deligit designies.					
1. Prima	ry Filter Sand – 375 lb.					•
	dary Filter Sand $-\frac{90}{107}$ lb.					
Remarks:	inte Siuriy — gvii	$\bigotimes$	——————————————————————————————————————	Connector	451.12 ft	
Natur of Co	ral Sand Collapse Comprises @60 % alculated Sand Volume.	$\bowtie$		Secondary er Pack	134.12 R	•
Attrib	er than Calculated Grout Volume Used outable to Apparent Washouts in	XX	Top	Primary Filter I	Pack	
Boreh	nole.	_	(10	0/20 Sand): of Screen (20	449.12	ft
		E		(Nominal) Sched	ule 40 PVC ( 10 ft L	. ft ength)
		Ē	∄	Coordinates	i.	
		Ē		N: 996108.4		
		E		E: 726981.7	8	
		E	∄∥			
	Bottom Hole Depth: 34.8 bgs	E		Base Sump:	37.97 btoc	
	-	10	.25	Base Elev:	435.29 ft	
		Inc	hes			
	PIEZOMETER		GRF	DFII Fn	gineering P	esources, Inc.
P-9	CONSTRUCTION	ŀ			NMENTAL ENGI	
	DIAGRAM			AND	AIR	WATER
Date Piezometer Completed:	AMEREN MISSOURI	.	Jefferson City	st High Street , Missouri 65101		Telephone: (573) 659-9078 Facsimile: (573) 659-9079
10/20/09	LABADIE POWER PLANT		DATE 1/2010	SCALE N.T.S.	DRAWN BY: BED	APPROVED BY: MCC

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					, , , , , , , , , , , , , , , , , , , ,				
	Top Casing Elev:	472.14 ft	Ц	<del>"</del> 1		Concrete	Pad		
Ground Su	rface Elev: 468.95	14 (1990) (1990)		No				<del></del>	<del></del>
	•			$\mathcal{M}$					
Moximum	Groundwater Elevation:	464.19 ft			•				
	Groundwater Elevation:								
<b>6</b> '								•	
riezo	ometer Construction Quar	itities:							
1. Primar	ry Filter Sand – 2	00 lb.							
		45 lb.	M			,			
3. Bentor	nite Slurry - 76	gal.							
Remarks: Natur	al Sand Collapse Compris	tes @50 %	ळ			449.71 ft			
of Co	ilculated Sand Volume.	<del></del>	$\bowtie$	Fi	ter Pack				
Attrib	r than Calculated Grout utable to Apparent Wash		M	Ţ	p Primary Filter I	Pack			
Boreh	iole.			. 100001	20/40 Sand): p of Screen (10		ft 445.71 ft	*	
				2	(Nominal) Sched	ule 40 PVC (	10 ft Len	gth)	
				3	Coordinates				
				3	N: 996215.7				
				3	E: 728171.1	2			,
				3					
				3					
	Bottom Hole Depth:	33.8 bgs	Ē	3	Base Sump:	36.76 btd	oc		
			8.	25	Bose Elev:	435.38 ft			
· · · · · · · · · · · · · · · · · · ·			Inc	hes					
	PIEZON	/IETER		GRI	DELL En	gineeri	ng Re	sources	. Inc.
P-12	CONSTR					NMENTAL			,
	DIAG	KAM			LAND	Al		WATE	
Date Plezometer Completed:	AMEREN N	/IISSOURI		Jefferson C	ast High Street ity, Missouri 65101			Telephone: (57: Facsimile: (57:	
9/16/09	LABADIE POV	VER PLANT		DATE 1/2010	SCALE N.T.S.	DRAWN BY:	BED	APPROVED BY:	MCC

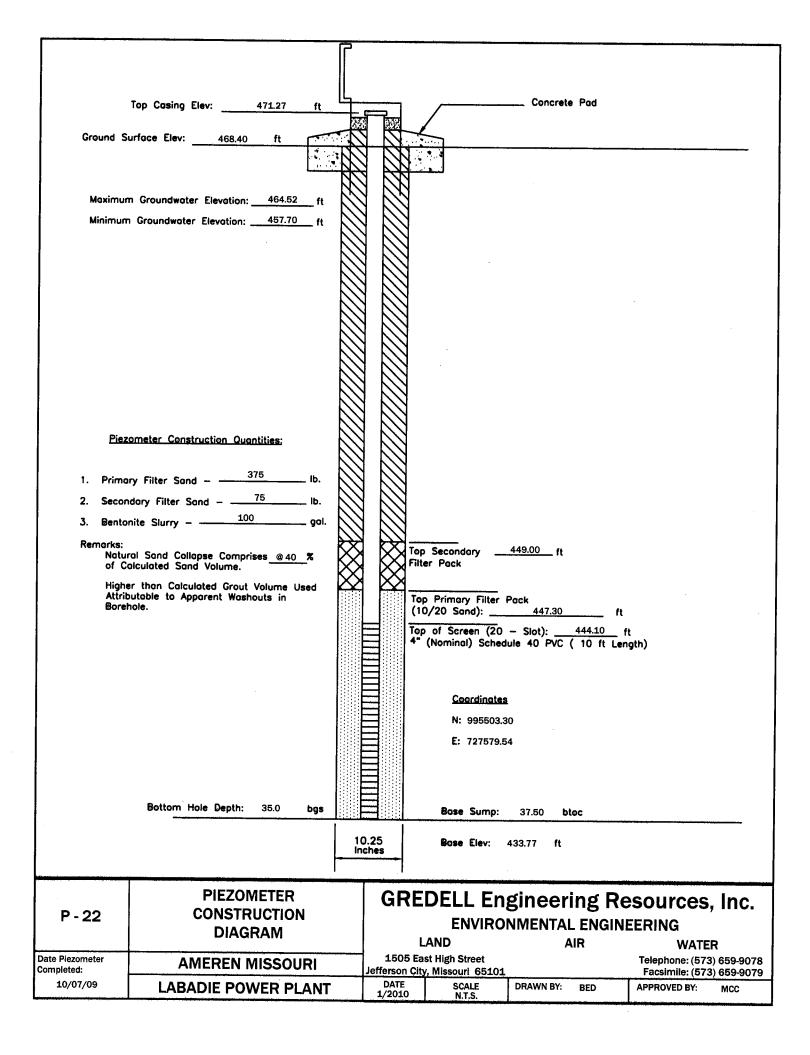
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		Total Control				
,	op Casing Elev: 472.40 ft				Concrete Pad	
	rface Elev: 469.35 ft			/ 		
	Groundwater Elevation: 464.49 ft  Groundwater Elevation: 457.17 ft					
<u>Piezc</u>	ometer Construction Quantities:					
2. Second	y Filter Sand — 150 lb.  dary Filter Sond — 50 lb.  ite Slurry — 78 gal.					
of Co Highe Attrib	ol Sand Collapse Comprises <u>@ 65</u> % ilculated Sand Volume.  r than Calculated Grout Volume Used utable to Apparent Washouts in		Filte	Primary Filter F	449.08 ft Pack	
Boreh	ole.		Top	of Screen (10 (Nominal) Schedu		ft
				Coordinates N: 995802.4 E: 727271.30		
	Bottom Hole Depth: 35.0 bgs			Base Sump:	37.55 <b>btoc</b>	
		8. In	.25 ches	Base Elev:	434.85 ft	
P - 15	PIEZOMETER CONSTRUCTION DIAGRAM		L	ENVIROI AND	gineering R NMENTAL ENGIN AIR	esources, Inc. IEERING WATER
Date Piezometer Completed: 9/17/09	AMEREN MISSOURI LABADIE POWER PLAN	Г	Jefferson Cit	st High Street , Missouri 65101 SCALE	DRAWN BY: BED	Telephone: (573) 659-9078 Facsimile: (573) 659-9079 APPROVED BY: MCC
	LADADIE I OTTEN I LAN		1/2010	N.T.S.		<u> </u>

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	Top Casing Elev: 472.19 ft	<u> </u>			Concrete Pad	•
Ground Si	urface Elev: 469.30 ft			<b>/</b> 		
				•		
	_			<del></del>		
	n Groundwater Elevation: 464.23 ft  Groundwater Elevation: 457.81 ft					
	Totaliawater Elevation, 407.02					
•						
<u>Piez</u>	ometer Construction Quantities:				·	
1 Daime	ry Filter Sand – 225 lb.					
	ry Filter Sand – 225 lb. ldary Filter Sand – 50 lb.					
	nite Slurry – 70 gal	. []]				
Remarks:	ral Sand Collapse Comprises @ 50 %	$\otimes$		Secondary	448.73ft	
of Ce	olculated Sand Volume.	$\otimes$	Filt	er Pack		
nigne Attrib Borel	er than Calculated Grout Volume Used outable to Apparent Washouts in hole.			Primary Filter (		
			Top	of Screen (10	- Slot): 444.93 f	t
			2"	(Nominal) Sched	ule 40 PVC ( 10 ft Len	gth)
				•		
				Coordinates		
				N: 995789.7		
				E: 727851.6	1	
	Bottom Hole Depth: 35.0 bgs			Base Sump:	37.59 <b>btoc</b>	
		8	.25	Base Elev:	434.60 ft	<u> </u>
		In	ches	BUSC LIEV.	434.00 It	
	PIEZOMETER	•	CDE	DELL Ex	dinocrine De	20011600 1
P-17	CONSTRUCTION		GRE		gineering Re NMENTAL ENGIN	esources, Inc.
	DIAGRAM			AND	AIR	WATER
Date Piezometer Completed:	AMEREN MISSOURI		1505 Ea	st High Street v, Missouri 65101		Telephone: (573) 659-9078 Facsimile: (573) 659-9079
9/16/09	LABADIE POWER PLAN	T	DATE 1/2010	SCALE N.T.S.	DRAWN BY: BED	APPROVED BY: MCC
						The second control of

	<del> </del>							4 W W	
					,				
	Top Casing Elev: 470.84 ft	4			/	Concrete	Pad		
Ground Si	urface Elev: 467.90 ft				/ 				
				-					
Maximun	n Groundwater Elevation: <u>464.09</u> ft								
Minimum	Groundwater Elevation: <u>458.09</u> ft								
Piez	ometer Construction Quantities;								
	390 Ib								
	ry Filter Sand $ \frac{350}{}$ lb.								
	nite Slurry – 108 gal.								
Remarks: Natui	rol Sand Collapse Comprises @40 %				Secondary	448.44 ft			
Highe	er than Calculated Grout Volume Used	$\otimes$	$  \otimes$						
Borel	outable to Apparent Washouts in hole.			(20	Primary Filter   /40 Sand):	447.24	ft		
				Тор 4"	of Screen (10 (Nominal) Sched	- Slot); ule 40 PVC (	443.84 f	t gth)	
					Coordinates				
					N: 995768.9 E: 728438.4				
								•	
	Bottom Hole Depth: 34.8 bgs				Base Sump:	37.33 bt	oc		
			0.25 ches		Base Elev:	433.51 ft		•	
	PIEZOMETER		GF	RE	DELL En	gineeri	ng Re	sources, Inc.	
P - 19	CONSTRUCTION DIAGRAM				ENVIRO	NMENTAL	. ENGINI	EERING	
Date Piezometer Completed:	AMEREN MISSOURI			5 Ea	AND st High Street	A	IR	WATER Telephone: (573) 659-90	
10/16/09	LABADIE POWER PLANT		DATE 1/201		, Missouri 65101 SCALE N.T.S.	DRAWN BY:	BED	Facsimile: (573) 659-90 APPROVED BY: MCC	۶

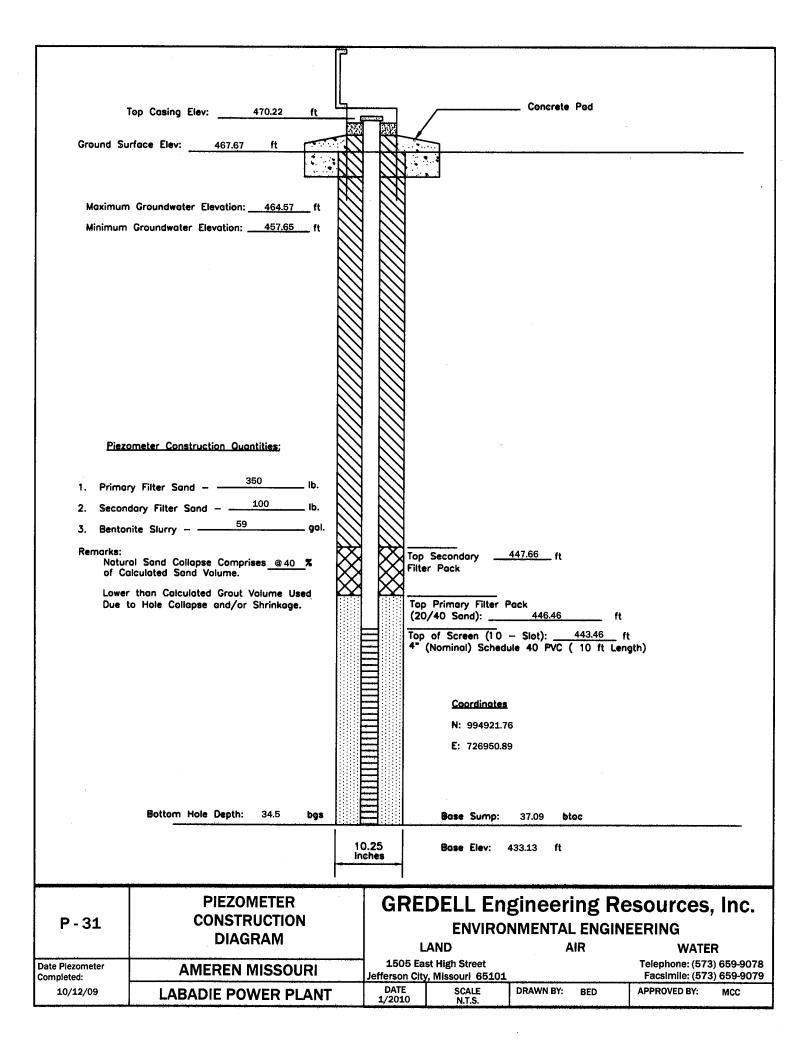
<del> </del>		<del></del>	distr.							
	Top Casing Elev:	472.28 ft	<u> </u>		_		Concrete	Pod		
Ground Su	rface Elev: 469.35	ft F			$\leq$	and the state of t				
Maximum	Groundwater Elevation:	464.66 ft								
Minimum	Groundwater Elevation: _	457.02 ft							•	
Piezo	ometer Construction Quer	tities:								
	22	25								
	y filter Sond -	50 lb.								
	nite Slurry - 90	gol.								
Remarks:	al Sand Collapse Compris	tes @ 50 %	$\bowtie$		op Seco		449.51 ft			
of Co	ilculated Sand Volume.		$\bowtie$	$\boxtimes$	ilt <b>e</b> r Po	ek .				
Attrib Boreh	r than Calculated Grout to utable to Apparent Washoole.	outs in			Top Prin (20/40	nory Filter F Sond):	Pack 447.61	ft		
				<b>–</b>         1	op of S	creen (10	- Slot):	445.11	t <b>.</b>	
					² (Nom	inol) Schedi	ule 40 PVC (	, 10 ft Len	gth)	
				3						·
				3		<u>Coordinates</u> N: 995510.5				į
						E: 726856.2	-			
	Bottom Hole Depth:	34.8 <b>bgs</b>			80	se Sump:	37.50 bt	<b>ο</b> ε	<del></del>	<del></del>
			8. Inc	25 thes	Be	se Elev:	434.78 ft			
· · · · · · · · · · · · · · · · · · ·	PIEZOM	1ETER		GP	FDF	II Fn	oineari	ng De	sources	Inc
P-20	CONSTR	UCTION	}	۵i۱			NMENTAL	_		, IIIC.
	DIAGI	RAM			LAND			JR	WATE	
Date Piezometer Completed:	AMEREN N			Jefferson	East Hig City, Miss	ouri 65101	<del>, , , , , , , , , , , , , , , , , , , </del>		Telephone: (573 Facsimile: (573	
9/17/09	LABADIE POV	VER PLANT		DATE 1/2010		SCALE N.T.S.	DRAWN BY:	BED	APPROVED BY:	MCC



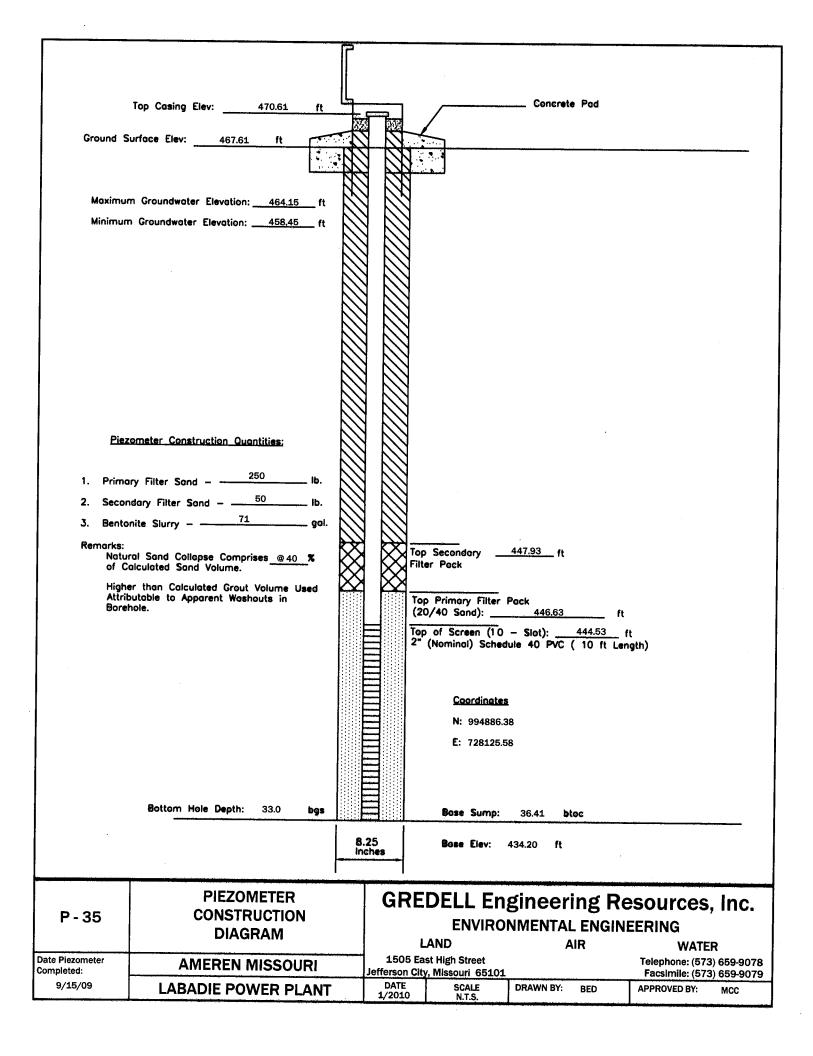
					<del></del>	
	·	3				
,	Too Ope to Flow 474.44 (1)	<del>1</del>		and the state of t	Concrete Pad	
	Top Casing Elev: 471.44 ft					
Ground Su	urface Elev: 468.50 ft	$\square$			·	
Maximum	n Groundwater Elevation: 464.16 ft					
	Groundwater Elevation: 464.16 ft Groundwater Elevation: 458.27 ft					
Piezo	ometer Construction Quantities;					
1. Prima	ry Filter Sand – 225 lb.					
	dary Filter Sand - 50 lb.					
	nite Slurry - 72 gal.					
Remarks:	sel Sand Callana Camadan o sa	K	Top	Secondary	448.06 ft	
of Co	ral Sand Collopse Comprises @ 50 % siculated Sand Volume.	$\aleph$		er Pack		
Highe Attrib	er than Calculated Grout Volume Used butable to Apparent Washouts in	$\mathbf{Y}$	Tor	Primary Filter F	Pack	
Boreh	nole.		(20	)/40 Sand):	446.86	ft
		E	Тор 2"	of Screen (10 (Nominal) Schedu	- Slot): <u>444.16</u> ule 40 PVC ( 10 ft	_ ft Length)
		E		Canadinakaa		
				<u>Coordingtes</u> N: 995476.2		
				E: 728133.29		
	Bottom Hole Depth: 35.0 bgs			Base Sump:	37.61 btoc	
		8.25		Base Elev:	422.02 6	
	-	inche	s	puse Elev. 4	433.83 ft	
P-24	PIEZOMETER CONSTRUCTION		GRE			Resources, Inc.
г • <b>24</b>	DIAGRAM		1		NMENTAL ENGI	· i
Date Plezometer	AMEREN MISSOURI	$\dashv$	1505 Ea	AND st High Street	AIR	<b>WATER</b> Telephone: (573) 659-9078
Completed: 9/16/09	LABADIE POWER PLANT		DATE	, Missouri 65101 SCALE	DRAWN BY: BED	Facsimile: (573) 659-9079  APPROVED BY: MCC
	LADADIE I OWER FLAINI		1/2010	N.T.S.		

				-		
	Top Casing Elev: 471.99	<u>n</u> L			Concrete Pad	
Ground Su	urface Elev: 469.07 ft		7	/ 		
				* <b>)</b>		
Moximum	n Groundwater Elevation: 464.56	_n				
Minimum	Groundwater Elevation: 457.63					
Piez	ometer Construction Quantities:					
1. Prima	ry Filter Sand — 240	_ lb.				
	dary Filter Sand - 50	_ lb. _ gal.				
Remarks:	into Sidity	, M		 Secondary	448.65 ft	
Natur of Co	ral Sand Collapse Comprises @ 50 alculated Sand Volume.	-* X		er Pack	π	
Highe Attrib Borel	er than Calculated Grout Volume U outable to Apparent Washouts in	sed 🕰	Top	Primary Filter F	Pack	
50.0			Top	0/40 Sand): o of Screen (10	- Slot): 444.05 ft	
	·			(Nominal) Schedi	ule 40 PVC ( 10 ft Lene	gth)
					•	
				<u>Coordinates</u> N: 995206.0	6	
				E: 727247.5	5	
	Bottom Hole Depth: 35.2	bgs		Base Sump:	38.27 btoc	
			.25	· · · · · · · · · · · · · · · · · · ·	433.72 ft	
			ches	BUSE DIEV.		
	PIEZOMETER	.1	GRE	DELL En	gineering Re	sources, Inc.
P - 27	CONSTRUCTION DIAGRAM	N		ENVIROI -AND	NMENTAL ENGINE AIR	
Date Piezometer	AMEREN MISSOU	IRI	1505 Ea	-AND ist High Street y, Missouri 65101	AIR	WATER Telephone: (573) 659-9078 Faceimile: (573) 659-9079
Completed: 9/17/09	LABADIE POWER PL	<del></del>	DATE 1/2010	SCALE N.T.S.	DRAWN BY: BED	Facsimile: (573) 659-9079 APPROVED BY: MCC
	· · · · · · · · · · · · · · · · · · ·					

		ļ				
		<u>_</u>			Concrete Pad	
	Top Casing Elev: 470.83 ft	- 5	733			
Ground Su	rface Elev: 467.73 ft	*		<u> </u>		
5.05	40.70	1				
		H				
		M				
Maximum	Groundwater Elevation: 464,33 ft					
Minimum	Groundwater Elevation: 458.09 ft					
					-	
	:	$\mathbb{N}$				
ς.						
Piezo	ometer Construction Quantities:					
	225	$/\!\!/\!\!/$				
1. Prima	ry Filter Sand – ———— 10.	$/\!\!/\!\!/$				
2. Second	dary Filter Sand — 50 lb.					
3. Bentor	nite Slurry – 65 gal.					
Remarks:		$\langle \chi \rangle$	$\bigotimes_{i}$	op Secondary	447.52 ft	
of Co	al Sand Collapse Comprises <u>@50</u> % plculated Sand Volume.	$\aleph$		ilter Pack		
	er than Calculated Grout Volume Used	$\boxtimes$	$\bowtie$	<del> </del>		
Attrib Boreh	outable to Apparent Washouts in note.			「op Primary Filter P (20/40 Sand):		
			12323231			ft.
			= :	(Nominal) Schedu	- Slot): <u>443.62</u> ile 40 PVC ( 10 ft Lei	ngth)
			=			
			3 1			
	·		3	<u>Coordingtes</u>		
				N: 995188.03	3	
				E: 727844.69	)	
			=			
		ŀ	=			
	Bottom Hole Depth: 35.0 bgs			Base Sump:	37.54 <b>btoc</b>	
		8.	.25	Base Elev: 4	133.29 ft	
		in	ches	5000 2.07.	100.23	•
		<del>- 1 - 1 - 1</del>				The state of the s
	PIEZOMETER		GR	EDELI Fn	gineering R	esources, Inc.
P - 29	CONSTRUCTION		``'`			
	DIAGRAM				NMENTAL ENGIN	
Data Blazawata		,	1505	LAND East High Street	AIR	<b>WATER</b> Telephone: (573) 659-9078
Date Plezometer Completed:	AMEREN MISSOURI		Jefferson	City, Missouri 65101		Facsimile: (573) 659-9079
9/15/09	LABADIE POWER PLANT		DATE 1/2010	SCALE N.T.S.	DRAWN BY: BED	APPROVED BY: MCC

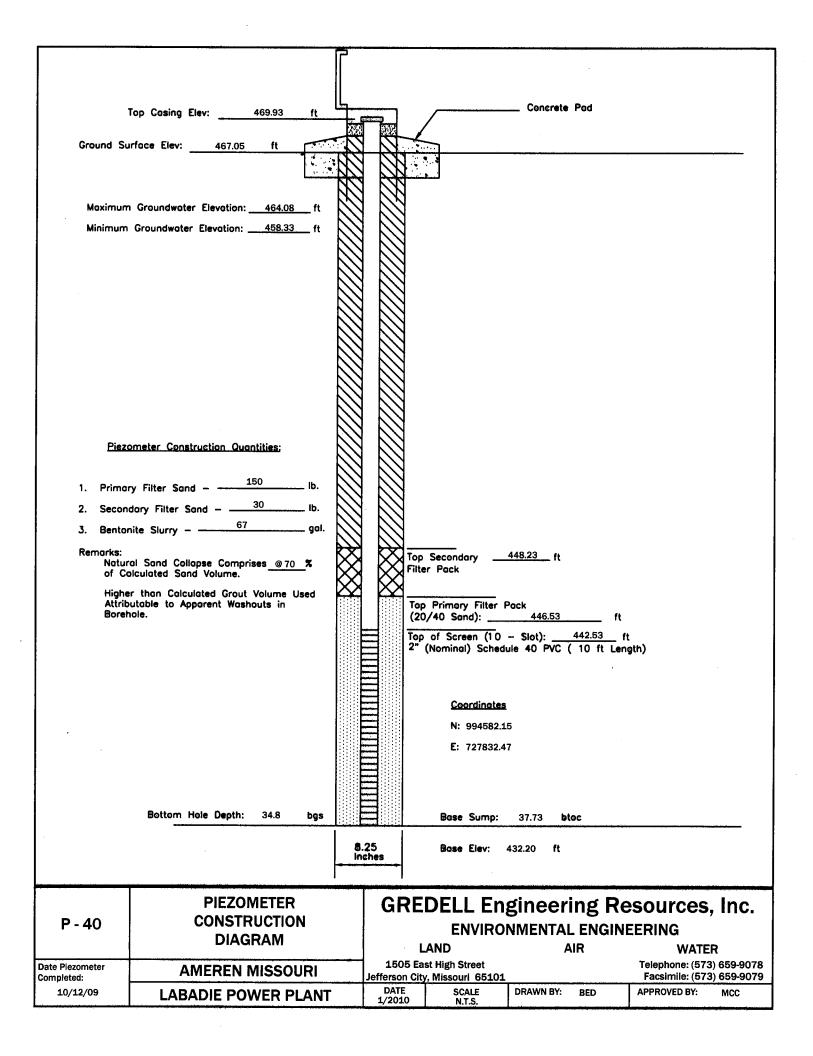


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									· . · · · · · · · · · · · · · · · · · ·	
	Top Casing Elev:	471.18 ft				/	Concrete	Ped		
Ground Su	rface Elev: 468.44	ft pro-	Z		$\prec$	·			····	·
Maximum	Groundwater Elevation:	464.47 ft								
Minimum	Groundwater Elevation:	458.02 ft							*	
					3					
Piezo	ometer Construction Quan	itities:								
	ry Filter Sond - 24									
	dary Filter Sand —									
Remarks:	al Sand Collapse Compris	200 @ 4E <b>Y</b>	$\bigotimes$			Secondary _	448.21 ft			
of Co	or than Calculated Grout \		$\bowtie$	$\otimes$	Filte	r Pack				
Attrib Boreh	utable to Apparent Washo	outs in			Top (20	Primary Filter /40 Sand):	Pack 447.01	ft		
					Top 2"	of Screen (10 (Nominal) Sche	- Slot):	444.21 f	t ath)	
								•	• /	
						Coordinate	<u>s</u>			
•	•					<b>N:</b> 994910.	34			
						<b>E</b> : 727559.	71			
	Bottom Hole Depth:	34.8 <b>bgs</b>				Base Sump:	37.30 b	toc		
			8.	.25 ches		Bose Elev:	433.88 ft			
				-			·			<b>X-</b>
-	PIEZON			GI	RE	DELL En	gineer	ing Re	esources	, Inc.
P-33	CONSTRI DIAGE				ı	ENVIRO AND	NMENTA	L ENGINI AIR	EERING WATI	<b>.</b>
Date Piezometer Completed:	AMEREN M	IISSOURI			)5 Eas	AND st High Street , Missouri 6510:		711	Telephone: (57 Facsimile: (57	3) 659-9078
9/14/09	LABADIE POW	VER PLANT		DAT 1/20:	E	SCALE N.T.S.	DRAWN BY:	BED	APPROVED BY:	MCC

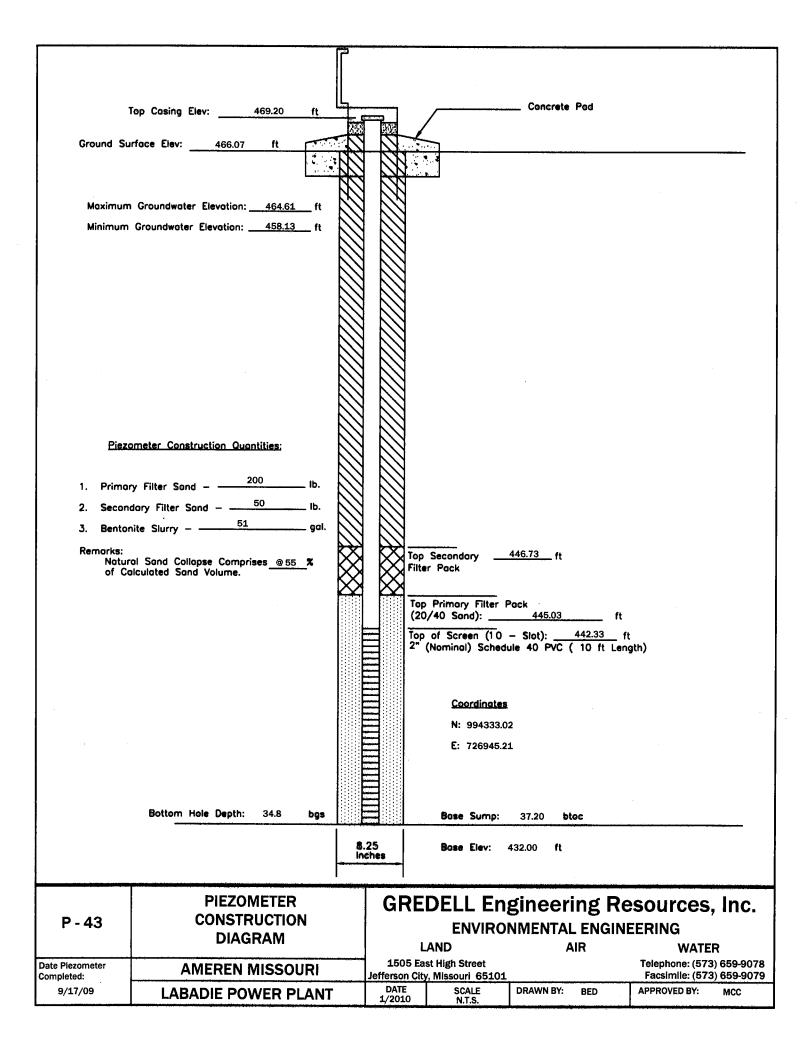


	manager of the same of the sam								
	Top Casing Elev: 4	71.23 ft		7	/	Concrete	Pad		
Ground Su	urface Elev: 468.20	ft Tools			/ 		·		
				<u>}</u>					
	n Groundwater Elevation:								
Minimum	Groundwater Elevation:	458.59 ft							
Piez	ometer Construction Quanti	ities:							
	ry Filter Sand - 100								
	dary Filter Sand — 50 nite Slurry — 91	lb. gal.							
Remarks: Natur	ral Sand Collapse Comprise	es @ 80 %	$\aleph$			449.07ft			
of Co	olculated Sand Volume. or than Calculated Grout Vo		$\otimes$	X Filt	r Pack				
Attrib Boret	outable to Apparent Washou	its in			Primary Filter ( /40 Sand):	Pack 447.07	ft		
				Top 2"	of Screen (10 (Nominal) Sched	- Slot): ule 40 PVC (	444.07 ft	t ath)	
						·		-	
					Coordingtes				
					N: 995058.2	8			
			E		E: 728509.4	4		-	
	Bottom Hole Depth:	35.3 <b>bgs</b>			Base Sump:	37.49 bt	oc		
		-	8.25 inches		Base Elev:	433.74 <b>f</b> t			
<u> </u>	PIEZOMI	ETER		PF	DELL En	gingari	ng De	sources	Inc
P-36	CONSTRU	ICTION				NMENTAL			, 1116.
Date Piezometer	DIAGR				AND st High Street	A	IR	WATE Telephone: (573	
Completed: 9/15/09	AMEREN MI LABADIE POW	<del>,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,</del>	Jeffer DA	son City ATE	, Missouri 65101 SCALE	DRAWN BY:	BED	Facsimile: (573	MCC
· · · · · · · · · · · · · · · · · · ·	LADADIL FOW	LIV L LAIVI	1/2	010	N.T.S.	L			

				,			va		
	Top Casing Elev: 470.11 ft	Ц.				Concrete	Pad		
		328	1						
Ground Su	rface Elev: 467.15 ft	M.		1					
	• • •	•							
Manianua	Groundwater Elevation:464,32ft			}					
	Groundwater Elevation: 464.32 ft  Groundwater Elevation: 458.00 ft			1					
Willing	ordandwater Elevation. — 100.00 It								
				}					
				}					
				1					
				}					
				}					
Piezo	ometer Construction Quantities:			]					
	· · · · · · · · · · · · · · · · · · ·								
1. Primar	y Filter Sand - 225 lb.								
2. Second	dary Filter Sand – 50 lb.								
3. Bentor	nite Slurry - 91 gol.			]					
Remarks:	al Sand Collapse Comprises @ 50 %	$\bigotimes$	$\stackrel{\triangleright}{\triangleright}$			448.28 ft			
	ilculated Sand Volume.	$\otimes$		Filte	r Pack				
Highe Attrib	r than Calculated Grout Volume Used utable to Apparent Washouts in	$\sim$		Top	Primary Filter F	Pack			
Boreh	ole.			(20	/40 Sand):	446.08	ft		
				Top 2"	of Screen (10 (Nominal) Sched	- Slot): ule 40 PVC (	443.28 ft 10 ft Len	t gth)	
			Ξ		Coordinates				
					N: 994618.7				
					E: 727238.6	2			
	• •		=						
	Bottom Hole Depth: 34.6 bgs			L	Base Sump:	37.16 btc	oc .	· · · · · · · · · · · · · · · · · · ·	
		8. In	.25 ches		Base Elev:	432.95 ft			
		<del></del>							
· · · · · · · · · · · · · · · · · · ·	PIEZOMETER		GF	?F	DFII Fn	gineeri	ng Re	sources, Inc.	_
P-38	CONSTRUCTION		~.	<b>`</b>		NMENTAL	_	· ·	
	DIAGRAM			L	AND	A		WATER	
Date Piezometer	AMEREN MISSOURI			)5 Eas	st High Street	· ·		Telephone: (573) 659-907	
Completed: 9/22/09	LABADIE POWER PLANT		DATI 1/201	E	, Missouri 65101 SCALE	DRAWN BY:	BED	Facsimile: (573) 659-907 APPROVED BY: MCC	J
			/201		N.T.S.	L.,,,		l	!



							:			:
1	Top Casing Elev:	470.60 ft	Ц_		/		Concrete Pa	ıd		
Ground Su	rface Elev:467.74	ft :								<del></del>
				$\mathcal{M}$						
Maximum	Groundwater Elevation: _	463.98 ft								
	Groundwater Elevation: _	- <del>,</del>								
Pi	amatan Canatanatian O an	. A. Ya								
Piezo	ometer Construction Quan	Killes;								
1. Primor	ry Filter Sand - 42	25 lb.								
2. Second	dary Filter Sand — ——	62 lb.								
3. Bentor	nite Slurry - 142	gal.								
Remarks: Natur	al Sand Collapse Compris	es @30 %			op Secondary	_	448.03 ft			
of Co	ilculated Sand Volume.		$\bowtie$	- XX <sup>™</sup>	ilt <b>e</b> r Pack					
	r than Calculated Grout V utable to Apparent Washo		X		op Primary Filte					
Boren	ole.			1111111	10/20 Send): _			ft 3.53 ft		
				]	" (Nominal) Scl	hedu	- Slot): <u>44</u> ile 40 PVC ( 10	0 ft Leng	ith)	
					Coording	ates				
				$\exists$	N: 99453	38.42	2			
					E: 72842	20.83				
				3						
	Bottom Hole Depth:	34.8 <b>bgs</b>			Base Sum	p:	37.40 btoc	· ** ·		<del></del>
			10	).25 ches	Base Elev:	. 4	133.20 ft			
				snes -						
	PIEZOM	1ETER	***	GR	FDFII F	'n	oineerin	g Re	sources	Inc
P - 42	CONSTR	UCTION		SI.			NMENTAL E	_		, 1110.
	DIAG	RAM			LAND	. • 1	AIR	wali <b>1 h</b>	WATE	R
Date Piezometer Completed:	AMEREN M	IISSOURI			East High Street City, Missouri 651	101			Telephone: (573 Facsimile: (573	8) 659-9078 8) 659-9079
10/06/09	LABADIE POV	VER PLANT		DATE 1/2010	SCALE N.T.S.		DRAWN BY: B	ED	APPROVED BY:	мсс

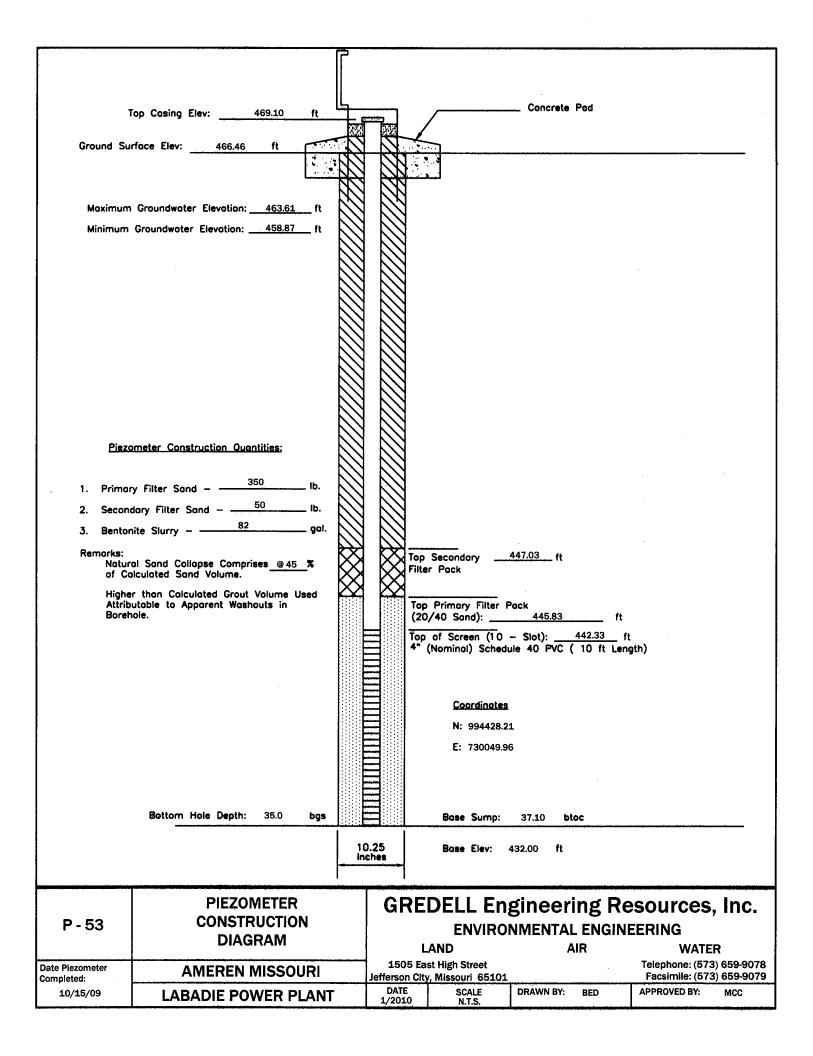


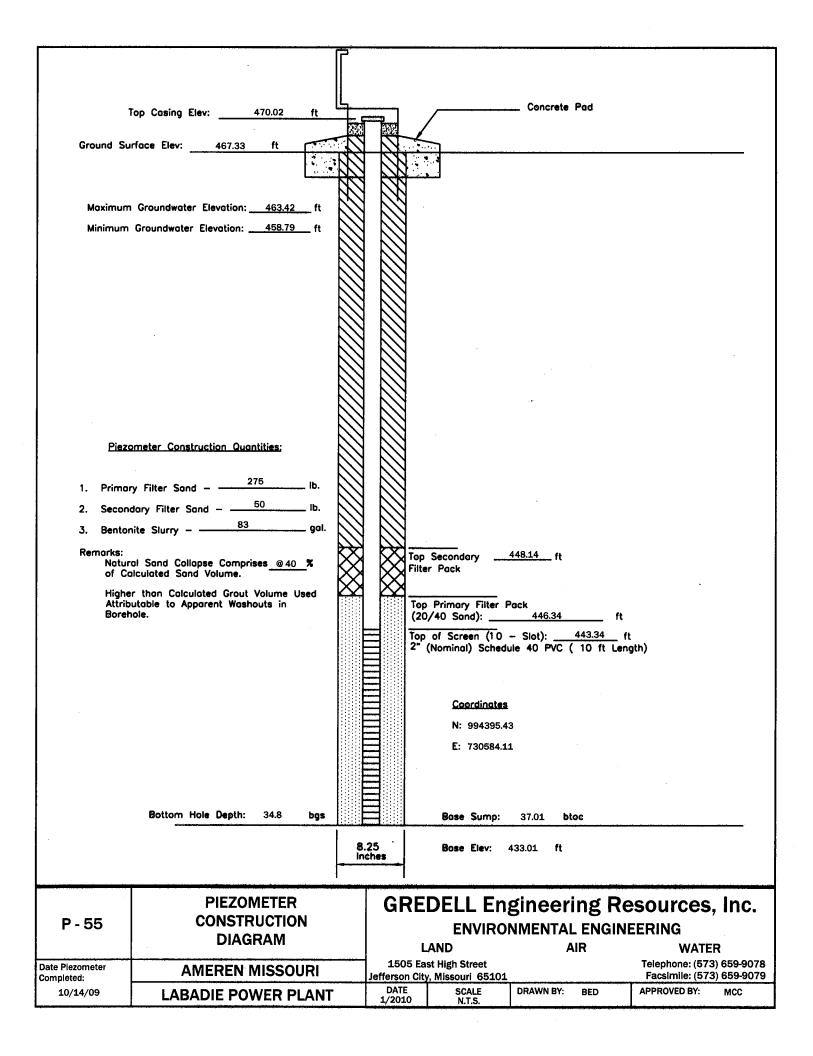
					<u> </u>	
	T. 2001 T. 400 CT #				Concrete Pad	
	Top Casing Elev: 420.07 ft		7332			
Ground Si	urface Elev: 467.12 ft	**				
	n Groundwater Elevation: 464.28 ft					
Minimum	Groundwater Elevation: <u>458.29</u> ft					
	ometer Construction Quantities;					
1. Prima	ry Filter Sand – ———————————————————————————————————					
	dary Filter Sand - 50 lb.					
3. Bento	nite Slurry – <u>80</u> gal.					
Remarks: Natur of Co	ral Sand Collapse Comprises @ 60 % alculated Sand Volume.			Top Secondary Filter Pack	<u>447.86</u> ft	
Highe Attrib Boret	er than Calculated Grout Volume Used outable to Apparent Washouts in nole.	~~	XX	Top Primary Filter (20/40 Sand):	Pock 445.96 ft	
				Top of Screen (10 2" (Nominal) Scheo	- Slot): 442.96 dule 40 PVC ( 10 ft Len	ft ngth)
		E	3	<u>Coordinate:</u>		
		-	3	N: 994324.	- ,	
		Ē	=	E: 727532.2		
			3			
			=			
	Bottom Hole Depth: 34.8 bgs			B 6	0 <b>7</b> (4	
		11111		Base Sump:	37.44 btoc	<del> </del>
		8.: Ind	25 ches	Base Elev:	432.63 ft	
	PIEZOMETER		GF	REDELL En	gineering D	esources, Inc.
P - 45	CONSTRUCTION		<b>~</b> 1		NMENTAL ENGIN	· ·
	DIAGRAM			LAND	INMENTAL ENGIN AIR	WATER
Date Piezometer	AMEREN MISSOURI			5 East High Street		Telephone: (573) 659-9078
Completed: 9/18/09	LABADIE POWER PLANT		DATE		DRAWN BY: BED	Facsimile: (573) 659-9079  APPROVED BY: MCC
· '	LADADIE FUWER FLANT	إبيدييا	1/201		J	IVICC

							<del></del>	
	Top Casing Elev: 469.86 ft	<u>L</u>	<del></del>		Concrete	Ped .		
	urface Elev: 467.10 ft							
Maximun	n Groundwater Elevation: <u>464.11</u> ft				**************************************			
Minimum	Groundwater Elevation: 458.50 ft							
	ometer Construction Quantities: ry Filter Sand — 200 lb.							
	inite Slurry - 73 gal.					,		
Remarks:	ral Sand Collapse Comprises @ 55 % alculated Sand Volume.		Top	Secondary	447.30 ft			
Highe	er than Calculated Grout Volume Used outable to Apparent Washouts in	$\boxtimes$	Top	o Primary Filter   0/40 Sand): of Screen (10 (Nominal) Sched	445,90 - Slot):	ft f 443.10 f ( 10 ft Len	t gth)	
				<u>Coordinates</u> N: 994320.6 E: 728124.5	6			·
	Bottom Hole Depth: 34.9 bgs			Base Sump:	37.09 <b>bt</b>	toc		
		8. Inc	25 ches	Base Elev:	432.77 ft			-
P - 47	PIEZOMETER CONSTRUCTION DIAGRAM				NMENTAI		SOUTCES EERING WATE	
Date Piezometer Completed:	AMEREN MISSOURI			st High Street y, Missouri 65101			Telephone: (573 Facsimile: (573	
9/18/09	LABADIE POWER PLANT		DATE 1/2010	SCALE N.T.S.	DRAWN BY:	BED	APPROVED BY:	MCC

	· · · · · · · · · · · · · · · · · · ·			<u> </u>			
	Top Casing Elev: 470.56 ft		1900		Concrete Pad		
Ground Su	urface Elev: 467.58 ft	- 13					
	Laterian et	1	7	لطائه			
Maximum	Groundwater Elevation: <u>463.89</u> ft						
Minimum	Groundwater Elevation: 458.95 ft						
Piezo	ometer Construction Quantities:						
1. Prima	ry Filter Sand – 275 lb.						
	dary Filter Sand - 50 lb.						
	nite Slurry – 69 gal.						
Remarks:		$\bowtie$	₩,	op Secondary	448.28 ft		
	ral Sand Collapse Comprises <u>@ 40</u> % siculated Sand Volume.	$\bowtie$	₩	iter Pack			
Highe Attrib	er than Calculated Grout Volume Used outable to Apparent Washouts in	M	<b>- 1</b>	op Primary Filter F	Pack		
Boreh	nole.			20/40 Send):	446.48	ft	
				op of Screen (10 " (Nominal) Schedu	- Slot): <u>443.08</u> ule 40 PVC ( 10 ft	_ ft Length)	
				Coordinates			
	•		3	N: 994499.8	4		
				E: 728938.9	7		
		Ė	3				
	Bottom Hole Depth: 35.0 bgs			Base Sump:	37.81 btoc		
		8.	25	Base Elev: 4	432.75 ft		
		Inc	ches				İ
	PIEZOMETER	<del></del>	CD	FDFII Fn	gineering [	Resources, Inc.	
P - 49	CONSTRUCTION		GI1		NMENTAL ENG	·	
	DIAGRAM			LAND	AIR	WATER	İ
Date Piezometer Completed:	AMEREN MISSOURI			East High Street City, Missourl 65101		Telephone: (573) 659-907 Facsimile: (573) 659-907	
10/14/09	LABADIE POWER PLANT		DATE 1/2010	SCALE N.T.S.	DRAWN BY: BED	APPROVED BY: MCC	$\exists$
							_

	<del> </del>	<del> </del>	Trick.							
							Concrete	a Bod		
	Top Casing Elev:	169.06 ft	132.0	75.72			Concreti	e red		
Ground Su	urface Elev: 466.25	ft Freeze	1		4	:				
	<del></del>				} • •	. 3				
		البينية		1						
Maximun	n Groundwater Elevation: _	463.77 ft			}					
Minimum	Groundwater Elevation:	458.98 ft			}					
					1					
					1					
•					1					
					1					
					}					
					}					
Piez	ometer Construction Quan	tities:			1					
4 0-1		io lb.			1					
	ry Filter Sand -	50 lb.								
	addiy Filter Sand —	10. gal.								
	nite Slurry - 43	gui.				<del>/</del>				
Remarks: Natur	al Sand Collapse Compris	es <u>@ 70</u> %	$\bowtie$	$\otimes$	Top	Secondary <u> </u>	447.77 ft			
of Co	olculated Sand Volume.		XX		' "	1 GCR				
		•			Тор	Primary Filter	Pack			
				_		/40 Send):		ft		
					16p 2" (	of Screen (10 Nominal) Sched	– Slot): <u> </u>	( 10 ft Len	t gth)	
				=						
						,				
				=		Coordinates	1			
						N: 994463.3	37			
				=		<b>E</b> : 729490.0	00			
				=						
	Bottom Hole Depth:	35.0 <b>bgs</b>		$\equiv$		Base Sump:	37.32 t	otec		
				.25		Boss Flour	404.74 6			<del></del>
			In	ches		Bose Elev:	431.74 ft			
<b></b>		<del></del>	l 							
	PIEZON	IETER	ì	GF	REI	DELL En	gineei	ring Re	esources	. Inc.
P-51	CONSTRI						_	L ENGIN		,
	DIAGF	RAM			L	AND		AIR	WATE	ER
Date Piezometer	AMEREN M	IISSOURI		150	5 Eas	t High Street			Telephone: (57	3) 659-9078
Completed: 10/14/09	LABADIE POW	<del></del>	+	DATE	E ]	Missouri 65101 SCALE	DRAWN BY:	BED	Facsimile: (57	3) 659-9079 MCC
	LADADIL I OV	FILL FWIAI		1/201	.0	N.T.S.	1			





	the state of the s				<del></del>				
						Concre	ete Pad		
	Top Casing Elev: 468.87 ft			/					
Ground Su	rface Elev: 465.99 ft		7	$\stackrel{\checkmark}{\mapsto}$	<u> </u>				
Moximum	Groundwater Elevation: 463.21 ft								
·	Groundwater Elevation: 458.84 ft								
i									
Piezo	ometer Construction Quantities;								
	400	$\mathbb{N}$							
	ry Filter Sand - 400 lb.								
	dary Filter Sand - 100 lb.  102 gal.								
Remarks:	inter Sturry	$\langle \rangle \rangle$	<i>&gt;&gt;&gt;</i>			447.02			
Natur	al Sand Collapse Comprises @ 35 % plculated Sand Volume.	$\bowtie$	$\bowtie$		Secondary r Pack	741.02 1	τ		
Highe Attrib	r than Calculated Grout Volume Used outable to Apparent Washouts in	$\bowtie$	$\sim$	Too	Primary Filter F	) a a b			
Boret				(20	/40 Sand):	445.0	2 ft		
				Top 4" (	of Screen (10 Nominal) Schedu	– Slot): _ ule 40 PV	441.92 fi C ( 10 ft Len		
			$\exists$						
			$\equiv$		Coordinates			<b>%</b>	
	·				N: 994356.7				
					E: 731212.5				
			=						
			=						
	Bottom Hole Depth: 34.8 bgs				Base Sump:	37.28	btoc		
		<u>1</u> 0	.25		Base Elev:	431.59 f	't		
		inc	ches						
	PIEZOMETER		GF	?F	DFII Fn	ginee	ring Re	sources	Inc
P - 57	CONSTRUCTION			<b>`</b>		_	AL ENGIN		, 1110.
	DIAGRAM			L	AND		AIR	WATE	:R
Date Piezometer Completed:	AMEREN MISSOURI				st High Street , Missouri 65101			Telephone: (57: Facsimile: (57:	
10/15/09	LABADIE POWER PLANT		DATE 1/201		SCALE N.T.S.	DRAWN B	Y: BED	APPROVED BY:	мсс

	· · · · · · · · · · · · · · · · · · ·						
,	Top Casing Elev: 467.94 ft	<u> </u>		/	Concrete Pad		
Ground Su	rface Elev: 465.36 ft	Z	X	•••			
Moximum  Minimum  Piezo  1. Primoi  2. Seconi  3. Bentor  Remarks:  Notur	Groundwater Elevation: 464.44 ft Groundwater Elevation: 458.31 ft  Demeter Construction Quantities:  Try Filter Sand — 225 lb.  Idary Filter Sand — 50 lb.  Inite Slurry — 57 gal.  Tale Sand Collapse Comprises 650 %  Description of the Sand Volume.		Filte Tep (20	Primary Filter F /40 Sand): of Screen (10 (Nominal) Schedu  Coordinates N: 994039.3 E: 727225.40  Base Sump:	443.70 ft - Slot): 440.90 ft ule 40 PVC ( 10 ft Ler	t igth)	
<u> </u>	PIEZOMETER		CDE	DELL En	gineering Ro	SCOTINGS	lnc
P - 59	CONSTRUCTION DIAGRAM				MENTAL ENGIN AIR	•	iiiG.
Date Piezometer Completed:	AMEREN MISSOURI			st High Street v, Missouri 65101		Telephone: (573) 6 Facsimile: (573) 6	
9/21/09	LABADIE POWER PLANT		DATE 1/2010	SCALE N.T.S.	DRAWN BY: BED	1	мсс
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	<del>and the second of the second </del>				at the second se	- · · · · · · · · · · · · · · · · · · ·
	Top Casing Elev: 468.87 ft				Concrete Pad	
Ground St	urface Elev: 465.92 ft			/		
,						
	n Groundwater Elevation: 464.24 ft					
Minimum	Groundwater Elevation: <u>458.45</u> ft					
<u>Piez</u>	ometer Construction Quantities;					
	5::. 0 . 350 lb					
	ry Filter Sand —io.					
	nite Slurry – 76 gal.					
Remarks:	·	$\bowtie$	₩,	p Secondary	446.07ft	
	ral Sand Collapse Comprises <u>@ 40</u> % alculated Sand Volume.	$\bowtie$		ter Pack	.,	
		$\bowtie$	Τ	p Primary Filter F	Pack	
				0/20 Sand): p of Screen (20		ft ft
			<b>1</b> 14°	(Nominal) Schedu	ule 40 PVC ( 10 ft	
			=			
		Ē		Coordinates		
				N: 994020.2	2	
				E: 727813.3:	ı	
			3			
	Bottom Hole Depth: 34.7 bgs			Bose Sump:	37.53 <b>btoc</b>	
				<del> </del>		<del> </del>
			25 ches	Base Elev: /	431.34 ft	
	PIEZOMETER	·	CDI	DELL Ex	dingering	Posouroos Inc
P-61	CONSTRUCTION		GAL		SINEETING I	Resources, Inc.
	DIAGRAM			LAND	AIR	WATER
Date Piezometer Completed:	AMEREN MISSOURI			ast High Street ty, Missouri 65101		Telephone: (573) 659-9078 Facsimile: (573) 659-9079
10/26/09	LABADIE POWER PLANT	<u> </u>	DATE 1/2010	SCALE N.T.S.	DRAWN BY: BED	APPROVED BY: MCC

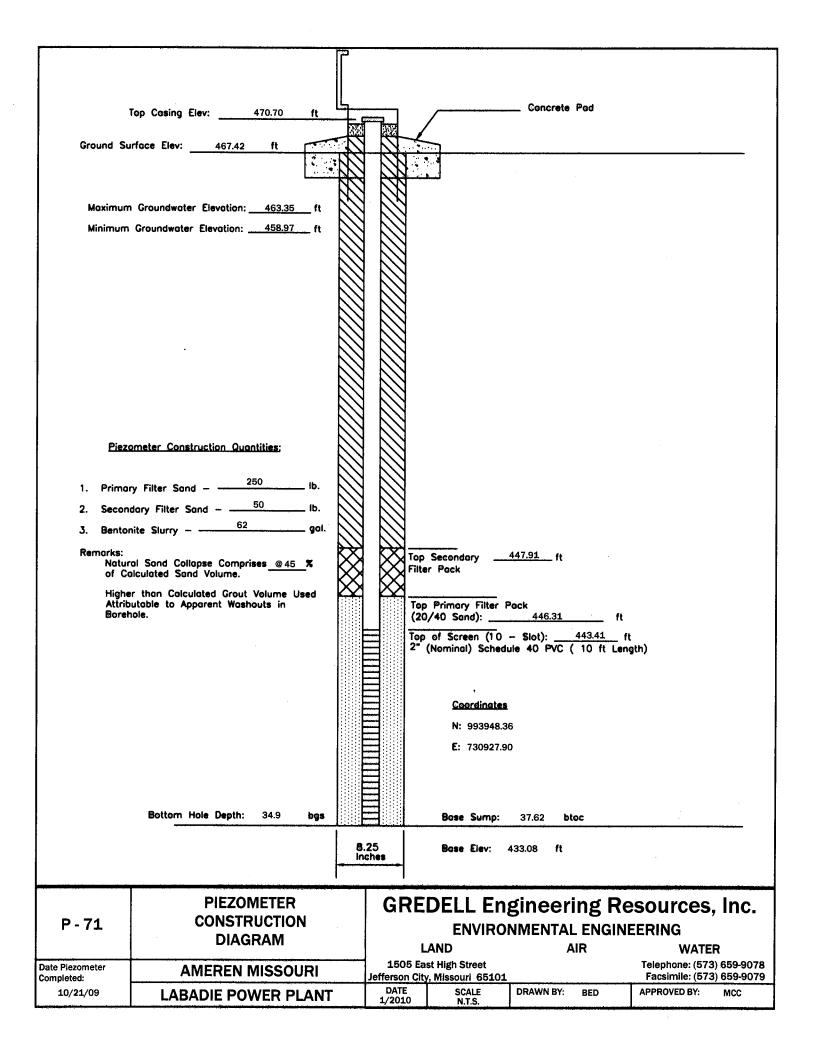
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<del>( </del>	<del></del>			<del>/</del>		<del> </del>	
	Top Casing Elev: 469.10	<u>n</u>		/	Concrete Pad		
		888					
Ground Su	urface Elev: 466.20 ft		1 12				
Maximum	Groundwater Elevation: 464.06	_ft	1 1/1				
Minimum	Groundwater Elevation: 458.66	_#					
			} (//				
-							
Piezo	ometer Construction Quantities:						
1. Prima	ry Filter Sand - 190	_ 1b.					
		_ lb.					
	oory rinter sond =	_ gol.					
	nite Slurry - 55	- goi.					
Remarks: Natur	al Sand Collapse Comprises @60				446.94 ft		
of Co	cliculated Sand Volume.	-~ XX	Filt	er Pack			
		X	XX	~			
				Primary Filter F 1/40 Sand):	°ack 444.74fi		
			F 15555551				
			2"	(Nominal) Sched	- Slot): <u>442.14</u> ule 40 PVC ( 10 ft Le	ngth)	
						•	
				<u>Coordinates</u>			
				N: 994004.9	8		
				<b>E</b> : 728407.7	1		
					_		
							•
	Bottom Hole Depth: 34.9	bgs		Base Sump:	37.29 btoc		
							<del></del>
		ln In	.25 iches	Bose Elev:	431.81 ft		
	PIEZOMETER		CDE	DELL E.	etina a a visa et D		1
D 62	CONSTRUCTION	J	GRE		gineering R		inc.
P-63	DIAGRAM	•			NMENTAL ENGIN	IEERING	
	DIAGRAM		L	AND	AIR	WATE	
Date Piezometer Completed:	AMEREN MISSOU	RI		st High Street v, Missouri 65101		Telephone: (573 Facsimile: (573	
9/21/09	LABADIE POWER PL	<del></del>	DATE	SCALE	DRAWN BY: BED	APPROVED BY:	MCC
-,,	LADADIE PUVVER PL	W141	1/2010	N.T.S.			

<del>,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,</del>		<del> </del>							
						· ·	-		
	Top Casing Elev:	471.31 ft			<del></del>	Concrete	Pad		
Ground St	urface Elev:468.06	ft rest			<u>/</u> 				
								<del> </del>	<del></del>
Maximua	n Groundwater Elevation: _	163 Q4							
	Groundwater Elevation: _								
							,		
<u>Piez</u>	ometer Construction Quan	ntities;							
	26								
	ry Filter Sand - 26	50 lb.							
	dary Filter Sand — 89	10. gal.							
Remarks:	al Sand Collapse Compris	040 =	$\bigotimes$	τ <sub>ο</sub>	Secondary	448.30 ft			
of Co	olculated Sand Volume.	<del></del>	$\bowtie$		er Pack				
Highe Attrib Borer	er than Calculated Grout Noutable to Apparent Washo nole.	Volume Used outs in	$\stackrel{\sim}{}$		p Primary Filter I 0/40 Sand):	Pack 446.90			
				1:0:0:1	o of Screen (10 (Nominal) Sched		ft ft	:	
				<b>=</b>     2"	(Nominal) Sched	ule 40 PVC (	10 ft Len	gth)	
					<u>Coordinates</u> N: 993990.8				
					E: 729165.6			•	
				3					
	Bottom Hole Depth:	34.9 <b>bgs</b>		3	Base Sump:	37.64 bt	0¢		<del></del>
			8. In	25 ches	Base Elev:	433.67 ft			
	PIEZOM			GRE	DELL En	gineeri	ng Re	sources	Inc.
P - 65	CONSTRI DIAGF				ENVIRO	NMENTAL	. ENGINE		,
Date Piezometer	· · · · · · · · · · · · · · · · · · ·			1505 E	LAND ast High Street	А	IR	WATE Telephone: (573	
Completed: 10/13/09	AMEREN M	<del></del>		Jefferson Ci DATE	y, Missouri 65101	DRAWN BY:	BED	Facsimile: (573 APPROVED BY:	
	-ADADIL I UV	L/1/1		1/2010	SCALE N.T.S.				

					0		
٦	Top Casing Elev: 468.28 ft				Concrete Pad		
Ground Su	rface Elev: 465.52 ft	- 1	7	<u>/</u>			
Maximum  Minimum  Pieza  1. Primar  2. Second  3. Bentor  Remarks: Natur	organization Construction Quantities:  The Groundwater Elevation: 463.65 ft Groundwater Elevation: 459.10 ft ft ft ft ft ft ft ft ft ft ft ft ft		Filt To (2	er Pack  p Primary Filter F 0/40 Sond):	445.86 ft  Pack 444.76 ft  - Slot): 441.46  ule 40 PVC ( 10 ft Lei		
	Bottom Hole Depth: 35.0 bgs			Coordinates N: 993985.69 E: 729758.29		·	
		8 In	.25 iches	Base Elev: 4	431.13 ft		
P - 67	PIEZOMETER CONSTRUCTION DIAGRAM			ENVIROI LAND	gineering Ro NMENTAL ENGIN AIR	WATER	
Date Piezometer Completed:	AMEREN MISSOURI			ast High Street ty, Missouri 65101		Telephone: (573) 659-90 Facsimile: (573) 659-90	
10/13/09	LABADIE POWER PLANT		DATE 1/2010	SCALE N.T.S.	DRAWN BY: BED	APPROVED BY: MCC	
					**************************************		

	· · · · · · · · · · · · · · · · · · ·	the second second							<b>.</b>
	Top Casing Elev:	467.73 ft	220 402		<i></i>	Concrete	Pad		
Ground Su Maximum	rface Elev: 465.05	ft							
1. Primai 2. Secon 3. Bentor Remarks: Natur	ry Filter Sand — 22 dary Filter Sand — 51 nite Slurry — 51 al Sand Collapse Compris	55 lb. 50 lb. gal.		Top !	Secondary Pack	<u>444.92</u> ft			,
	Bottom Hole Depth:	35.0 <b>bgs</b>		(20/ Top	Primary Filter I 40 Sand): of Screen (1 0 Nominal) Sched  Coordinates N: 993965.4 E: 730346.8	443.92 - Slot): uie 40 PVC (		t gth)	
	Marketon in the Control of the Contr		8.25 Inches		<del></del>	430.19 ft			····
P - 69	PIEZOM CONSTRI DIAGE	UCTION		LA	ENVIRO IND	NMENTAL	_	WATE	R
Date Piezometer Completed:	AMEREN M		Jefferso	n City,	High Street Missourl 65101			Telephone: (573 Facsimile: (573	659-9079
10/13/09	LABADIE POV	VER PLANT	DATE 1/201		SCALE N.T.S.	DRAWN BY:	BED	APPROVED BY:	MCC



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			7			, , , , , , , , , , , , , , , , , , , ,		
	Top Cosing Elev:46	69.94 ft				Concrete Po	nd	
Ground Su	irface Elev: 467.06	ft profits	K					
		1	1	1/1		<del></del>		······································
			***		المحت			
Moximum	Groundwater Elevation:	<u>464.51</u> ft						
Minimum	Groundwater Elevation:	<u>458.47</u> ft				•		
l								
						,		
Piezo	ometer Construction Quanti	ities:						
1. Prima	ry Filter Sand - 275	<u>.                                    </u>						
	dary Filter Sand - 75	_						
	nite Slurry - 56	gal.						
Remarks:	and Court College Court design	<del>-</del>		₩;	op <b>Se</b> condary	447.83 ft		
	al Sand Collapse Comprise alculated Sand Volume.	s <u>@ 50</u> %	$\otimes$		ilter Pack			
	r than Calculated Grout Vo to Hole Collapse and/or Si		$\sim$	<b>M</b> -	Top Primary Filter	Pack		
			L		(10/20 Sand):	446.13	ft	
			E	]	op of Screen (20 " (Nominal) Sched	- Slot):44 lule 40 PVC ( 1	3.43 ft 0 ft Leng	
			E	3				
			E	]	Coordinate	,		
			Ε	3	N: 993742.			
			E	3	E: 726924.	60		
			E	3				
			Ξ	3				
	Bottom Hole Depth:	34.0 <b>bgs</b>	E		Base Sump:	36.84 btoc		
			10.	25	Bose Elev:	433.10 ft		
		<b> </b> -	ine	hes				
	PIEZOM	ETER	T	CD	FDFII Fn	gineerin	ø Po	sources, Inc.
P-73	CONSTRU	ICTION		۵į۱		NMENTAL E	_	<del>-</del>
	DIAGR	AM	İ		LAND	AIR		WATER
Date Piezometer Completed:	AMEREN M	ISSOURI			East High Street City, Missouri 65101			Telephone: (573) 659-9078 Facsimile: (573) 659-9079
11/06/09	LABADIE POW	ER PLANT		DATE 1/2010	SCALE N.T.S.		BED	APPROVED BY: MCC

.

	Top Casing Elev: 468.75	<u>«                                    </u>	er-men		Concrete Pad	
Ground S	Surface Elev: 466.12 ft					
Maximu	m Groundwater Elevation: 464,29	n 🕅				
		n				
				,		
<u>Pie</u>	zometer Construction Quantities;					
1. Prim	dry Titter Solid	b.				
		lb. gal.				
Remarks:		, XX		pp Secondary	446.15 ft	
of (	ural Sand Collapse Comprises @45 \$ Calculated Sand Volume.	$\otimes$	} ∭F	lter Pack		
Attr	ner than Calculated Grout Volume Use ibutable to Apparent Washouts in shole.	d KX	Ī	op Primory Filter F 20/40 Sand):	Pack 444.85 ft	
			<b>—</b> 17	op of Screen (10	· · · · · · · · · · · · · · · · · · ·	(t
				(,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		
				Coordinates		
				N: 993730.50		
				E: 727511.13	3	
	Bottom Hole Depth: 34.8	)gs		Base Sump:	37.23 btoc	
			3.25 nches	Base Elev: 4	431.52 ft	
		"	TUTIES -			·
	PIEZOMETER		GR	EDELL Eng	gineering Re	esources, Inc.
P - 75	CONSTRUCTION DIAGRAM		]	ENVIROI LAND	NMENTAL ENGIN AIR	
Date Piezometer	AMEREN MISSOUR	RI		East High Street lity, Missouri 65101	AIR	WATER Telephone: (573) 659-9078 Facsimile: (573) 659-9079
Completed: 9/28/09	LABADIE POWER PLA		DATE 1/2010	SCALE N.T.S.	DRAWN BY: BED	APPROVED BY: MCC
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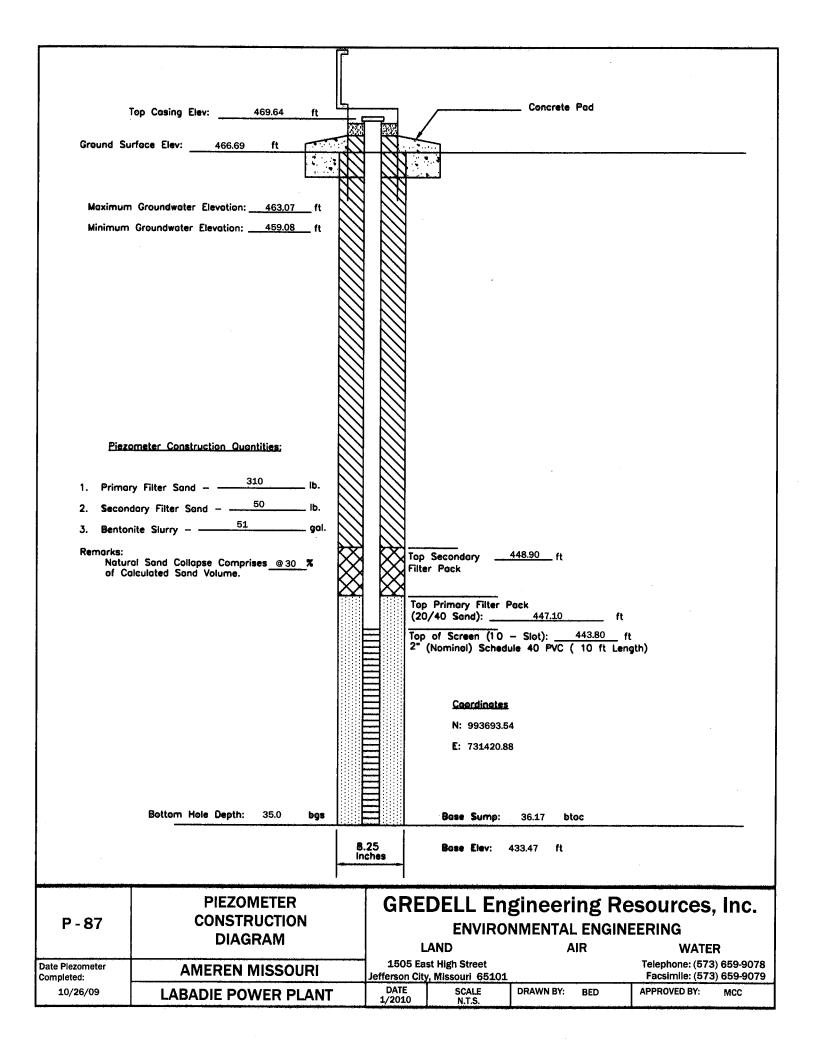
			•
		Ļ	Concrete Pad
•	Top Casing Elev: 468.05 ft	284 38	Concrete Pod
Ground Su	urface Elev: 465.41 ft		
	Groundwater Elevation: 464.09 ft		
Minimum	Groundwater Elevation: 458.57 ft		
Piezo	ometer Construction Quantities:		
	250 H		
	ry Filter Sand – ———————————————————————————————————		
	odry Filter Sand – ———— io.		
	nite Slurry – ——————— gal.	Z Z	
Remarks: Natur of Co	ol Sand Collapse Comprises @50 %	$\bowtie$ $\bowtie$	Top Secondary 445.73 ft Filter Pock
	er than Calculated Grout Volume Used	$\boxtimes$ $\boxtimes$	<u> </u>
Attrib Boreh	outable to Apparent Washouts in nole.		Top Primary Filter Pack (20/40 Sand): 444.03 ft
			Top of Screen (10 - Slot): 440.93 ft
			2" (Nominal) Schedule 40 PVC ( 10 ft Length)
			Coordinates
			N: 993714.81
			E: 728102.38
	Bottom Hole Depth: 34.8 bgs		Base Sump: 37,45 btoc
		8.25	Bose Elev: 430.60 ft
		Inches	<del> </del>
	PIEZOMETER		PEDELL Engineering December 195
P - 77	CONSTRUCTION	4	GREDELL Engineering Resources, Inc.
	DIAGRAM		ENVIRONMENTAL ENGINEERING LAND AIR WATER
Date Piezometer	AMEREN MISSOURI		L505 East High Street Telephone: (573) 659-907
Completed: 9/28/09	LABADIE POWER PLANT	DA	rson City, Missouri 65101 Facsimile: (573) 659-907  ATE SCALE DRAWN BY: BED APPROVED BY: MCC
		1/2	2010 N.T.S. 1100

<del></del>						
	Top Casing Elev:469.84	· " [_			Concrete Pad	
Ground Su	urface Elev: 467.01 ft			<u>/</u>	*************	
Moximum	n Groundwater Elevation: <u>463.</u>	.89_ft				
Minimum	Groundwater Elevation: <u>458.</u>	.88_ ft				
				·		
I						·
Piez	ometer Construction Quantities;					
	ry Filter Sand - 265	— lb.				
	dary Filter Sand - 50 nite Slurry - 49	lb. gal.				
Remarks:				Secondary	446.97 ft	
	ral Sand Collapse Comprises @ alculated Sand Volume.	<u>⁴0</u> *		er Pack	•••	
		KX	To (2	p Primary Filter F 0/40 Sand):	<sup>9</sup> ack ************************************	
			81 (1999)		<u>445.67</u> ft - Slot): <u>442.57</u> ft ule 40 PVC ( 10 ft Lend	t į
				(Nominal) Schedu	ule 40 PVC ( 10 ft Lend	gth)
				<b>5</b>		
				<u>Coordinates</u> N: 993695.02		
				E: 728850.48		
	Bottom Hole Depth: 35.0	bgs		Base Sump:	37.60 btoc	
		1	8.25 Inches	Base Elev: 4	432.24 ft	
	PIEZOMETE		GRE	DELL En	gineering Re	esources, Inc.
P-79	CONSTRUCTI DIAGRAM			ENVIRO	NMENTAL ENGIN	EERING
Date Piezometer	AMEREN MISSO	···	1505 Ea	LAND ast High Street	AIR	<b>WATER</b> Telephone: (573) 659-9078
Completed: 10/28/09	LABADIE POWER		Jefferson Cit	y, Missouri 65101 SCALE	DRAWN BY: BED	Facsimile: (573) 659-9079  APPROVED BY: MCC
	LADADIL FOVER	FLANI	1/2010	N.T.S.		,

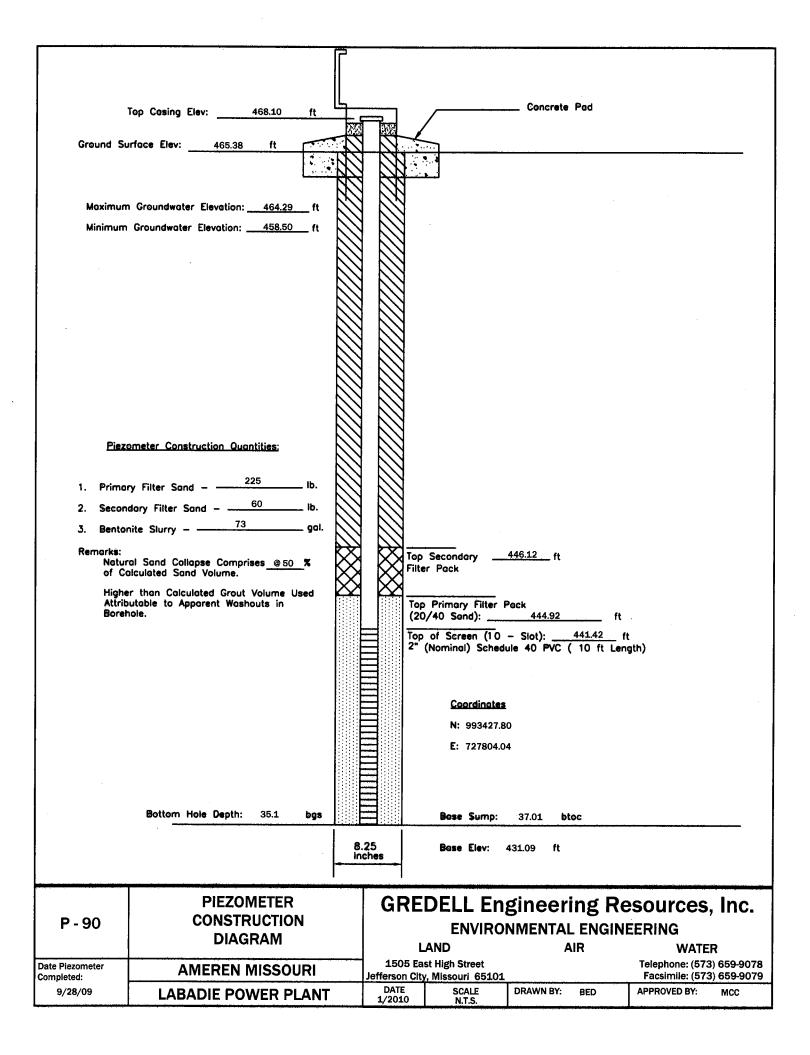
	Top Casing Elev: 470.31					Concrete	Ped		
	Top Casing Elev: 470.31	<u>ft</u>	202						
Ground Su	urface Elev: 467.64 ft			-	]				<del></del>
	Ĺ								
Maximum	Groundwater Elevation: 463.74	_n							
	_	.n							
	·								
Piez	ometer Construction Quantities:								
	360								
	ry Filter Sand —	ib.							
	odiy tinter Solid =	ib. gal.							
Remarks:	,			Tee	Secondary	<u>447.71</u> ft			
	al Sand Collapse Comprises @ 40 ? alculated Sand Volume.	' 💢			Pack	1(			
		XX	<b>XX</b> .	Top	Primary Filter F	Pack			
				(10/	'20 Sand):	446.41	ft		•
				Top 4" (	of Screen (20 Nominal) Sched	- Slot): ule 40 PVC (	443.21 ft 10 ft Len		
					Coordinates				
·					N: 993679.3				
					E: 729444.9	7			
	•								
	Bottom Hole Depth: 34.8	ogs		<del>,</del>	Bose Sump:	37.43 bt	ос	<del></del>	————————————————————————————————————
			0.25 ches		Base Elev:	432.88 ft			
			-						
	PIEZOMETER		GR	REL	ELL En	gineeri	ng Re	esources	. Inc
P-81	CONSTRUCTION			. — -		NMENTAL	_		,
t Mariant a distance to the	DIAGRAM				ND		JR	WATE	
Date Piezometer Completed:	AMEREN MISSOUF	श	Jefferson	City,	High Street Missouri 65101			Telephone: (57 Facsimile: (57	
10/28/09	LABADIE POWER PLA	NT	DATE 1/2010		SCALE N.T.S.	DRAWN BY:	BED	APPROVED BY:	MCC

<del> </del>		-				<u> </u>			
	Top Casing Elev: 467.55 ft	4				Concrete Po	od		
	urface Elev: 464.71 ft			1					
0.00						<del>,, ,, ,,</del> ,,		······································	
Maximum	Groundwater Elevation: 463.59 ft								
	Groundwater Elevation: 459.20 ft								
-									
	•								
Piez	ometer Construction Quantities;								
Liga									
	ry Filter Sand - 250 lb.								
	dary Filter Sand - 50 lb.  nite Slurry - 36 gal.								
Remarks: Notur	al Sand Collapse Comprises @45 %				Secondary	445.24 ft			
of Ce	alculated Sand Volume.	$\boxtimes$	$\otimes$	Filte	r Pack				
	to Hole Collapse and/or Shrinkage.			Top (20	Primary Filter   /40 Sand):	Peck 443.74	ft		
				Top 2" (	of Screen (10 Nominal) Sched	- Slot): <u>44</u> ule 40 PVC ( 1	0.74 ft 0 ft Len	t gth)	
								•	
					Coordinates	ı			
					N: 993664.2				
-					E: 730089.1				
								·	
	Bottom Hole Depth: 34.8 bgs				Base Sump:	37.14 btoc		· · · · · · · · · · · · · · · · · · ·	
			25 ches		Bose Elev:	430.41 ft			
	PIEZOMETER	I	C E	) F I	DÉLL En	gineerin	σ Dr	esources	Inc
P-83	CONSTRUCTION		G G	<b>\</b> L		NMENTAL E	_		, 1116.
Date Piezometer	DIAGRAM	· . ·	150		AND It High Street	AIR		WATE Telephone: (573	
Completed: 11/10/09	AMEREN MISSOURI  LABADIE POWER PLANT	-	Jeffersor DATE	n City	Missouri 65101 SCALE		ED	Facsimile: (573	
	LADADIL FUVVER FLANI		1/201	0	N.T.S.	<u> </u>			50

Ground Su Maximum Minimum	riace Elev: 464.41 ft  Groundwater Elevation: 463.40 ft  Groundwater Elevation: 459.11 ft			Concrete Pa	od .		
<ol> <li>Primar</li> <li>Second</li> <li>Bentor</li> <li>Remarks:         <ul> <li>Nature</li> <li>of Co</li> </ul> </li> <li>Lower</li> </ol>	printer Construction Quantities:  The state of the state	Fill To (2)	p Secondary ler Pack  p Primary Filter f 0/40 Sand): p of Screen (10 (Nominal) Sched  Coordinates N: 993647.3 E: 730619.2  Base Sump:	443.57 - Slot): 44 ule 40 PVC ( 1	ft 0.37 ft 0 ft Leng	jth)	
		).25 ches	Base Elev:	430.04 ft			
P - 85	PIEZOMETER CONSTRUCTION DIAGRAM		LAND	gineerin NMENTAL E	ENGINE	ERING WATE	R
Date Piezometer Completed:	AMEREN MISSOURI	 Jefferson C	ast High Street ty, Missouri 65101			Telephone: (573 Facsimile: (573	3) 659-9079
11/10/09	LABADIE POWER PLANT	 DATE 1/2010	SCALE N.T.S.	DRAWN BY: B	BED	APPROVED BY:	мсс
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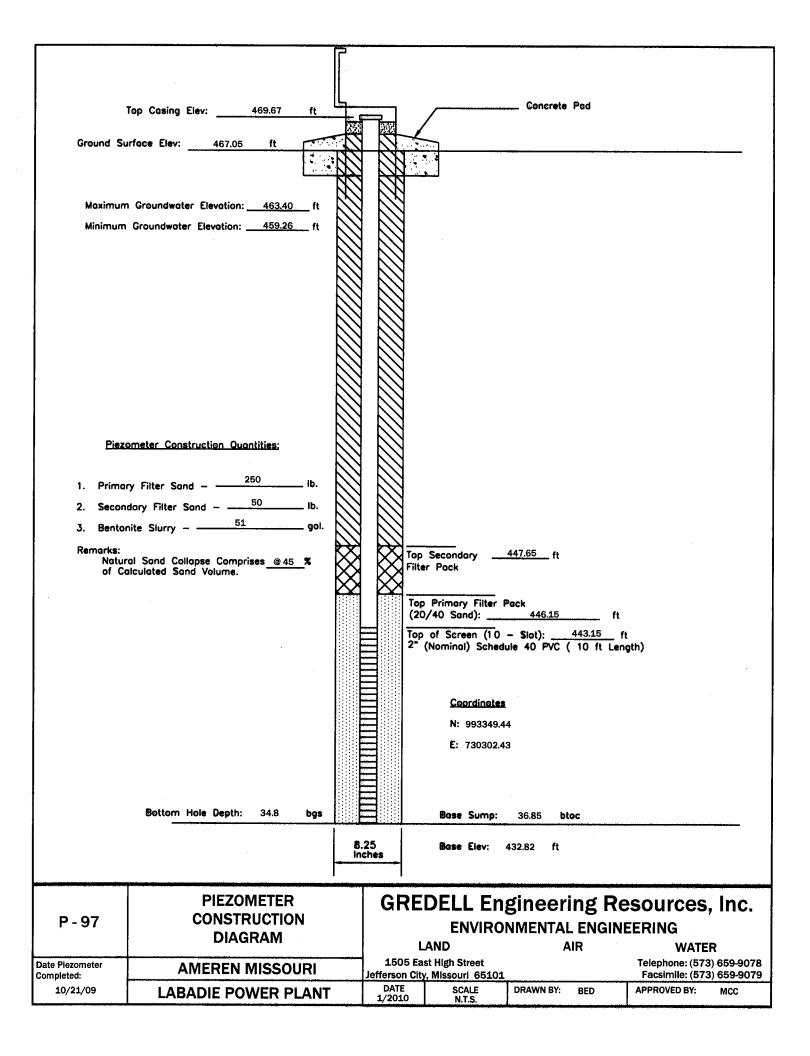


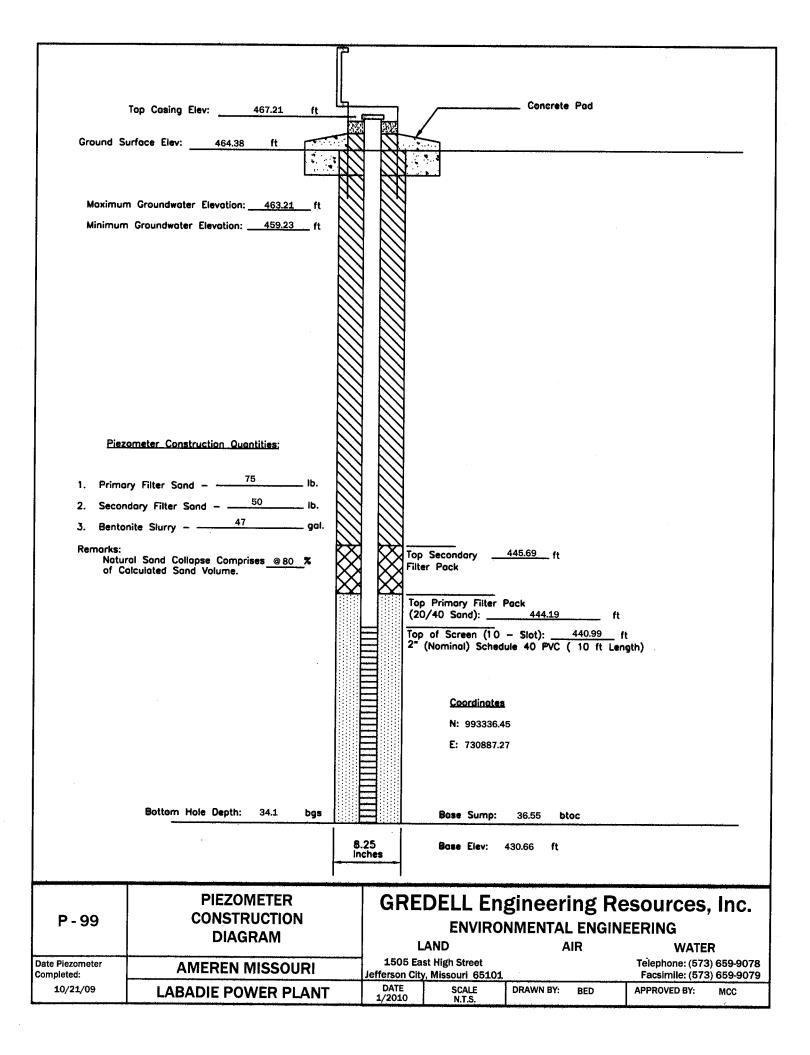
<del></del>			-		<del></del>				
	Ton Coolea Flaur	400.40				Concrete	Pad		
	Top Casing Elev:	469.13 ft	157	1 3332					
Ground Si	urface Elev: 466.25	ft T	Z,		<u>,                                     </u>				<del></del>
Maximun	n Groundwater Elevation: _	464.39 ft							
	Groundwater Elevation: _								
white the same of	GIOGIIGWALEF EIEVALION: _	<u>458.53</u> ft							
-									
•									
Piez	ometer Construction Quar	. titi							
1.192	STREET CONSTRUCTION COUR	iunes.							
1. Prima	ry Filter Sand - 2	75 lb.							
2. Secon	dary Filter Sand – ——	40 lb.							
3. Bentoi	nite Slurry - 37	gal.							
Remarks:		<b>-</b> .	$\Rightarrow$		Secondary	446.15 ft			
of Co	al Sand Collapse Compris alculated Sand Volume.	ses @ 40 %	$\bowtie$		er Pack				
Lower Due 1	than Calculated Grout V to Hole Collapse and/or:	olume Used	$\sim$		p Primary Filter F	Pack			
				(2	0/40 Sand):	444.95	ft		
				To 2°	p of Screen (10 (Nominal) Sched	- Slot): ule 40 PVC	442.45 f	t ath)	
					•		•	•	
					<u>Coordinates</u>				
					N: 993401.9				
					E: 727072.9	2			
	Bottom Hole Depth:	34.8 <b>bgs</b>			Base Sump:	37.01 b	toc	<del></del>	<del></del>
			8.	.25 ches	Base Elev:	432.12 ft			
			<del></del>						
1. T	PIEZON	IETER	********	CDI	DELL En	ginger	ing Da	SOULOGO	Inc
P - 88	CONSTR			GIL					, mc.
	DIAGE			]	ENVIROI LAND	NMENTAI			·D
Date Piezometer	AMEREN M	HECOLIDI	·	1505 E	ast High Street	Α	NR	WATE Telephone: (573	
Completed: 11/06/09	TWO IS A STREET OF THE STREET	<del></del>			y, Missourl 65101	DRAWN BY:	PED	Facsimile: (57	3) 659-9079
11/00/03	LABADIE POV	VER PLANT	w.,	1/2010	SCALE N.T.S.	DRAWN BY:	BED	APPROVED BY:	MCC



	terre de la companya de la companya de la companya de la companya de la companya de la companya de la companya				· · · · · · · · · · · · · · · · · · ·				
	Top Casing Elev: 468.82 ft			/	,	Concret	e Pad		
Ground S	urface Elev: 465.91 ft		7	<u> </u>	}				
Maximum Minimum  1. Prima 2. Secon 3. Benta Remarks: Natural	m Groundwater Elevation:			Top (	Primary Filter 40 Sand): of Screen (1 0 lominal) Sched	445.15	ft ft ( 10 ft Ler	it igth)	
	Bottom Hole Depth: 35.0 bgs				Coordinates N: 993388.3 E: 729062.3 Base Sump:	5 2	bloc		
		8.: Inc	25 thes		Bose Elev:	431.92 ft			į
P - 93	PIEZOMETER CONSTRUCTION DIAGRAM		GR	ED	ENVIRO	NMENTA	ring Re	SOURCES EERING WATE	
Date Piezometer Completed:	AMEREN MISSOURI		1505 Jefferson	East City, I	High Street Missouri 65101			Telephone: (57 Facsimile: (57	3) 659-9078 3) 659-9079
10/20/09	LABADIE POWER PLANT		DATE 1/2010		SCALE N.T.S.	DRAWN BY:	BED	APPROVED BY:	MCC

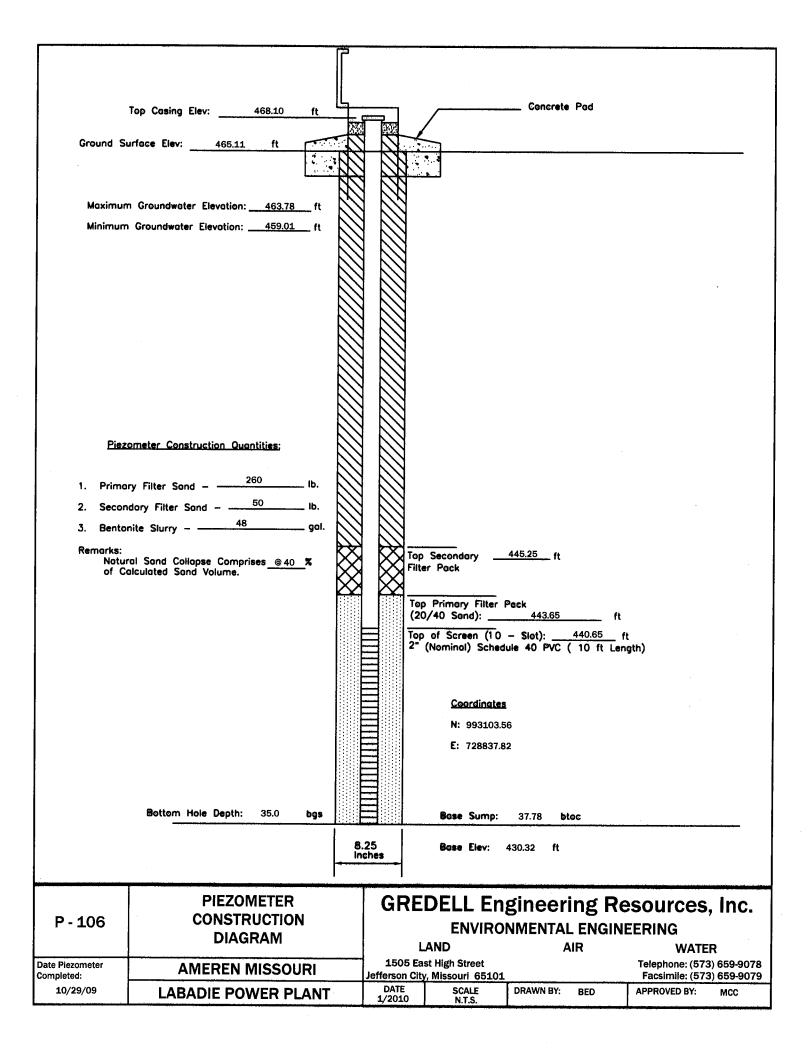
· · · · · · · · · · · · · · · · · · ·									
	Top Casing Elev: 469.9	92 ft L			/	Concrete	Pad		
Ground Su	irface Elev: 467.22 f	1		1	, 				
		1::18	7 12		•			· · · · · ·	<del></del>
			3 12						
	· · · · · · · · · · · · · · · · · · ·	3.62 ft							
Minimum	Groundwater Elevation:45	9.25 ft							
						•			
Piezo	ometer Construction Quantities	E	3 (3)						
	250								
	ry Filter Sand - 60	lb.							
	nite Slurry - 39	gal.							
Remorks:	•			Тор	Secondary	447.43 ft			
	al Sand Collapse Comprises piculated Sand Volume.	<u>@ 45</u> <b>%</b>	$\otimes \otimes$		r Pack				
	· than Calculated Grout Volum to Hole Collapse and/or Shrir			Тор	Primory Filter F	Pack			
• •					/40 Sand):		ft 443.13 <i>f</i> f	•	
				2" (	of Screen (10 (Nominal) Sched	ule 40 PVC (	10 ft Len	gth)	
					Coordinates				
					N: 993368.4				İ
					E: 729725.0	6			
	Bottom Hole Depth: 34.	9 <b>bgs</b>			Base Sump:	37.12 bt	9C		
	The state of the s		8.25		· · · · · · · · · · · · · · · · · · ·	· · . · . · . · · · · · · · · · ·		<del></del>	<del></del>
		-	inches		DOST LIEV.	432.80 ft			
	PIEZOMET		GF	REI	DELL En	gineeri	ng Re	sources	, Inc.
P-95	CONSTRUC DIAGRAI				ENVIRO	NMENTAL	. ENGINI		
Date Piezometer	**************************************	· · · · · · · · · · · · · · · · · · ·	150		AND at High Street	Α	IR	WATI Telephone: (57	
20/20/09	AMEREN MIS	· · · · · · · · · · · · · · · · · · ·		City	, Missouri 65101 SCALE	DRAWN BY:	BED	Facsimile: (57	3) 659-9079
10, 20, 03	LABADIE POWER	( PLANI	1/201		N.T.S.	PINCESIS DI:	סבט	AFFROVED DT:	MCC





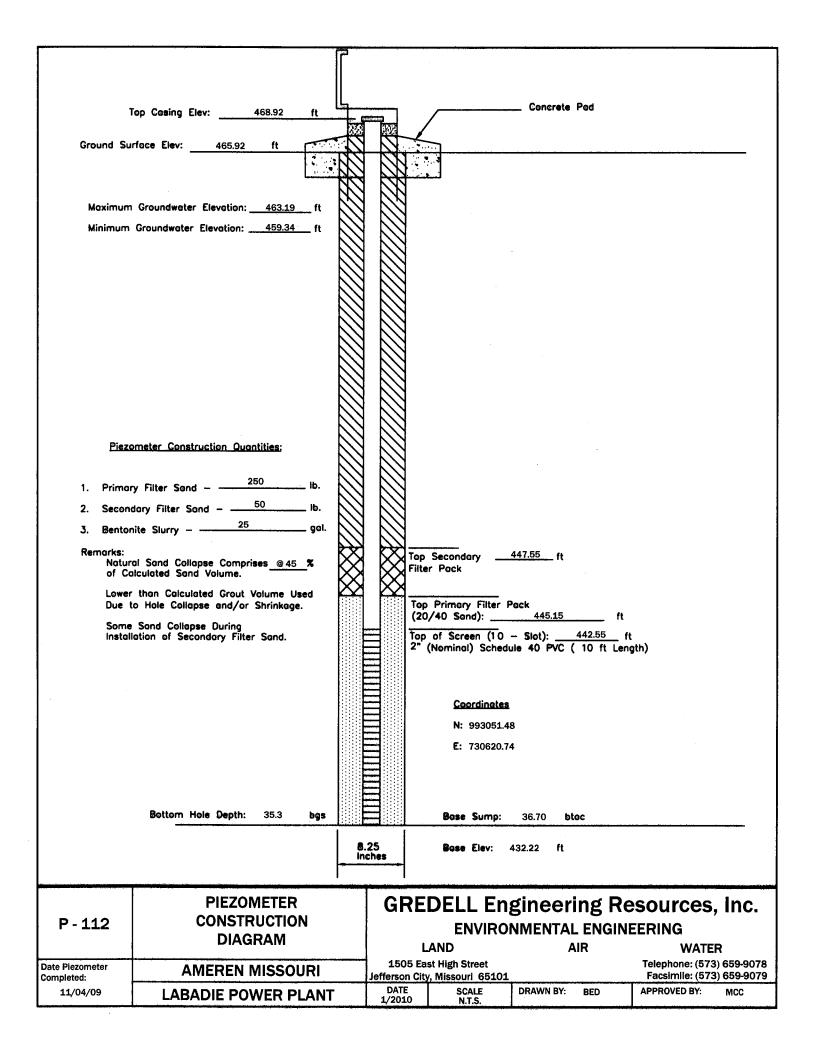
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,	Top Casing Elev: 467.27 ft				Concrete F	<sup>3</sup> od		
Ground Su	irface Elev: 464.29 ft	- 1						
		1	1 12		<del></del>			
		M						
	Groundwater Elevation: 464.42 ft							
Minimum	Groundwater Elevation: 458.52 ft							
	,							
						`		
Piezo	ometer Construction Quantities:							
<del></del> ··								
1. Primor	ry Filter Sand – 200 lb.							
	dary Filter Sand - 40 lb.							
	nite Slurry – ——————————————————————————————————							
Remarks: Natur of Ca	al Sand Collapse Comprises @ 60 %	$\bowtie$		Top Secondary Filter Pack	446.33 ft			
Highe	r than Calculated Grout Volume Used	$\boxtimes$						
Attrib Boreh	utable to Apparent Washouts in sole.			Top Primary Filter F (20/40 Sand):		ft		
			目	Top of Screen (10 2" (Nominal) Schedu	- Slot): 4	41.73 ft	t eth)	
				<b>(101111111)</b>	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	10 11	Ren's	
				<u>Coordinates</u> N: 993140.4				
				E: 727503.6				
	Bottom Hole Depth: 34.7 bgs			Base Sump:	35.87 btoo	8		
		8	.25	Bose Elev:	431.40 ft			
		In	ches					
	PIEZOMETER		GF	REDELL En	gineerii	ng Re	equirces I	nc
P-102	CONSTRUCTION		ļ ~.		NMENTAL			110.
	DIAGRAM			LAND	Ali		WATER	
Date Piezometer Completed:	AMEREN MISSOURI			5 East High Street n City, Missouri 65101			Telephone: (573) 65 Facsimile: (573) 65	59-9078 59-9079
9/29/09	LABADIE POWER PLANT		DATE 1/201		DRAWN BY:	BED	APPROVED BY: M	1CC

			-							
		,								
	Top Casing Elev:	467.78 ft	<u>L</u> ,			<i></i>	Concrete	Pad		
Ground Sc	urface Elev: 465.00	ft F	Z		!	′ 	-			
	n Groundwater Elevation:									
Minimum	Groundwater Elevation: _	458.70 ft								
Piez	ometer Construction Quar	ntities;				,				
1 Beima	ry Filter Sand - 42	25 lb.								
		75 lb.								
-	dary fines saine =									
	nite Slurry - 116	goi.								
Remarks: Natur of Co	al Sand Collapse Compris	ses <u>@ 30</u> %	$\bowtie$			Secondary r Pack	_445.47 ft			
Highe Attrib Boret	er than Calculated Grout Sutable to Apparent Wash	Volume Used outs in	$\bowtie$	$\bowtie$	Тор	Primary Filter	Pack			
00161	ivie.				Top	/20 Sand): of Screen (20	- Slot):	ft f	t	
					٠ (	Nominal) Sched	ule 40 PVC (	, 10 ft Len	gtn <i>)</i>	
						Coordinates	l.			
				3		N: 993125.7	75			
						E: 728085.4	10			
	Bottom Hole Depth:	34.8 <b>bgs</b>				Base Sump:	37.34 bt	oc		<del>~</del>
				0.25 ches		Base Elev:	430.44 ft			
	PIEZOM	IETER	******	GR	F	)FII Fn	gineeri	ng Da	sources	Inc
P-104	CONSTR			GIV	6		NMENTAL		*	, 1116.
	DIAGE	RAM			L	AND FIANIKO		- ENGINI JR	CERING WATE	R
Date Piezometer Completed:	AMEREN M	IISSOURI			5 Eas	t High Street Missouri 65101			Telephone: (57: Facsimile: (57:	3) 659-9078
10/05/09	LABADIE POV	VER PLANT		DATE 1/2010		SCALE N.T.S.	DRAWN BY:	BED	APPROVED BY:	MCC
			***************************************			The second second				



	Top Casing Elev: 468.5	55 ft	<u> </u>		/	Concrete	Pød		
			M						
Ground Su	urface Elev: 465.71 ft		(N	M					<del></del> _
·		1	$\mathcal{H}$	$\mathcal{M}$					
Maximum	Groundwater Elevation:46	3.61ft							
		9.22 ft	W						
			W						
			$\parallel \parallel$						
			W						
			W					•	
			$\parallel \parallel$						
<u>Piez</u>	ometer Construction Quantities	<u>ت</u> .	W						
	250								
	ry Filter Sand	lb.							
	dary Filter Sand - 50 nite Slurry - 30	10. gal.							
Remarks:	into signify		<i>///</i>	<u> </u>		440.40			
Natur	al Sand Collapse Comprises of Collapse	<u>@ 45</u> %	$\mathbb{X}$		<u>p</u> Secondary <u> </u> ter Pack	446.13 ft			
Lower	than Calculated Grout Volum	e Used	$\boxtimes$	$\bowtie$ _					
Due 1	to Hole Collapse and/or Shrin	kage.			pp Primary Filter F 20/40 Sand):	Pack 444.53	ft		
			Ē	T <sub>o</sub>	p of Screen (10 (Nominal) Sched	- Slot):	441.43 f	t <b>.</b>	
			E	]   '	(Nominal) Schedi	ule 40 PVC (	10 ft Len	gth)	
			E	3 1					
			E	3	Coordinates				
			Ē		N: 993084.0	9			i
			E	3	<b>E</b> : 729427.9	3			
			E	3					
			Ē	=					
	Bottom Hole Depth: 35.0	) bgs	E		Base Sump:	37.45 bt	9 <b>C</b>	- <del>1847 - 1848 - 1848 - 1848 - 1848 - 1848 - 1848 - 1848 - 1848 - 1848 - 1848 - 1848 - 1848 - 1848 - 1848 - 184</del>	·
			8.2		Base Elev:	431.10 ft			
		-	ine	hes					
	PIEZOMET	FD.	T	<u> </u>	'Drii e				
P - 108	CONSTRUCT			GK	DELL En				, inc.
1 100	DIAGRAN				ENVIROI LAND	NMENTAL ^			_
Date Plezometer	AMEREN MISS	SOLIDI		1505 E	ast High Street		IR	WATI Telephone: (57	
Completed: 11/04/09		<del></del>			ty, Missouri 65101 SCALE	DRAWN BY:	BED	Facsimile: (57	3) 659-9079
, 0 ,, 00	LABADIE POWER	PLANI		1/2010	N.T.S.			OF HOTED BI:	MCC

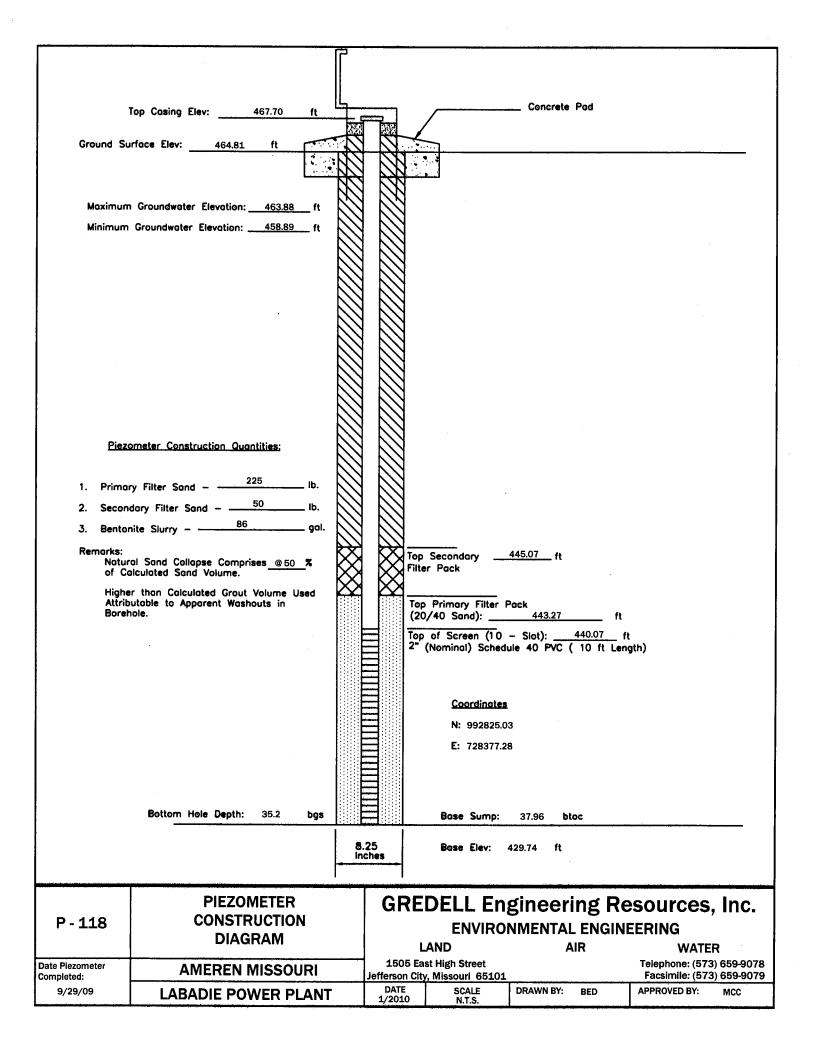
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				<del></del>	<del></del>			· · · · · · · · · · · · · · · · · · ·		
	Top Casing Elev:	468.99 ft			/		Concrete	Ped		
Ground Su	urface Elev: 466.14	ft Total	-		_	1				
						4				
Maximum	n Groundwater Elevation: _	463.46 ft								
	Groundwater Elevation: _									
Piezo	ometer Construction Quan	ntities:								
1. Prima	ry Filter Sand — 20	60 lb.								
	dury ritter 30nd	50 lb.								
Remorks:	nite siurry -	gal.					446.04			
Natur	ral Sand Collapse Compris alculated Sand Volume.	ses <u>@ 45</u> %	$\bowtie$		Top S Filter		446.91 ft			
	r than Calculated Grout V to Hole Callapse and/or :		X			Primary Filter				
			E	=     :	Top o	f Screen (10	445.41 - Slot):	ft ft	t.	
					2" (N	ominal) Sched	ule 40 PVC (	10 ft Len	gth)	
				$\exists$						
			Ē			Coordinates N: 993066.8				
			E	3		E: 730012.3				
			<u> </u>	3						
	Solder Hole Coult	05.0	E							
	Bottom Hole Depth:	35.2 <b>bgs</b>	l E I		· · · · · · · · · · · · · · · · · · ·	Base Sump:	37.37 bt	.oc		<del></del>
			8.: Inc	25 ches		Base Elev:	431.98 ft			
	PIEZOM			GR	RED	ELL En	gineer	ing Re	esources	, Inc.
P - 110	CONSTR DIAGE						NMENTAL			
Date Piezometer	AMEREN M	<del> </del>				High Street		MR	WATI Telephone: (57 Facsimile: (57	3) 659-9078
Completed: 11/04/09	LABADIE POV			DATE 1/2010		Missouri 65101 SCALE N.T.S.	DRAWN BY:	BED	APPROVED BY:	3) 659-9079 MCC
***********			_							the state of the s



	Top Casing Elev:4	166.78 ft			/	Concrete	Pad		
Ground Su	rface Elev: 463.94	ft Francisco							
				} :					
Maximum	Groundwater Elevation:	463.07 ft							
	Groundwater Elevation:	l l		3					
				}					
									-
<u>Piezo</u>	ometer Construction Quant	tities:							
1. Prima	ry Filter Sand - 45	<u>0</u>							
	-	<u>′5</u> lb.							
3. Bentor	nite Slurry - 61	gal.							
Remarks: Natur of Co	al Sand Collapse Compris Diculated Sand Volume.	es <u>@ 25</u> %	$X \times X$		Secondary Pack	443.97 ft			
Lower	than Calculated Grout Vo		$\boxtimes$	}					
Due 1	o Hole Collapse and/or S	Shrinkage.		(20/	Primary Filter F 40 Sand):	442.47	ft		
				Top 4" (I	of Screen (10 Nominal) Sched	– Slot): ule 40 PVC (	439.57 ft 10 ft Len	: gth)	
					Coordinates				
					N: 993026.2				
					E: 731203.7	2			
	Bottom Hole Depth:	34.8 <b>bgs</b>	E		Bose Sump:	37.54 bt	oc		
			10.25 Inches		Base Elev:	429.24 ft			
		<u> </u>		1					
D 444	PIEZOM CONSTRI		G	REC		_	_	sources	, Inc.
P - 114	DIAGE			1 4	ENVIRO	NMENTAL A	_ ENGINE JIR	EERING WATE	- <sub>R</sub>
Date Piezometer Completed:	AMEREN M	IISSOURI		05 East	High Street Missouri 65101			Telephone: (57 Facsimile: (57	3) 659-9078
11/12/09	LABADIE POW	/ER PLANT	DA1 1/20	E	SCALE N.T.S.	DRAWN BY:	BED	APPROVED BY:	MCC

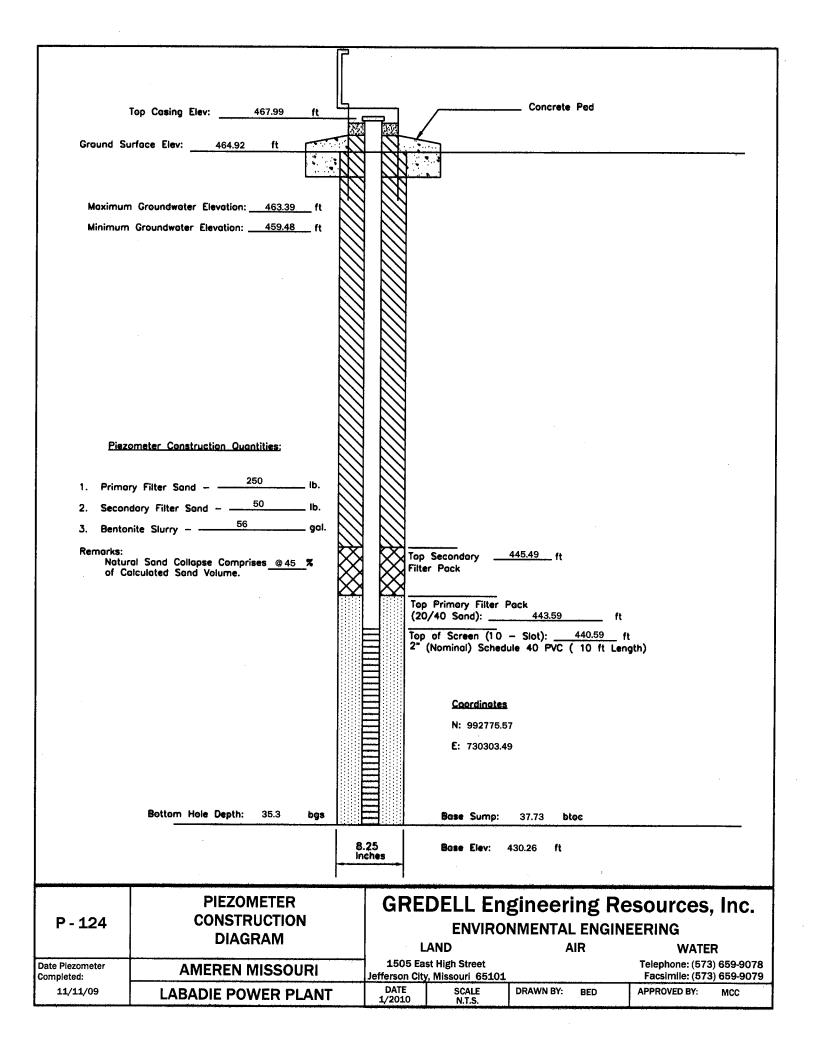
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	Top Casing Elev: 467.55 ft		NAME OF THE OWNER OWNER OF THE OWNER	,	/	Concrete	Pod		
Ground Su	urface Elev: 464.82 ft			$\prec$	]	·	·		
		:		<b>\</b>					
Maximum	Groundwater Elevation: 464.32 ft			1					
Minimum	Groundwater Elevation: 458.69 ft								
				1					
<u>Piez</u>	ometer Construction Quantities;								
	5 2								
	ry Filter Sand – — 1b.  dary Filter Sand – 40   1b.								
3. Bentor	nite Slurry – 75 gal	. []]							
Remarks: Natur	ral Sand Collopse Comprises @ 50 %	$\otimes$			Secondary Pack	445.30 ft			
Highe	er than Calculated Grout Volume Used	$\otimes$	$  \otimes$		04-1	<b>.</b>			
Boret	outable to Apparent Washouts in nole.			(20,	Primary Filter F /40 Sand):	443.60	ft		
				Тор 2" (	of Screen (10 Nominal) Schedu	- Slot): ule 40 PVC (	440.40 ft 10 ft Leng		
					<u>Coordinates</u>				
					N: 992841.30 E: 727788.60				
	Bottom Hole Depth: 35.0 bgs	لننتندا ا		<u>}</u>	Base Sump:	37.48 bt	loc	i de la companya di santa di santa di santa di santa di santa di santa di santa di santa di santa di santa di s	-
		8 In	.25 iches		Base Elev: 4	430.07 ft			
	PIEZOMETER		GI	REI	DELL En	gineer	ing Re	sources	, Inc.
P - 116	CONSTRUCTION DIAGRAM				ENVIROI And	NMENTAI	L ENGINI		
Date Piezometer Completed:	AMEREN MISSOURI	<del></del>		)5 Eas	AND t High Street Missouri 65101	P	мг	WATI Telephone: (57 Facsimile: (57	3) 659-9078
9/29/09	LABADIE POWER PLAN	T	DAT 1/201	E	SCALE N.T.S.	DRAWN BY:	BED	APPROVED BY:	MCC

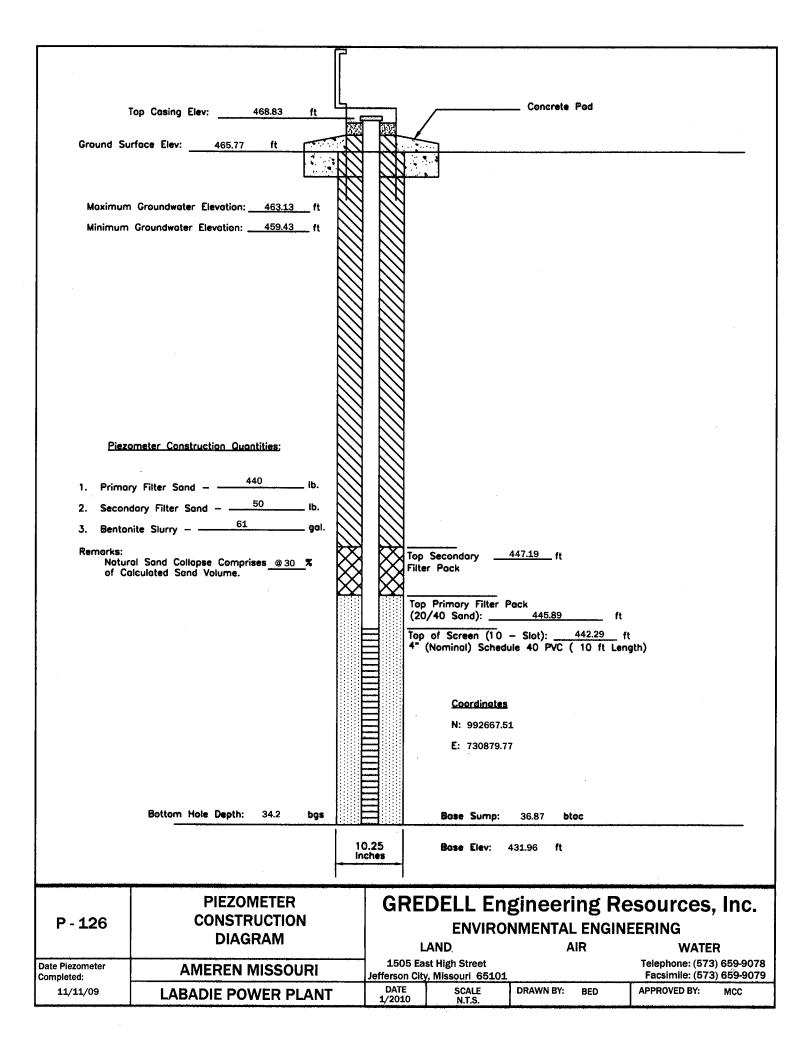
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•										
	Top Casing Elev:	467.65 ft	<u> </u>				Concrete	Pad		
Ground Si	urface Elev:464.75	ft soc	Z	3	$\preceq$	<u> </u>				
Maximun	n Groundwater Elevation: _	463.79 ft				•				
	Groundwater Elevation:								•	
		·								
Piez	ometer Construction Quar	ntitiae:								
1.192	on or other sections and	IIIIIes.								
1. Prima	ry Filter Sand - 3	75 lb.								
	odly lines saile =	75 lb.			,					
3. Bentoi Remarks:	nite Slurry - 85	gol.								
Natur	ral Sand Collapse Compris	ses <u>@ 40</u> %	$\bowtie$	$\bowtie$		Secondary <u> </u>	<u>445.49</u> ft			
Highe Attrib	er than Calculated Grout outable to Apparent Wash	Volume Used	$\bowtie$	$\bowtie$		Primary Filter	0			
Borel	nole.	5000 III		_	(10	/20 Sand):	443.89	ft		
					Top 4" (	of Screen (20 Nominal) Sched	- Slot): lule 40 PVC (	440.59 f 10 ft Len	t gth)	
			Ē	3		Coordinates	ì			
				$\equiv$		N: 992787.6	68			
				3 1		<b>E</b> : 729145.9	0			
			<u>.</u>	3						
	Bottom Hole Depth:	34.9 <b>bgs</b>	Ē	=		Base Sump:	27.20 ht			•
			<b>ا</b> فارندنا			<del></del>	**************************************	oc		· · · · · ·
		,	inc	.25 thes		Base Elev:	430.26 ft			
	PIEZON	1ETER		GF	?FI	)FII Fn	gineeri	ng Re	sources	Inc
P - 120	CONSTR			<b>₩</b> 1	'		NMENTAL			,,
<u></u>	DIAGI	······································				AND		JR	WATE	
Date Piezometer Completed:	AMEREN N			Jeffersor	City,	t High Street Missouri 65101			Telephone: (57 Facsimile: (57	3) 659-9078 3) 659-9079
10/22/09	LABADIE POV	VER PLANT		DATE 1/201		SCALE N.T.S.	DRAWN BY:	BED	APPROVED BY:	MCC

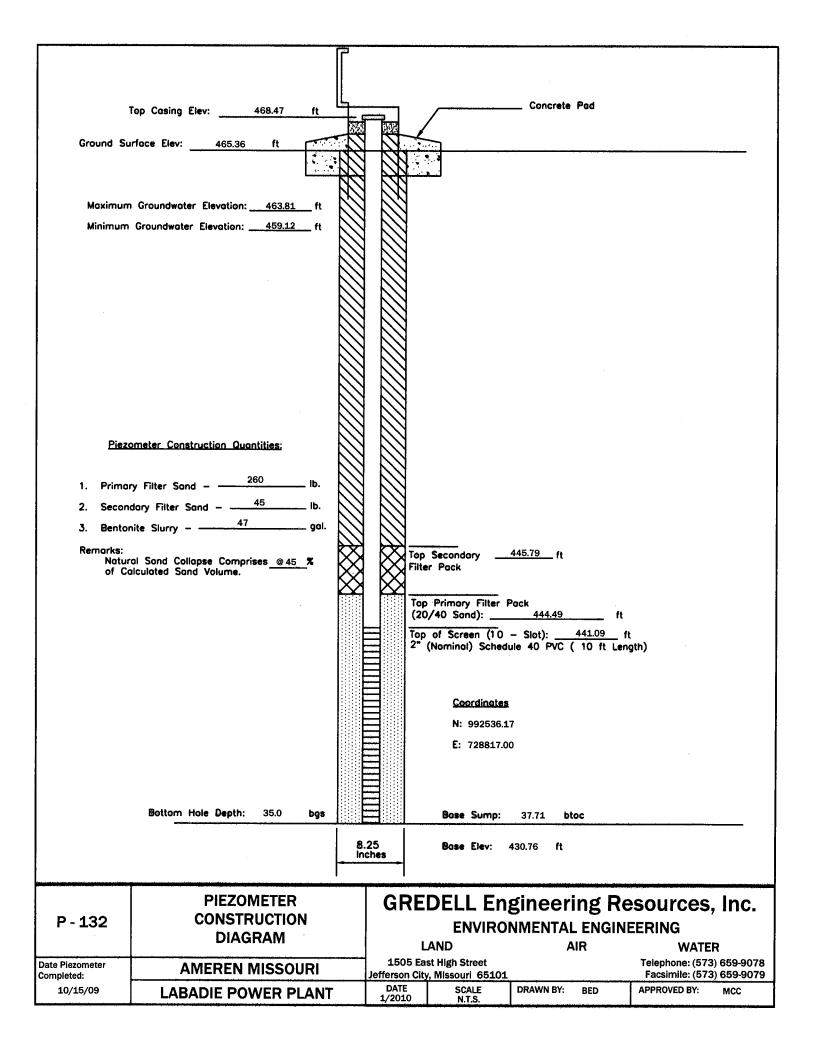
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1	Top Casing Elev: 467	7.71 ft	- (manum)		Concrete I	Pad		
Ground Su	rface Elev:464.74	n T					······································	
Maximum	Groundwater Elevation: 4	163.67 ft						
Minimum	Groundwater Elevation:4	159.31 ft						
*								
Piezo	ometer Construction Quantiti	es:						
	ry Filter Sand - 275	lb.						
	dary Filter Sand – 25 nite Slurry – 38	1b.						
Remarks: Natur	al Sand Collapse Comprises	@ 40 <b>%</b>			445.40ft			
Lower	ilculated Sand Volume. than Calculated Grout Volu			Filter Pack				
Due t	o Hole Collapse and/or Shr	inkage.		Top Primary Filter F (20/40 Sand):	444,10	ft		
				Top of Screen (10 2" (Nominal) Schedu	- Slot):4 ule 40 PVC (	140.60 ft 10 ft Leng		
				<u>Coordinates</u> N: 992758.8	4			
				E: 729781.03	1			
	Bottom Hole Depth: 35	5.2 <b>bgs</b>		Base Sump:	37.44 <b>bto</b>	e		
			8.25 inches	Base Elev: 4	430.27 ft			
	PIEZOME		GF	REDELL Eng	gineeri	ng Re	sources.	Inc.
P - 122	CONSTRUC DIAGRA			ENVIRO	NMENTAL	ENGINE	ERING	
Date Piezometer Completed:	AMEREN MIS		150 Jefferson	LAND 5 East High Street n City, Missouri 65101	Al	ĸ	WATER Telephone: (573) Facsimile: (573)	659-9078
11/10/09	LABADIE POWE	R PLANT	DATE 1/201	SCALE	DRAWN BY:	BED	APPROVED BY:	MCC





<del></del>	The second of th	200.				
•	Top Casing Elev: 468.60 ft	<u> </u>			Concrete Pad	
Ground Su	urface Elev: 465.74 ft		7		<u> </u>	
Moximum	Groundwater Elevation: 464.40 ft					
	Groundwater Elevation: 458.69 ft					
Piezo	ometer Construction Quantities:					
	ry Filter Sand - 400 lb.					
	ry Filter Sand - 75 lb.					
	nite Slurry – 72 gal.					
Remarks: Natur	al Sand Collapse Comprises @35 %	紁			<u>446.44</u> ft	
	piculated Sand Volume.	$\bowtie$	$\bigotimes'$	ilter Pack		
				op Primary Filter F 10/20 Sand):	Pack 444.64 f	t
			<b>=</b>        <sub>1</sub>	op of Screen (20		ft
		Ē		(HOMMU) Schedu	10 10 10 10 10 10 10 10 10 10 10 10 10 1	sng(n)
			3			
				<u>Coordinates</u> N: 992561.8		
		Ē	$\exists \parallel \parallel$	<b>E:</b> 727385.5		
		E	3			
-						
	Bottom Hole Depth: 34.7 bgs	<u>l</u>		Base Sump:	37.39 <b>btoc</b>	
		10 Inc	.25 :hes	Base Elev:	431.21 ft	
	PIEZOMETER		GR	EDELL En	gineering R	esources, Inc.
P-128	CONSTRUCTION DIAGRAM		- · · -		NMENTAL ENGI	•
Date Piezometer			1505	LAND East High Street	AIR	WATER Telephone: (573) 659-9078
Completed: 11/07/09	AMEREN MISSOURI  LABADIE POWER PLANT		Jefferson ( DATE	City, Missouri 65101	DRAWN BY: BED	Facsimile: (573) 659-9079  APPROVED BY: MCC
	LABADIE FOWER PLANT		1/2010	N.T.S.		

	Top Casing Elev: 468.13				Concrete Pad	
Ground Su	rface Elev: 465.15 ft			/ 	•	
i						
				<del></del>		
	Groundwater Elevation: <u>464.0</u> Groundwater Elevation: <u>458.8</u>					
Minimon	Groundwater Elevation:	<del>7_ "</del>				
Piezo	ometer Construction Quantities;					
4 84	240	16.				
	ry Filter Sond - 50	lb.				
	nite Slurry - 63	gal.				
Remarks:	al Sand Collapse Comprises @ 8				446.21 ft	
of Co	piculated Sand Volume.	- X	Filt	er Pack		
	r than Calculated Grout Volume utable to Apparent Washouts in lale	Used K.X.		Primary Filter F 0/40 Sand):		
50.0			1 1::::::1	• • •		
			2"	(Nominal) Schedu	ule 40 PVC ( 10 ft Len	gth)
				Coordinates		
				N: 992537.6 E: 728075.0		
				E. 128015.0		
	Bottom Hole Depth: 34.9	bgs		Base Sump:	37.35 <b>btoc</b>	
		8	.25	Base Elev:	430.78 ft	
		- "	nches			
	PIEZOMETE	₹	GRE	DELL En	gineering Re	sources, Inc.
P - 130	CONSTRUCTION	NC			NMENTAL ENGINI	·
	DIAGRAM	····	l .	LAND	AIR	<b>WATER</b> Telephone: (573) 659-9078
Date Piezometer Completed:	AMEREN MISSO	<del>~</del>	Jefferson Cit	st High Street y, Missouri 65101	DDAWN BY	Facsimile: (573) 659-9079
9/30/09	LABADIE POWER I	PLANT	DATE 1/2010	SCALE N.T.S.	DRAWN BY: BED	APPROVED BY: MCC



<del></del>		<del></del>	-							
				-						
1	Top Casing Elev:4	466.82 ft	<u> </u>	337			Concrete	Pad		
Ground Su	rface Elev: 464.10	ft recons	***	1		P. Ada - '.	3.00			
									ŧ	
Maximum	Groundwater Elevation:	463.69 ft								
Minimum	Groundwater Elevation:	<u>459.31</u> ft								
Piezo	ometer Construction Quant	tities:								
1. Primar	ry Filter Sand — 15	io lb.								
	dary rater Sand -	<u>25</u>								
3. Bentor Remarks:	nite Slurry - 49	gal.								
Nature	al Sand Collapse Compriso Diculated Sand Volume.	es <u>@ 70</u> %	$\bowtie$		Top Se Filt <b>e</b> r f		445.83 ft			
			$\bowtie$	$\bowtie$	Top P	imary Filter I	Pack			
			L		(20/4	) Sand):	444.13	ft		
			E	]	2" (No	minal) Sched	- Slot): ule 40 PVC (	10 ft Len	t igth)	
			E							
			E			Coordinates	i			
			Ē			N: 992491.3 E: 729438.2				
			E			E: /29430.2	1			
			E	3						
	Bottom Hole Depth:	34.9 bgs	E		<del> </del>	Base Sump:	37.62 bt	oc		
		-	8.2 Inc	25 thes		Base Elev:	429.20 ft			
· · · · · · · · · · · · · · · · · · ·	DIEZOM		<del></del>							
P - 134	PIEZOM CONSTRU			GR	KED		-	_	esources	i, Inc.
- <del></del> -	DIAGR	RAM			LAN		NMENTAL A	. ENGINI JR	EERING WATE	ER .
Date Piezometer Completed:	AMEREN M	ISSOURI				igh Street Issouri 65101			Telephone: (57 Facsimile: (57	3) 659-9078
11/10/09	LABADIE POW	/ER PLANT		DATE 1/2010		SCALE N.T.S.	DRAWN BY:	BED	APPROVED BY:	мсс

· · · · · · · · · · · · · · · · · · ·	the state of the s							
	Top Cosing Elev: 466.73 ft		]		Concret	e Pad		
Ground St	urface Elev: 463.71 ft		$\prec$	, 		· · · · · · · · · · · · · · · · · · ·		
			<u>}</u>					
Maximun	n Groundwater Elevation: 463,48 ft							
Minimum	Groundwater Elevation: 459.45 ft							
Pier	amatas Casalasatias O satiiva							
Elez	ometer Construction Quantities;							
	ry Filter Sand – 425 lb.							
	dary Filter Sand — 75 lb.  nite Slurry — 76 gal.							
Remarks:	al Sand Collapse Comprises @ 30 %	$\langle \langle $	Top	Secondary	443.83 ft			
of Co	alculated Sand Volume.	$\aleph$	Filte	r Pack				
			Top (20	Primary Filter F /40 Sand):	Pack 442.23	ft		
		Ħ	: -	of Screen (10 (Nominal) Schedu			t ath)	
				,		( 10 K 20H	<b>3</b> \	
				Coordinates				
				N: 992488.64	4			
				E: 730004.49	€			
	Bottom Hole Depth: 34.7 bgs			Base Sump:	37.63 t	otoc		
		10.25 inches		Bose Elev: 4	429.10 ft			
***		HICHES	+	3 - Landau and Carlo				
	PIEZOMETER	G	RE	DELL Eng	gineeı	ring Re	sources	, Inc.
P - 136	CONSTRUCTION DIAGRAM			ENVIRO	NMENTA	L ENGINI	EERING	
Date Piezometer	AMEREN MISSOURI		05 Ea	AND at High Street		AIR	WATE	3) 659-9078
Completed: 11/11/09	LABADIE POWER PLANT	DA 1/20	TE	, Missouri 65101 SCALE N.T.S.	DRAWN BY:	BED	Facsimile: (57: APPROVED BY:	MCC
	· · · · · · · · · · · · · · · · · · ·				The second second			

	Top Casing Elev: 466.99 ft	4	7		Concrete	Ped		
Ground St	urface Elev: 464.10 ft		<b>\</b>	, 			······································	
Meximun	n Groundwater Elevation: <u>463.29</u> ft							
Minimum	Groundwater Elevation: <u>459.48</u> ft							
Pierr	ometer Construction Quantities							
Plez	ometer Construction Quantities:							
	ry Filter Sand – 225 lb.							
	dary Filter Sand - 50 lb.  nite Slurry - 31 gal.							
Remarks: Natur	ral Sand Collapse Comprises @50 % olculated Sand Volume.		Top	Secondary	445.07 ft			
	r than Calculated Grout Volume Used to Hole Collapse and/or Shrinkage.		(20	·	443.17	ft		
			16p 2"	of Screen (10 (Nominal) Schedu	- Slot): ile 40 PVC (	440.27 ft 10 ft Len	: gth)	
				Coordinates				
				N: 992469.33 E: 730675.26				
				g. 130010.20	,			
	Bottom Hole Depth: 34.4 bgs			Base Sump:	37.05 <b>b</b> to	96		
		8.25 Inches	-	Base Elev: 4	129.94 ft			
P - 138	PIEZOMETER CONSTRUCTION	0	RE	DELL En	gineeri NMENTAL			Inc.
Date Piezometer	DIAGRAM			AND st High Street	Α	IR	WATE Telephone: (573	
Completed: 11/12/09	AMEREN MISSOURI LABADIE POWER PLANT	Jeffe D	rson City ATE	, Missouri 65101 SCALE	DRAWN BY:	BED	Facsimile: (573	
,	LADADIE PUWER PLANI		2010	N.T.S.		——— ——————————————————————————————————		

P	<del></del>			<del></del>	<u> </u>				
!   	Top Casing Elev:	468.57 ft	<u>L</u>		/	Concrete	Pod		
Ground Si	urface Elev:465.72	ft produ	N N						
					**		<u> </u>		•
Maximun	n Groundwater Elevation:	462.90 ft							
Minimum Groundwater Elevation: <u>459,50</u> ft									
·									
Piez	orneter Construction Qua	ntities:							
1. Prima	ry Filter Sand – 2	40 lb.							
2. Secondary Filter Sand - 50 lb.									
	nite Slurry - 38	gol.							
Remarks: Natur of Co	ral Sand Collapse Compri alculated Sand Volume.	ses <u>@ 50</u> %	$\bigotimes$	To	Secondary er Pack	446.04 ft			
Lower than Calculated Grout Volume Used Due to Hole Collapse and/or Shrinkage.				₩ To	Primary Filter I	Pack			
			(20/40 Sand):444.84 ft  Top of Screen (10 - Slot):441.74ft						
				2"	(Nominal) Sched	ule 40 PVC (	10 ft Len	gth)	
				<u>Coordinates</u>					
			N: 992404.70						
					<b>E</b> : 731394.9	3			
	Bottom Hole Depth:	34.7 <b>bgs</b>			Base Sump:	37.16 bto	e .		
			8. Inc	25 thes	Base Elev:	431.41 ft			
P - 140	PIEZOMETER CONSTRUCTION DIAGRAM			GREDELL Engineering Resources, Inc. ENVIRONMENTAL ENGINEERING LAND AIR WATER					
Date Piezometer Completed:	AMEREN MISSOURI				st High Street y, Missouri 65101	·	<u> </u>	Telephone: (573) 659-90 Facsimile: (573) 659-90	078 079
10/27/09	LABADIE POV	VER PLANT		DATE 1/2010	SCALE N.T.S.	DRAWN BY:	BED	APPROVED BY: MCC	

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					. , , , , , , , , , , , , , , , , , , ,			
		L			Concrete	Pad		
	Top Casing Elev: 467.66	ft 288			Concrete	7 00		
Ground Su	urface Elev: 464.83 ft			···			· · · · · · · · · · · · · · · · · · ·	
	Groundwater Elevation: 464.20 Groundwater Elevation: 458.87	-"						
Millingill	Groundwater Elevation;438.87	-"						
Piez	ometer Construction Quantities:			•				
	300	. ())						
	ry Filter Sand -	- lb.						
	oory rinter Sund =	_ lb. _ gel.						
Remarks:	inter Signify — -	, W	<u>                                   </u>		44540			
Natur	rol Sand Collapse Comprises @ 30 alculated Sand Volume.	- <b>*</b> 💢		Secondary er Pack	445.13 ft			
Lower	than Calculated Grout Volume Us	ed 💢	<u>                                    </u>					
Due 1	to Hole Collapse and/or Shrinkage.			Primary Filter F 0/40 Sand):		ft		
			Top	of Screen (10 (Nominal) Sched	- Slot):	440.43		
				(Nominal) Sched	ule 40 PVC (	10 ft Len	gtn)	į
				<u>Coordinates</u>				
				N: 992250.7	2			
				E: 727764.6	9			
						ý.		i
	<b>5</b> 4 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5							
	Bottom Hole Depth: 35.1	bgs		Base Sump:	37.56 bt	9C		<del></del>
		8 In	.25 ches	Base Elev:	430.10 ft			
		-						
· · · · · · · · · · · · · · · · · · ·	PIEZOMETER		GRE	DELL En	gineeri	ng Re	sources	Inc
P - 142	CONSTRUCTION	ł	GREDELL Engineering Resources, Inc.  ENVIRONMENTAL ENGINEERING					
	DIAGRAM		(	AND		IR	WATE	R
Date Piezometer Completed:	AMEREN MISSOU	RI		st High Street /, Missouri 65101			Telephone: (57: Facsimile: (57:	
11/06/09	LABADIE POWER PL	ANT	DATE 1/2010	SCALE N.T.S.	DRAWN BY:	BED	APPROVED BY:	мсс

Coordinates N: 992236.95 E: 728361.22  Base Sump: 37.52 btoc  10.25   Base Elev: 430.22 ft  PIEZOMETER CONSTRUCTION  PR. 144	Maximu Minimur 1. Prima 2. Secor 3. Benta Remarks: Notu	Top Casing Elev: 467.74  Surface Elev: 464.56 ft  m Groundwater Elevation: 463.93  n Groundwater Elevation: 459.03  range Filter Sand - 300  andary Filter Sand - 80  andary Filter Sand - 64  ral Sand Collapse Comprises 650  alculated Sand Volume.	lb. lb. gal.	To	p Secondary p Primary Filter 0/20 Sand): p of Screen (20 (Nominal) Sched	443.25 - Slot):	ft 440.55	it igth)	
DIAGRAM ENVIRONMENTAL ENGINEERING LAND AIR WATER	P - 144	PIEZOMETER CONSTRUCTION	1 1	0.25 nches	Coordinates N: 992236.5 E: 728361.2  Base Sump: Base Elev:  DELL En ENVIRO	alule 40 PVC ( alule	oc Re	esources EERING WATE	R
Date Piezometer Completed:         AMEREN MISSOURI         1505 East High Street Jefferson City, Missouri 65101         Telephone: (573) 659-9078 Facsimile: (573) 659-9079           9/30/09         LABADIE POWER PLANT         DATE 1/2010         SCALE N.T.S.         DRAWN BY: BED         APPROVED BY: MCC	Completed:		<del></del>	Jefferson Cit	y, Missouri 65101 SCALE		<del></del>	Telephone: (573 Facsimile: (573	3) 659-9078 3) 659-9079

		r						
		]]						
		L			0	. 6.4		
	Top Casing Elev: 467.48 ft				Concrete	Paa		
Ground S	urface Elev: 464.80 ft		}-					
	<b>.</b>		$\mathcal{U}$	5.4	. ******			
		<del>188</del>	$\mathcal{H}^-$	لسما				
Meximur	m Groundwater Elevation: 463.69 ft		$\mathcal{X}$					
1	Groundwater Elevation: 459.28 ft							
			)]					
			]					
	•		]					
			3					
Piez	ometer Construction Quantities:		$\mathcal{I}$					
			3					
1. Primo	ry Filter Sand - 225 lb.		3					
2. Secon	ndary Filter Sand - 25 lb.		3					
3. Bento	nite Slurry - 34 gal.							
Remarks:		$\mathcal{A}$	K		447.02			
Natur of G	ral Sand Collapse Comprises @60 % olculated Sand Volume.	$\bowtie$		Secondary <u> </u>	447.03			
Lowe	r than Calculated Grout Volume Used	$\boxtimes$	$\mathbb{A}_{}$					
Due	to Hole Callapse and/or Shrinkage.		Top	Primary Filter ( 0/40 Sand):	Pack 445 93	ft		
			::I	of Screen (10			•	
			2"	(Nominal) Sched	ule 40 PVC	10 ft Len	gth)	
	•							
				Coordinates				
				N: 992265.5	4			
	ı			E: 729102.6	2			
	Bottom Hole Depth: 34.8 bgs			Base Sump:	37.28 bt	oc		
		0.05					· · · · · · · · · · · · · · · · · · ·	
		8.25 Inches	_	Base Elev:	430.20 ft			
	PIEZOMETER	G	RF	DFII Fn	gingari	ng De	sources,	Inc
P - 146	CONSTRUCTION	4	• <b>\</b>		NMENTAL			1116.
	DIAGRAM	ĺ	ı	ENVIRUI AND		. ENGINI IR		,
Date Piezometer	AMEREN MISSOURI	15		AND st High Street	A	ii7	WATEI Telephone: (573	
Completed:		Jeffers	on City	, Missouri 65101			Facsimile: (573	659-9079
11/09/09	LABADIE POWER PLANT	DA 1/20		SCALE N.T.S.	DRAWN BY:	BED	APPROVED BY:	MCC

	the state of the same of the same state of the s	Table (						
	Top Casing Elev: 466.84 ft	4			Concrete	e Pad		
Ground St	urface Elev: 463.86 ft							
Maximun	n Groundwater Elevation: 463.63 ft							
Minimum	Groundwater Elevation: 459.44 ft							
•								
Piez	ometer Construction Quantities:							
	ry Filter Sand - 225 lb.							
	dary Filter Sand $-\frac{30}{}$ lb. nite Slurry $-\frac{30}{}$ gal.							
Remarks:	,	$\gg$			442 PE 4			
Natur of Co	ral Sand Collapse Comprises @50 % alculated Sand Volume.	$\bowtie$		op Secondary <u> </u>	443.85 ft			
Lower Due 1	r than Calculated Grout Volume Used to Hole Callapse and/or Shrinkage.	$\times$	X	Top Primary Filter	Pack			
				(20/40 Sand):	442.65	ft		
				op of Screen (10 " (Nominal) Sche	) - Slot): dule 40 PVC	439.75 f ( 10 ft Len	t gth)	
								:
				Coordinate	<u>:s</u>			-
				N: 992252	.64			
				<b>E</b> : 729630	10			
	Bottom Hole Depth: 34.7 bgs							
	Bottom Mole Depth: 34.7 bgs	<u> </u>		Base Sump:	37.42 b	loc	<del></del>	
			.25 ches	Base Elev:	429.42 ft			
	PIEZOMETER		0.0			!d D		
P - 148	CONSTRUCTION		GR	EDELL ER	igineer Dimental			inc.
	DIAGRAM			LAND		L ENGINI NR	EERING WATEI	<sub>3</sub>
Date Piezometer Completed:	AMEREN MISSOURI			East High Street City, Missouri 6510:	1		Telephone: (573 Facsimile: (573	659-9078
11/09/09	LABADIE POWER PLANT		DATE 1/2010	SCALE N.T.S.	DRAWN BY:	BED	APPROVED BY:	мсс

· · · · · · · · · · · · · · · · · · ·			
	<u>[</u>		
	Top Casing Elev: 465.91 ft		Concrete Ped
	8		
Ground St	urface Elev: 463.22 ft	<del>8 6</del>	
		$\mathcal{B}$	
Maximun	n Groundwater Elevation:463.41 ft	3 12	
Minimum	Groundwater Elevation: 459.55 ft		
		3 ()	
		3 ()	
		3 (2)	
<b>.</b> .			
Piez	ometer Construction Quantities:	3 (3)	
1. Prima	ry Filter Sand – 275 lb.		
	idary Filter Sand - 50 lb.	3 (3)	
3. Bento	nite Slurry – 65 gal.		
Remarks:	rol Sand Calleges Comprises 0 to 7	X K	Top Secondary 443.42 ft
of Co	ral Sand Collapse Comprises @40 % alculated Sand Volume.	$\otimes$ B	Filter Pack
Attrib	er than Calculated Grout Volume Used butable to Apparent Washouts in	1 KY	Top Primary Filter Pack
Boret	hole.		(20/40 Sand): 441.42 ft
			Top of Screen (10 - Slot): 438.62 ft 2" (Nominal) Schedule 40 PVC ( 10 ft Length)
		Ħ	
		Ħ	Occupant
			<u>Coordinates</u> N: 992189.21
			E: 730256.27
	Bottom Hole Depth: 35.1 bgs		Base Sump: 37.62 bloc
		<b>8</b> 25	Page 51
	-	8.25 inches	Base Elev: 428.29 ft
	.	-	
B 450	PIEZOMETER	GI	REDELL Engineering Resources, Inc.
P - 150	CONSTRUCTION DIAGRAM		ENVIRONMENTAL ENGINEERING
Date Piezometer		150	LAND         AIR         WATER           05 East High Street         Telephone: (573) 659-9078
Completed:	AMEREN MISSOURI	Jefferso	on City, Missouri 65101 Facsimile: (573) 659-9079
11/14/09	LABADIE POWER PLANT	1/20:	E SCALE DRAWN BY: BED APPROVED BY: MCC LO N.T.S.

	Top Casing Elev: 466.31 ft		Concrete Pad
Ground Si	urface Elev: 463.55 ft		
		3 13	
		7 13	<del>}</del>
Maximun	n Groundwater Elevation: 463.13 ft	3 13	
Minimum	Grøundwater Elevation: 459.61 ft		
		3 10	
		3 10	
Piez	ometer Construction Quantities;		
	225		
	ry Filter Sand -	3 [[	
	nite Slurry - 51 gal.		
Remarks:	into starry		Top Secondary 444.50 ft
Natur	ral Sand Collapse Comprises <u>@ 50</u> % alculated Sand Volume.	$X \times X$	Top Secondary <u>444.50</u> ft Filter Pack
	×	Y X	Top Primary Filter Pack
			(20/40 Sand): ft
			Top of Screen (10 - Slot): 439.50 ft 2" (Nominel) Schedule 40 PVC ( 10 ft Length)
			<u>Coordinates</u> N: 992168.58
			E: 730889.93
	Bottom Hole Depth: 34.8 bgs		Bese Sump: 37.14 btoc
		8.25	Bose Elev: 429.17 ft
		Inches	1
	DIEZOMETED	T ~	DEDELL Fordings of D
P - 152	PIEZOMETER CONSTRUCTION	G	REDELL Engineering Resources, Inc.
1 - 102	DIAGRAM		ENVIRONMENTAL ENGINEERING LAND AIR WATER
Date Piezometer	AMEREN MISSOURI		05 East High Street Telephone: (573) 659-9078
Completed: 11/12/09	LABADIE POWER PLANT	DAT	on City, Missouri 65101 Facsimile: (573) 659-9079    FE
	t a company of the co	_/~0	15.1.0,

					A	
,	Top Casing Elev: 466.27 ft	1	730		Concrete Pad	
Ground Su	urface Elev: 463,44 ft	-	4	· · · · · · · · · · · · · · · · · · ·		
		M		7.3		<del></del>
	<u> </u>			ليهن		
Meximum	Groundwater Elevation: 463.97 ft					
Minimum	Groundwater Elevation: 459.07 ft					
Piezo	ometer Construction Quantities:					
1. Prima	ry Filter Sand - 250 lb.					
2. Second	dary Filter Sand - 40 lb.					
3. Bentor	nite Slurry – 58 gal.					
Remarks: Natur	al Sand Collapse Comprises @45 %				443.87 ft	
of Co	alculated Sand Volume.	$\bowtie$	₩'"	ter Pack		
Attrib	r than Calculated Grout Volume Used utable to Apparent Washouts in	$\mathbf{x}$	To	op Primary Filter F	Pack	
Boreh	noie.		10000	20/40 Sand):		
		E	]   To	p of Screen (10 "(Nominal) Schedu	- Slot): <u>439.27</u> ft ule 40 PVC ( 10 ft Lend	gth)
		l	3			
			3			
		E	3	Coordinates		
			3	N: 991943.9		
		E	∄	E: 728065.9	7	
		E	3			
		E	3			
	Bottom Hole Depth: 34.8 bgs			Base Sump:	37.33 btoc	
		8.2	5	Bose Elev:	428.94 ft	
		Incl	hes			
	DIEZOMETED	· ·		DELL E		
P - 155	PIEZOMETER CONSTRUCTION		GK		- <del>-</del>	sources, Inc.
L - TOO	DIAGRAM				NMENTAL ENGIN	
Date Piezometer	**************************************			LAND ast High Street	AIR	WATER Telephone: (573) 659-9078
Completed:	AMEREN MISSOURI	1	efferson C	ty, Missouri 65101	DDAWN PY	Facsimile: (573) 659-9079
9/30/09	LABADIE POWER PLANT		DATE 1/2010	SCALE N.T.S.	DRAWN BY: BED	APPROVED BY: MCC

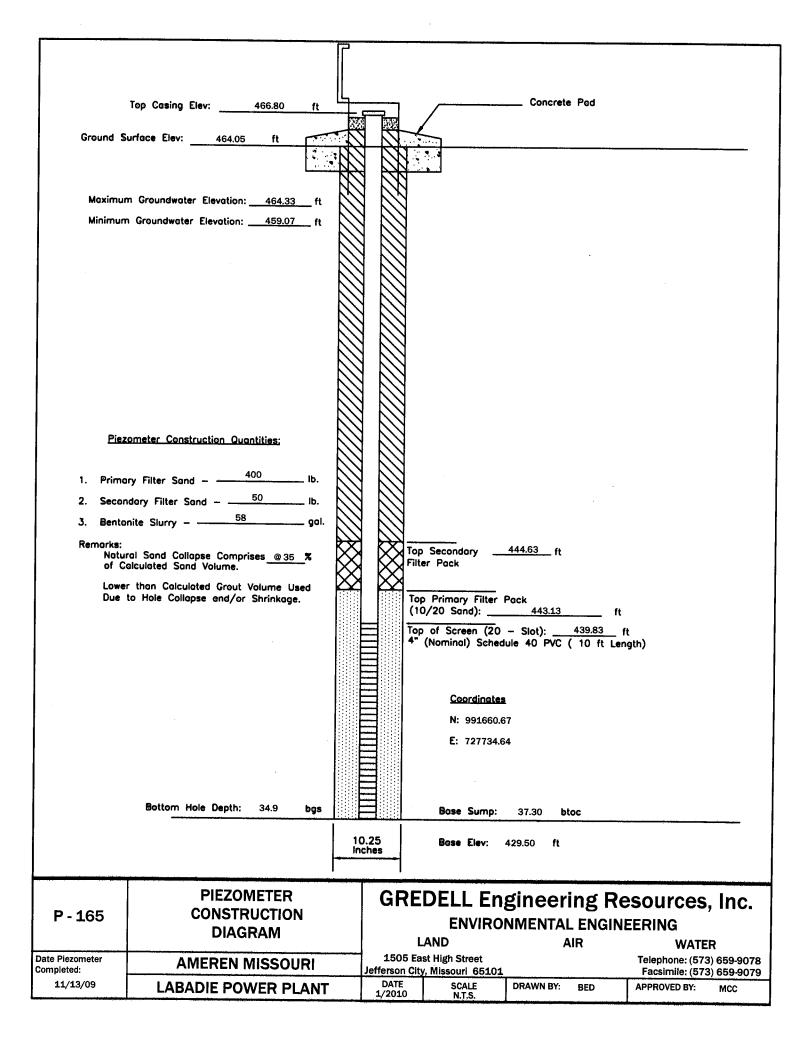
1	79-27			<del></del>	
	Top Cosing Elev: 467.60 ft			Concrete Pad	
Ground	Surface Elev: 464.89 ft	2 2			
		3 13			
1	um Groundwater Elevation: 463.72 ft				
Minimu	m Groundwater Elevation: 459.30 ft				
				·	
<u>Pie</u>	zometer Construction Quantities;				
1	ary Filter Sand – 250 lb.				
	ndary Filter Sand $-\frac{50}{49}$ lb.  onite Slurry $-\frac{49}{9}$ gal.				
Remarks:		$\emptyset$	Top Secondary	_444.89 ft	
of C	Calculated Sand Volume.	$\aleph$	Filter Pack		
			Top Primary Filter (20/40 Sand):		ŧ
			Top of Screen (10 2" (Nominal) Schee	- Slot): 440.69	ft enath)
				, -	•
			Coordingter	i	
			N: 991964.3 E: 728791.3		
			C. 720791.3	<b>5</b> 0	
	Bottom Hole Depth: 34.8 bgs		Base Sump:	37.24 btoc	
	-	8.25 Inches	Bose Elev:	430.36 ft	
	PIEZOMETER	GR	EDELL En	gineering R	esources, Inc.
P - 156	CONSTRUCTION DIAGRAM		ENVIRO	NMENTAL ENGIN	
Date Piezometer	AMEREN MISSOURI	1505	LAND East High Street	AIR	<b>WATER</b> Telephone: (573) 659-9078
Completed: 11/09/09	LABADIE POWER PLANT	Jefferson DATE 1/2010	City, Missouri 65101 SCALE N.T.S.	DRAWN BY: BED	Facsimile: (573) 659-9079  APPROVED BY: MCC

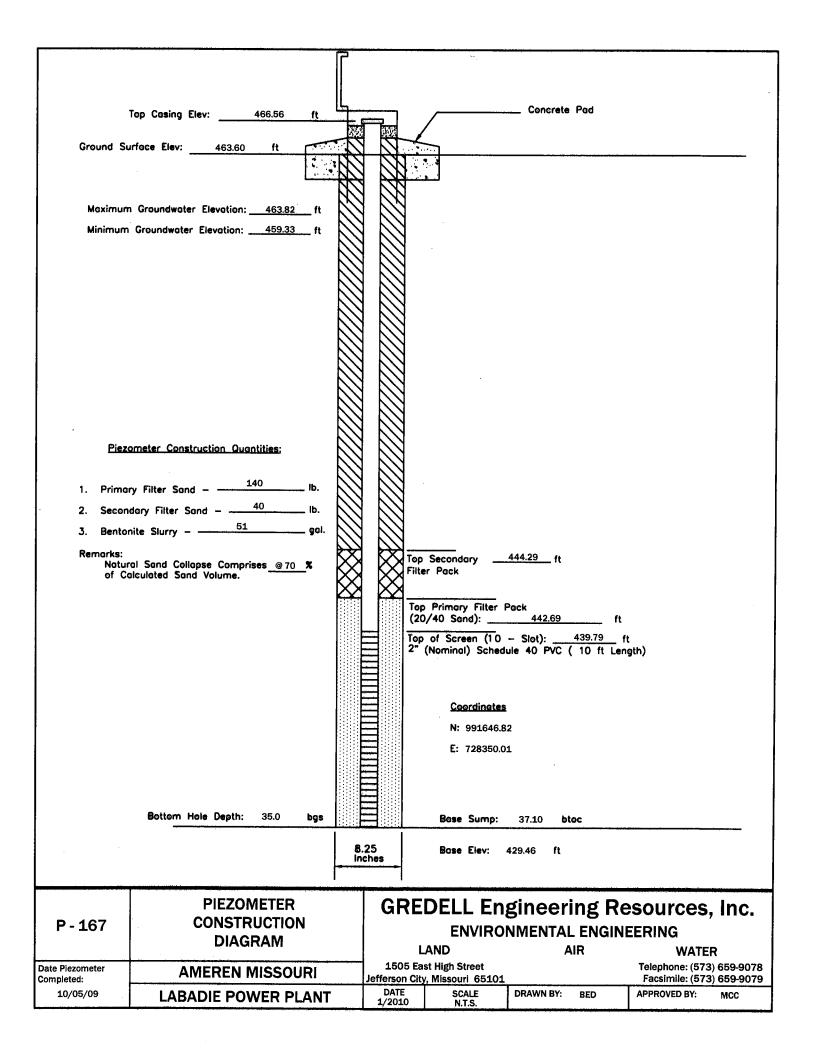
		11				
	Top Casing Elev: 467.63 ft	Ц		<i></i>	Concrete Pad	
		878	20%			
Ground Su	urface Elev: 464.72 ft	7				
Maximum	Groundwater Elevation: 463.51 ft			\$		
Minimum	Groundwater Elevation: 459.47 ft					
				3		
				3		
				3		
				1		
				1		
Piez	ometer Construction Quantities:					
	THE TOTAL STATE OF THE STATE OF					
1. Prima	ry Filter Sand - 250 lb.			}		
	dary Filter Sand - 50 lb.					
	nite Slurry – 41 gol.					
Remarks:	•		$\longrightarrow$	To Secondary	444.62 ft	
Notur	al Sand Collapse Comprises @ 45 %	$\bowtie$	$\otimes$	Top Secondary Filter Pack	11	
	than Calculated Grout Volume Used	$\boxtimes$	$\boxtimes$			
Due t	to Hole Collapse and/or Shrinkage.			Top Primory Filter P (20/40 Sand):		ft
			=	Top of Screen (10	- Slot): 440.32	ft
			=	2" (Nominal) Schedu	ule 40 PVC ( 10 ft L	ength)
			3			
			=	Coordinates		
				N: 991945.43	4	
				E: 729368.05		
			3		,	
			=			
	Ballon Hala Dartha 040		3			iq.
	Bottom Hole Depth: 34.9 bgs			Base Sump:	37.64 btoc	
		8.	25 ches	Base Elev: 4	129.99 ft	
	PIEZOMETER		$\sim$ 1	DEDELL Ex	dinocrind D	Occursos Inc
P - 158	CONSTRUCTION		G			Resources, Inc.
. 100	DIAGRAM			ENVIROI LAND	NMENTAL ENGII AIR	
Date Plezometer	AMEDEN MICCOLLO		150	LAND 05 East High Street	AIR	<b>WATER</b> Telephone: (573) 659-9078
Completed:	AMEREN MISSOURI			n City, Missouri 65101	DDAWN BY:	Facsimile: (573) 659-9079
11/13/09	LABADIE POWER PLANT		1/20:	SCALE LO N.T.S.	DRAWN BY: BED	APPROVED BY: MCC

			Concrete Pad
	Top Casing Elev: 466.42 ft	920 (13)	Concrete Fgg
Ground Si	urface Elev: 463.70 ft	ŽŽ	
		3 2	
	n Groundwater Elevation: 463.11 ft		
Minimum	Groundwater Elevation: 459.60 ft	3 8	
		3 1	
		3 8	
		3 13	
		3 8	
		3 1	
Piez	ometer Construction Quantities:	3 0	
	275		
1. Prima	ry Filter Sand - 275 lb.		
	olto Sture 333	3 1	
	nite Slurry – 33 gal.	2 6	
Remarks: Natur	ral Sand Collapse Comprises @40 %	$\otimes$	Top Secondary <u>443.55</u> ft Filter Pack
	alculated Sand Volume.  r than Calculated Grout Volume Used	ЯХ	X
Due	to Hole Collapse and/or Shrinkage.		Top Primary Filter Pack (20/40 Sand): 442.05 ft
			Top of Screen (10 - Slot): 438.85 ft
			2" (Nominal) Schedule 40 PVC ( 10 ft Length)
		E	Coordinates
			N: 991884.45
			E: 729979.25
	Bottom Hole Depth: 35.0 bgs		Base Sump: 37.90 btoc
		8.25	Bose Elev: 428.52 ft
	-	Inches	-
	PIEZOMETER		DEDELL Fordings also de Deserver de
P - 160	CONSTRUCTION	6	REDELL Engineering Resources, Inc.
. ===	DIAGRAM		ENVIRONMENTAL ENGINEERING LAND AIR WATER
Date Piezometer	AMEREN MISSOURI		05 East High Street Telephone: (573) 659-9078
Completed: 12/11/09	LABADIE POWER PLANT	DAT	
	PURULI ALLEU LEVILI	1/20	010 N.T.S.

Maximu Minimur 1. Prima 2. Secon 3. Benta Remarks: Natu of C	Top Casing Elev: 465.98 ft  Surface Elev: 463.28 ft  Image: 463.07 ft ft ft ft ft ft ft ft ft ft ft ft ft	Top Secondary 443.40 ft Filter Pack  Top Primary Filter Pack (20/40 Sand): 441.60 ft Top of Screen (10 – Slot): 438.60 ft 4" (Nominal) Schedule 40 PVC ( 10 ft Length)  Capardinates N: 991801.20 E: 730861.78  Base Sump: 37.71 blac  10.25 fnches  Rose Elev: 428.27 ft
<del></del>	PIEZOMETER	GREDELL Engineering December 1
P - 162  Date Piezometer	CONSTRUCTION DIAGRAM AMEREN MISSOURI	GREDELL Engineering Resources, Inc. ENVIRONMENTAL ENGINEERING LAND AIR WATER 1505 East High Street Telephone: (573) 659-9078
Completed: 12/10/09	LABADIE POWER PLANT	Jefferson City, Missouri 65101   Facsimile: (573) 659-9079     DATE
		1 7 1 1110.

·								
Te	op Cosing Elev: 465.83 ft			/	<u> </u>	_ Concrete	Ped	
Ground Sur	*			<u> </u>	<u> </u>	<del>,, </del>		
								•
	Groundwater Elevation: 462.86 ft							
Minimum	Groundwater Elevation: <u>459.67</u> ft							
Piezo	meter Construction Quantities:							
	275							
	y Filter Sand — 375 lb.  lary Filter Sand — 100 lb.							
3. Benton	ite Slurry – 57 gol.							
Remarks: Nature of Ca	al Sand Collapse Comprises @40 % Iculated Sand Volume.		$\bigotimes$	Top Filt <b>e</b> r	Secondary Pack	<u>444.10</u> ft		
	than Calculated Grout Volume Used o Hole Collapse and/or Shrinkage.	$\times$	XX		Primary Filter P	' <b>ock</b> 442,10	44	
				l . ' . '	/20 Sand): of Screen (20 Nominal) Schedu		ft 438.90 ft	orb)
				'	Nonimary Schedu	116 40 FVC V	( TO IC CBIN	, <i>,</i>
					<u>Goordinates</u>			
					N: 991871.12 E: 731169.33			
					E. 7311 <del>03</del> .33	•		
					·			
	Bottom Hole Depth: 34.8 bgs			<u>                                      </u>	Base Sump:		toc	<del></del>
		In	0.25 ches		Base Elev: 4	428.57 ft		
	PIEZOMETER		GI	RE		_	_	sources, Inc.
P - 164	CONSTRUCTION DIAGRAM			L	ENVIROI AND	NMENTA	L ENGINI AIR	EERING WATER
Date Piezometer Completed:	AMEREN MISSOURI			05 Eas	st High Street , Missouri 65101	·-··		Telephone: (573) 659-9078 Facsimile: (573) 659-9079
12/04/09	LABADIE POWER PLAN	Γ	DAT 1/20:		SCALE N.T.S.	DRAWN BY:	BED	APPROVED BY: MCC





						******		
	Top Casing Elev:46	7.42 ft	<u> </u>	<del></del> _		Concrete Pad		
Ground Su	orface Elev: 464.75	ft Park			/ 			_
Maximum	Groundwater Elevation:	463.62 ft						
	Groundwater Elevation:	459.50 ft						
		Ì						
<u>Piezo</u>	ometer Construction Quantit	ies:					•	
1. Prima	ry Filter Sand - 400	lb.						
	dary Filter Sand - 90	ib. gal.						
Remarks:	inte Siurry –				Secondary	445.02 ft		
	al Sand Collapse Comprises siculated Sand Volume.	<u>@35</u> %	$\boxtimes$		er Pack	π		
Lower Due 1	than Calculated Grout Volu to Hole Collapse and/or Sh	ıme Used rinkage.	$\stackrel{\sim}{}$		Primary Filter F			
				1000001	· · —	- Slot): 439.82 f	·	
					(Nominal) Schedu	ule 40 PVC ( 10 ft Len	gth)	
			E		Coordinates			
			E		N: 991653.9	7		
					E: 729053.82	2		
							•	
	Bottom Høle Depth: 3	5.0 <b>bgs</b>			Base Sump:	37.93 btoc		
			8.25	8	Base Elev: 4	429.49 ft		
· · · · · · · · · · · · · · · ·				<del></del>				
D 460	PIEZOME CONSTRUC			GRE		gineering Re	•	c.
P - 169	DIAGRA			ı	ENVIROI And	NMENTAL ENGINI AIR	EERING WATER	
Date Piezometer Completed:	AMEREN MI	SSOURI	Jei	1505 Ea	st High Street y, Missouri 65101	AIII	Telephone: (573) 659-9 Facsimile: (573) 659-9	
12/02/09	LABADIE POWE	R PLANT	1	DATE 1/2010	SCALE N.T.S.	DRAWN BY: BED	APPROVED BY: MCC	

ļ	Top Casing Elev: 466.87 ft	هـــ			Concrete Ped	
		325	W.			
Ground S	urface Elev: 463.97 ft		Z		· · · · · · · · · · · · · · · · · · ·	
		:100				
	<del></del>					
Maximun	n Groundwater Elevation: 463.38 ft					
Minimum	Groundwater Elevation: <u>459.57</u> ft					
				3		
				3		
				3		
				}		
-				3		
				\$		
©:	complex Construction O and the			\$		
: <u></u>	ometer Construction Quantities:			3		
1. Primo	ery Filter Sand – 275 lb.			3		
	ndary Filter Sand - 50 lb.			3		
	nite Slurry - 56 gol.			3		
Remarks:	July -					
Notur	ral Sand Collapse Comprises @40 % alculated Sand Volume.	$\bowtie$	$\otimes$	Top Secondary Filter Pack	444.20 ft	
	elculated Sand Yoldme.	$\bowtie$	$\otimes$			
				Top Primary Filter		
		_	_	(20/40 Send):	442.60 ft	
			3	2" (Nominal) Sched	- Slot): 439.50 Jule 40 PVC ( 10 ft Le	ngth)
		E	3			
			∄			
		E	3	<u>Conglinate</u>	_	
		=		N: 991629.		
			3	E: 729636.7	72	
			=			
	Sottom Hole Depth: 35.0 bgs		3	Base Sump:	37.70 <b>btoc</b>	
		8.2	25	Base Elev:	429.17 ft	
		Inc	hes	2000 2.000		
		· · · · · · · · · · · · · · · · · · ·				
	PIEZOMETER	- 1	Gl	REDELL En	gineering Re	esources, Inc.
P-171	CONSTRUCTION DIAGRAM			ENVIRO	NMENTAL ENGIN	EERING
		لغاسورس	<u></u>	LAND	AIR	WATER
Date Piezometer Completed:	AMEREN MISSOURI	].		05 East High Street in City, Missouri 65101		Telephone: (573) 659-9078 Facsimile: (573) 659-9079
12/02/09	LABADIE POWER PLANT	T	DAT 1/20:	E SCALE LO N.T.S.	DRAWN BY: BED	APPROVED BY: MCC

	Top Casing Elev: 466.33 ft		1 /		Concrete	Pad		
Ground Su	urface Elev: 463.40 ft							_
	n Groundwater Elevation: <u>463.15</u> ft n Groundwater Elevation: <u>459.67</u> ft							
1. Prima 2. Secon 3. Bento Remorks: Notur	ometer Construction Quantities:  ry Filter Sand — 300   lb.  Idary Filter Sand — 50   lb.  Inite Slurry — 50   gal.  ral Sand Collapse Comprises <u>@ 30</u> %  alculated Sand Volume.		Top Sec Filter Po	 ondary ick	<u>442.55</u> ft			
	Bottom Hole Depth: 35.0 bgs		(20/40 Top of 2" (Non		441.35 - Slot): ule 40 PVC (	ft 438,75 f ( 10 ft Len	t gth)	-
		8.25 Inches	8	ise Elev:	428.42 ft			
P - 173	PIEZOMETER CONSTRUCTION DIAGRAM		LAND	ENVIRO	NMENTAL	_	EERING WATER Telephone: (573) 659-	
Date Piezometer Completed:	AMEREN MISSOURI	Jeffer	son City, Mis	souri 65101		· • · · · · · · · · · · · · · · · · · ·	Facsimile: (573) 659-	9079
12/12/09	LABADIE POWER PLANT		ATE 010	SCALE	DRAWN BY:	BED	APPROVED BY: MCC	;

•		Ĺ		Consider Bod
	Top Casing Elev: 466.06 ft		733	Concrete Pad
Ground Su	urface Elev: 463.57 ft	代	N	
<del></del>		1	14	
	L		1	<del>(                                    </del>
Meximun	n Groundwater Elevation: 462.98 ft			
	Groundwater Elevation: 459.70 ft			
,				
		M		
Piez	ometer Construction Quantities:			
1. Prima	ry Filter Sand - 250 lb.	M		
2. Secon	idary Filter Sand — 40 lb.			
3. Bento	nite Slurry – 42. gal.			
Remarks:	and Good College Country of the	$\langle \chi \rangle$	$\Rightarrow$	Top Secondary 444.00 ft
of Co	ral Sand Collapse Comprises @ 50 % olculated Sand Volume.	$\boxtimes$	$\bowtie$	Filter Pack
	r than Calculated Grout Volume Used to Hole Collapse and/or Shrinkage.	XX	$\sim$	Top Primary Filter Pack
<i>D</i> 06	to hole consepse unayor simmage.			(20/40 Sond): 443.00
			3	Top of Screen (10 - Slot): 438.60 ft 2" (Nominal) Schedule 40 PVC ( 10 ft Length)
			$\exists$	- (Nonline) Schedule 40 F4C ( To It Length)
				Coordinates
				N: 991556.51
			3	<b>E</b> : 730873.59
			=	
			$\equiv$	
	Bottom Hole Depth: 35.0 bgs			Base Sump: 37.79 btoc
		R	25	Bose Elev: 428.27 ft
		In:	hes	5056 Elev: 428.27 R
		·\$240, ir		I
	PIEZOMETER		GI	REDELL Engineering Resources, Inc.
P-175	CONSTRUCTION DIAGRAM			ENVIRONMENTAL ENGINEERING
	DIAGRAM			LAND AIR WATER
Date Piezometer Completed:	AMEREN MISSOURI			05 East High Street       Telephone: (573) 659-9078         on City, Missouri 65101       Facsimile: (573) 659-9079
12/15/09	LABADIE POWER PLANT		DAT	

	· · · · · · · · · · · · · · · · · · ·					<del></del>			
						Consesso B			
·	Top Casing Elev:	466.87 ft	220 102	vel		Concrete P	<u>a</u>		
Ground S	urface Elev: 464.07	ft Foot		1					
				N:	53 N3				
		<del></del>			<del></del>				
	m Groundwater Elevation: _								
Minimum	n Groundwater Elevation: _	<u>459.40</u> ft							
				$\mathcal{Y}$					
	•								
							-		
<u>Piez</u>	ometer Construction Quar	itities:							
1. Primo	ry Filter Sand – 1	75 lb.							
2. Secon	idary Filter Sand	50 lb.							
3. Bento	nite Slurry - 21	gal.							
Remarks: Natui	ral Sand Collapse Compris	es @ 60 %				444.34ft			
of Co	alculated Sand Volume.		$\bowtie$	X Filto	er Pack				
Lowe: Due	r than Calculated Grout V to Hole Collapse and/or :	olume Used Shrinkage.			Primary Filter I		•		
				331	)/40 Sand):		ft		
				2"	of Screen (10 (Nominal) Sched	- Slot): <u>44</u> ule 40 PVC ( 1	0.04 f 0 ft Len	t gth)	
•					Consideration				
					<u>Coordinates</u> N: 991336.7				
					E: 728049.8				
						-			4.
	Bottom Hole Depth:	34.6 <b>bgs</b>			Base Sump:	37.16 <b>btoc</b>			
	**************************************			<u> </u>		07.20	<del></del>	· · · · · · · · · · · · · · · · · · ·	<del></del>
			8.25 Inches		Bose Elev:	429.71 ft			
		ſ			<del></del>		<del></del>	and the second of the second o	
	PIEZOM		G	RE	DELL En	gineerin	g Re	sources	. Inc.
P - 177	CONSTRI					NMENTAL E			,
	DIAGF	KAIVI			AND	AIR		WATE	
Date Piezometer Completed:	AMEREN M	ISSOURI	19 Jeffers	505 Eas	st High Street , Missouri 65101			Telephone: (573 Facsimile: (573	659-9078 659-9079
11/13/09	LABADIE POW	ER PLANT		TE	SCALE N.T.S.	DRAWN BY: BI	ED	APPROVED BY:	MCC

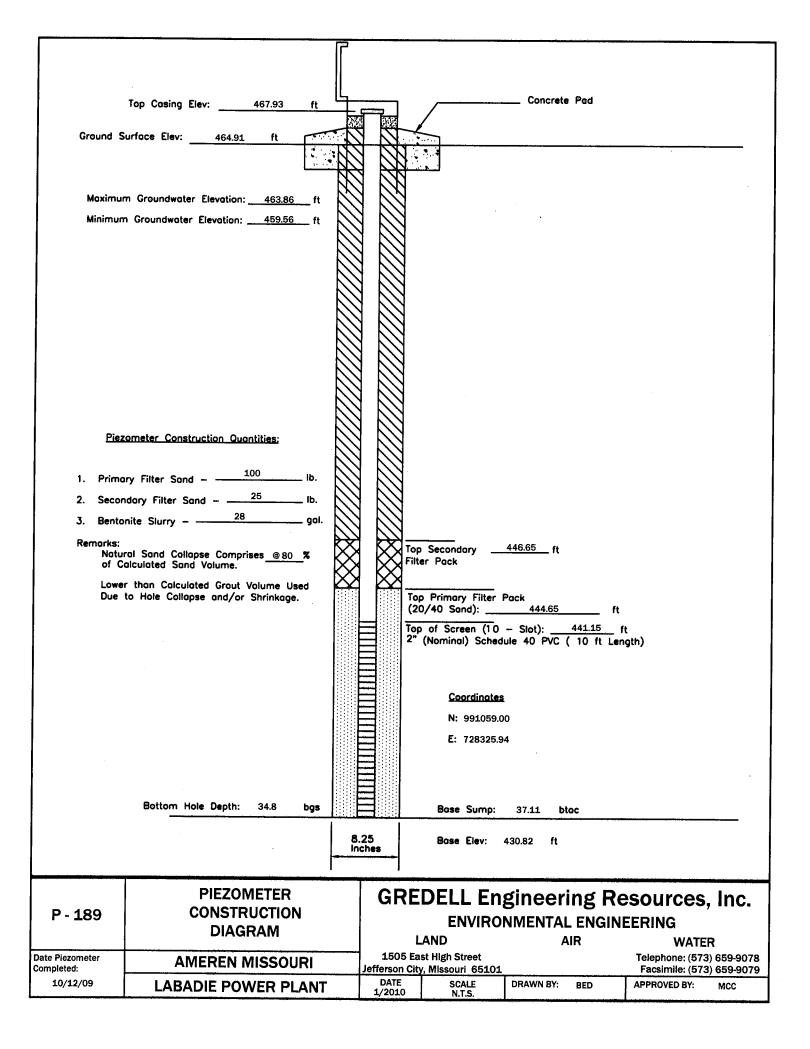
1	Top Casing Elev: 466.93 ft		֚֓֞֝֞֝֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֡֓֓֓֡		Concrete Pad	
Ground Su	rfoce Elev: 464.19 ft					
	Groundwater Elevation: 463.69 ft  Groundwater Elevation: 459.54 ft					
Riezo	ometer Construction Quantities:					
1. Primer	ry Filter Sand - 250 lb.					
2. Secon	dary Filter Sand - 50 lb.	3 8				
3. Bentor	nite Slurry – 44 gol.					
Remarks: Natur	al Sand Collapse Comprises @ 50 %	88		Secondary	444.59 ft	
	Ilculated Sand Volume.  than Calculated Grout Volume Used	$\ddot{x}$	X			
	o Hole Collapse and/or Shrinkage.			Primary Filter F /40 Sand):	Pack 443.19	ft
			1.0	• •	- Slot): 439.29	
			2"	(Nominal) Schedu	ule 40 PVC ( 10 ft	Length)
				Coordinates		
				N: 991350.8	6	
				<b>E:</b> 728780.93	2	
		E				
	Bottom Hole Depth: 34.9 bgs		<u> </u>	Bose Sump:	37.97 btoc	
		8.25 Inches	-	Base Elev:	428.96 ft	
,	PIEZOMETER		DE	DELL En	dinocrind	Posouroos Ino
P-179	CONSTRUCTION	"			NMENTAL ENG	Resources, Inc.
. —. <del>.</del>	DIAGRAM		L	AND	NIVIENTAL ENG AIR	WATER
Date Piezometer	AMEREN MISSOURI		L505 Ea	st High Street		Telephone: (573) 659-9078 Facsimile: (573) 659-9079
Completed: 12/03/09	LABADIE POWER PLANT	D	ATE 2010	y, Missouri 65101 SCALE N.T.S.	DRAWN BY: BED	APPROVED BY: MCC
				17.1.3,	L	

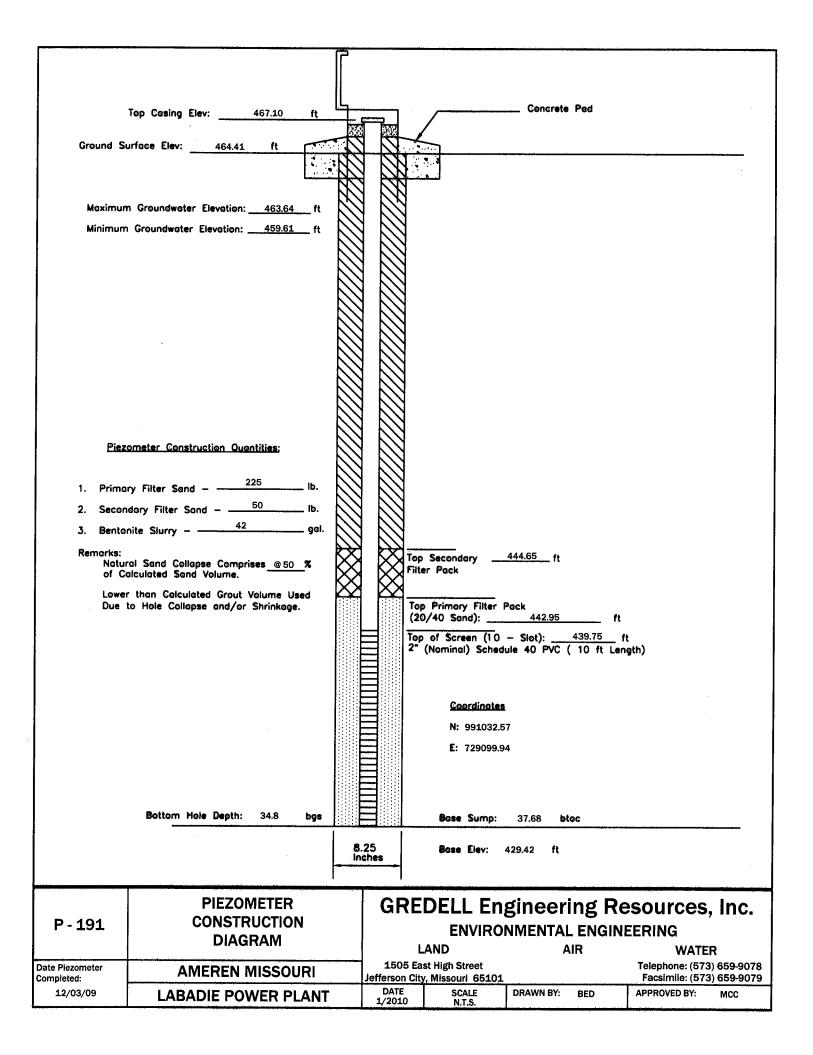
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		IL				0	<b>5</b> 4	
	Top Casing Elev: 467.35 ft				<del>/                                 </del>	Concrete	Pad	
	_		200	$\checkmark$				
Ground Su	urface Elev: 464.42 ft	1			]			· · · · · · · · · · · · · · · · · · ·
		· <i>M</i>			1			
	<del></del>	W		<u> </u>	J			
Maximun	Groundwater Elevation: 463.55 ft			1				
	<del></del>			1				
Minimum	Groundwater Elevation: 459.62 ft							
Piez	ometer Construction Quantities:							
<del>-</del> ,								
	225 lb							•
1. Prima	ry Filter Sana							
2. <b>Se</b> con	dary Filter Sand - 50 lb.							
3. Bentoi	nite Slurry – 33 gal.							
Remarks:		<i>&gt;&gt;&gt;</i>	$\sim$			444 50		
Natur	al Sand Collapse Comprises @ 50 %	$\times$		Top S	econdary Pack	444.58 ft		
of Co	alculated Sand Volume.							
	than Calculated Grout Volume Used to Hole Collapse and/or Shrinkage.	$\mathcal{M}$	$\sim$	Too	Primary Filter F	Pack		
	to hole conspie shay of Similarge.				10 Send):	443.08	ft	
			=	Top o	f Screen (10	- Siot):	440.18	<u>t</u>
				2" (N	f Screen (10 Iominal) Sched	ule 40 PVC	( 10 ft Len	gth)
								•
					Coordinates			
					N: 991334.4			
			$\exists$		E: 729380.2	3		
								•
	Sollow Male Coathy 247 has		=		_			
	Bottom Hole Depth: 34.7 bgs			<del></del>	Base Sump:	37.50 <b>b</b>	loc	······
		8.	.25		Base Elev:	429.85 ft		
		In	ches		2000 2.00	425.00		
and the second s		1	1					
	PIEZOMETER		\ \C_{\text{\tin}\\ \text{\texi}\text{\text{\text{\text{\text{\text{\text{\texi}\text{\texi{\text{\texi}\text{\texi}\text{\texi}\titt{\texi}\tilint{\text{\text{\text{\texi{\texi{\texi{\texi}\texi{\texi}\texi{\t		ELL P.	dir	ind D	00114600 1-0
D 404	CONSTRUCTION		j Gr	KEL		_	_	esources, Inc.
P - 181			ĺ		ENVIRO	NMENTA	L ENGIN	EERING
	DIAGRAM			LA	ND	Į.	<b>NR</b>	WATER
Date Piezometer	AMEREN MISSOURI				High Street			Telephone: (573) 659-9078
Completed:	the state of the s		Jefferson DATE		Missouri 65101	DRAWNEY		Facsimile: (573) 659-9079
12/03/09	LABADIE POWER PLAN	Γ	1/2010		SCALE N.T.S.	DRAWN BY:	BED	APPROVED BY: MCC

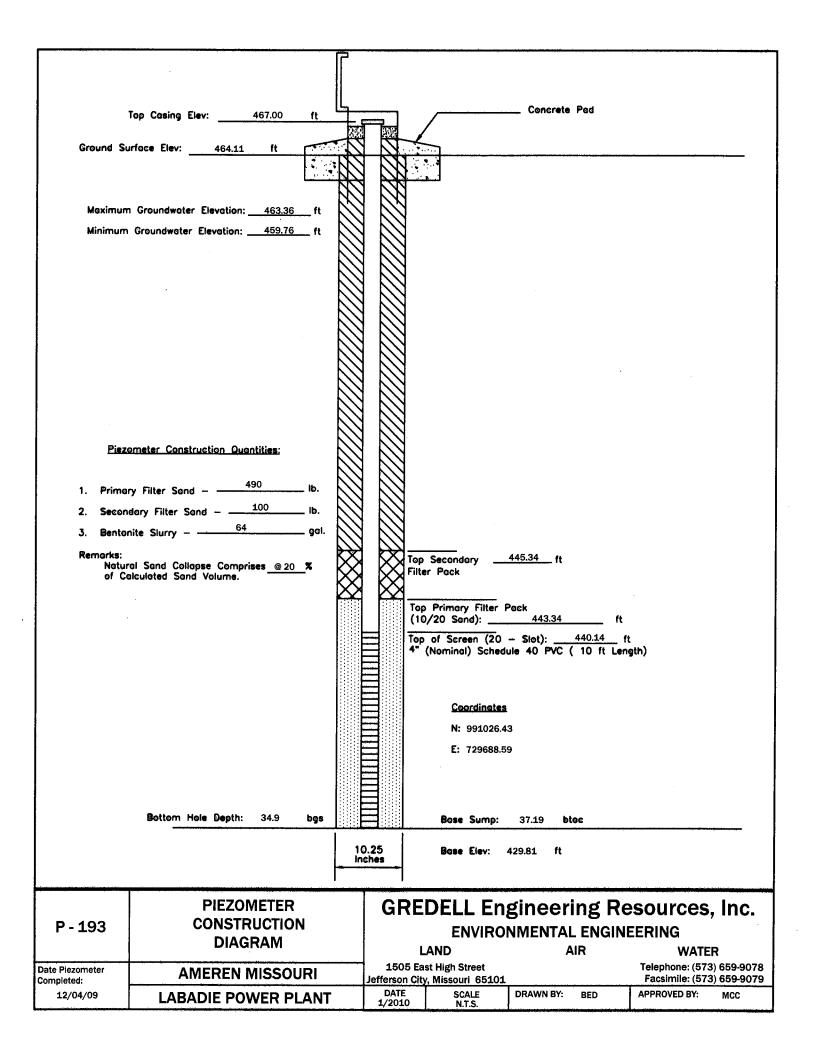
,		r				4
1						
	Top Casing Elev: 465.96 ft	4			Concrete Pad	
		3%	W.			
Ground Si	urface Elev: 463.40 ft				<del></del>	<del> </del>
	( \$, 1) ( 1)	M				
Meximun	n Groundwater Elevation: 463.15 ft					
Minimum	Groundwater Elevation: <u>459.74</u> ft					
						:
Piez	ometer Construction Quantities:					
1. Prima	ry Filter Sand - 175 lb.					
	dary Filter Sand - 45 lb.					
	nite Slurry - 26 gal.					
Remarks:	·	$\longrightarrow$	- <del>                                     </del>		443.67 ft	
Netur	ral Sand Collapse Comprises @60 %	$\times$		op Secondary <u> </u>	443.07 11	,
	than Calculated Grout Volume Used	$\boxtimes$				
Due 1	to Hole Collapse and/or Shrinkage.			op Primary Filter F 20/40 Sand):	Pack 441.87 ft	
			1090909		- Slot): 438.57 fi	:
			²	" (Nominal) Schedu	ule 40 PVC ( 10 ft Len	gth)
				Coordinates		
				N: 991309.5		
				E: 729980.8		
				E. 123360.6	,	
	Ballian IIII Balli ana					
	Bottom Hole Depth: 35.2 bgs			Base Sump:	37.72 btoc	
		8.	.25 ches	Base Elev:	428.24 ft	
		- "				
	PIEZOMETER	<del>*************</del>	CD	DEII EM	dingering De	SOURCE INC
P - 183	CONSTRUCTION		GRI		_	esources, Inc.
	DIAGRAM			ENVIROI LAND	NMENTAL ENGINE AIR	· · · · · · · · · · · · · · · · · · ·
Date Piezometer	AMEDEN MICCOUR	· <del></del>		ast High Street	AIR	WATER Telephone: (573) 659-9078
Completed:	AMEREN MISSOURI	<del>,</del>		ity, Missouri 65101	DDAWN DV: PP	Facsimile: (573) 659-9079
12/11/09	LABADIE POWER PLANT	-	1/2010	SCALE N.T.S.	DRAWN BY: BED	APPROVED BY: MCC

<del></del>			· · · · · · · · · · · · · · · · · · ·			
	Ton Coolea Flaur ACC 2C 41	<u>L</u>			Concrete Pad	
	Top Casing Elev: 466.26 ft	7327	TURE.			
Ground Su	urface Elev: 463.75 ft	1	N			
		1/1	-14	1		······································
	<u> </u>	<del>M</del>	$\mathcal{H}$	4		
Mautania	Considerate Flourism 400.00 to	M		3		
	Groundwater Elevation: 463.08 ft			3		
Minimum	Groundwater Elevation: 459.72 ft			3		
				}		
		M		3		
·		M		3		
				3		
		$\mathbb{N}$		3		
		M				
		$\square$				
				3		
		$\square$		1		
		$\mathbb{N}$		3		
Piez	ometer Construction Quantities:					
ı				3		
1. Prima	ry Filter Sand - 275 lb.			<b>.</b>		
	dary Filter Sand - 40 lb.			1		
	AF	M		}		
	nite Slurry – 45 gal.			3		
Remørks: Natur	al Sand Collapse Comprises @40 %	$\boxtimes$	$\boxtimes$	Top Secondary _	442.99 ft	
of Co	alculated Sand Volume.	$\bowtie$	$\otimes$	Filter Pack		
	than Calculated Grout Volume Used to Hole Collapse and/or Shrinkage.	$\sim$	$\sim$	Top Primary Filter	Pack	
	to flote collapse dita, of sill likelye.			(20/40 Send):	441.79 ft	<b>!</b>
		 	=	Top of Screen (10	) - Slot): <u>438.79</u> dule 40 PVC ( 10 ft Le	ft
		E	=	2" (Nominal) Sche	dule 40 PVC ( 10 ft Le	ngth)
		E	$\exists$			
		E	3			
		E	3	Goordinate		
		E	3	N: 991289	.70	
		E	=	<b>E</b> : 730564.	.03	
	•	E	3			
		E	=			
	Bottom Hole Depth: 35.1 bgs	Ε	3	Base Sump:	37.80 <b>btoc</b>	
		*1*1*11				to the first to th
		8.2 Inc	25 :hes	Base Elev:	428.46 ft	
	1			1		
	DICZONACTED	· ·	~	DEDEL : =		<u> </u>
<b>.</b>	PIEZOMETER	- [	Gl	KEDELL Er	ngineering R	esources, Inc.
P - 185	CONSTRUCTION			ENVIRO	NMENTAL ENGIN	IEERING
	DIAGRAM			LAND	AIR	WATER
Date Piezometer Completed:	AMEREN MISSOURI			05 East High Street on City, Missouri 6510	1	Telephone: (573) 659-9078 Facsimile: (573) 659-9079
12/15/09	LABADIE POWER PLANT		DAT 1/20:	E SCALE	DRAWN BY: BED	APPROVED BY: MCC

Pie:  1. Prime 2. Secon 3. Bente Remarks: Naturof C	Top Casing Elev: 462.85 ft  Surface Elev: 462.85 ft  Im Groundwater Elevation: 462.82 ft Im Groundwater Elevation: 459.76 ft  Top Casing Elev: 462.85 ft  Im Groundwater Elevation: 459.76 ft  Top Casing Elev: 462.85 ft  Im Groundwater Elevation: 459.76 ft  Top Casing Elev: 462.85 ft  Im Groundwater Elevation: 459.76 ft  Top Casing Elev: 462.85 ft  Top Casing Elev: 462.85 ft  Top Casing Elev: 462.85 ft  Top Casing Elev: 462.85 ft  Top Casing Elev: 462.85 ft  Top Casing Elev: 462.85 ft  Top Casing Elev: 462.85 ft  Top Casing Elev: 462.85 ft  Top Casing Elev: 462.85 ft  Top Casing Elev: 462.85 ft  Top Casing Elev: 462.85 ft  Top Casing Elev: 462.85 ft  Top Casing Elev: 462.85 ft  Top Casing Elev: 462.85 ft  Top Casing Elev: 462.85 ft  Top Casing Elev: 462.85 ft  Top Casing Elev: 462.85 ft  Top Casing Elev: 462.85 ft  Top Casing Elev: 462.85 ft  Top Casing Elevity Elevation: 462.82 ft  Top Casing Elevity Elevation: 462.82 ft  Top Casing Elevity Elevation: 462.82 ft  Top Casing Elevity Elevation: 462.82 ft  Top Casing Elevation: 462.82 ft  Top Ca		Top Secondary Tilter Pack  Top Primary Filter (20/40 Sand): Top of Screen (10) Top of Scr	442.58 fi - Slot): 439.58 ule 40 PVC ( 10 ft Le	ft	
	Bottom Hole Depth: 35.1 bgs	8.25 Inches		36.42 btoc 429.25 ft		
P - 187	PIEZOMETER CONSTRUCTION DIAGRAM	GR		gineering Ronnell Ronn	esources, Inc. IEERING WATER	
Date Piezometer Completed:	AMEREN MISSOURI	1505 Jefferson (	East High Street City, Missouri 65101	· · · · · ·	Telephone: (573) 659-9078 Facsimile: (573) 659-9079	
10/28/09	LABADIE POWER PLANT	DATE 1/2010	SCALE N.T.S.	DRAWN BY: BED	APPROVED BY: MCC	1



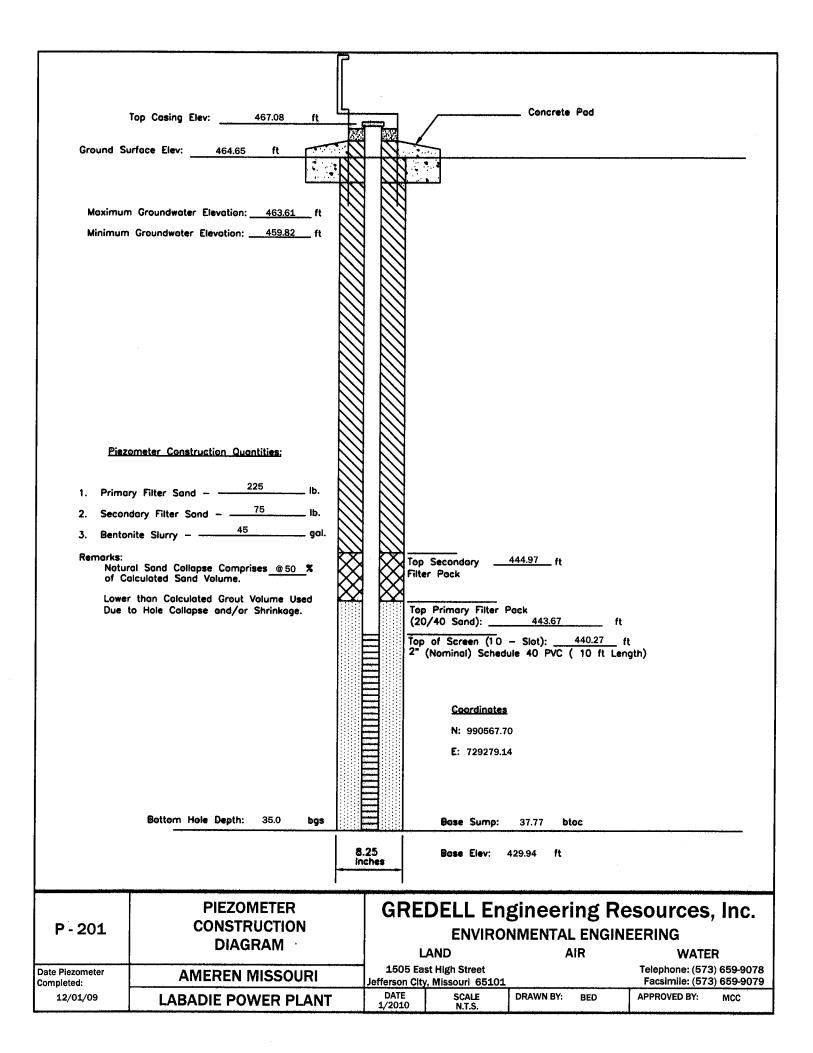




							The second secon
	Top Casing Elev: 466.07	<u> </u>	(market)		Concrete	Ped	
Ground St	urface Elev:463.44 ft						
ordana si	403,44 1	1: 18				<del></del>	
			3 199	لنحث			
Maximun	n Groundwater Elevation: 463,1	_n 🛚	3 83				
Minimum	Groundwater Elevation: 459.7	<u>.</u> n					
Piez	ometer Construction Quantities:						
	350						
	ry Filter Sand —	— Ib.					
	odry rinter sand -	— lb.					
	nite Slurry - 52	gal.		<del></del>	-		
Remarks: Natur	ral Sand Collapse Comprises @ 20 alculated Sand Volume.	_* 🌣		p Secondary ter Pack	_442.56 ft		
01 01	piculated Sand Volume.	$\otimes$	$\mathbb{R}^{2}$				
			Te (2	p Primary Filter ( 0/40 Sand):	P <b>ock</b> 441.36	ft	
						<del></del>	<b>l</b>
			2"	p of Screen (10 (Nominal) Sched	ule 40 PVC (	10 ft Len	gth)
				Coordinates			
				N: 991065.8	1		
				E: 730256.0	4		
	Bottom Hole Depth: 35.1	bgs		Base Sump:	38.14 <b>bto</b>	E	
			3.25	Book Et-	497.00 **		
		İr	nches	Base Elev:	427.93 ft		
· · · · · · · · · · · · · · · · · · ·		<u> </u>	1			* . **************	
	PIEZOMETER		GRE	DELL En	gineerii	ng Re	sources, Inc.
P - 195	CONSTRUCTION DIAGRAM	IN			NMENTAL	ENGINE	EERING
Data Blazzari		<del></del>	1	LAND ast High Street	All	R	WATER
Date Piezometer Completed:	AMEREN MISSO		Jefferson Ci	y, Missouri 65101	<b>r</b> #=	*******************************	Telephone: (573) 659-9078 Facsimile: (573) 659-9079
12/11/09	LABADIE POWER P	LANT	DATE 1/2010	SCALE N.T.S.	DRAWN BY:	BED	APPROVED BY: MCC

and the second				
	Top Casing Elev: 466.10 ft			Concrete Pad
	Groundwater Elevation: <u>462.98</u> ft  Groundwater Elevation: <u>459.81</u> ft			
<ol> <li>Prima</li> <li>Secon</li> <li>Bentor</li> <li>Remarks:         <ul> <li>Natur</li> <li>of Co</li> </ul> </li> <li>Lower</li> </ol>	orneter Construction Quantities:  Ty Filter Sand — 375   lb.    dary Filter Sand — 100   lb.    nite Slurry — 57   gal.    Tal Sand Collapse Comprises @ 40 %    pliculated Sand Volume.  Than Calculated Grout Volume Used to Hole Collapse and/or Shrinkage.			Top Secondary 444.41 ft Filter Pack  Top Primary Filter Pack (10/20 Sand): 442.51 ft  Top of Screen (20 - Slot): 439.31 ft 4" (Nominal) Schedule 40 PVC ( 10 ft Length)
	Bottom Hole Depth: 34.7 bgs			Coordinates  N: 990891.95  E: 730883.14  Base Sump: 37.12 btoc
	-	10 Inc	).25 shes	<b>Base Elev:</b> 428.9§ ft
P - 197	PIEZOMETER CONSTRUCTION DIAGRAM			REDELL Engineering Resources, Inc. ENVIRONMENTAL ENGINEERING LAND AIR WATER 05 East High Street Telephone: (573) 659-9078
Date Piezometer Completed:	AMEREN MISSOURI		Jefferso	on City, Missouri 65101 Facsimile: (573) 659-9079
12/05/09	LABADIE POWER PLANT		DAT 1/201	

	Top Casing Elev: 468.13 ft	ove.	3.512F		Concrete Ped	
Ground Su	urface Elev: 465.28 ft				· · · · · · · · · · · · · · · · · · ·	
Mavimum				<u></u>		
	Groundwater Elevation: <u>463.79</u> ft  Groundwater Elevation: <u>459.72</u> ft					
Piezo	ometer Construction Quantities:					
1. Primo	ry Filter Sand – 450 lb.		W			
2. Secon	dary Filter Sand — 90 lb.		W			
3. Bentor	nite Slurry – <u>84</u> gal.		$/\!\!/$			
Remarks:	ral Sand Collapse Comprises @ 25 %			Top Secondary	445.54 ft	
of Co	sloulated Sand Volume.		$\bigotimes$	Filter Pack		
	or than Calculated Grout Volume Used outable to Apparent Washouts in noile.		$\sim$	Top Primary Filter ( (20/40 Sand):	Pock 443.74 f	t
		E		Top of Screen (10 4" (Nominal) Sched	- Slot): 440.74 ule 40 PVC ( 10 ft Lo	ft ength)
				Coordinates		
				N: 990738.7 E: 728782.0		
				E: 728782.0	5	
	Bottom Hole Depth: 34.9 bgs	Ξ		Base Sump:	37.32 btoc	***
	-	10.25 Inches		Base Elev:	430.41 ft	
<u> </u>	PIEZOMETER		CD	EDELL Ex	gineering D	esources, Inc.
P - 199	CONSTRUCTION		uп		MENTAL ENGI	
	DIAGRAM			LAND	NIVIEN I AL ENGII AIR	WATER
Date Piezometer	AMEREN MISSOURI	ا		East High Street		Telephone: (573) 659-9078 Facsimile: (573) 659-9079
Completed: 12/01/09	LABADIE POWER PLANT		DATE /2010	City, Missouri 65101 SCALE N.T.S.	DRAWN BY: BED	APPROVED BY: MCC



# **Appendix 6**

Survey Data

Detailed Site Investigation Proposed Utility Waste Disposal Area Ameren Labadie Power Plant

Prepared by: GREDELL Engineering Resources, Inc.

### Piezometer and Boring Locations/Elevations KdG Project 080086-0005

Designation	Northing	ionating.	noffice/United	181523Barriton
P-9	996108.40	726981.78	469.90	473.26
B-10	996103.24	727271,42	469.4	***
C-11	996087.44	727863.35	468.6	***
P-12	996215.71	728171.12	468.95	472.14
B-13	996065.73	728454.79	468.4	***
C-13	996064.70	728453.55	468.1	***
B-14	995811.17	726971.86	470.0	***
P-15	995802.44	727271.36	469.35	472.40
C-16	995796.01	727587.85	469.5	***
P-17	995789.75	727851.61	469.30	472.19
C-18	995781.84	728155.08	468.0	***
P-19	995768.95	728438.40	467.90	470.84
P-20	995510.59	726856.24	469.35	472.28
C-21	995508.43	727263.08	469.1	***
P-22	995503.30	727579.54	468.40	471.27
C-23	995493.86	727854.19	468.5	***
P-24	995476.21	728133.29	468.50	471.44
C-25	995479.57	728426.49	467.0	***
B-26	995220.60	726964.14	468.5	***
P-27	995206.06	727247,55	469.07	471.99
C-28	995191.80	727570.51	468.0	***
P-29	995188.03	727844.69	467.73	470.83
C-30	995181.54	728136.93	468.2	***
P-31	994921.76	726950.89	467.67	470.22
C-32	994919.82	727239,84	468.1	***
P-33	994910.34	727559.71	468.44	471.18
C-34	994906.91	727840.02	467.1	***
P-35	994886.38	728125.58	467.61	470.61
P-36	995058.28	728509.44	468.20	471.23
C-37	994633.32	726940.78	466.8	***
P-38	994618.74	727238.62	467.15	470.11
C-39	994610.37	727532.49	467.0	***
P-40	994582.15	727832.47	467.05	469.93
C-41	994571.00	728120.73	467.0	***
P-42	994538.42	728420.83	467.74	470.60
P-43	994333.02	726945.21	466.07	469.20
C-44	994339.91	727235.79	466.5	***
P-45	994324.97	727532.26	467.12	470.07
C-46	994335.16	727828.30	466.5	***
C-46A	994335.45	727834.36	466.4	***

Horizontal Datum: Missouri State Plane Coordinates - NAD 83 (Feet)

Vertical Datum: NAVD 88 (Feet)

#### Piezometer and Boring Locations/Elevations KdG Project 080086-0005

- क्रुअंतिम्भाग्रा	Storthing	Pesing	Gramat Blazition	Rips Blazziton
P-47	994320.66	728124.52	467.10	469.86
C-48	994317.23	728416.23	466.7	***
P-49	994499.84	728938.97	467.58	470.56
B-50	994279.71	729167.67	467.7	***
C-50	994279.51	729171.66	467.6	***
P-51	994463.37	729490.00	466.25	469.06
B-52	994257.04	729758.59	465.3	***
P-53	994428.21	730049.96	466.46	469.10
B-54	994252.30	730351.55	467.1	***
P-55	994395.43	730584.11	467.33	470.02
B-56	994240.10	730939.28	467.4	***
P-57	994356.77	731212.53	465.99	468.87
B-58	994038.11	726928.67	464.3	***
P-59	994039.34	727225.40	465.36	467.94
C-60	994027.11	727521.57	466.4	***
P-61	994020.22	727813.31	465.92	468.87
C-62	994016.40	728113.05	466.2	***
P-63	994004.98	728407.71	466.20	469.10
C-64	993995.34	728865.99	466.6	***
P-65	993990.81	729165.61	468.06	471.31
C-66	993980.14	729457.50	467.7	***
C-66A	993983.55	729455.30	467.6	***
P-67	993985.65	729758.28	465.52	468.28
C-68	993969.55	730078.53	466.1 461.6	***
P-69	993965.46	730346.87	465.05	467.73
C-70	993949.84	730636.69	466.0	***
P-71	993948.36	730927.90	467.42	470.70
B-72	993933.70	731225.42	467.3	***
P-73	993742.59	726924.60	467.06	469.94
C-74	993741.15	727218.57	464.6	***
P-75	993730.50	727511.13	466.12	468.75
C-76	993720.40	727809.69	465.7	***
P-77	993714.81	728102.38	465.41	468.05
C-78	993707.27	728399.78	465.3	***
P-79	993695.02	728850.48	467.01	469.84
C-79	993690.91	728845.97	466.7	***
C-80	993682.86	729155.13	466.6	***
P-81	993679.30	729444.97	467.64	470.31
C-81	993687.41	729445.36	467.3	***
C-82	993677.60	729741.30	467.5	***

Horizontal Datum: Missouri State Plane Coordinates NAD 83 (Feet)

Vertical Datum: NAVD 88 (Feet)

#### Piezometer and Boring Locations/Elevations KdG Project 080086-0005

क्रिशांचुत्तर्भावत	Moething	Charting	Croppall Blayation	epre plezamon
P-83	993664.23	730089.18	464.74	467.55
C-84	993657.32	730332.48	465.1	***
P-85	993647.31	730619.20	464.41	466.75
C-86	993650.66	730924.62	465.7	***
P-87	993693.54	731420.88	466.69	469.64
P-88	993401.94	727072.92	466.25	469.13
C-89	993438.19	727504.02	465.1	***
P-90	993427.80	727804.04	465.38	468.10
C-91	993413.86	728094.56	465.1	***
C-92	993398.00	728843.81	465.6	***
B-92	993398.38	728845.92	465.7	***
P-93	993388.35	729062.32	465.91	468.82
C-94	993375,69	729434.37	466.5	***
P-95	993368.45	729725.06	467.22	469.92
C-96	993362.59	730021.06	467.9	***
P-97	993349.44	730302.43	467.05	469.67
C-98	993346.95	730622.85	465.2	***
P-99	993336.45	730887.27	464.38	467.21
B-100	993325.31	731204.95	465.7	***
C-100	993325.31	731205.45	465.7	***
B-101	993154.88	727200.58	466.0	***
P-102	993140.49	727503.68	464.29	467.27
C-103	993136.62	727785.53	464.5	***
P-104	993125.75	728085.40	465.00	467.78
C-105	993135.15	728390.05	464.7	***
P-106	993103.56	728837.82	465.11	468.10
C-106	993109.35	728836.44	464.9	***
C-107	993103.27	729135.70	465.0	***
C-107A	993103.10	729146.13	464.9	***
P-108	993084.09	729427.93	465.71	468.55
C-109	993088.06	729726.68	466.3	***
P-110	993066.85	730012.30	466.14	468,99
C-111	993063.54	730316.44	466.3	***
P-112	993051.48	730620.74	465.92	468,92
C-113	993055.00	730901.31	463.5	***
P-114	993026.22	731203.72	463.94	466.78
B-115	992864.44	727489.17	465.3	***
P-116	992841.30	727788.60	464.82	467.55
C-117	992838.23	728076.07	465.3	***
P-118	992825.03	728377.28	464.81	467.70

Horizontal Datum: Missouri State Plane Coordinates - NAD 83 (Feet)

Vertical Datum: NAVD 88 (Feet)

#### Piezometer and Boring Locations/Elevations KdG Project 080086-0005

Designation	Modifing	Chaffing	Chountlestavition	i Pjparntavrtion
C-119	992807.06	728831.40	465.1	***
P-120	992787.68	729145.90	464.75	467.65
C-121	992788.41	729418,06	464.1	***
P-122	992758.84	729781.01	464.74	467.71
C-123	992783.29	730008.50	464.9	***
P-124	992775.57	730303.49	464.92	467.99
C-125	992770.51	730600.29	466.0	***
P-126	992667.51	730879.77	465.77	468.83
B-127	992782.41	731193.33	463.4	***
P-128	992561.87	727385.52	465.74	468.60
C-129	992541.28	727767.11	464.1	***
P-130	992537.68	728075.04	465.15	468.13
C-131	992547.91	728365.33	465.0	***
P-132	992536.17	728817.00	465.36	468.47
C-133	992516.71	729146.50	464.6	***
P-134	992491.31	729438.21	464.10	466.82
C-135	992494.22	729732.31	463.7	***
C-135A	992494.17	729740.20	463.9	***
P-136	992488.64	730004.49	463.71	466.73
C-137	992490.70	730304.63	463.6	***
P-138	992469.33	730675.26	464.10	466.99
C-139	992467.71	730891.11	464.4	***
C-139A	992473.22	730892.04	464.5	***
P-140	992404.70	731394.93	465.72	468.57
B-141	992258.30	727479.78	466.2	***
P-142	992250.72	727764.69	464.83	467.66
C-143	992247.00	728062.44	463.9	***
P-144	992236.95	728361.22	464.56	467.74
C-145	992222.70	728823.71	465.0	***
C-145A	992218.35	728823.23	465.0	***
P-146	992265.54	729102.62	464.80	467.48
C-147	992208.03	729416.58	464.5	***
C-147A	992202.60	729416.37	464.5	***
P-148	992252.64	729630.10	463.86	466.84
C-149	992190.52	730004.82	463.3	***
P-150	992189.21	730256.27	463.22	465.91
C-151	992180.61	730603.47	463.0	***
P-152	992168.58	730889.93	463.55	466.31
B-153	992163.20	731176.80	463.7	***
B-154	991956.86	727759.71	465.1	***

Horizontal Datum: Missouri State Plane Coordinates - NAD 83 (Feet) Vertical Datum: NAVD 88 (Feet)