

May 9, 2012

Project #: 123-84274

Ameren Services
One Ameren Plaza
1901 Chouteau Avenue
St. Louis, Missouri 63103

**RE: REPORT ON PIEZOMETER INSTALLATION, WATER LEVEL MONITORING, AND
GROUNDWATER SAMPLING
LABADIE, MISSOURI**

Golder Associates Inc. (Golder) is pleased to submit this letter report summarizing drilling and piezometer installation south of the Ameren Missouri (Ameren) Labadie Power Plant facility in Franklin County, Missouri. This letter summarizes piezometer installation, groundwater sampling methods, water level monitoring methods, and laboratory analyses of the groundwater samples collected during April 2012. A tabulated summary of the periodic water level data collected to date is provided in Table 1. Laboratory analytical results are summarized in Table 2. The site layout and piezometer locations are shown on Figure 1 with the groundwater potentiometric surface map. Borehole logs are provided as Attachment A. Piezometer construction forms are provided as Attachment B. Attachment C contains copies of the MDNR Well Registration Forms and receipt confirmation from the MDNR Wellhead Protection Program.

1.0 PROJECT SCOPE OF WORK

Our scope of work included the following:

- Drill and install three new groundwater piezometers
- Develop and sample the three new groundwater piezometers
- Survey the ground surface and casing elevations of the new piezometers
- Install electronic instruments in the new piezometers for periodic water level measurements
- Tabulate sampling results and prepare a summary report

2.0 DRILLING, PIEZOMETER INSTALLATION, AND DEVELOPMENT

Three new groundwater piezometers were installed based on the January 24, 2012 map of proposed locations provided by Ameren in the Preliminary Work Plan. Roberts Environmental Drilling, Inc. performed the drilling and piezometer installation under the direct supervision of Golder. The new piezometers were installed with open or screened intervals in bedrock at similar depths to nearby residential water wells in general accordance with Missouri Department of Natural Resources (MDNR) Well Construction Rules (10 CSR 23-4.060 Construction Standards for Monitoring Wells). New piezometers were installed using air rotary drilling methods. Geologic borehole logs and piezometer construction logs were prepared for each new piezometer installation and are included as Attachments A and B. Two of the new piezometers (TGP-A and TGP-B) were constructed of two-inch diameter, schedule 80 polyvinyl chloride (PVC) riser pipe with 0.01-inch machine slotted PVC screen. The screened portion was constructed with a sand pack consisting of environmental silica sand. A bentonite seal was placed in the annulus above the sand pack and extended up to two feet below ground surface to



form a well seal. A small concrete surface pad and protective steel cover extends down to the top of the bentonite seal. The riser extends to approximately three feet above ground surface to facilitate groundwater sampling. The third piezometer (TGP-C) was constructed as a six-inch open-hole completion in bedrock with six-inch steel surface casing extending to 95 feet below ground surface. The surface casing was grouted into bedrock using a cement bentonite grout to form a seal above the open-hole interval. A small concrete surface pad and flush-mount protective steel cover extend down to the top of the grouted casing seal.

Zahner & Associates, Inc. provided professional land survey of the three new piezometers. Surveyed piezometer coordinates and elevations are located on monitoring well construction logs in Attachment B.

New piezometers were developed using surging and purging techniques. A stainless steel bailer was lowered into each piezometer and used to surge and remove drilling sediment from the bottom of each installation. A submersible electric pump with polyethylene tubing was lowered into each piezometer and at least three well-bore volumes of groundwater were removed. Development was deemed complete when at least three consecutive readings of field parameters (pH, turbidity, conductivity, and temperature) were within 10% of previous measurements.

3.0 WATER LEVEL MONITORING

Following development, Golder installed electronic instruments in each piezometer for the purpose of periodic (daily) water level measurements. An In-Situ Inc. Level Troll 500 device with vented cable was installed in each piezometer for this purpose. The devices electronically measure water column pressures (piezometric head) and record the data in on-board dataloggers at the selected intervals. The water level data was then retrieved from the surface using a readout device and downloaded to a computer for tabulation. Golder manually measured water levels in each piezometer when the instrument data was retrieved. A tabulated summary of daily water level data collected to date is provided in Table 1. Table 1 will be regularly updated during the monitoring period. Figure 1 provides a groundwater potentiometric surface map showing the gradient and direction of groundwater flow using the surveyed piezometer coordinates and elevations and the most recent water level data. Figure 1 shows that the groundwater flow direction observed in these three piezometers is from the southeast to the northwest, towards the Missouri River.

4.0 GROUNDWATER SAMPLING AND ANALYTICAL RESULTS

After the piezometers equilibrated for a minimum one month period following development, groundwater samples were collected from each piezometer. Samples were collected after three well-bore volumes had again been purged from each piezometer using a submersible electric pump with dedicated polyethylene tubing. Field parameters including pH, conductivity, temperature, and turbidity were measured and recorded during purging and sampling.

After three well-bore volumes were removed and three consecutive sets of field parameter measurements were stabilized within 10% of previous measurements for conductivity and temperature and within 0.1 for pH, groundwater samples were collected and submitted to Test America - Chicago for total metals analysis using USEPA Method 6010B, anions analysis using USEPA Method 9056, and mercury analysis using USEPA Method 7470A. The samples were analyzed for boron, an indicator constituent for leachate from coal combustion products, and inorganic constituents that have regulatory standards for protection of drinking water supplies specified in Table A of 10 CSR 20-7.031.

Groundwater sampled for analysis was collected into laboratory-supplied containers directly from the pump tubing discharge. One duplicate groundwater sample was collected from one of the piezometers for quality assurance/quality control (QA/QC) purposes. One equipment rinsate blank was collected from the submersible sampling pump using laboratory grade de-ionized water and analyzed at the laboratory. After collection in the field, groundwater samples were labeled with the sample identification number,

requested analysis, collection date, and sampler's initials, and placed on ice in a cooler for shipment under chain-of-custody protocol via overnight transport to the Test America – Chicago Laboratory.

Analytical results for groundwater are summarized below and tabulated in Table 2. Boron concentrations were below detection limits in all three samples, suggesting that groundwater at the three monitoring points is not affected by leachate from coal combustion products. Other metal constituents and anions were detected; however, concentrations of the other constituents were lower than both the Missouri and federal drinking water standards. It is not uncommon to detect low levels of inorganic constituents in uncontaminated groundwater samples because these elements are often naturally present in the soils and rocks that are in contact with the groundwater.

Several analytical results are qualified with a B, J, or ^ data flags. The B flag indicates that the constituent was detected in a laboratory blank, and therefore the analytical result may be biased high. Since all results were low and below drinking water standards, any such bias was minimal and does not significantly affect interpretation of the results. The J flag indicates that the constituent was detected at a very low level, in a range where the precision of the laboratory instruments is low, and therefore the reported concentration is qualified as estimated. Again, this does not adversely affect the interpretation because all results were lower than the drinking water standards. The ^ flag indicates that the laboratory interference check was slightly above acceptance limits; however, all of the results for the affected constituents were non-detect, so there was no relevant bias affecting results.

5.0 CLOSING

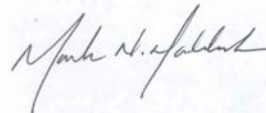
Golder appreciates the opportunity to serve as your consultant on this project. If you have any questions concerning this letter report or need additional information, please contact the undersigned at 636-724-9191.

Sincerely,

GOLDER ASSOCIATES INC.



Michael Dreyer, E.I.T.
Staff Engineer



Mark N. Haddock, R.G., P.E.
Senior Engineer
Associate



Mark R. Sandfort, P.E.
Senior Consultant
Principal

Attachments:

- Table 1 – Record of Water Level Readings
- Table 2 – Summary of Groundwater Analytical Results
- Figure 1 – Groundwater Potentiometric Surface Map
- Attachment A – Borehole Logs
- Attachment B – Well Construction Logs
- Attachment C – MDNR Well Registration Forms and Receipt Confirmation

MWD/MNH

TABLES

TABLE 1: RECORD OF WATER LEVEL READINGS
Ameren, Labadie MO Hydrogeology Study
Labadie, MO

	TGP-A		TGP-B		TGP-C	
Ground Surface Elevation (ft MSL)* NAVD 88	479.78		491.27		612.23	
Top of Casing Elevation (ft MSL)* NAVD 88	482.32		494.62		611.5	
Date	Water Level (ft BTOC)	Water Elevation (ft MSL)	Water Level (ft BTOC)	Water Elevation (ft MSL)	Water Level (ft BTOC)	Water Elevation (ft MSL)
3/17/2012	21.60	460.72	28.24	466.38	114.23	497.27
3/18/2012	21.31	461.01	28.00	466.62	114.10	497.40
3/19/2012	20.91	461.41	27.64	466.98	114.04	497.46
3/20/2012	20.77	461.55	27.35	467.27	113.89	497.61
3/21/2012	20.78	461.55	27.31	467.31	113.63	497.87
3/22/2012	20.77	461.55	27.29	467.33	113.63	497.87
3/23/2012	20.51	461.81	27.23	467.39	113.63	497.87
3/24/2012	20.08	462.24	27.04	467.58	113.34	498.16
3/25/2012	19.62	462.70	26.95	467.67	113.50	498.00
3/26/2012	19.14	463.18	26.83	467.79	113.66	497.84
3/27/2012	18.62	463.71	26.63	467.99	113.63	497.87
3/28/2012	18.33	463.99	26.42	468.20	113.41	498.09
3/29/2012	18.35	463.97	26.34	468.28	113.47	498.04
3/30/2012	18.29	464.03	26.19	468.44	113.18	498.32
3/31/2012	18.41	463.91	26.20	468.42	113.18	498.32
4/1/2012	18.31	464.01	26.14	468.48	113.33	498.17
4/2/2012	18.06	464.26	26.01	468.61	113.41	498.09
4/3/2012	18.13	464.19	26.07	468.56	113.67	497.83
4/4/2012	18.17	464.15	26.28	468.34	113.55	497.95
4/5/2012	18.10	464.22	26.02	468.60	113.48	498.03
4/6/2012	18.29	464.03	26.13	468.49	113.35	498.15
4/7/2012	18.40	463.92	26.14	468.48	113.42	498.08
4/8/2012	18.53	463.79	26.20	468.42	113.40	498.10
4/9/2012	18.58	463.74	26.12	468.50	113.45	498.05
4/10/2012	18.58	463.74	26.13	468.49	113.57	497.93
4/11/2012	18.71	463.62	26.27	468.35	113.56	497.94
4/12/2012	18.80	463.52	26.38	468.25	113.87	497.63

Notes:

* - Survey performed by Zahner & Associates, 3-5-12 and 3-6-12

BTOC - Below the Top of Casing (water level depth)

MSL - Elevation in feet above Mean Sea Level

Prepared By: MWD

Checked By: ALD

Reviewed By: MNH

Date: 4/19/2012

Date: 4/20/2012

Date: 5/8/2012

Table 2
Summary of Groundwater Analytical Results
Ameren, Labadie MO

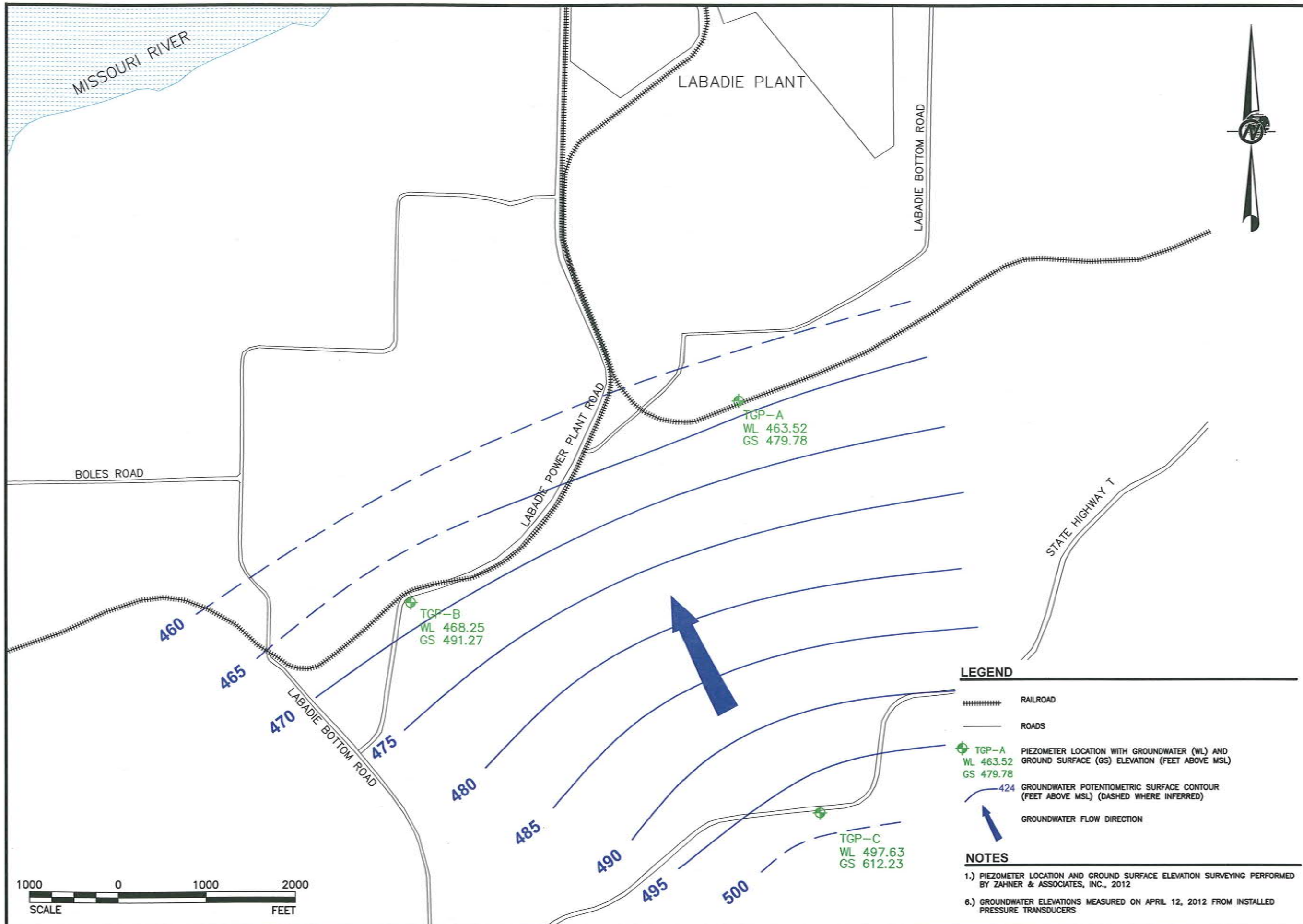
	Missouri Drinking Water Supply (DWS) Standard ¹	US EPA Federal Maximum Contaminant Level (MCL) ²	TGP-A	MDL	TGP-B	MDL	TGP-C	MDL	DUP-1	MDL	RB-1	MDL	
Sample Date			4/12/12		4/13/12		4/12/12		4/12/12		4/13/12		
Sample Time			17:05		11:35		15:00		0:00		12:00		
Total Metals (SW846 Method 6010B)													
Analyte	CAS No.	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	
Antimony	7440-36-0	0.006	0.006	< 0.0026	0.0026	0.0026 J	0.0026	< 0.0026	0.0026	< 0.0026	0.0026	< 0.0026	0.0026
Arsenic	7440-38-2	0.05	0.01	< 0.0024	0.0024	< 0.0024	0.0024	< 0.0024	0.0024	< 0.0024	0.0024	< 0.0024	0.0024
Barium	7440-39-3	2.0	2.0	0.21 B	0.00044	0.10 B	0.00044	0.15 B	0.00044	0.22 B	0.00044	0.0028 JB	0.00044
Beryllium	7440-41-7	0.004	0.004	< 0.00044	0.00044	< 0.00044	0.00044	< 0.00044	0.00044	< 0.00044	0.00044	< 0.00044	0.00044
Boron	7440-42-8	No DWS ³	No MCL ⁴	< 0.024	0.024	< 0.024	0.024	< 0.024	0.024	< 0.024	0.024	< 0.024	0.024
Cadmium	7440-43-9	0.005	0.005	< 0.00054 ^	0.00054	< 0.00054 ^	0.00054	< 0.00054 ^	0.00054	< 0.00054 ^	0.00054	< 0.00054 ^	0.00054
Chromium	7440-47-3	0.1	0.1	0.0029 J	0.00096	0.0025 J	0.00096	0.0013 J	0.00096	0.0034 J	0.00096	0.0011 J	0.00096
Copper	7440-50-8	1.3	1.3	< 0.0011	0.0011	< 0.0011	0.0011	< 0.0011	0.0011	< 0.0011	0.0011	0.0017 J	0.0011
Lead	7439-92-1	0.015	0.015	0.0031 JB	0.0016	0.0036 JB	0.0016	0.0044 JB	0.0016	0.0037 JB	0.0016	0.0020 JB	0.0016
Nickel	7440-02-0	0.1	No MCL ⁴	0.0020 J	0.0019	< 0.0019	0.0019	< 0.0019	0.0019	0.0021 J	0.0019	< 0.0019	0.0019
Selenium	7782-49-2	0.05	0.05	< 0.0027	0.0027	< 0.0027	0.0027	< 0.0027	0.0027	< 0.0027	0.0027	< 0.0027	0.0027
Silver	7440-22-4	0.05	[0.10]	< 0.0011	0.0011	< 0.0011	0.0011	< 0.0011	0.0011	< 0.0011	0.0011	< 0.0011	0.0011
Thallium	7440-28-0	0.002	0.002	< 0.0013	0.0013	< 0.0013	0.0013	< 0.0013	0.0013	< 0.0013	0.0013	< 0.0013	0.0013
Zinc	7440-66-6	5.0	[5.0]	< 0.0047	0.0047	< 0.0047	0.0047	0.0064 J	0.0047	< 0.0047	0.0047	0.052	0.0047
Anions, Ion Chromotography (SW846 Method 9056)													
Analyte	CAS No.	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	
Chloride	16887-00-6	250	[250]	5.8 B	0.083	29 B	0.83	43 B	0.83	5.7 B	0.083	0.64 B	0.083
Fluoride	16984-48-8	4	4	0.20	0.029	0.25	0.029	0.16 J	0.029	0.18 J	0.029	< 0.029	0.029
Nitrate as N	14797-55-8	10	10	1.3	0.023	7.9	0.23	5.0	0.23	1.3	0.023	0.28	0.023
Sulfate	14808-79-8	250	[250]	13	0.90	25	0.90	34	0.90	14	0.90	0.17 J	0.090
Mercury (SW846 Method 7470A)													
Analyte	CAS No.	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	
Mercury	7439-97-6	2.0	2.0	< 0.070	0.070	< 0.070	0.070	< 0.070	0.070	< 0.070	0.070	< 0.070	0.070

Notes:

- 1) Missouri Drinking Water Supply (DWS) Standard per 10 CSR 20-7.031 Table A
- 2) Federal Maximum Contaminant Level (MCL)
 - [] indicates that there is no MCL for the constituent, and the non-enforceable secondary MCL is displayed
- 3) A DWS for Boron does not exist
- 4) MCL or secondary MCL values for Boron and Nickel do not exist
- 5) The following qualifiers are used;
 - **B**, the compound was found in the blank and the sample
 - **J**, the result is less than the reporting limit (RL) but greater than or equal to the method detection limit (MDL) and the concentration is an approximate value
 - **^**, ICV, CCV, ICB, CCB, ISA, ISB, CRI, CRA, DLCK or MRL standard: Instrument related QC exceeds the control limits.
- 6) **BOLD** values indicate a detection
- 7) SW846 - "Test Method for Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates
- 8.) mg/l = milligrams per liter
- 9.) µg/l = micrograms per liter

Prepared By: MWD 4/19/2012
 Checked By: ALD 4/20/2012, MWD 5/8/2012
 Reviewed By: MNH 5/8/2012

FIGURES



PROJECT
 GROUNDWATER PIEZOMETER
 INSTALLATION
 AMEREN LABADIE PIEZOMETERS
 Labadie, MO

TITLE
 GROUNDWATER
 POTENTIOMETRIC SURFACE MAP
 (APRIL 2012)

PROJECT No.	123-84274
FILE No.	12384274-F01
REV. 0	SCALE AS SHOWN
DESIGN	MWD 04/09/12
CADD	MWD 04/20/12
CHECK	ALD 04/20/12
REVIEW	MMH 05/08/12

FIGURE
 1

LEGEND

- RAILROAD
- ROADS
- TGP-A
WL 463.52
GS 479.78
PIEZOMETER LOCATION WITH GROUNDWATER (WL) AND GROUND SURFACE (GS) ELEVATION (FEET ABOVE MSL)
- 424
GROUNDWATER POTENTIOMETRIC SURFACE CONTOUR (FEET ABOVE MSL) (DASHED WHERE INFERRED)
- GROUNDWATER FLOW DIRECTION

NOTES

- 1.) PIEZOMETER LOCATION AND GROUND SURFACE ELEVATION SURVEYING PERFORMED BY ZAHNER & ASSOCIATES, INC., 2012
- 6.) GROUNDWATER ELEVATIONS MEASURED ON APRIL 12, 2012 FROM INSTALLED PRESSURE TRANSDUCERS

APPENDIX A
BOREHOLE LOGS

RECORD OF BOREHOLE TGP-A

SHEET 1 of 3

PROJECT: Ameren Labadie Wells
 PROJECT NUMBER: 123-84274
 LOCATION: TGP-A

DRILLING METHOD: Air Rotary 6"
 DRILLING DATE: 2/27/2012
 DRILL RIG: CME 75

DATUM: NAVD88
 AZIMUTH: N/A
 COORDINATES: N: 988,186.35 E: 724,460.71

ELEVATION: 482.32
 INCLINATION: -90

DEPTH (feet)	BORING METHOD	SOIL/ROCK PROFILE				SAMPLES				PENETRATION RESISTANCE				REMARKS	
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	BLOWS / ft ■				
					DEPTH (ft)						10	20	30		40
0	6 1/4" HSA	(0.0 - 0.5) Soft, brownish black (5YR 2/1), CLAYEY SILT, some organics, tree roots, moist (ML) TOPSOIL	CL-ML		481.8 0.5										Soil and rock type and descriptions determined from cuttings. Strength and weathering inferred from drilling. Sampling and discontinuity measurements not conducted.
5		(0.5 - 10.0) Soft, dark yellowish brown (10YR 4/2), SILT, some clay, some fine to medium sand, trace fine gravel (ML), moist	ML												
10		(10.0 - 25.0) Soft, olive gray (5Y 4/1), CLAYEY SILT, little fine to medium sand (CL-ML), moist	CL-ML		472.3 10.0										
15	6 1/4" HSA														
20															
25		(25.0 - 32.5) Firm, light brownish gray (5YR 6/1), SILTY CLAY, trace fine sand (CL), very moist	CL		457.3 25.0										
30	6 1/4" HSA														
35		(32.5 - 36.0) Compact, moderate brown (5YR 4/4), fine to medium grained, SILTY SAND, trace fine gravel, trace organics (SM), very moist	SM		449.8 32.5										(32.5) Drilling penetration resistance increases
40		(36.0 - 53.0) Slightly to moderately weathered, yellowish gray (5Y 8/1), very fine to fine crystalline, medium strong (R3), DOLOMITE, little chert (likely SMITHVILLE POWELL FORMATION)			446.3 36.0										(36.0) HSA refusal on top of bedrock switch to air rotary drilling
		Log continued on next page													

GOLDER STL RECORD OF BOREHOLE MWD 12384274_AMEREN LABADIE WELLS.GPJ GLDR.CO.GDT 4/20/12

SCALE: 1 in = 5 ft
 DRILLING CONTRACTOR: Roberts Environmental Drilling, Inc.
 DRILLER: J. Crank/C. Hebel

LOGGED: MWD
 CHECKED: PJJ
 REVIEWED: MNH



RECORD OF BOREHOLE TGP-A

SHEET 2 of 3

PROJECT: Ameren Labadie Wells
 PROJECT NUMBER: 123-84274
 LOCATION: TGP-A

DRILLING METHOD: Air Rotary 6"
 DRILLING DATE: 2/27/2012
 DRILL RIG: CME 75

DATUM: NAVD88
 AZIMUTH: N/A
 COORDINATES: N: 988,186.35 E: 724,460.71

ELEVATION: 482.32
 INCLINATION: -90

DEPTH (feet)	BORING METHOD	SOIL/ROCK PROFILE				SAMPLES					PENETRATION RESISTANCE				REMARKS	
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	BLOWS / ft ■					
					DEPTH (ft)						10	20	30	40		
40	6" Air Rotary	(36.0 - 53.0) Slightly to moderately weathered, yellowish gray (5Y 8/1), very fine to fine crystalline, medium strong (R3), DOLOMITE, little chert (likely SMITHVILLE POWELL FORMATION) (Continued)		[Hatched Pattern]	437.3 45.0											<p>(41.0) Stop rock drilling after roughly 5 feet. Attempt to push casing deeper to cut off flowing sands.</p> <p>Unable to seal off flowing sands on top fo bedrock. Offset ~5' north, set 6" steel casing and resume.</p> <p>(62.0) Stop drilling. Pump grout into mud filled void to seal mud and rock debris from falling into borehole</p>
45		(45.0) Color changes to yellowish gray (5Y 8/1) and pale olive (10Y 6/2)		[Hatched Pattern]												
50																
55		(53.0 - 57.0) Slightly weathered, light gray (N7), very fine crystalline, medium strong (R3), DOLOMITE and yellowish gray (5Y 8/1) and grayish orange (10YR 7/4), fine to medium grained, SANDSTONE, little chert.		[Hatched Pattern]	429.3 53.0											
60		(57.0 - 62.0) Slightly weathered, yellowish gray (5Y 8/1) and pale olive (10Y 6/2), very fine to fine crystalline, medium strong (R3), DOLOMITE, little chert		[Hatched Pattern]	425.3 57.0											
65		(61.0) Very light gray (N8), solutioned limestone		[Hatched Pattern]	421.3 61.0											
65		(62.0 - 67.0) Mud filled void		[Hatched Pattern]	420.3 62.0											
70		(67.0 - 105.0) Slightly to moderately weathered, yellowish gray (5Y 8/1) and pale olive (10Y 6/2), very fine to fine crystalline, medium strong (R3), DOLOMITE, some chert, little solutioned limestone		[Hatched Pattern]	415.3 67.0											
75		(76.0) Slightly weathered, little chert, trace solutioned limestone		[Hatched Pattern]	406.3 76.0											
80		Log continued on next page														

GOLDER STL RECORD OF BOREHOLE MWD 12384274 AMEREN LABADIE WELLS.GPJ GLDR.CO.GDT 4/20/12

SCALE: 1 in = 5 ft
 DRILLING CONTRACTOR: Roberts Environmental Drilling, Inc.
 DRILLER: J. Crank/C. Hebel

LOGGED: MWD
 CHECKED: PJJ
 REVIEWED: MNH



RECORD OF BOREHOLE TGP-A

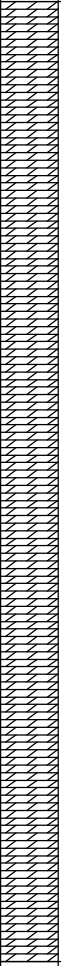
SHEET 3 of 3

PROJECT: Ameren Labadie Wells
 PROJECT NUMBER: 123-84274
 LOCATION: TGP-A

DRILLING METHOD: Air Rotary 6"
 DRILLING DATE: 2/27/2012
 DRILL RIG: CME 75

DATUM: NAVD88
 AZIMUTH: N/A
 COORDINATES: N: 988,186.35 E: 724,460.71

ELEVATION: 482.32
 INCLINATION: -90

DEPTH (feet)	BORING METHOD	SOIL/ROCK PROFILE				SAMPLES					PENETRATION RESISTANCE				REMARKS
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	BLOWS / ft ■				
					DEPTH (ft)						10	20	30	40	
80	6" Air Rotary	(67.0 - 105.0) Slightly to moderately weathered, yellowish gray (5Y 8/1) and pale olive (10Y 6/2), very fine to fine crystalline, medium strong (R3), DOLOMITE, some chert, little solutioned limestone <i>(Continued)</i>													
85															
90															
95															
100															
105		END OF BORING AT 105 FT BGS			377.3 105.0										
110															
115															
120															

Terminate boring at 105 ft BGS, 3/1/2012 @ 1100. Install piezometer TGP-A. See monitoring well construction log TGP-A for details.

GOLDER STL RECORD OF BOREHOLE MWD 12384274_AMEREN LABADIE WELLS.GPJ GLDR_CO.GDT 4/20/12

SCALE: 1 in = 5 ft
 DRILLING CONTRACTOR: Roberts Environmental Drilling, Inc.
 DRILLER: J. Crank/C. Hebel

LOGGED: MWD
 CHECKED: PJJ
 REVIEWED: MNH



RECORD OF BOREHOLE TGP-B


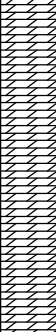


SHEET 1 of 4

PROJECT: Ameren Labadie Wells
 PROJECT NUMBER: 123-84274
 LOCATION: TGP-B

DRILLING METHOD: Air Rotary 6"
 DRILLING DATE: 2/20/2012
 DRILL RIG: Ingersol Rand T3W

DATUM: NAVD88
 AZIMUTH: N/A
 COORDINATES: N: 985,894.58 E: 720,699.99

ELEVATION: 494.62
 INCLINATION: -90

DEPTH (feet)	BORING METHOD	SOIL/ROCK PROFILE				SAMPLES					PENETRATION RESISTANCE				REMARKS	
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	BLOWS / ft ■					
					DEPTH (ft)						10	20	30	40		
0	6" Air Rotary	(0.0-1.0) Dense, yellowish gray (5Y 8/1), medium to coarse GRAVEL, some fine to coarse sand (GW), dry (OVERBURDEN)	GW		493.6											(1.0) Top of bedrock at 1.0 ft BGS Soil and rock type and descriptions determined from cuttings. Strength and weathering inferred from drilling. Sampling and discontinuity measurements not conducted. (19.0) Driller notes ~1 foot water pocket (20.0) Cuttings pulverized to sandlike consistency ▽ Water Level 28.04 ft bgs 2/24/12 at 08:00
1.0		(1.0 - 10.0) Moderately to slightly weathered, yellowish gray (5Y 8/1), very fine to fine crystalline, medium strong (R3), DOLOMITE, little chert			484.6											
10		(10.0 - 20.0) Slightly weathered to fresh, yellowish gray (5Y 8/1) to moderate yellowish brown (10YR 5/4), very fine to fine crystalline, medium strong (R3), DOLOMITE, some chert, little sandstone			474.6											
20		(20.0 - 76.0) Fresh, yellowish gray (5Y 8/1) and pale olive (10Y 6/2), very fine to fine crystalline, medium strong (R3), DOLOMITE, little chert			454.6											
40		Log continued on next page														

GOLDER STL RECORD OF BOREHOLE MWD 12384274_AMEREN LABADIE WELLS.GPJ GLDR.CO.GDT 4/20/12

SCALE: 1 in = 5 ft
 DRILLING CONTRACTOR: Roberts Environmental Drilling, Inc.
 DRILLER: C. Hebel

LOGGED: MWD
 CHECKED: PJJ
 REVIEWED: MNH



RECORD OF BOREHOLE TGP-B

SHEET 2 of 4

PROJECT: Ameren Labadie Wells
 PROJECT NUMBER: 123-84274
 LOCATION: TGP-B

DRILLING METHOD: Air Rotary 6"
 DRILLING DATE: 2/20/2012
 DRILL RIG: Ingersol Rand T3W

DATUM: NAVD88
 AZIMUTH: N/A
 COORDINATES: N: 985,894.58 E: 720,699.99

ELEVATION: 494.62
 INCLINATION: -90

DEPTH (feet)	BORING METHOD	SOIL/ROCK PROFILE				SAMPLES					PENETRATION RESISTANCE				REMARKS
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	BLOWS / ft ■				
					DEPTH (ft)						10	20	30	40	
40	6" Air Rotary	(20.0 - 76.0) Fresh, yellowish gray (5Y 8/1) and pale olive (10Y 6/2), very fine to fine crystalline, medium strong (R3), DOLOMITE, little chert (<i>Continued</i>) (40.0) Dolomite becomes strong (R4)		[Hatched Pattern]	40.0										(40.0) Water encountered
76		(76.0 - 95.0) Fresh, light gray (N7), very fine to fine crystalline, strong (R4), DOLOMITE, little chert		[Hatched Pattern]	418.6 76.0										
80		Log continued on next page		[Hatched Pattern]											

GOLDER STL RECORD OF BOREHOLE MWD 12384274 AMEREN LABADIE WELLS.GPJ GLDR.CO.GDT 4/20/12

SCALE: 1 in = 5 ft
 DRILLING CONTRACTOR: Roberts Environmental Drilling, Inc.
 DRILLER: C. Hebel

LOGGED: MWD
 CHECKED: PJJ
 REVIEWED: MNH



RECORD OF BOREHOLE TGP-B

SHEET 3 of 4

PROJECT: Ameren Labadie Wells
 PROJECT NUMBER: 123-84274
 LOCATION: TGP-B

DRILLING METHOD: Air Rotary 6"
 DRILLING DATE: 2/20/2012
 DRILL RIG: Ingersol Rand T3W

DATUM: NAVD88
 AZIMUTH: N/A
 COORDINATES: N: 985,894.58 E: 720,699.99

ELEVATION: 494.62
 INCLINATION: -90

DEPTH (feet)	BORING METHOD	SOIL/ROCK PROFILE				SAMPLES					PENETRATION RESISTANCE				REMARKS	
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	BLOWS / ft ■					
					DEPTH (ft)						10	20	30	40		
80	6" Air Rotary	(76.0 - 95.0) Fresh, light gray (N7), very fine to fine crystalline, strong (R4), DOLOMITE, little chert <i>(Continued)</i>		[Hatched Pattern]												
85																
90																
95			(95.0 - 115.0) Fresh, light brownish gray (5YR 6/1) and brownish gray (5YR 4/1), very fine to fine crystalline, strong (R4), DOLOMITE, little chert		[Hatched Pattern]	399.6 95.0										
100																
105																
110		(110.0) Also some light bluish gray (5B 7/1)		[Hatched Pattern]	384.6 110.0											
115		(115.0 - 130.0) Fresh, light gray (N7), very fine to fine crystalline, strong (R4), DOLOMITE, little chert		[Hatched Pattern]	379.6 115.0											
120		Log continued on next page		[Hatched Pattern]												

GOLDER STL RECORD OF BOREHOLE MWD 12384274 AMEREN LABADIE WELLS.GPJ GLDR.CO.GDT 4/20/12

SCALE: 1 in = 5 ft
 DRILLING CONTRACTOR: Roberts Environmental Drilling, Inc.
 DRILLER: C. Hebel

LOGGED: MWD
 CHECKED: PJJ
 REVIEWED: MNH



RECORD OF BOREHOLE TGP-B

SHEET 4 of 4

PROJECT: Ameren Labadie Wells
 PROJECT NUMBER: 123-84274
 LOCATION: TGP-B

DRILLING METHOD: Air Rotary 6"
 DRILLING DATE: 2/20/2012
 DRILL RIG: Ingersol Rand T3W

DATUM: NAVD88
 AZIMUTH: N/A
 COORDINATES: N: 985,894.58 E: 720,699.99

ELEVATION: 494.62
 INCLINATION: -90

DEPTH (feet)	BORING METHOD	SOIL/ROCK PROFILE				SAMPLES					PENETRATION RESISTANCE BLOWS / ft ■				REMARKS
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	10	20	30	40	
					DEPTH (ft)										
120	6" Air Rotary	(115.0 - 130.0) Fresh, light gray (N7), very fine to fine crystalline, strong (R4), DOLOMITE, little chert <i>(Continued)</i>			364.6										
125					130.0										
130		END OF BORING AT 130 FT BGS													Terminate boring at 130 ft BGS, 2/20/2012 @ 1200. Installed Well TGP-B. Install piezometer TGP-A. See monitoring well construction log TGP-A for details.
135															
140															
145															
150															
155															
160															

GOLDER STL RECORD OF BOREHOLE MWD 12384274_AMEREN LABADIE WELLS.GPJ GLDR.CO.GDT 4/20/12

SCALE: 1 in = 5 ft
 DRILLING CONTRACTOR: Roberts Environmental Drilling, Inc.
 DRILLER: C. Hebel

LOGGED: MWD
 CHECKED: PJJ
 REVIEWED: MNH



RECORD OF BOREHOLE TGP-C

SHEET 1 of 7

PROJECT: Ameren Labadie Wells
 PROJECT NUMBER: 123-84274
 LOCATION: TGP-C

DRILLING METHOD: Air Rotary 6"
 DRILLING DATE: 2/21/2012
 DRILL RIG: Ingersol Rand T3W

DATUM: NAVD88
 AZIMUTH: N/A
 COORDINATES: N: 983,559.90 E: 725,352.32

ELEVATION: 611.50
 INCLINATION: -90

DEPTH (feet)	BORING METHOD	SOIL/ROCK PROFILE				SAMPLES				PENETRATION RESISTANCE				REMARKS	
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	BLOWS / ft ■				
					DEPTH (ft)						10	20	30		40
0	10" Tri-Cone Air Rotary	(0.0 - 14.0) Firm, moderate brown (5YR 3/4), CLAYEY SILT, little fine sand (CL-ML), slightly moist	CL-ML		597.5									Soil and rock type and descriptions determined from cuttings. Strength and weathering inferred from drilling. Sampling and discontinuity measurements not conducted.	
5															
10															
15		(14.0 - 17.0) Moderately to highly weathered, moderate brown (5YR 4/4), fine to medium grained, weak (R2), SANDSTONE			594.5	14.0									
20		(17.0 - 23.0) Moderately weathered, pale yellowish orange (10YR 8/6), fine grained, weak (R2), SANDSTONE			591.5	17.0									
25		(20.0) color changes to very pale orange (10YR 8/2)			588.5	20.0									
30	(23.0 - 30.0) Highly weathered, pale yellowish brown (10YR 6/2), very fine to fine crystalline, weak (R2), DOLOMITE, some chert, little clay		581.5	23.0											
35	(30.0 - 36.0) Moderately to slightly weathered, yellowish gray (5Y 8/1) and light greenish gray (5GY 8/1), very fine to fine crystalline, medium strong (R3), DOLOMITE, little chert		575.5	30.0											
40	(36.0 - 42.0) Highly weathered, grayish orange (10YR 7/4) and light greenish gray (5GY 8/1), fine to medium grained, weak (R2), DOLOMITE, and sand, some silt, trace clay		575.5	36.0											
		Log continued on next page													

GOLDER STL RECORD OF BOREHOLE MWD 12384274_AMEREN LABADIE WELLS.GPJ GLDR_CO.GDT 4/20/12

SCALE: 1 in = 5 ft
 DRILLING CONTRACTOR: Roberts Environmental Drilling, Inc.
 DRILLER: C. Hebel

LOGGED: MWD
 CHECKED: PJJ
 REVIEWED: MNH



RECORD OF BOREHOLE TGP-C

SHEET 2 of 7

PROJECT: Ameren Labadie Wells
 PROJECT NUMBER: 123-84274
 LOCATION: TGP-C

DRILLING METHOD: Air Rotary 6"
 DRILLING DATE: 2/21/2012
 DRILL RIG: Ingersol Rand T3W

DATUM: NAVD88
 AZIMUTH: N/A
 COORDINATES: N: 983,559.90 E: 725,352.32

ELEVATION: 611.50
 INCLINATION: -90

DEPTH (feet)	BORING METHOD	SOIL/ROCK PROFILE			SAMPLES				PENETRATION RESISTANCE BLOWS / ft ■				REMARKS	
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV. DEPTH (ft)	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	10	20		30
40	10" Tri-Cone Air Rotary	(42.0 - 95.0) Moderately weathered, light olive gray (5Y 6/1) and greenish gray (5G 6/1), very fine to fine crystalline, medium strong (R3), DOLOMITE, little chert, little silt		569.5										
42.0														
45														
50														
55														
60														(60.0 - 65.0) Several voids observed
65														(65.0) Encounter water
70														(65.0 - 70.0) Driller notes suspected sand/sandstone pocket
75														
80		Log continued on next page												

GOLDER STL RECORD OF BOREHOLE MWD 12384274 AMEREN LABADIE WELLS.GPJ GLDR.CO.GDT 4/20/12

SCALE: 1 in = 5 ft
 DRILLING CONTRACTOR: Roberts Environmental Drilling, Inc.
 DRILLER: C. Hebel

LOGGED: MWD
 CHECKED: PJJ
 REVIEWED: MNH



RECORD OF BOREHOLE TGP-C

SHEET 3 of 7

PROJECT: Ameren Labadie Wells
 PROJECT NUMBER: 123-84274
 LOCATION: TGP-C

DRILLING METHOD: Air Rotary 6"
 DRILLING DATE: 2/21/2012
 DRILL RIG: Ingersol Rand T3W

DATUM: NAVD88
 AZIMUTH: N/A
 COORDINATES: N: 983,559.90 E: 725,352.32

ELEVATION: 611.50
 INCLINATION: -90

DEPTH (feet)	BORING METHOD	SOIL/ROCK PROFILE				SAMPLES				PENETRATION RESISTANCE				REMARKS	
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	BLOWS / ft ■				
					DEPTH (ft)						10	20	30		40
80	10" Tri-Cone Air Rotary	(42.0 - 95.0) Moderately weathered, light olive gray (5Y 6/1) and greenish gray (5G 6/1), very fine to fine crystalline, medium strong (R3), DOLOMITE, little chert, little silt (Continued)	[Hatched Pattern]	516.5	95.0										
85				90											
95	6" Air Rotary Hammer	(95.0 - 105.0) Slightly weathered to fresh, pale yellowish brown (10YR 6/2) and moderate yellowish brown (10YR 5/4), fine crystalline, medium strong (R3), DOLOMITE, trace chert, trace quartz sandstone	[Hatched Pattern]	506.5	105.0										
100				105											
105	6" Air Rotary Hammer	(105.0 - 125.0) Slightly to moderately weathered, light olive gray (5Y 6/1), fine crystalline, weak to medium strong (R2 to R3), DOLOMITIC LIMESTONE, some shale	[Brick Pattern]	[Blank]											
110				115											
120	Log continued on next page		[Blank]	[Blank]											

(95.0) Set 6" steel casing at 95 ft BGS. Continue drilling open hole with 6" air rotary hammer.

Water Level 115.4 ft bgs 2/24/12 at 10:45

GOLDER STL RECORD OF BOREHOLE MWD 12384274 AMEREN LABADIE WELLS.GPJ GLDR.CO.GDT 4/20/12

SCALE: 1 in = 5 ft
 DRILLING CONTRACTOR: Roberts Environmental Drilling, Inc.
 DRILLER: C. Hebel

LOGGED: MWD
 CHECKED: PJJ
 REVIEWED: MNH



RECORD OF BOREHOLE TGP-C

SHEET 4 of 7

PROJECT: Ameren Labadie Wells
 PROJECT NUMBER: 123-84274
 LOCATION: TGP-C

DRILLING METHOD: Air Rotary 6"
 DRILLING DATE: 2/21/2012
 DRILL RIG: Ingersol Rand T3W

DATUM: NAVD88
 AZIMUTH: N/A
 COORDINATES: N: 983,559.90 E: 725,352.32

ELEVATION: 611.50
 INCLINATION: -90

DEPTH (feet)	BORING METHOD	SOIL/ROCK PROFILE				SAMPLES					PENETRATION RESISTANCE				REMARKS	
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	BLOWS / ft ■					
					DEPTH (ft)						10	20	30	40		
120	6" Air Rotary Hammer	(105.0 - 125.0) Slightly to moderately weathered, light olive gray (5Y 6/1), fine crystalline, weak to medium strong (R2 to R3), DOLOMITIC LIMESTONE, some shale (Continued)		486.5												
125		(125.0 - 138.0) Slightly weathered to fresh, pale yellowish brown (10YR 6/2), and moderate yellowish brown (10YR 5/4), fine crystalline, medium strong (R3), DOLOMITE, little sandstone, trace chert		125.0												
130		(132.0) little chert		479.5 132.0												
135		(138.0 to 240.0) Slightly weathered, pale yellowish brown (10YR 6/2) and medium light gray (N6), very fine crystalline, medium strong (R3), DOLOMITE, trace quartz sandstone, trace chert		473.5 138.0												
140		(150.0 - 190.0) occasional shale layers		461.5 150.0												
145																
150																
155																
160		Log continued on next page														

GOLDER STL RECORD OF BOREHOLE MWD 12384274_AMEREN LABADIE WELLS.GPJ GLDR.CO.GDT 4/20/12

SCALE: 1 in = 5 ft
 DRILLING CONTRACTOR: Roberts Environmental Drilling, Inc.
 DRILLER: C. Hebel

LOGGED: MWD
 CHECKED: PJJ
 REVIEWED: MNH



RECORD OF BOREHOLE TGP-C

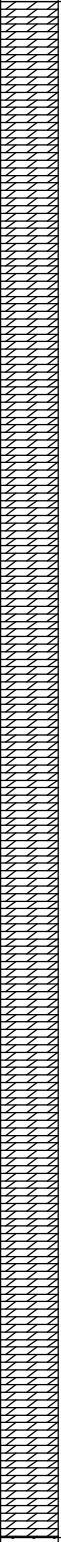
SHEET 6 of 7

PROJECT: Ameren Labadie Wells
 PROJECT NUMBER: 123-84274
 LOCATION: TGP-C

DRILLING METHOD: Air Rotary 6"
 DRILLING DATE: 2/21/2012
 DRILL RIG: Ingersol Rand T3W

DATUM: NAVD88
 AZIMUTH: N/A
 COORDINATES: N: 983,559.90 E: 725,352.32

ELEVATION: 611.50
 INCLINATION: -90

DEPTH (feet)	BORING METHOD	SOIL/ROCK PROFILE				SAMPLES				PENETRATION RESISTANCE				REMARKS			
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	BLOWS / ft ■						
					DEPTH (ft)						10	20	30		40		
200	6" Air Rotary Hammer	(138.0 to 240.0) Slightly weathered, pale yellowish brown (10YR 6/2) and medium light gray (N6), very fine crystalline, medium strong (R3), DOLOMITE, trace quartz sandstone, trace chert (<i>Continued</i>)															
205																	
210																	
215																	
220																	
225																	
230																	
235																	
240																	
						Log continued on next page			371.5								

GOLDER STL RECORD OF BOREHOLE MWD 12384274 AMEREN LABADIE WELLS.GPJ GLDR.CO.GDT 4/20/12

SCALE: 1 in = 5 ft
 DRILLING CONTRACTOR: Roberts Environmental Drilling, Inc.
 DRILLER: C. Hebel

LOGGED: MWD
 CHECKED: PJJ
 REVIEWED: MNH



RECORD OF BOREHOLE TGP-C

SHEET 7 of 7

PROJECT: Ameren Labadie Wells
 PROJECT NUMBER: 123-84274
 LOCATION: TGP-C

DRILLING METHOD: Air Rotary 6"
 DRILLING DATE: 2/21/2012
 DRILL RIG: Ingersol Rand T3W

DATUM: NAVD88
 AZIMUTH: N/A
 COORDINATES: N: 983,559.90 E: 725,352.32

ELEVATION: 611.50
 INCLINATION: -90

DEPTH (feet)	BORING METHOD	SOIL/ROCK PROFILE				SAMPLES				PENETRATION RESISTANCE				REMARKS	
		DESCRIPTION	USCS	GRAPHIC LOG	ELEV.	NUMBER	TYPE	BLOWS per 6 in 140 lb hammer 30 inch drop	N	REC ATT	BLOWS / ft ■				
					DEPTH (ft)						10	20	30		40
240		END OF BORING AT 240 FT BGS			240.0										Terminate boring at 240 ft BGS, 2/23/12. Piezometer TGP-C installed in borehole as open hole completion. See monitoring well construction log TGP-A for details.
245															
250															
255															
260															
265															
270															
275															
280															

GOLDER STL RECORD OF BOREHOLE MWD 12384274 AMEREN LABADIE WELLS.GPJ GLDR.CO.GDT 4/20/12

SCALE: 1 in = 5 ft
 DRILLING CONTRACTOR: Roberts Environmental Drilling, Inc.
 DRILLER: C. Hebel

LOGGED: MWD
 CHECKED: PJJ
 REVIEWED: MNH

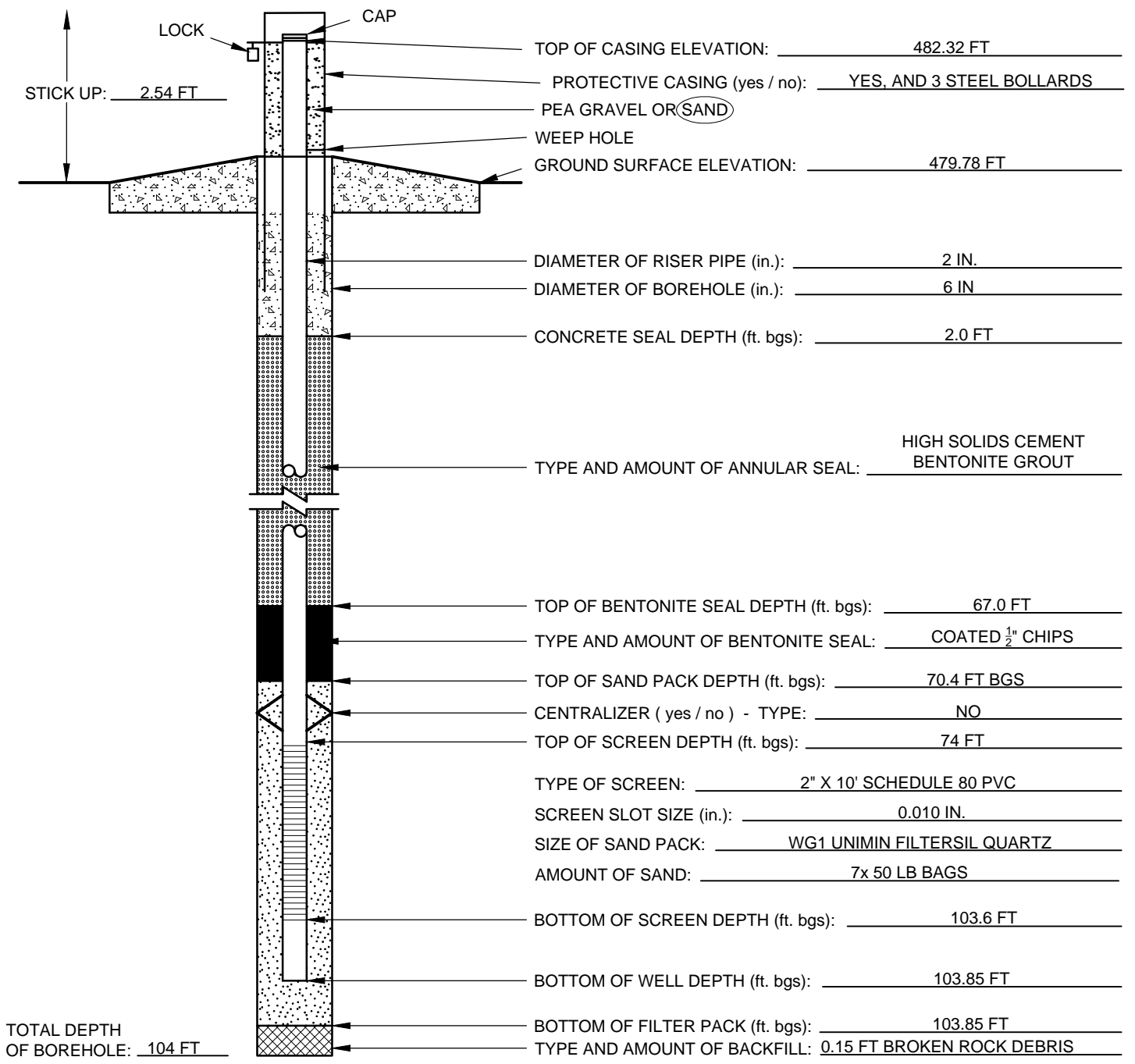


APPENDIX B
WELL CONSTRUCTION LOGS



ABOVE GROUND MONITORING WELL CONSTRUCTION LOG TGP-A

PROJECT NAME: AMEREN LABADIE WELLS		PROJECT NUMBER: 123-84274	
SITE NAME: AMEREN, LABADIE MO		LOCATION: TGP-A	
CLIENT: AMEREN MO		SURFACE ELEVATION: 479.78 FT	
GEOLOGIST: M. DREYER	NORTHING: 988186.35	EASTING: 724460.71	
DRILLER: C. HEBEL	STATIC WATER LEVEL: 21.55 FT BTOC	COMPLETION DATE: 3-1-2012	
DRILLING COMPANY: ROBERTS ENVIRONMENTAL		DRILLING METHODS: 6 1/4" HSA/ 6" AIR ROTARY	



TOP OF CASING ELEVATION: 482.32 FT
 PROTECTIVE CASING (yes / no): YES, AND 3 STEEL BOLLARDS
 PEA GRAVEL OR SAND
 WEEP HOLE
 GROUND SURFACE ELEVATION: 479.78 FT
 DIAMETER OF RISER PIPE (in.): 2 IN.
 DIAMETER OF BOREHOLE (in.): 6 IN
 CONCRETE SEAL DEPTH (ft. bgs): 2.0 FT
 TYPE AND AMOUNT OF ANNULAR SEAL: HIGH SOLIDS CEMENT BENTONITE GROUT
 TOP OF BENTONITE SEAL DEPTH (ft. bgs): 67.0 FT
 TYPE AND AMOUNT OF BENTONITE SEAL: COATED 1/2" CHIPS
 TOP OF SAND PACK DEPTH (ft. bgs): 70.4 FT BGS
 CENTRALIZER (yes / no) - TYPE: NO
 TOP OF SCREEN DEPTH (ft. bgs): 74 FT
 TYPE OF SCREEN: 2" X 10' SCHEDULE 80 PVC
 SCREEN SLOT SIZE (in.): 0.010 IN.
 SIZE OF SAND PACK: WG1 UNIMIN FILTERSIL QUARTZ
 AMOUNT OF SAND: 7x 50 LB BAGS
 BOTTOM OF SCREEN DEPTH (ft. bgs): 103.6 FT
 BOTTOM OF WELL DEPTH (ft. bgs): 103.85 FT
 BOTTOM OF FILTER PACK (ft. bgs): 103.85 FT
 TYPE AND AMOUNT OF BACKFILL: 0.15 FT BROKEN ROCK DEBRIS

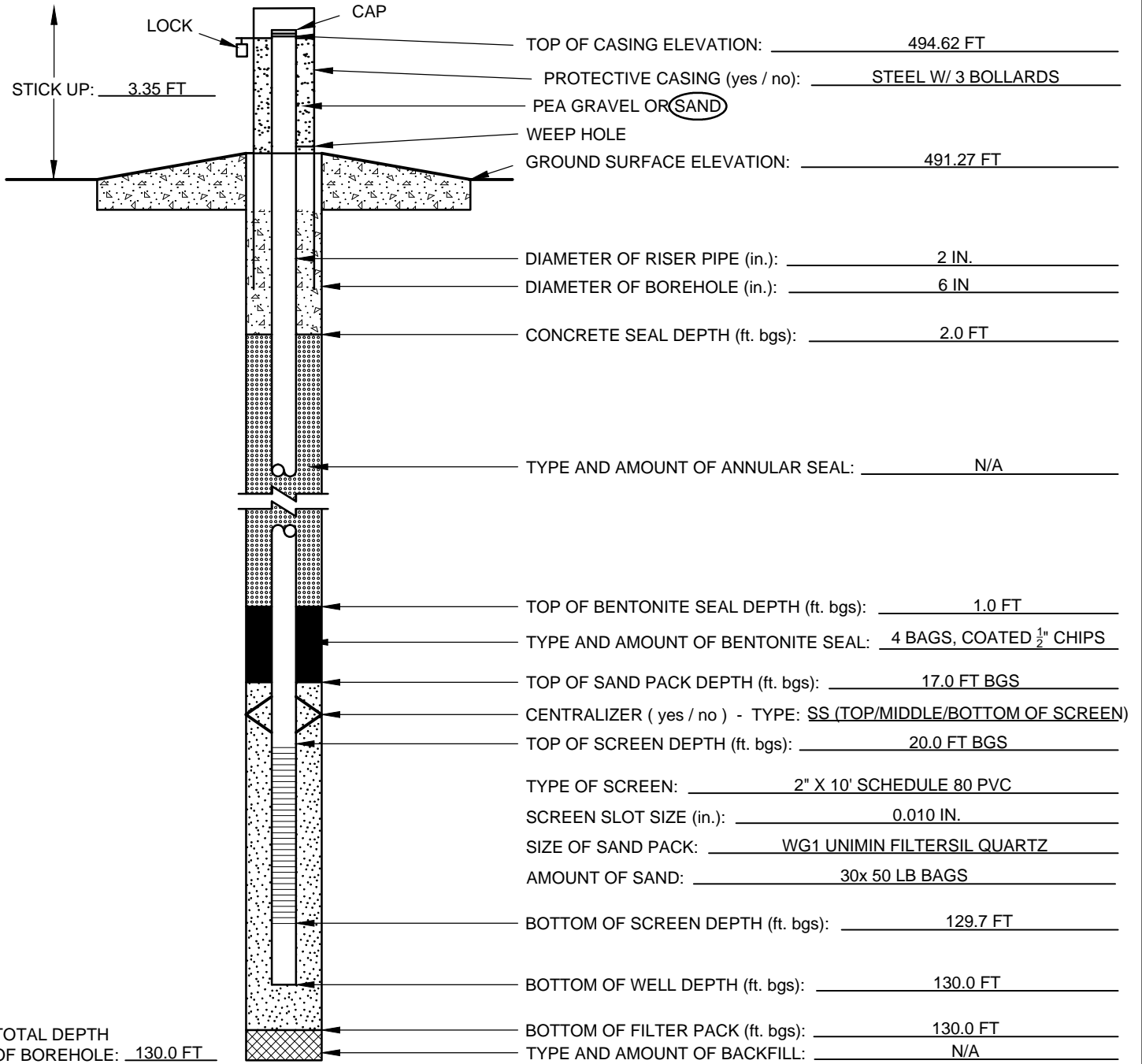
TOTAL DEPTH OF BOREHOLE: 104 FT

ADDITIONAL NOTES: CENTRALIZER WAS NOT INSTALLED DUE TO CAVING FORMATION AND INABILITY TO GET RISER WITH CENTRALIZER TO DEPTH.



ABOVE GROUND MONITORING WELL CONSTRUCTION LOG TGP-B

PROJECT NAME: AMEREN LABADIE WELLS		PROJECT NUMBER: 123-84274	
SITE NAME: AMEREN, LABADIE MO		LOCATION: TGP-B	
CLIENT: AMEREN MO		SURFACE ELEVATION: 491.27 FT	
GEOLOGIST: M. DREYER	NORTHING: 985894.54	EASTING: 720699.99	
DRILLER: C. HEBEL	STATIC WATER LEVEL: 28.00 FT BTOC	COMPLETION DATE: 2-20-2012	
DRILLING COMPANY: ROBERTS ENVIRONMENTAL		DRILLING METHODS: 6" AIR ROTARY	

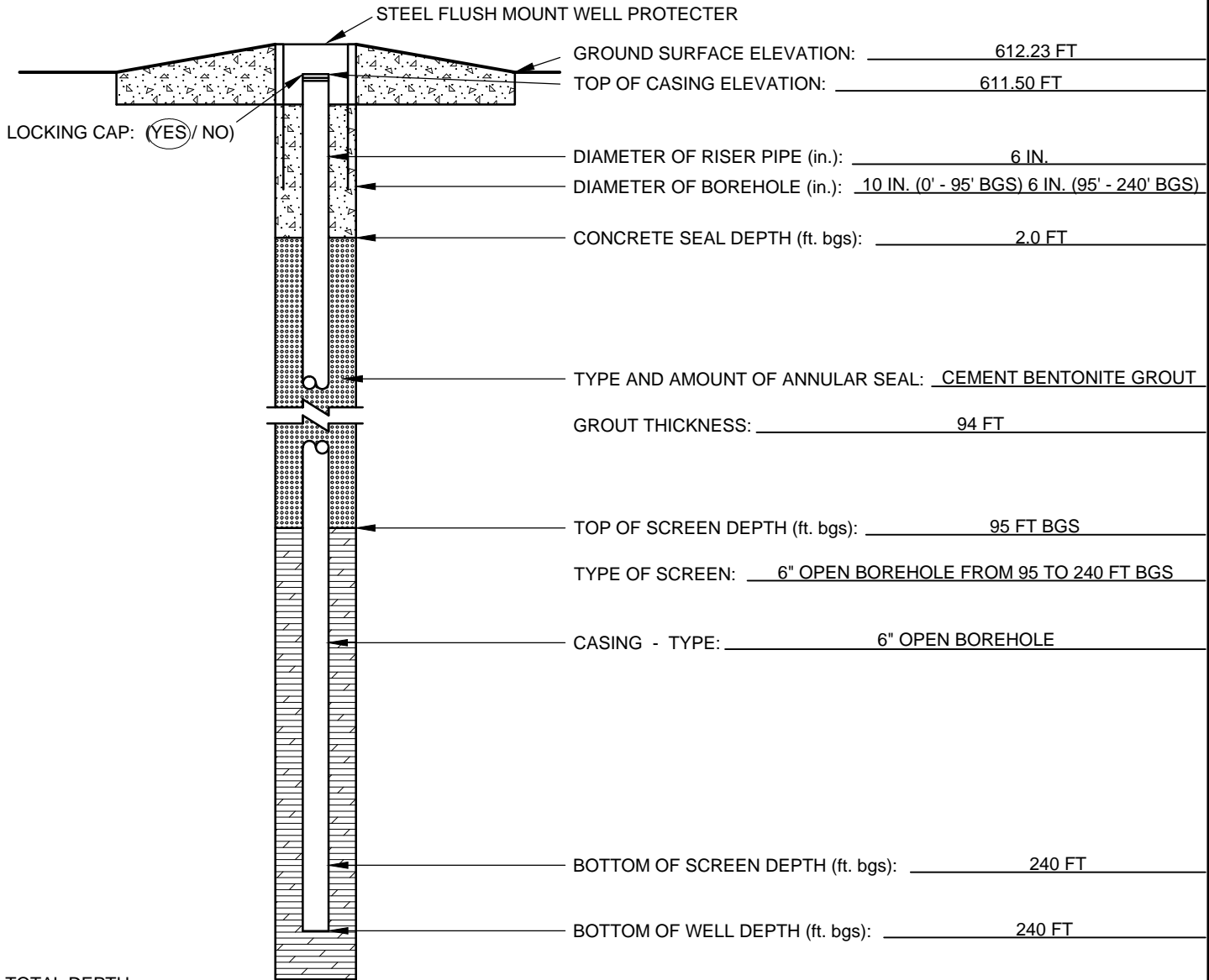


ADDITIONAL NOTES: _____

FLUSH-MOUNT MONITORING WELL CONSTRUCTION LOG

TGP-C

PROJECT NAME: AMEREN LABADIE PIEZOMETERS		PROJECT NUMBER: 123-84274	
SITE NAME: AMEREN, LABADIE MO		LOCATION: TGP-C	
CLIENT: AMEREN MO		SURFACE ELEVATION: 612.23 FT	
GEOLOGIST: M. DREYER	NORTHING: 983559.9	EASTING: 725352.32	
DRILLER: C. HEBEL	STATIC WATER LEVEL: 115.4 FT BGS	COMPLETION DATE: C. HEBEL	
DRILLING COMPANY: ROBERTS ENVIRONMENTAL		DRILLING METHODS: ROBERTS ENVIRONMENTAL	



STEEL FLUSH MOUNT WELL PROTECTOR

GROUND SURFACE ELEVATION: 612.23 FT

TOP OF CASING ELEVATION: 611.50 FT

LOCKING CAP: (YES/ NO) NO

DIAMETER OF RISER PIPE (in.): 6 IN.

DIAMETER OF BOREHOLE (in.): 10 IN. (0' - 95' BGS) 6 IN. (95' - 240' BGS)

CONCRETE SEAL DEPTH (ft. bgs): 2.0 FT

TYPE AND AMOUNT OF ANNULAR SEAL: CEMENT BENTONITE GROUT

GROUT THICKNESS: 94 FT

TOP OF SCREEN DEPTH (ft. bgs): 95 FT BGS

TYPE OF SCREEN: 6" OPEN BOREHOLE FROM 95 TO 240 FT BGS

CASING - TYPE: 6" OPEN BOREHOLE

BOTTOM OF SCREEN DEPTH (ft. bgs): 240 FT

BOTTOM OF WELL DEPTH (ft. bgs): 240 FT

TOTAL DEPTH OF BOREHOLE: 240 FT

ADDITIONAL NOTES: INSTALLED AS 6" OPEN BOREHOLE FROM 95' TO 240' BGS.

CHECKED BY: P. JOPLIN
 DATE CHECKED: 3-16-2012



PREPARED BY: M. DREYER

APPENDIX C
MDNR WELL REGISTRATION FORMS AND RECEIPT
CONFIRMATION



MISSOURI DEPARTMENT OF NATURAL RESOURCES
GEOLOGICAL SURVEY PROGRAM
**MONITORING WELL
CERTIFICATION RECORD**

OFFICE USE ONLY		DATE RECEIVED
REFERENCE NO. <u>449718</u>	CHECK NO.	
C.R. NO.	REVENUE NO.	
STATE WELL NUMBER	APPROVED BY	
ENTERED Ph1 Ph2 Ph3	ROUTE	

INFORMATION SUPPLIED BY PRIMARY CONTRACTOR OR DRILLING CONTRACTOR
NOTE: THIS FORM IS NOT TO BE USED FOR NESTED WELLS

OWNER NAME Ameren Missouri	CONTACT NAME 314-342-1000		VARIANCE GRANTED BY DNR
OWNER ADDRESS One Ameren Plaza, 1901 Chouteau Ave.	CITY St. Louis	STATE MO	ZIP CODE 63166
SITE NAME Labadie Energy Center	WELL NUMBER TGP-A		COUNTY St. Louis
SITE ADDRESS 226 Labadie Power Plant Road	CITY Labadie	STATIC WATER LEVEL 21.55 ft	

SURFACE COMPLETION TYPE <input checked="" type="checkbox"/> ABOVE GROUND <input type="checkbox"/> FLUSH MOUNT <input type="checkbox"/> LOCKING CAP <input checked="" type="checkbox"/> WEEP HOLE		LENGTH AND DIAMETER OF SURFACE COMPLETION LENGTH <u>5</u> FT. DIAMETER <u>4x4</u> IN.	DIAMETER AND DEPTH OF THE HOLE SURFACE COMPLETION WAS PLACED DIAMETER <u>12</u> IN. LENGTH <u>2.5</u> FT.	SURFACE COMPLETION GROUT <input checked="" type="checkbox"/> CONCRETE <input type="checkbox"/> OTHER	LOCATION OF WELL (D/M/S FORMAT ONLY) LAT. <u>38</u> ° <u>32</u> ' <u>49.5</u> " LONG. <u>90</u> ° <u>50</u> ' <u>5.0</u> "																													
ANNULAR SEAL LENGTH <u>64.5</u> FT. <input checked="" type="checkbox"/> SLURRY <input type="checkbox"/> CHIPS <input type="checkbox"/> PELLETS <input type="checkbox"/> GRANULAR <input checked="" type="checkbox"/> CEMENT/SLURRY IF CEMENT/BENTONITE MIX: BAGS OF CEMENT USED <u>12</u> % OF BENTONITE USED <u>5</u> WATER USED/BAG <u>7</u> GAL.		RISER RISER PIPE DIAMETER <u>2</u> IN. RISER PIPE LENGTH <u>76.5</u> FT. DIAMETER OF DRILL HOLE <u>6</u> IN. WEIGHT OR SDR# <u>80</u>		MONITORING FOR: (CHECK ALL THAT APPLY) <input type="checkbox"/> RADIONUCLIDES <input type="checkbox"/> PETROLEUM PRODUCTS ONLY <input type="checkbox"/> EXPLOSIVES <input type="checkbox"/> METALS <input type="checkbox"/> VOC <input type="checkbox"/> SVOCs <input type="checkbox"/> PESTICIDES/HERBICIDES																														
SECONDARY FILTER PACK LENGTH <u>NA</u> FT.		BENTONITE SEAL LENGTH <u>3</u> FT. <input checked="" type="checkbox"/> CHIPS <input type="checkbox"/> PELLETS <input type="checkbox"/> GRANULAR <input type="checkbox"/> SLURRY <input type="checkbox"/> SATURATED ZONE <input type="checkbox"/> HYDRATED		PROPOSED USE OF WELL <input type="checkbox"/> GAS MIGRATION WELL <input type="checkbox"/> OBSERVATION <input type="checkbox"/> EXTRACTION WELL <input type="checkbox"/> OPEN HOLE <input checked="" type="checkbox"/> PIEZOMETERS <input type="checkbox"/> INJECTION WELL <input type="checkbox"/> DIRECT PUSH																														
DEPTH TO TOP OF PRIMARY FILTER PACK <u>70</u> FT.		SCREEN SCREEN DIAMETER <u>2</u> IN. SCREEN LENGTH <u>30</u> FT. DIAMETER OF DRILL HOLE <u>6</u> IN. DEPTH TO TOP <u>74</u> FT.		DEPTH TO FORMATION DESCRIPTION <table border="1"> <thead> <tr> <th colspan="2">DEPTH</th> <th rowspan="2">FORMATION DESCRIPTION</th> </tr> <tr> <th>TO</th> <th>FROM</th> </tr> </thead> <tbody> <tr> <td>(REDI)</td> <td>JOB#</td> <td>121014-AR/D</td> </tr> <tr> <td>0'</td> <td>25'</td> <td>Silt/Clayey Silt</td> </tr> <tr> <td>25'</td> <td>32'</td> <td>Silty Clay</td> </tr> <tr> <td>32'</td> <td>36'</td> <td>Silty Sand</td> </tr> <tr> <td>36'</td> <td>53'</td> <td>Dolomite</td> </tr> <tr> <td>53'</td> <td>62'</td> <td>Dolomite and Sandstone</td> </tr> <tr> <td>62'</td> <td>67'</td> <td>Mud Filled VOID</td> </tr> <tr> <td>67'</td> <td>105'</td> <td>Dolomite</td> </tr> </tbody> </table>		DEPTH		FORMATION DESCRIPTION	TO	FROM	(REDI)	JOB#	121014-AR/D	0'	25'	Silt/Clayey Silt	25'	32'	Silty Clay	32'	36'	Silty Sand	36'	53'	Dolomite	53'	62'	Dolomite and Sandstone	62'	67'	Mud Filled VOID	67'	105'	Dolomite
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LENGTH OF PRIMARY FILTER PACK <u>34</u> FT.		SCREEN MATERIAL <input type="checkbox"/> STEEL <input checked="" type="checkbox"/> THERMOPLASTIC (PVC) <input type="checkbox"/> OTHER		TOTAL DEPTH: <u>104 FT.</u>																														

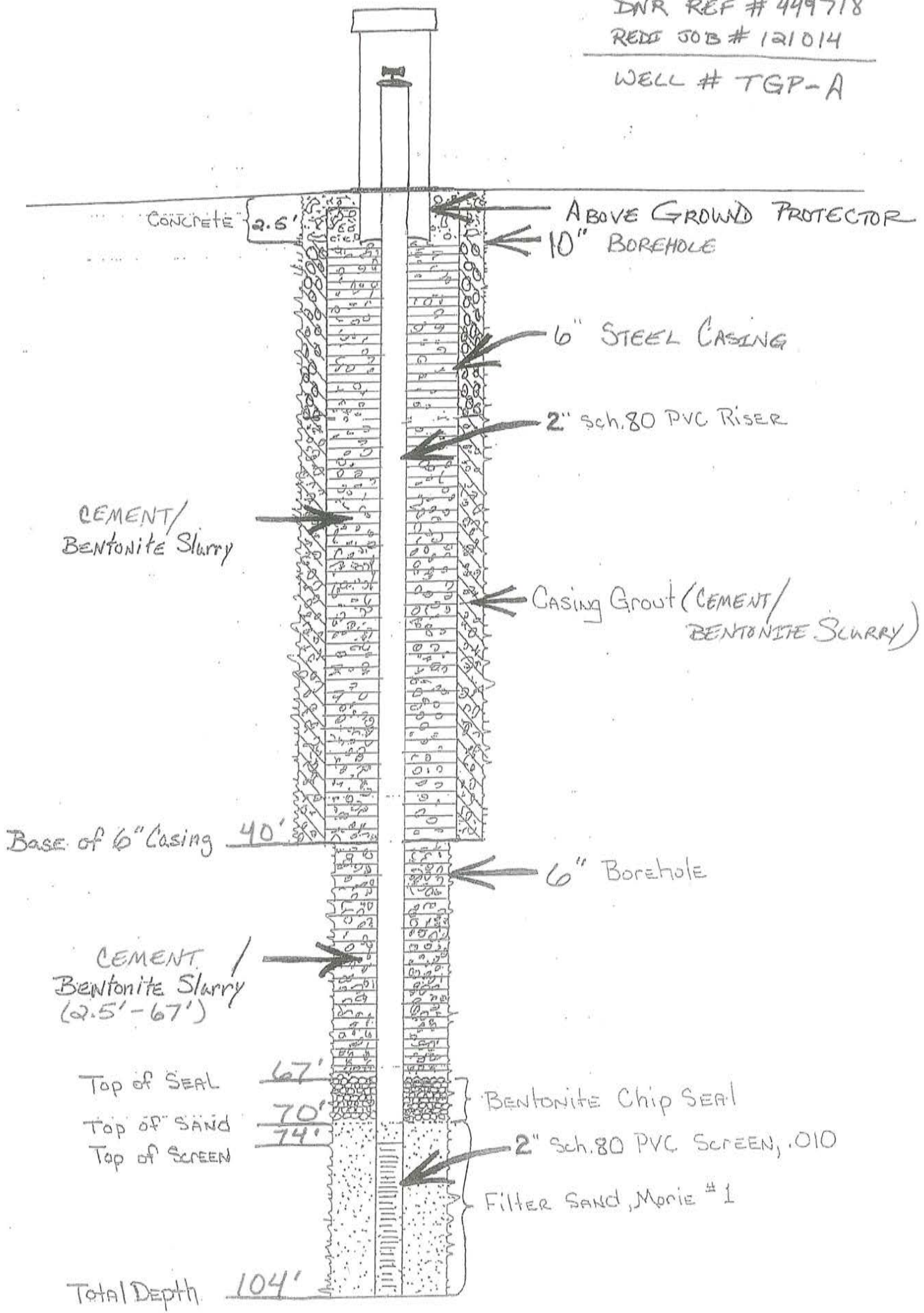
FOR CASED WELLS, SUBMIT ADDITIONAL AS BUILT DIAGRAMS SHOWING WELL CONSTRUCTION DETAILS INCLUDING TYPE & SIZE OF ALL CASING, HOLE DIAMETER & GROUT USED.

SIGNATURE (PRIMARY CONTRACTOR) <i>[Signature]</i>	PERMIT NUMBER <u>004753-M</u>	DATE WELL DRILLING WAS COMPLETED 03/01/2012	
I HEREBY CERTIFY THAT THE MONITORING WELL HEREIN DESCRIBED WAS CONSTRUCTED IN ACCORDANCE WITH MISSOURI DEPARTMENT OF NATURAL RESOURCES REQUIREMENTS FOR THE CONSTRUCTION OF MONITORING WELLS.			<input type="checkbox"/> PUMP INSTALLED
SIGNATURE (WELL DRILLER) <i>[Signature]</i>	PERMIT NUMBER <u>4440 WPM</u>	SIGNATURE (OF APPRENTICE)	APPRENTICE PERMIT NUMBER

DNR REF # 449718

REDE JOB # 121014

WELL # TGP-A





MISSOURI DEPARTMENT OF NATURAL RESOURCES
 GEOLOGICAL SURVEY PROGRAM
**MONITORING WELL
 CERTIFICATION RECORD**

OFFICE USE ONLY		DATE RECEIVED
REFERENCE NO. 449719	CHECK NO.	
C.R. NO.	STATE WELL NUMBER	
REVENUE NO.		ENTERED
Ph1	Ph2	Ph3
APPROVED BY	ROUTE	

INFORMATION SUPPLIED BY PRIMARY CONTRACTOR OR DRILLING CONTRACTOR

NOTE: THIS FORM IS NOT TO BE USED FOR NESTED WELLS

OWNER NAME Ameren Missouri	CONTACT NAME 314-342-1000		VARIANCE GRANTED BY DNR
OWNER ADDRESS One Ameren Plaza, 1901 Chouteau Ave.	CITY St. Louis	STATE MO	ZIP CODE 63166
SITE NAME Labadie Energy Center		WELL NUMBER TGP-B	COUNTY St. Louis
SITE ADDRESS 226 Labadie Power Plant Road		CITY Labadie	STATIC WATER LEVEL 28 ft

SURFACE COMPLETION		LOCATION OF WELL (D/M/S FORMAT ONLY)																	
TYPE	LENGTH AND DIAMETER OF SURFACE COMPLETION	DIAMETER AND DEPTH OF THE HOLE SURFACE COMPLETION WAS PLACED	SURFACE COMPLETION GROUT																
<input checked="" type="checkbox"/> ABOVE GROUND	LENGTH <u>5</u> FT. DIAMETER <u>4x4</u> IN.	DIAMETER <u>12</u> IN. LENGTH <u>2.5</u> FT.	<input checked="" type="checkbox"/> CONCRETE <input type="checkbox"/> OTHER																
<input type="checkbox"/> FLUSH MOUNT																			
<input checked="" type="checkbox"/> LOCKING CAP	<table border="1"> <tr> <td colspan="2">SMALLEST</td> <td colspan="2">LARGEST</td> </tr> <tr> <td><u>NW</u> 1/4</td> <td><u>SW</u> 1/4</td> <td><u>SW</u> 1/4</td> <td></td> </tr> <tr> <td colspan="2">SECTION <u>19</u></td> <td colspan="2">TOWNSHIP <u>44</u> NORTH</td> </tr> <tr> <td colspan="2">RANGE <u>2</u> EAST</td> <td colspan="2"><input type="checkbox"/> WEST</td> </tr> </table>			SMALLEST		LARGEST		<u>NW</u> 1/4	<u>SW</u> 1/4	<u>SW</u> 1/4		SECTION <u>19</u>		TOWNSHIP <u>44</u> NORTH		RANGE <u>2</u> EAST		<input type="checkbox"/> WEST	
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	DEPTH		FORMATION DESCRIPTION																
	TO	FROM																	
	(REDI)	JOB#	121014-AR/D																
	0'	20'	Moderately Weathered																
	20'	130'	Fresh Dolomite																
	TOTAL DEPTH:		130 FT.																

FOR CASED WELLS, SUBMIT ADDITIONAL AS BUILT DIAGRAMS SHOWING WELL CONSTRUCTION DETAILS INCLUDING TYPE & SIZE OF ALL CASING, HOLE DIAMETER & GROUT USED.

SIGNATURE (PRIMARY CONTRACTOR)	PERMIT NUMBER 004753-M	DATE WELL DRILLING WAS COMPLETED 03/01/2012
I HEREBY CERTIFY THAT THE MONITORING WELL HEREIN DESCRIBED WAS CONSTRUCTED IN ACCORDANCE WITH MISSOURI DEPARTMENT OF NATURAL RESOURCES REQUIREMENTS FOR THE CONSTRUCTION OF MONITORING WELLS.		<input type="checkbox"/> PUMP INSTALLED
SIGNATURE (WELL DRILLER)	PERMIT NUMBER 4420WPAH	SIGNATURE (OF APPRENTICE)
		APPRENTICE PERMIT NUMBER



MISSOURI DEPARTMENT OF NATURAL RESOURCES
GEOLOGICAL SURVEY PROGRAM
**MONITORING WELL
CERTIFICATION RECORD**

OFFICE USE ONLY		DATE RECEIVED
REFERENCE NO. <u>449720</u>	CHECK NO.	
C.R. NO.	REVENUE NO.	
STATE WELL NUMBER	APPROVED BY	
ENTERED	ROUTE	
Ph1 Ph2 Ph3		

INFORMATION SUPPLIED BY PRIMARY CONTRACTOR OR DRILLING CONTRACTOR
NOTE: THIS FORM IS NOT TO BE USED FOR NESTED WELLS

OWNER NAME Ameren Missouri		CONTACT NAME 314-342-1000		VARIANCE GRANTED BY DNR	
OWNER ADDRESS One Ameren Plaza, 1901 Chouteau Ave.		CITY St. Louis	STATE MO	ZIP CODE 63166	NUMBER <u>5214</u>
SITE NAME Labadie Energy Center Project - PRIVATE RESIDENCE			WELL NUMBER TGP-C	COUNTY St. Louis	
SITE ADDRESS 2272 Highway T			CITY Labadie	STATIC WATER LEVEL 115.4 ft	

SURFACE COMPLETION TYPE <input type="checkbox"/> ABOVE GROUND <input checked="" type="checkbox"/> FLUSH MOUNT <input checked="" type="checkbox"/> LOCKING CAP <input type="checkbox"/> WEEP HOLE		LENGTH AND DIAMETER OF SURFACE COMPLETION LENGTH <u>1</u> FT. DIAMETER <u>8</u> IN.	DIAMETER AND DEPTH OF THE HOLE SURFACE COMPLETION WAS PLACED DIAMETER <u>14</u> IN. LENGTH <u>1</u> FT.	SURFACE COMPLETION GROUT <input checked="" type="checkbox"/> CONCRETE <input type="checkbox"/> OTHER	LOCATION OF WELL (D/M/S FORMAT ONLY) LAT. <u>38</u> ° <u>32</u> ' <u>3.8</u> " LONG. <u>90</u> ° <u>50</u> ' <u>53.8</u> "																																						
ANNULAR SEAL LENGTH <u>94</u> FT. <input type="checkbox"/> SLURRY <input type="checkbox"/> CHIPS <input type="checkbox"/> PELLETS <input type="checkbox"/> GRANULAR <input checked="" type="checkbox"/> CEMENT/SLURRY IF CEMENT/BENTONITE MIX: BAGS OF CEMENT USED <u>16</u> % OF BENTONITE USED <u>5</u> WATER USED/BAG <u>7</u> GAL.		RISER RISER PIPE DIAMETER <u>6</u> IN. RISER PIPE LENGTH <u>95</u> FT. DIAMETER OF DRILL HOLE <u>10</u> IN. WEIGHT OR SDR# _____		SMALLEST <u>SE</u> ° <u>NE</u> ° <u>NE</u> ° SECTION <u>30</u> TOWNSHIP <u>44</u> NORTH RANGE <u>2</u> <input checked="" type="checkbox"/> EAST <input type="checkbox"/> WEST																																							
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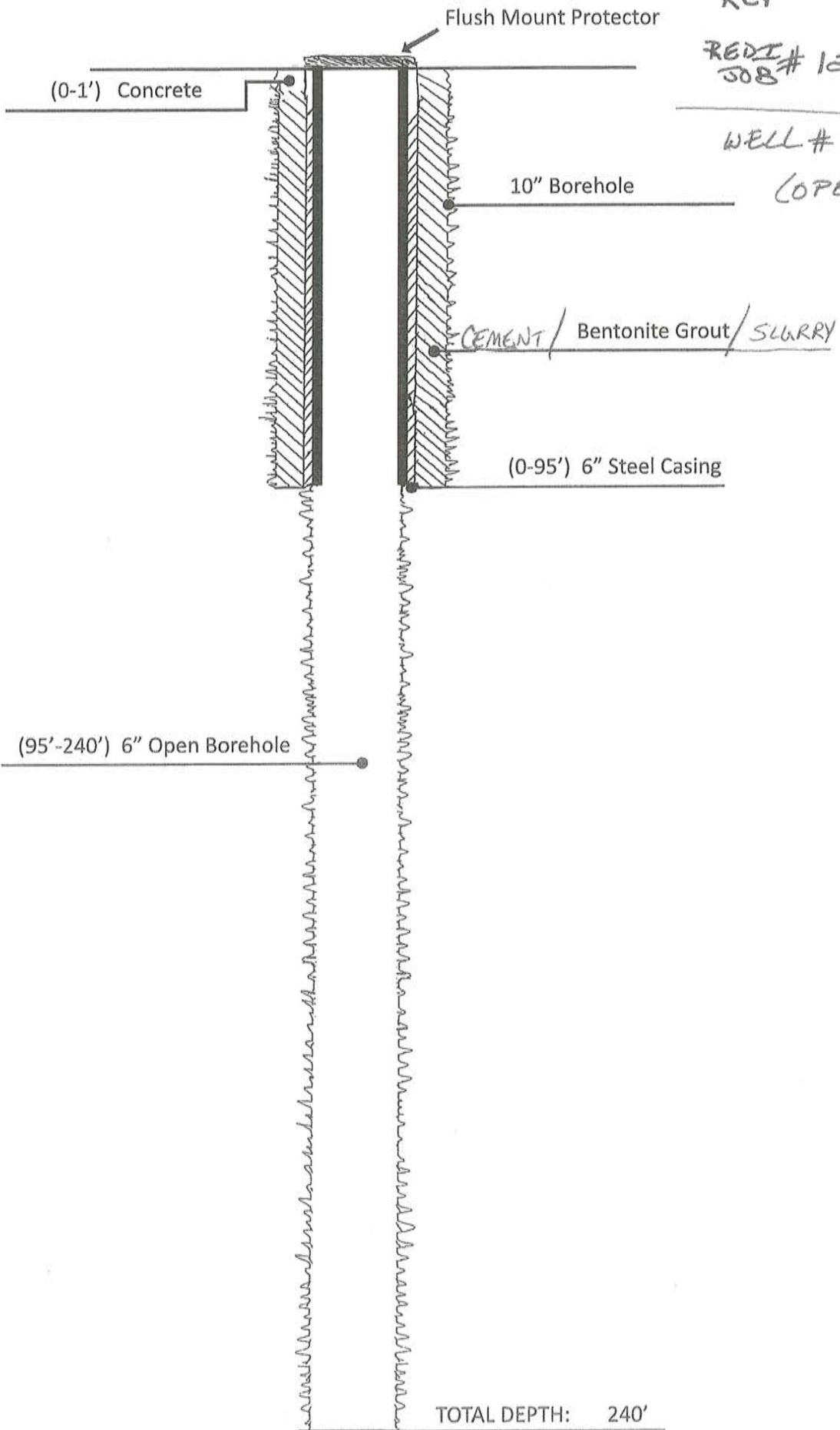
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SIGNATURE (PRIMARY CONTRACTOR) <i>[Signature]</i>	PERMIT NUMBER <u>004753-M</u>	DATE WELL DRILLING WAS COMPLETED 03/01/2012
I HEREBY CERTIFY THAT THE MONITORING WELL HEREIN DESCRIBED WAS CONSTRUCTED IN ACCORDANCE WITH MISSOURI DEPARTMENT OF NATURAL RESOURCES REQUIREMENTS FOR THE CONSTRUCTION OF MONITORING WELLS.		<input type="checkbox"/> PUMP INSTALLED
SIGNATURE (WELL DRILLER) <i>[Signature]</i>	PERMIT NUMBER <u>4440WPAH</u>	SIGNATURE (OF APPRENTICE)
		APPRENTICE PERMIT NUMBER

DNR # 449720
REF

REDI # 121014-AR/D
JOB

WELL # TGP-C
(OPEN HOLE)





STATE OF MISSOURI
DEPARTMENT OF NATURAL RESOURCES

Jeremiah W. (Jay) Nixon, Governor • Sara Parker Pauley, Director

www.dnr.mo.gov

P.O. Box 250 111 Fairgrounds Rd. Rolla, MO 65402-0250
 (573) 368-2165
 FAX(573) 368-2317

VARIANCE: Approved

VARIANCE NUMBER: 5214

WELL OWNER INFORMATION										
NAME:	AMEREN UE									
ADDRESS LINE 1:	ONE AMEREN PLAZA							FAX:		
ADDRESS LINE 2:	1901 CHOTEAU AVE									
CITY:	ST. LOUIS	STATE:	MO	ZIP:	63103	TELEPHONE:				
WELL LOCATION										
COUNTY:	FRANKLIN	LAT.	38	32	3.8	LONG.	90	50	53.8	
	1/4	1/4	1/4	NW	SEC. 30	TWN.	44	N	RNG. 2E	
CONTRACTOR INFORMATION										
COMPANY NAME:	ROBERTS ENVIRONMENTAL DRLG INC				PERMIT NUMBER:	004440				
CONTRACTOR NAME:	TRAVIS ROBERTS									
ADDRESS:	1107 S MULBERRY ST							FAX:	618-476-3619	
CITY:	MILLSTADT	STATE:	IL	ZIP:	62260	TELEPHONE:	618-476-7334			
VARIANCE INFORMATION										
VARIANCE EXPLANATION										
APPROVAL GRANTED TO COMPLETE AN OPEN-HOLE MONITORING WELL AT THIS LOCATION. REQUIRED: THE WELL MUST MEET MINIMUM CASING REQUIREMENTS FOR DOMESTIC WELLS IN AREA 1: SET NO LESS THAN 80 FEET OF CASING, NO LESS THAN 30 FEET INTO COMPETENT BEDROCK.										
RULE NUMBER MODIFIED:	10 CSR 23-4.060									
REASON FOR VARIANCE										
VERBAL APPROVAL GIVEN 2/10/2012 BY MATTHEW PARKER. WELL WAS CONSTRUCTED TO A TOTAL DEPTH OF 200 FEET AND CONTAINS 95 FEET OF CASING.										
DATE:	04/18/2012				BY:	MOLLY STARKEY <i>MJS</i>				
COPY SENT TO OWNER (DATE):					BY:					
COPY SENT TO CONTRACTOR (DATE):					BY:					
Cc:	Cc:									

WIMS Bi-Monthly Well and Pump Report

Report Date: 05/01/2012

From - 03/01/2012 to - 04/30/2012

The table below lists the well and/or pump reports that the Wellhead Protection Section received from your company during the time period identified above. Compare these reports with your record of reports submitted. If you have turned in reports during this time period that are not on the list, please call us at (573) 368-2165.

RECEIVED

MAY 03 2012

GOLDER ASSOCIATES, INC.

GOLDER ASSOCIATES INC
820 SOUTH MAIN STREET
ST CHARLES, MO 63303

Ref Num	Rec Type	Date Rcvd	Owner	City	Contractor	Permit #	Cert #
00449718	Monitoring Well	04/26/2012	AMEREN MISSOURI	ST. LOUIS	GOLDER ASSOCIAT	004753	*
00449719	Monitoring Well	04/26/2012	AMEREN MISSOURI	ST. LOUIS	GOLDER ASSOCIAT	004753	*
00449720	Monitoring Well	04/26/2012	AMEREN MISSOURI	ST. LOUIS	GOLDER ASSOCIAT	004753	*