61574

City of Andover

PWS Well

1367 Washington Street
Andover, Iowa
Started 6/23/08, completed 7/8/08

Log of Well

0'	To	1'	Gravel
1'	To	6'	Red Brown Sandy Clay
6'	To	61'	Medium Sand
61'	To	84'	Blue Gray Clay Streaks of Sand
84'	To	182'	Blue Clay
182'	To	199'	Brown Red Clay
199'	To	201'	Brown Yellow Limestone
201'	To	205'	Blue Shale
205'	To	212'	Blue Brown Shale
212'	To	290'	Brown Shale
290'	To	495'	Brown Limestone
495'	To	500'	Red Limestone
500'	To	515'	Brown Grey and Red Limestone
515'	To	517'	Light Brown Limestone
517'	To	524'	Gray Shale Rock
524'	To	567'	Grey Brown Limestone
567'	To	598'	Blue Shale
598'	To	642'	Sandstone
642'	To	643'	Blue Shale
643'	To	695'	Grey Brown Limestone
695'	To	712'	Crème Limestone
712'	To	718'	Crème Pink Limestone
719'	To	780'	Grey Limestone

Construction Record

A 6.5" hole was drilled to a depth of 205'. A 17.5" hole was then drilled to a depth of 66' subsequently 67' of 16" OD casing was set. This casing was grouted into place with a high solids bentonite grout. A 14.75" hole was fluid drilled from 66' to 209'. There was next 211' of 10" X .375" wall casing set with a cement float shoe on the bottom of the 10" casing. Then 154 sacks of Neat Cement Grout was pumped into the annular space. After the specified cure time, a 9 7/8" hole was drilled from a depth of 209' to a depth of 695'. Afterwards, 697' of a 6 5/8" OD X .280" wall steel casing was set into place. The Braden Head was then attached to the casing and the Halliburton Method of grouting was utilized, pumping 260 sacks of Neat Cement Grout. After the specified cure time, a 6" hole was drilled from a depth of 695' to a final total well depth of 780'. The well was then airlifted for hours with an estimated flow of 80 plus gallons per minute. The well was also airlifted at a depth of 465' at 60 GPM and then again at a depth of 415' at 30 GPM. An electric line was utilized to determine the static water level at a depth of 233'. The well was then chlorinated and capped.

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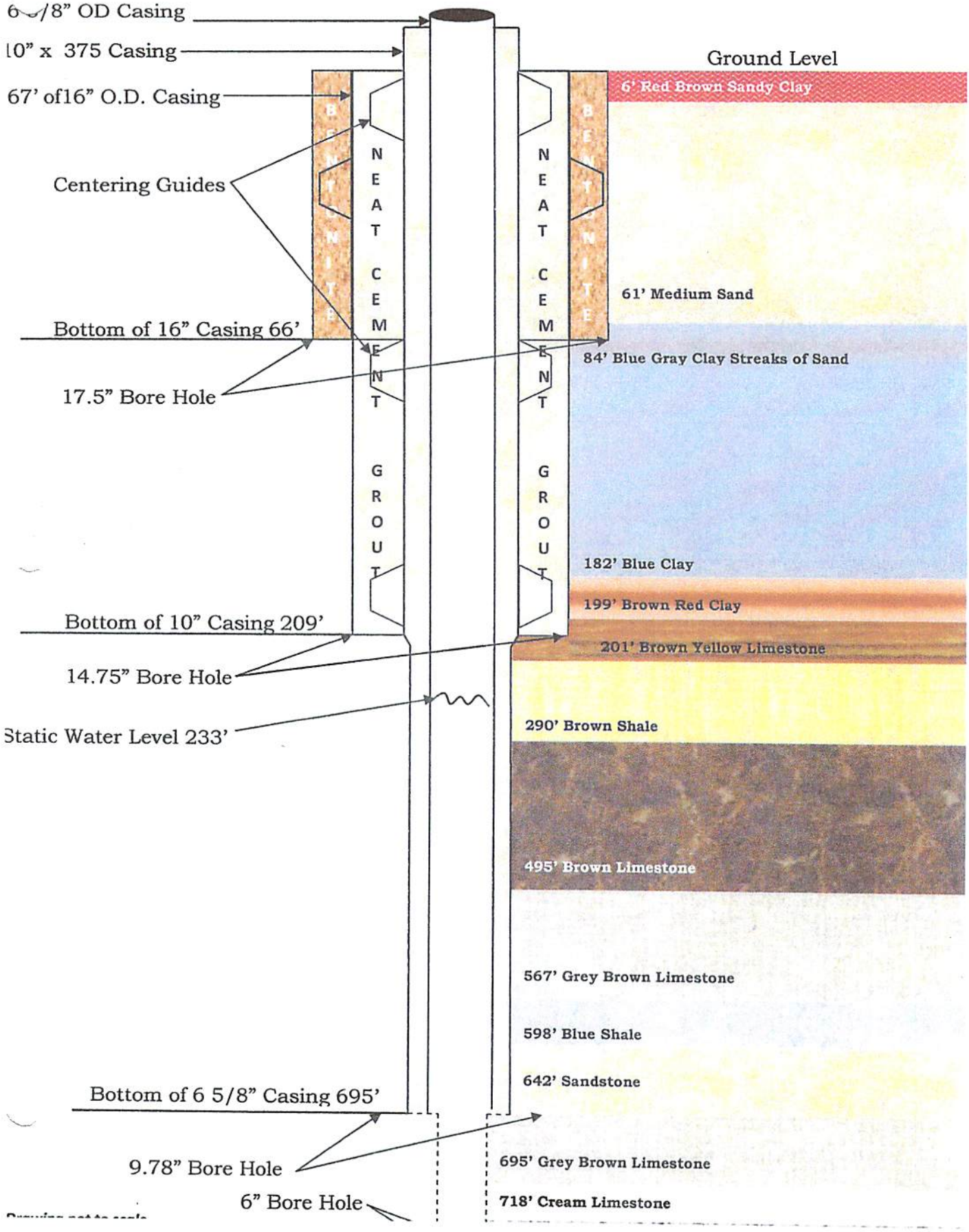
Andover, IA



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Shawver Well Company - Well Grouting Report

Project Name: *City of Andover PWS Well 10" Surface Casing* Date: 06/27/08

Casing Depth: 211 Borehole Size: 14 3/4"

Casing Size: 10" Method of Placement: 2" oil field cement shoe

Were any additive(s) added?: Y N

If yes, what additive(s) & how much?:

No. of sacks ordered, initial pumping: 71

Did circulation occur with initial pumping?: yes

If Braden head/rubber plug was used, # of gallons of water pumped behind plug:

Depth grout settled to after initial pumping
or depth grout was found at after initial pumping: 69'

No. of trucks used to supply cement on initial pumping: 1

Weights of grout from each truck — Time to Pump each Truck

Truck #1:	15	Length of time to pump #1:	30 minutes
Truck #2:		Length of time to pump #2:	
Truck #3:		Length of time to pump #3:	
Truck #4:		Length of time to pump #4:	
Truck #5:		Length of time to pump #5:	
Truck #6		Length of time to pump #6:	

Subsequent Grouting(s)

Date 2nd grouting occurred: Sacks ordered:

Method of Placement: Depth Tremmie Placed:

Size of Tremmie Used: Cement Weight:

Date 3rd grouting occurred: Sacks ordered:

Method of Placement: Depth Tremmie Placed:

Size of Tremmie Used: Cement Weight:

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Well Grouting Report

Project Name: *City of Andover PWS Well 6 5/8" Primary Casing* Date: 07/03/08

Casing Depth: 695' Borehole Size: 9 7/8"

Casing Size: 6" Method of Placement: Halabriton

Were any additive(s) added?: Y N

If yes, what additive(s) & how much?:

No. of sacks ordered, initial pumping: 250

Did circulation occur with initial pumping?: yes

If Braden head/rubber plug was used, # of gallons of water pumped behind plug: 981

Depth grout settled to after initial pumping
or depth grout was found at after initial pumping: 28 '

No. of trucks used to supply cement on initial pumping: 2

Weights of grout from each truck		Time to Pump each Truck	
Truck #1:	15.1	Length of time to pump #1:	9 minutes
Truck #2:	15	Length of time to pump #2:	9 minutes
Truck #3:		Length of time to pump #3:	
Truck #4:		Length of time to pump #4:	
Truck #5:		Length of time to pump #5:	
Truck #6		Length of time to pump #6:	

Subsequent Grouting(s)

Date 2nd grouting occurred: 7/3/2008 Sacks ordered: 20 Sacks highearly

Method of Placement: Tremie Depth Tremmie Placed: 28'

Size of Tremmie Used: 1" Cement Weight: 15.5

Date 3rd grouting occurred: 7/7/2008 Sacks ordered: 6 sacks high early

Method of Placement: 1" Tremie Depth Tremmie Placed: 20'

Size of Tremmie Used: 1" Cement Weight: 15.5

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SHAWVER WELL COMPANY, INC.
TEST PUMPING REPORT

Project:	City of Andover PWS Well	**Well ID:**	PWSID 2307001
Location:	Andover, Iowa	**Date:**	July 21,22, 2008
Test Pump Crew:	Keith Benter, Wayne Kuhlman	**Length of Casing Above Ground:**	1'4"
Depth of Well:	780'	**Miscellaneous:**	
Size of Well:	10"		
SWL:	233'		
Pump Model:	13SC		
Pump HP:	5 hp		
Orifice Size:	Meter Read		
Length of Airline:	350'		
Depth of Pump:	350'		

Time	GPM	PWL (air)	PWL (elec.)	Ph	Temp	Character of Water/Pumping Details
1445	39	238'	240'			Dirty Water
1446	39	238'	240'			
1447	39	238'	240'2"			
1448	39		241	7	56.5	
1449	39		241'1"			
1450	39		241'			
1451	39		241'			
1452	39		241'			
1453	39		241'			
1454	39		241'			Water Clearing
1455	39		241'			
1500	39		241'7"			
1505	39		241'3"			
1510	39		241'5"			
1515	39		241'6"			
1530	39		241'8"			
1545	39		241'			
1600	39		242'1"			
1615	39		242'2"			Clear
1630	39		242'7"			

SHAWVER WELL COMPANY, INC.
TEST PUMPING REPORT

Project:	City of Andover PWS Well	Well ID:	PWSID 2307001
Location:	Andover, Iowa	Date:	July 21, 2008 - July 22, 2008

Time	GPM	PWL (air)	PWL (elec.)	Ph	Temp	Character of Water/Pumping Details
1645	39		242'			
1745	39		242'11"	7	56.4	Water is clear
1845	39		243'			
1945	39		243'1"			
2045	39		243'2"			
2145	39		243'6"			
2245	39		243'9"			
2345	39		243'11"			
0045	39		244'			
0145	39		244'1"			
0245	39		244'3"			
0345	39		244'3"			
0445	39		244'4"			
0545	39		244'5"			
0645	39		244'5"			
0745	39		244'5"			
0845	39		244'5"			
0900	39		244'5"			Took Water Samples
0915	0		Shutdown			
0916	0		239'			
0917	0		237'8"			
0918	0		237'8"			
0919	0		237'7"			
0920	0		237'7"			
0921	0		237'6"			
0922	0		237'5"			
0923	0		237'5"			
0924	0		237'4			
0925	0		237'4"			
0930	0		237'2"			

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SHAWVER WELL COMPANY, INC.
TEST PUMPING REPORT

Project:	City of Andover PWS Well	Well ID:	PWSID 2307001
Location:	Andover, Iowa	Date:	July 22, 2008

Time	GPM	PWL (air)	PWL (elec.)	Ph	Temp	Character of Water/Pumping Details
0940	0		237'1"			
0945	0		236'10"			
1000	0		236'10"			
1015	0		236'7"			
1030	0		236'4"			
1045	0		236'1"			
1100	0		235'9"			
1115	0		235'5"			

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City of Andover

Plumbness Deviation Report

			Hang Pt.	29						
				dev at top			DEV AT DEPTH			
Depth	A+HP	B/HP	north	south	east	west	NORTH	SOUTH	EAST	WEST
5	34	1.17	0		1/4		0.00	0.00	0.29	0.00
10	39	1.34	1/4		1/4		0.34	0.00	0.34	0.00
15	44	1.52	3/8		3/8		0.57	0.00	0.57	0.00
20	49	1.69	1/2		3/8		0.84	0.00	0.63	0.00
25	54	1.86	1/2		1/4		0.93	0.00	0.47	0.00
30	59	2.03	1/2		1/4		1.02	0.00	0.51	0.00
35	64	2.21	1/2		1/8		1.10	0.00	0.28	0.00
40	69	2.38	1/2		1/8		1.19	0.00	0.30	0.00
45	74	2.55	5/8		0		1.59	0.00	0.00	0.00
50	50	1.72	5/8		0		1.08	0.00	0.00	0.00
55	55	1.90	5/8		0		1.19	0.00	0.00	0.00
60	60	2.07	1/2			0	1.03	0.00	0.00	0.13
65	65	2.24	1/2			1/4	1.12	0.00	0.00	0.56
70	70	2.41	1/2			1/4	1.21	0.00	0.00	0.60
75	75	2.59	3/8			3/8	0.97	0.00	0.00	0.97
80	80	2.76	3/8			1/2	1.03	0.00	0.00	1.38
85	85	2.93	1/2			1/2	1.47	0.00	0.00	1.47
90	90	3.10	3/8			5/8	1.16	0.00	0.00	1.94
95	124.00	4.28	3/8			1/2	1.60	0.00	0.00	2.14
100	129.00	4.45	3/8			1/2	1.67	0.00	0.00	2.22
105	134.00	4.62	3/8			1/2	1.73	0.00	0.00	2.31
110	139.00	4.79	1/4			1/2	1.20	0.00	0.00	2.40
115	144.00	4.97	1/4			1/2	1.24	0.00	0.00	2.48
120	149.00	5.14	1/4			1/2	1.28	0.00	0.00	2.57
125	154.00	5.31	1/4			1/4	1.33	0.00	0.00	1.33
130	159.00	5.48	1/4			3/8	1.37	0.00	0.00	2.06
135	164.00	5.66	1/4			3/8	1.41	0.00	0.00	2.12
140	169.00	5.83	1/4			1/4	1.46	0.00	0.00	1.46
145	174.00	6.00	0			1/4	0.38	0.00	0.00	1.50
150	179.00	6.17	0			1/4	0.39	0.00	0.00	1.54
155	184.00	6.34	0			0	0.40	0.00	0.00	0.40
160	189.00	6.52	0			0	0.41	0.00	0.00	0.00
165	194.00	6.69	0			0	0.00	0.00	0.00	0.00
170	199.00	6.86	0			0	0.00	0.00	0.00	0.00
175	204.00	7.03					0.00	0.00	0.00	0.00
180	209.00	7.21					0.00	0.00	0.00	0.00