

APPENDIX C

MONITORING WELL DIAGRAMS

FOR THE REPORT

CHARACTERIZATION OF GROUND WATER FLOW IN THE LOWER BOISE RIVER BASIN

prepared for and in cooperation with the

Idaho Department of Water Resources
1301 North Orchard
Boise, Idaho 83706-2237

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IDAHO WATER RESOURCES RESEARCH INSTITUTE
RESEARCH REPORT

IWRRI-2003-09



Appendix C: Construction Details for Dedicated, Multi-Level Piezometers

This section provides well construction diagrams for the four dedicated monitoring wells constructed in conjunction with the Treasure Valley Hydrologic Project.

Diagram for TVHP #1 taken from United Water Idaho report “Hydrogeology, Geochemistry, and Well Construction of the Treasure Valley Hydrologic Project Monitoring Well #1, Ada County, Idaho (Dittus, Allred and Squires, 1999). Diagram for TVHP #2 provided by Ed Squires, Hydrologic, Inc. Diagram for TVHP #3 provided by Terry Scanlan, Scanlan Engineering. Diagram for TVHP #4 created by Scott Urban, IDWR.

Treasure Valley Hydrologic Project Monitoring Well #1

Comparison of Water Chemistry in Piezometer Completion Zones

(Analyses in mg/l unless note otherwise.)

Constituent screen setting (ft below ground)	Zone 4 130-140 ft. 150-170 ft.		Zone 3 210-220 ft. 240-250 ft.		Zone 2 270-290 ft.		Zone 1 300-310 ft. 330-340 ft.	
	X	Y	X	Y	X	Y	X	Y
Laboratory X: Alchem Y: Analytical								
Date sampled	12/13/98		12/13/98		12/13/98		12/13/96	
Chloride	3.20	3	2.63	3	1.73	2	2.05	2
Fluoride (direct)	0.33	0.75	0.37	0.05	0.36	0.06	0.34	0.57
Nitrate (N)	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.13	0.16
Sodium	24.9	24.2	20.3	19.4	15.2	14.2	17.3	15.8
Sulfate	10.2	11	22.5	22	11.4	12	14.4	14
Sulfide	<0.05	0.19	<0.05	0.16	<0.05	0.23	<0.05	0.07
Calcium	37.5	33.3	39.0	35.1	28.1	25.8	28.9	29.2
Potassium	2.17	1.64	2.55	2.06	2.07	1.63	2.00	1.58
Magnesium	4.16	3.62	7.22	6.55	3.94	3.70	4.54	4.58
Iron-total	0.03	<0.05	0.63	0.50	0.05	<0.05	0.06	<0.05
Iron-dissolved *	0.01	<0.05	0.57	0.45	0.01	<0.05	0.02	<0.05
Manganese-total	0.01	<0.05	0.06	0.05	0.04	<0.05	0.03	<0.05
Manganese-dissolved *	0.01	<0.05	0.05	0.05	0.04	<0.05	0.03	<0.05
Silica	28.7	30.6	31.5	32.9	33.6	33.6	32.5	29.9
Alkalinity	139.0	143	132.0	138	101.0	103	112.0	114
Conductivity lab (uS)	299	294	313	305	224	237	260	255
Conductivity - field (uS)	262		273		213		247	
Corrosivity (Langlier)	-0.33	-0.7	-0.35	-0.8	-0.54	-0.8	-0.87	-1.1
Hardness	111.0	108	129.0	125	86.4	93.7	90.9	99.9
Phosphorus (total)	0.05	0.08	0.04	0.06	0.03	0.07	0.04	0.07
Total dissolved solids	248.0	188	173.0	200	188.0	164	218.0	182
pH-lab (standard units)	7.70	8.0	7.65	7.9	7.70	8.1	7.30	7.6
pH-field (standard units)	7.36		7.18		7.42		7.03	
Temperature	54.8 °F		56.6 °F		58.0 °F		58.4 °F	

* Samples for dissolved Iron and Manganese were filtered in the field

Location: NW ¼, SW ¼, SW ¼, Section 14, T4N, R1E, B.M., Ada County, Idaho
Well design by United Water Idaho Geosciences
Well completed 12/5/96 by Stevens & Sons Well Drilling, Boise, ID.

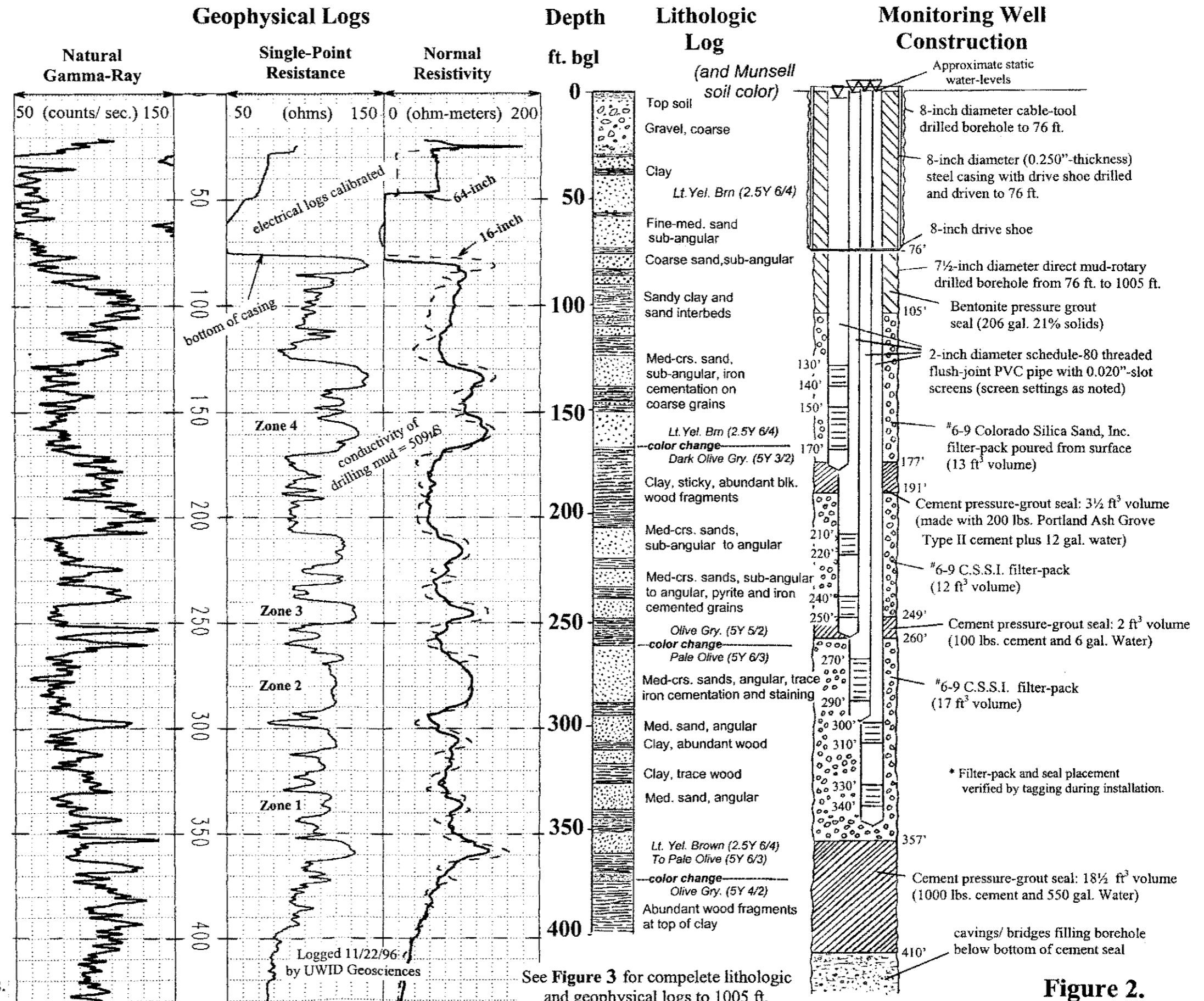


Figure 2.

Figure 2. Composite diagram showing well construction, lithologic log, geophysics and water chemistry at various depths.

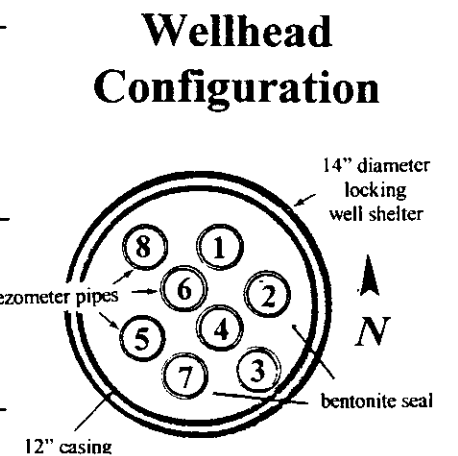
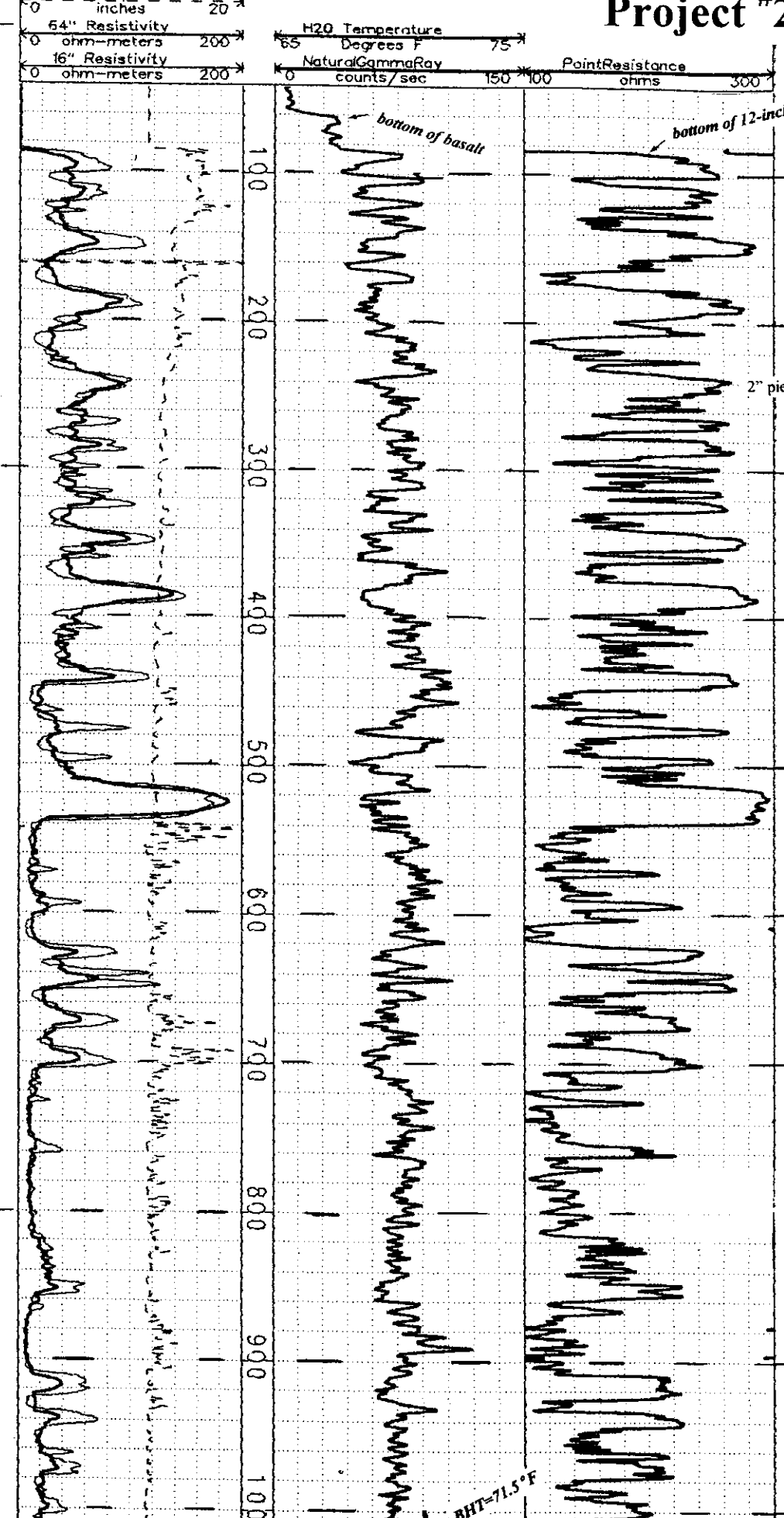
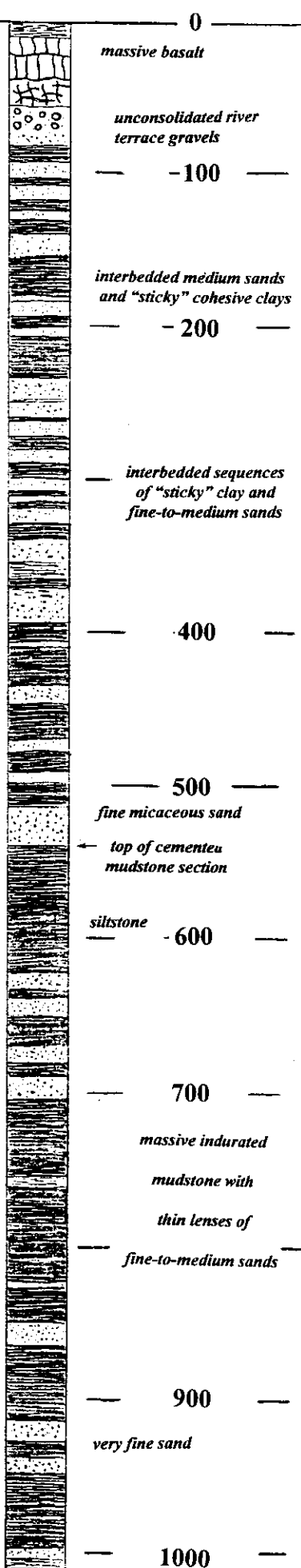
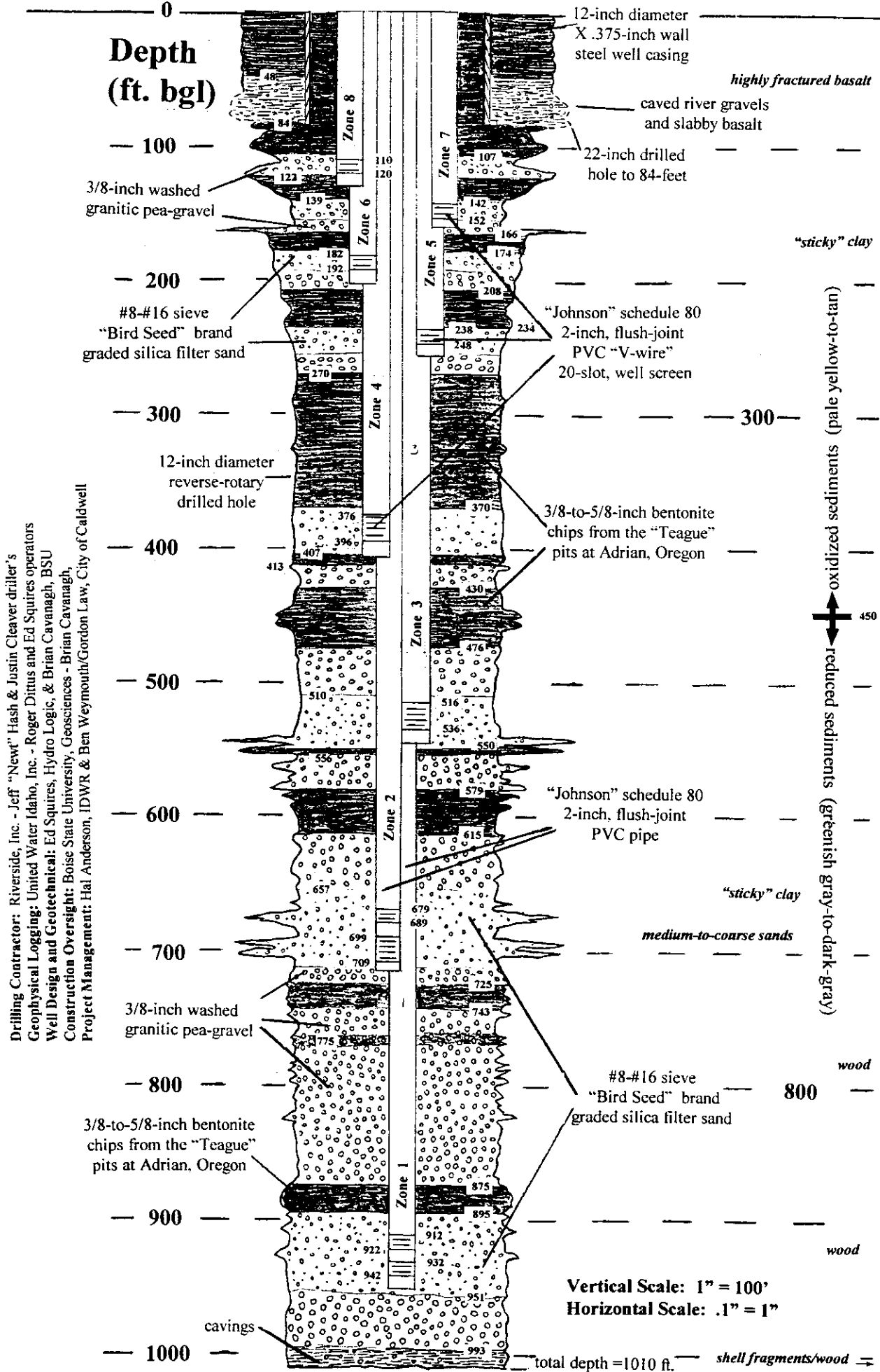
Well Construction

Lithology

Geophysics

Treasure Valley Hydrologic Project #2 Monitoring Well

11/2/1999



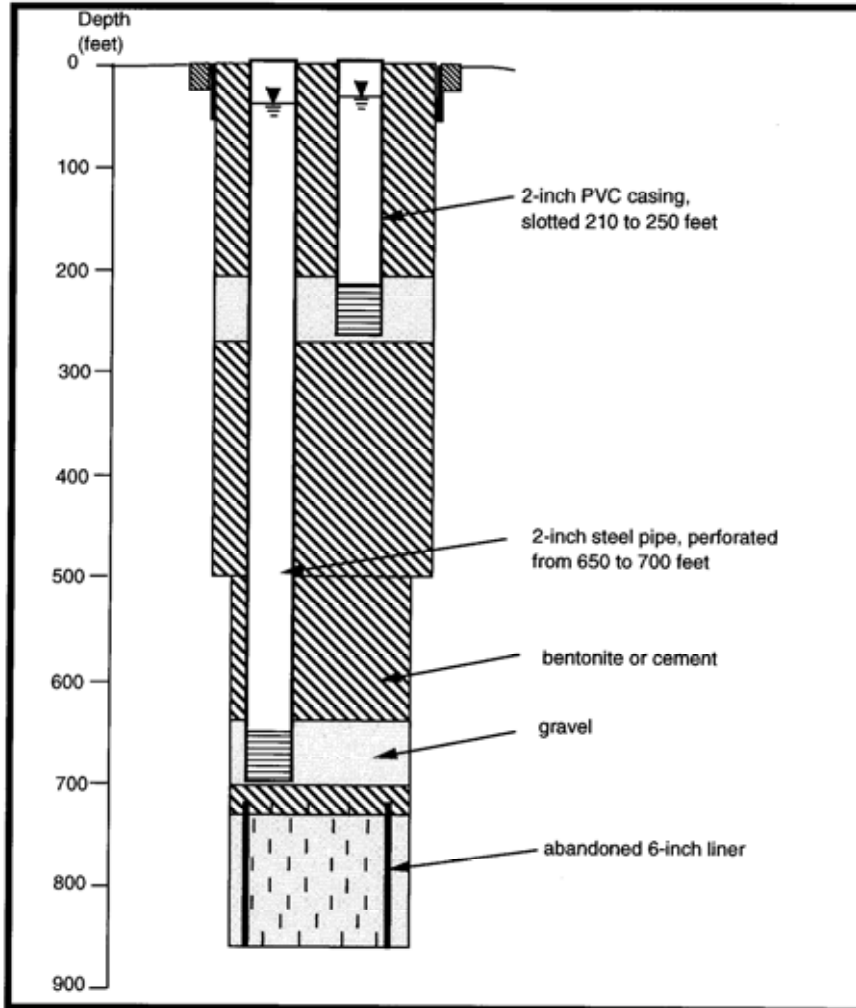
Parameter (mg/l)	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6	Zone 7	Zone 8
Aluminum	23.2	60.5	6.18	349.0	76.3	107	142	152
Ammonia as N	0.33	0.04	0.04	0.06	0.03	0.03	0.03	0.03
Calcium	10.3	24.0	10.7	18.9	62.3	123	139	182
Chloride	2.44	2.80	3.06	9.81	1.15	1.15	1.15	1.15
Copper	0.25	0.42	0.44	0.43	0.15	0.15	0.15	0.15
Fluoride	28.9	30.2	31.9	31.9	31.9	31.9	31.9	31.9
Iron	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Magnesium	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Manganese (diss.)	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Nitrate as N	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Potassium	1.38	1.38	1.38	1.38	1.38	1.38	1.38	1.38
Sulfate	1.38	1.38	1.38	1.38	1.38	1.38	1.38	1.38
Sodium	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9
Total Dissolved Solids	167	170	170	170	170	170	170	170
Total Phosphorus as P	0.030	0.037	0.056	0.021	0.037	0.037	0.037	0.037
Field pH	7.81	7.81	7.81	7.81	7.81	7.81	7.81	7.81
Field Conductance uS	183	183	183	183	183	183	183	183
Field Temperature *F	66.0	64	64	64	64	64	64	64
Odor	H2S	H2S	H2S	H2S	H2S	H2S	H2S	H2S
Gas (volatile)	no	no	no	no	no	no	no	no
Water level (ft. bgl)	40.82	36.38	72.77	75.25	75.16	69.92	67.26	74.45
VOC's								

Water Chemistry

Geophysical logs run in an open, water filled borehole on 10/1/99

ES/BC
11-99

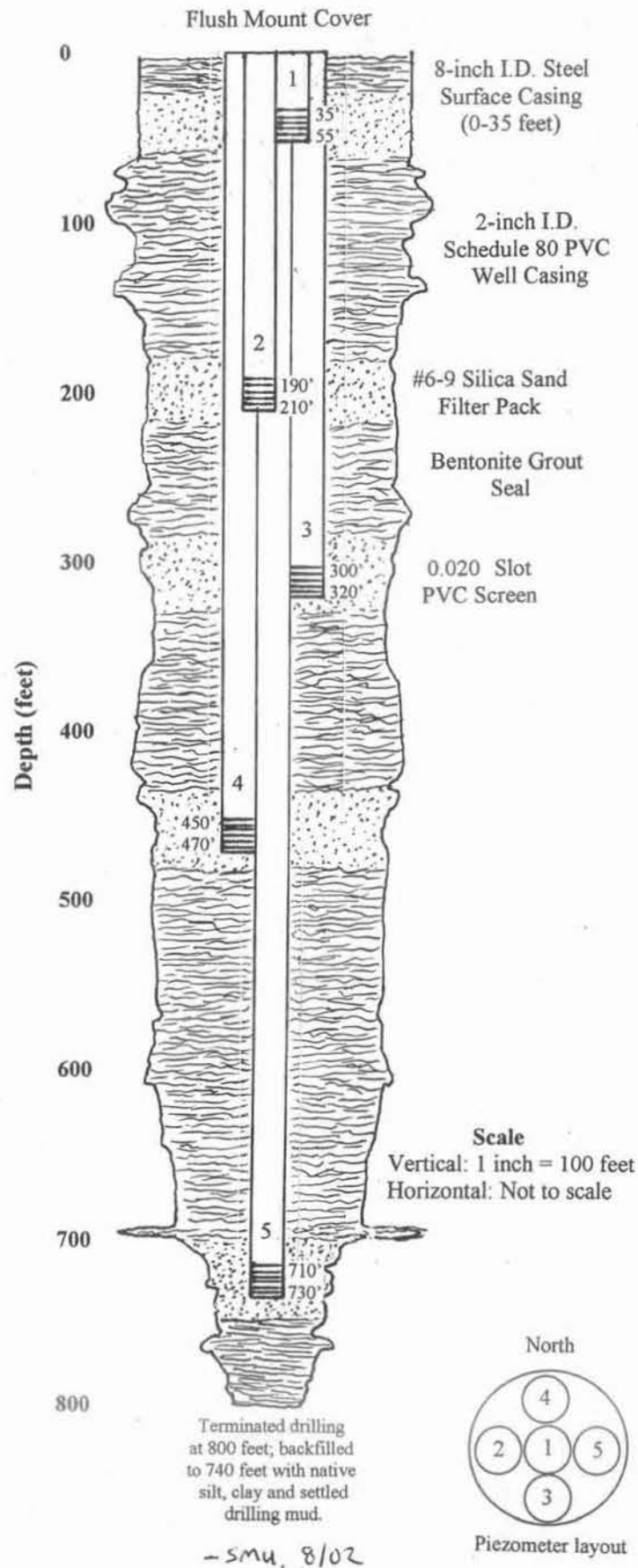
Drilling Contractor: Riverside, Inc. - Jeff "Newt" Hash & Justin Cleaver driller's
 Geophysical Logging: United Water Idaho, Inc. - Roger Dittus and Ed Squires operators
 Well Design and Geotechnical: Ed Squires, Hydro Logic, & Brian Cavanagh, BSU
 Construction Oversight: Boise State University, Geosciences - Brian Cavanagh,
 Project Management: Hal Anderson, IDWR & Ben Weymouth/Gordon Law, City of Caldwell



TVHP #3 – Quarry View Park
 (diagram by T. Scanlan, Scanlan Engineering)

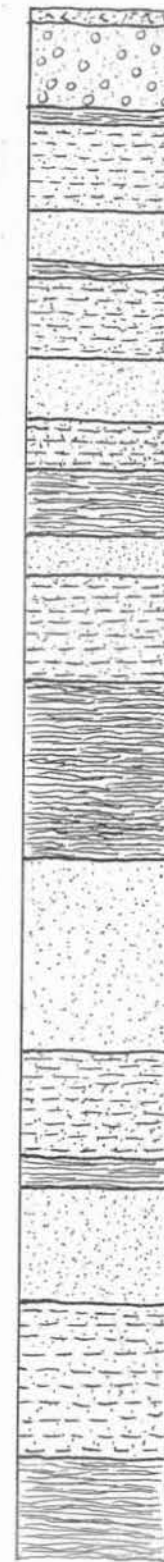
Municipal Park Monitoring Well (TVHP #4)

Well Construction Details

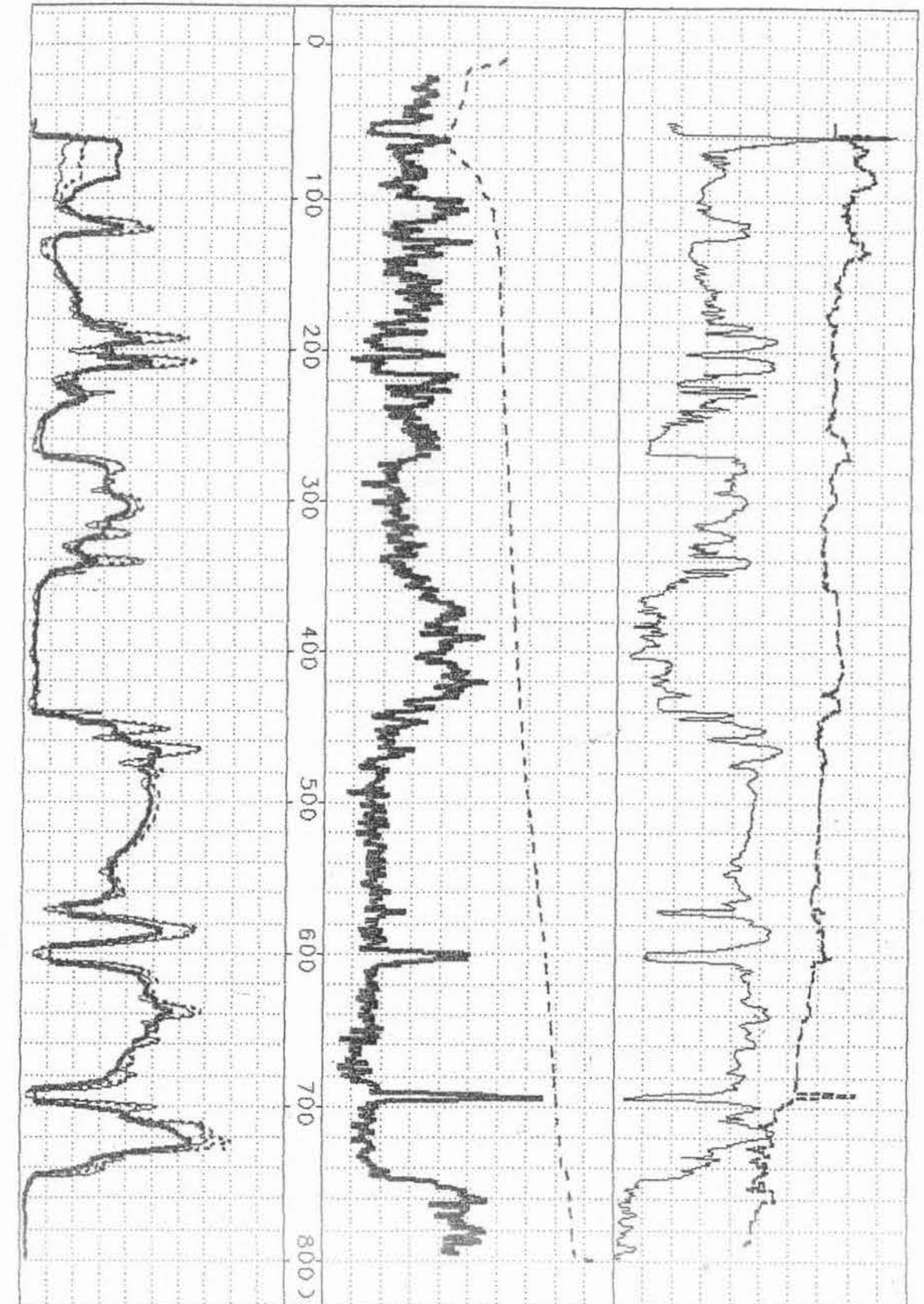


Lithologic Log

0 - 8	Topsoil/fill/sand and gravel; grayish brown (2.5Y 5/2)
8 - 55	Sand with gravel; light brownish gray (2.5Y 6/2); Possibly cemented at 37 - 38 feet, then >H ₂ O
55 - 60	V. fine sand (yellowish-brown, 10YR 5/4) interbedded with clay (dark gray, 5Y 4/4). "Brown clay" in driller's report
60 - 105	Fine to coarse sand with clay; gray (5Y 6/1); Fast drilling (60 feet/hour)
105 - 130	Fine to coarse sand; light olive-gray (5Y 6/2)
130 - 140	Clay; v. dark gray (10YR 3/1); some wood fragments;
140 - 180	Sandy clay, fine to medium; greenish-gray (5GY 5/1)
180 - 215	Sand, interbedded fine to coarse; olive-gray (5Y 5/2)
215 - 240	Sandy clay; v. dark gray (5Y 3/1 - 4/1)
240 - 270	Clay; v. dark gray (5Y 4/1)
270 - 295	Sand, fine to coarse; olive-gray (5Y 5/2)
295 - 345	Sand, fine to coarse, interbedded with clay; dark gray (5Y 5/1) Fast drilling (averaging 90 feet/hour from 330 - 530 feet)
345 - 440	Clay; dark gray (10YR 4/1)
440 - 540	Sand, fine to coarse; dark gray (5Y 4/1)
540 - 595	Sand, fine to coarse, interbedded with some clay; dark gray (5Y 4/1); Slower drilling (30 feet/hour)
595 - 610	Clay/sandy clay; dark gray (5Y 4/1)
610 - 670	Sand, fine to coarse; dark gray (5Y 4/1) Slow drilling (35 feet/hour); Caliper log suggests evidence of bit wear.
670 - 750	Sand, sandy clay, possible sandstone/mudstone; dark gray (5Y 4/1); very slow drilling (less than 20 feet/hour)
750 - 800	Clay; dark gray (5Y 4/1)



Geophysical Logs



Drilled by Stevens and Son Well Drilling, Inc.
- Started drilling 6/18/02; well completed on 7/29/02
- Cable tool rig 0-59 feet; mud rotary 59-800 feet

Geophysical logging by L. Pearson, Hydro Logic, Inc.
- Well logged on 6/27/02

