

# RECORD OF BOREHOLE THOMPSON CREEK MW


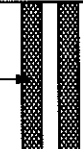


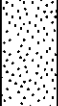


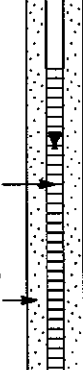




SHEET 1 of 1

PROJECT: Yelm Groundwater Study  
 PROJECT NUMBER: 043-1328  
 LOCATION: Thompson Creek

DRILLING DATE: 11-9-05  
 DRILLING METHOD: Hollow Stem Auger  
 DRILL RIG: Canterra CT 450 #123

DATUM:  
 AZIMUTH: N/A  
 COORDINATES: not surveyed

ELEVATION: Not Surveyed  
 INCLINATION: -90

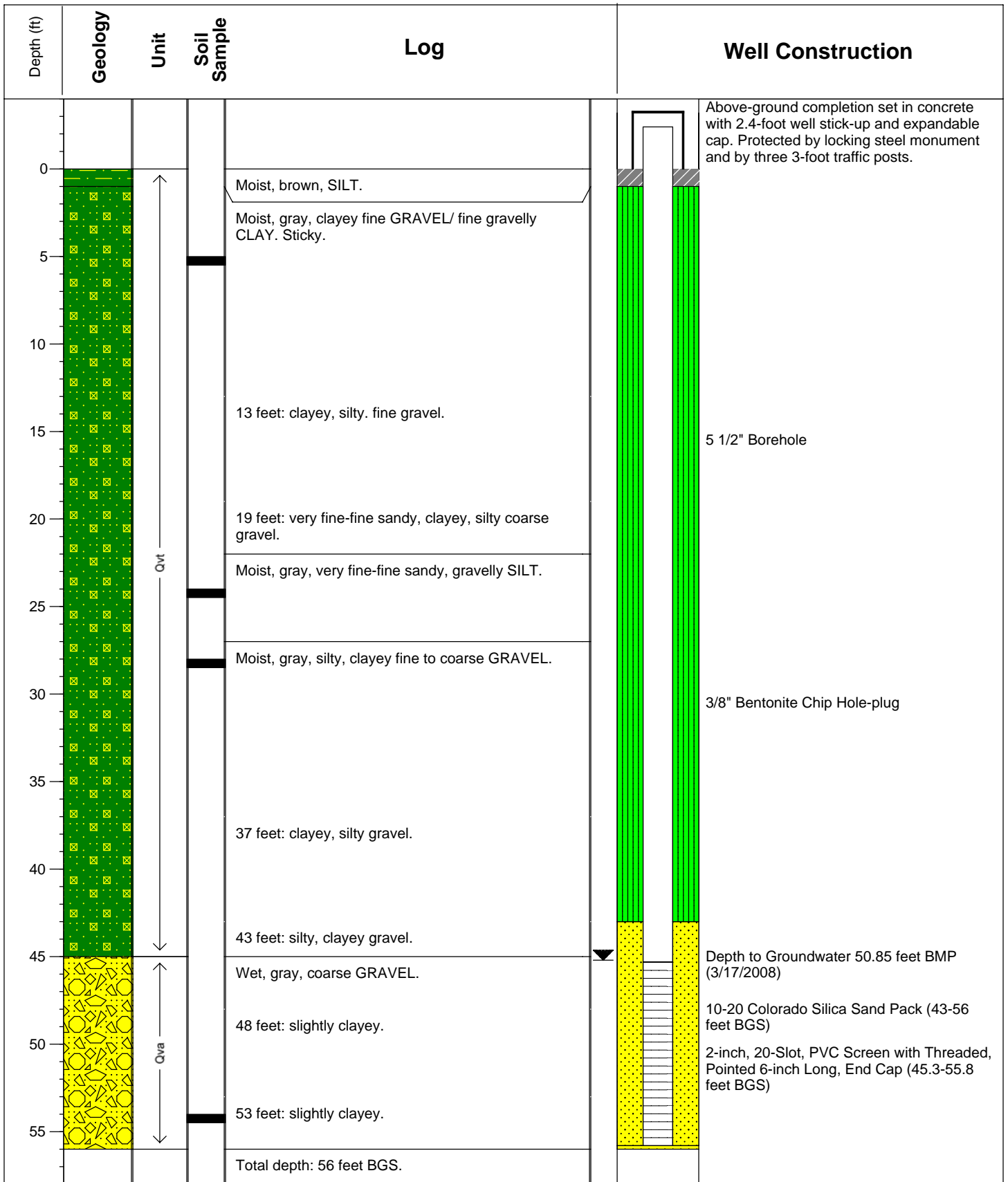
DEPTH (ft)	SOIL PROFILE		SAMPLES		FIELD OBSERVATIONS	WELL CONSTRUCTION	
	DESCRIPTION	Geological Unit	GRAPHIC LOG	TYPE	NUMBER	COMMENTS	NOTES WATER LEVELS WELL GRAPHIC
0	0.0 - 2.0 <b>SANDY SILT w/ GRAVEL</b> dark grayish brown (moist 10YR 2/2); poorly graded, subrounded gravels 1-2" dia.; fine sands; very soft	ML					
	2.0 - 6.0 <b>WELL-GRADED GRAVEL w/ SILT and SAND</b> dark brown (moist 10YR 3/3); subrounded/subangular gravels 1-2" dia.	GW-GM					
5	6.0 - 7.5 <b>POORLY GRADED SAND w/ GRAVEL</b> brown (moist 10YR 4/3); trace gravels subrounded/subangular to 1" dia.; soft; moist	SP					
	7.5 - 10.0 <b>WELL-GRADED GRAVEL w/ SILT and SAND</b> brown (moist 10YR 4/3); gravels to 3/4" dia.; moist	GW-GM					
10	10.0 - 15.0 Same as above; dark grayish brown (moist 10YR 4/2); trace gravels to 1" dia.; fine sands	GW-GM				Water encountered at 12' bgs.	
	15.0 - 16.0 <b>POORLY GRADED SAND</b> greenish gray (wet 10GY 5/1); trace silt; soft	SP					
	16.0 - 17.0 <b>SILT</b> greenish gray (moist 5GY 5/1); soft	ML					
	Boring completed at 17.0 ft.						
20							

PORTLAND GEOLOGICAL LOG THOMPSON CREEK.GPJ\_GLD.R\_WA.GDT 5/9/06

DRILLING CONTRACTOR: Holt Drilling, Inc.  
 DRILLER: Ken Phillips

LOGGED: Ken Janssen  
 CHECKED: Mark Wirganowicz  
 DATE: 5/8/2006





Project Name: Thurston Highlands  
 Drilling Method: 5 1/2" Air Rotary  
 Driller: Tim  
 Firm: Environmental West Exploration  
 Consulting Firm: Pacific Groundwater Group  
 Logged by: Tad Cline  
 Location: Thurston Highlands

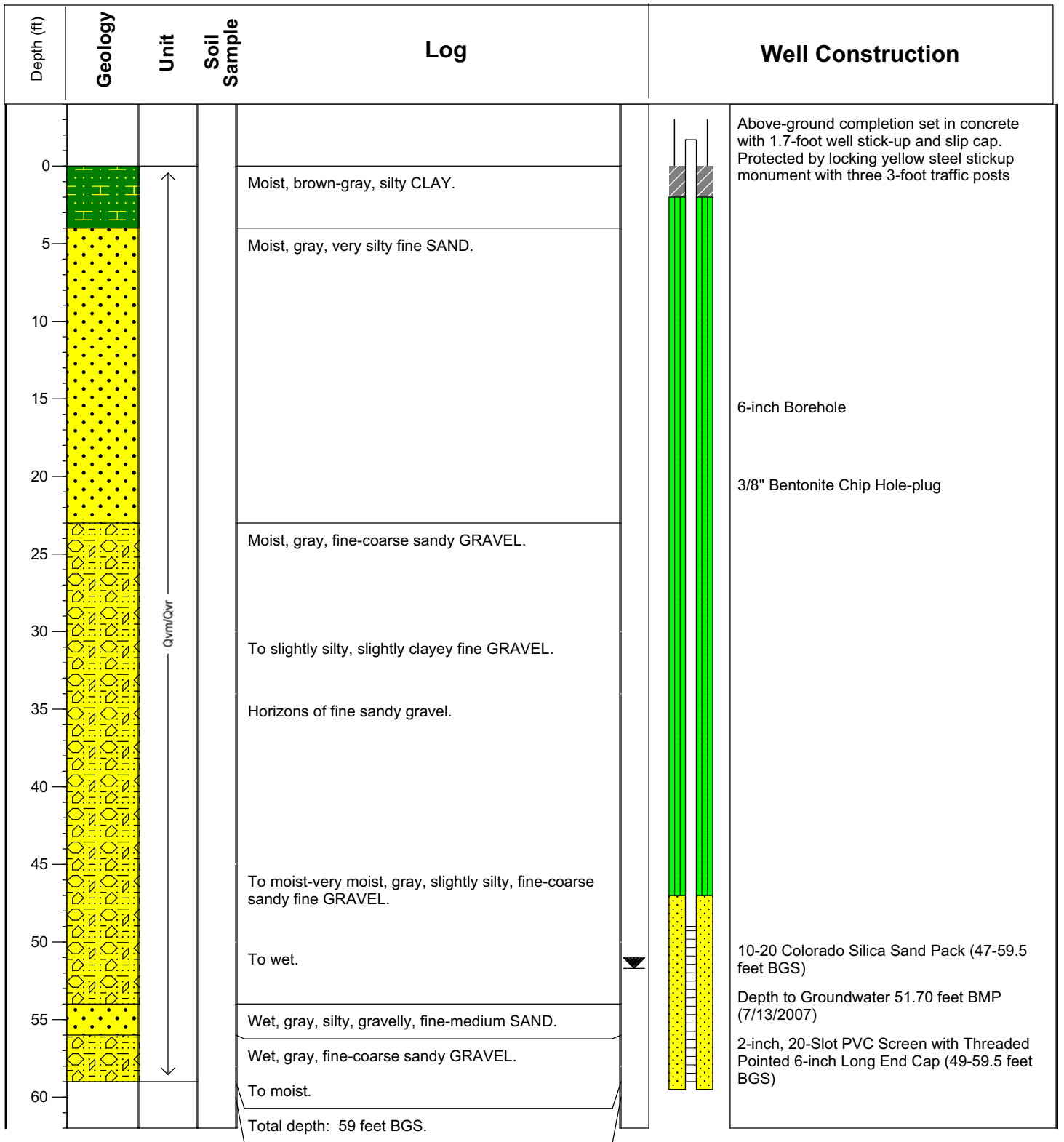
Well Name: P18  
 Ecology ID: BAS468  
 MP Elevation: 381.07  
 Datum: NGVD 29  
 Installed: 3/13/2008  
 DTW: 50.85 BMP on 3/17/2008

**Figure A-17**  
**GEOLOGIC LOG AND AS-BUILT**  
**FOR PIEZOMETER P18**

Thurston Highlands, LLC  
 Yelm, Washington  
 JC0701, 9/2008





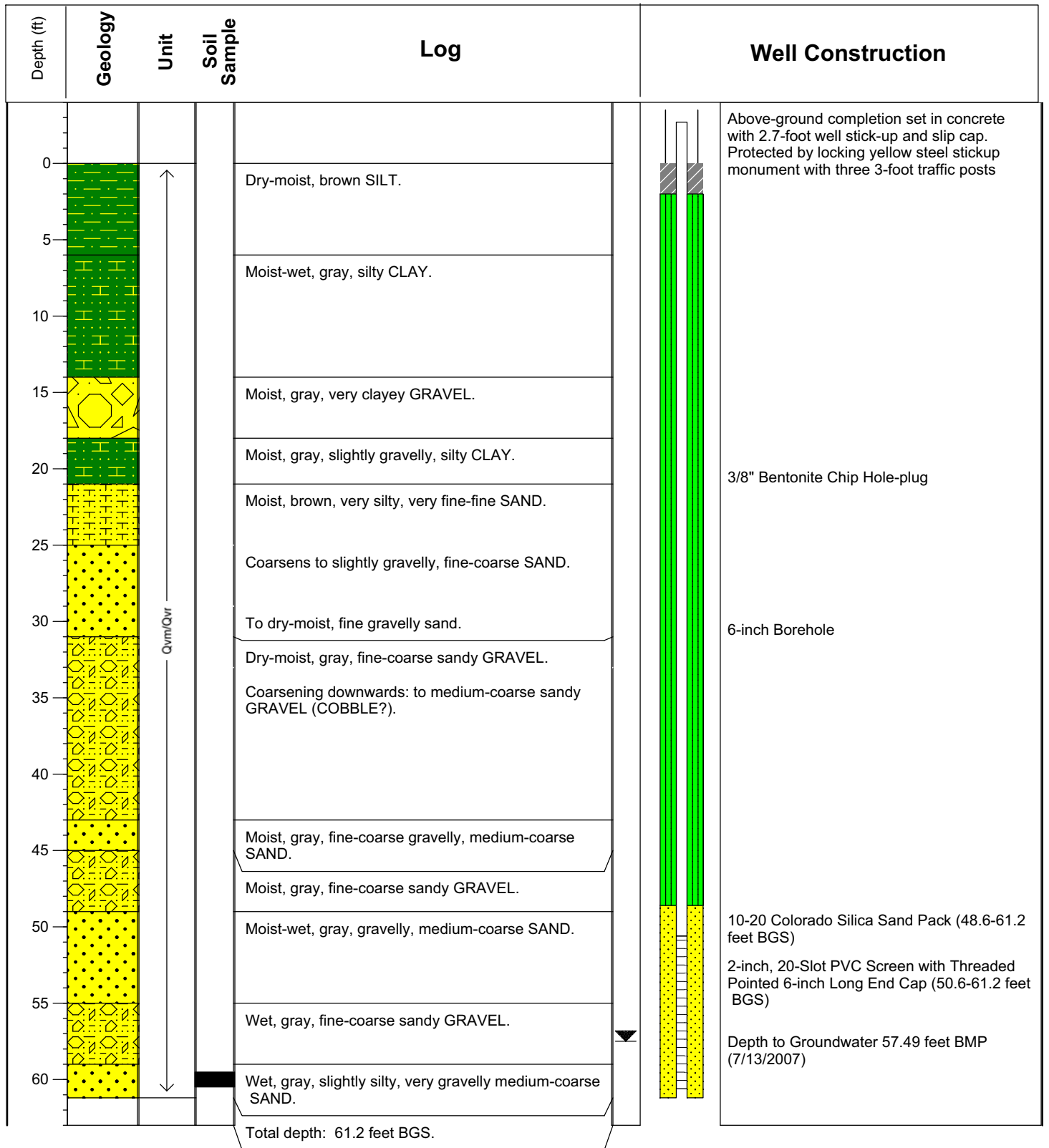


Project Name: Thurston Highlands  
 Drilling Method: 5 1/2" Air Rotary  
 Driller: Ron  
 Firm: Environmental West Exploration  
 Consulting Firm: Pacific Groundwater Group  
 Logged by: Tad Cline  
 Location: Thurston Highlands

Well Name: P2  
 Ecology ID: apc066  
 MP Elevation: 375.85  
 Datum: NGVD 29  
 Installed: 6/26/2007  
 DTW: 51.70 BMP on 7/13/2007

**Figure A-2**  
**GEOLOGIC LOG AND AS-BUILT**  
**FOR PIEZOMETER P2**  
 Shea, Carr, Jewell  
 Yelm, Washington  
 JC0701, 7/2007





Project Name: Thurston Highlands  
 Drilling Method: 5 1/2" Air Rotary  
 Driller: Ron  
 Firm: Environmental West Exploration  
 Consulting Firm: Pacific Groundwater Group  
 Logged by: Tad Cline  
 Location: Thurston Highlands

Well Name: P3  
 Ecology ID: APC063  
 MP Elevation: 405.12  
 Datum: NGVD 29  
 Installed: 6/26/2007  
 DTW: 57.49 BMP on 7/13/2007

**Figure A-3**  
**GEOLOGIC LOG AND AS-BUILT**  
**FOR PIEZOMETER P3**  
 Shea, Carr, Jewell  
 Yelm, Washington  
 JC0701, 7/2007





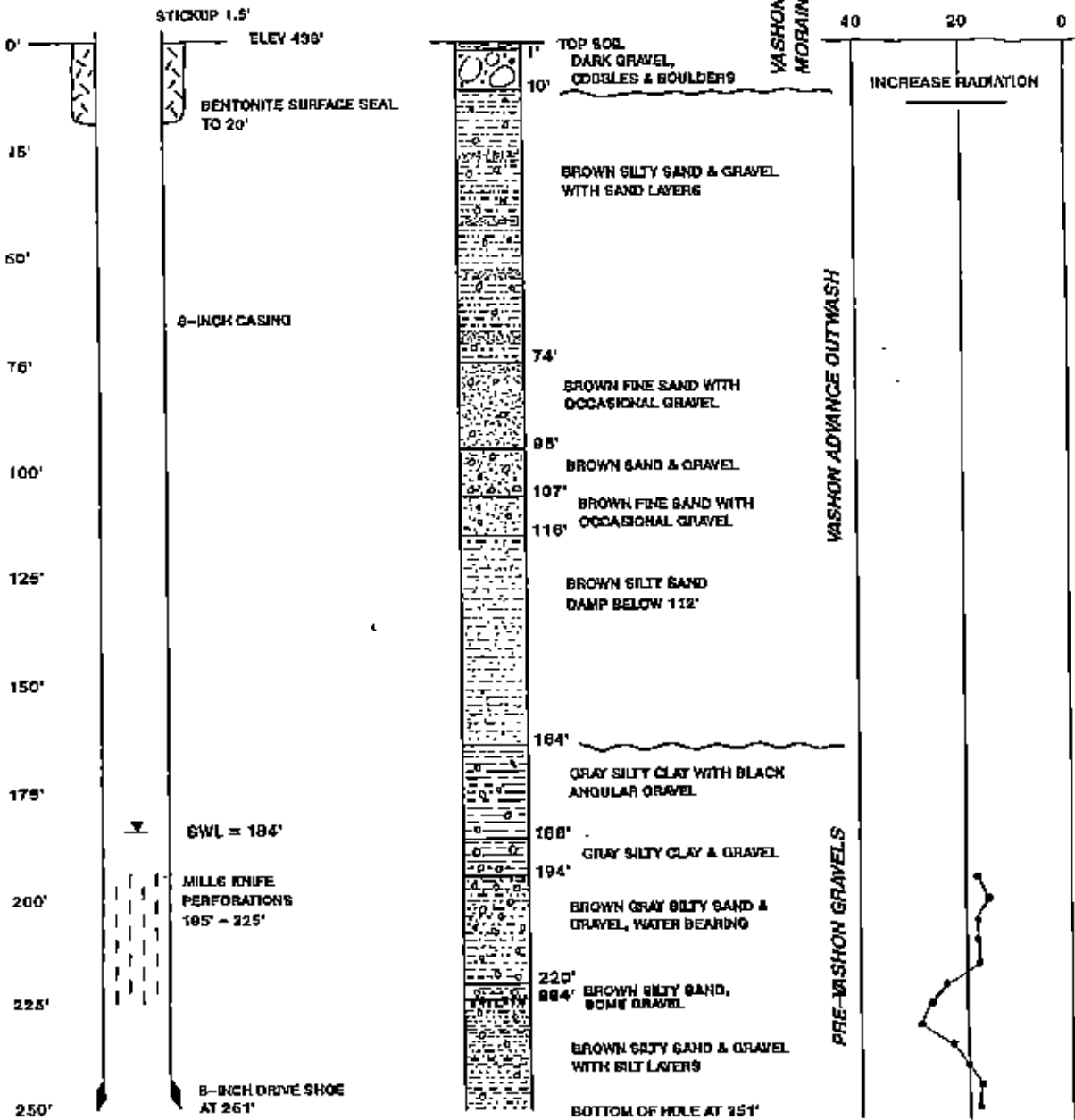
THURSTON HIGHLANDS  
NORTH TEST WELL

FIGURE 2A

CONSTRUCTION DETAIL

GEOLOGIC LOG

GAMMA RAY LOG  
SECONDS / 150 EMISSIONS



PUMP TEST:

$Q = 43, s = 10.3$

$Q/a = 4.2$

$T = 4200$

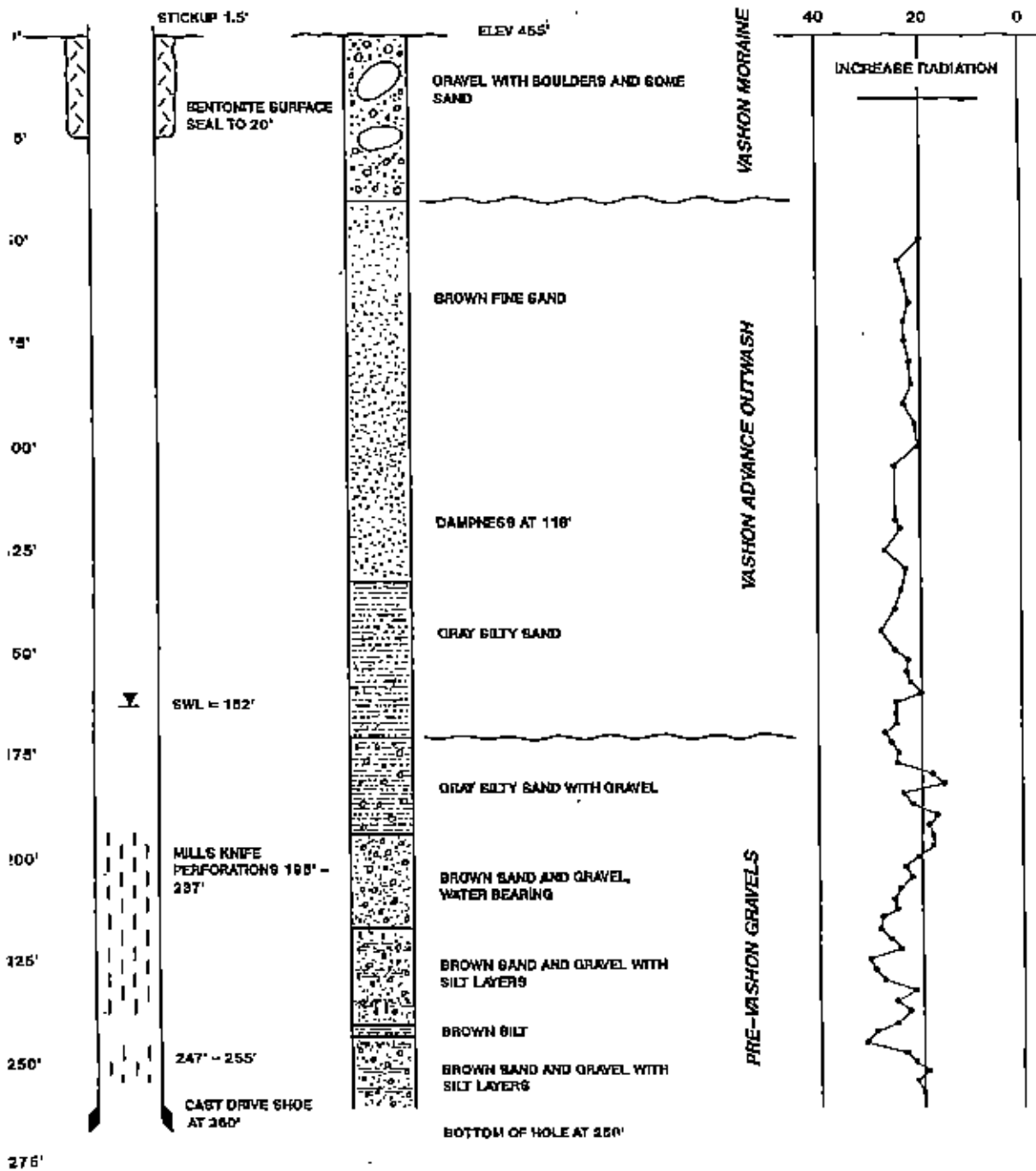
THURSTON HIGHLANDS  
SOUTH TEST WELL

FIGURE 2C

CONSTRUCTION DETAIL

GEOLOGIC LOG

GAMMA RAY LOG  
SECONDS/250 EMISSIONS



PUMP TEST:

Q = 71, s = 27.5  
Q/s = 2.6  
T = 2700

JOB #6119  
ROBINSON & NOBLE, INC.

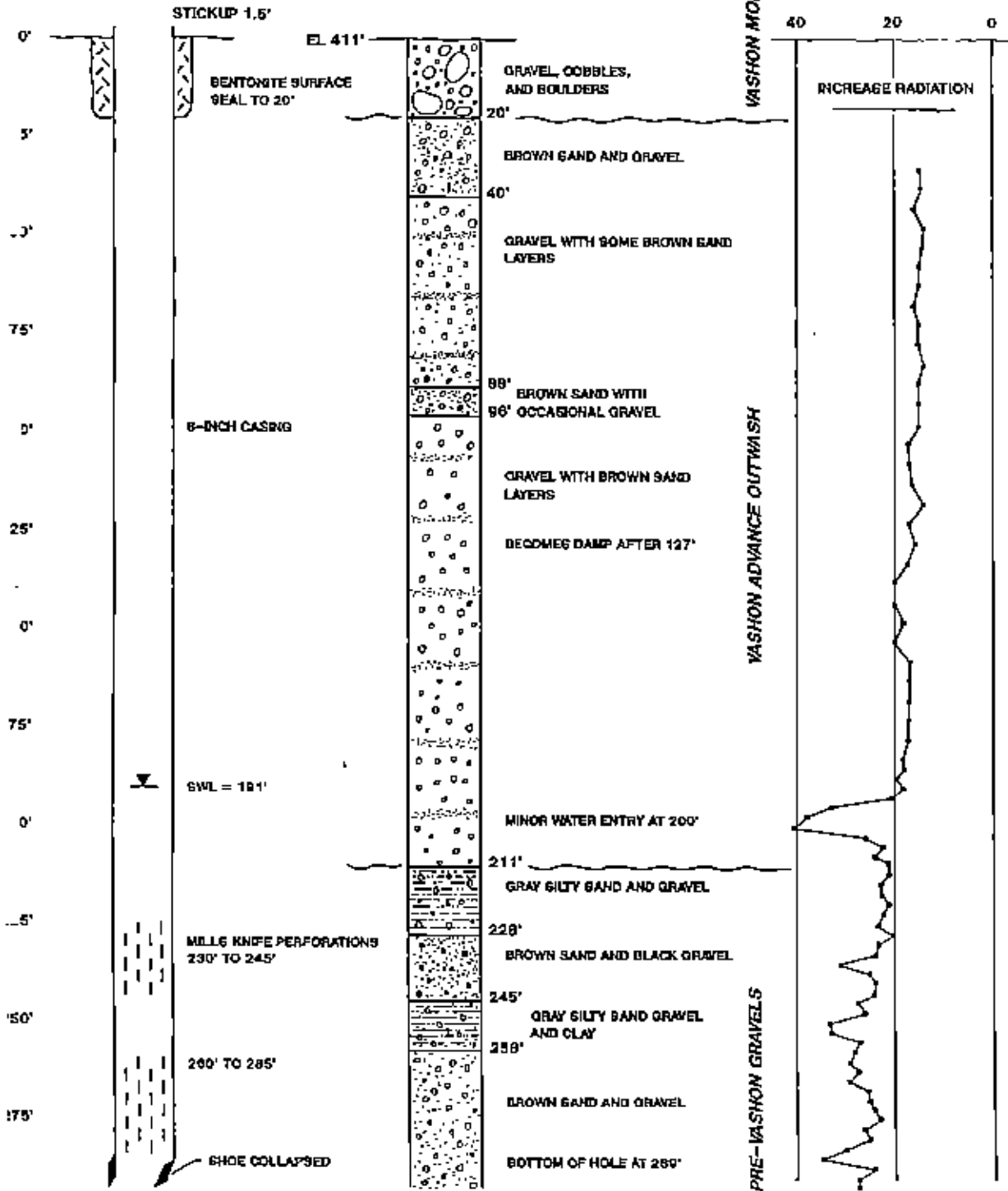


WEST TEST WELL

CONSTRUCTION DETAIL

GEOLOGIC LOG

GAMMA RAY LOG  
SECONDS / 250 EMISSIONS



PUMP TEST:  
 Q = 150, s = 15  
 Q/s = 10.6  
 T = 38,000 (dd)  
 T = 105,000 (rea)


# RECORD OF BOREHOLE SW YELM NO. 1

SHEET 1 of 12  
ELEVATION: 450  
INCLINATION: -90

PROJECT: Anderson Property  
PROJECT NUMBER: 043-1328  
LOCATION: Thurston County, Yelm, WA

DRILLING DATE: 8/17/05  
DRILLING METHOD: Cable tool  
DRILL RIG:

DATUM:  
AZIMUTH: N/A  
COORDINATES: not surveyed

DEPTH (ft)	SOIL PROFILE		SAMPLES		FIELD OBSERVATIONS	WELL CONSTRUCTION	
	DESCRIPTION	Geological Unit	GRAPHIC LOG	TYPE	NUMBER	COMMENTS	NOTES WATER LEVELS WELL GRAPHIC
0	0.0 - 20.0 Mixture of silt, sand, gravel and cobbles		X			0-8' Drillers report mixture of silt, sand, gravel, and cobbles	 <p>Carbon steel casing 12-inch Nom. Dia.</p> <p>Carbon steel casing 16-inch Nom. Dia.</p> <p>Neat cement surface seal</p>
5		FILL	X			Drillers report silt, sand, gravel and cobbles	
10			X			Drillers report silty sand and gravels with large cobbles from 17-30'	
20	20.0 - 30.0 <b>SANDY SILT with GRAVEL</b> dark grayish brown (moist 2.5Y 4/2); well graded, subangular gravels up to 2" dia.; well graded sands; some woody debris		X		GRAB		Native formation
25		ML	X				
30	30.0 - 40.0 <b>SANDY SILT with GRAVEL</b> same as above except gravels up to 1" dia.		X		GRAB	Drillers report silty sand, gravels and cobbles from 30-36'	
35		ML	X			Drillers report silty sand, gravels and cobbles from 36-47'	
40	Log continued on next page		X				

PORTLAND GEOLOGICAL LOG YELM LOGS.GPJ GLDR WA.GDT 5/9/06

DRILLING CONTRACTOR: Holt Drilling, Inc.  
DRILLER: T. Farenbach and R. Miller

LOGGED: K. Janssen and A. Clark  
CHECKED: Mark Wirganowicz  
DATE: 5/8/2006



# RECORD OF BOREHOLE SW YELM NO. 1

SHEET 2 of 12  
ELEVATION: 450  
INCLINATION: -90

PROJECT: Anderson Property  
PROJECT NUMBER: 043-1328  
LOCATION: Thurston County, Yelm, WA

DRILLING DATE: 8/17/05  
DRILLING METHOD: Cable tool  
DRILL RIG:

DATUM:  
AZIMUTH: N/A  
COORDINATES: not surveyed

DEPTH (ft)	SOIL PROFILE		SAMPLES		FIELD OBSERVATIONS	WELL CONSTRUCTION	
	DESCRIPTION	Geological Unit	GRAPHIC LOG	TYPE	NUMBER	COMMENTS	NOTES WATER LEVELS WELL GRAPHIC
40	40.0 - 50.0 <u>SANDY SILT with GRAVEL</u> same as above	ML	[Pattern]	GRAB			
45							
50	50.0 - 60.0 <u>SANDY SILT with GRAVEL</u> same as above	ML	[Pattern]	GRAB		Drillers report silt, sand, gravel and cobbles from 47-49'  Drillers report brown silt with few gravels from 49-53'  Drillers report brown silt, sand, gravel, and cobbles from 53-61'	
55							
60	60.0 - 70.0 <u>SANDY SILT with GRAVEL</u> same as above	ML	[Pattern]	GRAB		Drillers report brown silty sand and gravels with cobbles from 61-80'	Native formation
65							
70	70.0 - 80.0 <u>Well-graded SAND with SILT and GRAVEL</u> dark grayish brown (moist 2.5Y 4/2); well graded sands; well graded, subrounded gravels up to 1" dia.	SW-SM	[Pattern]	GRAB			
75							
80	Log continued on next page						

PORTLAND GEOLOGICAL LOG YELM LOGS.GPJ GLDR.WA.GDT 5/9/06

DRILLING CONTRACTOR: Holt Drilling, Inc.  
DRILLER: T. Farenbach and R. Miller

LOGGED: K. Janssen and A. Clark  
CHECKED: Mark Wirganowicz  
DATE: 5/8/2006












# RECORD OF BOREHOLE SW YELM NO. 1

SHEET 3 of 12  
ELEVATION: 450  
INCLINATION: -90

PROJECT: Anderson Property  
PROJECT NUMBER: 043-1328  
LOCATION: Thurston County, Yelm, WA

DRILLING DATE: 8/17/05  
DRILLING METHOD: Cable tool  
DRILL RIG:

DATUM:  
AZIMUTH: N/A  
COORDINATES: not surveyed

DEPTH (ft)	SOIL PROFILE		SAMPLES		FIELD OBSERVATIONS	WELL CONSTRUCTION	
	DESCRIPTION	Geological Unit	GRAPHIC LOG	TYPE	NUMBER	COMMENTS	NOTES WATER LEVELS WELL GRAPHIC
80	80.0 - 90.0 <u>Well-graded SAND with SILT and GRAVEL</u> same as above	SW-SM		GRAB		Drillers report brown silty sand and gravels from 80-98'	
85							
90	90.0 - 100.0 <u>Well-graded SAND with SILT and GRAVEL</u> same as above except well graded, subrounded/subangular gravels up to 2" dia.	SM		GRAB			
95							
100	100.0 - 110.0 <u>SANDY SILT with GRAVEL</u> dark greenish gray (moist 10Y 4/1); well graded sands; well graded, subrounded/subangular gravels up to 1" dia.	ML		GRAB		Drillers report brown silty sand and gravels from 103-112'	
105							
110	110.0 - 120.0 <u>SANDY SILT - SILTY SAND, with GRAVEL</u> dark greenish gray (moist 10Y 4/1); well graded sands; well graded, subrounded/subangular gravels up to 1" dia.	ML-SM		GRAB		Drillers report brown/gray silt and gravels from 112-126'	
115							
120	Log continued on next page						

Native formation

PORTLAND GEOLOGICAL LOG\_YELM LOGS.GPJ\_GLD.R WA.GDT\_5/9/06

DRILLING CONTRACTOR: Holt Drilling, Inc.  
DRILLER: T. Farenbach and R. Miller

LOGGED: K. Janssen and A. Clark  
CHECKED: Mark Wirganowicz  
DATE: 5/8/2006



# RECORD OF BOREHOLE SW YELM NO. 1

SHEET 4 of 12  
ELEVATION: 450  
INCLINATION: -90

PROJECT: Anderson Property  
PROJECT NUMBER: 043-1328  
LOCATION: Thurston County, Yelm, WA

DRILLING DATE: 8/17/05  
DRILLING METHOD: Cable tool  
DRILL RIG:

DATUM:  
AZIMUTH: N/A  
COORDINATES: not surveyed

DEPTH (ft)	SOIL PROFILE		SAMPLES		FIELD OBSERVATIONS	WELL CONSTRUCTION	
	DESCRIPTION	Geological Unit	GRAPHIC LOG	TYPE	NUMBER	COMMENTS	NOTES WATER LEVELS WELL GRAPHIC
120	120.0 - 130.0 <u>SANDY SILT - SILTY SAND, with GRAVEL</u> same as above	ML-SM	[Graphic Log Pattern]	GRAB			
125							
130	130.0 - 140.0 <u>SANDY SILT - SILTY SAND, with GRAVEL</u> same as above except gravels rounded to subrounded						
135							
140	140.0 - 150.0 <u>SANDY SILT - SILTY SAND, with GRAVEL</u> same as above except poorly graded gravels 1-2" dia.; basalt cobble 3+" dia.						
145							
150	150.0 - 160.0 <u>SANDY SILT - SILTY SAND, with GRAVEL</u> same as above except poorly graded, subrounded/subangular gravels up to 3/4" dia.	ML-SM	[Graphic Log Pattern]	GRAB			
155							
160	Log continued on next page						

PORTLAND GEOLOGICAL LOG YELM LOGS.GPJ GLDR WA.GDT 5/9/06

Native formation →

DRILLING CONTRACTOR: Holt Drilling, Inc.  
DRILLER: T. Farenbach and R. Miller

LOGGED: K. Janssen and A. Clark  
CHECKED: Mark Wirganowicz  
DATE: 5/8/2006



# RECORD OF BOREHOLE SW YELM NO. 1

SHEET 5 of 12  
ELEVATION: 450  
INCLINATION: -90

PROJECT: Anderson Property  
PROJECT NUMBER: 043-1328  
LOCATION: Thurston County, Yelm, WA

DRILLING DATE: 8/17/05  
DRILLING METHOD: Cable tool  
DRILL RIG:

DATUM:  
AZIMUTH: N/A  
COORDINATES: not surveyed

DEPTH (ft)	SOIL PROFILE		SAMPLES		FIELD OBSERVATIONS	WELL CONSTRUCTION	
	DESCRIPTION	Geological Unit	GRAPHIC LOG	TYPE	NUMBER	COMMENTS	NOTES WATER LEVELS WELL GRAPHIC
160	160.0 - 170.0 <b>SANDY SILT - SILTY SAND, with GRAVEL</b> same as above except poorly-graded gravels up to 1" dia.	ML-SM	[Graphic Log Pattern]	GRAB			[Well Construction Graphic]
165							
170	170.0 - 180.0 Same as above	ML-SM	[Graphic Log Pattern]	GRAB		Drillers report brown silty sand, gravels and cobbles from 170-185'	[Well Construction Graphic]
175							
180	180.0 - 190.0 <b>GRAVELLY SILT</b> brown (5Y 5/2); well graded sands; well graded gravels; subrounded to subangular gravels; largest observed gravel 1" to 2" diameter	ML	[Graphic Log Pattern]	GRAB		Drillers report brown silty sand, gravels and large cobbles and occasional silt-bound layers from 185-195'	[Well Construction Graphic]
185							
190	190.0 - 200.0 <b>SANDY SILT - SILTY SAND, with GRAVEL</b> olive gray (moist: 5Y 5/2); stiff, blocky silt (10GY 6/1) with mottles (5YR 5/6); well-graded sands; well-graded, subrounded gravels up to 2" dia.; some cobbles up to 5"+ dia.; some fine rootlets	ML-SM	[Graphic Log Pattern]	GRAB			[Well Construction Graphic]
195							
200	Log continued on next page						

PORTLAND GEOLOGICAL LOG YELM LOGS.GPJ GLDR WA.GDT 5/9/05

Carbon steel casing  
12-inch Nom. Dia.  
  
Native formation

DRILLING CONTRACTOR: Holt Drilling, Inc.  
DRILLER: T. Farenbach and R. Miller

LOGGED: K. Janssen and A. Clark  
CHECKED: Mark Wirganowicz  
DATE: 5/8/2006



# RECORD OF BOREHOLE SW YELM NO. 1

SHEET 6 of 12  
ELEVATION: 450  
INCLINATION: -90

PROJECT: Anderson Property  
PROJECT NUMBER: 043-1328  
LOCATION: Thurston County, Yelm, WA

DRILLING DATE: 8/17/05  
DRILLING METHOD: Cable tool  
DRILL RIG:

DATUM:  
AZIMUTH: N/A  
COORDINATES: not surveyed

DEPTH (ft)	SOIL PROFILE		SAMPLES		FIELD OBSERVATIONS	WELL CONSTRUCTION	
	DESCRIPTION	Geological Unit	GRAPHIC LOG	TYPE	NUMBER	COMMENTS	NOTES WATER LEVELS WELL GRAPHIC
200	200.0 - 210.0 <b>SILTY SAND with GRAVEL</b> dark gray (moist: 5Y 4/1); well-graded sands; well-graded gravels, subrounded/subangular gravels up to 2" in dia.; some cobbles up to 3" in dia.	SM	[Pattern: Dotted]	GRAB		Drillers note minor water entry at 205'	[Symbol: Inverted triangle]
210	210.0 - 220.0 <b>Well-graded SAND with SILT and GRAVEL</b> dark gray (moist: 5Y 4/1); subrounded/subangular gravels up to 1" dia.; some cobbles up to 3"+ dia.						
215		SW-SM	[Pattern: Dotted]	GRAB			
220	220.0 - 226.0 Same as above; % gravels declining; gravels up to 1" dia.	SW-SM	[Pattern: Dotted]	GRAB		Native formation	[Symbol: Arrow pointing right]
225	226.0 - 230.0 Same as above; finer sands; % gravels declining; gravels up to 1-2" dia.						
230	230.0 - 234.0 Same as above; gravels up to 2" dia.	SW-SM	[Pattern: Dotted]	GRAB			
235	234.0 - 236.0 <b>SILTY SAND - SILTY GRAVEL</b> olive (moist: 5Y 4/3) well-graded sands and gravels; gravels up to 2" dia.; cobbles up to 3"+ dia.; some oxidation on cobbles	SM-GM	[Pattern: Dotted with black spots]	GRAB	Drillers note silt layer		
240	236.0 - 240.0 Same as above; well graded gravels; gravels up to 2" dia.; some cobbles from 3"-4" dia.; trace amounts of oxidation on gravels; silt with small amounts of clay as binder; silts are soft and blocky (gray 5Y 5/1 with orange 5YR 4/6 mottles)	SM-GM	[Pattern: Dotted with black spots]	GRAB	Silt bound layers at 236' bgs.		
Log continued on next page							

Minor water entry noted at 205' bgs

PORTLAND GEOLOGICAL LOG YELM LOGS.GPJ GLDR.WA.GDT 5/9/06

DRILLING CONTRACTOR: Holt Drilling, Inc.  
DRILLER: T. Farenbach and R. Miller

LOGGED: K. Janssen and A. Clark  
CHECKED: Mark Wirganowicz  
DATE: 5/8/2006




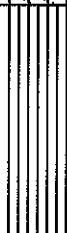



# RECORD OF BOREHOLE SW YELM NO. 1

SHEET 7 of 12  
ELEVATION: 450  
INCLINATION: -90

PROJECT: Anderson Property  
PROJECT NUMBER: 043-1328  
LOCATION: Thurston County, Yelm, WA

DRILLING DATE: 8/17/05  
DRILLING METHOD: Cable tool  
DRILL RIG:

DATUM:  
AZIMUTH: N/A  
COORDINATES: not surveyed

DEPTH (ft)	SOIL PROFILE		SAMPLES		FIELD OBSERVATIONS	WELL CONSTRUCTION	
	DESCRIPTION	Geological Unit	GRAPHIC LOG	TYPE	NUMBER	COMMENTS	NOTES WATER LEVELS WELL GRAPHIC
240	240.0 - 244.0 <b>SILTY SAND</b> olive (moist: 5Y 3/3) well graded gravels; subrounded to subangular gravels; gravels to 1"+ dia.; some cobbles to 3"+ dia.	SM		GRAB			
245	244.0 - 250.0 <b>SILT</b> light yellowish brown (moist: 2.5Y 6/4); some oxidation; trace poorly graded sands; some poorly graded gravels	ML		GRAB			
250	250.0 - 260.0 <b>SILTY GRAVEL - GRAVELLY SILT</b> olive gray (5Y 5/2); trace clay; well graded sands; subrounded gravels to 2"+ dia.; silt/clay as matrix (greenish gray)	GW-GM		GRAB			
260	260.0 - 270.0 <b>SILTY GRAVEL</b> olive gray (5Y 5/2); well graded sands; well graded gravels; subrounded gravels to 2"+ dia.	GM		GRAB			Native formation →
270	270.0 - 280.0 <b>SILTY GRAVEL-GRAVELLY SILT</b> well graded sands; well graded gravels; subrounded gravels to 2"+ dia.	GW-GM		GRAB			
280	Log continued on next page						

PORTLAND GEOLOGICAL LOG YELM LOGS.GPJ GLDR WA.GDT 5/9/06

DRILLING CONTRACTOR: Holt Drilling, Inc.  
DRILLER: T. Farenbach and R. Miller

LOGGED: K. Janssen and A. Clark  
CHECKED: Mark Wirganowicz  
DATE: 5/8/2006





# RECORD OF BOREHOLE SW YELM NO. 1

SHEET 8 of 12  
ELEVATION: 450  
INCLINATION: -90

PROJECT: Anderson Property  
PROJECT NUMBER: 043-1328  
LOCATION: Thurston County, Yelm, WA

DRILLING DATE: 8/17/05  
DRILLING METHOD: Cable tool  
DRILL RIG:

DATUM:  
AZIMUTH: N/A  
COORDINATES: not surveyed

DEPTH (ft)	SOIL PROFILE		SAMPLES		FIELD OBSERVATIONS	WELL CONSTRUCTION	
	DESCRIPTION	Geological Unit	GRAPHIC LOG	TYPE	NUMBER	COMMENTS	NOTES WATER LEVELS WELL GRAPHIC
280	280.0 - 290.0 Same as above; dark gray (5Y 4/1); cobbles to 6"+ dia.	GW-GM		GRAB		Drillers report gray silt bound gravels and sand from 280-293'; water going down (283'-9"+10'-1" = 293'-10" +13'-11" = 307'-9")	
285							
290	290.0 - 293.0 <b>SILTY GRAVEL</b> dark greenish gray (10Y 4/1); grayish/blue; well graded sand; coarse gravels to 2.5" dia.; rounded to subrounded gravels; gravels in fine sand to clay matrix; clay form ribbons (soft)	GM		GRAB		Drillers report large cobbles and gravels with sand from 293-304'; gray silt binder; water up and down	
295	293.0 - 296.0 <b>SILTY SAND</b> bluish black (10G 2.5/1); fines are pale olive (5Y 6/3); gravels subrounded to 2" dia.	SM		GRAB			
296.0 - 298.0	Same as above; coarse sands	SM		GRAB		Note recovery around 296' to 298' appeared to have less clay than 301' sample; cleaner returns	
298.0 - 301.0	Same as above; fine sands	SM		GRAB			
300	301.0 - 304.0 Same as above; increasing gravels and cobbles; most sand is broken from larger materials (fresh); gravels subangular to rounded	SM		GRAB		Drillers report large cobbles and gravels with sand and gray silt binder from 304-317'; making water; 307'-9" + 9'-10" = 317" +10'-1" = 327'-8"	Native formation →
305	304.0 - 307.0 <b>SILTY SAND - SANDY SILT</b> very dark gray (5Y 3/1); well graded gravel	SM-ML		GRAB			
310	307.0 - 310.0 <b>SILTY SAND w/ GRAVEL</b> very dark gray (5Y 3/1);	SM		GRAB		Sample at 316' - Silty/sandy gravels with cobbles and clay; some cobbles 4-5" in dia.; large gravels and cobbles mostly subrounded, clay is greenish blue-gray with slightly mottled appearance and is sticky; forms slight ribbons; increasing fines in matrix than in sample from 313'	
315	310.0 - 313.0 <b>SILTY GRAVEL w/ SAND</b> very dark gray (5Y 3/1); cobbles with clay; clay is bluish-gray (not as abundant as 307'); cobbles are up to 6" x 3" in size; gravels and cobbles are subrounded to rounded	GM		GRAB			
316.0 - 319.0	Same as above; greenish black (5GY 2.5/1); fines are olive (5Y 5/3)	GM		GRAB			
320	316.0 - 319.0 <b>SILTY-CLAYEY GRAVEL w/SAND</b> greenish gray (10Y 5/1)	GC-GM		GRAB			
320	Log continued on next page	GW-GM		GRAB			

PORTLAND GEOLOGICAL LOG YELM LOGS.GPJ GLDR.WA.GDT 5/9/06

DRILLING CONTRACTOR: Holt Drilling, Inc.  
DRILLER: T. Farenbach and R. Miller

LOGGED: K. Janssen and A. Clark  
CHECKED: Mark Wrganowicz  
DATE: 5/8/2006



# RECORD OF BOREHOLE SW YELM NO. 1

SHEET 9 of 12  
ELEVATION: 450  
INCLINATION: -90

PROJECT: Anderson Property  
PROJECT NUMBER: 043-1328  
LOCATION: Thurston County, Yelm, WA

DRILLING DATE: 8/17/05  
DRILLING METHOD: Cable tool  
DRILL RIG:

DATUM:  
AZIMUTH: N/A  
COORDINATES: not surveyed

DEPTH (ft)	SOIL PROFILE		SAMPLES		FIELD OBSERVATIONS	WELL CONSTRUCTION	
	DESCRIPTION	Geological Unit	GRAPHIC LOG	TYPE	NUMBER	COMMENTS	NOTES WATER LEVELS WELL GRAPHIC
320	319.0 - 322.0 <b>SILT SAND w/ GRAVEL</b> dark gray (5Y 4/1); trace cobbles; sand and clay; most coarse sand is ground material; gravels are broken to 2" dia.; less fines than 316' sample; fines are olive (5Y 5/3) (Continued)	GW-GM		GRAB		Driller reports large cobbles; gravels with sand and gray silt from 317-324'; making some water; 327'-8"	<p>Riser pipe with rubber packer 5'-1" above top of screen</p> <p>Naturally developed (no filter pack)</p> <p>70-slot stainless steel wire wrap screen</p> <p>Low carbon steel casing</p>
325	322.0 - 325.0 <b>SANDY GRAVEL w/ SILT</b> dark gray (5Y 4/1); cobbles to 6" x 4" in size; brown medium to coarse sand; fewer fines (silts and clays) than in 319' sample; noted pumice; noted pink sand	GW-GM		GRAB		Drillers report large cobbles and gravels with sand and gray silt from 324-334'; 327'-8" + 10'-0" = 337'-8"	
330	325.0 - 328.0 <b>SANDY GRAVEL w/ SILT</b> dark gray (5Y 4/1); mottles (7.5YR 4/6); silts (5Y 7/3); with cobbles and clay; brown fine to medium sand; clay is greenish brown and soft; forms slight ribbons; much sand sizes appear to be broken larger material; gravel is subrounded; oxidation in matrix	GW-GM		GRAB			
	328.0 - 331.0 Same as above; olive (5Y 5/3); some gravels 3" x 1" in size	GW-GM		GRAB			
	331.0 - 334.0 Same as above	GW-GM		GRAB			
	334.0 - 337.0 <b>WELL GRADED GRAVELLY SAND</b> very dark gray (5Y 3/1); fines pale olive (5Y 6/4); fine to coarse sands ground cuttings from gravels and cobbles; fewer fines; gravels green and brown; gravels subrounded; gravels 2" x 1.5" in size	SWG		GRAB		Drillers report large cobbles and gravels with sand and gray silt binder from 334-344'; 337'-8" + 9'-10" = 347'-6"	
335	337.0 - 340.0 same as above; some cobbles/clay; unbroken gravels are subrounded to rounded to 2" dia.; increasing fines	SWG		GRAB			
340	340.0 - 343.0 same as above; fewer fines than in 337' sample; clay noted attached to gravels; most medium to coarse sand is broken material	SWG		GRAB		Driller reports formation of water still looks brown at 340-343'	
	343.0 - 346.0 Same as above; less silt/clay	SWG		GRAB		Driller reports large cobbles and gravel with sand and gray silt binder from 344-354'; static level at 218' bgs. in AM.; 347'-6" + 10'-0" = 357'-6"	
345	346.0 - 349.0 Same as above; increased silt/clay content; silt/clay noted as matrix support for gravel and sand	SWG		GRAB			
	349.0 - 352.0 same as above; fewer fines; increased amounts of undisturbed coarse sands and gravel; appears cleaner; trace cementation; clay/silt grayish brown in color; soft and forms ribbons; clay/silts do not support larger grains	SWG		GRAB		Note - not in sample, but discarded along sample area are cobbles, some are 4-7" in dia.; uncertain about depth interval; between 334' and 354'	
350	352.0 - 354.0 <b>POORLY-GRADED GRAVEL</b> very dark gray (5Y 3/1); some fines; well graded sands and gravels; silt pale olive (5Y 6/4); gravels subrounded to rounded; gravel 2" x 1" in size	GP		GRAB		Interval for bail-down test; note - returns were from 4th bail and are mostly medium to coarse sand size broken from larger grains; gravels to 1" dia.; gravels subrounded; fines present but minor silt/clay; not complete sample but closest material to test zone	
	354.0 - 357.0 <b>POORLY-GRADED SAND</b> medium to coarse sands; trace fines; little coarse to fine gravels; gravels subrounded to 1" dia.	SP		GRAB		Note - after collecting 357' sample, drilling gets hung up on cobbles as noted by the driller	
355	357.0 - 360.0 <b>POORLY-GRADED SAND</b> very dark gray (5Y 3/1); medium to coarse sands; trace fines; little coarse to fine gravels; gravels subangular-subrounded to 1" dia.; trace cobbles to 4" dia.	SP		GRAB			
360	Log continued on next page						

PORTLAND GEOLOGICAL LOG YELM LOGS.GPJ GLDR.WA.GDT 5/9/06

DRILLING CONTRACTOR: Holt Drilling, Inc.  
DRILLER: T. Farenbach and R. Miller

LOGGED: K. Janssen and A. Clark  
CHECKED: Mark Wirganowicz  
DATE: 5/8/2006



# RECORD OF BOREHOLE SW YELM NO. 1

SHEET 10 of 12  
ELEVATION: 450  
INCLINATION: -90

PROJECT: Anderson Property  
PROJECT NUMBER: 043-1328  
LOCATION: Thurston County, Yelm, WA

DRILLING DATE: 8/17/05  
DRILLING METHOD: Cable tool  
DRILL RIG:

DATUM:  
AZIMUTH: N/A  
COORDINATES: not surveyed

DEPTH (ft)	SOIL PROFILE			SAMPLES		FIELD OBSERVATIONS	WELL CONSTRUCTION
	DESCRIPTION	Geological Unit	GRAPHIC LOG	TYPE	NUMBER	COMMENTS	NOTES WATER LEVELS WELL GRAPHIC
360.0 - 363.0	<b>WELL-GRADED SAND</b> very dark gray (5Y 3/1); trace fines; little coarse gravels; gravels subrounded to 2" dia.	SW		GRAB		Bail down test performed	<p>70-slot stainless steel wire wrap screen</p> <p>Low carbon steel casing</p> <p>50-slot stainless steel wire wrap screen</p> <p>100-slot stainless steel wire wrap screen</p>
363.0 - 366.0	<b>POORLY-GRADED SAND</b> very dark gray (5Y 3/1); fines olive (5Y 5/3); medium sands; little fines; some coarse to fine gravels; gravels subangular to subrounded	SP		GRAB			
366.0 - 369.0	<b>WELL-GRADED SAND</b> dark greenish gray (10GY 3/1); trace fines; some coarse to fine gravels	SW		GRAB		Coarse grains and large cobbles not included in samples but observed in sampling area (cobbles up to 9" x 5"; noted), unknown depths ; subrounded cobbles	
369.0 - 372.0	same as above; increased coarse sands and gravels; gravels to 1.5" dia.	SW		GRAB			
372.0 - 375.0	same as above; trace cobbles; little fines	SW		GRAB			
375.0 - 378.0	same as above	SW		GRAB			
378.0 - 381.0	<b>POORLY-GRADED SAND</b> black (N 2.5/); trace fines; some coarse to fine gravels; gravels rounded-subrounded to 2.5" dia.	SP		GRAB			
381.0 - 384.0	same as above	SP		GRAB			
384.0 - 387.0	<b>SILTY GRAVEL w/ SAND</b> dark greenish gray (5G 3/1); trace silts olive (5Y 5/4); some clay mottled dark greenish gray to black (5G 3/1 - N 2.5/); trace cobbles to 4" dia.	GM		GRAB			
387.0 - 390.0	<b>POORLY-GRADED GRAVELLY SAND</b> very dark gray (N 3/); trace fines; gravels rounded-subrounded to 2.5" dia.	SPG		GRAB		Driller notes large cobbles	
390.0 - 393.0	same as above; gravels to 3.5" dia.	SPG		GRAB			
393.0 - 396.0	same as above; gravels subrounded to angular; gravels to 2" dia.;	SPG		GRAB			
396.0 - 399.0	same as above; gravels subrounded	SPG		GRAB			
400	Log continued on next page						

PORTLAND GEOLOGICAL LOG YELM LOGS.GPJ GLDR.WA.GDT 5/9/08

DRILLING CONTRACTOR: Holt Drilling, Inc.  
DRILLER: T. Farenbach and R. Miller

LOGGED: K. Janssen and A. Clark  
CHECKED: Mark Wirganowicz  
DATE: 5/8/2006



# RECORD OF BOREHOLE SW YELM NO. 1

SHEET 11 of 12  
ELEVATION: 450  
INCLINATION: -90

PROJECT: Anderson Property  
PROJECT NUMBER: 043-1328  
LOCATION: Thurston County, Yelm, WA

DRILLING DATE: 8/17/05  
DRILLING METHOD: Cable tool  
DRILL RIG:

DATUM:  
AZIMUTH: N/A  
COORDINATES: not surveyed

DEPTH (ft)	SOIL PROFILE		SAMPLES		FIELD OBSERVATIONS	WELL CONSTRUCTION	
	DESCRIPTION	Geological Unit	GRAPHIC LOG	TYPE	NUMBER	COMMENTS	NOTES WATER LEVELS WELL GRAPHIC
400	399.0 - 402.0 same as above (Continued)	SPG					
	402.0 - 405.0 <b>POORLY-GRADED SAND</b> very dark gray (N 3/); trace fines; little coarse to fine gravels; gravels rounded-subrounded to 1" dia.	SP		GRAB		Driller notes change to sand at 401' bgs and reddish color	
405	405.0 - 408.0 same as above; some coarse to fine gravels	SP		GRAB			
	408.0 - 411.0 <b>POORLY-GRADED GRAVELLY SAND</b> very dark gray (N 3/); trace fines; gravels subrounded to 4" dia.	SPG		GRAB			
	411.0 - 414.0 <b>POORLY-GRADED SAND</b> very dark gray (N 3/); trace fines; some coarse to fine gravels; gravels rounded-subrounded to 1" dia.	SP		GRAB			
415	414.0 - 417.0 same as above; little coarse to fine gravels; little fines; gravels subrounded to 2" dia.	SP		GRAB		Large cobble encountered at 413.5' bgs. required drilling here with hammer; hammer not used from at least 390' to 413.5' bgs. Driller believes this is a silty zone instead. Color change in water is now now greyish/brown instead of greenish/black at casing depth 415.5' bgs.	
	417.0 - 420.0 same as above; some coarse to fine gravels	SP		GRAB			
420	420.0 - 423.0 <b>POORLY-GRADED GRAVELLY SAND</b> very dark gray (N 3/); trace fines; fine sands; gravels subrounded to rounded; gravels to 1/2" dia.	SPG		GRAB			
	423.0 - 426.0 <b>POORLY-GRADED GRAVELLY SAND</b> very dark gray (N 3/); trace fines; fine sands; gravels subangular-rounded to 2" dia.	SPG		GRAB		Note driller collects sample of wood at approximately 425' bgs.	
	426.0 - 429.0 <b>POORLY-GRADED SAND</b> very dark gray (N 3/); trace fines; some coarse to fine gravels; gravels rounded-subrounded to 2.5" dia.	SP		GRAB			
430	429.0 - 432.0 same as above; gravels to 1/2" dia.; increased fine gravels	SP		GRAB			
	432.0 - 435.0 same as above; little coarse to fine gravels; gravels subangular to rounded	SP		GRAB			
435	435.0 - 438.0 <b>SILTY GRAVEL w/ SAND</b> greenish gray (10Y 5/1); well graded gravels; gravels subrounded-rounded to 2" dia.;	GM		GRAB			
		SP		GRAB			
440	Log continued on next page						

PORTLAND GEOLOGICAL LOG YELM LOGS.GPJ GLDR WA.GDT 5/9/06

DRILLING CONTRACTOR: Holt Drilling, Inc.  
DRILLER: T. Farenbach and R. Miller

LOGGED: K. Janssen and A. Clark  
CHECKED: Mark Wirganowicz  
DATE: 5/8/2006







# RECORD OF BOREHOLE SW YELM NO. 1

SHEET 12 of 12  
ELEVATION: 450  
INCLINATION: -90

PROJECT: Anderson Property  
PROJECT NUMBER: 043-1328  
LOCATION: Thurston County, Yelm, WA

DRILLING DATE: 8/17/05  
DRILLING METHOD: Cable tool  
DRILL RIG:

DATUM:  
AZIMUTH: N/A  
COORDINATES: not surveyed

DEPTH (ft)	SOIL PROFILE			SAMPLES		FIELD OBSERVATIONS	WELL CONSTRUCTION
	DESCRIPTION	Geological Unit	GRAPHIC LOG	TYPE	NUMBER	COMMENTS	NOTES WATER LEVELS WELL GRAPHIC
440	438.0 - 441.0 <b>POORLY-GRADED SAND</b> very dark gray (N 3/); trace fines light olive gray (5Y 6/2); some coarse to fine gravels; gravels subangular-subrounded to 3" dia. (Continued)	SP		GRAB		Small sample from 445' bgs taken; gravels (small to coarse) in matrix of silty clay with fine to medium sands; silt/clay is gray w/greenish zones; clay forms ribbons; is soft and forms film; one course gravel to 3.5" dia.	 Gravel backfill, in accordance with WAC 173-160
445	441.0 - 444.0 same as above; increased coarse sands; gravels rounded-subrounded to 2" dia.	SP		GRAB			
445	444.0 - 446.0 <b>POORLY to WELL-GRADED SAND</b> very dark gray (N 3/); trace fines light olive gray (5Y 6/2); some coarse to fine gravels; gravels subangular-subrounded to 3" dia.	SP-SW					
450	Boring completed at 450.0 ft.						

PORTLAND GEOLOGICAL LOG YELM LOGS.GPJ GLDR.WA.GDT 5/9/06

DRILLING CONTRACTOR: Holt Drilling, Inc.  
DRILLER: T. Farenbach and R. Miller

LOGGED: K. Janssen and A. Clark  
CHECKED: Mark Wirganowicz  
DATE: 5/8/2006

