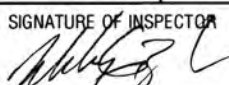


HTW DRILLING LOG

HOLE NO.
MW-01 D
SHEET 1
OF 9 SHEETS

1. COMPANY NAME Burns & McDonnell / Avatar		2. DRILLING SUBCONTRACTOR Trant Drilling	
3. PROJECT Forbes S-5 Atlas		4. LOCATION S-5 E of Council Grove, KS	
5. NAME OF DRILLER Nate Stebbins		6. MANUFACTURER'S DESIGNATION OF DRILL Versa Sonic V-100	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	7" OD Bit		8. HOLE LOCATION MW-01 D
	Double wall sampler w/		
	4" inner barrel & 6"		
	Outer casing		
9. SURFACE ELEVATION		10. DATE STARTED 5-13-15	
11. DATE COMPLETED 5-13-15		12. OVERBURDEN THICKNESS 4'	
13. DEPTH DRILLED INTO ROCK 66'		15. DEPTH GROUNDWATER ENCOUNTERED See remarks	
14. TOTAL DEPTH OF HOLE 70'		16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED N/A	
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY) 5-14 @ 1925: 9.3' bgs, 5-15 @ 1800: 22.5' bgs		18. GEOTECHNICAL SAMPLES	
DISTURBED N/A		UNDISTURBED N/A	
19. TOTAL NUMBER OF CORE BOXES N/A		20. SAMPLES FOR CHEMICAL ANALYSIS	
VOC N/A		METALS N/A	
OTHER (SPECIFY) N/A		OTHER (SPECIFY) N/A	
OTHER (SPECIFY) N/A		OTHER (SPECIFY) N/A	
21. TOTAL CORE RECOVERY 100 %		22. DISPOSITION OF HOLE	
BACKFILLED		MONITORING WELL	
OTHER (SPECIFY)		X	
23. SIGNATURE OF INSPECTOR 			

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	0	CLAY, trace silt, very dark gray (10yr, 3%), damp to moist, soft, high plasticity, organics present	0.0				5-13-15 @ 0845' Trant begins drilling w/ 7" Sonic
	1	CLAY, some rock fragments, olive yellow (2.5% 4%), damp, soft, high plasticity (FILL)	0.0				
	2		0.3				
	3	CLAY, trace silt, dark gray (10yr, 4%), damp, soft, high plasticity, organics present	0.0				
	4	cont. with silt, limestone fragments, brown (10yr, 5%), trace clay and silt (Regolith)	0.0				
	5		0.0				

HTW DRILLING LOG

HOLE NO.
MW-01D

PROJECT
Forbes S-5

INSPECTOR
J. Bryant

SHEET 2
OF 9 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	5	LIMESTONE, with chert, moderate yellowish brown (10YR, 5/4), medium light gray (2.6) chert, wear. highly weathered. Bedded in thin sheets, small shell fragments, crinoid fragments	1.7				
	6	-becoming blocky and hard at 6.5' hrs, very strong,	1.0				
	7	CLAYSTONE, moderate yellowish brown (10YR, 5/4), very weak, highly weathered, very thin laminations, medium gray (N5)	0.0				
	8		0.0				
	9	LIMESTONE, with medium light gray chert (2.6), moderate yellowish brown (10YR, 5/4), very strong, slightly weathered	0.0				
	10	SHALE, dusky yellow (5Y, 4/4), weak, slightly weathered, occasional limestone inclusions					
	11						
	12						
	13	- interbedded w/ Limestone, chert fragments present 13-15'					
	14						

HTW DRILLING LOG

HOLE NO.
MW-010

PROJECT
Forbes S-S Atlas

INSPECTOR
J. Bryant

SHEET 3
OF 9 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	14	SHALE, dusky yellow (5Y, 6/4), weak, slightly weathered, interbedded with limestone, chert fragments throughout					@ 14' by s switch to double well sample barrel 4" inside OD, 6" outer OD
	15	SHALE, dusky yellow (5Y, 6/4), very weak, slightly weathered					
	16						
	17	SHALE, medium gray (N5), weak, slightly weathered					
	18	SHALE, dusky yellow (5Y, 6/4), very weak, slightly weathered					
	19						
	20	- becoming strong					
	21						
	22						
	23						

HTW DRILLING LOG

HOLE NO.
mw-01D
SHEET 4
OF 9 SHEETS

PROJECT
Forbes S-S Atlas

INSPECTOR
J. Bryant

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	23	SILTACE, dark gray (N3), weak strong, fresh					
	24	LIMESTONE, with chert, dark gray (N3), strong, fresh, fossiliferous					
	25						
	26	LIMESTONE, pale yellowish brown (10YR 6/2), strong, slightly weathered, fossiliferous					
	27	(JB)					
	28	LIMESTONE, light olive gray (5Y 6/1), with chert, dark gray (N3), strong, fresh to slightly weathered, fossiliferous					
	29						
	30						1033 have 1130 lost ~500 gal water. Begin using David Quick-Gel
	31						
	32						

HTW DRILLING LOG

HOLE NO.
MW-01D

PROJECT
Forbes S-5 Atlas

INSPECTOR
J. Bryant

SHEET 5
OF 9 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	32	LIMESTONE, with chert, dark gray (N3), strong, slightly weather					Color change w 32' logs
	33						
	34	SHALE, medium dark gray (N4), weak, weathered					
	35						
	36						
	37						
	38						
	39						
	40	SHALE (B) SANDSTONE, grayish green (106X, 5/2), strong, fresh					1147 1406 : Resum
		SHALE, grayish red (10R, 4/2), strong, fresh, variable consolidation					
	41						

HTW DRILLING LOG

HOLE NO.
MW-01 D

PROJECT
Forbes S-5 Atlas

INSPECTOR
J. Bryant

SHEET 6
OF 9 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	41	SHALE, grayish red (10R, 4½), strong, fresh, variable consolidation					
	42						
	43						
	44						
	45						
	46						
	47	- mottled grayish green (10G, 5½) to grayish red (10R, 4½)					
	48						
	49						
	50	LIMESTONE, grayish green (10G, 5½), weak, slightly weathered					

HTW DRILLING LOG

HOLE NO.
Mw-01D

PROJECT
Forbes S-S Atlas

INSPECTOR
J. Bryant

SHEET 7
OF 9 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	50	LIMESTONE, grayish green (10G, 5L), weak, slightly weathered - color change to light olive gray (57, 4L)					
	51	color change to medium light gray (N6) JSB LIMESTONE, medium light gray (N6), strong, fresh, ^{thin} bands of chert & small nodules					
	52						
	53						
	54						
	55						
	56	- Medium gray (N5)					
	57						
	58						
	59						

HTW DRILLING LOG

HOLE NO.
mw-01D

SHEET *8*
OF *9* SHEETS

PROJECT
Forbes S-S Atlas

INSPECTOR
J. Bryant

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	59	LIMESTONE, medium gray (NS), strong, fresh, thin beds and small nodules of chert					
	60						
	61						
	62						
	63						
	64						
	65						
	66	SHALE, medium dark gray (N4), strong, fresh					
	67						
	68						

HTW DRILLING LOG

HOLE NO.
mw-01D

PROJECT
Forbes S-5 Atlas

INSPECTOR
J. Bryant

SHEET 9
OF 9 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	68	SAALC, medium dark gray (LN4), strong, fresh					
	69						
	70	TD = 70' bgs					1605: Trant stops @ 70' bgs. - Trant flushes boring w/ fresh water - 1630: Trant begins installing mw-01 to 65' bgs - No additional fluid loss after 30' bgs Total lost: 500 gal. - Groundwater was not observed during drilling

HTW DRILLING LOG

HOLE NO.
MW-01D

PROJECT
Forbes Atlas S-5

INSPECTOR
J. B. Gant

SHEET 1
OF 1 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
							<p>Monitoring well Details</p> <p>BH TD: 70' bgs MW TD: 65' bgs Material: 2" dia Sch 40 PVC Cap: Flat Screen: 0.010" Factory slotted Riser: Blau PVC Manufacturer: Johnson</p> <p>Lengths:</p> <p>Cap: 0.35 Screen: 10.04 Riser: 10.00 10.00 10.00 10.00 10.00</p> <p>Total: 70.39' Cut off: 2.64' Stickup: 2.15'</p> <p>Backfill: Haliburton 3/8" bentonite chips 70-66': 1-50# bag - Premier silica 20/40 silica sand 66-65' bgs, 1-50# bag</p> <p>Filter Pack: Premier Silica 20/40 Silica Sand 65-51' bgs, 9-50# bags</p> <p>Seal: PDS Pel-Plug bentonite pellets 51-47' bgs 2-5 gal buckets</p> <p>Grout: Haliburton EZ Seal & Quik-Grout EZ Seal - 4-50# bags Quik-Grout - 0.7-50# bags 47-3' bgs</p>
		<p>Not to scale.</p> <p>Install date: 5-13-15 Grout date: 5-14-15</p>					

HTW DRILLING LOG

HOLE NO.
MW-02D

1. COMPANY NAME <i>Ducas & McDonnell</i>		2. DRILLING SUBCONTRACTOR <i>Traut Drilling</i>		SHEET 1 OF 8 SHEETS		
3. PROJECT <i>Forbes Atlas S-5</i>			4. LOCATION <i>S-5 East of Council Grove, KS</i>			
5. NAME OF DRILLER <i>Nate Stebbins</i>			6. MANUFACTURER'S DESIGNATION OF DRILL <i>Uersa Sonic U100</i>			
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	4" dia bit		8. HOLE LOCATION			
	4" dia sampler barrel (10')					
	6" dia overdrill casing					
	4" dia double wall sampler (10')					
	6" dia bit					
9. SURFACE ELEVATION		10. DATE STARTED <i>5-17-15</i>		11. DATE COMPLETED <i>5-17-15</i>		
12. OVERBURDEN THICKNESS <i>4.5'</i>			15. DEPTH GROUNDWATER ENCOUNTERED <i>See Remarks</i>			
13. DEPTH DRILLED INTO ROCK <i>55.5'</i>			16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED <i>35.96' btoe - 61 hrs</i>			
14. TOTAL DEPTH OF HOLE <i>60'</i>			17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY) <i>44.77' btoe - 5/26 - 6 days after development</i>			
18. GEOTECHNICAL SAMPLES		DISTURBED <i>N/A</i>	UNDISTURBED <i>N/A</i>	19. TOTAL NUMBER OF CORE BOXES <i>N/A</i>		
20. SAMPLES FOR CHEMICAL ANALYSIS		VOC <i>N/A</i>	METALS <i>N/A</i>	OTHER (SPECIFY) <i>N/A</i>	OTHER (SPECIFY) <i>N/A</i>	OTHER (SPECIFY) <i>N/A</i>
21. TOTAL CORE RECOVERY <i>100%</i>						
22. DISPOSITION OF HOLE		BACKFILLED	MONITORING WELL <i>X</i>	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR <i>[Signature]</i>	

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	0	CLAY, trace silt, trace fine sand, trace fine gravel, dark grayish brown (10YR, 4/2), damp, medium stiffness, high plasticity, organics present	0.0				5-17-15 @ 1207 Traut begins drilling w/ 4" dia bit and 4" dia sampler barrel.
	1	- becoming stiff - oxidation present	0.0				
	2	- becoming grayish brown (10YR, 5/2)	0.0				
	3	CLAY, light yellowish brown (2.5Y, 6/4), damp, medium stiffness, medium plasticity	0.0				
	4		0.0				
	5	LIMESTONE, moderate yellowish brown (10YR, 5/4), strong, fresh, black speckling present	0.0				1211

HTW DRILLING LOG

HOLE NO.
MW-02D
SHEET *2*
OF *8* SHEETS

PROJECT
Forbes Atlas 5-5

INSPECTOR
J. Bryant

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	<i>5</i>	<i>CLAY, with coarse sand and fine gravel, light brownish gray (2.57, 6/2), damp, soft, medium plasticity, sand and gravel is angular</i>	<i>0.0</i>				<i>1218</i>
	<i>6</i>	<i>LIMESTONE, with thin shale intrusions, yellowish gray (57, 7/2), strong, slightly weathered - becoming medium dark gray (N4) w/ small calcite crystals throughout</i>	<i>0.0</i>				<i>Hard drilling</i>
	<i>7</i>	<i>SHALE, with small limestone inclusions, dusky yellow (57, 6/4), weak, slightly weathered, oxidation present</i>	<i>0.0</i>				
	<i>8</i>		<i>0.0</i>				<i>1225 1228</i>
	<i>9</i>		<i>0.0</i>				
	<i>10</i>	<i>- less oxidation present</i>	<i>0.0</i>				<i>(JB) 1232 1235 - Driller begins using double wall sampler - Driller using Quick Gel</i>
	<i>11</i>		<i>0.0</i>				
	<i>12</i>	<i>- traces of gray mottling present</i>	<i>0.0</i>				
	<i>13</i>	<i>- becoming limy</i>	<i>0.0</i>				
	<i>14</i>	<i>- thin limestone layer, olive gray (57, 4/1), fossiliferous</i>	<i>0.0</i>				

HTW DRILLING LOG

HOLE NO.
MW-020
SHEET 3
OF 8 SHEETS

PROJECT
Forbes Atlas S-5

INSPECTOR
J. Bryant

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	14	SHALE, mottled medium dark gray (24) to light olive brown (54.5/6), moderately strong, slightly weathered, traces of oxidation present		0.0			change @ 14'
	15			0.0			1250 - lunch break 1422 - driller changes O-ring on double wall sampler Resume @ 1422
	16				0.0		Driller advances 6" overdrill casing
	17				0.0		
	18				0.0		
	19			0.0			
	20	LIMESTONE, with medium bluish gray (58.5/6) chert, yellowish gray to medium light gray (26), strong, slightly weathered		0.0			1459 1508 - driller reports - 300 gal fluid loss from 0-20'
	21			0.0			
	22			0.0			
	23			0.0			

HTW DRILLING LOG

HOLE NO.
MW-02D

PROJECT
Forbes Atlas S-5

INSPECTOR
J. Bryant

SHEET 4
OF 8 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	23	LIMESTONE, with medium bluish gray (50.5%) chert, yellowish gray to medium light gray (16%), strong, slightly weathered, traces of oxidation	0.0				
	24		0.0				
	25		0.0				
	26		0.0				
	27		0.0				
	28		0.0				
	29		0.0				
	30	SHALE, dark greenish gray (56.4%), moderately strong, fresh	0.0				1526 - Driller reports no additional fluid loss after 20' lgs.
	31		0.0				50 gal fluid loss 20-30' lgs
	32		0.0				

HTW DRILLING LOG

HOLE NO.
MW-020

PROJECT
Forbes Atlas S-5

INSPECTOR
J. Bryant

SHEET 5
OF 8 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	32	SHALE, dark greenish gray (5G, 4/1), moderately strong, fresh	0.0				
	33		0.0				
	34		0.0				
	35		0.0				
	36		0.0				
	37		0.0				
	38		0.0				
	39		0.0				
	40	SHALE, grayish red (5R, 4/2), moderately strong, fresh	0.0				1547 1558
	41						

HTW DRILLING LOG

HOLE NO.
MW-020

PROJECT Forbes Atlas S-5

INSPECTOR J. Bryant

SHEET 6
OF 8 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	41	SHALE, grayish red (SR, 4/2), moderately strong, fresh					
	42						
	43	SHALE, medium gray (NS), weak, fresh					
	44						
	45						
	46						
	47	SHALE, greenish gray (SGY, 4/1), moderately strong, fresh					
	48						
	49						
	50	LEMEISTONE, light gray (LT), strong, slightly weathered, few solution cavities, thin bands and small nodules of chert					1630

HTW DRILLING LOG

HOLE NO.
MW-02D

PROJECT

Forbes Atlas S-5

INSPECTOR

I. Bryant

SHEET 7
OF 8 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	50	LIMESTONE, light gray (NT), strong, slightly weathered, few solution cavities, thin bands and small nodules of chert					1643
	51						
	52						
	53						
	54						
	55	SHALE, medium gray (NS), strong, fresh					
	56						
	57						
	58						
	59						

HTW DRILLING LOG

HOLE NO.
MW-020

PROJECT
Forbes Atlas S-5

INSPECTOR
J. B. Grant

SHEET 8
OF 8 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	59	SHALLEY MUDSTONE, dark gray (NS), moderately strong, fresh					change @ 55' bgs
	60						1658
		TD = 60' bgs					Trant 1700: Stop @ 60' bgs. Trant sets went to 55' bgs - No additional fluid loss after 30' bgs. - Groundwater not observed during drilling.

HTW DRILLING LOG

HOLE NO.
MW-02D
SHEET 1
OF 1 SHEETS

PROJECT
Forbes Atlas 5-5

INSPECTOR
J. Bryant

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
							<p><u>Well Details</u></p> <p>Material: 2" dia, Sch 40 PVC Cap: Flat Screens: 0.010" Factory slotted Riser: Blank PVC Manufacturer: Johnson</p> <p><u>Lengths:</u></p> <p>Cap: 0.23 Screen: 5.00 Riser: 10.01 10.00 10.01 10.00 10.01 3.29 50.00 58.48' Total: 67.26 58.55 Cut off: 0.0 Stickup: 3.33</p> <p><u>Backfill:</u> Haliburton 3/8" Bentonite chips 60-58', 1-50# bag -Premier silica 20/40 silica sand 58-55', 1-50# bag</p> <p><u>Filter Pack:</u> Premier silica 20/40 silica sand 55-46' bgs 5-50# bags</p> <p><u>Seal:</u> PDS PE-Plug Bentonite pellets 46'-42' bgs 1.5-50 55gal buckets</p> <p><u>Grout:</u> Haliburton: EC Seal - 3 50# bags Quick-Grout - 0.3- 50# bags 42'-3' bgs</p>
		<p>Stickup: 3.3'</p> <p>Locking Cover</p> <p>j-Plug</p> <p>Protection Cover</p> <p>Cement well pad</p> <p>High Solids Bentonite Grout</p> <p>PVC Riser</p> <p>Bentonite Seal</p> <p>Sand Filter Pack</p> <p>Well Screen</p> <p>Bottom Cap</p> <p>Bentonite chips (Backfill)</p>					
		<p>Top of grout: 3' bgs</p> <p>Top of bentonite Seal: 42' bgs</p> <p>Top of Filter Pack: 46' bgs</p> <p>Top of screen: 50' bgs</p> <p>Well TD: 55' bgs</p> <p>Top of backfill: 58' bgs</p> <p>Borehole TD: 60' bgs</p>					
		<p>Not to scale.</p> <p>Install date: 5-17-15</p> <p>Grout date: 5-18-15</p>					

HTW DRILLING LOG

HOLE NO.
SB-01/MW-025

1. COMPANY NAME
Buros & McDonnell

2. DRILLING SUBCONTRACTOR
Trout Drilling

SHEET 1
OF 5 SHEETS

3. PROJECT
Forbes Atlas S-5

4. LOCATION
S-5, E. of Council Grove, KS

5. NAME OF DRILLER
Kate Stebbins

6. MANUFACTURER'S DESIGNATION OF DRILL
Versa Sonic V100

7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT
4" dia bit
4" dia single wall sampler
4" dia double wall sampler
4" dia bit
6" dia casing

8. HOLE LOCATION

9. SURFACE ELEVATION

10. DATE STARTED
5-19-15

11. DATE COMPLETED
5-27-15

12. OVERBURDEN THICKNESS
4.5'

15. DEPTH GROUNDWATER ENCOUNTERED
See Remarks

13. DEPTH DRILLED INTO ROCK
35.5'

16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED
13.35' bgs, 9 days after drilling

14. TOTAL DEPTH OF HOLE
40'

17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)
N/A

18. GEOTECHNICAL SAMPLES

DISTURBED
N/A

UNDISTURBED
N/A

19. TOTAL NUMBER OF CORE BOXES
N/A

20. SAMPLES FOR CHEMICAL ANALYSIS

VOC
7

METALS
N/A

OTHER (SPECIFY)
7 TOC

OTHER (SPECIFY)
N/A

OTHER (SPECIFY)
N/A

21. TOTAL CORE RECOVERY
100 %

22. DISPOSITION OF HOLE

BACKFILLED

MONITORING WELL

OTHER (SPECIFY)

23. SIGNATURE OF INSPECTOR
[Signature]

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	0	CLAY, trace silt, very dark grayish brown (10YR, 3/2), damp, soft, high plasticity, organics present	0.0		0840 SB-01/SB-01-0-1 Dup-3/SB		0825-5/19/15: Trout begins drilling SB-01 w/ Sonic - 4" dia single wall sampler & 4" dia bit
	1	CLAY, trace silt, trace medium sand, dark grayish brown (10YR, 4/2), damp, medium stiffness, high plasticity	0.0				
	2		0.0				
	3	- oxidation present	0.0				
	4		0.0		0850 SB-01/SB-01-3-4		
	5	SHALE, moderate yellowish brown (10YR, 5/4) to light olive brown (5Y, 5/6), moderately strong, slightly weathered, occasional calcite nodules	0.0				

HTW DRILLING LOG

HOLE NO.
SB-01/MW-025
SHEET 2
OF 5 SHEETS

PROJECT
Forbes Atlas S-5

INSPECTOR
I. Bryant

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	5	SHALE, moderate yellowish brown (10YR 5/4) to light olive brown (5Y 5/6), moderately strong, slightly weathered, occasional CALICHE nodules present	0.0				
	6		0.0				
	7	- CALICHE nodules present	0.0				
	8	becoming weak, weathered	0.0		0900 SB-01/SB-01-8-10-9		
	9	becoming moderately strong, slightly weathered	0.0				
	10		0.0				0832 0835
	11	- becoming weak, weathered	0.0				
	12	- becoming moderately strong, weathered	0.0		0925 SB-01/SB-01-11-12		
	13		0.0				
	14	CLAYEY SHALE, yellowish gray (5Y 7/6), weak, weathered, extremely friable	0.0				

HTW DRILLING LOG

HOLE NO.
SB-01/MW-025

PROJECT
Forbes Atlas S-5

INSPECTOR
J. Bryant

SHEET 3
OF 5 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	14	LIMEY SHALE, yellowish gray (57, 7/2), weak, weathered, friable	0.0		0935 SB-01/SB-01-14-15		
	15		0.0				
	16	SHALE, moderate olive brown (57, 4/4), weak, slightly weathered	0.0				
	17	- becoming moderate olive brown (57, 4/4) to medium gray (N5) and weathered	0.0		0945 SB-01/SB-01-17-18		
	18	SHALE, light olive gray (57, 6/6), strong, fresh	0.0				
	19	LIMESTONE, mottled grayish orange (10YR 7/4) to dark gray (N3), strong, fresh	0.0				
	20	LIMESTONE, with chert nodules, yellowish gray (57, 7/2) to medium light gray (N6), strong, slightly weathered	0.0				
	21		0.0				0845 - Driller 0850 - Driller installs 6" dia casing. & switches to 4" dia double wall sampler & begins using Quick-Cut & water
	22		0.0				- Driller estimates ~100 gal fluid loss. - Driller estimates an additional 1-200 gal fluid loss 0-20' during 8" casing placement
	23		0.0				

HTW DRILLING LOG

HOLE NO.
SB-01/MW-025

PROJECT
Forbes Atlas 5-5

INSPECTOR
J. Bryant

SHEET 4
OF 5 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	23	LIMESTONE, with clay, grayish orange (10YR, 7/4), wet, weak, weathered, friable, oxidation present			0955 SB-01/SB-01-23-24		Change @ 23' - Saturated sample, possible ground water
	24	LIMESTONE, with chert nodules, yellowish gray (5Y, 7/2) to medium light gray (N6), strong, slightly weathered					
	25	LIMESTONE, with clay, yellowish gray (5Y, 7/2), weak, weathered, friable					
	26	LIMESTONE, with chert nodules, yellowish gray (5Y, 7/2), strong, slightly weathered, some fossils					
	27						
	28	LIMESTONE, with clay, medium dark gray (N4), weak, weathered, friable					
	29	LIMESTONE, grayish orange (10YR, 7/4), strong, slightly weathered, oxidation present, bluish gray chert nodules present					
	30						
	31	SHALE, medium dark gray (N4), moderately strong, slightly weathered, some shell fragment impressions, slight oxidation present					- Driller installs 8" casing stabilize to 20' by 1000-Driller - stops 8" @ 18' bgs. - 6" @ 27' bgs 5/27/15 @ 1049: Driller resumes drilling w/ 6" dia casing to 30' bgs
	32						

HTW DRILLING LOG

HOLE NO.
SB-01/mw-025

PROJECT
Forbes Atlas S-5

INSPECTOR
J. B. Grant

SHEET 5
OF 5 SHEETS

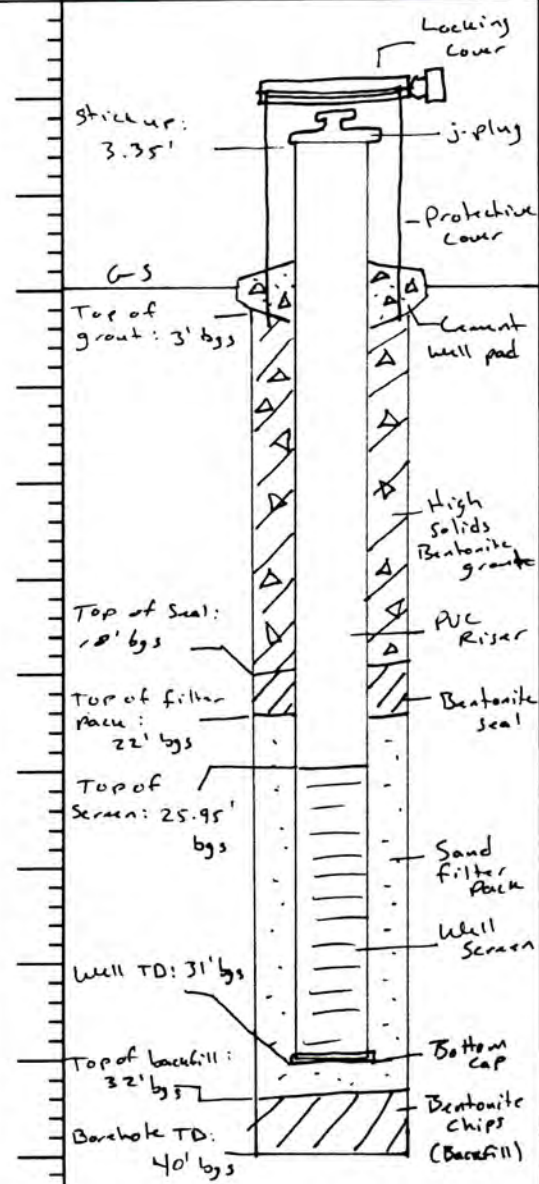
ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	32	SHALE, medium dark gray (N4), moderately strong, slightly weathered, some shell fragment impressions, slight oxidation present					
	33	LIMESTONE, medium gray (NS), strong, slightly weathered					
	34	SHALE, greenish gray (56, 41), moderately strong, fresh					
	35						
	36						
	37	SHALE, grayish red (10R, 4/2), moderately strong, fresh					
	38						
	39						- Driller estimates a total of ~300 gal fluid loss for the hole.
	40						
		TD = 40' bgs					5/27/15 @ 1107: Driller stops @ 40' bgs. Install well to 31' bgs. Details on diagram.

HTW DRILLING LOG

HOLE NO.
SB-01/MW-025
SHEET 1
OF 1 SHEETS

PROJECT
Forbes Atlas 5-5

INSPECTOR
J. B. Grant

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
							<p>MW-025 Monitoring well Details.</p> <p>BHTD: 40' 40' bgs MWTD: 31' bgs</p> <p>Material: 2" dia Sch 40 PVC Screen: 0.010" Factory slotted Cap: Flat Riser: 2" dia blank</p> <p>Lengths: Cap: 0.23 Screen: 5.05 Riser: 10.00 10.00 10.00 Total: 35.28' Cutoff: 0.93 Stick up: 3.35</p> <p>Backfill: - Halibarton 3/8" Hole Plug bentonite chips 32-40' bgs used 20-50# bags - Premier Silica 20/40 grade Silica Sand 31-32' bgs used 1-50# bag</p> <p>Filter Pack: - Premier Silica 20/40 Grade Silica Sand - 22-31' bgs used 5-50# bags</p> <p>Seal: PDS-Pel Plug Bentonite Pellets - 18-22' bgs - 1.25-5 gal blots</p> <p>Grout: Halibarton EZ Seal: 1.5-50# bags Quick Grout: 0.25 50# bags 18-31' bgs</p>
		<p>Stick up: 3.35'</p> <p>Locking Cover</p> <p>j-plug</p> <p>Protective Cover</p> <p>GS</p> <p>Top of grout: 3' bgs</p> <p>Cement well pad</p> <p>High Solids Bentonite grout</p> <p>PVC Riser</p> <p>Bentonite seal</p> <p>Top of Seal: 18' bgs</p> <p>Top of filter pack: 22' bgs</p> <p>Top of Screen: 25.95' bgs</p> <p>Sand filter pack</p> <p>Well Screen</p> <p>Well TD: 31' bgs</p> <p>Bottom cap</p> <p>Top of backfill: 32' bgs</p> <p>Bentonite chips (Backfill)</p> <p>Borehole TD: 40' bgs</p>					<p>Not to scale.</p> <p>Install date: 5-27-15</p> <p>Grout date: 5-27-15</p>

HTW DRILLING LOG

HOLE NO.
SB-09/MW-03D
SHEET 1
OF 8 SHEETS

1. COMPANY NAME <i>Burns & McDonnell</i>		2. DRILLING SUBCONTRACTOR <i>Trout Drilling</i>		
3. PROJECT <i>Forbes Atlas S-5</i>		4. LOCATION <i>S-5, E of Council Grove, KS</i>		
5. NAME OF DRILLER <i>Nate Stebbins</i>		6. MANUFACTURER'S DESIGNATION OF DRILL <i>Versa-Sonic V100</i>		
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	4" dia bit		8. HOLE LOCATION	
	4" dia single wall sampler			
	4" dia double wall sampler			
	6" dia bit			
	6" dia casing			
8" dia bit & casing		9. SURFACE ELEVATION		
12. OVERBURDEN THICKNESS <i>2.7</i>		15. DEPTH GROUNDWATER ENCOUNTERED <i>See Remarks</i>		
13. DEPTH DRILLED INTO ROCK <i>57.3</i>		16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED <i>39.99' btoe - 3 days</i>		
14. TOTAL DEPTH OF HOLE <i>60</i>		17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY) <i>42.91' btoe - post development</i>		
18. GEOTECHNICAL SAMPLES		19. TOTAL NUMBER OF CORE BOXES		
DISTURBED <i>N/A</i>		UNDISTURBED <i>N/A</i>		
20. SAMPLES FOR CHEMICAL ANALYSIS		21. TOTAL CORE RECOVERY		
VOC		METALS	OTHER (SPECIFY)	OTHER (SPECIFY)
<i>6</i>		<i>N/A</i>	<i>6-TOC</i>	<i>N/A</i>
22. DISPOSITION OF HOLE		23. SIGNATURE OF INSPECTOR		
BACKFILLED		MONITORING WELL	OTHER (SPECIFY)	<i>[Signature]</i>
		<i>X</i>		

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	0	CLAY, some coarse gravel, trace silt, dark grayish brown (10YR, 4/2), moist, soft, trace plasticity, organics present			<i>0915</i> <i>SB-09/SB-09-0-1</i>		<i>6-2-15 @ 0830:</i> <i>Trout begins drilling w/ 4" dia bit & 4" dia single wall sampler.</i>
	1	GRAVEL, with clay, some silt, pale brown (10YR, 6/3), moist, loose, coarse, poorly graded, angular, fragmented limestone and chert					
	2	CLAY, shaly, pale olive (5Y, 6/4), dry stiff, high plasticity CLAY, very dark gray (5Y, 8/1), damp, stiff, high plasticity			<i>0925</i> <i>SB-09/SB-09-2-3</i>		
	3	SHALE, dusky yellow (5Y, 6/4), weak, weathered, oxidation present, some gray mottling present					
	4						
	5						<i>0833</i>

HTW DRILLING LOG

HOLE NO.
SB-09/MW-030

PROJECT
Forbes Atlas S-5

INSPECTOR
J. Bryant

SHEET 2
OF 8 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	5	SHALE, dusky yellow (5Y, 6/4), weak, weathered, oxidation and some gray mottling present					0835
	6						
	7	- becoming moderately strong			0935 SB-09/SB-09-6-7		
	8						
	9						
	10						0839 0841
	11						0940: Driller advances 8" dia bit & casing to 10' to stop fluid escaping under mud tub. ~ 50 gal fluid loss
	12						
	13				0945 SB-09/SB-09-12-13 + MS/MSD		
	14						

HTW DRILLING LOG

HOLE NO.
SB-09/MW-030

PROJECT
Forbes Atlas S-5

INSPECTOR
J. Bryant

SHEET 3
OF 8 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	14	SAND, dusky yellow (54, 6/4) with gray mottling, moderately strong, weathered, oxidation present					
	15						0840 0842 (SB)
	16				1005 SB-09/SB-09-15-16		
	17				1015 SB-09/SB-09-17-18		
	18	LIMESTONE, with very light gray (N7) chert, yellowish gray (54, 7/2), strong, fresh					0845 0847
	19	LIMESTONE WITH LIGHT BLUISH GRAY (5B 7/1) CHERT, yellowish gray (54, 7/2) MODERATELY STRONG, SLIGHTLY WEATHERED. OXIDATION PRESENT			1015 (SB) SB-09/SB-09-18-19		
	20						0855: Traut advances 6" dia bit & casing to 18' bgs and switch to 4" dia double wall sampler - Using Helixman Aquia gel in drilling fluid.
	21						
	22	LIMESTONE YELLOWISH GRAY (54 7/2) MODERATELY STRONG, SLIGHTLY WEATHERED					
	23						

HTW DRILLING LOG

HOLE NO.
SB-09/mw-03D
SHEET 4
OF 8 SHEETS

PROJECT *Forkes Atlas S-5*

INSPECTOR *J. S. Tant*

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	23	LIMESTONE WITH LIGHT ^{AS} YELLOWISH GRAY (5y 7/2) MODERATELY STRONG, SLIGHTLY WEATHERED					
	24	LIMESTONE WITH LIGHT BLuish GRAY (5B/7/1) CHERT, YELLOWISH GRAY (5y 7/2) MODERATELY STRONG, SLIGHTLY WEATHERED.					
	25	LIMESTONE MEDIUM LIGHT GRAY (N6) STRONG, FRESH TRACES OF LIGHT BLuish GRAY (5B 7/1) CHERT					0922 0928
	26						
	27						
	28						
	29						
	30	SHALE GREENISH GRAY (5GY 6/1) HIGHLY WEATHERED WEAK					0938 0945
	31						
	32						

HTW DRILLING LOG

HOLE NO.
SB-09/mw-03D
SHEET 5
OF 8 SHEETS

PROJECT
Forbes Atlas S-5

INSPECTOR
J. B. Zett

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	32	SHALE GREENISH GRAY (SGY 6/1) HIGHLY WEATHERED WEAK					
	33						
	34	SHALE GREENISH GRAY (SGY 6/1) HIGHLY WEATHERED MODERATELY STRONG					
	35						
	36						
		SHALE GRAYISH RED (OR 4/2) MODERATELY STRONG, WEATHERED					
	37	SHALE GREENISH GRAY (SGY 6/1) WEAK, HIGHLY WEATHERED					
		SHALE GRAYISH RED, (OR, 4/2) moderately strong, weathered					
	38						
	39						
	40						1035 1039
	41						

HTW DRILLING LOG

HOLE NO.
53-09/mw-030

PROJECT
Forbes Atlas S-5

INSPECTOR
J. B. Grant

SHEET 6
OF 8 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	41	SHALE, grayish red (10R, 4/2), moderately strong, weathered					
	42						
	43						
	44						
	45						
	46						
	47						
	48						
	49	LIMESTONE, medium light gray (N6), strong, slightly weathered, thin bands and small nodules of gray to black chert					
	50						

1114

HTW DRILLING LOG

HOLE NO.
SB-09/mw-030

PROJECT
Forbes Atlas S-5

INSPECTOR
J. Bryant

SHEET 7
OF 8 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	50	LIMESTONE, medium light gray (N6), strong, slightly weathered, thin bands and small nodules of gray to black chert					1132
	51						
	52						
	53						
	54	SHALE, medium dark gray (N4), strong, fresh					
	55						
	56	LIMESTONE, medium light gray (N6), strong, slightly weathered SHALE, medium dark gray (N4), strong, fresh.					
	57						
	58						
	59						

HTW DRILLING LOG

HOLE NO.
SB-09 / MW-03D

PROJECT
Forbes Atlas S-5

INSPECTOR
J. Bryant

SHEET 8
OF 8 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	59	SHALE, medium dark gray (M4), strong, fresh					
	60	TD = 60' bgs					1152 TRAUT ADVANCES 6" SAMPLER TO 60' 1156 RECOVER SAMPLER
	61						1156: Traut stops @ 60' bgs.
	62						- Traut installs well to 54' bgs. Details on well diagram.
	63						- Total fluid lost: ~50 gal
	64						- Total flow (liquid) generated: ~1300 gal.
	65						
	66						
	67						
	68						

HTW DRILLING LOG

HOLE NO.
MW-03D

PROJECT
Forbes Atlas S-5

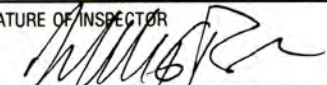
INSPECTOR
J. B. Zant

SHEET
OF SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
							<p>Monitoring well Details</p> <p>BH TD: 60' bgs MWTD: 54' bgs Material: 2" dia Sch 40 PVC Man: Johnson Cap: Flat Screen: 0.010" Factory slotted Riser: Blank PVC</p> <p><u>Lengths</u></p> <p>cap: 0.23 Screen: 5.00 Riser: 10.00 10.00 10.00 10.00 10.00 10.00</p> <p>Total: 65.23 Cutoff: 8.05 Stickup: 2.75</p> <p><u>Backfill:</u> Wyo- Ben 3/8" Bentonite chips 60-56' bgs used 1.25-50# bag</p> <p><u>Filter pack:</u> Premier Silicon 20/40 Grade Silicon Sand 56-45' bgs Used 5-50# bags</p> <p><u>Seal:</u> POS Pel plug bentonite pellets 45-41' bgs Used 1.5-5gal buckets</p>
		<p>Not to scale.</p> <p>Well install date: 6-2-15</p> <p>Grout date: 6-2-15</p>					<p><u>Grout:</u> Halliburton EZ seal: 3-50# bag Quick Grout: 0.3- 50# bag 41-3' bgs</p>

HTW DRILLING LOG

HOLE NO.
MW-035

1. COMPANY NAME <i>Traut Drilling</i>		2. DRILLING SUBCONTRACTOR <i>Traut Drilling</i>		SHEET 1 OF 4 SHEETS		
3. PROJECT <i>Forbes Atlas S-5</i>			4. LOCATION <i>S-5 E of Council Grove, KS</i>			
5. NAME OF DRILLER <i>Nete Stebbins</i>			6. MANUFACTURER'S DESIGNATION OF DRILL <i>Vibra Sonic V 100</i>			
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	4" dia bit		8. HOLE LOCATION			
	4" dia singlewall sampler					
	4" dia double wall sampler					
	6" dia bit					
	4" dia casing					
9. SURFACE ELEVATION			10. DATE STARTED <i>6-9-15</i>		11. DATE COMPLETED <i>6-9-15</i>	
12. OVERBURDEN THICKNESS <i>3.5'</i>			15. DEPTH GROUNDWATER ENCOUNTERED <i>See Remarks</i>			
13. DEPTH DRILLED INTO ROCK <i>26.5'</i>			16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED <i>17.47' btoe - 1 Day</i>			
14. TOTAL DEPTH OF HOLE <i>30'</i>			17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY) <i>17.85' gtoe - post development</i>			
18. GEOTECHNICAL SAMPLES		DISTURBED <i>N/A</i>	UNDISTURBED <i>N/A</i>	19. TOTAL NUMBER OF CORE BOXES <i>N/A</i>		
20. SAMPLES FOR CHEMICAL ANALYSIS		VOC <i>N/A</i>	METALS <i>N/A</i>	OTHER (SPECIFY) <i>N/A</i>	OTHER (SPECIFY) <i>N/A</i>	OTHER (SPECIFY) <i>N/A</i>
22. DISPOSITION OF HOLE		BACKFILLED	MONITORING WELL <i>X</i>	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR 	
21. TOTAL CORE RECOVERY <i>100 %</i>						

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	0	CLAY, with gravel, grayish brown (10% to 5%), soft, medium plasticity, organics (top soil)					0854 = 6-9-15: Bayin drilling w/ Sonic - 4" dia bit & 4" dia single wall sampler
	1	- less gravel (trace), occasional cobbles					
	2	- becoming medium stiffness and high plasticity					
	3						
	4	STONE, dusky yellow (5% to 6%), weak, weathered, oxidation and some gray mottling present					
	5						0856

HTW DRILLING LOG

HOLE NO.
mw-035

PROJECT
Forbes Atlas S-5

INSPECTOR
J. B. Grant

SHEET 2
OF 4 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	5	SAND, dusky yellow (57, 6/4), weak, weathered, oxidation and some gray mottling present					0857
	6						
	7						
	8						
	9						
	10	- becoming moderately strong, gray laminae present					0858 0857901
	11						
	12						
	13						
	14						

HTW DRILLING LOG

HOLE NO.
MW-035
SHEET 3
OF 4 SHEETS

PROJECT
Forbes Atlas S-S

INSPECTOR
J. Bryant

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	14	SHALE, dusky yellow (57, 6/4), moderately strong, weathered, oxidation and gray mottling and laminae present					
	15						0903 0904
	16						
	17						
	18	- limestone cobbles and gravel present - limestone is cherty, weathered, and in angular fragments					0910 Driller 0926 switches to 4" dia bit & 4" dia double well sampler. - Using quick gel bentonite in drilling fluid. - Install 6" casing to 18' bgs
	19	CONGLOMERATE, pale yellowish brown (10YR, 6/2), clay matrix, moderately well cemented, grains are fine gravel to cobble size. grains consist of limestone, chert, and shale					
	20						
	21	LIMESTONE, with medium bluish gray to dark gray chert, yellowish gray (5Y, 7/2), moderately strong, slightly weathered					
	22	- calcite vugs 22.1 - 22.5' bgs					
	23						

HTW DRILLING LOG

HOLE NO.
MW-035

PROJECT
Forbes Atlas S-5

INSPECTOR
J. E. Grant

SHEET 4
OF 4 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	23	LIMESTONE, with medium bluish gray to dark gray chert, yellowish gray (57, 7/16), moderately strong, slightly weathered					
	24						
	25	- crinoid fossils present, limestone becoming pale yellowish brown (104R, 6/12)					0942 0946
	26						
	27	SHALE, medium dark gray (24), moderately strong, fresh, abundant, crinoids, spicules, and shell fragments					
	28						
	29						
	30						0956
	31	TD = 30' bgs					0956: Driller stops @ 30' bgs. - Driller installs well to 27' bgs - Details on well diagram - No fluid loss. - Generated 2700 gal IDW (liquid)
	32						

HTW DRILLING LOG

HOLE NO.
MW-035

PROJECT
Forbes Atlas S-5

INSPECTOR
J. Bryant

SHEET 1
OF 1 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
							<p>Well installation details</p> <p>Material: 2" dia Sch 40 PVC Cap: Point Screen: 0.010" Factory slotted Riser: Blank PVC Manufacturer: Johnson BHTD: 30' bgs MWTD: 27' bgs</p> <p>Lengths</p> <p>cap: 0.24 Screen: 5.00 Riser: 10.00 10.00 7.09 Total: 32.33 Culoff: 1.95 stickup: 2.68</p> <p>Backfill/Filter pack</p> <p>Premier Silica - 20/40 Grade Silica Sand 30-18' bgs 5-50# bags</p> <p>Seal: PDS Pel-Plug Bentonite pellets 18-14' bgs 1.5-5 gal buckets</p> <p>Grout: Haliburton EZ seal: 2-50# bags Quick Grout: 0.2-50# bags 14-3' bgs</p>
		<p>Locking Cover</p> <p>J-Plug</p> <p>Steel Protective Cover</p> <p>Cement well pad</p> <p>PVC Riser</p> <p>High Solids Bentonite grout</p> <p>Bentonite Seal</p> <p>Sand filter pack</p> <p>Well Screen</p> <p>Bottom Cap</p> <p>Top of Grout: 3' bgs</p> <p>Top of Seal: 14' bgs</p> <p>Top of filter pack: 18' bgs</p> <p>Top of screen: 22' bgs</p> <p>MW TD: 27' bgs</p> <p>BHTD: 30' bgs</p>					<p>Not to scale.</p> <p>Install date: 6-9-15</p> <p>Grout date: 6-9-15</p>

HTW DRILLING LOG

HOLE NO.
MW-040

SHEET 1
OF 9 SHEETS

1. COMPANY NAME
Burns & McDonnell

2. DRILLING SUBCONTRACTOR
Trout Drilling

3. PROJECT
Forbes Atlas S-5

4. LOCATION
S-5, E of Council Grove

5. NAME OF DRILLER
Nate Stebbins

6. MANUFACTURER'S DESIGNATION OF DRILL
Versa Sonic V100

7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT

4" dia bit
4" dia single wall sampler
4" dia double wall sampler
6" dia bit
6" dia casing

8. HOLE LOCATION

9. SURFACE ELEVATION

10. DATE STARTED
5-31-15

11. DATE COMPLETED
5-31-15

12. OVERBURDEN THICKNESS
6'

15. DEPTH GROUNDWATER ENCOUNTERED
See Remarks

13. DEPTH DRILLED INTO ROCK
64'

16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED
24.20 ~~64.97~~' b.t.c. - 2 days

14. TOTAL DEPTH OF HOLE
70'

17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)
51.05 - post development

18. GEOTECHNICAL SAMPLES

DISTURBED
N/A

UNDISTURBED
N/A

19. TOTAL NUMBER OF CORE BOXES
N/A

20. SAMPLES FOR CHEMICAL ANALYSIS

VOC
N/A

METALS
N/A

OTHER (SPECIFY)
N/A

OTHER (SPECIFY)
N/A

OTHER (SPECIFY)
N/A

21. TOTAL CORE RECOVERY
93% ~~100%~~

22. DISPOSITION OF HOLE

BACKFILLED

MONITORING WELL
X

OTHER (SPECIFY)

23. SIGNATURE OF INSPECTOR
[Signature]

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	0	CLAY, very dark brown (10YR, 2/2), soft, high plasticity, organics present in top 0.3', moist	0.0				5-31-15 @ 0951: Trout begins drilling w/ 4" bit w/ 4" dia single wall sampler.
	1	- becoming dark grayish brown (10YR, 4/2)	0.0				
	2		0.0				
	3	CLAY, reddish brown (5YR, 4/4), damp, stiff, high plasticity	0.0				
	4		0.0				
	5	CLAY, with silt and limestone fragments, light gray (10YR, 7/2), damp, soft, medium plasticity	0.0				0954

HTW DRILLING LOG

HOLE NO.
MW-04D

PROJECT
Forbes Atlas S-5

INSPECTOR
J. J. Zant

SHEET 2
OF 9 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	5	CLAY, with silt and limestone fragments, light gray (10YR, 7/2), damp, soft, medium plasticity	0.0				0855
	6	SHALE, limy, moderate yellow (5Y, 7/6), weak, weathered, friable	0.0				
	7		0.0				
	8		0.0				
	9	SHALE, dusky yellow (5Y, 6/4), weak, moderately weathered	0.0				0856 0857
	10		0.0				Driller advances 6" bit & casing to 10ft
	11		0.0				
	12	- oxidation present	0.0				
	13	LIMESTONE, dusky yellow (5Y, 6/4), strong, moderately weathered	0.0				
	14		0.0				

HTW DRILLING LOG

HOLE NO.
MW-040
SHEET 3
OF 9 SHEETS

PROJECT
Forbes Atlas 5-5

INSPECTOR
J. Bryant

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	14	SHALE, yellowish gray (5-7%), weak, slightly weathered	0.0				Change @ 14' logs
	15	- becoming dusky yellow green (5-7.5%) and strong	0.0				1022 1028
	16		0.0				
	17	SHALE, medium dark gray (4-4), strong, fresh	0.0				
	18		0.0				
	19		0.0				
	20		0.0				1047 Driller reports 1052 reports ~ 100 gal fluid loss 0-20' - using Haliburton Quinceal in drilling fluid.
	21		0.0				
	22		0.0				
	23		0.0				

HTW DRILLING LOG

HOLE NO.
MW-04D
SHEET 4
OF 9 SHEETS

PROJECT
Forbes Atlas 5-5

INSPECTOR
J. Bryant

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	23	SHALE, medium dark gray (N4), strong, fresh	0.0				
	24		0.0				
	25		0.0				1107 1116
	26	LIMESTONE, medium dark gray (N4), strong, slightly weathered, occasional light olive gray (5Y, 6/1) chert nodules	0.0				
	27	LIMESTONE, pale yellowish brown (10YR, 6/2), strong, slightly weathered	0.0				
	28	CHERT, medium bluish gray (5B, 5/1), strong, slightly weathered	0.0				
	29	LIMESTONE, moderate yellowish brown (10YR, 5/4), strong, slightly weathered, oxidation present, abundant small fossils becoming pale yellowish brown (10YR, 6/2) bluish gray chert present, w. 1' bioturbation, possible burrows present	0.0				- Driller reports 28-30' were soft
	30	LIMESTONE, pale yellowish brown (10YR, 6/2), moderately strong, slightly weathered	0.0				1129 1144
	31	LIMESTONE, with chert medium light gray (N6), strong, slightly weathered, chert is medium dark gray (N4)					
	32						

HTW DRILLING LOG

HOLE NO.
MW-04D

PROJECT
Forbes Atlas S-5

INSPECTOR
J. Bryant

SHEET 5
OF 9 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	32	LIMESTONE, with chert, medium light gray (N6), strong, slightly weathered, chert is medium dark gray (N4)					
	33						
	34	LIMESTONE, pale yellowish brown (10YR, 6/2), strong, fresh, fossiliferous					
	35	SHALE, medium gray (N5), moderately strong, fresh, abundant fossils: crinoid plates, spiracles, brachiopods					
	36						
	37	LIMESTONE, medium gray (N5), moderately strong, fresh, abundant small fossil fragments					
	38	SHALE, dark greenish gray (5G, 4/1), weak, fresh					
	39						
	40	SHALE, grayish green (5G, 5/2), strong, fresh, bluish					1205 1320 1333: Bit plugged Driller stops to clean bit. 1350: Resume @ 41'
	41						

HTW DRILLING LOG

HOLE NO.

MW-04D

PROJECT

Forbes Atlas S-5

INSPECTOR

J. Brand

SHEET 6
OF 9 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	41	SHALE, grayish green (56, 5/2), strong, fresh					
	42						
	43						
	44	SHALE, grayish red (10R, 4h), moderately strong, fresh					
	45						
	46						
	47						
	48						
	49						
	50						

JB
1333 1416

PROJECT

Forbes Atlas S-5

HOLE NO.

MW-04D

HTW DRILLING LOG

HOLE NO.
MW-04D

PROJECT
Forbes Atlas S-5

INSPECTOR
J. B. Grant

SHEET 7
OF 9 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	50	SHALE, grayish red (10R, 4/2), moderately strong, fresh					1425
	51	SHALE, mottled grayish red (10R, 4/2) to grayish green (5G, 5/2), moderately strong, slightly weathered					
	52	SHALE, grayish red (10R, 4/2), weak, weathered					
	53	SHALE, mottled grayish red (10R, 4/2) to grayish green (5G, 5/2), moderately strong, slightly weathered					
	54	- coarse gravel to cobble sized mudrock and limestone clasts present					
	55	No recovery 55-60'					
	56						
	57						
	58						
	59						

HTW DRILLING LOG

HOLE NO.
MW-04D

PROJECT
Forbes Atlas S-5

INSPECTOR
J. Bryant

SHEET 8
OF 9 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	59	No recovery 55-60' bgs					
	60	LIMESTONE, medium dark gray (N4), strong, slightly weathered, thin bands and small nodules of chert.					1440 1526 - Recovery is 5/10'. Driller reports likely cause is O-ring failure @ bit to stem joint, causing core samples to be washed away - Driller replaces O-ring
	61						
	62						
	63						
	64	SHALE, medium gray (N5), strong, fresh					
	65						
	66						
	67						
	68						

HTW DRILLING LOG

HOLE NO.
MW-04D
SHEET 9
OF 9 SHEETS

PROJECT Forbes Atlas S-5

INSPECTOR J. Bryant

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	68	LIMESTONE, medium gray (NS), strong, fresh, abundant small fossil fragments					Change @ 68' bgs
	69	SHALE, medium dark gray (N4), strong, fresh					
	70	TD = 70' bgs					1540 1540: Traut stops @ 70' bgs - Traut installs monitoring well to 64' bgs. Details on well diagram. - FOW (fluid) generated: ~1100 gal - Estal fluid lost: ~200 gal.

HTW DRILLING LOG

HOLE NO.
MW-040

SHEET 1
OF 1 SHEETS

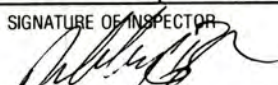
PROJECT
Forbes Atlas S-S

INSPECTOR
J. Bryant

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
							<p>Well Installation Details</p> <p>BH TD: 70' bgs Well TD: 64' bgs</p> <p>Material</p> <p>- 2" dia Sch 40 PVC</p> <p>- Cap: Point</p> <p>- Screen: 0.010" Factory slotted</p> <p>- Riser: Blank</p> <p>Man: Johnson Lengths</p> <p>cap: 0.37</p> <p>Screen: 5.00</p> <p>Riser: 10.00</p> <p>10.00</p> <p>10.00</p> <p>10.00</p> <p>10.00</p> <p>6.03</p> <p>Total: 71.40</p> <p>Cutoff: 3.29 to 6.66</p> <p>Stickup: 2.71</p> <p>Backfill: PDS</p> <p>Per-Plug Bentonite Pellets</p> <p>70-65' bgs</p> <p>0.5 - 5 gal bucket</p> <p>Filter Pack:</p> <p>Premix Silica, 20/40 Silica Sand</p> <p>65-55' bgs</p> <p>6 - 50# Bags</p> <p>Seal: PDS</p> <p>Per-Plug Bentonite Pellets</p> <p>55-51' bgs</p> <p>1.5 - 5 gal bucket</p> <p>Grout: Haliburton</p> <p>EZ Seal: 3-50# bags</p> <p>Quick Grout: 0.5-50# - 6 bags</p> <p>51-3' bgs</p>
		<p>Not to scale</p> <p>Install Date: 5-31-15</p> <p>Grout Date: 6-1-15</p>					

HTW DRILLING LOG

HOLE NO.
SB-10/MW-045

1. COMPANY NAME <i>Burns & McDonnell</i>		2. DRILLING SUBCONTRACTOR <i>Trout Drilling</i>		SHEET 1 OF 5 SHEETS		
3. PROJECT <i>Forbes Atlas S-5</i>			4. LOCATION <i>S-5, E of Council Grove, KS</i>			
5. NAME OF DRILLER <i>Nate Stebbins</i>			6. MANUFACTURER'S DESIGNATION OF DRILL <i>Versa Serie V100</i>			
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT		4" dia bit		8. HOLE LOCATION		
		4" dia single wall sampler				
		4" dia double wall sampler				
		6" dia bit				
		6" dia casing				
9. SURFACE ELEVATION		10. DATE STARTED <i>6-1-15</i>		11. DATE COMPLETED <i>6-1-15</i>		
12. OVERBURDEN THICKNESS <i>5'</i>			15. DEPTH GROUNDWATER ENCOUNTERED <i>See remarks</i>			
13. DEPTH DRILLED INTO ROCK <i>35'</i>			16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED <i>22.55 37.17 bloc - 1 Day</i>			
14. TOTAL DEPTH OF HOLE <i>40'</i>			17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY) <i>24.52' bloc - Post development</i>			
18. GEOTECHNICAL SAMPLES		DISTURBED <i>N/A</i>	UNDISTURBED <i>N/A</i>	19. TOTAL NUMBER OF CORE BOXES <i>N/A</i>		
20. SAMPLES FOR CHEMICAL ANALYSIS		VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)
		<i>6</i>	<i>N/A</i>	<i>C-TOC</i>	<i>N/A</i>	<i>N/A</i>
22. DISPOSITION OF HOLE		BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR 	
			<i>X</i>			

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	0	CLAY, very dark gray (10YR, 7/1), damp, stiff, high plasticity, organics present 0-1' bgs	0.0		<i>1120</i> <i>SB-10/SB-10-01</i> <i>Dep-5/SB</i>		<i>6-1-15 @ 1056:</i> <i>Trout begins drilling w/ 4" dia bit and single wall sampler.</i>
	1	- becoming dark brown (10YR, 7/5)	0.0				
	2		0.0				
	3	CLAY, trace silt, dark reddish brown (10YR, 7/4), damp, stiff, medium plasticity	0.0		<i>1135</i> <i>SB-10/SB-10-3-4</i>		
	4	GRAVEL, with cobbles and fine to coarse sand; light gray (10YR, 7/6), dry, loose, mostly limestone and chert fragments, angular	0.0				
	5		0.0				

HTW DRILLING LOG

HOLE NO.
SB-10/MW-045

PROJECT
Forbes Atlas S-5

INSPECTOR
J. Bryant

SHEET 2
OF 5 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	5	SHALE, limy, moderate yellow (5Y, 7/6), weak, weathered	0.0				change @ 5' bgs
	6	LIMESTONE, dusky yellow (5Y, 6/4), strong, weathered, fragmented, some chert nodules present	0.0				
	7	SHALE, moderate yellow (5Y, 7/6), weak, weathered, wet	0.0				
	8		0.0				
	9	- becoming damp, moderately strong	0.0		1145 SB-10/SB-10-8-9 SB-10/SB-10-8-9-M3 SB-10/SB-10-8-9-M3D Dup-6/SB		(Saturated, bulk prep)
	10	LIMESTONE, very light gray (10B), with light bluish gray chert nodules, strong, weathered, large angular fragments	0.0				1104 1106
	11	LIMESTONE and interbedded SHALE, yellowish gray (5Y, 7/6), strong, weathered, shale is moderately yellow (5Y, 7/6), weak, weathered	0.0				
	12	SHALE, moderate yellowish brown (10YR, 5/4), weak, moderately weathered, oxidation and gray mottling present	0.0				
	13	SAND, trace fine gravel, moderate yellowish brown (10YR, 7/4), wet, loose, medium to coarse, poorly graded, angular, grains are primarily shale, limestone, and chert, <10% quartz, fining upward	0.0				
	14		0.0				

HTW DRILLING LOG

HOLE NO.
SB-10/MW-045

PROJECT
Forbes Atlas S-5

INSPECTOR
J. Bigant

SHEET 3
OF 5 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	14	SAND, some fine to sparse gravel, moderate yellowish brown (10YR, 5/4), wet, loose, medium to coarse, poorly graded, angular, grains are primarily shale, limestone, and chert, <10% quartz, fining upward	0.0				
	15		0.0				1124 1127
	16	- Gravel with coarse sand	0.0				
	17	SHALE, light olive gray (5Y, 5/2), moderately strong, slightly weathered	0.0				
	18		0.0				
	19		0.0				
	20	SHALE, medium dark gray (N4), weak, weathered	0.0				1150 1151: 323 Driller begins advancing 6" bit & casing to 20' bgs and using 4" dia bit and double wall sampler - Also using Haliburton quick- set in drilling fluid. ~ 50 gal fluid loss 0-20' bgs
	21		0.0		1405 SB-10/5B-10-21-22		
	22	SHALE, medium dark gray (N4), moderately strong, slightly weathered	0.0				
	23		0.0				

HTW DRILLING LOG

HOLE NO.
SB-10/mw-045

PROJECT
Forbes Atlas S-5

INSPECTOR
J. Bryant

SHEET 4
OF 5 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	23	SAND, medium dark gray (N4), moderately strong, slightly weathered	0.0				
	24		0.0				
	25		0.0				1338 1343
	26	SAND, shaly, some fine gravel. light gray (107R, 7/2) to yellow (107R, 7/6), wet, loose medium density, coarse, poorly graded, angular, grains are primarily limestone, shale, and chert, <10% quartz	0.0				
	27	LIMESTONE, with bluish gray chert, pale yellowish brown (107R, 4/2), strong, slightly weathered, oxidation present, fossiliferous - crinoids, spicules, small shell fragments	0.0				
	28		0.0				
	29	- possible bioturbation or vugs 29-30' bgs	0.0				
	30	- limestone color change to light gray (N7)	0.0				1354 1400
	31	- occasional dark gray (N3) chert nodules in addition to the bluish gray chert	0.0				
	32		0.0				

HTW DRILLING LOG

HOLE NO.
SB-10/mw-045

PROJECT
Forbes Atlas 5-5

INSPECTOR
J. B. Trout

SHEET 5
OF 5 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	32	Limestone, with bluish gray and dark gray chert nodules, light gray (N7), strong, slightly weathered, oxidation present, fossiliferous, crinoids, spicules, small shell fragments,	0.0				
	33		0.0				
	34	SHALE, medium gray (N5), moderately strong, fresh, abundant crinoids, spicules, brachiopods, shell fragments	0.0				
	35		0.0				
	36	Limestone, medium dark gray (N4), strong, fresh, abundant crinoids, spicules, brachiopod shell fragments	0.0				
	37		0.0				
	38		0.0				
	39	SHALE, medium gray (N5), weak, slightly weathered	0.0				
	40		0.0				1418
		TD = 40' bgs					Total fluid loss: ~50 gal Top 20. Total liquid flow: ~1500 gal 1418' Trout stops @ 40' bgs. - Trout will set well to 34' bgs

HTW DRILLING LOG

HOLE NO.
MW-045
SHEET 1
OF 1 SHEETS

PROJECT Forbes Atlas S-5

INSPECTOR J. Bryant

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
							<p>Well Installation Details</p> <p>Material: 2" dia Sch 40 PUC Cap: Flat Screen: 0.010" Factory slotted Riser: PUC Blank Manufacturer: Johnson BHTD: 40' bgs MWTD: 34' bgs</p> <p>Lengths (ft)</p> <p>Cap: 0.35 Screen: 5.00 Riser: 10.00 10.01 10.01 10.00 Total: 45.37' Cutoff: 8.62 Stickup: 2.75</p> <p>Backfill: PDS Pel-Plug Bentonite Pellets 40-36', 1.5-5 gal buckets</p> <p>Filter Pack: Premier Silica, 20/40 Silica sand 36-25', 5-50# bags</p> <p>Seal: PDS EZ Seal Pel-Plug Bentonite Pellets, 25-21' bgs 1.5-5 gal buckets</p> <p>Grout: Halibuton EZ Seal: 2-50# bags Quick Grout: 0.2-50# bags 21-3' bgs</p>
		<p>Not to scale.</p> <p>Install date: 6-1-15</p> <p>Grout date: 6-1-15</p>					

HTW DRILLING LOG

HOLE NO.
NW-050
SHEET 1
OF 9 SHEETS

1. COMPANY NAME
Furber & McDonnell

2. DRILLING SUBCONTRACTOR
Trout Drilling

3. PROJECT
Furber Atlas 5-5

4. LOCATION
5-5 E of Council Grove, KS

5. NAME OF DRILLER
Nate Stebbins

6. MANUFACTURER'S DESIGNATION OF DRILL
Verza Sonic V100

7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT

4" dia bit
4" dia single wall sampler
4" dia double wall sampler
6" dia bit
6" dia casing

8. HOLE LOCATION

9. SURFACE ELEVATION

10. DATE STARTED
5-30-15

11. DATE COMPLETED
5-30-15

12. OVERBURDEN THICKNESS
6'

15. DEPTH GROUNDWATER ENCOUNTERED
See remarks

13. DEPTH DRILLED INTO ROCK
64'

16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED
27.38' btoe - 3 days

14. TOTAL DEPTH OF HOLE
70'

17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)
55.22 - Post development

18. GEOTECHNICAL SAMPLES

DISTURBED
N/A

UNDISTURBED
N/A

19. TOTAL NUMBER OF CORE BOXES
N/A

20. SAMPLES FOR CHEMICAL ANALYSIS

VOC
N/A

METALS
N/A

OTHER (SPECIFY)
N/A

OTHER (SPECIFY)
N/A

OTHER (SPECIFY)
N/A

21. TOTAL CORE RECOVERY
100 %

22. DISPOSITION OF HOLE

BACKFILLED

MONITORING WELL
X

OTHER (SPECIFY)

23. SIGNATURE OF INSPECTOR
[Signature]

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	0	CLAY, very dark brown (10YR, 2/6), damp, soft, high plasticity, 10% organic in top 0.2' - becoming stiffer.	0.0				0840: Driller starts drilling w/ 4" dia bit & 4" dia single wall sampler.
	1		0.0				
	2	CLAY, reddish brown (10.5YR, 4/6), damp, stiff, high plasticity, trace fine sand	0.0				
	3	Large chunky limestone fragments present 2.7-4.5' b	0.0				0846 0847
	4		0.0				
	5		0.0				

HTW DRILLING LOG

HOLE NO.
MW-050

PROJECT
Forbes Atlas S-5

INSPECTOR
J. Bryant

SHEET 2
OF 9 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	5	CLAY, reddish brown (5YR, 4/4), damp, stiff, high plasticity, trace fine sand	0.0				
	6	SHALE, limy, dark yellowish orange (10YR, 6/6), weak, weathered, friable	0.0				
	7		0.0				
	8	MUDSTONE, dark yellowish orange (10YR, 6/6), strong, weathered, black speckling	0.0				
	9	SHALE, limy, yellowish gray (5Y, 7/2), weak, weathered, friable	0.0				
	10	LIMESTONE, medium gray (N5), strong, weathered, oxidation present	0.0				0854 0859
	11	SHALE, dusky yellow (5Y, 6/4), weak, slightly weathered, some oxidation present	0.0				Hard, slow drilling
	12		0.0				
	13		0.0				
	14		0.0				

HTW DRILLING LOG

HOLE NO.
MW-05D
SHEET *4*
OF *9* SHEETS

PROJECT
Forbes Atlas S-5

INSPECTOR
J. Bryant

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	23	SHALE, medium dark gray (d4), moderately strong, fresh	0.0				
	24		0.0				
	25	SHALE, limy, medium dark gray (d4), strong, fresh, abundantly fossiliferous	0.0				
	26	Limestone MUDSTONE, pale yellowish brown (10YR, 6/2), strong, slightly weathered	0.0				
	26	CHERT, medium gray (d5), slightly weathered					
	27	LIMESTONE, pale yellowish brown (10YR, 6/2), strong, slightly weathered, oxidation and solution cavities present	0.0				
		becoming grayish orange (10YR, 7/4)					
		possible bicurbation or burrows 27.5 - 28.1' by s vugs	0.0				
	28						
	29		0.0				
	30	LIMESTONE, with bluish gray chert, pale yellowish brown (10YR, 6/2), strong, slightly weathered	0.0				<i>1045</i> <i>1049</i>
	31	CHERT, medium bluish gray (5B, 5/1) with medium gray (d5) limestone, strong, fresh	0.0				
	32	LIMESTONE, with chert, pale yellowish brown (10YR, 6/2), strong, slightly weathered, some small fossils	0.0				

HTW DRILLING LOG

HOLE NO.
MW-05D

PROJECT
Forbes Atlas 5-5

INSPECTOR
J. Bryant

SHEET 5
OF 9 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	32	LIMESTONE, with chert, pale yellowish brown (10YR, 6/6), strong, slightly weathered, some small fossils	0.0				
	33		0.0				
	34		0.0				
	35	SHALE, dark gray (N3), weak, fresh	0.0				
	36	LIMESTONE, medium dark gray (N4), strong, fresh, abundant fossils, with multiple crinoids & spicules	0.0				
	37	SHALE, grayish grayish green (5G, 5/2), moderately strong, fresh, with thin interbedded mudstone,	0.0				
	38	grayish green (5G, 5/2), moderately strong, fresh	0.0				
	39		0.0				
	40		0.0				
	41						1112 1258 - Quiller reports broken inner barrel allowing water inside sample barrel. Crew replacing barrel

HTW DRILLING LOG

HOLE NO.
MW-050

PROJECT
Forbes Atlas S-5

INSPECTOR
J. Bryant

SHEET 6
OF 9 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	41	SHALE, grayish green (56, 52), moderately strong, fresh, with thin interbedded mudstone, grayish green (56, 52), moderately strong, fresh					
	42						
	43	SHALE, grayish red (10R, 4L), moderately strong weak, fresh, with thin interbedded mudstone, grayish red (10R, 4L), moderately strong, fresh					
	44						
	45						
	46						
	47						
	48	SHALE, dark grayish gray (56Y, 4L), moderately strong, slightly weathered					
	49						
	50						1532

HTW DRILLING LOG

HOLE NO.
MW-05D
SHEET 7
OF 9 SHEETS

PROJECT Forbes Atlas S-5

INSPECTOR J. Bryant

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	50	SHALE, dark greenish gray (56-7, 41), moderately strong, slightly weathered					1348
	51						
	52						
	53						
	54	MUDSTONE, pale green (56, 6/2), strong, slightly weathered					
	55	LIMESTONE, medium light gray (N6), strong, slightly weathered, occasional fragmented fossils, occasional thin, dark bands and nodules of chert					
	56						
	57	becoming medium dark gray (N4)					
	58						
	59						

HTW DRILLING LOG

HOLE NO.
MW-05D

PROJECT
Forbes Atlas 5-5

INSPECTOR
J. Bryant

SHEET 8
OF 9 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	59	LIMESTONE, medium dark gray (N4), strong, slightly weathered, occasional fragmented fossils, occasional thin dark, thin bands and nodules					
	60						1407 1420
	61						
	62	SHALE, medium dark gray (N4), strong, fresh, calcareous					
	63						
	64						
	65	LIMESTONE, medium light gray (N6), strong, slightly weathered, fossiliferous					
	66						
	67						
	68	SHALE, dark gray (N3), moderately strong, slightly weathered					

HTW DRILLING LOG

HOLE NO.
MW-05D

PROJECT
Forbes Atlas S-5

INSPECTOR
J.B. Grant

SHEET 9
OF 9 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	68	SHALE, dark gray (N3), moderately strong, slightly weathered					
	69						
	70	TD = 70' bgs					1450: Driller stops @ 70' bgs. - no groundwater observed - Total fluid loss: ~150 gal - Fluid IDW generated: ~1400 gal

HTW DRILLING LOG

HOLE NO.
MW-05D

PROJECT
Forbes Atlas 5-5

INSPECTOR
J. Bryant

SHEET 1
OF 1 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
							<p>Monitoring Well Installation Details</p> <p>BH TD = 70' bgs MW TD = 61' bgs</p> <p>Material: 2" dia Sch 40 PVC</p> <p>- Man: Johnson - Cap: Point - Screen: 0.010" Factory Slotted - Riser: Blank</p> <p><u>Lengths</u></p> <p>Cap: 0.23' Screen: 5.00 Riser: 10.00 10.00 10.00 10.00 10.00</p> <p>Total: 65.23' Cutoff: 0.89' Stickup: 2.67'</p> <p><u>Backfill: Haliburton</u> 3/8" bentonite chips 70-63' bgs 2.35 - 50# bags</p> <p><u>Filter Pack:</u> Premier Silica, 20/40 grade silica sand 63-52' bgs 5.5 - 50# bags</p> <p><u>Seal: PDS</u> Pel-Plug bentonite Pellets 52-48' bgs 1.5 - 5 gal pails</p> <p><u>Grout: Haliburton</u> EZ seal: 3 equiv Grout: 0.5 48-3' bgs</p>
		<p>Locking cover</p> <p>J-Plug</p> <p>Steel Protective Lower</p> <p>Cement well pad</p> <p>High Solids Bentonite grout</p> <p>PVC Riser</p> <p>Bentonite Seal</p> <p>Slotted well screen</p> <p>Sand filter pack</p> <p>Bottom Cap</p> <p>Backfill (bentonite)</p> <p>BH TD</p>					
		<p>GS</p> <p>Top of grout: 3' bgs</p> <p>Top of seal:</p> <p>Top of filter pack:</p> <p>Top of well screen: 56' bgs</p> <p>Well TD: 61' bgs</p> <p>Top of backfill: 63' bgs</p> <p>BH TD: 70' bgs</p>					
		<p>Not to scale.</p> <p>Install date: 5-30-15</p> <p>Grout date: 5-31-15</p>					

HTW DRILLING LOG

HOLE NO.
MW-06 D

1. COMPANY NAME <i>Burns & McDonnell</i>		2. DRILLING SUBCONTRACTOR <i>Trout Drilling</i>		SHEET 1 OF 6 SHEETS	
3. PROJECT <i>Forbes Atlas S-S</i>			4. LOCATION <i>S-S E of Council Grove - S of Sump Discharge</i>		
5. NAME OF DRILLER <i>Nate Stebbins</i>			6. MANUFACTURER'S DESIGNATION OF DRILL <i>Ursa Sonic U100</i>		
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT		4" dia bit		8. HOLE LOCATION	
		4" dia sampler (10')		9. SURFACE ELEVATION	
		4" dia double wall sampler			
		6" dia overdrill casing			
10. DATE STARTED <i>5-16-15</i>		11. DATE COMPLETED <i>5-16-15</i>			
12. OVERBURDEN THICKNESS <i>1.5'</i>		15. DEPTH GROUNDWATER ENCOUNTERED <i>See Remarks</i>			
13. DEPTH DRILLED INTO ROCK <i>48.5'</i>		16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED <i>13.52' btoe - 3 days</i>			
14. TOTAL DEPTH OF HOLE <i>50'</i>		17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY) <i>42.30' btoe - Post development</i>			
18. GEOTECHNICAL SAMPLES		DISTURBED <i>N/A</i>	UNDISTURBED <i>N/A</i>	19. TOTAL NUMBER OF CORE BOXES <i>N/A</i>	
20. SAMPLES FOR CHEMICAL ANALYSIS		VOC <i>N/A</i>	METALS <i>N/A</i>	OTHER (SPECIFY) <i>N/A</i>	OTHER (SPECIFY) <i>N/A</i>
					21. TOTAL CORE RECOVERY <i>100 %</i>
22. DISPOSITION OF HOLE		BACKFILLED	MONITORING WELL <i>X</i>	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR <i>[Signature]</i>

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	0	CLAY, trace to some silt, trace fine gravel, trace limestone fragments, very dark gray (10YR, 3/1), moist, stiff, high plasticity, organics present	0.0				0915 on 5-16-15. Trout begins drilling w/ 4" dia bit & 4" dia sampler
	1	becoming black (10YR, 2/1)	0.0				
	2	LIMESTONE, with chert, very pale orange (10YR, 8/6), strong, slightly weathered, oxidation present, fragmented	0.0				
	3	SHALE, light olive brown (5Y, 5/6), weak, moderately weathered, small precipitate deposits throughout	0.0				
	4		0.0				
	5		0.0				0917

HTW DRILLING LOG

HOLE NO.
MW-06 D
SHEET 2
OF 6 SHEETS

PROJECT Forbes Atlas S-5

INSPECTOR J. Bryant

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	5	SHALE, light olive brown (5Y, 5/6), weak, moderately weathered, small precipitate deposits throughout	0.0				0920
	6	becoming moderately strong, slightly weathered, oxidation present	0.0				
	7	medium gray (NS) mottling present	0.0				
	8	occasional calcareous nodules	0.0				
	9		0.0				
	10	becoming mottled olive gray (5Y, 4/1) to dark gray (NS)	0.0				0922 Hard 0925 drilling Trant switches to double wall sampler (4") and 6" over drill casing
	11		0.0				0950: Trant begins adding Gurcon gel to drilling water to prevent water loss.
	12	LIMESTONE, with chert, variable moderate yellowish brown (10YR, 5/4) to medium gray (NS), medium bluish gray (5B, 5/1) chert, strong, slightly weathered	0.0				
	13	LIMESTONE, pale yellowish brown (10YR, 6/2), very weak, highly weathered, crumbly	0.0				
	14	LIMESTONE, yellowish gray (5Y, 8/1), strong, slightly weathered, oxidation present	0.0				

HTW DRILLING LOG

HOLE NO.
MW-06A

PROJECT
Forbes Atlas S-5

INSPECTOR
J. B. Grant

SHEET 3
OF 6 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	14	LIMESTONE, yellowish gray (5Y, 8/1), strong, slightly weathered oxidation present	0.0				
	15		0.0				
	14	LIMESTONE, with chert, light gray (N7), light bluish gray (5B, 7/1) chert, strong, slightly weathered	0.0				
	14	LIMESTONE, yellowish gray (5Y, 8/1), strong, slightly weathered, oxidation and solution cavities (small) present	0.0				
	17		0.0				
	18	LIMESTONE, with chert, light gray (N7), light bluish gray chert, strong, slightly weathered	0.0				
	19	LIMESTONE, yellowish gray (5Y, 8/1), strong, slightly weathered, some small fossils (shell fragments, plant fragments)	0.0				
	20	becoming mottled yellowish gray (5Y, 8/1) to medium gray (N5) LIMESTONE, with chert, yellowish gray (5Y, 8/1), light bluish gray (5B, 7/1) chert, strong, slightly weathered, small solution cavities	0.0				1005 - Driller reports 1013 ~300 gal fluid loss.
	21		0.0				
	22		0.0				
	23	SHALE, medium dark gray (N4), strong, fresh	0.0				

HTW DRILLING LOG

HOLE NO.
mw-06a

PROJECT
Forbes Atlas S-5

INSPECTOR
J. Bryant

SHEET 4
OF 6 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	23	SHALE, medium dark gray (N4), strong, fresh	0.0				
	24	SHALE, greenish gray (56y, 6/1), strong, fresh	0.0				
	25		0.0				
	26		0.0				
	27		0.0				
	28		0.0				
	29		0.0				
	30	SHALE, grayish red (10R, 4h), strong, fresh	0.0				1035 1047
	31		0.0				
	32		0.0				

HTW DRILLING LOG

HOLE NO.
mw-06D

PROJECT
Forbes Atlas S-5

INSPECTOR
J. Bryant

SHEET 5
OF 6 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	32	SHALE, grayish red (10R.4/2), Strong, fresh	0.0				
	33		0.0				
	34		0.0				
	35		0.0				
	36		0.0				
	37	SHALE, grayish green (10G4.5/2), Strong, fresh	0.0				
	38		0.0				
	39		0.0				
	40		0.0				$\frac{1109}{1195}$
	41	LIMESTONE, medium gray (NS), Strong, fresh to slightly weathered, thin bands of dark gray chert					

HTW DRILLING LOG

HOLE NO.
MW-06D

PROJECT
Forbes Atlas S-5

INSPECTOR
J. Bryant

SHEET 6
OF 6 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	41	LIMESTONE, medium gray (NS), strong, fresh to slightly weathered, thin bands of dark gray chert					
	42						
	43						
	44						
	45						
	46						
	47						
	48						
	49	SHALE, medium gray (NS), strong fresh					-No additional fluid loss after 20' bgs. 1145: Traut stops @ 50' bgs
	50	TD = 50' bgs					-Traut installs monitoring well to 48' bgs.

HTW DRILLING LOG

HOLE NO.
MW-060

PROJECT
Forbes Atlas S-5

INSPECTOR
J. Bryant

SHEET 1
OF 1 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
							<p>Monitoring well Details</p> <p>Material: 2" dia Sch 40 PVC cap: Flat Screen: 0.010" Factory slotted Riser: Blank PVC</p> <p>Manufacturer: Johnson</p> <p>BSA TD: 50' bgs MW TD: 48' bgs</p> <p>Lengths: Cap: 0.23' Screen: 5.05' Riser: 10.01' 10.00' 10.00' 10.00' 10.00'</p> <p>Total: 55.29' Cutoff: 4.54' Stickup: 2.75'</p> <p>Backfill: Premier Silica, 20/40 silica sand 50-48' bgs 1-50# bag</p> <p>Filter Pack: Premier Silica, 20/40 silica sand 48-38' bgs 5-50# bags</p> <p>Seal: Haliburton PDS, Rel- Plug bentonite pellets 38-35' bgs 2-5 gal buckets</p> <p>Grout: Haliburton EZ Seal: 3-50# bags Quick Grout: 0.3 50# bags 35'-3' bgs</p>
		<p>Not to scale.</p> <p>Install date: 5-16-15</p> <p>Grout date: 5-17-15</p>					

HTW DRILLING LOG

HOLE NO.
SB-08/mw-065
SHEET 1
OF 4 SHEETS

1. COMPANY NAME <i>Burns & McDonnell</i>		2. DRILLING SUBCONTRACTOR <i>Trout Drilling</i>	
3. PROJECT <i>Forbes Atlas S-5</i>		4. LOCATION <i>S-5, E of Council Grove, KS</i>	
5. NAME OF DRILLER <i>Trout Drilling</i>		6. MANUFACTURER'S DESIGNATION OF DRILL <i>Versa Sonic V100</i>	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	4" dia bit		8. HOLE LOCATION
	4" dia single wall sampler		
	4" dia double wall sampler		
	6" dia bit		
	6" dia casing		
9. SURFACE ELEVATION		10. DATE STARTED <i>5-29-15</i>	
11. DATE COMPLETED <i>5-29-15</i>		12. OVERBURDEN THICKNESS <i>2'</i>	
13. DEPTH DRILLED INTO ROCK <i>28'</i>		15. DEPTH GROUNDWATER ENCOUNTERED <i>See remarks</i>	
14. TOTAL DEPTH OF HOLE <i>30'</i>		16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED <i>8.16' btoe - 2 days</i>	
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY) <i>7.95' btoe - Post development</i>		18. GEOTECHNICAL SAMPLES	
DISTURBED <i>N/A</i>		UNDISTURBED <i>N/A</i>	
19. TOTAL NUMBER OF CORE BOXES <i>N/A</i>		20. SAMPLES FOR CHEMICAL ANALYSIS	
VOC <i>4</i>		METALS <i>N/A</i>	
OTHER (SPECIFY) <i>4-TOC</i>		OTHER (SPECIFY) <i>N/A</i>	
OTHER (SPECIFY) <i>N/A</i>		21. TOTAL CORE RECOVERY <i>100%</i>	
22. DISPOSITION OF HOLE		23. SIGNATURE OF INSPECTOR	
BACKFILLED		MONITORING WELL	
		<i>X</i>	
		<i>[Signature]</i>	

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	0	CLAY, trace silt, with rock fragments, very dark gray (10YR, 3/1), wet, soft, medium plasticity, organics present	0.0		1340 SB-08/SB-08-0-1		5-29-15 @ 1320: Trout begins drilling w/ 4" dia bit & 4" dia single wall sampler
	1		0.0				
	2	SHALE, light olive brown (5Y, 5/6), weak, slightly weathered, oxidation present	0.0				
	3		0.0				
	4	SHALE, dusky yellow (5Y, 4/4) with medium dark gray (N4) mottling, weak to moderately strong, slightly weathered, oxidation present	0.0		1350 SB-08/SB-08-4-5		
	5		0.0				1322

HTW DRILLING LOG

HOLE NO.
SB-08/mw-065

PROJECT
Forbes Atlas S-5

INSPECTOR
J. B. Gent

SHEET 2
OF 4 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	5	SHALE, dusky yellow (5Y, 6/4) with medium dark gray (N4) mottling, moderately strong, slightly weathered, oxidation present	0.0				1324
	4		0.0				
	7	- becoming limy	0.0				
	8	LIMESTONE, mottled medium dark gray (N4) to yellowish gray (5Y, 7/2), strong, slightly weathered, oxidation and small solution cavities present	0.0		1400		
	9		0.0		SB-08/SB-08-89		
	10	LIMESTONE, with chert, yellowish gray (5Y, 7/2), strong, slightly weathered	0.0				1325
		CONGLOMERATE, limy, yellowish gray (5Y, 7/2), weakly cemented, angular grains, coarse					1327
	11	LIMESTONE, with chert, yellowish gray (5Y, 7/2), chert is light bluish gray (5B, 7/1), strong, weathered, oxidation & solution cavities present	0.0				Driller switches to 4" dia double wall sampler.
	12		0.0				
	13		0.0				
	14		0.0				

HTW DRILLING LOG

HOLE NO.
50-08/mw-065

PROJECT
Forbes Atlas 5-5

INSPECTOR
J. Bryant

SHEET 3
OF 4 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	14	LIMESTONE, with chert, yellowish gray (5Y, 7/2), chert is light bluish gray (5B, 7/1), strong, weathered, oxidation & solution cavities present	0.0				
	15		0.0				
	16		0.0				
	17		0.0				
	18		0.0				
	19	Interbedded SHALE and LIMESTONE, shale is greenish gray (5G, 6/1), weak, slightly weathered, limestone is yellowish gray (5Y, 7/2), strong, weathered, both thinly bedded	0.0				
	20	LIMESTONE, with chert, yellowish gray (5Y, 7/2) with light gray (N7) limestone interfingering, strong, fresh to slightly weathered - abundant medium gray (N5) chert	0.0				1356 Driller 1410 advances 6" dia casing to 20'
	21	SHALE, greenish gray (5G, 6/1), weak, fresh					
	22						
	23						

HTW DRILLING LOG

HOLE NO.
SB-08/mw-063

PROJECT
Forbes Atlas S-5

INSPECTOR
J. B. Tant

SHEET 4
OF 4 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	23	SHALE, greenish gray (5G4, 6/1), weak, fresh					
	24				1455 SB-08/SB-08-24-25		
	25	LIMESTONE, medium dark gray (N4), strong, slightly weathered, fossiliferous					
	26	SHALE, greenish gray (5G4, 6/1), moderately strong, fresh					
	27						
	28						
	29						
	30						1455
		TD = 30' bgs					10/35: Driller stops @ 30' bgs. - Driller installs well to 21' bgs. - Groundwater not observed - Used 700 gal water - lost ~50 gal water

HTW DRILLING LOG

HOLE NO.

MW-065

PROJECT

Forbes Atlas 5-5

INSPECTOR

J. Bryant

SHEET 1

OF 1 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
							<p>Monitoring well Details</p> <p>BH TD: 30' bgs mw TD: 21' bgs</p> <p>Material:</p> <p>2" dia, sch 40 PVC</p> <p>Cap: flat</p> <p>Screens 0.010" Factory slotted</p> <p>Riser PVC Blank</p> <p>Man: Johnson</p> <p>Lengths</p> <p>Cap: 0.22</p> <p>Screen: 5.00</p> <p>Riser: 10.00</p> <p>10.00</p> <p>Total: 25.22</p> <p>Cutoff: 0.75</p> <p>Stickup: 2.86</p> <p>Backfill: Halibuton</p> <p>3/8" bentonite chips</p> <p>30-23'</p> <p>2.5-50# bags</p> <p>Filter Pack:</p> <p>Premier Silica</p> <p>24# Silica sand</p> <p>23-12' bgs</p> <p>5-50# bags</p> <p>Seal: PDS</p> <p>Pat-Plug bentonite pellets</p> <p>12-8' bgs</p> <p>1.5-5gal buckets</p> <p>Bentonite:</p> <p>Halibuton 3/8" bentonite chips</p> <p>8'-3' bgs</p> <p>1.75-50# bags</p>
		<p>Not to scale.</p> <p>Install date: 5-29-15</p>					

HTW DRILLING LOG

HOLE NO.
SB-04 / MW-075
SHEET 1
OF 5 SHEETS

1. COMPANY NAME <i>Burns & McDonnell</i>		2. DRILLING SUBCONTRACTOR <i>Traut Drilling</i>	
3. PROJECT <i>Forbes Atlas S-5</i>		4. LOCATION <i>S-5, E of Council Grove, KS</i>	
5. NAME OF DRILLER <i>Nate Stebbins</i>		6. MANUFACTURER'S DESIGNATION OF DRILL <i>Versa Sonic V100</i>	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	4" dia bit		8. HOLE LOCATION
	4" dia single wall sample barrel		
	4" dia double wall barrel		
	6" dia bit		
	6" dia casing		
9. SURFACE ELEVATION		10. DATE STARTED <i>5-28-15</i>	
11. DATE COMPLETED <i>5-28-15</i>		12. OVERBURDEN THICKNESS <i>4.2'</i>	
13. DEPTH DRILLED INTO ROCK <i>35.8'</i>		15. DEPTH GROUNDWATER ENCOUNTERED <i>See Remarks</i>	
14. TOTAL DEPTH OF HOLE <i>40.0'</i>		16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED <i>18.02' bloc - 2 days</i>	
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY) <i>13.65 - Post development</i>		18. GEOTECHNICAL SAMPLES	
DISTURBED <i>N/A</i>		UNDISTURBED <i>N/A</i>	
19. TOTAL NUMBER OF CORE BOXES <i>N/A</i>		20. SAMPLES FOR CHEMICAL ANALYSIS	
VOC <i>6</i>		METALS <i>N/A</i>	
OTHER (SPECIFY) <i>6 - TOC</i>		OTHER (SPECIFY) <i>N/A</i>	
OTHER (SPECIFY) <i>N/A</i>		21. TOTAL CORE RECOVERY <i>100 %</i>	
22. DISPOSITION OF HOLE		23. SIGNATURE OF INSPECTOR	
BACKFILLED		MONITORING WELL	
		<i>X</i>	

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	0	CLAY, some silt, with rock fragments, grayish brown (10YR, 5/2), wet, soft, trace plasticity, organics	0.0		<i>1115</i> <i>SB-04 / MW-075-0-1</i>		5-28-15 @ 1047 : Driller begins drilling w/ 4" dia single wall sampler & 4" dia bit
	1	CLAY, with rock fragments, very pale brown (10YR, 7/4), moist, medium stiffness, high plasticity	0.0				
	2	SAND, yellowish brown (10YR, 5/4), moist, to medium density, fine to coarse, well graded, sub rounded	0.0				
	3	CLAY, very dark gray (10YR, 4/1), damp, stiff, high plasticity	0.0				
	4	GRAVEL, with clay, grayish brown (10YR, 5/2), damp, loose, coarse, angular limestone fragments	0.0				
	5	LIMESTONE, dusky yellow (5Y, 6/4) to light olive gray (5Y, 5/6), strong, weathered, fragmented	0.0				

HTW DRILLING LOG

HOLE NO.
SB-04/MW-075

PROJECT
Forbes Atlas S-5

INSPECTOR
J. Bergant

SHEET 2
OF 5 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	5	LIMESTONE, dusky yellow (57.64) to light olive gray (57.52), strong, unweathered, fragmented	0.0				
	6	SHALE, limy, moderate yellow (57.76) to dusky yellow (57.64), weak, unweathered	0.0				
	7	- thin CALICHE band (5")	0.0		1125 SB-04/SB-04-7-8		
	8	LIMESTONE MUDSTONE, light olive gray (57.56), strong, slightly weathered, fragmented	0.0				
	9		0.0				
	10	LIMESTONE, dusky yellow (57.64) to light olive gray (57.52), moderately strong, highly weathered to gravel and sand size fragments	0.0				1059 1102
	11	- becoming shaly	0.0				
	12	SHALE, light olive brown (57.56), weak, slightly weathered, oxidation present	0.0				
	13		0.0				
	14		0.0		1150 SB-04/SB-04-13-14 Dup-4/SB		

HTW DRILLING LOG

HOLE NO.
SB-04/MW-075

PROJECT
Forbes Atlas S-5

INSPECTOR
J. Bryant

SHEET 3
OF 5 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	14	SHALE, light olive brown (57, 5/6), weak, slightly weathered, oxidation present	0.0				
	15	- becoming light olive gray (57, 5/2)	0.0				1111 1115
	16		0.0		1225 SB-04/SB-04-16-17		
	17		0.0				
	18	SHALE, clasy yellow (57, 6/4) with dark gray (N3) mottling, weak, slightly weathered, oxidation present	0.0				
	19		0.0		1235 SB-04/SB-04-19-20		1120: Trawt advances 4" dia casing to 20' bgs.
	20	SHALE, dark gray (N3), weak, weathered	0.0				1135 1141
	21	- becoming strong, slightly weathered	0.0		1250 SB-04/SB-04-20-21		- Trawt switches to 4" dia double wall sampler & 4" dia bit - Driller estimates ~250 gal fluid loss 0-20' bgs
	22	LIMESTONE, mottled medium dark gray (N4) to yellowish gray (57, 7/2), strong, slightly weathered, few small fossils	0.0				
	23		0.0				

HTW DRILLING LOG

HOLE NO.
SB-04/mw-075

PROJECT
Forbes Atlas S-5

INSPECTOR
J. Bryant

SHEET 4
OF 5 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	23	LIMESTONE, mottled medium dark gray (N4) to yellowish gray (5Y, 7/2), strong, slightly weathered, few small fossils	0.0				
	24	LIMESTONE, yellowish gray (5Y, 7/2) to light bluish gray (5B, 7/1), strong, fresh to slightly weathered, some small fossils and solution cavities	0.0				
	25		0.0				
	26		0.0				
	27	- chert nodules present, medium dark gray (N4)	0.0				
	28		0.0				
	29		0.0				
	30		0.0				1156 1204
	31		0.0				Driller reports additional ~50% fluid loss
	32		0.0				

HTW DRILLING LOG

HOLE NO.
55-04/MW-078

PROJECT
Forbes Atlas S-S

INSPECTOR
J. Sigant

SHEET 5
OF 5 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	32	SHALE, medium gray (N5), weak, slightly weathered	0-0				Change @ 32' bgs
	33	LIMESTONE, medium dark gray (N4), strong, slightly weathered, fossiliferous	0-0				
	34		0-0				
	35	SHALE, grayish green (5G, 5L), moderately strong, fresh	0-0				
	36		0-0				
	37		0-0				
	38		0-0				
	39		0-0				
	40		0-0				1224: Driller stops @ 40' bgs
		TD = 40' bgs					- Trant installs well to 32' bgs. - No groundwater observed. - Total fluid loss ~ 300 gal.

HTW DRILLING LOG

HOLE NO.
MW-075
SHEET 1
OF 1 SHEETS

PROJECT
Forbes Atlas S-5

INSPECTOR
J. Bryant

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
							<p>Well installation details</p> <p>Material: 2" dia Sch 40 pvc</p> <p>Screen: 0.010" Factory slotted</p> <p>Cap: Flat Point</p> <p>Riser: Black pvc</p> <p>Manufacturer: Johnson.</p> <p><u>Lengths:</u></p> <p>Cap: 0.24</p> <p>Screen: 5.00</p> <p>Riser: 10.00 10.00 10.00</p> <p>Total: 35.38'</p> <p>Cutoff: 0.0</p> <p>Stickup: 2.8</p> <p><u>Backfill:</u></p> <p>Haliburton 3/8" bentonite chips 40' - 34' bgs used 2-50# bags</p> <p>Filter Pack:</p> <p>Premier Silica 20/40 grade Silica Sand 34' - 32' bgs used 1-50# bag</p> <p><u>Filter Pack:</u></p> <p>Premier Silica 20/40 grade Silica Sand 32' - 23' used 5-50# bags</p> <p><u>Seal: PDS</u></p> <p>Pel-Plug bentonite pellets 23-19' bgs used 1.5-5 gal buckets</p> <p><u>Grout: Haliburton</u></p> <p>C2 Seal 2-50# bags Quickgrout 0.3 50# bags 19-3' bgs</p>
		<p>Not to scale.</p> <p>Install date: 5-28-15</p> <p>Grout date: 5-29-15</p>					

HTW DRILLING LOG

HOLE NO.
MW-085

1. COMPANY NAME <i>Burns & McDonnell & Avatar</i>		2. DRILLING SUBCONTRACTOR <i>Trout Wells, Inc.</i>			SHEET 1 OF 4 SHEETS	
3. PROJECT <i>Forbes Atlas S-5 site</i>			4. LOCATION <i>Forbes Atlas S-5 site, Lyon Co., MS</i>			
5. NAME OF DRILLER <i>Nathan Stebbins</i>			6. MANUFACTURER'S DESIGNATION OF DRILL <i>Versa-Drill V-100</i>			
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	4" dia bit		8. HOLE LOCATION			
	4" dia single wall sampler					
	6" dia bit					
	6" dia casing					
9. SURFACE ELEVATION			10. DATE STARTED <i>6-3-16</i>		11. DATE COMPLETED <i>6-3-16</i>	
12. OVERBURDEN THICKNESS <i>15'</i>			15. DEPTH GROUNDWATER ENCOUNTERED <i>See Remarks</i>			
13. DEPTH DRILLED INTO ROCK <i>8'</i>			16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED <i>12.07' btoe, 48 hrs</i>			
14. TOTAL DEPTH OF HOLE <i>23'</i>			17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY) <i>N/A</i>			
18. GEOTECHNICAL SAMPLES		DISTURBED <i>N/A</i>	UNDISTURBED <i>N/A</i>	19. TOTAL NUMBER OF CORE BOXES <i>N/A</i>		
20. SAMPLES FOR CHEMICAL ANALYSIS		VOC <i>N/A</i>	METALS <i>N/A</i>	OTHER (SPECIFY) <i>N/A</i>	OTHER (SPECIFY) <i>N/A</i>	OTHER (SPECIFY) <i>N/A</i>
21. TOTAL CORE RECOVERY <i>100 %</i>						
22. DISPOSITION OF HOLE		BACKFILLED	MONITORING WELL <i>X</i>	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR <i>[Signature]</i>	

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	0	<i>CLAY, some silt, light olive gray (5% btoe), damp, medium stiffness, trace to medium plasticity, organic in top 6", limestone fragments present</i>	0.0	<i>N/A</i>	<i>N/A</i>	<i>N/A</i>	<i>0950: start</i>
	1		0.0				
	2	<i>- gray and brown mottling 1.5-7.5' bgs - less silt (trace silt), stiff</i>	0.0				
	3		0.0				
	4		0.0				
	5		0.0				

HTW DRILLING LOG

HOLE NO.
MW-085

PROJECT
Forbes Atlas 5-5

INSPECTOR
J. Bryant

SHEET 2
OF 4 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	5	CLAY, trace silt, occasional limestone fragments, light olive gray (57, 6/2) with gray and brown mottling, stiff, medium plasticity, damp	0.0	N/A	N/A	N/A	
	6						
	7		0.0				
	8	CLAY, shaley, very dark grayish brown (104R, 3/2), damp, stiff, medium plasticity, olive mottling, oxidation, limestone fragments	0.0				
	9		0.0				
	10	CLAY, with limestone and chert fragments, brown (104R, 5/3), damp, soft to medium stiffness, trace to medium plasticity	0.0				
	11		0.0				
	12		0.0				
	13	- abundant chert fragments 12.5-12.7' bgs	0.0				
	14	- becoming moist	0.0				Harder drilling @ 14' bgs

HTW DRILLING LOG

HOLE NO.
MW-085

PROJECT
Forbes Atlas S-5

INSPECTOR
J. Bryant

SHEET 3
OF 4 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	14	CLAY, with limestone and chert fragments, brown (10YR, 5/2), moist, soft, medium plasticity, abundant chert fragments 14-14.2' bgs	NA (B)	N/A	N/A	N/A	
	15	SHALE, light olive gray (5Y, 5/2) with yellow and gray mottling, weak, highly weathered	0.0				
	16	- weathered, oxidized limestone fragments 16-16.2' bgs	0.0				
	17	LIMESTONE, yellowish gray (5Y, 7/2) with bluish gray to gray chert nodules, strong, slightly weathered, occasional small vugs, mostly fragments in top 0.5'	0.0				
	18		0.0				
	19		0.0				
	20	SHALE, medium dark gray (N4), weak, moderately weathered, moderate fossils, scutal debris, crinoids - Alternating thin beds of more resistant shale and weathered shale 20-20.5'	0.0				1020 1025
	21		0.0				
	22	- becoming greenish gray (5G, 4/1)	0.0				
	23	TD = 23' bgs	0.0				1040: Trant slips @ 23' bgs. Trant sets well to 20.0' bgs. Details next page.

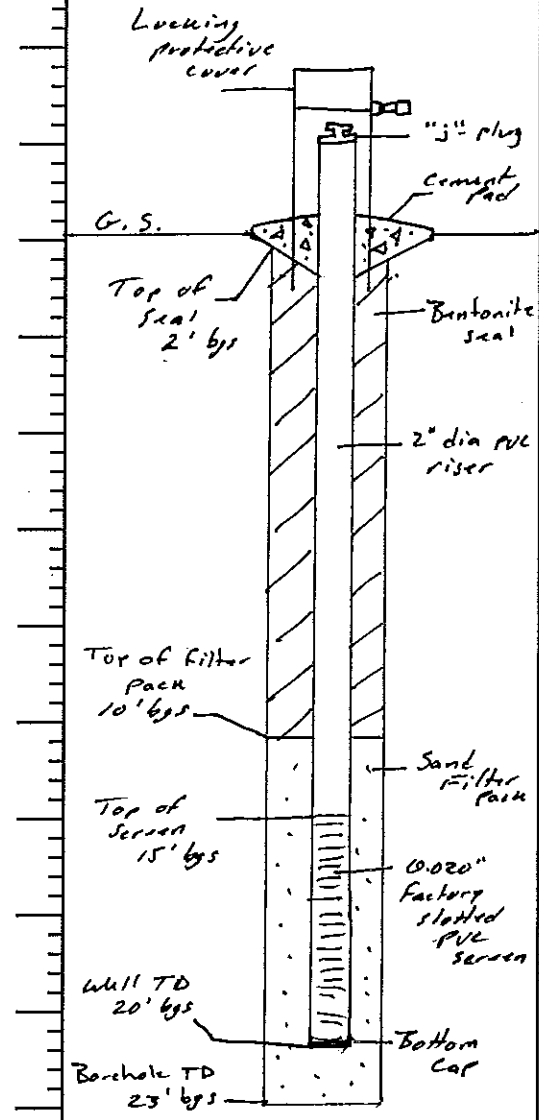
HTW DRILLING LOG

HOLE NO.
MW-085

PROJECT
Forbes Atlas S-5

INSPECTOR
J. Bryant

SHEET 4
OF 4 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
							<p><u>MW-085 Details</u></p> <p><u>Material:</u> 2" dia Sch 40 PVC Cap: Flat Screen: 0.020" factory slotted PVC - Johnson</p> <p><u>Lengths</u> Cap: 0.22 Screen: 5.05 Riser: 10.05 10.05 Total: 25.37 Cutoff: 2.55' Stickup: 3.03'</p> <p><u>Filter Pack:</u> Premier Silica 20/40 silica sand 23 - 10' bgs Used - 6-50#</p> <p><u>Seal:</u> Halliburton 3/8" Bentonite chips 10-2' bgs 2 - 50# bags</p> <p><u>Surface</u> 3 x 3' Cement Pad 4 bollards Orange paint</p>

HTW DRILLING LOG

HOLE NO.
MW-095

1. COMPANY NAME
Burns & McDonnell & Avatar

2. DRILLING SUBCONTRACTOR
Trout Well

SHEET 1
OF 5 SHEETS

3. PROJECT
Forbes Atlas S-5

4. LOCATION
Forbes Atlas S-5 site, Lyon Co., KS

5. NAME OF DRILLER
Nathan Stebbins

6. MANUFACTURER'S DESIGNATION OF DRILL
Versa-Drill U-100

7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT

<i>4" dia bit</i>
<i>4" dia single wall sampler</i>
<i>6" dia bit</i>
<i>6" dia casing</i>

8. HOLE LOCATION

9. SURFACE ELEVATION

10. DATE STARTED
6-2-16

11. DATE COMPLETED
6-2-16

12. OVERBURDEN THICKNESS
5.9'

15. DEPTH GROUNDWATER ENCOUNTERED
See Remarks

13. DEPTH DRILLED INTO ROCK
19.1'

16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED
12.72' bhc, 48 hrs

14. TOTAL DEPTH OF HOLE
25'

17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)
N/A

18. GEOTECHNICAL SAMPLES

DISTURBED
N/A

UNDISTURBED
N/A

19. TOTAL NUMBER OF CORE BOXES
N/A

20. SAMPLES FOR CHEMICAL ANALYSIS

VOC
N/A

METALS
N/A

OTHER (SPECIFY)
N/A

OTHER (SPECIFY)
N/A

OTHER (SPECIFY)
N/A

21. TOTAL CORE RECOVERY
100%

22. DISPOSITION OF HOLE

BACKFILLED

MONITORING WELL
X

OTHER (SPECIFY)

23. SIGNATURE OF INSPECTOR
[Signature]

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	0	<i>CLAY, some silt, trace limestone fragments, dark grayish brown (10YR, 4/2), damp, medium stiffness, medium plasticity, roots & organics in top 1'</i>		<i>N/A</i>	<i>N/A</i>	<i>N/A</i>	<i>1038: Start</i>
	1		<i>0.0</i>				
	2		<i>0.0</i>				
	3		<i>0.0</i>				
	4	<i>CLAY, some silt, with limestone and chert fragments, gravel to cobble sized, brown (10YR, 4/2), damp to moist, soft, trace plasticity</i>	<i>0.0</i>				
	5		<i>0.0</i>				

HTW DRILLING LOG

HOLE NO.
MW-095

PROJECT
Forbes Atlas S-5

INSPECTOR
J. Bryant

SHEET 2
OF 5 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	5	CLAY, same silt, with limestone and chert fragments, gravel to cobble sized, brown (10YR, 4/2), damp to moist, soft, trace plasticity	0.0	N/A	N/A	N/A	
	6	SHALE, light olive brown (5Y, 5/6) with moderate yellow to light gray and dark gray mottling and laminar, weak, highly weathered	0.0				
	7	- occasional calcite nodules	0.0				
	8		0.0				
	9		0.0				
	10		0.0				
	11	- Fragmented, weathered, oxidized limestone mixed with shale @ 0.5-1.5' bgs	0.0				1100: Trant stops to offload sand loader & take lunch. 1250: Trant resumes @ 10'. - Constant rock @ 10.5' bgs
	12		0.0				
	13		0.0				
	14		0.0				

HTW DRILLING LOG

HOLE NO.
MW-095
SHEET *3*
OF *5* SHEETS

PROJECT
Forbes Atlas S-5

INSPECTOR
J. Bryant

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	14	SHALE, light olive brown (5Y, 5/6) with moderate yellow to light gray and dark gray mottling and laminae, weak, highly weathered	0.0	N/A	N/A	N/A	
	15		0.0				
	16	LIMESTONE, medium bluish gray (5B, 5/1), strong, weathered	0.0				
	17	LIMESTONE, interbedded shale, yellowish gray (5Y, 8/1) with bluish gray to medium gray chert nodules, strong, weathered, mostly fractured/fragmented	0.0				
	18	- color change to yellowish gray (5Y, 7/2)	0.0				
	19		0.0				
	20		0.0				1320 <hr/> 1327
	21	LIMESTONE, medium bluish gray (5B, 5/1) to medium gray (N5), strong, slightly weathered, moderate skeletal debris, crinoids	0.0				
		LIMESTONE, light gray (N7), strong, slightly weathered, sparse skeletal debris, occasional warts (small)					
	22	- occasional bluish gray chert nodules	0.0				
	23		0.0				

HTW DRILLING LOG

HOLE NO.
MW-095

PROJECT
Forbes Atlas S-5

INSPECTOR
J. Traut

SHEET *4*
OF 5 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	23	<p><i>SHALE, medium dark gray (N4), weak to moderately strong, fresh to moderately weathered, abundant crinoids, fusulinids, & skeletal debris in top 1'</i></p>	<i>N/A</i>	<i>N/A</i>	<i>N/A</i>	<i>N/A</i>	<i>Change @ 23'</i>
	24						
	25	<i>TD = 25' bgs</i>					<i>1335</i>
							<p><i>1335: Traut stops @ 25' bgs. Base of target formation is 23' bgs. Traut installs well to 23' bgs. Details next page.</i></p>

HTW DRILLING LOG

HOLE NO.
MW-095
SHEET *5*
OF 5 SHEETS

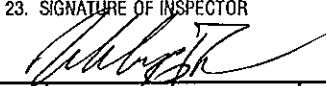
PROJECT
Forbes Atlas S-S

INSPECTOR
J. Bryant

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
							<p><u>MW-095 Details</u></p> <p>Material: 2" dia, Sch 40 PVC</p> <p>Cap: Flat</p> <p>Screen: 0.020" Factory slotted PVC</p> <p>- Johnson</p> <p><u>Lengths</u></p> <p>Cap: 0.23</p> <p>Screen: 5.04</p> <p>Riser: 10.04</p> <p>10.06 + 0.14 (threads)</p> <p>Total: 25.51 25.51</p> <p>Cutoff: 0</p> <p>Sticup: 2.51'</p> <p><u>Filter Pack:</u> Premier Silica 20/40 Silica Sand 25-14' bgs used 6-50# bags</p> <p><u>Seal:</u> Halliburton 3/8" Bentonite Chips (Hydrated) 14-2' bgs used 3-50# bags</p> <p><u>Surface</u></p> <p>3'x3' Cement Pad</p> <p>4 Bollards orange paint</p>

HTW DRILLING LOG

HOLE NO.
MW-105
SHEET 1
OF 5 SHEETS

1. COMPANY NAME Burns & McDonnell & Avatar		2. DRILLING SUBCONTRACTOR Trant Wells, Inc				
3. PROJECT Forbes Atlas S-5		4. LOCATION Forbes S-5, E of Council Grove, KS				
5. NAME OF DRILLER Nathan Stebbins		6. MANUFACTURER'S DESIGNATION OF DRILL Vesta-Drill II 100				
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	4" dia bit		8. HOLE LOCATION			
	4" dia single wall sampler					
	6" dia bit					
	6" dia casing					
9. SURFACE ELEVATION		10. DATE STARTED 5-24-16	11. DATE COMPLETED 5-24-16			
12. OVERBURDEN THICKNESS 2'		15. DEPTH GROUNDWATER ENCOUNTERED See remarks				
13. DEPTH DRILLED INTO ROCK 23'		16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED 7.60' btoe, ~19 hrs				
14. TOTAL DEPTH OF HOLE 25'		17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY) N/A				
18. GEOTECHNICAL SAMPLES	DISTURBED NA	UNDISTURBED NA	19. TOTAL NUMBER OF CORE BOXES NA			
20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY 100 %
	NA	NA	NA	NA	NA	
22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR 		
		X				

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	0	CLAY, some silt, with limestone fragments, dark gray (5YR, 4/1), damp to moist, soft, trace plasticity, 0.0 organics organics in top 6".		N/A	N/A	N/A	1424: Trant starts w/ 4" dia single wall sampler & bit and 6" dia override casing.
	1	CLAY, some silt, dark reddish brown, (5YR, 7/3), damp, medium stiffness to stiff, trace plasticity	0.0				
	2	LIMESTONE, with clay mix, grayish orange (10YR, 7/4), with medium gray (NS) chert nodules, strong, weathered, fractured, mostly gravel sized fragments	0.0				
	3	SHALE, dusky yellow (5Y, 6/4), weak, moderately weathered, tan and gray laminae	0.0				
	4		0.0				
	5		0.0				

HTW DRILLING LOG

HOLE NO.
MW-105

PROJECT
Forbes Atlas S-5

INSPECTOR
J. Bryant

SHEET *2*
OF *5* SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	5	<i>SHALE, dusky yellow (5Y, 6/4), weak, moderately weathered, tan and gray laminae</i>	0.0	N/A	N/A	N/A	
	6	<i>- dark gray mottling 5.9-7'</i>	0.0				
		<i>- reddish brown mottling 6.4-6.6' bs</i>					
	7	<i>- caliche nodules 7'-7.4'</i>	0.0				
	8		0.0				
	9	<i>- organics 8.2-8.4', gray and yellow mottling</i>	0.0				
	10		0.0				
	11		0.0				<i>1530: Drilling mud returning to surface under mud tub. Traut stops & seals borehole.</i>
	12		0.0				<i>1555: Traut resumes w/ 6" @ 11' bgs.</i>
	13		0.0				
	14	<i>LIMESTONE, light olive gray (5Y, 6/1), bluish gray to light gray chert nodules, strong, weathered, weathered shale interbeds.</i>	0.0				

HTW DRILLING LOG

HOLE NO.
MW-105

PROJECT
Forbes Atlas 5-5

INSPECTOR
J. Bryant

SHEET 3
OF 5 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEO TECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	14	Limestone, light olive gray (57, 61), bluish gray to light gray chert nodules, strong, weathered, weathered shale interbeds	0.0	N/A	N/A	N/A	
	15		0.0				
	16	LIMESTONE, yellowish gray (54, 7/2) with bluish gray to dark gray chert nodules, strong, weathered, large angular fragments	0.0				
	17	-highly fragmented 17-18' by	0.0				
	18		0.0				
	19	LIMESTONE, medium light gray (26), dark gray chert nodules, slightly weathered, strong	0.0				
	20	-small veins 20.2-20.5' by	0.0				
	21	LIMESTONE, light brownish gray (57R, 61), strong, slightly weathered, occasional gray chert	0.0				
	22	SHALE, medium dark gray (24) to dark gray (25), moderately strong to med, slightly weathered to moderately weathered, occasional Crinoids and shell fragments	0.0				
	23		0.0				

HTW DRILLING LOG

HOLE NO.
MW-105

PROJECT
Forbes Atlas 5-5

INSPECTOR
J. Bryant

SHEET 4
OF 5 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	23	SHALE, medium dark gray (N4) to dark gray (N3), moderately strong to weak, slightly weathered to moderately weathered, occasional crinoids and shell fragments	0.0	N/A	N/A	N/A	
	24						
	25	TD = 25' bgs					1630: Trant stops @ 25' bgs. Base of target zone is 22' bgs. Trant installs well to 22' bgs. Details next page.

HTW DRILLING LOG

HOLE NO.
MW-105

PROJECT
Forbes Atlas 5-5

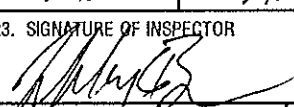
INSPECTOR
J. Bryant

SHEET 5
OF 5 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
							<p><u>MW-105 Details</u></p> <p>Materials: 2" dia, Sch 40 PUC Cap: Flat Screen: 0.020" Factory slotted Manufacturer: Johnson</p> <p><u>Lengths</u> Cap: 0.15' Screen: 5.00 Riser: 10.05 10.05 Total: 25.25 Cutoff: 0.48 Stickup: 2.77</p> <p><u>Filterpack:</u> Premier Silica 20/40 Silica sand 25-14' bgs Used: 5-50# bags</p> <p><u>Seal:</u> Halliburton 3/8" Hole Plug Bentonite Chips 14-2' bgs Hydrated in 1' lifts. Used: 4.5-50# bags</p> <p><u>Surface</u> 3x3' Cement Pad 4 bollards Orange paint</p>

HTW DRILLING LOG

HOLE NO.
MW-115

1. COMPANY NAME <i>Burns & McDonnell</i>		2. DRILLING SUBCONTRACTOR <i>Trout Wells, Inc.</i>		SHEET 1 OF 5 SHEETS		
3. PROJECT <i>Forbes Atlas S-5</i>			4. LOCATION <i>Forbes Atlas S-5 site, Lyon Co., MS</i>			
5. NAME OF DRILLER <i>Nathan Stebbins</i>			6. MANUFACTURER'S DESIGNATION OF DRILL <i>Verse Drill V-100</i>			
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	4" dia bit		8. HOLE LOCATION			
	4" dia Single wall sampler					
	6" dia bit					
	6" dia casing					
9. SURFACE ELEVATION			10. DATE STARTED <i>5-25-16</i>		11. DATE COMPLETED <i>5-25-16</i>	
12. OVERBURDEN THICKNESS <i>3.8'</i>			15. DEPTH GROUNDWATER ENCOUNTERED <i>See Remarks</i>			
13. DEPTH DRILLED INTO ROCK <i>26.2'</i>			16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILING COMPLETED <i>9.29' btoe, 7 days</i>			
14. TOTAL DEPTH OF HOLE <i>30'</i>			17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY) <i>N/A</i>			
18. GEOTECHNICAL SAMPLES		DISTURBED <i>N/A</i>	UNDISTURBED <i>N/A</i>	19. TOTAL NUMBER OF CORE BOXES <i>N/A</i>		
20. SAMPLES FOR CHEMICAL ANALYSIS		VOC <i>N/A</i>	METALS <i>N/A</i>	OTHER (SPECIFY) <i>N/A</i>	OTHER (SPECIFY) <i>N/A</i>	OTHER (SPECIFY) <i>N/A</i>
21. TOTAL CORE RECOVERY <i>100 %</i>						
22. DISPOSITION OF HOLE		BACKFILLED	MONITORING WELL <i>X</i>	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR 	

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	0	CLAY, some silt, limestone gravel to cobbles, grayish brown (104R, 5/2), damp, soft to medium stiffness, trace plasticity	0.0	N/A	N/A	N/A	16.34' Trout starts drilling w/ 4" dia bit & sampler and 6" override casing
	1		0.0				
	2		0.0				
	3	- becoming light olive brown (2.5Y, 5/4)	0.0				
	4	LIMESTONE, fragments to cobbles, yellowish gray (5Y, 8/1) to light olive gray (5Y, 6/1), strong, moderately weathered	0.0				
	5	- mixed w/ olive brown (2.5Y, 4/4) clay	0.0				

HTW DRILLING LOG

HOLE NO.
MW-115
SHEET *2*
OF *5* SHEETS

PROJECT *Forbes Atlas 5-5*

INSPECTOR *J. Bryant*

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	5	LIMESTONE, with olive brown clay, yellowish gray (5Y, 8/1) to light olive gray (5Y, 6/1), strong, to moderately weathered, fragments to cobbles		N/A	N/A	N/A	
	6		0.0				
	7	SHALE, dusky yellow (5Y, 6/4), with medium light gray (N6) and moderate yellow (5Y, 7/6) mottling and laminar, weak, moderately to highly weathered	0.0				
	8		0.0				
	9		0.0				
	10		0.0				<i>1643 - mixing mud</i>
	11		0.0				<i>1715 - mud mixer not working. Crew repairs</i>
	12		0.0				
	13	- limestone fragments & gray chert fragments, sand to cobble size	0.0				
	14		0.0				

HTW DRILLING LOG

HOLE NO.
MW-115
SHEET 3
OF 5 SHEETS

PROJECT *Forbes Atlas S-5*

INSPECTOR *J. Bryant*

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	14	LIMESTONE, pale yellowish brown (107R, 6/2) with light bluish gray to dark gray chert nodules, strong, moderately weathered, mostly fragmented		N/A	N/A	N/A	<i>change c 14' b/s</i>
	15		0.0				
	16	- color changes to yellowish gray (54, 7/2), occasional solution cavities	0.0				
	17	- sparse skeletal debris	0.0				
	18		0.0				
	19	LIMESTONE, very light gray (N9), chalky, weak, highly weathered, bluish gray to black chert nodules and fragments	0.0				
	20		0.0				<i>1745 1800</i>
	21		0.0				
	22	SHALE, medium dark gray (N4), weak to moderately strong, slightly weathered, abundant skeletal debris in upper 1-2'	0.0				
	23		0.0				

HTW DRILLING LOG

HOLE NO.
MW-115

PROJECT
Forbes Atlas S-5

INSPECTOR
J. Bryant

SHEET 4
OF 5 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	23	SHALE, medium dark gray, weak (N4) to moderately strong, slightly weathered, abundant skeletal debris in upper 1-2'		N/A	N/A	N/A	
	24		0.0				
	25		0.0				
	26		0.0				
	27	SHALE, grayish green (S6, S6), weak to moderately strong, slightly weathered	0.0				
	28		0.0				
	29		0.0				
	30	TD = 30' bgs					1815: Trant stops @ 30' bgs. In TB Base of target formation is 22' bgs. Trant installs well to 22' bgs. Details next page

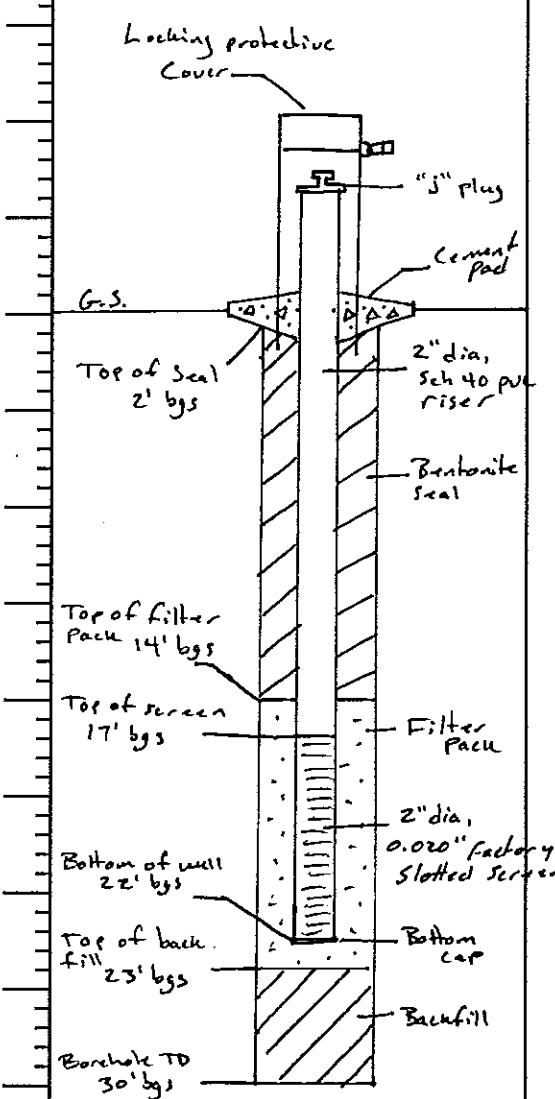
HTW DRILLING LOG

HOLE NO.
MW-115

PROJECT
Forbes Atlas S-S

INSPECTOR
J. Bryant

SHEET *5*
OF 5 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
							<p><i>MW-115 Details</i></p> <p><i>Material: 2" dia, Sch 40 PVC</i></p> <p><i>Cap:</i></p> <p><i>Screen: 2" dia, 0.020" factory slotted</i></p> <p><i>Manufacturer: Johnson</i></p> <p><u>Lengths</u></p> <p><i>Cap: 0.15</i></p> <p><i>Screen: 5.00</i></p> <p><i>Riser: 10.06</i> <i>10.05</i></p> <p><i>Total: 25.26'</i></p> <p><i>Cutoff: 0.43'</i></p> <p><i>Stick up: 1.83'</i></p> <p><u>Filter</u></p> <p><i>Backfill:</i></p> <p><i>Halliburton 3/8" Bentonite chips</i></p> <p><i>30-23' bgs</i></p> <p><i>Used 2.5-50# bgs</i></p> <p><u>Filter pack:</u></p> <p><i>Premier silica</i></p> <p><i>20/40 silica sand</i></p> <p><i>23-14' bgs</i></p> <p><i>Used 6-50# bgs</i></p> <p><u>Seal:</u> <i>Halliburton 3/8" Bentonite chips</i></p> <p><i>14-2' bgs</i></p> <p><i>Used 2.5-50# bgs</i></p> <p><u>Surface</u></p> <p><i>3' x 3' cement pad</i></p> <p><i>4 - Ballards Orange Paint</i></p>

HTW DRILLING LOG

HOLE NO.
MW-125

1. COMPANY NAME *Burns & McDonnell & Avatar* 2. DRILLING SUBCONTRACTOR *Trout Wells, Inc* SHEET 1 OF 5 SHEETS

3. PROJECT *Forbes Atlas S-5* 4. LOCATION *Forbes Atlas S-5 site, Lyon, CO., KS*

5. NAME OF DRILLER *Nate Stebbins* 6. MANUFACTURER'S DESIGNATION OF DRILL *Vega-Drill U-100*

7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	4" dia Bit	8. HOLE LOCATION	9. SURFACE ELEVATION	10. DATE STARTED <i>5-26-16</i>	11. DATE COMPLETED <i>5-26-16</i>
	4" dia Single wall sampler				
	6" dia bit				
	6" dia casing				

12. OVERBURDEN THICKNESS *6.5'* 15. DEPTH GROUNDWATER ENCOUNTERED *See Remarks*

13. DEPTH DRILLED INTO ROCK *18.5'* 16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED *15.02' btoe, 6 days*

14. TOTAL DEPTH OF HDLE *25.0'* 17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY) *N/A*

18. GEOTECHNICAL SAMPLES	DISTURBED <i>N/A</i>	UNOISTURBED <i>N/A</i>	19. TOTAL NUMBER OF CORE BOXES <i>N/A</i>		
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20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY <i>100 %</i>
	<i>3</i>	<i>N/A</i>	<i>3-TOC</i>	<i>N/A</i>	<i>N/A</i>	

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
		<i>X</i>		

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	0	CLAY, some silt, some fragments of chert and limestone, gravel to cobble size, grayish brown (10YR, 5/2), damp, soft to medium stiffness, trace plasticity, organics in top 1'	0.0	N/A	1410: SB-11-0-1 SB-11-0-1-MS SB-11-0-1-MSD	N/A	1340: Trout begins drilling w/ 4" dia bit & sampler and 6" dia bit & overcasing
	1		0.0				
	2		0.0				
	3	LIMESTONE, mixed with clay, bluish gray to gray chert fragments, yellowish gray (5Y, 6/1) to light olive gray (5Y, 6/1), strong, weathered, fragmented gravel to cobble sized	0.0				
	4		0.0				
	5	CLAY, some limestone fragments, dark grayish brown (10YR, 4/2), stiff, damp & medium plasticity	1.6				

HTW DRILLING LOG

HOLE NO.
MW-125

PROJECT
Forbes Atlas S-5

INSPECTOR
J. Bryant

SHEET *2*
OF *5* SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	5	CLAY, some limestone fragments, dark grayish brown (10YR, 4/2), stiff, damp, medium plasticity	1.6	N/A	SB-11-5-6 <u>DUP-1/3B</u>	N/A	<u>1425</u> : sample 5-6' 6) 5
	6		0.0				
	7	SHALE, dusky yellow (5Y, 6/4), yellow to gray mottling and laminar, weak, moderately weathered	0.0				
	8		0.0				
	9		0.0				
	10		0.0				
	11		0.0				
	12		0.0				
	13		11.1				
	14		27.5				

HTW DRILLING LOG

HOLE NO.
MW-125
SHEET 3
OF 5 SHEETS

PROJECT Forbes Atlas S-5

INSPECTOR J. Bizout

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEO TECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	14	SHALE, dusky yellow (5Y, 4/4), yellow to gray mottling and laminar, weak, moderately weathered	27.5	N/A	SB-11-14-15	N/A	1440: sample 14-15' bgs
	15	LIMESTONE, with interbedded shale, dark gray (N4) to light olive gray (5Y, 4/1), strong, moderately weathered	11.7				
	16		0.0				
	17	LIMESTONE, pale yellowish brown (10YR, 6/2) with light bluish gray to dark gray chert nodules, strong, moderately weathered,	0.0				
	18	mostly fragmented in upper 2'.	0.0				
	19	LIMESTONE, very light gray (N9), chalky, weak, highly weathered, bluish gray to black chert nodules	0.0				
	20	LIMESTONE, light brownish gray (5YR, 4/1), strong, slightly moderately weathered, occasional small vugs	0.0				
	21		0.0				
	22		0.0				
	23	LIMESTONE, light bluish gray (5B7/1) to light brownish gray (5YR, 4/1), bluish gray chert nodules, strong, slightly weathered, small vugs	0.0				

HTW DRILLING LOG

HOLE NO.

MW-125

PROJECT

Forbes Atlas S-5

INSPECTOR

J. Bryant

SHEET 4

OF 5 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	23	LIMESTONE, light bluish gray (5B, 7/1) to light brownish gray (5YR, 6/1), bluish gray chert nodules, strong, slightly weathered, occasional small vugs	0.0	N/A	N/A	N/A	
	24		0.0				
	25	SHALE, medium dark gray (N4), moderately strong to weak, slightly to moderately weathered, crinoids, shell fragments	0.0				
		TD = 25' bgs					1435; Trant stops @ 25' bgs. Trant installs well to 25' bgs. Details next page.

HTW DRILLING LOG

HOLE NO.
MW-125

PROJECT
Forbes Atlas S-5

INSPECTOR
J. Bryant

SHEET 5
OF 5 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
							<p>MW-125 Details</p> <p><u>Material:</u> 2" dia, Sch 40 PVC</p> <p><u>Cap:</u> Flat</p> <p><u>Screen:</u> 2" dia, 0.020" factory slotted PVC</p> <p><u>Manufacturer:</u> Johnson</p> <p><u>Lengths</u></p> <p>Cap: 0.15</p> <p>Screen: 10.00</p> <p>Riser: 10.05 10.05</p> <p>Total: 30.25'</p> <p>Cut off: 3.22'</p> <p>Stickup: 2.03'</p> <p><u>Filter Pack:</u> Premier silica 20/40 silica sand 25-12' bgs Used 8 - 50# bgs</p> <p><u>Seal:</u> Halliburton 3/8" Bentonite chips - hydrated in 1' bths 12-2' bgs Used 4 - 50# bgs</p> <p><u>Surface</u> 3x3' cement pad 4 Bollards Orange paint</p>

HTW DRILLING LOG

HOLE NO.
MW-135

1. COMPANY NAME
Burns & McDonnell & Avatar

2. DRILLING SUBCONTRACTOR
Traut Well

SHEET 1
OF 4 SHEETS

3. PROJECT
Forbes Atlas S-5

4. LOCATION
Forbes Atlas S-5 site - Lyon Co.

5. NAME OF DRILLER
Nathan Stebbins

6. MANUFACTURER'S DESIGNATION OF DRILL
Verza Drill V-100

7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT

4" dia bit
4" dia - single wall sampler
6" dia bit
6" dia casing

8. HOLE LOCATION

9. SURFACE ELEVATION

10. DATE STARTED
6-1-16

11. DATE COMPLETED
6-1-16

12. OVERBURDEN THICKNESS
1.5'

15. DEPTH GROUNDWATER ENCOUNTERED
See Remarks

13. DEPTH DRILLED INTO ROCK
18.5'

16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED
7.10' btoe, 60 hrs

14. TOTAL DEPTH OF HOLE
20'

17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)
N/A

18. GEOTECHNICAL SAMPLES

DISTURBED
N/A

UNDISTURBED
N/A

19. TOTAL NUMBER OF CORE BOXES
N/A

20. SAMPLES FOR CHEMICAL ANALYSIS

VOC
3

METALS
N/A
3 - JB

OTHER (SPECIFY)
3 - TOC

OTHER (SPECIFY)
NA

OTHER (SPECIFY)
N/A

21. TOTAL CORE RECOVERY
100 %

22. DISPOSITION OF HOLE

BACKFILLED

MONITORING WELL
X

OTHER (SPECIFY)

23. SIGNATURE OF INSPECTOR
[Signature]

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	0	<i>CLAY, some with limestone fragments, dark grayish brown (10YR, 4/6), damp, medium stiffness, trace plasticity</i>	<i>0.0</i>	<i>N/A</i>	<i>SB-12-0-1</i>	<i>N/A</i>	<i>1140: Start</i> <i>1220: Sample</i> <i>0-1' by 5</i>
	1	<i>- mixed with olive shale</i>	<i>0.0</i>				
	2	<i>SHALE, dusky yellow (5Y, 6/4) with yellow and gray mottling and laminar, wean, highly weathered</i>	<i>0.0</i>				
	3		<i>0.0</i>				
	4	<i>- calcite nodules 4-5' by 5</i>	<i>0.0</i>		<i>SB-12-3-1</i>		<i>1230: Sample</i> <i>3-4' by 5</i>
	5		<i>0.0</i>				

HTW DRILLING LOG

HOLE NO.
MW-135

PROJECT
Forbes Atlas S-5

INSPECTOR
J. Bryant

SHEET 2
OF 4 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	5	SHALE, dusky yellow (5Y, 6/2) with yellow and gray mottling and laminae, weak, highly weathered	0.0	N/A		N/A	
	6		0.0		SB-12-6-7		1240: Sample 6-7' bjs
	7	LIMESTONE, with interbedded shale, dark gray (N4) to light olive gray (5Y, 6/1), strong, moderately weathered, a few crinoids & small chert nodules	0.0				
	8	LIMESTONE, pale yellowish brown (10YR, 6/2) with light bluish gray to dark gray chert nodules, strong, moderately weathered, fragmented oxidation and small vugs 8.5-9'	0.0				
	9	LIMESTONE, very light gray (N9), chalky, weak, highly weathered, bluish gray chert nodules, oxidation present - several small vugs 9.8-10' bjs	0.0				
	10	LIMESTONE, light bluish gray (5B, 7/1) to yellowish gray (5Y, 8/1), strong, weathered, fractured, oxidation present	0.0				1153 1200
	11		0.0				
	12	LIMESTONE, yellowish gray (5Y, 8/1), weak, weathered, light bluish gray to medium gray chert nodules	0.0				
	13		0.0				
	14		0.0				

HTW DRILLING LOG

HOLE NO.
MW-135
SHEET 5
OF 4 SHEETS

PROJECT
Forbes Atlas S-5

INSPECTOR
J. Bryant

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	14	LIMESTONE, yellowish gray (5Y, 8/1) with bright bluish gray to medium gray chert nodules, wear, weathered	0.0	N/A	N/A	N/A	
	15		0.0				
		SHALE, light olive gray (5Y, 6/1), wear, unweathered to highly weathered	0.0				
	16	LIMESTONE, pale yellowish brown (10YR, 6/2) to light olive gray (5Y, 6/1), strong, slightly to moderately weathered, medium light gray chert nodules	0.0				
	17		0.0				
		- oxidation present in bottom ~ 3-4 inches					
	18	SHALE, medium dark gray (N4), wear to moderately strong, moderately weathered, fossiliferous	0.0				
	19		0.0				
	20		0.0				1250
		TDC = 20' bgs					1250: Traut stops @ 20' bgs. Base of target formation is 18' bgs. Traut sets well to 18' bgs. Details next page.
	21						
	22						
	23						

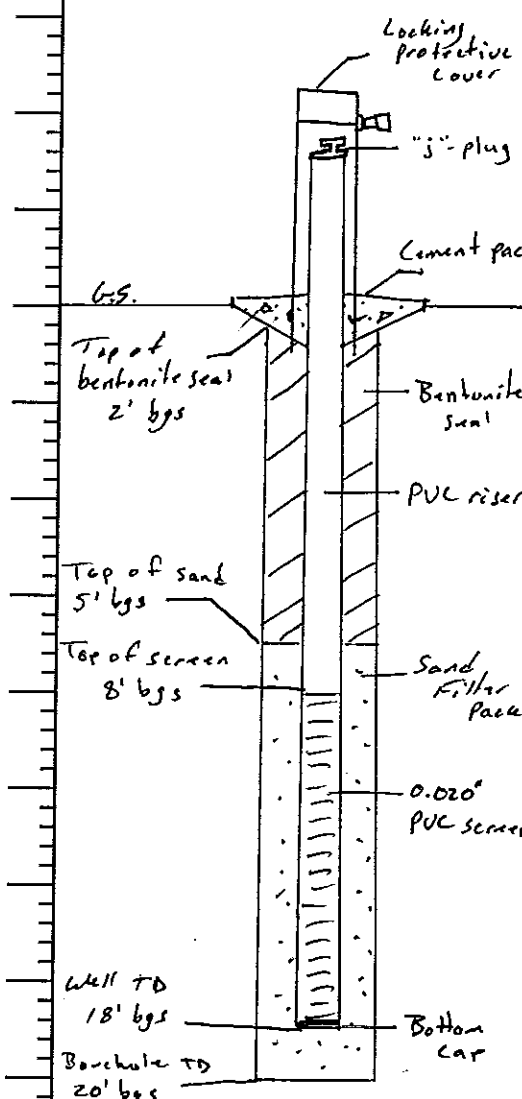
HTW DRILLING LOG

HOLE NO.
MW-135

PROJECT
Forbes Atlas S-5

INSPECTOR
J. Bryant

SHEET 4
OF 4 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
							<p><u>MW-135 Details</u></p> <p>Material: 2" dia, Sch 40 PVC</p> <p>- Johnson cap: flat</p> <p>Screen: 2" dia, 0.020" factory slotted pvc</p> <p><u>Lengths</u></p> <p>Cap: 0.22 Screen: 10.05 Riser: 10.06 Total: 20.33 Cutoff: 0.57' Stickup: 1.76'</p> <p><u>Filter pack:</u> Premier Silica 20/40 silica sand 20-5' bgs used 7-50# bags</p> <p><u>Seal:</u> Halliburton 3/8" bentonite chips 5-2' bgs. used 1-50# bag</p> <p><u>Surface</u> 3 x 3' cement pad 4 bollards orange paint</p>

HTW DRILLING LOG

HOLE NO.

SB-02

1. COMPANY NAME

Burns & McDonnell

2. DRILLING SUBCONTRACTOR

Trant

SHEET 1

OF 4 SHEETS

3. PROJECT

Forbes Atlas S-5

4. LOCATION

S-5 E of Council Grove

5. NAME OF DRILLER

Nate Stebbins

6. MANUFACTURER'S DESIGNATION OF DRILL

Versa Sonic V100

7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT

 4" dia bit
 4" dia double wall barrel
 6" dia core drill casing
 6" dia bit
 4" dia single wall sampler

8. HOLE LOCATION

9. SURFACE ELEVATION

10. DATE STARTED

5-15-15

11. DATE COMPLETED

5-15-15

12. OVERBURDEN THICKNESS

9'

15. DEPTH GROUNDWATER ENCOUNTERED

See Remarks

13. DEPTH DRILLED INTO ROCK

21'

16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED

N/A

14. TOTAL DEPTH OF HOLE

30'

17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)

N/A

18. GEOTECHNICAL SAMPLES

DISTURBED

N/A

UNDISTURBED

N/A

19. TOTAL NUMBER OF CORE BOXES

N/A

20. SAMPLES FOR CHEMICAL ANALYSIS

VOC

METALS

OTHER (SPECIFY)

OTHER (SPECIFY)

OTHER (SPECIFY)

21. TOTAL CORE RECOVERY

4

N/A

4 (TOC)

N/A

N/A

100 %

22. DISPOSITION OF HOLE

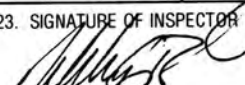
BACKFILLED

MONITORING WELL

OTHER (SPECIFY)

23. SIGNATURE OF INSPECTOR

X



ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	0	CLAY, some silt, some coarse sand, some limestone fragments, gray (57, 5/1), damp to moist, soft, medium plasticity	0.0		0920 SB-0-1 SB-02/01 JB		5-15-15 @ 0906 : Trant begins drilling w/ 4" dia bit & single wall sampler.
	1		0.5				
	2	-increased sand content (with coarse sand)	0.7		0940 SB-2-3 SB-02/23 JB		
	3	CLAY, some silt, some medium sand, some limestone fragments, grayish brown (107R, 5/2), damp, stiff, medium plasticity, occasional dark gray mottling @ bands	0.9				
	4		0.6				
	5		0.5				0909

HTW DRILLING LOG

HOLE NO.
SB-02

PROJECT
Forbes Atlas S-5

INSPECTOR
J. Bryant

SHEET 2
OF 4 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	5	CLAY, brown (5YR, 4/4), damp, hard, medium plasticity, occasional CALICHE deposits, some gray mottling, oxidation present	0.0				change @ 5' by
	6		0.0				
	7		0.9				
	8	- becoming shaly - abundant CALICHE from 8-9' by	4.3				
	9		3.3		SB-02/SB-8-9		
	10	LIMESTONE, yellowish gray (5Y, 7/2), very strong, slightly weathered. chert present	2.4				ONS 0919
	11	SHALE, dusky yellow (5Y, 6/4), weak, moderately weathered	0.0				
	12		0.0				
	13		0.0				
	14	SHALE, yellow gray (5Y, 7/2), moderately weak, slightly weathered	0.0				

HTW DRILLING LOG

HOLE NO.

SB-02

PROJECT

Forbes Atlas S-5

INSPECTOR

J. Bryant

SHEET 3

OF 4 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	14	SHALE, yellow gray (5Y, 7/2), Moderately weak, slightly weathered	0.0				
	15	SHALEY SAND, yellowish gray (5Y, 7/2), dense, medium to coarse, poorly graded, sub angular to angular	0.0				0943 - Drilling 0947 hard. Trant begins using 4" drill wall of 6" dia drill over drill casing
	16		0.0				
	17		0.0				
	18	SHALE, light olive gray (5Y, 5/2), weak, slightly weathered	0.0				
	19		0.0				
	20	LIMESTONE, dark gray (N3), Some chert nodules and medium sand grain inclusions, very strong, slightly weathered	0.0				0945 1010 1019
	21	LIMESTONE, pale yellowish brown (10YR, 6/2), strong, fresh, fossiliferous	0.0				
	22	LIMESTONE, yellowish gray (5Y, 7/2), strong, slightly weathered, oxidation present, some small fossils	0.0				
	23	- becoming cherty	0.0				

HTW DRILLING LOG

HOLE NO.

SB-02

PROJECT

Forbes Atlas S-5

INSPECTOR

J. Bryant

SHEET 4

OF 4 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	23	Limestone, with chert, yellowish gray (5Y, 7/6), medium gray (N5)	0.0				
	24	Chert, strong, slightly weathered, oxidation present, some small fossils	0.0				24-25' very easy drilling
	25	Limestone, interbedded with shale, highly weathered, pale yellowish orange (10YR, 8/6), strong limestone, very weak shale, slightly slightly weathered	0.0		1150 SB-02/SB-25-26		Possible groundwater 25-26' bgs - oxidation present
	26	Limestone, with chert, yellowish gray (5Y, 8/1), medium dark gray chert (N4), strong, fresh	0.0				
	27		0.0				
	28	- chert becomes darker (Dark gray (N3))	0.0				
	29	Limestone, with chert, medium gray (N5), strong, fresh	0.0				
	30	TW = 30' bgs	0.0				1045: Traut stops @ 30' bgs Traut backfills borehole w/ bentonite chips.

HTW DRILLING LOG

HOLE NO.

SB03

1. COMPANY NAME

Burns & McDonnell

2. DRILLING SUBCONTRACTOR

Trout Drilling

SHEET 1

OF 4 SHEETS

3. PROJECT

Forbes Atlas S-5

4. LOCATION

S-5, E of Council Grove, KS

5. NAME OF DRILLER

Nate Stebbins

6. MANUFACTURER'S DESIGNATION OF DRILL

Voss Sonic U100

7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT

 4" dia bit
 4" dia single wall sample barrel
 4" dia double wall sample barrel
 6" dia bit
 4" dia overdrill casing

8. HOLE LOCATION

9. SURFACE ELEVATION

10. DATE STARTED

5-18-15

11. DATE COMPLETED

5-18-15

12. OVERBURDEN THICKNESS

4'

15. DEPTH GROUNDWATER ENCOUNTERED

See Remarks

13. DEPTH DRILLED INTO ROCK

26'

16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED

N/A

14. TOTAL DEPTH OF HOLE

30'

17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)

N/A

18. GEOTECHNICAL SAMPLES

DISTURBED

n/a

UNDISTURBED

n/a

19. TOTAL NUMBER OF CORE BOXES

n/a

20. SAMPLES FOR CHEMICAL ANALYSIS

VOC

METALS

OTHER (SPECIFY)

OTHER (SPECIFY)

OTHER (SPECIFY)

21. TOTAL CORE RECOVERY

6

n/a

C-TOC

n/a

n/a

100 %

22. DISPOSITION OF HOLE

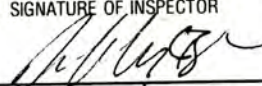
BACKFILLED

MONITORING WELL

OTHER (SPECIFY)

23. SIGNATURE OF INSPECTOR

X



ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	0	CLAY, trace silt, trace fine sand, very dark gray (10YR, 3/1), damp, medium stiffness, high plasticity, organics present - some coarse sand present	0.0		1145 SB-03/SB-03-0-1 SB-03/SB-03-0-1-MS SB-03/SB-03-0-1-MSD		5-18-15 @ 1115: Trout begins drilling w/ 4" dia bit & 4" dia single wall sample barrel
	1	CLAY, mottled olive gray (5Y, 5/2) to dark gray (5Y, 4/1), damp, stiff, trace plasticity, oxidation present	0.0				
	2	CLAY, brown (7.5YR, 4/3), damp, stiff, medium plasticity	0.0				
	3	CLAY, with coarse sand, dark grayish brown (N7YR, 4/2), ^{moist} soft, non-plastic Limestone fragments & gravel present	0.0		1230 SB-03/SB-03-3-4		
	4	SHALE, light olive brown (2.5Y, 5/6), damp, weak, moderately weathered	0.0				
	5		0.0				1120

PROJECT

Forbes Atlas S-5

HOLE NO.

SB-03

HTW DRILLING LOG

HOLE NO.
SB-03

PROJECT
Forbes Atlas 5-5

INSPECTOR
S. Bryant

SHEET 2
OF 4 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	5	LIMESTONE, medium dark gray (N4), strong, slightly weathered, small calcite crystals throughout	0.0				1121
	6	SHALE, dusky yellow (5Y, 6/4), moderately strong, slightly weathered, oxidation present	0.0				
	7		0.0				
	8		0.0				
	9	becoming weathered & weak, & light olive gray (5Y, 5/2)	0.0		1240 SB-03/SB-03-9-10		
	10		0.0				1127 1129
	11		0.0				
	12		0.0		1250 SB-03/SB-03-11-12 Dup-2/SB		
	13	SHALE, mottled moderate yellow (5Y, 7/6) to olive gray (5Y, 4/1), moderately strong, slightly weathered	0.0				
	14		0.0				

HTW DRILLING LOG

HOLE NO.
SB-03

PROJECT
Forbes Atlas S-5

INSPECTOR
J. Bryant

SHEET 3
OF 4 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	14	SHALE, mottled moderate yellow (5Y, 8/6) to olive gray (5Y, 4/1), weak, weathered	0.0		1300 SB-03/SB-03-14-15		Change @ 14'
	15	- becoming strong, slightly weathered	0.0				
	16		0.0				
	17	SHALE, mottled medium gray (N5) to grayish yellow (5Y, 8/4), moderately strong, slightly weathered	0.0				
	18	- weak, weathered	0.0		1310 SB-03/SB-03-18-19		
	19	SHALE, medium gray (N5), moderately strong, fresh	0.0				
	20	LIMESTONE, mottled pale yellowish brown (10YR, 6/2) to medium light gray (N6), strong, slightly weathered, fossiliferous	0.0				135 104 - driller sets 6" dia overdrill casing & begins casing 4" dia double wall sampler barrel
	21	- becoming yellowish gray (5Y, 7/2)	0.0				
	22	LIMESTONE, yellowish gray (5Y, 7/2) to light bluish gray (5B, 7/1), strong, fresh	0.0				
	23		0.0				

HTW DRILLING LOG

HOLE NO.
SB-03

PROJECT
Forbes Atlas S-5

INSPECTOR
J. B. Trout

SHEET 4
OF 4 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	23	LIMESTONE, yellowish gray (SY, 7/2) to light bluish gray (SB, 7/1), strong, fresh	0.0				
	24	- slightly weathered	0.0				
	25		0.0				
	26		0.0				
	27	LIMESTONE, chunky, yellowish gray (SY, 7/2) to light bluish gray (SB, 7/1), strong, slightly weathered	0.0				
	28		0.0				
	29	LIMESTONE, light olive gray (SY, 6/1) to medium dark gray (N4), strong, slightly weathered, small spots chert nodules	0.0				
	30		0.0				1220
		TD = 30' bgs					1220: Trout stops @ 30' bgs. Trout backfills boring w/ bentonite. No groundwater observed

HTW DRILLING LOG

HOLE NO.
5B-05

1. COMPANY NAME <i>Avatar / Burns & McDonnell</i>		2. DRILLING SUBCONTRACTOR <i>Trout Drilling</i>		SHEET 1 OF 2 SHEETS	
3. PROJECT <i>Forbes Atlas S-5</i>			4. LOCATION <i>S-5, E of Council Grove, KS</i>		
5. NAME OF DRILLER <i>Nate Stebbing</i>			6. MANUFACTURER'S DESIGNATION OF DRILL <i>Versa Drill U100</i>		
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT		4" dia double wall sampler		8. HOLE LOCATION	
		4" dia drill bit		9. SURFACE ELEVATION	
				10. DATE STARTED <i>5-14-15</i>	
				11. DATE COMPLETED <i>5-14-15</i>	
12. OVERBURDEN THICKNESS <i>4</i>		15. DEPTH GROUNDWATER ENCOUNTERED <i>See Remarks</i>			
13. DEPTH DRILLED INTO ROCK <i>5</i>		16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED <i>N/A</i>			
14. TOTAL DEPTH OF HOLE <i>9'</i>		17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY) <i>N/A</i>			
18. GEOTECHNICAL SAMPLES		DISTURBED <i>N/A</i>	UNDISTURBED <i>N/A</i>	19. TOTAL NUMBER OF CORE BOXES <i>N/A</i>	
20. SAMPLES FOR CHEMICAL ANALYSIS		VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)
		<i>2</i>	<i>N/A</i>	<i>2 (TOC)</i>	<i>N/A</i>
21. TOTAL CORE RECOVERY <i>100 %</i>		OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	
22. DISPOSITION OF HOLE		BACKFILLED <i>X</i>	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR <i>[Signature]</i>

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	0	CLAY, with silt, light brownish gray (10%R, 4%), damp, soft, medium plasticity, organics and abundant rock fragments	0.0		1715 5B-05-0-2		5-14-15 @ 1639: Trout begins drilling w/ 4" bit & 4" double wall sampler
	1	CLAY, some silt, very dark gray (10%R, 3%), damp, soft, high plasticity, organics and rock fragments abundant	0.0				
	2		0.0		1725 5B-05-1.5-2.5 dep-1-5B		
	3	CLAY, with coarse sand and fine gravel, weak red (2.5%R, 4%), damp, soft, medium plasticity	0.0				
	4	CLAY, limestone fragments, chert nodules, olive yellow (2.5%R, 6%), dry, medium stiffness, medium plasticity	0.0				
	5	SHALE, olive yellow (2.5%R, 6%), weak, weathered	0.0				

HTW DRILLING LOG

HOLE NO.
SB-05

PROJECT
Forbes Atlas 5-5

INSPECTOR
J. Bryant

SHEET 2
OF 2 SHEETS

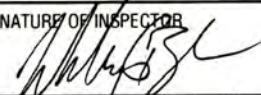
ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	5	LIMESTONE, thin shale interbeds, moderate yellowish brown (10YR, 5/4), strong, slightly weathered	0.0				change @ 5'
	6		1.2				
	7	SHALE, moderate yellowish brown (10YR, 5/4), strong, slightly weathered	1.3				
	8		1.2				
	8	LIMESTONE, with chert, moderate yellowish brown (10YR, 5/4), medium light gray (N6) chert, strong, fresh					
	9						1700' Traut stops @ 9' bgs.
	10						- Traut backfills borehole w/ bentonite chips.
	11						- No groundwater observed
	12						
	13						
	14						

PROJECT
Forbes Atlas 5-5

HOLE NO.
SB-05

HTW DRILLING LOG

HOLE NO.
SB-05R

1. COMPANY NAME <i>Burns & McDonnell</i>		2. DRILLING SUBCONTRACTOR <i>Traut Drilling</i>		SHEET 1 OF 4 SHEETS		
3. PROJECT <i>Forbes Atlas S-5</i>			4. LOCATION <i>S-5 E of Council Grove</i>			
5. NAME OF DRILLER <i>Nate Stebbins</i>			6. MANUFACTURER'S DESIGNATION OF DRILL <i>Versa Sonic V100</i>			
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT		4" dia double wall sampler		8. HOLE LOCATION		
		4" dia bit		9. SURFACE ELEVATION		
		6" dia bit				
		6" dia overdrill casing				
10. DATE STARTED <i>5-15-15</i>		11. DATE COMPLETED <i>5-15-15</i>				
12. OVERBURDEN THICKNESS <i>4'</i>			15. DEPTH GROUNDWATER ENCOUNTERED <i>See remarks</i>			
13. DEPTH DRILLED INTO ROCK <i>26'</i>			16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED <i>N/A</i>			
14. TOTAL DEPTH OF HOLE <i>30'</i>			17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY) <i>N/A</i>			
18. GEOTECHNICAL SAMPLES		DISTURBED <i>N/A</i>	UNDISTURBED <i>N/A</i>	19. TOTAL NUMBER OF CORE BOXES <i>N/A</i>		
20. SAMPLES FOR CHEMICAL ANALYSIS		VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY <i>100%</i>
		<i>2</i>	<i>N/A</i>	<i>2 (TOC)</i>	<i>N/A</i>	
22. DISPOSITION OF HOLE		BACKFILLED <i>X</i>	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR 	

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	0	CLAY, with silt, light brownish gray (107R, 6/6), damp, soft, medium plasticity, organics and abundant rock fragments present	0.0				5-15-15 @ 1430: Traut begins drilling w/ 4" dia bit and 4" dia double wall sampler
	1	CLAY, some silt, very dark gray (104R, 3/1), damp, soft, high plasticity, organics and abundant rock fragments	0.0				
	2		0.0				
	3	CLAY, limestone fragments, chert nodules, olive yellow (2.57, 4/6), dry, medium stiffness, medium plasticity	6.0				
	4	SHALE, olive yellow (2.57, 6/6), weak, weathered	0.0				
	5		6.0				

HTW DRILLING LOG

HOLE NO.
SB-05R

PROJECT
Forbes Atlas S-5

INSPECTOR
J. Bryant

SHEET 2
OF 4 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	5	LIMESTONE, with chert, moderate yellowish brown (10YR, 5/4), strong, slightly weathered	0.0				Change @ 5'
	6	SANDY SAND, with gravel, moderate yellowish brown (10YR, 5/4), loose, coarse, poorly graded, angular	0.0				
	6	SHALE, moderate yellowish brown (10YR, 5/4), strong, slightly weathered	0.0				
	7		0.0				
	8		0.0				
	9	LIMESTONE, some chert, moderate yellowish brown (10YR, 5/4), strong, slightly weathered, few solution cavities	0.0				1439 1441
	9	SHALE, dusky yellow (5Y, 6/4), strong, fresh	0.0				Hard drilling 9-20'
	10		0.0				
	11	- slightly weathered, some oxidation present	0.0				
	12		0.0				
	13		0.0				
	14						

1545
SB-05R/SB-12-12
SB-05R/SB-12-13 MS
SB-05R/SB-12-13 MSD

HTW DRILLING LOG

HOLE NO.
SB-05R

PROJECT
Forbes Atlas S-S

INSPECTOR
J. Bryant

SHEET 3
OF 4 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	14	SHALE, dusky yellow (5Y, 6/4), strong, slightly weathered, some oxidation present	0.0				
	15	SHALE, dark gray (N3), strong, fresh, thin laminae, moderate yellow (5Y, 7/6)	0.0				1513 1536
	16		0.0				
	17		0.0				
	18		0.0				
	19		0.0				
	20	thinly interbedded with weak, weathered shale	0.0		1640 SB-05R/SB-20-21		1558 1605 Hard drilling 20-30'
	21		0.0				
	22	LIMESTONE, mottled medium dark gray (N4) to yellowish gray (5Y, 7/6), with thin interbeds of medium dark gray (N4) shale, strong, fresh	0.0				
	23		0.0				

HTW DRILLING LOG

HOLE NO.
SB-05R

PROJECT Forbes Atlas S-5

INSPECTOR J. Bryant

SHEET 4
OF 4 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	23	LIMESTONE, with thin dark gray shale interbeds, mottled medium dark gray (N4) to yellowish gray (5Y, 7/6), strong, fresh	0.0				
	24		0.0				
	25	LIMESTONE, with light bluish gray (5B, 7/1) chert, light gray (N7), strong, slightly weathered	0.0				
	26	LIMESTONE, pale yellowish orange (10YR, 6/6), strong, slightly weathered, oxidation present, thin, light gray (N7) shale interbeds	0.0				
	27	LIMESTONE, yellowish gray (5Y, 7/2), weak, highly weathered, oxidation present	0.0				
	28	LIMESTONE, yellowish gray (5Y, 7/2), moderately strong, slightly weathered, some small fossils - chert present, light bluish gray (5B, 7/1)	0.0				
	29		0.0				
	30		0.0				
		TD = 30' bgs					1628: Trant Stops @ 30' bgs - Abandon boring w/ bentonite. - No groundwater observed

HTW DRILLING LOG

HOLE NO.
SB-06
SHEET 1
OF 3 SHEETS

1. COMPANY NAME <i>Burns & McDonnell</i>		2. DRILLING SUBCONTRACTOR <i>Traut Drilling</i>	
3. PROJECT <i>Furber Atlas S-5</i>		4. LOCATION <i>S-5 E. of Council Grove, KS</i>	
5. NAME OF DRILLER <i>Nate Stebbins</i>		6. MANUFACTURER'S DESIGNATION OF DRILL <i>Versa Sonic U100</i>	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	4" dia double wall sampler		8. HOLE LOCATION
	4" dia drill stem & bit		
	6" dia bit		
	6" dia casing		
9. SURFACE ELEVATION		10. DATE STARTED <i>5-14-15</i>	
11. DATE COMPLETED <i>5-14-15</i>		12. OVERBURDEN THICKNESS <i>2'</i>	
13. DEPTH DRILLED INTO ROCK <i>19'</i>		15. DEPTH GROUNDWATER ENCOUNTERED <i>See remarks</i>	
14. TOTAL DEPTH OF HOLE <i>21'</i>		16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED <i>N/A</i>	
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY) <i>N/A</i>		18. GEOTECHNICAL SAMPLES	
DISTURBED <i>N/A</i>		UNDISTURBED <i>N/A</i>	
19. TOTAL NUMBER OF CORE BOXES <i>N/A</i>		20. SAMPLES FOR CHEMICAL ANALYSIS	
VOC <i>2</i>		METALS <i>N/A</i>	
OTHER (SPECIFY) <i>2 (TOC)</i>		OTHER (SPECIFY) <i>N/A</i>	
OTHER (SPECIFY) <i>N/A</i>		21. TOTAL CORE RECOVERY <i>100 %</i>	
22. DISPOSITION OF HOLE		23. SIGNATURE OF INSPECTOR	
BACKFILLED <i>X</i>		MONITORING WELL	
OTHER (SPECIFY)		<i>[Signature]</i>	

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	0	CLAY, with fine gravel, some silt, light brownish gray (10%R, 6%L), damp, stiff, trace plasticity	0.0		<i>1845</i> <i>SB-06-0-1</i>		5-14-15: 1730: Traut begins drilling w/ 4" dia bit & 4" dia double walled sampler
	1	CLAY, some silt, yellowish red (5%R, 5%L), damp, medium stiffness, medium plasticity	0.0		<i>1855</i> <i>SB-06-1-2</i>		
	2	LEIMESTONE, with chert, yellowish gray (5%R, 8%L), medium gray chert (N5), strong, moderately weathered	0.0				
	3	SHALE, moderate yellow (5%R, 7%L), weak, weathered	0.0				
	4		0.0				
	5		0.0				

HTW DRILLING LOG

HOLE NO.
SB-06

PROJECT
Forbes Atlas 5-5

INSPECTOR
J. Bryant

SHEET 2
OF 3 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	5	LIMESTONE, with chert, yellowish gray (5Y, 8/1), light gray (N7) chert, strong, slightly weathered	0.0				change @ 5' hrs
	6	SHALE, dusky yellow (5Y, 6/4), strong, fresh	0.6				
	7		0.3				
	8		0.6				
	9		1.7				
	10		0.0				
	11		0.0				
	12		0.2				
	13		0.2				
	14		0.4				

HTW DRILLING LOG

HOLE NO.
SB-06
SHEET 3
OF 3 SHEETS


PROJECT Forbes Atlas S-S

INSPECTOR J. Bryant

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	14	SHALE, yellowish gray (5Y, 7/2), moderately strong, slightly weathered, occasional oxidation present	0.0				change @ 14'
	15		0.0				
	16		0.0				
	17	- gray discoloration present	0.0				
	18	Interbedded SHALE and LIMESTONE, gray to yellowish gray (5Y, 7/4) shale, weak, slightly weathered,	0.0				
	19	yellowish gray (5Y, 8/1) cherty limestone, strong, slightly weathered	0.0				
	20	SHALE, medium dark gray (2.5Y, 7/6) with moderate yellow (5Y, 7/6) mottling & laminae, strong, fresh to slightly weathered	0.0				
	21	TD = 21' bgs					1750: Traut stops @ 21' bgs. - Traut backfills borehole w/ bentonite chips. - no groundwater observed

HTW DRILLING LOG

 HOLE NO.
 513-07

1. COMPANY NAME <i>BURNS AND McDONNELL</i>		2. DRILLING SUBCONTRACTOR <i>TRAUT</i>		SHEET 1 OF 4 SHEETS		
3. PROJECT <i>FORBES ATLAS 5-5</i>			4. LOCATION <i>5-5, East of Council Grounds</i>			
5. NAME OF DRILLER <i>NATE STARBINS</i>			6. MANUFACTURER'S DESIGNATION OF DRILL <i>VERSA SONIC V100</i>			
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	4" DIA BIT		8. HOLE LOCATION			
	4" DIA SINGLE BARREL SAMPLER					
	4" DOUBLE BARREL SAMPLER					
	6" DIA BIT					
6" DIA CASING		9. SURFACE ELEVATION		11. DATE COMPLETED <i>5-18-15</i>		
10. DATE STARTED <i>5-18-15</i>		12. OVERBURDEN THICKNESS <i>2.5 FT</i>				
13. DEPTH DRILLED INTO ROCK <i>27.5 FT</i>		15. DEPTH GROUNDWATER ENCOUNTERED <i>SEE REMARKS</i>				
14. TOTAL DEPTH OF HOLE <i>30 FT.</i>		16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED <i>N/A</i>				
18. GEOTECHNICAL SAMPLES		DISTURBED <i>N/A</i>	UNDISTURBED <i>N/A</i>	19. TOTAL NUMBER OF CORE BOXES <i>N/A</i>		
20. SAMPLES FOR CHEMICAL ANALYSIS		VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)
		<i>6</i>	<i>N/A</i>	<i>6-TOC</i>	<i>N/A</i>	<i>N/A</i>
21. TOTAL CORE RECOVERY <i>100 %</i>		22. DISPOSITION OF HOLE		23. SIGNATURE OF INSPECTOR		
		BACKFILLED	MONITORING WELL	OTHER (SPECIFY)		
		<i>X</i>				

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	0	CLAY TRACER SILT VERY DARK GRAYISH BROWN (10yr 3/2), DAMP, MEDIUM STIFFNESS, HIGH PLASTICITY, ORGANICS, LARGE LIMESTONE FRAGMENTS, LIGHT BROWN (5yr 5/6), VERY STRONG SLIGHTLY WEATHERED	0.00		<i>1520</i> <i>58-07-0-1</i>		<i>5-18-15 @ 1506: Traut begins drilling w/ 4" dia bit & 4" dia single wall sampler</i>
	1	CLAY, TRACER GRAVEL, YELLOWISH BROWN (10yr 5/6), DAMP, LIMESTONE FRAGMENTS PRESENT ANGULAR GRAIN, OXIDATION STAINING ON FRAGMENTS	0.00				
	2	SHALY LIMESTONE PREDOMINANTLY SHALE W/ LIMESTONE FRAGMENTS THROUGHOUT, SHALE IS LIGHT OLIVE BROWN (5yr 5/6), SLIGHTLY WEATHERED, STIFF.	0.00		<i>1530</i> <i>58-07-3-4</i>		
	3	LIMESTONE VERY LIGHT GRAY (NG) VERY HARD, MODERATELY WEATHERED	0.00				
	4		0.00				
	5		0.00				<i>1507</i>

HTW DRILLING LOG

HOLE NO.
SB-07

PROJECT
Forbes Atlas S-5

INSPECTOR
J. B. Teat

SHEET 2
OF 4 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	5	SHALY LIMESTONE, PREDOMINANTLY SHALE W/ LIMESTONE FRAGMENTS THROUGHOUT. SHALE IS LIGHT OLIVE BROWN (5y 5/6), STIFF, SLIGHTLY WEATHERED.	0.00				1508 DRILLER BEGINS USING QUICK GEL IN DRILLING FLUID
	6	LIMESTONE INCLUSIONS VARY LIGHT GRAY (N8) VARY HARD, MODERATELY WEATHERED	0.00				
	7		0.00				
	8		0.00				
	9		0.00		1535 SB-07-9-10		
	10	SHALE LIGHT OLIVE BROWN (5y 5/6) SLIGHTLY WEATHERED WEAK	0.00				1510 CONTINUES DRILLING 1543 10'-14' RECOVERED DRILLER BEGINS USING 6" CASING
	11		0.00				
	12	SHALE MEDIUM DARK GRAY (N4) SLIGHTLY WEATHERED, STIFF,	0.00		1630 SB-07-12-13		
	13	LIMESTONE MEDIUM GRAY. (N5) STRONG, FRESH, NO EVIDENT WEATHERING	0.00				
	14						

HTW DRILLING LOG

HOLE NO.
SB-07

PROJECT
Forbes Atlas 5-5

INSPECTOR
J. B. Grant

SHEET 3
OF 4 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	14	LIMESTONE MEDIUM GRAY (NS) STRONG, NO EVIDENT WEATHERING					
	15	LIMESTONE YELLOWISH GRAY (5y 8/1) STRONG, EVIDENCE OF SLIGHT WEATHERING, DISSOLUTION HOLES, FEW DARK GRAY (N3) CHERT INCLUSIONS					DRILLER REPORTS 400 gal fluid loss DRILLER INSTALLS 8" casing to 10'
	16						1620 14'-20' RECOVERED
	17	LIMESTONE ALTERATION BETWEEN YELLOWISH GRAY (5y 8/1) AND MEDIUM GRAY (NS). SLIGHTLY WEATHERED, STRONG.					
	18						
	19						
	20	LIMESTONE YELLOWISH GRAY (5y 8/1), STILL ALTERNATING WITH MEDIUM GRAY (NS)					1620 DRILLER CHANGES O-RING ON DOUBLE WALL SAMPLER
	21	ABUNDANT DARK GRAY (N3) CHERT THROUGHOUT. LIGHT BLuish GRAY CHERT (5B 7/1) ALTERATION, SLIGHTLY WEATHERED, STRONG					1640 20'-30' RECOVERED DRILLER STOP DRILLING
	22	LIMESTONE MEDIUM GRAY (NS) SLIGHTLY WEATHERED, STRONG, FOSSILIFEROUS					
	23						

HTW DRILLING LOG

HOLE NO.
5B-07

PROJECT

Forbes Atlas S-5

INSPECTOR

J. Bryant

SHEET 4
OF 4 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO. e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	23	LIMESTONE MEDIUM GRAY (NS) SLIGHTLY WEATHERED, STRONG, FOSSILIFEROUS, CRINOID FRAGMENTS SPONGE SPICULUS					
	24						
	25						
	26	SHALE MEDIUM GRAY (NS) VERY SOFT, WEATHERED			1645 5B-07-26-27		
	27	SHALE MEDIUM DARK GRAY (N4) HIGHLY WEATHERED, VERY SOFT					
	27	LIMESTONE MEDIUM GRAY (NS) STRONG, SLIGHTLY WEATHERED, FOSSILIFEROUS, BRACHIOPOD FRAGMENTS					
	28	SHALE GREENISH GRAY (5 GY 6/1) MUDSTONE FORMING STRONG MODERATELY WEATHERED WEATHERED PORTIONS ARE RELATIVELY WEAK.			1655 5B-07-28-29		
	29						
	30	TD = 30' bgs					1640 20'-30' RECOVERED DRILLERS STOP DRILLING 1715 TRAUT FINISHES GROUTING - No groundwater observed

Monitoring Well Construction Diagram

Project Number: 80447	Well Number: MW-01D
Project Name: Former Forbes Atlas S5	Site Name: Former Forbes Atlas S5
Geologist: Jeff Bryant	Northing: 2055491.8
Drilling Company: Traut Drilling	Easting: 1939416.70
Driller: Nate Stebbins	Survey Datum: NAVD 1988

Drilling Method: Sonic Drilling
 Borehole Diameter: 7"

Elevations	
Top of Casing (TOC)	1422.75
Ground Surface (GS)	1420.78
Reference Point (RP)	1422.75

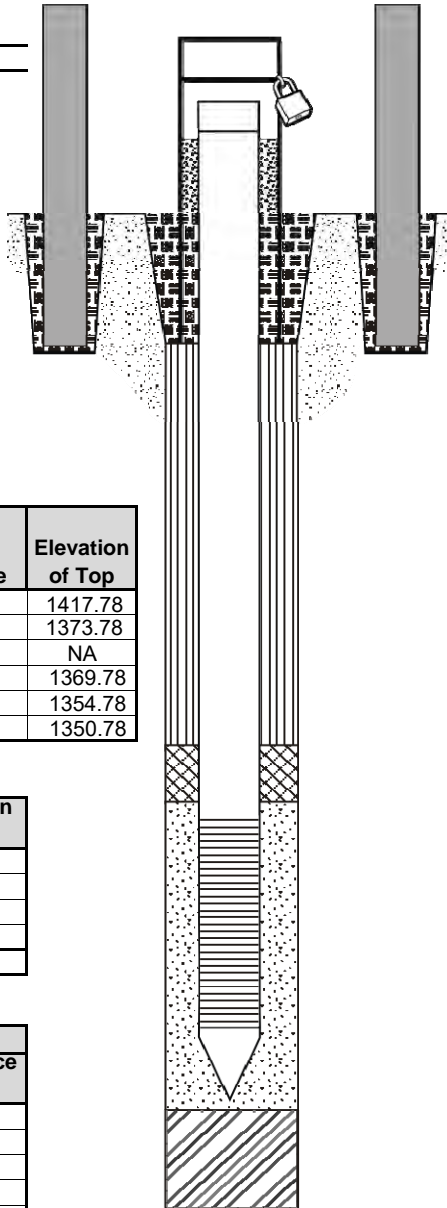
Dates	
Drilling Start	5/13/15
Drilling Complete	5/13/15
Installation Start	5/13/15
Installation Complete	5/14/15
Development Start	5/16/15
Development Complete	5/18/15

Annular Material Measurements	Depth to Top from GS	Total Footage	Elevation of Top
Annular Seal	3.0	44.0	1417.78
Bentonite Seal	47.0	4.0	1373.78
Secondary Filter Pack	NA	NA	NA
Filter Pack	51.0	15.0	1369.78
Backfill	66.0	4.0	1354.78
Bottom of Borehole	70.0	NA	1350.78

Casing Materials Measurements	Total Footage	Elevation of Top
Total Riser Installed	60.0	NA
Total Riser Cutoff	2.64	NA
Screen	10.04	1364.75
End Cap	0.35	1354.71
Total Depth from TOC	67.75	

Groundwater Levels		
Date & Time	Depth	Reference Point
7/26/15	46.72	TOC

Notes



Cap Type:	J-plug
Lock Keyed to:	
Protective Cover:	
Material:	Steel
Size:	4"
Length:	5'
Pea Gravel (Y/N):	Sand
Weep Hole (Y/N):	Y
Guage Mark (Y/N):	Y
Bollards (# and type):	4 - steel
Surface Pad:	
Dimensions:	3' x 3' x 6"
Material:	Concrete
Annular Seal:	
Type & Size:	EZ Seal / Quick Grout
Manufacturer:	Haliburton
Amount Used:	4 - 50# bag / 0.7 - 50# bag
Bentonite Seal:	
Type & Size:	Pel-Plug Bentonite Pellets
Manufacturer:	PDS
Amount Used:	2 - 5 gal buckets
Secondary Filter Pack:	
Type & Size:	NA
Manufacturer:	NA
Amount Used:	NA
Primary Filter Pack:	
Type & Size:	Silica Sand 20/40
Manufacturer:	Haliburton
Amount Used:	9 - 50# bags
Well Casing:	
Type:	PVC
Diameter:	2"
Sch. or Weight:	SCH 40
Manufacturer:	Johnson Screens
Screen Type:	PVC
Screen Slot Size:	0.01
Bottom Cap Type:	Flat
Centralizers (Y/N):	NA
Material:	NA
Number:	NA
Depth(s):	NA
Backfill Material:	
Type & Size:	3/8" Bentonite Chips
Manufacturer:	Haliburton
Amount Used:	1 - 50 lbs

Monitoring Well Construction Diagram

Project Number: 80447	Well Number: MW-02D
Project Name: Former Forbes Atlas S5	Site Name: Former Forbes Atlas S5
Geologist: Jeff Bryant	Northing: 2055059.6
Drilling Company: Traut Drilling	Easting: 1939681.9
Driller: Nate Stebbins	Survey Datum: NAVD 1988

Drilling Method: Sonic Drilling
Borehole Diameter: 7"

Elevations	
Top of Casing (TOC)	1422.70
Ground Surface (GS)	1419.47
Reference Point (RP)	1422.70

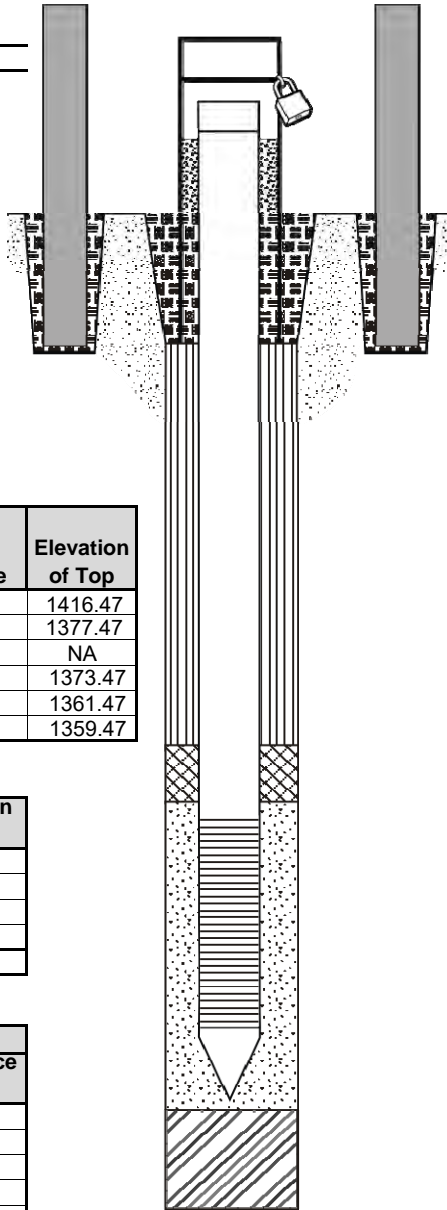
Dates	
Drilling Start	5/17/15
Drilling Complete	5/17/15
Installation Start	5/17/15
Installation Complete	5/18/15
Development Start	5/20/15
Development Complete	5/31/15

Annular Material Measurements	Depth to Top from GS	Total Footage	Elevation of Top
Annular Seal	3.0	39.0	1416.47
Bentonite Seal	42.0	4.0	1377.47
Secondary Filter Pack	NA	NA	NA
Filter Pack	46.0	12.0	1373.47
Backfill	58.0	2.0	1361.47
Bottom of Borehole	60.0	NA	1359.47

Casing Materials Measurements	Total Footage	Elevation of Top
Total Riser Installed	53.29	NA
Total Riser Cutoff	0.0	NA
Screen	5.0	1369.30
Bottom Cap	0.25	1364.30
Total Depth from TOC	58.54	

Groundwater Levels		
Date & Time	Depth	Reference Point
7/26/15	41.19	TOC

Notes



Cap Type: J-plug	Lock Keyed to: _____
Protective Cover:	Material: Steel
	Size: 4"
	Length: 5'
	Pea Gravel (Y/N): Sand
	Weep Hole (Y/N): Y
	Guage Mark (Y/N): Y
Bollards (# and type): 4 - steel	
Surface Pad:	Dimensions: 3' x 3' x 6"
	Material: Concrete
Annular Seal:	Type & Size: EZ Seal / Quick Grout
	Manufacturer: Haliburton
	Amount Used: 3-50# bag / 0.5-50# bag
Bentonite Seal:	Type & Size: Pel-Plug Bentonite Pellets
	Manufacturer: PDS
	Amount Used: 1.5 - 5 gal bucket
Secondary Filter Pack:	Type & Size: NA
	Manufacturer: NA
	Amount Used: NA
Primary Filter Pack:	Type & Size: Silica Sand 20/40
	Manufacturer: Premier Silica
	Amount Used: 6 - 50# bags
Well Casing:	Type: PVC
	Diameter: 2"
	Sch. or Weight: SCH 40
	Manufacturer: Johnson Screens
	Screen Type: PVC
	Screen Slot Size: 0.01
	Bottom Cap Type: Flat
Centralizers (Y/N): NA	Material: NA
	Number: NA
	Depth(s): NA
Backfill Material:	Type & Size: 3/8" Bentonite Chips
	Manufacturer: Haliburton
	Amount Used: 1 - 50 lbs

Monitoring Well Construction Diagram

Project Number: 80447	Well Number: MW-02S
Project Name: Former Forbes Atlas S5	Site Name: Former Forbes Atlas S5
Geologist: Jeff Bryant	Northing: 2055056.3
Drilling Company: Traut Drilling	Easting: 1939686.3
Driller: Nate Stebbins	Survey Datum: NAVD 1988

Drilling Method: Sonic Drilling
 Borehole Diameter: 7"

Elevations	
Top of Casing (TOC)	1421.97
Ground Surface (GS)	1419.42
Reference Point (RP)	1421.97

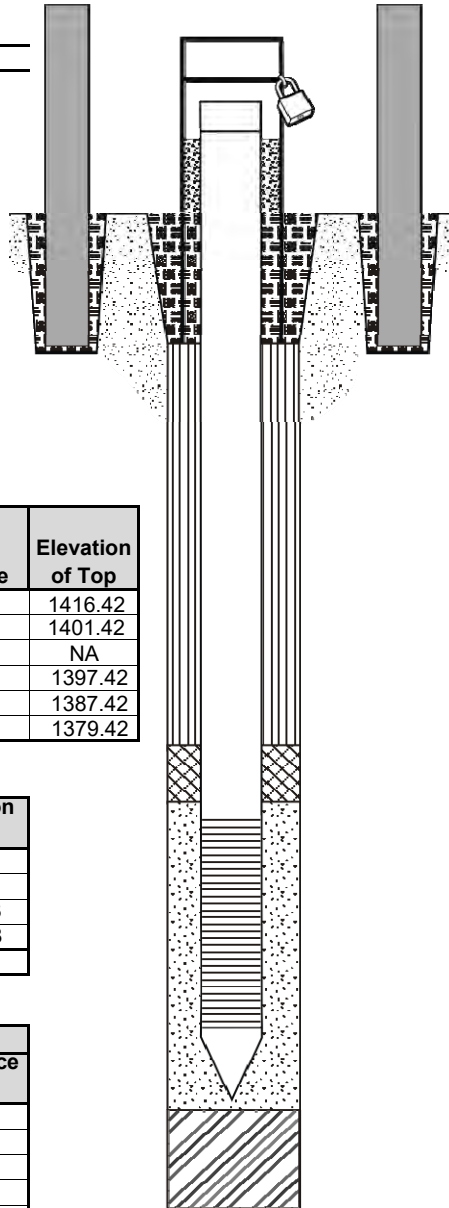
Dates	
Drilling Start	5/19/15
Drilling Complete	5/27/15
Installation Start	5/27/15
Installation Complete	5/27/15
Development Start	5/31/15
Development Complete	6/9/15

Annular Material Measurements	Depth to Top from GS	Total Footage	Elevation of Top
Annular Seal	3.0	15.0	1416.42
Bentonite Seal	18.0	4.0	1401.42
Secondary Filter Pack	NA	NA	NA
Filter Pack	22.0	10.0	1397.42
Backfill	32.0	8.0	1387.42
Bottom of Borehole	40.0	NA	1379.42

Casing Materials Measurements	Total Footage	Elevation of Top
Total Riser Installed	30.0	NA
Total Riser Cutoff	0.93	NA
Screen	5.05	1392.83
End Cap	0.23	1387.78
Total Depth from TOC	34.35	

Groundwater Levels		
Date & Time	Depth	Reference Point
7/26/15	21.18	TOC

Notes



Cap Type:	J-plug
Lock Keyed to:	
Protective Cover:	
Material:	Steel
Size:	4"
Length:	5'
Pea Gravel (Y/N):	Sand
Weep Hole (Y/N):	Y
Gauge Mark (Y/N):	Y
Bollards (# and type):	4 - steel
Surface Pad:	
Dimensions:	3' x 3' x 6"
Material:	Concrete
Annular Seal:	
Type & Size:	EZ Seal / Quick Grout
Manufacturer:	Haliburton
Amount Used:	1.5-50# bag / 0.25-50# bag
Bentonite Seal:	
Type & Size:	Pel-Plug Bentonite Pellets
Manufacturer:	PDS
Amount Used:	1.5 - 5 gal bucket
Secondary Filter Pack:	
Type & Size:	NA
Manufacturer:	NA
Amount Used:	NA
Primary Filter Pack:	
Type & Size:	Silica Sand 20/40
Manufacturer:	Premier Silica
Amount Used:	6 - 50# bags
Well Casing:	
Type:	PVC
Diameter:	2"
Sch. or Weight:	SCH 40
Manufacturer:	Johnson Screens
Screen Type:	PVC
Screen Slot Size:	0.01
End Cap Type:	Flat
Centralizers (Y/N):	NA
Material:	NA
Number:	NA
Depth(s):	NA
Backfill Material:	
Type & Size:	3/8" Bentonite Chips
Manufacturer:	Haliburton
Amount Used:	2 - 50 lbs

Monitoring Well Construction Diagram

Project Number: 80447	Well Number: MW-03D
Project Name: Former Forbes Atlas S5	Site Name: Former Forbes Atlas S5
Geologist: Jeff Bryant	Northing: 2055408.3
Drilling Company: Traut Drilling	Easting: 1939612.2
Driller: Nate Stebbins	Survey Datum: NAVD 1988

Drilling Method: Sonic Drilling
 Borehole Diameter: 7"

Elevations	
Top of Casing (TOC)	1418.65
Ground Surface (GS)	1416.10
Reference Point (RP)	1418.65

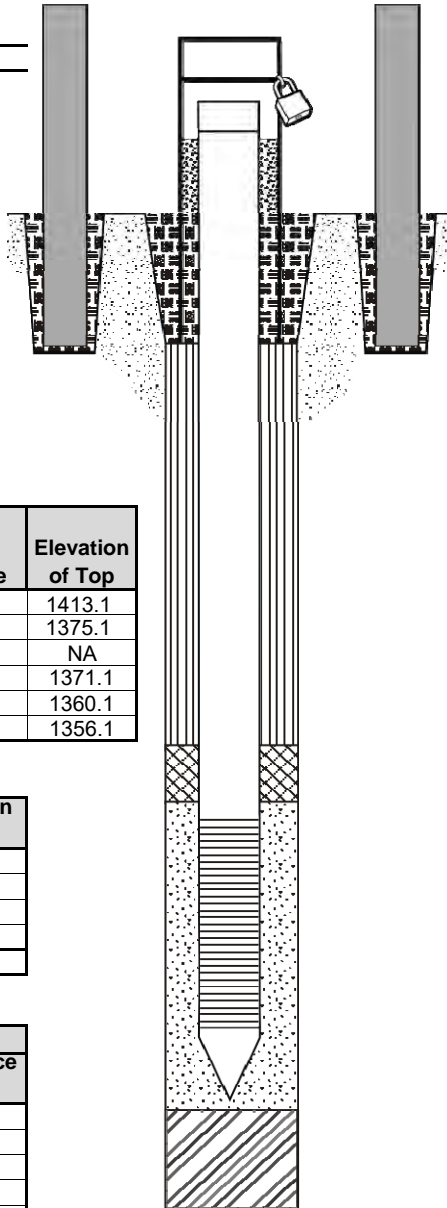
Dates	
Drilling Start	6/2/15
Drilling Complete	6/2/15
Installation Start	6/2/15
Installation Complete	6/2/15
Development Start	6/5/15
Development Complete	6/9/15

Annular Material Measurements	Depth to Top from GS	Total Footage	Elevation of Top
Annular Seal	3.0	38.0	1413.1
Bentonite Seal	41.0	4.0	1375.1
Secondary Filter Pack	NA	NA	NA
Filter Pack	45.0	11.0	1371.1
Backfill	56.0	4.0	1360.1
Bottom of Borehole	60.0	NA	1356.1

Casing Materials Measurements	Total Footage	Elevation of Top
Total Riser Installed	60.0	NA
Total Riser Cutoff	8.05	NA
Screen	5.0	1366.56
End Cap	0.23	1361.56
Total Depth from TOC	57.18	

Groundwater Levels		
Date & Time	Depth	Reference Point
7/26/15	42.57	TOC

Notes



Cap Type:	J-plug
Lock Keyed to:	
Protective Cover:	
Material:	Steel
Size:	4"
Length:	5'
Pea Gravel (Y/N):	Sand
Weep Hole (Y/N):	Y
Guage Mark (Y/N):	Y
Bollards (# and type):	4 - steel
Surface Pad:	
Dimensions:	3' x 3' x 6"
Material:	Concrete
Annular Seal:	
Type & Size:	EZ Seal / Quick Grout
Manufacturer:	Haliburton
Amount Used:	3-50# bag / 0.3-50# bag
Bentonite Seal:	
Type & Size:	Pel-Plug Bentonite Pellets
Manufacturer:	PDS
Amount Used:	1.5 - 5 gal bucket
Secondary Filter Pack:	
Type & Size:	NA
Manufacturer:	NA
Amount Used:	NA
Primary Filter Pack:	
Type & Size:	Silica Sand 20/40
Manufacturer:	Premier Silica
Amount Used:	5 - 50# bags
Well Casing:	
Type:	PVC
Diameter:	2"
Sch. or Weight:	SCH 40
Manufacturer:	Johnson Screens
Screen Type:	PVC
Screen Slot Size:	0.01
End Cap Type:	Flat
Centralizers (Y/N):	NA
Material:	NA
Number:	NA
Depth(s):	NA
Backfill Material:	
Type & Size:	3/8" Bentonite Chips
Manufacturer:	Wyo-Ben
Amount Used:	1.25 - 50# bags

Monitoring Well Construction Diagram

Project Number: 80447	Well Number: MW-03S
Project Name: Former Forbes Atlas S5	Site Name: Former Forbes Atlas S5
Geologist: Jeff Bryant	Northing: 2055413.0
Drilling Company: Traut Drilling	Easting: 1939610.7
Driller: Nate Stebbins	Survey Datum: NAVD 1988

Drilling Method: Sonic Drilling
Borehole Diameter: 7"

Elevations	
Top of Casing (TOC)	1418.29
Ground Surface (GS)	1415.77
Reference Point (RP)	1418.29

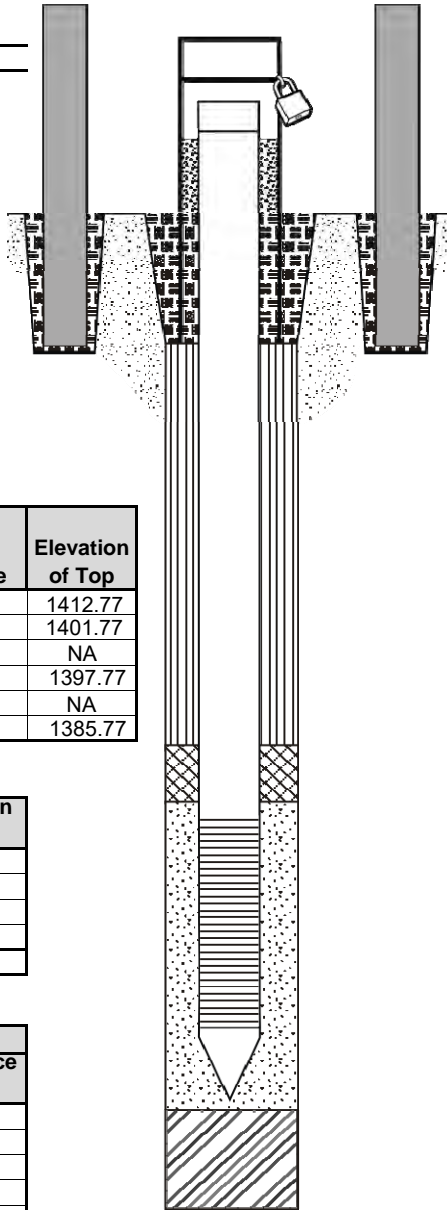
Dates	
Drilling Start	6/9/15
Drilling Complete	6/9/15
Installation Start	6/9/15
Installation Complete	6/9/15
Development Start	6/11/15
Development Complete	6/17/15

Annular Material Measurements	Depth to Top from GS	Total Footage	Elevation of Top
Annular Seal	3.0	11.0	1412.77
Bentonite Seal	14.0	4.0	1401.77
Secondary Filter Pack	NA	NA	NA
Filter Pack	18.0	12.0	1397.77
Backfill	NA	NA	NA
Bottom of Borehole	30.0	NA	1385.77

Casing Materials Measurements	Total Footage	Elevation of Top
Total Riser Installed	27.09	NA
Total Riser Cutoff	1.93	NA
Screen	5.0	1393.06
End Cap	0.24	1388.06
Total Depth from TOC	30.4	

Groundwater Levels		
Date & Time	Depth	Reference Point
7/26/15	20.46	TOC

Notes



Cap Type:	J-plug
Lock Keyed to:	
Protective Cover:	
Material:	Steel
Size:	4"
Length:	5'
Pea Gravel (Y/N):	Sand
Weep Hole (Y/N):	Y
Gauge Mark (Y/N):	Y
Bollards (# and type):	4 - steel
Surface Pad:	
Dimensions:	3' x 3' x 6"
Material:	Concrete
Annular Seal:	
Type & Size:	EZ Seal / Quick Grout
Manufacturer:	Haliburton
Amount Used:	2-50# bag / 0.2-50# bag
Bentonite Seal:	
Type & Size:	Pel-Plug Bentonite Pellets
Manufacturer:	PDS
Amount Used:	1.5 - 5 gal bucket
Secondary Filter Pack:	
Type & Size:	NA
Manufacturer:	NA
Amount Used:	NA
Primary Filter Pack:	
Type & Size:	Silica Sand 20/40
Manufacturer:	Premier Silica
Amount Used:	5 - 50# bags
Well Casing:	
Type:	PVC
Diameter:	2"
Sch. or Weight:	SCH 40
Manufacturer:	Johnson Screens
Screen Type:	PVC
Screen Slot Size:	0.01
End Cap Type:	Point
Centralizers (Y/N):	NA
Material:	NA
Number:	NA
Depth(s):	NA
Backfill Material:	
Type & Size:	NA
Manufacturer:	NA
Amount Used:	NA

Monitoring Well Construction Diagram

Project Number: 80447	Well Number: MW-04D
Project Name: Former Forbes Atlas S5	Site Name: Former Forbes Atlas S5
Geologist: Jeff Bryant	Northing: 2055271.2
Drilling Company: Traut Drilling	Easting: 1939320.4
Driller: Nate Stebbins	Survey Datum: NAVD 1988

Drilling Method: Sonic Drilling
 Borehole Diameter: 7"

Elevations	
Top of Casing (TOC)	1427.94
Ground Surface (GS)	1425.46
Reference Point (RP)	1427.94

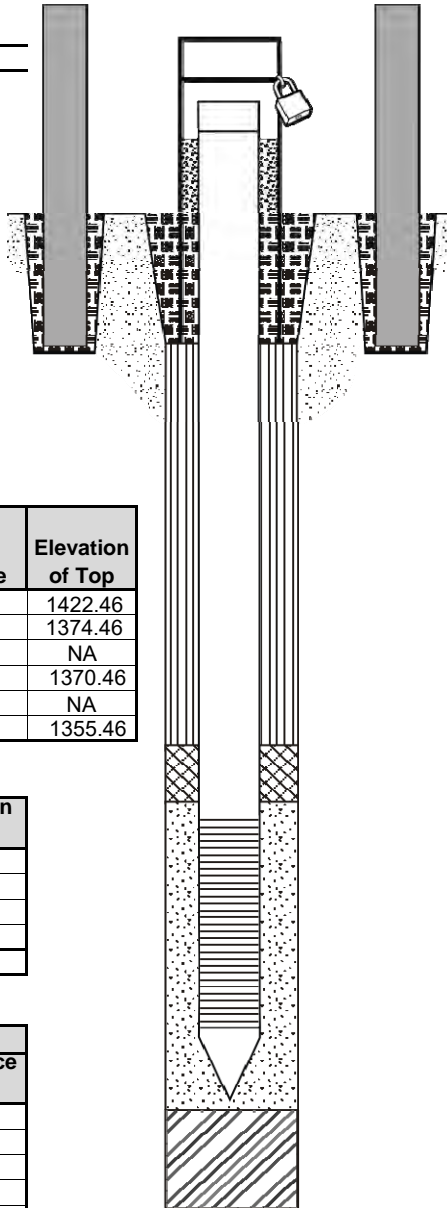
Dates	
Drilling Start	5/31/15
Drilling Complete	5/31/15
Installation Start	5/31/15
Installation Complete	6/1/15
Development Start	6/3/15
Development Complete	6/8/15

Annular Material Measurements	Depth to Top from GS	Total Footage	Elevation of Top
Annular Seal	3.0	48.0	1422.46
Bentonite Seal	51.0	4.0	1374.46
Secondary Filter Pack	NA	NA	NA
Filter Pack	55.0	10.0	1370.46
Backfill	65.0	5.0	NA
Bottom of Borehole	70.0	NA	1355.46

Casing Materials Measurements	Total Footage	Elevation of Top
Total Riser Installed	66.0	NA
Total Riser Cutoff	3.95	NA
Screen	5.0	1366.74
End Cap	0.37	1361.74
Total Depth from TOC	67.42	

Groundwater Levels		
Date & Time	Depth	Reference Point
7/26/15	50.71	TOC

Notes



Cap Type:	J-plug
Lock Keyed to:	
Protective Cover:	
Material:	Steel
Size:	4"
Length:	5'
Pea Gravel (Y/N):	Sand
Weep Hole (Y/N):	Y
Guage Mark (Y/N):	Y
Bollards (# and type):	4 - steel
Surface Pad:	
Dimensions:	3' x 3' x 6"
Material:	Concrete
Annular Seal:	
Type & Size:	EZ Seal / Quick Grout
Manufacturer:	Haliburton
Amount Used:	3-50# bag / 0.5-50# bag
Bentonite Seal:	
Type & Size:	Pel-Plug Bentonite Pellets
Manufacturer:	PDS
Amount Used:	1.5 - 5 gal bucket
Secondary Filter Pack:	
Type & Size:	NA
Manufacturer:	NA
Amount Used:	NA
Primary Filter Pack:	
Type & Size:	Silica Sand 20/40
Manufacturer:	Premier Silica
Amount Used:	6 - 50# bags
Well Casing:	
Type:	PVC
Diameter:	2"
Sch. or Weight:	SCH 40
Manufacturer:	Johnson Screens
Screen Type:	PVC
Screen Slot Size:	0.01
End Cap Type:	Point
Centralizers (Y/N):	NA
Material:	NA
Number:	NA
Depth(s):	NA
Backfill Material:	
Type & Size:	Pel-Plug Bentonite Pellets
Manufacturer:	PDS
Amount Used:	0.5 - 5 gal bucket

Monitoring Well Construction Diagram

Project Number: 80447	Well Number: MW-04S
Project Name: Former Forbes Atlas S5	Site Name: Former Forbes Atlas S5
Geologist: Jeff Bryant	Northing: 2055265.7
Drilling Company: Traut Drilling	Easting: 1939320.3
Driller: Nate Stebbins	Survey Datum: NAVD 1988

Drilling Method: Sonic Drilling
Borehole Diameter: 7"

Elevations	
Top of Casing (TOC)	1427.99
Ground Surface (GS)	1425.50
Reference Point (RP)	1427.99

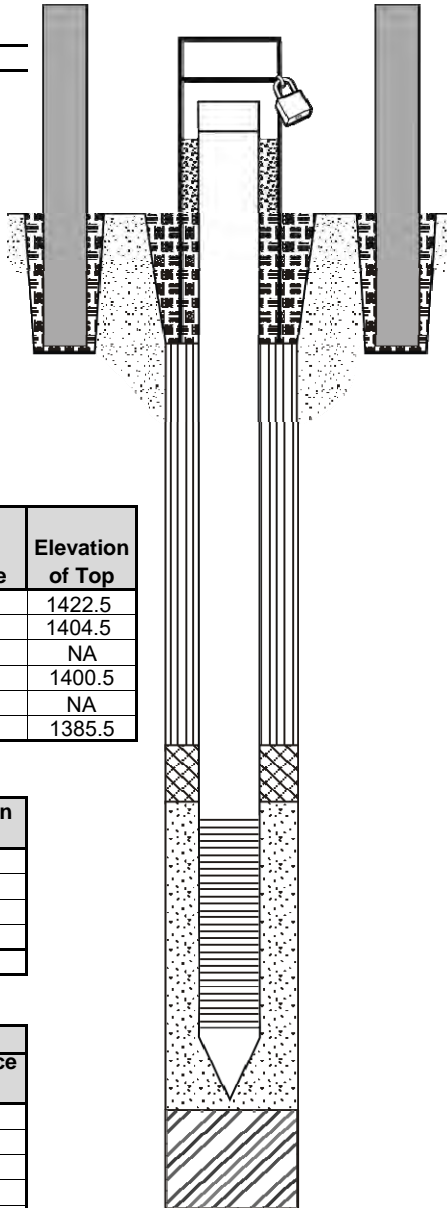
Dates	
Drilling Start	6/1/15
Drilling Complete	6/1/15
Installation Start	6/1/15
Installation Complete	6/1/15
Development Start	6/5/15
Development Complete	6/9/15

Annular Material Measurements	Depth to Top from GS	Total Footage	Elevation of Top
Annular Seal	3.0	18.0	1422.5
Bentonite Seal	21.0	4.0	1404.5
Secondary Filter Pack	NA	NA	NA
Filter Pack	25.0	11.0	1400.5
Backfill	36.0	4.0	NA
Bottom of Borehole	40.0	NA	1385.5

Casing Materials Measurements	Total Footage	Elevation of Top
Total Riser Installed	40.0	NA
Total Riser Cutoff	8.62	NA
Screen	5.0	1396.17
End Cap	0.35	1391.17
Total Depth from TOC	36.73	

Groundwater Levels		
Date & Time	Depth	Reference Point
7/26/15	29.11	TOC

Notes



Cap Type:	J-plug
Lock Keyed to:	
Protective Cover:	
Material:	Steel
Size:	4"
Length:	5'
Pea Gravel (Y/N):	Sand
Weep Hole (Y/N):	Y
Guage Mark (Y/N):	Y
Bollards (# and type):	4 - steel
Surface Pad:	
Dimensions:	3' x 3' x 6"
Material:	Concrete
Annular Seal:	
Type & Size:	EZ Seal / Quick Grout
Manufacturer:	Haliburton
Amount Used:	2-50# bag / 0.2-50# bag
Bentonite Seal:	
Type & Size:	Pel-Plug Bentonite Pellets
Manufacturer:	PDS
Amount Used:	1.5 - 5 gal bucket
Secondary Filter Pack:	
Type & Size:	NA
Manufacturer:	NA
Amount Used:	NA
Primary Filter Pack:	
Type & Size:	Silica Sand 20/40
Manufacturer:	Premier Silica
Amount Used:	5 - 50# bags
Well Casing:	
Type:	PVC
Diameter:	2"
Sch. or Weight:	SCH 40
Manufacturer:	Johnson Screens
Screen Type:	PVC
Screen Slot Size:	0.01
End Cap Type:	Flat
Centralizers (Y/N):	NA
Material:	NA
Number:	NA
Depth(s):	NA
Backfill Material:	
Type & Size:	Pel-Plug Bentonite Pellets
Manufacturer:	PDS
Amount Used:	1.5 - 5 gal bucket

Monitoring Well Construction Diagram

Project Number: 80447	Well Number: MW-05D
Project Name: Former Forbes Atlas S5	Site Name: Former Forbes Atlas S5
Geologist: Jeff Bryant	Northing: 2055071.0
Drilling Company: Traut Drilling	Easting: 1939324.2
Driller: Nate Stebbins	Survey Datum: NAVD 1988

Drilling Method: Sonic Drilling
Borehole Diameter: 7"

Elevations	
Top of Casing (TOC)	1427.32
Ground Surface (GS)	1424.83
Reference Point (RP)	1427.32

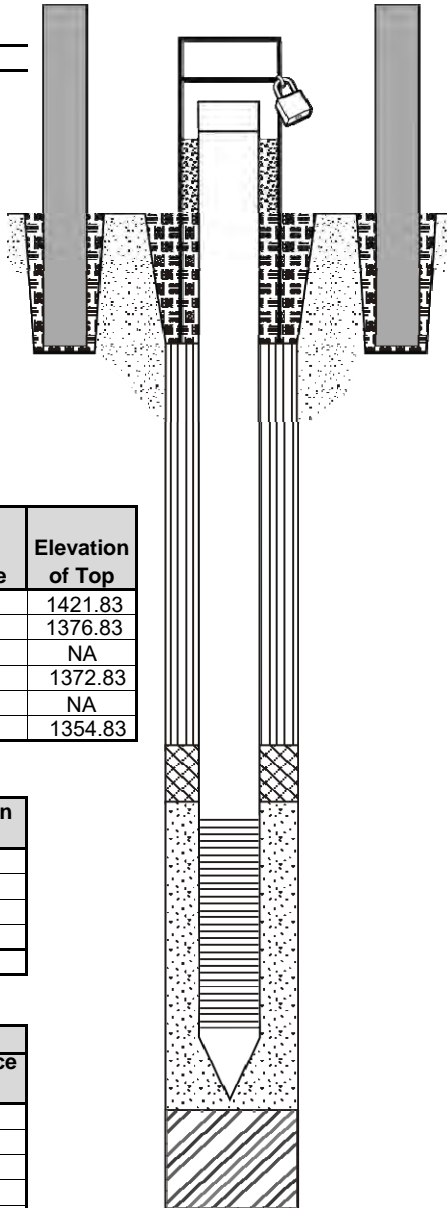
Dates	
Drilling Start	5/30/15
Drilling Complete	5/30/15
Installation Start	5/30/15
Installation Complete	5/30/15
Development Start	6/3/15
Development Complete	6/8/15

Annular Material Measurements	Depth to Top from GS	Total Footage	Elevation of Top
Annular Seal	3.0	45.0	1421.83
Bentonite Seal	48.0	4.0	1376.83
Secondary Filter Pack	NA	NA	NA
Filter Pack	52.0	11.0	1372.83
Backfill	63.0	7.0	NA
Bottom of Borehole	70.0	NA	1354.83

Casing Materials Measurements	Total Footage	Elevation of Top
Total Riser Installed	60.0	NA
Total Riser Cutoff	0.89	NA
Screen	5.0	1368.18
End Cap	0.23	1363.18
Total Depth from TOC	64.34	

Groundwater Levels		
Date & Time	Depth	Reference Point
7/26/15	49.22	TOC

Notes



Cap Type:	J-plug
Lock Keyed to:	
Protective Cover:	
Material:	Steel
Size:	4"
Length:	5'
Pea Gravel (Y/N):	Sand
Weep Hole (Y/N):	Y
Guage Mark (Y/N):	Y
Bollards (# and type):	4 - steel
Surface Pad:	
Dimensions:	3'x 3' x 6"
Material:	Concrete
Annular Seal:	
Type & Size:	EZ Seal / Quick Grout
Manufacturer:	Haliburton
Amount Used:	3-50# bag / 0.5-50# bag
Bentonite Seal:	
Type & Size:	Pel-Plug Bentonite Pellets
Manufacturer:	PDS
Amount Used:	1.5 - 5 gal bucket
Secondary Filter Pack:	
Type & Size:	NA
Manufacturer:	NA
Amount Used:	NA
Primary Filter Pack:	
Type & Size:	Silica Sand 20/40
Manufacturer:	Premier Silica
Amount Used:	5.5 - 50# bags
Well Casing:	
Type:	PVC
Diameter:	2"
Sch. or Weight:	SCH 40
Manufacturer:	Johnson Screens
Screen Type:	PVC
Screen Slot Size:	0.01
End Cap Type:	Point
Centralizers (Y/N):	NA
Material:	NA
Number:	NA
Depth(s):	NA
Backfill Material:	
Type & Size:	Pel-Plug Bentonite Pellets
Manufacturer:	PDS
Amount Used:	2.25 - 5 gal bucket

Monitoring Well Construction Diagram

Project Number: 80447	Well Number: MW-06D
Project Name: Former Forbes Atlas S5	Site Name: Former Forbes Atlas S5
Geologist: Jeff Bryant	Northing: 2054699.1
Drilling Company: Traut Drilling	Easting: 1939457.4
Driller: Nate Stebbins	Survey Datum: NAVD 1988

Drilling Method: Sonic Drilling
Borehole Diameter: 7"

Elevations	
Top of Casing (TOC)	1415.65
Ground Surface (GS)	1413.13
Reference Point (RP)	1415.65

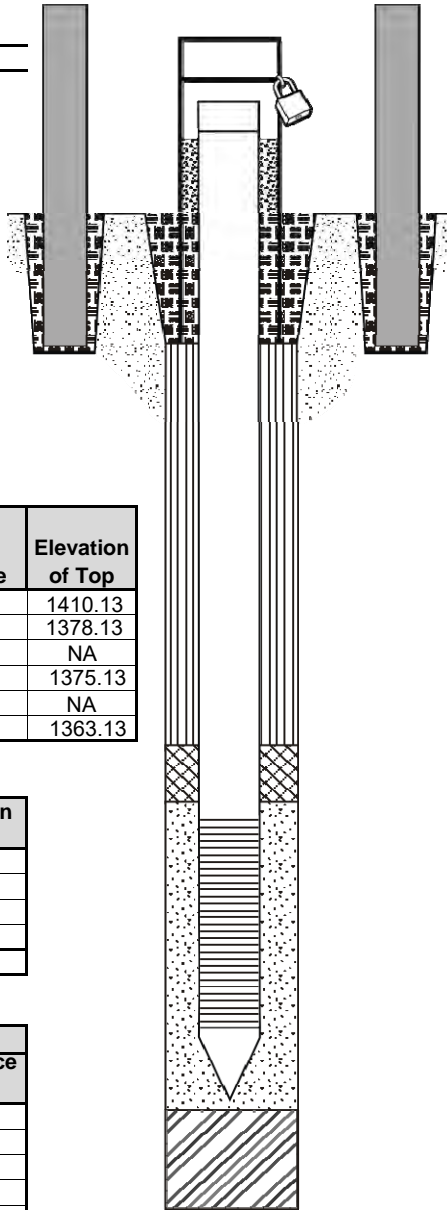
Dates	
Drilling Start	5/16/15
Drilling Complete	5/16/15
Installation Start	5/16/15
Installation Complete	5/17/15
Development Start	5/19/15
Development Complete	6/3/15

Annular Material Measurements	Depth to Top from GS	Total Footage	Elevation of Top
Annular Seal	3.0	32.0	1410.13
Bentonite Seal	35.0	3.0	1378.13
Secondary Filter Pack	NA	NA	NA
Filter Pack	38	12.0	1375.13
Backfill	NA	NA	NA
Bottom of Borehole	50.0	NA	1363.13

Casing Materials Measurements	Total Footage	Elevation of Top
Total Riser Installed	50.0	NA
Total Riser Cutoff	4.54	NA
Screen	5.0	1369.42
End Cap	0.23	1364.37
Total Depth from TOC	50.69	

Groundwater Levels		
Date & Time	Depth	Reference Point
7/26/15	27.13	TOC

Notes



Cap Type:	J-plug
Lock Keyed to:	
Protective Cover:	
Material:	Steel
Size:	4"
Length:	5'
Pea Gravel (Y/N):	Sand
Weep Hole (Y/N):	Y
Guage Mark (Y/N):	Y
Bollards (# and type):	4- steel
Surface Pad:	
Dimensions:	3' x 3' x 6"
Material:	Concrete
Annular Seal:	
Type & Size:	EZ Seal / Quick Grout
Manufacturer:	Haliburton
Amount Used:	3-50# bag / 0.3-50# bag
Bentonite Seal:	
Type & Size:	Pel-Plug Bentonite Pellets
Manufacturer:	PDS
Amount Used:	2.25 - 5 gal bucket
Secondary Filter Pack:	
Type & Size:	NA
Manufacturer:	NA
Amount Used:	NA
Primary Filter Pack:	
Type & Size:	Silica Sand 20/40
Manufacturer:	Premier Silica
Amount Used:	5.0 - 50# bags
Well Casing:	
Type:	PVC
Diameter:	2"
Sch. or Weight:	SCH 40
Manufacturer:	Johnson Screens
Screen Type:	PVC
Screen Slot Size:	0.01
End Cap Type:	Flat
Centralizers (Y/N):	NA
Material:	NA
Number:	NA
Depth(s):	NA
Backfill Material:	
Type & Size:	Pel-Plug Bentonite Pellets
Manufacturer:	PDS
Amount Used:	2.25 - 5 gal bucket

Monitoring Well Construction Diagram

Project Number: 80447	Well Number: MW-06S
Project Name: Former Forbes Atlas S5	Site Name: Former Forbes Atlas S5
Geologist: Jeff Bryant	Northing: 2054688.7
Drilling Company: Traut Drilling	Easting: 1939458.2
Driller: Nate Stebbins	Survey Datum: NAVD 1988

Drilling Method: Sonic Drilling
 Borehole Diameter: 7"

Elevations	
Top of Casing (TOC)	1415.34
Ground Surface (GS)	1412.64
Reference Point (RP)	1415.34

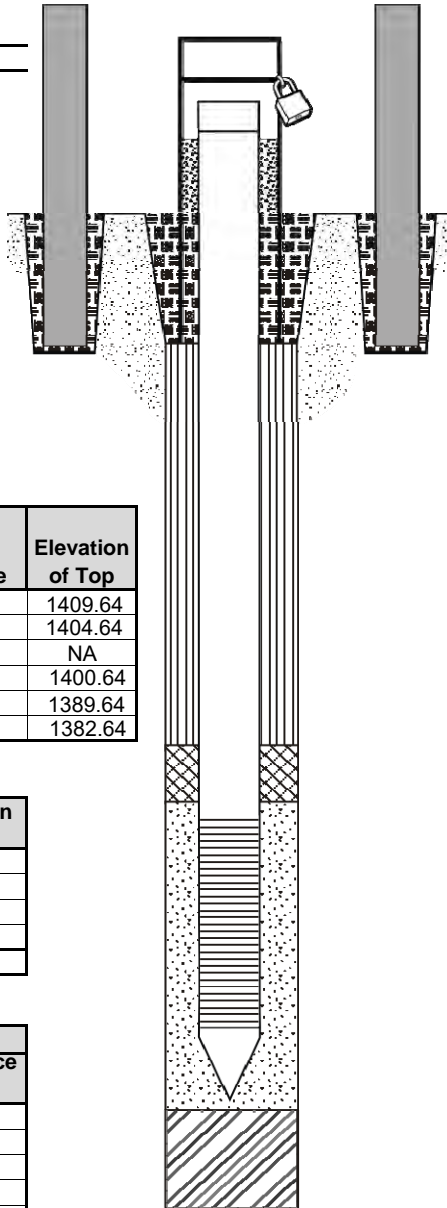
Dates	
Drilling Start	5/29/15
Drilling Complete	5/29/15
Installation Start	5/29/15
Installation Complete	5/29/15
Development Start	5/31/15
Development Complete	6/8/15

Annular Material Measurements	Depth to Top from GS	Total Footage	Elevation of Top
Annular Seal	3.0	5.0	1409.64
Bentonite Seal	8.0	4.0	1404.64
Secondary Filter Pack	NA	NA	NA
Filter Pack	12.0	11.0	1400.64
Backfill	23.0	7.0	1389.64
Bottom of Borehole	30.0	NA	1382.64

Casing Materials Measurements	Total Footage	Elevation of Top
Total Riser Installed	20.0	NA
Total Riser Cutoff	0.75	NA
Screen	5.0	1396.99
End Cap	0.22	1391.99
Total Depth from TOC	24.47	

Groundwater Levels		
Date & Time	Depth	Reference Point
7/26/15	13.04	TOC

Notes



Cap Type:	J-plug
Lock Keyed to:	
Protective Cover:	
Material:	Steel
Size:	4"
Length:	5'
Pea Gravel (Y/N):	Sand
Weep Hole (Y/N):	Y
Gauge Mark (Y/N):	Y
Bollards (# and type):	4 - steel
Surface Pad:	
Dimensions:	3' x 3' x 6"
Material:	Concrete
Annular Seal:	
Type & Size:	3/8" Bentonite Chips
Manufacturer:	Haliburton
Amount Used:	1.75-50# bag
Bentonite Seal:	
Type & Size:	Pel-Plug Bentonite Pellets
Manufacturer:	PDS
Amount Used:	1.5 - 5 gal bucket
Secondary Filter Pack:	
Type & Size:	NA
Manufacturer:	NA
Amount Used:	NA
Primary Filter Pack:	
Type & Size:	Silica Sand 20/40
Manufacturer:	Premier Silica
Amount Used:	5.0 - 50# bags
Well Casing:	
Type:	PVC
Diameter:	2"
Sch. or Weight:	SCH 40
Manufacturer:	Johnson Screens
Screen Type:	PVC
Screen Slot Size:	0.01
End Cap Type:	Flat
Centralizers (Y/N):	NA
Material:	NA
Number:	NA
Depth(s):	NA
Backfill Material:	
Type & Size:	3/8" Bentonite Chips
Manufacturer:	Haliburton
Amount Used:	2.25 - 5 gal bucket

Monitoring Well Construction Diagram

Project Number: 80447	Well Number: MW-07S
Project Name: Former Forbes Atlas S5	Site Name: Former Forbes Atlas S5
Geologist: Jeff Bryant	Northing: 2054899.7
Drilling Company: Traut Drilling	Easting: 1939549.2
Driller: Nate Stebbins	Survey Datum: NAVD 1988

Drilling Method: Sonic Drilling
 Borehole Diameter: 7"

Elevations	
Top of Casing (TOC)	1424.99
Ground Surface (GS)	1422.42
Reference Point (RP)	1424.99

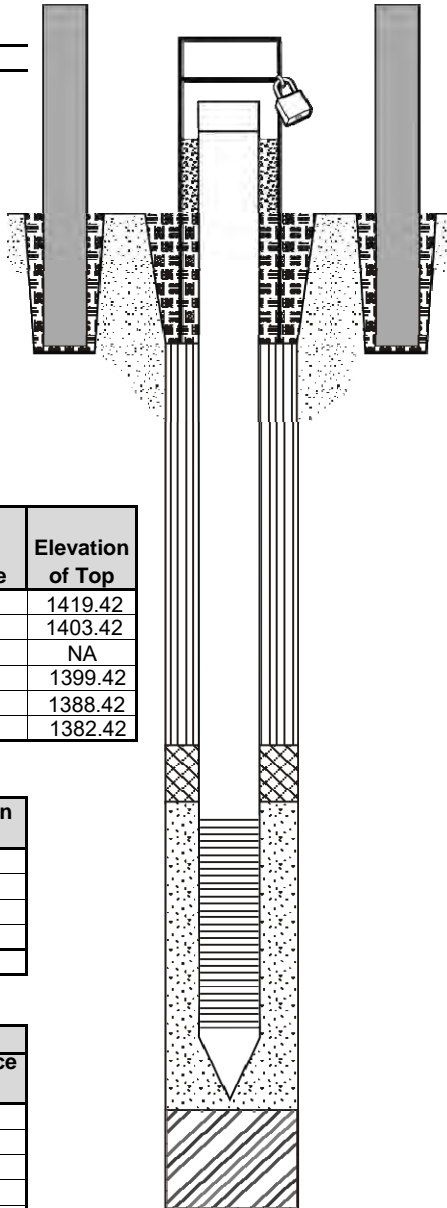
Dates	
Drilling Start	5/28/15
Drilling Complete	5/28/15
Installation Start	5/28/15
Installation Complete	5/28/15
Development Start	5/30/15
Development Complete	5/31/15

Annular Material Measurements	Depth to Top from GS	Total Footage	Elevation of Top
Annular Seal	3.0	16.0	1419.42
Bentonite Seal	19.0	4.0	1403.42
Secondary Filter Pack	NA	NA	NA
Filter Pack	23.0	11.0	1399.42
Backfill	34.0	6.0	1388.42
Bottom of Borehole	40.0	NA	1382.42

Casing Materials Measurements	Total Footage	Elevation of Top
Total Riser Installed	30.0	NA
Total Riser Cutoff	0.0	NA
Screen	5.0	1394.92
End Cap	0.24	1389.92
Total Depth from TOC	35.24	

Groundwater Levels		
Date & Time	Depth	Reference Point
7/26/15	23.92	TOC

Notes



Cap Type:	J-plug
Lock Keyed to:	
Protective Cover:	
Material:	Steel
Size:	4"
Length:	5'
Pea Gravel (Y/N):	Sand
Weep Hole (Y/N):	Y
Guage Mark (Y/N):	Y
Bollards (# and type):	4 - steel
Surface Pad:	
Dimensions:	3' x 3' x 6"
Material:	Concrete
Annular Seal:	
Type & Size:	EZ Seal / Quick Grout
Manufacturer:	Haliburton
Amount Used:	2.0-50# bag / 0.3 -50# bag
Bentonite Seal:	
Type & Size:	Pel-Plug Bentonite Pellets
Manufacturer:	PDS
Amount Used:	1.5 - 5 gal bucket
Secondary Filter Pack:	
Type & Size:	NA
Manufacturer:	NA
Amount Used:	NA
Primary Filter Pack:	
Type & Size:	Silica Sand 20/40
Manufacturer:	Premier Silica
Amount Used:	6.0 - 50# bags
Well Casing:	
Type:	PVC
Diameter:	2"
Sch. or Weight:	SCH 40
Manufacturer:	Johnson Screens
Screen Type:	PVC
Screen Slot Size:	0.01
End Cap Type:	Point
Centralizers (Y/N):	NA
Material:	NA
Number:	NA
Depth(s):	NA
Backfill Material:	
Type & Size:	3/8" Bentonite Chips
Manufacturer:	Haliburton
Amount Used:	2.0 - 5 gal bucket

Monitoring Well Construction Diagram

Project Number: 80447	Well Number: MW-08S
Project Name: Former Forbes Atlas S5	Site Name: Former Forbes Atlas S5
Geologist: Jeff Bryant	Northing: 2055761.0
Drilling Company: Traut Drilling	Easting: 11939858.0
Driller: Nate Stebbins	Survey Datum: NAVD 1988

Drilling Method: Sonic Drilling
 Borehole Diameter: 7"

Elevations	
Top of Casing (TOC)	1407.62
Ground Surface (GS)	1405.42
Reference Point (RP)	1407.62

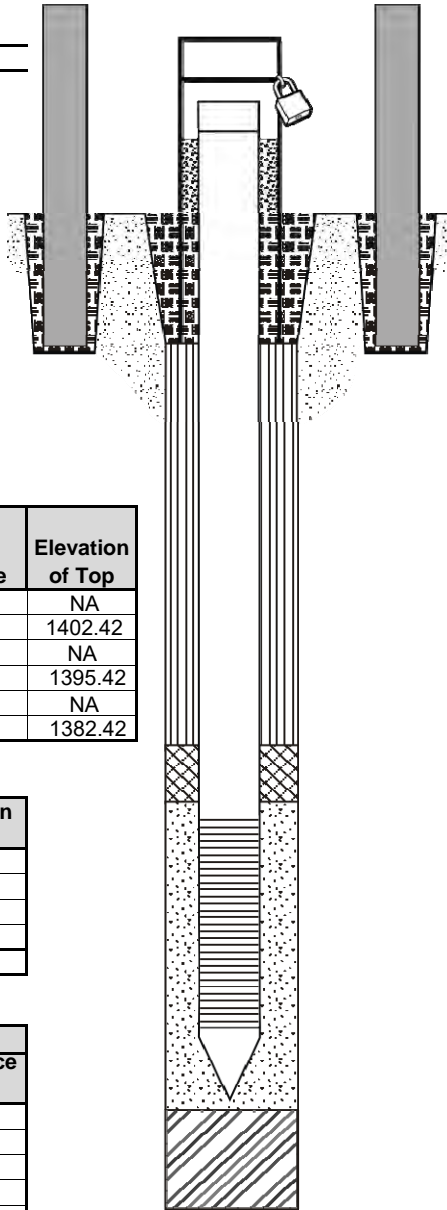
Dates	
Drilling Start	6/3/16
Drilling Complete	6/3/16
Installation Start	6/3/16
Installation Complete	6/3/16
Development Start	6/5/16
Development Complete	6/5/16

Annular Material Measurements	Depth to Top from GS	Total Footage	Elevation of Top
Annular Seal	NA	NA	NA
Bentonite Seal	3.0	6.0	1402.42
Secondary Filter Pack	NA	NA	NA
Filter Pack	10.0	13.0	1395.42
Backfill	NA	NA	NA
Bottom of Borehole	23.0	NA	1382.42

Casing Materials Measurements	Total Footage	Elevation of Top
Total Riser Installed	20.0	NA
Total Riser Cutoff	2.35	NA
Screen	5.0	1389.82
End Cap	0.22	1384.82
Total Depth from TOC	22.87	

Groundwater Levels		
Date & Time	Depth	Reference Point
6/27/16	16.43	TOC

Notes



Cap Type:	J-plug
Lock Keyed to:	
Protective Cover:	
Material:	Steel
Size:	4"
Length:	5'
Pea Gravel (Y/N):	Sand
Weep Hole (Y/N):	Y
Guage Mark (Y/N):	Y
Bollards (# and type):	4 - steel
Surface Pad:	
Dimensions:	3' x 3' x 6"
Material:	Concrete
Annular Seal:	
Type & Size:	NA
Manufacturer:	NA
Amount Used:	NA
Bentonite Seal:	
Type & Size:	EZ Seal / Quick Grout
Manufacturer:	Haliburton
Amount Used:	2.0-50# bag / 0.3 -50# bag
Secondary Filter Pack:	
Type & Size:	NA
Manufacturer:	NA
Amount Used:	NA
Primary Filter Pack:	
Type & Size:	Silica Sand 20/40
Manufacturer:	Premier Silica
Amount Used:	6.0 - 50# bags
Well Casing:	
Type:	PVC
Diameter:	2"
Sch. or Weight:	SCH 40
Manufacturer:	Johnson Screens
Screen Type:	PVC
Screen Slot Size:	0.02
End Cap Type:	Flat
Centralizers (Y/N):	NA
Material:	NA
Number:	NA
Depth(s):	NA
Backfill Material:	
Type & Size:	NA
Manufacturer:	NA
Amount Used:	NA

Monitoring Well Construction Diagram

Project Number: 80447	Well Number: MW-09S
Project Name: Former Forbes Atlas S5	Site Name: Former Forbes Atlas S5
Geologist: Jeff Bryant	Northing: 2055592.1
Drilling Company: Traut Drilling	Easting: 1939571.1
Driller: Nate Stebbins	Survey Datum: NAVD 1988

Drilling Method: Sonic Drilling
 Borehole Diameter: 7"

Elevations	
Top of Casing (TOC)	1412.19
Ground Surface (GS)	1410.11
Reference Point (RP)	1412.19

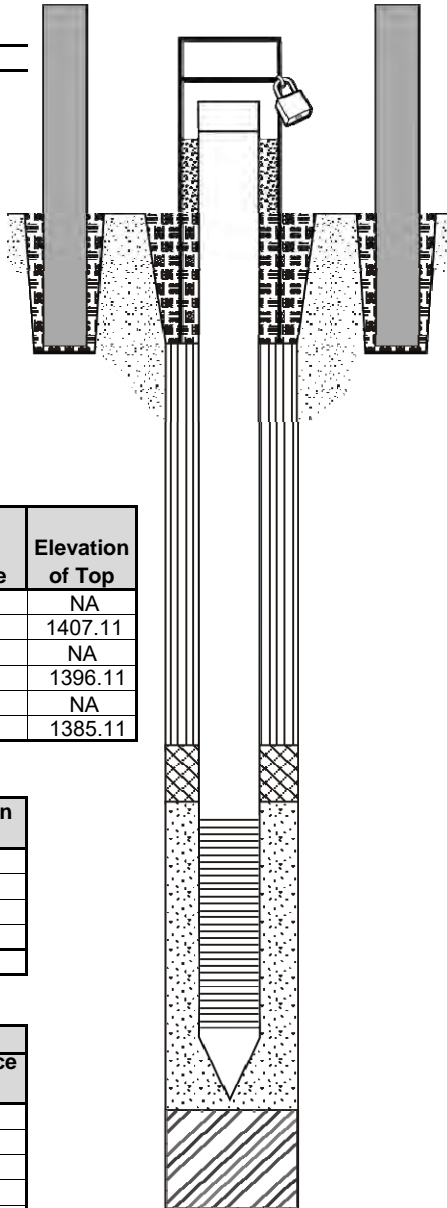
Dates	
Drilling Start	6/2/16
Drilling Complete	6/2/16
Installation Start	6/2/16
Installation Complete	6/2/16
Development Start	6/4/16
Development Complete	6/4/16

Annular Material Measurements	Depth to Top from GS	Total Footage	Elevation of Top
Annular Seal	NA	NA	NA
Bentonite Seal	3.0	11.0	1407.11
Secondary Filter Pack	NA	NA	NA
Filter Pack	14.0	11.0	1396.11
Backfill	NA	NA	NA
Bottom of Borehole	25.0	NA	1385.11

Casing Materials Measurements	Total Footage	Elevation of Top
Total Riser Installed	20.24	NA
Total Riser Cutoff	0.0	NA
Screen	5.04	1391.92
End Cap	0.23	1386.88
Total Depth from TOC	25.51	

Groundwater Levels		
Date & Time	Depth	Reference Point
6/27/16	14.98	TOC

Notes



Cap Type:	J-plug
Lock Keyed to:	
Protective Cover:	
Material:	Steel
Size:	4"
Length:	5'
Pea Gravel (Y/N):	Sand
Weep Hole (Y/N):	Y
Gauge Mark (Y/N):	Y
Bollards (# and type):	4 - steel
Surface Pad:	
Dimensions:	3' x 3' x 6"
Material:	Concrete
Annular Seal:	
Type & Size:	NA
Manufacturer:	NA
Amount Used:	NA
Bentonite Seal:	
Type & Size:	3/8" Bentonite Chips
Manufacturer:	Haliburton
Amount Used:	6.0-50# bag
Secondary Filter Pack:	
Type & Size:	NA
Manufacturer:	NA
Amount Used:	NA
Primary Filter Pack:	
Type & Size:	Silica Sand 20/40
Manufacturer:	Premier Silica
Amount Used:	6.0 - 50# bags
Well Casing:	
Type:	PVC
Diameter:	2"
Sch. or Weight:	SCH 40
Manufacturer:	Johnson Screens
Screen Type:	PVC
Screen Slot Size:	0.02
End Cap Type:	Flat
Centralizers (Y/N):	NA
Material:	NA
Number:	NA
Depth(s):	NA
Backfill Material:	
Type & Size:	NA
Manufacturer:	NA
Amount Used:	NA

Monitoring Well Construction Diagram

Project Number: 80447	Well Number: MW-10S
Project Name: Former Forbes Atlas S5	Site Name: Former Forbes Atlas S5
Geologist: Jeff Bryant	Northing: 2055350.3
Drilling Company: Traut Drilling	Easting: 1939916.9
Driller: Nate Stebbins	Survey Datum: NAVD 1988

Drilling Method: Sonic Drilling
 Borehole Diameter: 7"

Elevations	
Top of Casing (TOC)	1412.92
Ground Surface (GS)	1410.36
Reference Point (RP)	1412.92

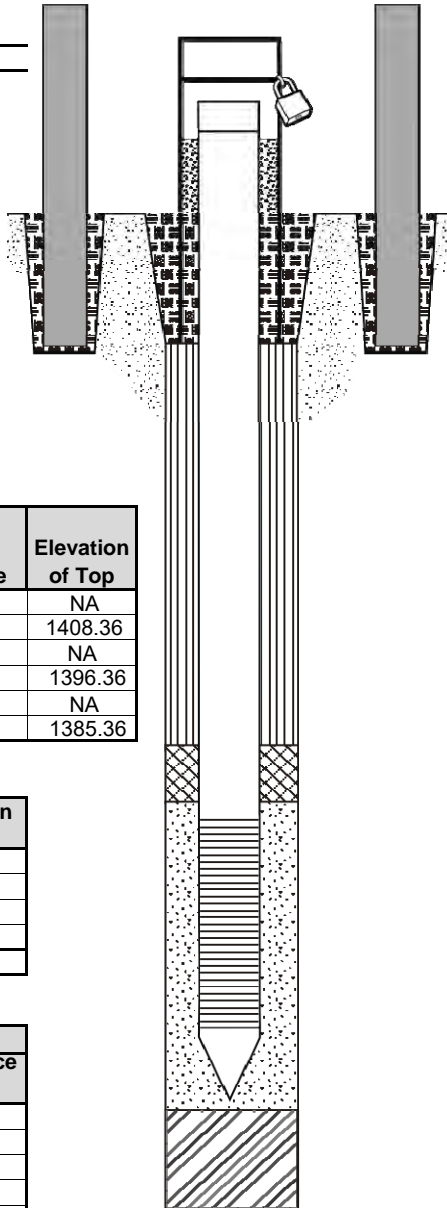
Dates	
Drilling Start	5/24/16
Drilling Complete	5/24/16
Installation Start	5/24/16
Installation Complete	5/24/16
Development Start	5/26/16
Development Complete	6/5/16

Annular Material Measurements	Depth to Top from GS	Total Footage	Elevation of Top
Annular Seal	NA	NA	NA
Bentonite Seal	2.0	12.0	1408.36
Secondary Filter Pack	NA	NA	NA
Filter Pack	14.0	11.0	1396.36
Backfill	NA	NA	NA
Bottom of Borehole	25.0	NA	1385.36

Casing Materials Measurements	Total Footage	Elevation of Top
Total Riser Installed	20.10	NA
Total Riser Cutoff	0.48	NA
Screen	5.0	1393.24
End Cap	0.15	1388.24
Total Depth from TOC	24.77	

Groundwater Levels		
Date & Time	Depth	Reference Point
6/27/16	14.17	TOC

Notes



Cap Type:	J-plug
Lock Keyed to:	
Protective Cover:	
Material:	Steel
Size:	4"
Length:	5'
Pea Gravel (Y/N):	Sand
Weep Hole (Y/N):	Y
Gauge Mark (Y/N):	Y
Bollards (# and type):	4 - steel
Surface Pad:	
Dimensions:	3' x 3' x 6"
Material:	Concrete
Annular Seal:	
Type & Size:	NA
Manufacturer:	NA
Amount Used:	NA
Bentonite Seal:	
Type & Size:	3/8" Bentonite Chips
Manufacturer:	Haliburton
Amount Used:	4.5-50# bag
Secondary Filter Pack:	
Type & Size:	NA
Manufacturer:	NA
Amount Used:	NA
Primary Filter Pack:	
Type & Size:	Silica Sand 20/40
Manufacturer:	Premier Silica
Amount Used:	5.0 - 50# bags
Well Casing:	
Type:	PVC
Diameter:	2"
Sch. or Weight:	SCH 40
Manufacturer:	Johnson Screens
Screen Type:	PVC
Screen Slot Size:	0.02
End Cap Type:	Flat
Centralizers (Y/N):	NA
Material:	NA
Number:	NA
Depth(s):	NA
Backfill Material:	
Type & Size:	NA
Manufacturer:	NA
Amount Used:	NA

Monitoring Well Construction Diagram

Project Number: 80447	Well Number: MW-11S
Project Name: Former Forbes Atlas S5	Site Name: Former Forbes Atlas S5
Geologist: Jeff Bryant	Northing: 2055079.8
Drilling Company: Traut Drilling	Easting: 1939892.4
Driller: Nate Stebbins	Survey Datum: NAVD 1988

Drilling Method: Sonic Drilling
 Borehole Diameter: 7"

Elevations	
Top of Casing (TOC)	1416.59
Ground Surface (GS)	1413.67
Reference Point (RP)	1416.59

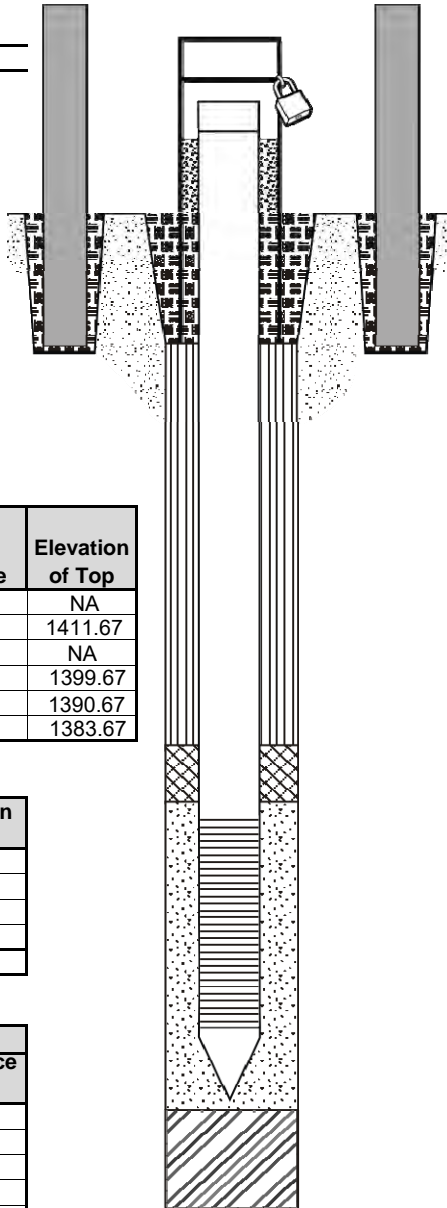
Dates	
Drilling Start	5/25/16
Drilling Complete	5/25/16
Installation Start	5/25/16
Installation Complete	5/25/16
Development Start	6/1/16
Development Complete	6/5/16

Annular Material Measurements	Depth to Top from GS	Total Footage	Elevation of Top
Annular Seal	NA	NA	NA
Bentonite Seal	2.0	12.0	1411.67
Secondary Filter Pack	NA	NA	NA
Filter Pack	14.0	9.0	1399.67
Backfill	23.0	7.0	1390.67
Bottom of Borehole	30.0	NA	1383.67

Casing Materials Measurements	Total Footage	Elevation of Top
Total Riser Installed	20.11	NA
Total Riser Cutoff	0.43	NA
Screen	5.0	1396.87
End Cap	0.15	1391.87
Total Depth from TOC	24.83	

Groundwater Levels		
Date & Time	Depth	Reference Point
6/27/16	16.77	TOC

Notes



Cap Type:	J-plug
Lock Keyed to:	
Protective Cover:	
Material:	Steel
Size:	4"
Length:	5'
Pea Gravel (Y/N):	Sand
Weep Hole (Y/N):	Y
Gauge Mark (Y/N):	Y
Bollards (# and type):	4 - steel
Surface Pad:	
Dimensions:	3' x 3' x 6"
Material:	Concrete
Annular Seal:	
Type & Size:	NA
Manufacturer:	NA
Amount Used:	NA
Bentonite Seal:	
Type & Size:	3/8" Bentonite Chips
Manufacturer:	Haliburton
Amount Used:	2.5-50# bag
Secondary Filter Pack:	
Type & Size:	NA
Manufacturer:	NA
Amount Used:	NA
Primary Filter Pack:	
Type & Size:	Silica Sand 20/40
Manufacturer:	Premier Silica
Amount Used:	6.0 - 50# bags
Well Casing:	
Type:	PVC
Diameter:	2"
Sch. or Weight:	SCH 40
Manufacturer:	Johnson Screens
Screen Type:	PVC
Screen Slot Size:	0.02
End Cap Type:	Flat
Centralizers (Y/N):	NA
Material:	NA
Number:	NA
Depth(s):	NA
Backfill Material:	
Type & Size:	3/8" Bentonite Chips
Manufacturer:	Haliburton
Amount Used:	2.5 - 50# bag

Monitoring Well Construction Diagram

Project Number: 80447	Well Number: MW-12S
Project Name: Former Forbes Atlas S5	Site Name: Former Forbes Atlas S5
Geologist: Jeff Bryant	Northing: 2054690.9
Drilling Company: Traut Drilling	Easting: 1939813.2
Driller: Nate Stebbins	Survey Datum: NAVD 1988

Drilling Method: Sonic Drilling
 Borehole Diameter: 7"

Elevations	
Top of Casing (TOC)	1418.05
Ground Surface (GS)	1416.14
Reference Point (RP)	1418.05

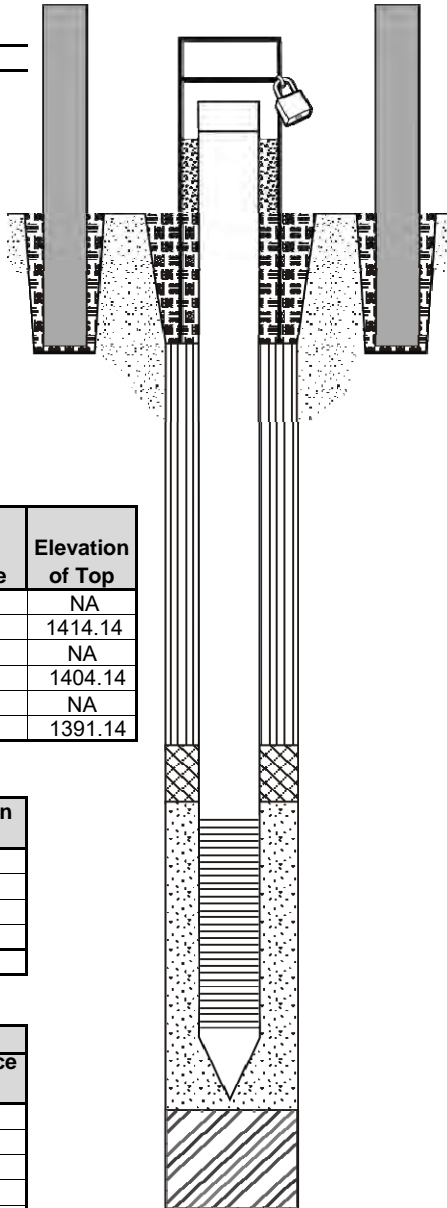
Dates	
Drilling Start	5/26/16
Drilling Complete	5/26/16
Installation Start	5/26/16
Installation Complete	5/26/16
Development Start	6/1/16
Development Complete	6/5/16

Annular Material Measurements	Depth to Top from GS	Total Footage	Elevation of Top
Annular Seal	NA	NA	NA
Bentonite Seal	2.0	10.0	1414.14
Secondary Filter Pack	NA	NA	NA
Filter Pack	12.0	13.0	1404.14
Backfill	NA	NA	NA
Bottom of Borehole	25.0	NA	1391.14

Casing Materials Measurements	Total Footage	Elevation of Top
Total Riser Installed	20.10	NA
Total Riser Cutoff	3.22	NA
Screen	10.0	1401.11
End Cap	0.15	1391.11
Total Depth from TOC	27.03	

Groundwater Levels		
Date & Time	Depth	Reference Point
6/27/16	18.53	TOC

Notes



Cap Type:	J-plug
Lock Keyed to:	
Protective Cover:	
Material:	Steel
Size:	4"
Length:	5'
Pea Gravel (Y/N):	Sand
Weep Hole (Y/N):	Y
Gauge Mark (Y/N):	Y
Bollards (# and type):	4 - steel
Surface Pad:	
Dimensions:	3' x 3' x 6"
Material:	Concrete
Annular Seal:	
Type & Size:	NA
Manufacturer:	NA
Amount Used:	NA
Bentonite Seal:	
Type & Size:	3/8" Bentonite Chips
Manufacturer:	Haliburton
Amount Used:	4-50# bag
Secondary Filter Pack:	
Type & Size:	NA
Manufacturer:	NA
Amount Used:	NA
Primary Filter Pack:	
Type & Size:	Silica Sand 20/40
Manufacturer:	Premier Silica
Amount Used:	8.0 - 50# bags
Well Casing:	
Type:	PVC
Diameter:	2"
Sch. or Weight:	SCH 40
Manufacturer:	Johnson Screens
Screen Type:	PVC
Screen Slot Size:	0.02
End Cap Type:	Flat
Centralizers (Y/N):	NA
Material:	NA
Number:	NA
Depth(s):	NA
Backfill Material:	
Type & Size:	NA
Manufacturer:	NA
Amount Used:	NA

Monitoring Well Construction Diagram

Project Number: 80447	Well Number: MW-13S
Project Name: Former Forbes Atlas S5	Site Name: Former Forbes Atlas S5
Geologist: Jeff Bryant	Northing: 2054694.5
Drilling Company: Traut Drilling	Easting: 1939287.6
Driller: Nate Stebbins	Survey Datum: NAVD 1988

Drilling Method: Sonic Drilling
 Borehole Diameter: 7"

Elevations	
Top of Casing (TOC)	1412.70
Ground Surface (GS)	1410.35
Reference Point (RP)	1412.70

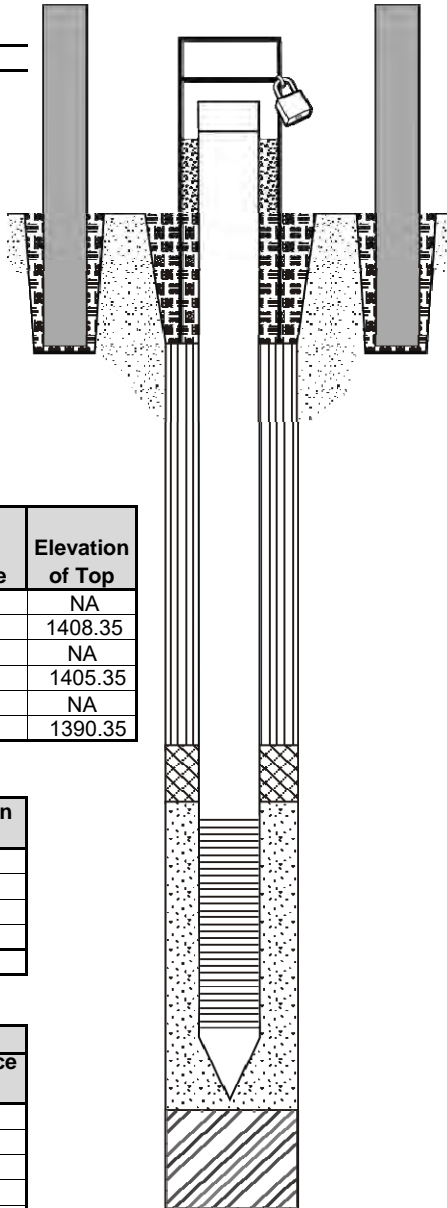
Dates	
Drilling Start	6/1/16
Drilling Complete	6/1/16
Installation Start	6/1/16
Installation Complete	6/1/16
Development Start	6/4/16
Development Complete	6/5/16

Annular Material Measurements	Depth to Top from GS	Total Footage	Elevation of Top
Annular Seal	NA	NA	NA
Bentonite Seal	2.0	3.0	1408.35
Secondary Filter Pack	NA	NA	NA
Filter Pack	5.0	15.0	1405.35
Backfill	NA	NA	NA
Bottom of Borehole	20.0	NA	1390.35

Casing Materials Measurements	Total Footage	Elevation of Top
Total Riser Installed	10.05	NA
Total Riser Cutoff	0.57	NA
Screen	10.0	1403.19
End Cap	0.22	1393.14
Total Depth from TOC	19.7	

Groundwater Levels		
Date & Time	Depth	Reference Point
6/27/16	10.97	TOC

Notes



Cap Type:	J-plug
Lock Keyed to:	
Protective Cover:	
Material:	Steel
Size:	4"
Length:	5'
Pea Gravel (Y/N):	Sand
Weep Hole (Y/N):	Y
Gauge Mark (Y/N):	Y
Bollards (# and type):	4 - steel
Surface Pad:	
Dimensions:	3' x 3' x 6"
Material:	Concrete
Annular Seal:	
Type & Size:	NA
Manufacturer:	NA
Amount Used:	NA
Bentonite Seal:	
Type & Size:	3/8" Bentonite Chips
Manufacturer:	Haliburton
Amount Used:	1-50# bag
Secondary Filter Pack:	
Type & Size:	NA
Manufacturer:	NA
Amount Used:	NA
Primary Filter Pack:	
Type & Size:	Silica Sand 20/40
Manufacturer:	Premier Silica
Amount Used:	7.0 - 50# bags
Well Casing:	
Type:	PVC
Diameter:	2"
Sch. or Weight:	SCH 40
Manufacturer:	Johnson Screens
Screen Type:	PVC
Screen Slot Size:	0.02
End Cap Type:	Flat
Centralizers (Y/N):	NA
Material:	NA
Number:	NA
Depth(s):	NA
Backfill Material:	
Type & Size:	NA
Manufacturer:	NA
Amount Used:	NA

WATER WELL RECORD Form WWC-5

Original Record Correction Change in Well Use

Division of Water Resources App. No.

Well ID MW-02D

1 LOCATION OF WATER WELL: County: Lyon	Fraction SW ¼ NE ¼ SE ¼ ¼	Section Number 4	Township Number T 16 S	Range Number R 10 <input checked="" type="checkbox"/> E <input type="checkbox"/> W
--	------------------------------	---------------------	---------------------------	---

2 WELL OWNER: Last Name: _____ First: _____ Business: Corp of Engineers Address: 601 E 12th Street Address: _____ City: Kansas City State: MO ZIP: 64106	Street or Rural Address where well is located (if unknown, distance and direction from nearest town or intersection): If at owner's address, check here: <input type="checkbox"/> 1/2 Mi NW of RD 360 & RD D
--	--

3 LOCATE WELL WITH "X" IN SECTION BOX:

N

NW	NE
SW	SE

S

|-----1 mile-----|

4 DEPTH OF COMPLETED WELL: **55** ft.

Depth(s) Groundwater Encountered: 1) ft.
 2) ft. 3) ft., or 4) Dry Well

WELL'S STATIC WATER LEVEL: **40.65** ft.

below land surface, measured on (mo-day-yr)
 above land surface, measured on (mo-day-yr)

Pump test data: Well water was ft.
 after hours pumping gpm
 Well water was ft.
 after hours pumping gpm

Estimated Yield: gpm
 Bore Hole Diameter: **7** in. to **60** ft. and
 in. to ft.

5 Latitude: **N 38.68601** (decimal degrees)
Longitude: **W 096.30221** (decimal degrees)
 Horizontal Datum: WGS 84 NAD 83 NAD 27
 Source for Latitude/Longitude:
 GPS (unit make/model: **garmin**)
 (WAAS enabled? Yes No)
 Land Survey Topographic Map
 Online Mapper:

6 Elevation: ft. Ground Level TOC
 Source: Land Survey GPS Topographic Map
 Other

7 WELL WATER TO BE USED AS:

1. Domestic: <input type="checkbox"/> Household <input type="checkbox"/> Lawn & Garden <input type="checkbox"/> Livestock 2. <input type="checkbox"/> Irrigation 3. <input type="checkbox"/> Feedlot 4. <input type="checkbox"/> Industrial	5. <input type="checkbox"/> Public Water Supply: well ID 6. <input type="checkbox"/> Dewatering: how many wells? 7. <input type="checkbox"/> Aquifer Recharge: well ID 8. <input checked="" type="checkbox"/> Monitoring: well ID 9. Environmental Remediation: well ID <input type="checkbox"/> Air Sparge <input type="checkbox"/> Soil Vapor Extraction <input type="checkbox"/> Recovery <input type="checkbox"/> Injection	10. <input type="checkbox"/> Oil Field Water Supply: lease 11. Test Hole: well ID <input type="checkbox"/> Cased <input type="checkbox"/> Uncased <input type="checkbox"/> Geotechnical 12. Geothermal: how many bores? a) Closed Loop <input type="checkbox"/> Horizontal <input type="checkbox"/> Vertical b) Open Loop <input type="checkbox"/> Surface Discharge <input type="checkbox"/> Inj. of Water 13. <input type="checkbox"/> Other (specify):
---	---	---

Was a chemical/bacteriological sample submitted to KDHE? Yes No If yes, date sample was submitted:

Water well disinfected? Yes No

8 TYPE OF CASING USED: Steel PVC Other CASING JOINTS: Glued Clamped Welded Threaded

Casing diameter **2** in. to **50** ft., Diameter in. to ft., Diameter in. to ft.
 Casing height above land surface **36** in. Weight lbs./ft. Wall thickness or gauge No. **sch 40**

TYPE OF SCREEN OR PERFORATION MATERIAL:
 Steel Stainless Steel Fiberglass PVC Other (Specify)
 Brass Galvanized Steel Concrete tile None used (open hole)

SCREEN OR PERFORATION OPENINGS ARE:
 Continuous Slot Mill Slot Gauze Wrapped Torch Cut Drilled Holes Other (Specify)
 Louvered Shutter Key Punched Wire Wrapped Saw Cut None (Open Hole)

SCREEN-PERFORATED INTERVALS: From **50** ft. to **55** ft., From ft. to ft., From ft. to ft.
GRAVEL PACK INTERVALS: From **46** ft. to **52** ft., From ft. to ft., From ft. to ft.

9 GROUT MATERIAL: Neat cement Cement grout Bentonite Other

Grout Intervals: From **1** ft. to **46** ft., From ft. to ft., From ft. to ft.

Nearest source of possible contamination:
 Septic Tank Lateral Lines Pit Privy Livestock Pens Insecticide Storage
 Sewer Lines Cess Pool Sewage Lagoon Fuel Storage Abandoned Water Well
 Watertight Sewer Lines Seepage Pit Feedyard Fertilizer Storage Oil Well/Gas Well
 Other (Specify) **concrete bunker**

Direction from well? Distance from well? ft.

10 FROM	TO	LITHOLOGIC LOG	FROM	TO	LITHO. LOG (cont.) or PLUGGING INTERVALS
0	5	gray clay			
5	19	gray/brown shale			
19	31	limestone			
31	50	green/gray shale			
50	55	limestone			
55	60	gray shale			
Notes:					

11 CONTRACTOR'S OR LANDOWNER'S CERTIFICATION: This water well was constructed, reconstructed, or plugged under my jurisdiction and was completed on (mo-day-yr) **05/17/15** and this record is true to the best of my knowledge and belief. Kansas Water Well Contractor's License No. **902** This Water Well Record was completed on (mo-day-yr) **06/27/15** under the business name of **Traut Wells**

WATER WELL RECORD Form WWC-5

Original Record Correction Change in Well Use

Division of Water Resources App. No.

Well ID MW-02S

1 LOCATION OF WATER WELL: County: Lyon	Fraction SE ¼ NE ¼ SE ¼ ¼	Section Number 4	Township Number T 16 S	Range Number R 10 <input checked="" type="checkbox"/> E <input type="checkbox"/> W
--	------------------------------	---------------------	---------------------------	---

2 WELL OWNER: Last Name: Corps of Engineers Business: Corps of Engineers Address: 601 E 12th Street Address: City: Kansas City State: MO ZIP: 64106	First: Street or Rural Address where well is located (if unknown, distance and direction from nearest town or intersection): If at owner's address, check here: <input type="checkbox"/> 1/2 Mi NW of RD 360 & RD D
--	--

3 LOCATE WELL WITH "X" IN SECTION BOX:

N

NW	NE
SW	SE

S

-----1 mile-----

4 DEPTH OF COMPLETED WELL: **31** ft.

Depth(s) Groundwater Encountered: 1) ft.
2) ft. 3) ft., or 4) Dry Well

WELL'S STATIC WATER LEVEL: **16.41** ft.

below land surface, measured on (mo-day-yr).....
 above land surface, measured on (mo-day-yr).....

Pump test data: Well water was ft.
after hours pumping gpm
Well water was ft.
after hours pumping gpm

Estimated Yield: gpm
Bore Hole Diameter: **7** in. to ft. and
..... in. to ft.

5 Latitude: **N 38.68600** (decimal degrees)
Longitude: **W 096.30215** (decimal degrees)
Horizontal Datum: WGS 84 NAD 83 NAD 27
Source for Latitude/Longitude:
 GPS (unit make/model: **garmin**)
(WAAS enabled? Yes No)
 Land Survey Topographic Map
 Online Mapper:

6 Elevation: ft. Ground Level TOC
Source: Land Survey GPS Topographic Map
 Other

7 WELL WATER TO BE USED AS:

1. Domestic: <input type="checkbox"/> Household <input type="checkbox"/> Lawn & Garden <input type="checkbox"/> Livestock	5. <input type="checkbox"/> Public Water Supply: well ID	10. <input type="checkbox"/> Oil Field Water Supply: lease
2. <input type="checkbox"/> Irrigation	6. <input type="checkbox"/> Dewatering: how many wells?	11. Test Hole: well ID
3. <input type="checkbox"/> Feedlot	7. <input type="checkbox"/> Aquifer Recharge: well ID	<input type="checkbox"/> Cased <input type="checkbox"/> Uncased <input type="checkbox"/> Geotechnical
4. <input type="checkbox"/> Industrial	8. <input checked="" type="checkbox"/> Monitoring: well ID	12. Geothermal: how many bores?
	9. Environmental Remediation: well ID	a) Closed Loop <input type="checkbox"/> Horizontal <input type="checkbox"/> Vertical
	<input type="checkbox"/> Air Sparge <input type="checkbox"/> Soil Vapor Extraction	b) Open Loop <input type="checkbox"/> Surface Discharge <input type="checkbox"/> Inj. of Water
	<input type="checkbox"/> Recovery <input type="checkbox"/> Injection	13. <input type="checkbox"/> Other (specify):

Was a chemical/bacteriological sample submitted to KDHE? Yes No If yes, date sample was submitted:

Water well disinfected? Yes No

8 TYPE OF CASING USED: Steel PVC Other CASING JOINTS: Glued Clamped Welded Threaded

Casing diameter **2** in. to **26** ft., Diameter in. to ft., Diameter in. to ft.

Casing height above land surface **36** in. Weight lbs./ft. Wall thickness or gauge No. **sch 40**

TYPE OF SCREEN OR PERFORATION MATERIAL:
 Steel Stainless Steel Fiberglass PVC Other (Specify)

Brass Galvanized Steel Concrete tile None used (open hole)

SCREEN OR PERFORATION OPENINGS ARE:
 Continuous Slot Mill Slot Gauze Wrapped Torch Cut Drilled Holes Other (Specify)

Louvered Shutter Key Punched Wire Wrapped Saw Cut None (Open Hole)

SCREEN-PERFORATED INTERVALS: From **26** ft. to **31** ft., From ft. to ft., From ft. to ft.

GRAVEL PACK INTERVALS: From **22** ft. to **33** ft., From ft. to ft., From ft. to ft.

9 GROUT MATERIAL: Neat cement Cement grout Bentonite Other

Grout Intervals: From **1** ft. to **22** ft., From ft. to ft., From ft. to ft.

Nearest source of possible contamination:

<input type="checkbox"/> Septic Tank	<input type="checkbox"/> Lateral Lines	<input type="checkbox"/> Pit Privy	<input type="checkbox"/> Livestock Pens	<input type="checkbox"/> Insecticide Storage
<input type="checkbox"/> Sewer Lines	<input type="checkbox"/> Cess Pool	<input type="checkbox"/> Sewage Lagoon	<input type="checkbox"/> Fuel Storage	<input type="checkbox"/> Abandoned Water Well
<input type="checkbox"/> Watertight Sewer Lines	<input type="checkbox"/> Seepage Pit	<input type="checkbox"/> Feedyard	<input type="checkbox"/> Fertilizer Storage	<input type="checkbox"/> Oil Well/Gas Well

Other (Specify) **concrete bunker**.....

Direction from well? Distance from well? ft.

10 FROM	TO	LITHOLOGIC LOG	FROM	TO	LITHO. LOG (cont.) or PLUGGING INTERVALS
0	5	gray clay			
5	19	gray/brown shale			
19	31	limestone			
31	40	green/gray shale			

11 CONTRACTOR'S OR LANDOWNER'S CERTIFICATION: This water well was constructed, reconstructed, or plugged under my jurisdiction and was completed on (mo-day-year) **05/19/15** and this record is true to the best of my knowledge and belief. Kansas Water Well Contractor's License No. **902**..... This Water Well Record was completed on (mo-day-year) **06/19/15** under the business name of **Traut Wells**.....

WATER WELL RECORD Form WWC-5

Original Record Correction Change in Well Use

Division of Water Resources App. No.

[Blank Box]

Well ID

MW-03D

1 LOCATION OF WATER WELL: County: Lyon Fraction SW 1/4 NE 1/4 SE 1/4 1/4 Section Number 4 Township Number T 16 S Range Number R 10 E W

2 WELL OWNER: Last Name: First: Street or Rural Address where well is located (if unknown, distance and direction from nearest town or intersection): If at owner's address, check here: 1/2 Mi NW of RD 360 & RD D

3 LOCATE WELL WITH 'X' IN SECTION BOX: N W E S | 4 DEPTH OF COMPLETED WELL: 54 ft. | 5 Latitude: N 38.68702 Longitude: W 096.30238

7 WELL WATER TO BE USED AS: 1. Domestic: 2. Irrigation 3. Feedlot 4. Industrial 5. Public Water Supply 6. Dewatering 7. Aquifer Recharge 8. Monitoring 9. Environmental Remediation 10. Oil Field Water Supply 11. Test Hole 12. Geothermal 13. Other

Was a chemical/bacteriological sample submitted to KDHE? Water well disinfected?

8 TYPE OF CASING USED: Steel PVC Other CASING JOINTS: Glued Clamped Welded Threaded Casing diameter 2 in. to 49 ft. Diameter 36 in. to 40 ft. Type of screen or perforation material: Steel Stainless Steel Fiberglass PVC Other

9 GROUT MATERIAL: Neat cement Cement grout Bentonite Other Grout intervals: From 1 ft. to 45 ft.

Nearest source of possible contamination: Septic Tank Lateral Lines Pit Privy Livestock Pens Insecticide Storage Sewer Lines Cess Pool Sewage Lagoon Fuel Storage Abandoned Water Well Watertight Sewer Lines Seepage Pit Feedyard Fertilizer Storage Oil Well/Gas Well

Table with columns: FROM, TO, LITHOLOGIC LOG, FROM, TO, LITHO. LOG (cont.) or PLUGGING INTERVALS. Rows: 0-2 brown clay, 2-18 yellow shale, 18-49 green/gray shale, 49-54 limestone, 54-60 gray shale.

11 CONTRACTOR'S OR LANDOWNER'S CERTIFICATION: This water well was constructed, reconstructed, or plugged under my jurisdiction and was completed on (mo-day-year) 06/02/15 and this record is true to the best of my knowledge and belief. Kansas Water Well Contractor's License No. 902 This Water Well Record was completed on (mo-day-year) 06/28/15 under the business name of Trout Wells

WATER WELL RECORD Form WWC-5

Division of Water Resources App. No.

MW-03S

Original Record Correction Change in Well Use

Well ID

1 LOCATION OF WATER WELL: County: Lyon Fraction SW 1/4 NE 1/4 SE 1/4 1/4 Section Number 4 Township Number T 16 S Range Number R 10 E W

2 WELL OWNER: Last Name: Business: Corps of Engineers Address: 601 E 12th Street City: Kansas City State: MO ZIP: 64106 Street or Rural Address where well is located: 1/2 Mi NW of RD 360 & RD D

3 LOCATE WELL WITH 'X' IN SECTION BOX: N W E S 1 mile. 4 DEPTH OF COMPLETED WELL: 27 ft. 5 Latitude: N 38.68703 Longitude: W 096.30238

7 WELL WATER TO BE USED AS: 1. Domestic: Household, Lawn & Garden, Livestock, Irrigation, Feedlot, Industrial. 2. Public Water Supply, Dewatering, Aquifer Recharge, Monitoring, Environmental Remediation, Air Sparge, Soil Vapor Extraction, Recovery, Injection, Oil Field Water Supply, Test Hole, Geothermal, Other.

Was a chemical/bacteriological sample submitted to KDHE? Water well disinfected?

8 TYPE OF CASING USED: Steel, PVC, Other. CASING JOINTS: Glued, Clamped, Welded, Threaded. TYPE OF SCREEN OR PERFORATION MATERIAL: Steel, Stainless Steel, Fiberglass, PVC, Other. SCREEN OR PERFORATION OPENINGS ARE: Continuous Slot, Mill Slot, Gauze Wrapped, Torch Cut, Drilled Holes, Other.

9 GROUT MATERIAL: Neat cement, Cement grout, Bentonite, Other. Grout Intervals: From 1 ft. to 18 ft.

Nearest source of possible contamination: Septic Tank, Lateral Lines, Pit Privy, Livestock Pens, Insecticide Storage, Sewer Lines, Cess Pool, Sewage Lagoon, Fuel Storage, Abandoned Water Well, Watertight Sewer Lines, Seepage Pit, Feedyard, Fertilizer Storage, Oil Well/Gas Well, Other (Specify): concrete bunker.

Table with columns: 10 FROM, TO, LITHOLOGIC LOG, FROM, TO, LITHO. LOG (cont.) or PLUGGING INTERVALS. Rows: 0-3 brown clay, 3-19 yellow shale, 19-27 limestone, 27-30 gray shale.

11 CONTRACTOR'S OR LANDOWNER'S CERTIFICATION: This water well was constructed, reconstructed, or plugged under my jurisdiction and was completed on (mo-day-year) 6/19/15 and this record is true to the best of my knowledge and belief. Kansas Water Well Contractor's License No. 902 This Water Well Record was completed on (mo-day-year) 6/29/15 under the business name of Traut Wells

WATER WELL RECORD Form WWC-5

Division of Water Resources App. No.

MW-04D

Original Record Correction Change in Well Use

Well ID

1 LOCATION OF WATER WELL: County: Lyon Fraction SW 1/4 NE 1/4 SE 1/4 1/4 Section Number 4 Township Number T 16 S Range Number R 10 E Q W

2 WELL OWNER: Last Name: First: Street or Rural Address where well is located (if unknown, distance and direction from nearest town or intersection): If at owner's address, check here: Corp of Engineers 601 E 12th Street 1/2 Mi NW of RD 360 & RD D Kansas City MO ZIP: 64106

3 LOCATE WELL WITH "X" IN SECTION BOX: N W E S 1 mile

4 DEPTH OF COMPLETED WELL: 64 ft. Depth(s) Groundwater Encountered: 1) 2) 3) 4) Dry Well WELL'S STATIC WATER LEVEL: 55.57 ft. below land surface, measured on (mo-day-yr) above land surface, measured on (mo-day-yr) Pump test data: Well water was after hours pumping gpm Well water was after hours pumping gpm Estimated Yield: gpm Bore Hole Diameter: 7 in. to ft. and in. to ft.

5 Latitude: N 38.68663 (decimal degrees) Longitude: W 96.30343 (decimal degrees) Horizontal Datum: WGS 84 NAD 83 NAD 27 Source for Latitude/Longitude: GPS (unit make/model: Garmin) (WAAS enabled? Yes No) Land Survey Topographic Map Online Mapper

6 Elevation: ft. Ground Level TOC Source: Land Survey GPS Topographic Map Other

7 WELL WATER TO BE USED AS: 1. Domestic: Household Lawn & Garden Livestock Irrigation Feedlot Industrial 2. Public Water Supply: well ID 3. Dewatering: how many wells? 4. Aquifer Recharge: well ID 5. Monitoring: well ID 6. Environmental Remediation: well ID Air Sparge Soil Vapor Extraction Recovery Injection 7. Oil Field Water Supply: lease 8. Test Hole: well ID Cased Uncased Geotechnical 9. Geothermal: how many bores? a) Closed Loop Horizontal Vertical b) Open Loop Surface Discharge Inj. of Water 10. Other (specify):

Was a chemical/bacteriological sample submitted to KDHE? Yes No If yes, date sample was submitted: Water well disinfected? Yes No

8 TYPE OF CASING USED: Steel PVC Other CASING JOINTS: Glued Clamped Welded Threaded Casing diameter 2 in. to 59 ft., Diameter in. to ft., Diameter in. to ft. Casing height above land surface 36 in. Weight lbs./ft. Wall thickness or gauge No. sch 40 TYPE OF SCREEN OR PERFORATION MATERIAL: Steel Stainless Steel Fiberglass PVC Other (Specify) Brass Galvanized Steel Concrete tile None used (open hole) SCREEN OR PERFORATION OPENINGS ARE: Continuous Slot Mill Slot Gauze Wrapped Torch Cut Drilled Holes Other (Specify) Louvered Shutter Key Punched Wire Wrapped Saw Cut None (Open Hole) SCREEN-PERFORATED INTERVALS: From 59 ft. to 64 ft., From ft. to ft., From ft. to ft. GRAVEL PACK INTERVALS: From 55 ft. to 66 ft., From ft. to ft., From ft. to ft.

9 GROUT MATERIAL: Neat cement Cement grout Bentonite Other Grout Intervals: From 1 ft. to 55 ft., From ft. to ft., From ft. to ft. Nearest source of possible contamination: Septic Tank Lateral Lines Pit Privy Livestock Pens Insecticide Storage Sewer Lines Cess Pool Sewage Lagoon Fuel Storage Abandoned Water Well Watertight Sewer Lines Seepage Pit Feedyard Fertilizer Storage Oil Well/Gas Well Other (Specify) concrete bunker Direction from well? Distance from well? ft.

Table with columns: 10 FROM, TO, LITHOLOGIC LOG, FROM, TO, LITHO. LOG (cont.) or PLUGGING INTERVALS. Rows: 0-4 gray, 4-10 yellow shale, 10-13 limestone, 13-17 sand, 17-26 gray shale, 26-34 limestone, 34-60 gray shale, 60-64 limestone, 64-70 shale. Includes Notes section.

11 CONTRACTOR'S OR LANDOWNER'S CERTIFICATION: This water well was constructed, reconstructed, or plugged under my jurisdiction and was completed on (mo-day-year) 05/31/15 and this record is true to the best of my knowledge and belief. Kansas Water Well Contractor's License No. 902 This Water Well Record was completed on (mo-day-year) 06/28/15 under the business name of Traut Wells

WATER WELL RECORD Form WWC-5

Division of Water Resources App. No.

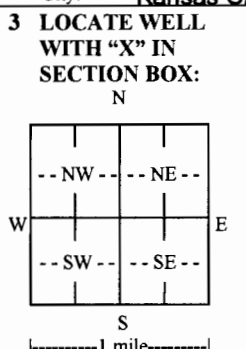
MW-05D

Original Record Correction Change in Well Use

Well ID

1 LOCATION OF WATER WELL: County: Lyon Fraction SW 1/4 NE 1/4 SE 1/4 1/4 Section Number 4 Township Number T 16 S Range Number R 10 E W

2 WELL OWNER: Last Name: First: Street or Rural Address where well is located (if unknown, distance and direction from nearest town or intersection): If at owner's address, check here: 1/2 Mi NW of RD 360 & RD D



3 LOCATE WELL WITH 'X' IN SECTION BOX: N 4 DEPTH OF COMPLETED WELL: 61 ft. Depth(s) Groundwater Encountered: 1) ... ft. 2) ... ft. 3) ... ft. or 4) Dry Well WELL'S STATIC WATER LEVEL: 55.22 ft.

5 Latitude: N 38.68607 (decimal degrees) Longitude: W 096.30341 (decimal degrees) Horizontal Datum: WGS 84 NAD 83 NAD 27 Source for Latitude/Longitude: GPS (unit make/model: Garmin) (WAAS enabled? Yes No) Land Survey Topographic Map Online Mapper:

6 Elevation: ... ft. Ground Level TOC Source: Land Survey GPS Topographic Map Other

7 WELL WATER TO BE USED AS: 1. Domestic: Household Lawn & Garden Livestock 2. Irrigation 3. Feedlot 4. Industrial 5. Public Water Supply: well ID 6. Dewatering: how many wells? 7. Aquifer Recharge: well ID 8. Monitoring: well ID 9. Environmental Remediation: well ID Air Sparge Soil Vapor Extraction Recovery Injection 10. Oil Field Water Supply: lease 11. Test Hole: well ID Cased Uncased Geotechnical 12. Geothermal: how many bores? a) Closed Loop Horizontal Vertical b) Open Loop Surface Discharge Inj. of Water 13. Other (specify):

Was a chemical/bacteriological sample submitted to KDHE? Yes No If yes, date sample was submitted: Water well disinfected? Yes No

8 TYPE OF CASING USED: Steel PVC Other CASING JOINTS: Glued Clamped Welded Threaded Casing diameter: 2 in. to 56 ft. Diameter: in. to ft. Diameter: in. to ft. Casing height above land surface: 36 in. Weight: lbs./ft. Wall thickness or gauge No. sch 40 TYPE OF SCREEN OR PERFORATION MATERIAL: Steel Stainless Steel Fiberglass PVC Other (Specify) Brass Galvanized Steel Concrete tile None used (open hole) SCREEN OR PERFORATION OPENINGS ARE: Continuous Slot Mill Slot Gauze Wrapped Torch Cut Drilled Holes Other (Specify) Louvered Shutter Key Punched Wire Wrapped Saw Cut None (Open Hole) SCREEN-PERFORATED INTERVALS: From 56 ft. to 61 ft. GRAVEL PACK INTERVALS: From 52 ft. to 63 ft.

9 GROUT MATERIAL: Neat cement Cement grout Bentonite Other Grout Intervals: From 1 ft. to 52 ft. From ft. to ft. From ft. to ft.

Nearest source of possible contamination: Septic Tank Lateral Lines Pit Privy Livestock Pens Insecticide Storage Sewer Lines Cess Pool Sewage Lagoon Fuel Storage Abandoned Water Well Watertight Sewer Lines Seepage Pit Feedyard Fertilizer Storage Oil Well/Gas Well Other (Specify) concrete bunker Direction from well? Distance from well? ft.

Table with columns: 10 FROM, TO, LITHOLOGIC LOG, FROM, TO, LITHO. LOG (cont.) or PLUGGING INTERVALS. Rows include lithology descriptions like brown clay, yellow shale, limestone, green/red/gray shale, gray shale.

11 CONTRACTOR'S OR LANDOWNER'S CERTIFICATION: This water well was constructed, reconstructed, or plugged under my jurisdiction and was completed on (mo-day-year) 5/30/15 and this record is true to the best of my knowledge and belief. Kansas Water Well Contractor's License No. 902 This Water Well Record was completed on (mo-day-year) 06/30/15 under the business name of Traut Wells

WATER WELL RECORD Form WWC-5

Original Record Correction Change in Well Use

Division of Water Resources App. No.

Well ID MW-06D

e

1 LOCATION OF WATER WELL: County: Lyon Fraction SW 1/4 NE 1/4 SE 1/4 1/4 Section Number 4 Township Number T 16 S Range Number R 10 E W

2 WELL OWNER: Last Name: First: Street or Rural Address where well is located (if unknown, distance and direction from nearest town or intersection): If at owner's address, check here:
 Business: Corps of Engineers Address: 601 E 12th Street 1/2 Mi NW of RD 360 & RD D
 Address: City: Kansas City State: MO ZIP: 64106

3 LOCATE WELL WITH "X" IN SECTION BOX:

N

	NW	NE	
W			E
	SW	SE	
	S		

1 mile

4 DEPTH OF COMPLETED WELL: 48 ft.
 Depth(s) Groundwater Encountered: 1) ft.
 2) ft. 3) ft., or 4) Dry Well
 WELL'S STATIC WATER LEVEL: 29.48 ft.
 below land surface, measured on (mo-day-yr).....
 above land surface, measured on (mo-day-yr).....
 Pump test data: Well water was ft.
 after hours pumping gpm
 Well water was ft.
 after hours pumping gpm
 Estimated Yield: gpm
 Bore Hole Diameter: 7 in. to ft. and
 in. to ft.

5 Latitude: N 38.68505 (decimal degrees)
Longitude: W 096.30298 (decimal degrees)
 Horizontal Datum: WGS 84 NAD 83 NAD 27
 Source for Latitude/Longitude:
 GPS (unit make/model: Garmin (WAAS enabled? Yes No)
 Land Survey Topographic Map
 Online Mapper:

6 Elevation: ft. Ground Level TOC
 Source: Land Survey GPS Topographic Map
 Other

7 WELL WATER TO BE USED AS:

1. Domestic: <input type="checkbox"/> Household <input type="checkbox"/> Lawn & Garden <input type="checkbox"/> Livestock 2. <input type="checkbox"/> Irrigation 3. <input type="checkbox"/> Feedlot 4. <input type="checkbox"/> Industrial	5. <input type="checkbox"/> Public Water Supply: well ID 6. <input type="checkbox"/> Dewatering: how many wells? 7. <input type="checkbox"/> Aquifer Recharge: well ID 8. <input checked="" type="checkbox"/> Monitoring: well ID 9. Environmental Remediation: well ID <input type="checkbox"/> Air Sparge <input type="checkbox"/> Soil Vapor Extraction <input type="checkbox"/> Recovery <input type="checkbox"/> Injection	10. <input type="checkbox"/> Oil Field Water Supply: lease 11. Test Hole: well ID <input type="checkbox"/> Cased <input type="checkbox"/> Uncased <input type="checkbox"/> Geotechnical 12. Geothermal: how many bores? a) Closed Loop <input type="checkbox"/> Horizontal <input type="checkbox"/> Vertical b) Open Loop <input type="checkbox"/> Surface Discharge <input type="checkbox"/> Inj. of Water 13. <input type="checkbox"/> Other (specify):
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Was a chemical/bacteriological sample submitted to KDHE? Yes No If yes, date sample was submitted:
 Water well disinfected? Yes No

8 TYPE OF CASING USED: Steel PVC Other CASING JOINTS: Glued Clamped Welded Threaded
 Casing diameter 2 in. to 43 ft., Diameter in. to ft., Diameter in. to ft.
 Casing height above land surface 36 in. Weight lbs./ft. Wall thickness or gauge No. sch 40
TYPE OF SCREEN OR PERFORATION MATERIAL:
 Steel Stainless Steel Fiberglass PVC Other (Specify)
 Brass Galvanized Steel Concrete tile None used (open hole)
SCREEN OR PERFORATION OPENINGS ARE:
 Continuous Slot Mill Slot Gauze Wrapped Torch Cut Drilled Holes Other (Specify)
 Louvered Shutter Key Punched Wire Wrapped Saw Cut None (Open Hole)
SCREEN-PERFORATED INTERVALS: From 43 ft. to 48 ft., From ft. to ft., From ft. to ft.
GRAVEL PACK INTERVALS: From 39 ft. to 50 ft., From ft. to ft., From ft. to ft.

9 GROUT MATERIAL: Neat cement Cement grout Bentonite Other
 Grout Intervals: From 1 ft. to 39 ft., From ft. to ft., From ft. to ft.
Nearest source of possible contamination:
 Septic Tank Lateral Lines Pit Privy Livestock Pens Insecticide Storage
 Sewer Lines Cess Pool Sewage Lagoon Fuel Storage Abandoned Water Well
 Watertight Sewer Lines Seepage Pit Feedyard Fertilizer Storage Oil Well/Gas Well
 Other (Specify) concrete bunker.....
 Direction from well? Distance from well? ft.

10 FROM	TO	LITHOLOGIC LOG	FROM	TO	LITHO. LOG (cont.) or PLUGGING INTERVALS
0	2	brown clay			
2	21	limestone			
21	25	gray shale			
25	40	gray/red/green			
40	48	limestone			
48	50	gray			
Notes:					

11 CONTRACTOR'S OR LANDOWNER'S CERTIFICATION: This water well was constructed, reconstructed, or plugged under my jurisdiction and was completed on (mo-day-year) 05/16/15 and this record is true to the best of my knowledge and belief. Kansas Water Well Contractor's License No. 902. This Water Well Record was completed on (mo-day-year) 06/29/15 under the business name of Traut Walls

WATER WELL RECORD Form WWC-5

Division of Water Resources App. No.

MW-06S

Well ID

Original Record Correction Change in Well Use

1 LOCATION OF WATER WELL: County: Lyon Fraction SW 1/4 NE 1/4 SE 1/4 1/4 Section Number 4 Township Number T 16 S Range Number R 10 E W

2 WELL OWNER: Last Name: First: Street or Rural Address where well is located (if unknown, distance and direction from nearest town or intersection): If at owner's address, check here: 1/2 Mi NW of RD 360 & RD D

3 LOCATE WELL WITH 'X' IN SECTION BOX: 4 DEPTH OF COMPLETED WELL: 21 ft. 5 Latitude: N 38.68503 Longitude: W 096.30300

7 WELL WATER TO BE USED AS: 1. Domestic: 2. Irrigation 3. Feedlot 4. Industrial 5. Public Water Supply: well ID 6. Dewatering: how many wells? 7. Aquifer Recharge: well ID 8. Monitoring: well ID 9. Environmental Remediation: well ID 10. Oil Field Water Supply: lease 11. Test Hole: well ID 12. Geothermal: how many bores? 13. Other (specify):

Was a chemical/bacteriological sample submitted to KDHE? Yes No If yes, date sample was submitted: Water well disinfected? Yes No

8 TYPE OF CASING USED: Steel PVC Other CASING JOINTS: Glued Clamped Welded Threaded Casing diameter 2 in. to 16 ft., Diameter in. to ft., Diameter in. to ft. Casing height above land surface 36 in. Weight lbs./ft. Wall thickness or gauge No. sch 40

9 GROUT MATERIAL: Neat cement Cement grout Bentonite Other Grout Intervals: From 1 ft. to 12 ft., From ft. to ft., From ft. to ft., From ft. to ft.

Nearest source of possible contamination: Septic Tank Lateral Lines Pit Privy Livestock Pens Insecticide Storage Sewer Lines Cess Pool Sewage Lagoon Fuel Storage Abandoned Water Well Watertight Sewer Lines Seepage Pit Feedyard Fertilizer Storage Oil Well/Gas Well Other (Specify) concrete bunker

Table with columns: 10 FROM, TO, LITHOLOGIC LOG, FROM, TO, LITHO. LOG (cont.) or PLUGGING INTERVALS. Rows: 0-2 brown clay, 2-8 shale, 8-21 limestone, 21-25 gray shale, 25-26 limestone, 26-31 gray shale.

11 CONTRACTOR'S OR LANDOWNER'S CERTIFICATION: This water well was constructed, reconstructed, or plugged under my jurisdiction and was completed on (mo-day-year) 05/28/15 and this record is true to the best of my knowledge and belief. Kansas Water Well Contractor's License No. 902 This Water Well Record was completed on (mo-day-year) 06/28/15 under the business name of Trout Wells

WATER WELL RECORD Form WWC-5

Division of Water Resources App. No.

MW-07S

Original Record Correction Change in Well Use

Well ID

1 LOCATION OF WATER WELL: County: Lyon Fraction SW 1/4 NE 1/4 SE 1/4 1/4 Section Number 4 Township Number T 16 S Range Number R 10 E W

2 WELL OWNER: Last Name: First: Street or Rural Address where well is located (if unknown, distance and direction from nearest town or intersection): If at owner's address, check here: 1/2 Mi NW of RD 360 & RD D

3 LOCATE WELL WITH "X" IN SECTION BOX: N W E S 1 mile

4 DEPTH OF COMPLETED WELL: 32 ft. Depth(s) Groundwater Encountered: 1) 2) 3) Dry Well WELL'S STATIC WATER LEVEL: 18.80 ft. below land surface, measured on (mo-day-yr) above land surface, measured on (mo-day-yr) Pump test data: Well water was after hours pumping gpm Well water was after hours pumping gpm Estimated Yield: gpm Bore Hole Diameter: 7 in. to ft. and in. to ft.

5 Latitude: N 38.68559 (decimal degrees) Longitude: W 096.30265 (decimal degrees) Horizontal Datum: WGS 84 NAD 83 NAD 27 Source for Latitude/Longitude: GPS (unit make/model: Garmin) (WAAS enabled? Yes No) Land Survey Topographic Map Online Mapper: Elevation: ft. Ground Level TOC Source: Land Survey GPS Topographic Map Other

7 WELL WATER TO BE USED AS: 1. Domestic: Household Lawn & Garden Livestock Irrigation Feedlot Industrial 2. Public Water Supply: well ID Dewatering: how many wells? Aquifer Recharge: well ID Monitoring: well ID Environmental Remediation: well ID Air Sparge Soil Vapor Extraction Recovery Injection Oil Field Water Supply: lease Test Hole: well ID Cased Uncased Geotechnical Geothermal: how many bores? Closed Loop Horizontal Vertical Open Loop Surface Discharge Inj. of Water Other (specify):

Was a chemical/bacteriological sample submitted to KDHE? Yes No If yes, date sample was submitted: Water well disinfected? Yes No

8 TYPE OF CASING USED: Steel PVC Other CASING JOINTS: Glued Clamped Welded Threaded Casing diameter 2 in. to 27 ft., Diameter in. to ft., Diameter in. to ft. Casing height above land surface 36 in. Weight lbs./ft. Wall thickness or gauge No. sch 40 TYPE OF SCREEN OR PERFORATION MATERIAL: Steel Stainless Steel Fiberglass PVC Other (Specify) Brass Galvanized Steel Concrete tile None used (open hole) SCREEN OR PERFORATION OPENINGS ARE: Continuous Slot Mill Slot Gauze Wrapped Torch Cut Drilled Holes Other (Specify) Louvered Shutter Key Punched Wire Wrapped Saw Cut None (Open Hole) SCREEN-PERFORATED INTERVALS: From 27 ft. to 32 ft., From ft. to ft., From ft. to ft. GRAVEL PACK INTERVALS: From 23 ft. to 35 ft., From ft. to ft., From ft. to ft.

9 GROUT MATERIAL: Neat cement Cement grout Bentonite Other Grout Intervals: From 1 ft. to 23 ft., From ft. to ft., From ft. to ft.

Nearest source of possible contamination: Septic Tank Lateral Lines Pit Privy Livestock Pens Insecticide Storage Sewer Lines Cess Pool Sewage Lagoon Fuel Storage Abandoned Water Well Watertight Sewer Lines Seepage Pit Feedyard Fertilizer Storage Oil Well/Gas Well Other (Specify) concrete bunker Direction from well? Distance from well? ft.

Table with columns: FROM, TO, LITHOLOGIC LOG, FROM, TO, LITHO. LOG (cont.) or PLUGGING INTERVALS. Rows: 0-5 brown clay, 5-22 brown shale, 22-32 limestone, 32-40 gray shale. Includes a Notes section.

11 CONTRACTOR'S OR LANDOWNER'S CERTIFICATION: This water well constructed, reconstructed, or plugged under my jurisdiction and was completed on (mo-day-year) 05/29/15 and this record is true to the best of my knowledge and belief. Kansas Water Well Contractor's License No. 902 This Water Well Record was completed on (mo-day-year) 06/29/15 under the business name of Traut Walls

WATER WELL RECORD Form WWC-5

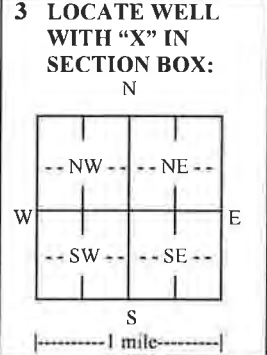
Original Record Correction Change in Well Use

Division of Water Resources App. No.

Well ID MW-08S

1 LOCATION OF WATER WELL: County: Lyon C Fraction SW 1/4 NE 1/4 SE 1/4 1/4 Section Number 4 Township Number T 16 S Range Number R 10 E W

2 WELL OWNER: Last Name: US Army Corp of Engineers First: 601 E 12th St Street or Rural Address where well is located (if unknown, distance and direction from nearest town or intersection): If at owner's address, check here:
 Address: 3622 Road D, Allen Kansas, 66833
 City: Kansas State: MO ZIP: 64106



4 DEPTH OF COMPLETED WELL: 19.5 ft. Depth(s) Groundwater Encountered: 1) 19.5 ft. 2) ft. 3) ft., or 4) Dry Well
 WELL'S STATIC WATER LEVEL: 10.5 ft. below land surface, measured on (mo-day-yr) 6-4-16 above land surface, measured on (mo-day-yr)
 Pump test data: Well water was ft. after hours pumping gpm
 Well water was ft. after hours pumping gpm
 Estimated Yield: gpm
 Bore Hole Diameter: 6.5/8 in. to 23 ft. and in. to ft.

5 Latitude: 38° 41.117'N (decimal degrees)
Longitude: 96° 18.092'W (decimal degrees)
 Horizontal Datum: WGS 84 NAD 83 NAD 27
 Source for Latitude/Longitude: GPS (unit make/model: Garmen) (WAAS enabled? Yes No) Land Survey Topographic Map Online Mapper:
6 Elevation: 1420 ft. Ground Level TOC
 Source: Land Survey GPS Topographic Map Other

7 WELL WATER TO BE USED AS:

1. Domestic: Household Lawn & Garden Livestock Irrigation Feedlot Industrial

2. Public Water Supply: well ID

3. Dewatering: how many wells?

4. Aquifer Recharge: well ID

5. Monitoring: well ID MW-08S

6. Environmental Remediation: well ID

7. Air Sparge Soil Vapor Extraction Recovery Injection

8. Oil Field Water Supply: lease

9. Test Hole: well ID Cased Uncased Geotechnical

10. Geothermal: how many bores?

11. a) Closed Loop Horizontal Vertical

12. b) Open Loop Surface Discharge Inj. of Water

13. Other (specify):

Was a chemical/bacteriological sample submitted to KDHE? Yes No If yes, date sample was submitted:
 Water well disinfected? Yes No

8 TYPE OF CASING USED: Steel PVC Other CASING JOINTS: Glued Clamped Welded Threaded
 Casing diameter 2 in. to 14.5 ft., Diameter in. to ft., Diameter in. to ft.
 Casing height above land surface 24 in. Weight 0.60 lbs./ft. Wall thickness or gauge No. Sch 40
 TYPE OF SCREEN OR PERFORATION MATERIAL: Steel Stainless Steel Fiberglass PVC Other (Specify)
 Brass Galvanized Steel Concrete tile None used (open hole)
 SCREEN OR PERFORATION OPENINGS ARE:
 Continuous Slot Mill Slot Gauze Wrapped Torch Cut Drilled Holes Other (Specify)
 Louvered Shutter Key Punched Wire Wrapped Saw Cut None (Open Hole)
 SCREEN-PERFORATED INTERVALS: From 14.5 ft. to 19.5 ft., From ft. to ft., From ft. to ft.
 GRAVEL PACK INTERVALS: From 10 ft. to 23 ft., From ft. to ft., From ft. to ft.

9 GROUT MATERIAL: Neat cement Cement grout Bentonite Other
 Grout Intervals: From 0 ft. to 10 ft., From ft. to ft., From ft. to ft.
 Nearest source of possible contamination:
 Septic Tank Lateral Lines Pit Privy Livestock Pens Insecticide Storage
 Sewer Lines Cess Pool Sewage Lagoon Fuel Storage Abandoned Water Well
 Watertight Sewer Lines Seepage Pit Feedyard Fertilizer Storage Oil Well/Gas Well
 Other (Specify)
 Direction from well? Distance from well? ft.

10 FROM	TO	LITHOLOGIC LOG	FROM	TO	LITHO. LOG (cont.) or PLUGGING INTERVALS
0	1	Top Soil - Black			
1	3	Clay - Brown			
3	7	Shale - Tan			
7	19	Limestone - Tan			
19	23	Shale - Gray			

Notes:
 6-inch Protective Casing with Locking Cap & 4-inch Bumper Posts

11 CONTRACTOR'S OR LANDOWNER'S CERTIFICATION: This water well was constructed, reconstructed, or plugged under my jurisdiction and was completed on (mo-day-year) 6-4-16 and this record is true to the best of my knowledge and belief. Kansas Water Well Contractor's License No. 902 This Water Well Record was completed on (mo-day-year) 8/14/16 under the business name of Traut Companies Signature James Traut

WATER WELL RECORD Form WWC-5

Original Record Correction Change in Well Use

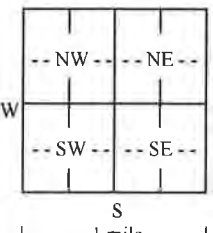
Division of Water Resources App. No.

Well ID

MW-09S

1 LOCATION OF WATER WELL: County: Lyon C	Fraction SW ¼ NE ¼ SE ¼ ¼	Section Number 4	Township Number T 16 S	Range Number R 10 <input checked="" type="checkbox"/> E <input type="checkbox"/> W
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2 WELL OWNER: Last Name: First: Business: US Army Corp of Engineers Address: 601 E 12th St Address: City: Kansas State: MO ZIP: 64106	Street or Rural Address where well is located (if unknown, distance and direction from nearest town or intersection): If at owner's address, check here: <input type="checkbox"/> 3622 Road D, Allen Kansas, 66833
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3 LOCATE WELL WITH "X" IN SECTION BOX: N  S -----1 mile-----	4 DEPTH OF COMPLETED WELL: 23 ft. Depth(s) Groundwater Encountered: 1) ft. 2) ft. 3) ft., or 4) <input type="checkbox"/> Dry Well WELL'S STATIC WATER LEVEL: 10.6 ft. <input checked="" type="checkbox"/> below land surface, measured on (mo-day-yr)..... 6-2-16..... <input type="checkbox"/> above land surface, measured on (mo-day-yr)..... Pump test data: Well water was ft. after..... hours pumping gpm Well water was ft. after..... hours pumping gpm Estimated Yield: gpm Bore Hole Diameter: .. 6.5/8 .. in. to 25 ft. and in. to ft.	5 Latitude: 38° 41.250'N(decimal degrees) Longitude: 96° 18.155'W(decimal degrees) Horizontal Datum: <input type="checkbox"/> WGS 84 <input type="checkbox"/> NAD 83 <input type="checkbox"/> NAD 27 Source for Latitude/Longitude: <input type="checkbox"/> GPS (unit make/model: <u>Garmen</u>) (WAAS enabled? <input type="checkbox"/> Yes <input type="checkbox"/> No) <input type="checkbox"/> Land Survey <input type="checkbox"/> Topographic Map <input type="checkbox"/> Online Mapper: 6 Elevation: 1414ft. <input checked="" type="checkbox"/> Ground Level <input type="checkbox"/> TOC Source: <input type="checkbox"/> Land Survey <input type="checkbox"/> GPS <input checked="" type="checkbox"/> Topographic Map <input type="checkbox"/> Other
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7 WELL WATER TO BE USED AS:

1. Domestic: <input type="checkbox"/> Household <input type="checkbox"/> Lawn & Garden <input type="checkbox"/> Livestock 2. <input type="checkbox"/> Irrigation 3. <input type="checkbox"/> Feedlot 4. <input type="checkbox"/> Industrial	5. <input type="checkbox"/> Public Water Supply: well ID 6. <input type="checkbox"/> Dewatering: how many wells? 7. <input type="checkbox"/> Aquifer Recharge: well ID 8. <input checked="" type="checkbox"/> Monitoring: well ID MW-09S 9. Environmental Remediation: well ID <input type="checkbox"/> Air Sparge <input type="checkbox"/> Soil Vapor Extraction <input type="checkbox"/> Recovery <input type="checkbox"/> Injection	10. <input type="checkbox"/> Oil Field Water Supply: lease 11. Test Hole: well ID <input type="checkbox"/> Cased <input type="checkbox"/> Uncased <input type="checkbox"/> Geotechnical 12. Geothermal: how many bores? a) Closed Loop <input type="checkbox"/> Horizontal <input type="checkbox"/> Vertical b) Open Loop <input type="checkbox"/> Surface Discharge <input type="checkbox"/> Inj. of Water 13. <input type="checkbox"/> Other (specify):
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Was a chemical/bacteriological sample submitted to KDHE? Yes No If yes, date sample was submitted:

Water well disinfected? Yes No

8 TYPE OF CASING USED: Steel PVC Other CASING JOINTS: Glued Clamped Welded Threaded

Casing diameter 2 in. to 18 ft., Diameter in. to ft., Diameter in. to ft.
 Casing height above land surface 24 in. Weight 0.60 lbs./ft. Wall thickness or gauge No. Sch. 40

TYPE OF SCREEN OR PERFORATION MATERIAL:
 Steel Stainless Steel Fiberglass PVC Other (Specify)
 Brass Galvanized Steel Concrete tile None used (open hole)

SCREEN OR PERFORATION OPENINGS ARE:
 Continuous Slot Mill Slot Gauze Wrapped Torch Cut Drilled Holes Other (Specify)
 Louvered Shutter Key Punched Wire Wrapped Saw Cut None (Open Hole)

SCREEN-PERFORATED INTERVALS: From .. 18 ft. to .. 23 ft., From ft. to ft., From ft. to ft.
GRAVEL PACK INTERVALS: From 14 ft. to 25 ft., From ft. to ft., From ft. to ft.

9 GROUT MATERIAL: Neat cement Cement grout Bentonite Other

Grout Intervals: From 0 ft. to 14 ft., From ft. to ft., From ft. to ft.

Nearest source of possible contamination:
 Septic Tank Lateral Lines Pit Privy Livestock Pens Insecticide Storage
 Sewer Lines Cess Pool Sewage Lagoon Fuel Storage Abandoned Water Well
 Watertight Sewer Lines Seepage Pit Feedyard Fertilizer Storage Oil Well/Gas Well
 Other (Specify)

Direction from well? Distance from well? ft.

10 FROM	TO	LITHOLOGIC LOG	FROM	TO	LITHO. LOG (cont.) or PLUGGING INTERVALS
0	1	Top Soil - Black			
1	3	Clay - Brown			
3	16	Shale - Tan			
16	23	Limestone - Tan			
23	25	Shale - Gray			

Notes:
6-inch Protective Casing with Locking Cap with 4-inch Bumper Posts

11 CONTRACTOR'S OR LANDOWNER'S CERTIFICATION: This water well was constructed, reconstructed, or plugged under my jurisdiction and was completed on (mo-day-year) 6-2-16 and this record is true to the best of my knowledge and belief. Kansas Water Well Contractor's License No. 902 This Water Well Record was completed on (mo-day-year) 8/14/16 under the business name of Traut Companies Signature Gard Traut

WATER WELL RECORD Form WWC-5

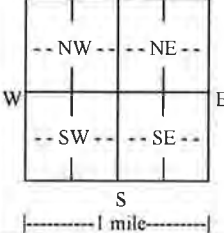
Original Record Correction Change in Well Use

Division of Water Resources App. No.

Well ID MW-10S

1 LOCATION OF WATER WELL: County: Lyon C	Fraction SW ¼ NE ¼ SE ¼ ¼	Section Number 4	Township Number T 16 S	Range Number R 10 <input checked="" type="checkbox"/> E <input type="checkbox"/> W
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2 WELL OWNER: Last Name: First: Business: US Army Corp of Engineers Address: 601 E 12th St Address: City: Kansas State: MO ZIP: 64106	Street or Rural Address where well is located (if unknown, distance and direction from nearest town or intersection): If at owner's address, check here: <input type="checkbox"/> 3622 Road D, Allen Kansas, 66833
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3 LOCATE WELL WITH "X" IN SECTION BOX: N  W E S	4 DEPTH OF COMPLETED WELL: 22 ft. Depth(s) Groundwater Encountered: 1) ft. 2) ft. 3) ft., or 4) <input type="checkbox"/> Dry Well WELL'S STATIC WATER LEVEL: 11.2 ft. <input checked="" type="checkbox"/> below land surface, measured on (mo-day-yr) 6-1-16 <input type="checkbox"/> above land surface, measured on (mo-day-yr) Pump test data: Well water was ft. after hours pumping gpm Well water was ft. after hours pumping gpm Estimated Yield: gpm Bore Hole Diameter: .. 6.5/8 in. to 25 ft. and in. to ft.	5 Latitude: 38° 41.208'N (decimal degrees) Longitude: 96° 18.080'W (decimal degrees) Horizontal Datum: <input type="checkbox"/> WGS 84 <input type="checkbox"/> NAD 83 <input type="checkbox"/> NAD 27 <u>Source for Latitude/Longitude:</u> <input type="checkbox"/> GPS (unit make/model: <u>Garmen</u>) (WAAS enabled? <input type="checkbox"/> Yes <input type="checkbox"/> No) <input type="checkbox"/> Land Survey <input type="checkbox"/> Topographic Map <input type="checkbox"/> Online Mapper:
		6 Elevation: 1413 ft. <input checked="" type="checkbox"/> Ground Level <input type="checkbox"/> TOC <u>Source:</u> <input type="checkbox"/> Land Survey <input type="checkbox"/> GPS <input checked="" type="checkbox"/> Topographic Map <input type="checkbox"/> Other

7 WELL WATER TO BE USED AS:

1. Domestic: <input type="checkbox"/> Household <input type="checkbox"/> Lawn & Garden <input type="checkbox"/> Livestock	5. <input type="checkbox"/> Public Water Supply: well ID 6. <input type="checkbox"/> Dewatering: how many wells? 7. <input type="checkbox"/> Aquifer Recharge: well ID 8. <input checked="" type="checkbox"/> Monitoring: well ID MW-10S	10. <input type="checkbox"/> Oil Field Water Supply: lease 11. Test Hole: well ID <input type="checkbox"/> Cased <input type="checkbox"/> Uncased <input type="checkbox"/> Geotechnical
2. <input type="checkbox"/> Irrigation	9. Environmental Remediation: well ID <input type="checkbox"/> Air Sparge <input type="checkbox"/> Soil Vapor Extraction <input type="checkbox"/> Recovery <input type="checkbox"/> Injection	12. Geothermal: how many bores? a) Closed Loop <input type="checkbox"/> Horizontal <input type="checkbox"/> Vertical b) Open Loop <input type="checkbox"/> Surface Discharge <input type="checkbox"/> Inj. of Water
3. <input type="checkbox"/> Feedlot		13. <input type="checkbox"/> Other (specify):
4. <input type="checkbox"/> Industrial		

Was a chemical/bacteriological sample submitted to KDHE? Yes No If yes, date sample was submitted:

Water well disinfected? Yes No

8 TYPE OF CASING USED: Steel PVC Other CASING JOINTS: Glued Clamped Welded Threaded
Casing diameter 2 in. to 17 ft., Diameter in. to ft., Diameter in. to ft.
Casing height above land surface 24 in. Weight 0.60 lbs./ft. Wall thickness or gauge No. Sch. 40

TYPE OF SCREEN OR PERFORATION MATERIAL:
 Steel Stainless Steel Fiberglass PVC Other (Specify)
 Brass Galvanized Steel Concrete tile None used (open hole)

SCREEN OR PERFORATION OPENINGS ARE:
 Continuous Slot Mill Slot Gauze Wrapped Torch Cut Drilled Holes Other (Specify)
 Louvered Shutter Key Punched Wire Wrapped Saw Cut None (Open Hole)

SCREEN-PERFORATED INTERVALS: From 17 ft. to 22 ft., From ft. to ft., From ft. to ft.
GRAVEL PACK INTERVALS: From 14 ft. to 25 ft., From ft. to ft., From ft. to ft.

9 GROUT MATERIAL: Neat cement Cement grout Bentonite Other
Grout Intervals: From 0 ft. to 14 ft., From ft. to ft., From ft. to ft.

Nearest source of possible contamination:
 Septic Tank Lateral Lines Pit Privy Livestock Pens Insecticide Storage
 Sewer Lines Cess Pool Sewage Lagoon Fuel Storage Abandoned Water Well
 Watertight Sewer Lines Seepage Pit Feedyard Fertilizer Storage Oil Well/Gas Well
 Other (Specify)

Direction from well? Distance from well? ft.

10 FROM	TO	LITHOLOGIC LOG	FROM	TO	LITHO. LOG (cont.) or PLUGGING INTERVALS
0	1	Top Soil - Black			
1	2	Clay - Brown			
2	13	Shale - Tan			
13	25	Limestone - Tan			

Notes:
6-inch Protective Casing with Locking Cap & 4-inch Bumper Posts

11 CONTRACTOR'S OR LANDOWNER'S CERTIFICATION: This water well was constructed, reconstructed, or plugged under my jurisdiction and was completed on (mo-day-year) 6-1-16 and this record is true to the best of my knowledge and belief. Kansas Water Well Contractor's License No. 902 This Water Well Record was completed on (mo-day-year) 8/14/16 under the business name of Traut Companies Signature [Signature]

WATER WELL RECORD Form WWC-5

Original Record Correction Change in Well Use

Division of Water Resources App. No.

Well ID MW-11S

1 LOCATION OF WATER WELL: County: Lyon C Fraction SW 1/4 NE 1/4 SE 1/4 1/4 Section Number 4 Township Number T 16 S Range Number R 10 E W

2 WELL OWNER: Last Name: First: Street or Rural Address where well is located (if unknown, distance and direction from nearest town or intersection): If at owner's address, check here:
 Business: US Army Corp of Engineers Address: 601 E 12th St 3622 Road D, Allen Kansas, 66833
 Address: City: Kansas State: MO ZIP: 64106

3 LOCATE WELL WITH "X" IN SECTION BOX:

N

NW	NE
SW	SE

S

-----| mile -----

4 DEPTH OF COMPLETED WELL: 22 ft.
 Depth(s) Groundwater Encountered: 1) ft.
 2) ft. 3) ft., or 4) Dry Well
WELL'S STATIC WATER LEVEL: 9.6 ft.
 below land surface, measured on (mo-day-yr) 5/25/16
 above land surface, measured on (mo-day-yr)
 Pump test data: Well water was ft. after hours pumping gpm
 Well water was ft. after hours pumping gpm
 Estimated Yield: gpm
 Bore Hole Diameter: 6.5/8 in. to 30 ft. and in. to ft.

5 Latitude: 38° 41.165'N (decimal degrees)
Longitude: 96° 18.085'W (decimal degrees)
 Horizontal Datum: WGS 84 NAD 83 NAD 27
Source for Latitude/Longitude:
 GPS (unit make/model: Garmen)
 (WAAS enabled? Yes No)
 Land Survey Topographic Map
 Online Mapper:
6 Elevation: 1417 ft. Ground Level TOC
Source: Land Survey GPS Topographic Map
 Other

7 WELL WATER TO BE USED AS:

1. Domestic: <input type="checkbox"/> Household <input type="checkbox"/> Lawn & Garden <input type="checkbox"/> Livestock 2. <input type="checkbox"/> Irrigation 3. <input type="checkbox"/> Feedlot 4. <input type="checkbox"/> Industrial	5. <input type="checkbox"/> Public Water Supply: well ID 6. <input type="checkbox"/> Dewatering: how many wells? 7. <input type="checkbox"/> Aquifer Recharge: well ID 8. <input checked="" type="checkbox"/> Monitoring: well ID MW-11S 9. Environmental Remediation: well ID <input type="checkbox"/> Air Sparge <input type="checkbox"/> Soil Vapor Extraction <input type="checkbox"/> Recovery <input type="checkbox"/> Injection	10. <input type="checkbox"/> Oil Field Water Supply: lease 11. Test Hole: well ID <input type="checkbox"/> Cased <input type="checkbox"/> Uncased <input type="checkbox"/> Geotechnical 12. Geothermal: how many bores? a) Closed Loop <input type="checkbox"/> Horizontal <input type="checkbox"/> Vertical b) Open Loop <input type="checkbox"/> Surface Discharge <input type="checkbox"/> Inj. of Water 13. <input type="checkbox"/> Other (specify):
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Was a chemical/bacteriological sample submitted to KDHE? Yes No If yes, date sample was submitted:
 Water well disinfected? Yes No

8 TYPE OF CASING USED: Steel PVC Other CASING JOINTS: Glued Clamped Welded Threaded
 Casing diameter 2 in. to 17 ft., Diameter in. to ft., Diameter in. to ft.
 Casing height above land surface 24 in. Weight 0.60 lbs./ft. Wall thickness or gauge No. Sch 40
TYPE OF SCREEN OR PERFORATION MATERIAL:
 Steel Stainless Steel Fiberglass PVC Other (Specify)
 Brass Galvanized Steel Concrete tile None used (open hole)
SCREEN OR PERFORATION OPENINGS ARE:
 Continuous Slot Mill Slot Gauze Wrapped Torch Cut Drilled Holes Other (Specify)
 Louvered Shutter Key Punched Wire Wrapped Saw Cut None (Open Hole)
SCREEN-PERFORATED INTERVALS: From 17 ft. to 22 ft., From ft. to ft., From ft. to ft.
GRAVEL PACK INTERVALS: From 14 ft. to 23 ft., From ft. to ft., From ft. to ft.

9 GROUT MATERIAL: Neat cement Cement grout Bentonite Other
 Grout Intervals: From 0 ft. to 14 ft., From 23 ft. to 30 ft., From ft. to ft.
Nearest source of possible contamination:
 Septic Tank Lateral Lines Pit Privy Livestock Pens Insecticide Storage
 Sewer Lines Cess Pool Sewage Lagoon Fuel Storage Abandoned Water Well
 Watertight Sewer Lines Seepage Pit Feedyard Fertilizer Storage Oil Well/Gas Well
 Other (Specify)
 Direction from well? Distance from well? ft.

10 FROM	TO	LITHOLOGIC LOG	FROM	TO	LITHO. LOG (cont.) or PLUGGING INTERVALS
0	1	Top Soil - Black			
1	4	Clay - Brown			
4	14	Shale - Brown			
14	22	Limestone - Tan			
22	30	Shale - Gray			

Notes:
 6-inch Protective Casing with Locking Cap & 4-inch Bumper Posts

11 CONTRACTOR'S OR LANDOWNER'S CERTIFICATION: This water well was constructed, reconstructed, or plugged under my jurisdiction and was completed on (mo-day-year) 5-25-16 and this record is true to the best of my knowledge and belief.
 Kansas Water Well Contractor's License No. 902 This Water Well Record was completed on (mo-day-year) 8/14/16
 under the business name of Traut Companies Signature *Traut*

WATER WELL RECORD Form WWC-5

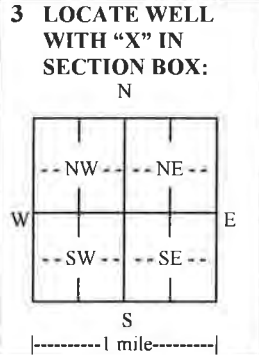
Original Record Correction Change in Well Use

Division of Water Resources App. No.

Well ID MW-12S

1 LOCATION OF WATER WELL: County: Lyon C Fraction SW ¼ NE ¼ SE ¼ ¼ Section Number 4 Township Number T 16 S Range Number R 10 E W

2 WELL OWNER: Last Name: First: Street or Rural Address where well is located (if unknown, distance and direction from nearest town or intersection): If at owner's address, check here:
 Business: US Army Corp of Engineers Address: 601 E 12th St 3622 Road D, Allen Kansas, 66833
 Address: City: Kansas State: MO ZIP: 64106



4 DEPTH OF COMPLETED WELL:25..... ft.
 Depth(s) Groundwater Encountered: 1) ft.
 2) ft. 3) ft., or 4) Dry Well
WELL'S STATIC WATER LEVEL:9.8..... ft.
 below land surface, measured on (mo-day-yr) 5-26-16
 above land surface, measured on (mo-day-yr)
 Pump test data: Well water was ft. after hours pumping gpm
 Well water was ft. after hours pumping gpm
 Estimated Yield: gpm
 Bore Hole Diameter: ..6.5/8.. in. to ..25.. ft. and in. to ft.

5 Latitude:38° 41.105'N.....(decimal degrees)
Longitude:96° 18.103'W.....(decimal degrees)
 Horizontal Datum: WGS 84 NAD 83 NAD 27
Source for Latitude/Longitude:
 GPS (unit make/model: Garmen (WAAS enabled? Yes No)
 Land Survey Topographic Map
 Online Mapper:
6 Elevation: ..1418.....ft. Ground Level TOC
Source: Land Survey GPS Topographic Map
 Other

7 WELL WATER TO BE USED AS:

1. Domestic: Household Lawn & Garden Livestock
 2. Irrigation
 3. Feedlot
 4. Industrial
 5. Public Water Supply: well ID
 6. Dewatering: how many wells?
 7. Aquifer Recharge: well ID
 8. Monitoring: well IDMW-12S.....
 9. Environmental Remediation: well ID
 Air Sparge Soil Vapor Extraction
 Recovery Injection
 10. Oil Field Water Supply: lease
 11. Test Hole: well ID
 Cased Uncased Geotechnical
 12. Geothermal: how many bores?
 a) Closed Loop Horizontal Vertical
 b) Open Loop Surface Discharge Inj. of Water
 13. Other (specify):

Was a chemical/bacteriological sample submitted to KDHE? Yes No If yes, date sample was submitted:

Water well disinfected? Yes No

8 TYPE OF CASING USED: Steel PVC Other CASING JOINTS: Glued Clamped Welded Threaded
 Casing diameter2..... in. to15..... ft., Diameter in. to ft., Diameter in. to ft.
 Casing height above land surface24..... in. Weight0.60..... lbs./ft. Wall thickness or gauge No. Sch.40.....
TYPE OF SCREEN OR PERFORATION MATERIAL:
 Steel Stainless Steel Fiberglass PVC Other (Specify)
 Brass Galvanized Steel Concrete tile None used (open hole)
SCREEN OR PERFORATION OPENINGS ARE:
 Continuous Slot Mill Slot Gauze Wrapped Torch Cut Drilled Holes Other (Specify)
 Louvered Shutter Key Punched Wire Wrapped Saw Cut None (Open Hole)
SCREEN-PERFORATED INTERVALS: From ..15..... ft. to ..25..... ft., From ft. to ft., From ft. to ft.
GRAVEL PACK INTERVALS: From12..... ft. to25..... ft., From ft. to ft., From ft. to ft.

9 GROUT MATERIAL: Neat cement Cement grout Bentonite Other
 Grout Intervals: From0..... ft. to12..... ft., From ft. to ft., From ft. to ft.
Nearest source of possible contamination:
 Septic Tank Lateral Lines Pit Privy Livestock Pens Insecticide Storage
 Sewer Lines Cess Pool Sewage Lagoon Fuel Storage Abandoned Water Well
 Watertight Sewer Lines Seepage Pit Feedyard Fertilizer Storage Oil Well/Gas Well
 Other (Specify)
 Direction from well? Distance from well? ft.

10 FROM	TO	LITHOLOGIC LOG	FROM	TO	LITHO. LOG (cont.) or PLUGGING INTERVALS
0	1	Top Soil - Black			
1	6	Clay - Brown			
6	14	Shale - Brown			
14	25	Limestone - Tan			

Notes:
 6-inch Protective Casing with Locking Cap & 4-inch Bumper Posts

11 CONTRACTOR'S OR LANDOWNER'S CERTIFICATION: This water well was constructed, reconstructed, or plugged under my jurisdiction and was completed on (mo-day-year) 5-26-16..... and this record is true to the best of my knowledge and belief. Kansas Water Well Contractor's License No. 902..... This Water Well Record was completed on (mo-day-year) 8/14/16..... under the business name of Traut Companies..... Signature *David Traut*.....

