



Appendix D: As-Built Reports for MW12-001A and MW12-001B, MW12-500, MW12-501, and MW12-502

Abandonment Report for MW03-500, MW03-501, and MW03-502

MEMORANDUM

To: **Sally McLeod, Environmental Superintendent**

CC: Stacy Staley, Sumitomo Metal Mining Pogo Mine
Lucas Walker, Sumitomo Metal Mining Pogo Mine

From: Sherry L Gaddy, Aspen Hydrologic Services, LLC (AHS)

Subject: **Pogo Mine – RTP (Reclaim Tailings Pond) Compliance Monitoring Wells Abandonment and Replacement Project- MW12-500, MW12-501 and MW12-502**

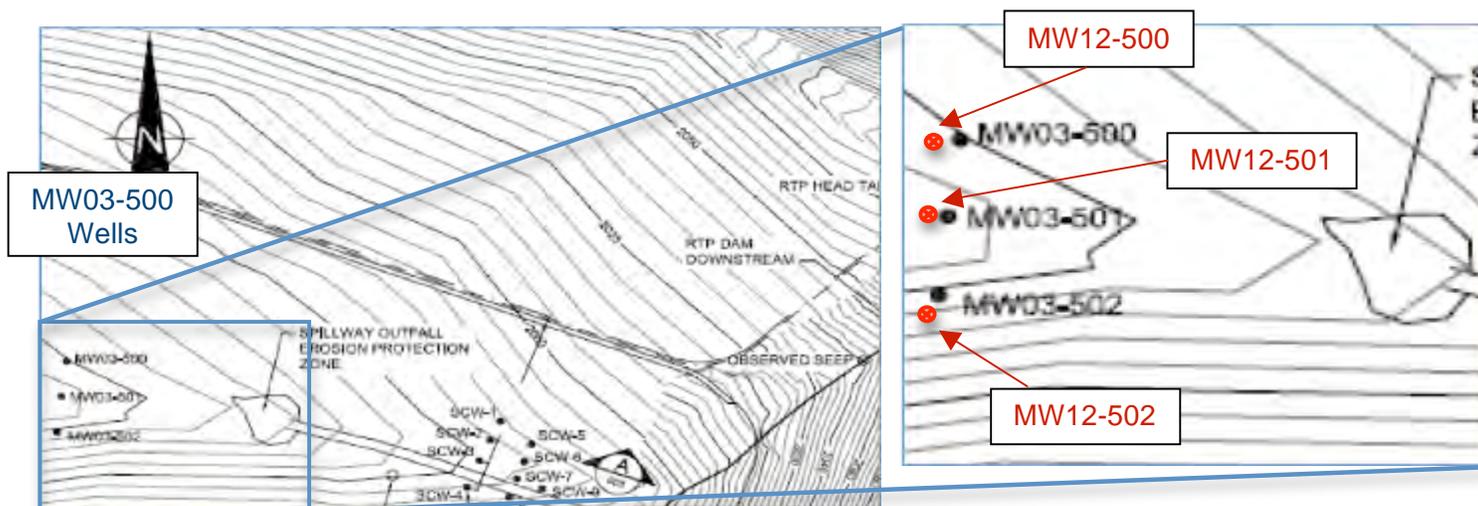
Introduction:

Aspen Hydrologic Services, LLC (AHS) oversaw the abandonment of MW03-500, MW03-501 and MW03-502; and the replacement of these wells with MW12-500, MW12-501 and MW12-502.

The existing wells were abandoned and replaced due to monitoring of the wrong formation (bedrock rather than first water in the alluvial layer), and to poor drilling, completion, and development practices that were necessary in 2003. Access to the site was limited to equipment capable of being flown in by helicopter, as road access was unavailable. The failure of MW03-501 prompted further investigation into all three wells and it was determined that replacement of all three compliance wells was required.

With road access available and a sonic rig, the replacement wells were drilled and completed properly to depth in the alluvial layer by October 25, 2012 (**Figure 1**). The wells were not developed after completion due to freezing temperatures. The wells were not drilled with water or mud ensuring location of first water and will need very little development after spring thaw.

Figure 1: Location of MW12-500, MW12-501 and MW12-502



Background:

The MW03-500 wells were drilled in August or September of 2003 with a core rig by an unknown drilling company near Liese Creek down-gradient of the RTP. It is unknown whether these core holes were drilled with HQ or NQ size drill bit (3.78” vs. 3.00” OD). Design and installation was completed by unknown entities. Construction details were determined from core logging pictures and a downhole camera survey (MW03-501). They are summarized as follows:

- ◆ Cased with two-inch Sch. 40 PVC, screened in the bedrock for 20ft.
- ◆ Alluvium/Bedrock contact determined from core logging pictures.
- ◆ Does not appear to be gravel packed (downhole camera survey of MW03-501).
- ◆ No surface seal other than concrete placed around the surface monuments, which vary in depth.
- ◆ No development records were found. First sampled in September 2003 as MW03-001 thru 003.
- ◆ Follow-up sample collected in May 2004 as MW03-500 thru 502.
- ◆ Drilled as RTP-MW1 thru 3 to 25ft below the alluvium/bedrock contact (core logging pictures).
- ◆ Heat taped to TD.

Historically, Pogo has sampled monitoring wells with Waterra foot valves attached to HDPE tubing. Pogo tried to install Grundfos dedicated pumps in MW03-500, 501 and 502 in April 2012. After pulling the sample tube, Pogo attempted to set the pumps and were unable to install them to depth. It was suspected that lost HDPE tubing or other equipment was blocking access. When the sample tubing was pulled from MW03-501, ice was noted and the well was steam thawed, as it appeared the heat tape was not functioning. Immediately after the well was thawed, Pogo attempted to install the pump and encountered refusal again at 36ft. Pogo attempted removal of lost tubing/equipment and after several unsuccessful attempts, decided to perform downhole camera surveys on all three wells.

Arctic Drilling mobed to site during July and surveyed the wells. Several short lengths of HDPE sample tubing was found in all three of the wells and fished out by Arctic Drilling. After fishing tubing out of MW03-501, the pump would not go past 36ft in the 53ft well. Another downhole survey was completed during September which shows the collapse of the well, “AHS Pogo MW03-501 Pro 11-5-12.pdf”.

After reviewing all information, Pogo decided to abandon and replace all three wells at the same time to minimize cost and enable monitoring of the correct formation (first water in the alluvium). A Boart Longyear Sonic Rig was already on-site and mobed to the site on October 22 (**Photos 1 thru 3**).

**Pogo Mine – RTP (Reclaim Tailings Pond) Compliance Monitoring Wells Abandonment and Replacement Project- MW12-500, MW12-501 and MW12-502
November 15, 2012**



Photo 1. Rig at MW12-502

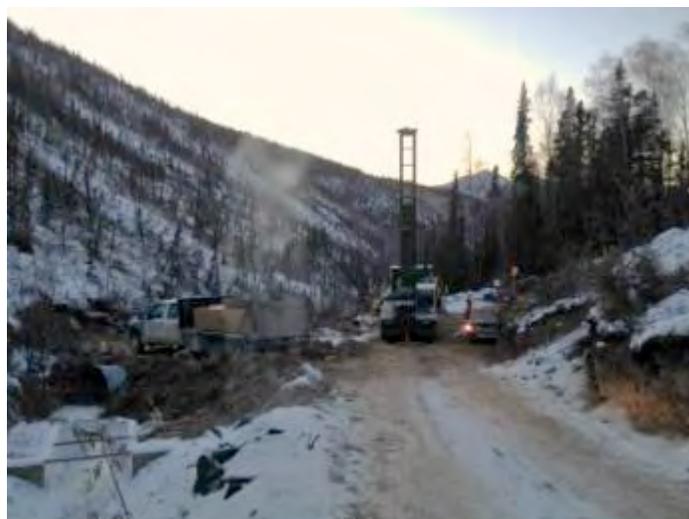


Photo 2. Rig at MW12-501



Photo 3. Rig Completing MW12-501

Conclusions:

The wells were established near Liese Creek to monitor water quality down-gradient of the RTP in the shallowest groundwater or first water. The wells drilled in 2003 were drilled too deep and screened in the bedrock as well as being drilled with core rigs and undeveloped. The replacement wells were drilled with a Boart Longyear sonic rig from October 22 through October 25 and were completed in the alluvium above the alluvium/bedrock contact. Well completions are noted in the following Table 1.

	MW12-500	MW12-501	MW12-502
Borehole Diameter (in):	10	10	10
Casing Material & ID (in):	Sch. 80 6in PVC	Sch. 80 6in PVC	Sch. 80 6in PVC
Total Depth (ft):	37	27	17
Length (ft) & Slot (in) Width of Screen:	20, 0.020	15, 0.020	10, 0.020
8 x 10 Washed Gravel Pack (ft):	37 to 15	27 to 10	17 to 5
3/8in Bentonite Hole Plug (ft):	15 to 0	10 to 0	5 to 0
Concrete Monument:	To Be Completed	To Be Completed	To Be Completed
Airlift Development:	Pump in Spring	Pump in Spring	Pump in Spring

See drill logs in **Appendix A** for well completion diagrams and geologic descriptions.

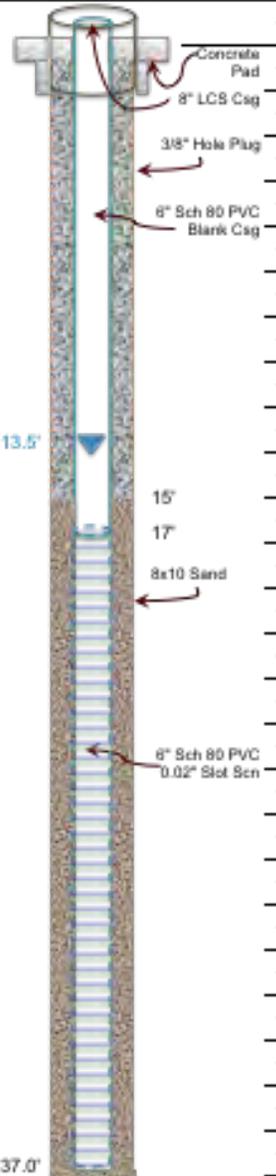
Recommendations:

AHS recommends monthly sampling to establish a new baseline. During the winter and with each sampling, the wells can be developed with small pumping systems to remove alluvial sand and silt entrained in the sand pack during completion. Further development may be required as the water level in the alluvial layer comes up with spring thaw as water levels in the wells are at their lowest throughout the winter months.

**APPENDIX A
Drill Logs**

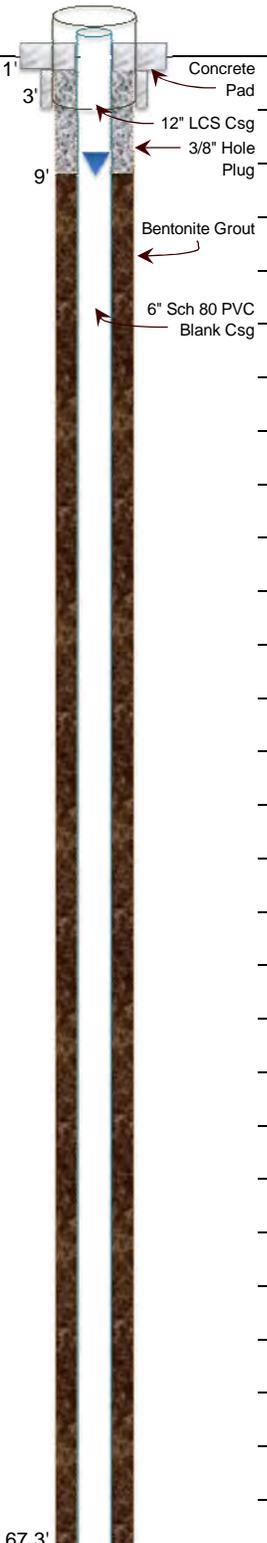
Pogo Mine – RTP (Reclaim Tailings Pond) Compliance Monitoring Wells Abandonment and Replacement Project- MW12-500, MW12-501 and MW12-502
November 15, 2012

MW12-500 Drill Log

		Pogo Mine		Well Name: MW12-500		Page: 1 of 1	
		Sumitomo Metal Mining Co.		Geologist : Sherry L. Gaddy, AHS		Date : 10/24/12	
Hole Diameter(s) : 8"x9" Corehole - Ream to 10" Drill w/no Water or Mud		Drill Rig : BL Sonic		Date Hole Commenced : 10/24/12			
Location Description : Below RTP next to Abandoned 03 Wells Coordinates :		Driller : Sean Adams Erik Skogan Casey Wallace		Date Hole Finished : 10/24/12		Date Well Installed : 10/24/12	
Depth (ft)	Core/Cuttings Recovery	Graphic	Description and Comments	Well Construction			
0.0			Ground Surface				
1.5			Silty, Sandy gravel w/7in minus cobble and a 9in silty clay seam, damp				
3.0			Silty, Sandy gravel w/BQFG (Biotite Quartz Feldspar Gneiss (Schist actually)) boulders and cobbles, damp				
4.5			Sandy, Silty Clay w/minor gravels, damp				
6.0			Silty, Gravelly Sand w/6in minus cobbles, damp to dry				
7.5			Silty, Gravelly Sand w/6in minus cobbles, damp to dry				
9.0			Silty, Gravelly Sand w/6in minus cobbles and BQFG Boulders, damp				
10.5			Silty, Gravelly Sand w/6in minus cobbles, damp				
12.0			Silty, Gravelly Sand w/6in minus cobbles, damp				
13.5			Silty, Gravelly Sand w/6in minus cobbles and BQFG Boulders, damp				
15.0			Sandy, Gravelly Cobbles, Wet				
16.5			Sandy, Gravelly Cobbles, Wet				
18.0			Silty, Gravelly Sand w/6in minus cobbles, Wet				
19.5			Silty, Gravelly Sand w/6in minus cobbles, Wet				
21.0			Silty, Gravelly Sand w/6in minus cobbles, Wet				
22.5			Silty, Gravelly Sand w/6in minus cobbles and BQFG Boulders, Wet				
24.0			Gravelly, Silty Sand w/6in minus cobbles, Wet				
25.5			Silty, Gravelly Sand w/6in minus cobbles, Wet				
27.0			Silty, Gravelly Sand w/3in minus cobbles, Wet				
28.5			Silty, Gravelly Sand w/3in minus cobbles, Wet				
30.0			Silty, Gravelly Sand w/3in minus cobbles, Wet				
31.5			Silty, Gravelly Sand w/4in minus cobbles, Wet				
33.0			Silty, Gravelly Sand w/3in minus cobbles, Wet				
34.5			Gravelly, Silty Sand w/4in minus cobbles, Wet				
36.0			Gravelly, Silty Sand w/4in minus cobbles, Wet				
37.0			Silty, Gravelly Sand w/3in minus cobbles, Wet				

Hole Diameter(s) : 8"x9" Corehole - Ream to 10" Drilled Dry	Drill Rig : BL Sonic	Date Hole Commenced : 10/2/2012
Location Description : Old Core Yard at Airstrip	Driller : Sean Adams	Date Hole Finished : 10/2/2012
Coordinates : NAD 83: Lat, Long, TOC (MP) Elev, GS Elev 64-28-03.75100, 144-54-58.81210, 1361.1', 1357 Casey Wallace	Eric Skogan	Date Well Installed : 10/3/2012

Depth (ft)	Core/Cuttings Recovery	Graphic	Description and Comments	Well Construction
1.5			Fill	1' Concrete Pad
3.0			Sandy gravel; ~60% hard, well-rounded to angular gravels 3in max size; well-rounded to sub-angular sand, coarse to fine; <5% non-plastic fines; v. loose, dry alluvium (could be fill); GM	3' 12" LCS Csg
4.0			angular sand, coarse to fine; <5% non-plastic fines; v. loose, damp alluvium (could be fill); GM	6" Sch 80 PVC Blank Csg
5.0			rounded to sub-angular sand, coarse to fine; ~5% non-plastic fines; v. loose, damp alluvium (could be fill); SM	3/8" Hole Plug
7.0			angular sand, coarse to fine; <5% non-plastic fines; v. loose, dry to sl. damp alluvium (could be fill); SM	9' 12' 17'
9.0			angular sand, coarse to fine; <5% non-plastic fines; v. loose, dry to sl. damp alluvium (could be fill); GM	8x10 Sand
10.0			Sandy gravel; ~60% hard, well-rounded to sub-angular gravels 5in max size; well-rounded to sub-angular sand, coarse to fine; <5% non-plastic fines; v. loose, wet alluvium; GM	6" Sch 80 PVC 0.02" Slot Csg
13.0			rounded to sub-angular sand, coarse to fine; ~5% non-plastic fines; v. loose, wet alluvium; GM	
13.5			Sandy gravel; ~80% hard, well-rounded to sub-angular gravels 4in max size; well-rounded to sub-angular sand, coarse to fine; <5% non-plastic fines; v. loose, wet alluvium; GM	
16.5			Sandy gravel silty; ~70% hard, well-rounded to sub-angular gravels 6in max size; well-rounded to sub-angular sand, coarse to fine; ~10% non-plastic fines; v. loose, wet alluvium; GM	
17.0			Gravelly sand; ~10% hard, well-rounded to sub-angular gravels 1in max size; well-rounded to sub-angular sand, coarse to fine; <5% non-plastic fines; v. loose, wet alluvium; SP	
18.5			Gravelly sand silty; ~30% hard, well-rounded to sub-angular gravels 4in max size; well-rounded to sub-angular sand, coarse to fine; ~10% non-plastic fines; loose, wet alluvium; SW	
19.0			Sandy gravel; ~90% hard, well-rounded to angular gravels 7in max size; well-rounded to sub-angular sand, coarse to fine; <5% non-plastic fines; v. loose, wet alluvium; GM	
22.0			Gravelly sand silty; ~35% hard, well-rounded to sub-angular gravels 5in max size; well-rounded to sub-angular sand, coarse to fine; ~5% non-plastic fines; loose, wet alluvium; SM	
23.0			Gravelly sand silty; ~20% hard, well-rounded to sub-angular gravels 6in max size; well-rounded to sub-angular sand, coarse to fine; ~5% non-plastic fines; loose, wet alluvium; SM	
23.3			Sandy gravel; ~75% hard, well-rounded to sub-angular gravels 6in max size; well-rounded to sub-angular sand, coarse to fine; <5% non-plastic fines; v. loose, wet alluvium; GM	
24.0			Sandy gravel; ~90% hard, well-rounded to sub-angular gravels 6in max size to 2in; well-rounded to sub-angular sand, coarse to fine; ~5% non-plastic fines; loose, wet alluvium; GM	
25.0			Sandy gravel silty; ~80% hard, well-rounded to sub-angular gravels 4in max size; well-rounded to sub-angular sand, coarse to fine; ~5% non-plastic fines; loose, wet alluvium; GM	
28.0			Sandy gravel; ~80% hard, well-rounded to sub-angular gravels 8in max size; well-rounded to sub-angular sand, coarse to fine; ~10% non-plastic fines; loose, wet alluvium; GM	
28.5			to sub-angular sand, coarse to fine; ~10% non-plastic fines; ~15% gry/brn/redish plastic fines, sl. Stiff alluvium; GW	
37.0			Sandy gravel; ~55% hard, well-rounded to sub-angular gravels 6in max size; well-rounded to sub-angular sand, coarse to fine; ~5% non-plastic fines; loose, wet alluvium; GM	
38.5			Sand; 100% well-rounded to sub-angular sand, fine; <2% non-plastic fines; v. loose, wet alluvium; SP	
40.5			Sandy gravel; ~70% hard, well-rounded to angular gravels 6in max size; well-rounded to sub-angular sand, coarse to fine; ~5% non-plastic fines; loose, wet alluvium; GM	
42.0			Sandy gravel silty; ~80% hard, well-rounded to sub-angular gravels 6in max size; well-rounded to sub-angular sand, coarse to fine; ~15% non-plastic fines; loose, wet alluvium; GM	
42.5			Sandy gravel; ~80% hard, well-rounded to angular gravels 4in max size; well-rounded to sub-angular sand, coarse to fine; ~5% non-plastic fines; loose, wet alluvium; GM	
45.0			Silty gravel sandy; ~80% hard, well-rounded to sub-angular gravels 8in max size; well-rounded to sub-angular sand, coarse to fine; ~15% non-plastic fines; loose, wet alluvium; GM	
52.0			Sandy gravel; ~55% hard, well-rounded to sub-angular gravels 8in max size; well-rounded to sub-angular sand, coarse to fine; ~5% non-plastic fines; loose, wet alluvium; GM	
52.3			Sandy gravel; ~95% hard, well-rounded to sub-angular gravels 4in max size; well-rounded to sub-angular sand, coarse to fine; ~5% non-plastic fines; loose, wet alluvium; GM	52.3'

		Pogo Mine		Well Name MW12-001B		Page: 1 of: 2	
Sumitomo Metal Mining Co.		Geologist : Sherry L Gaddy, AHS		Date : 9/8/2012			
Hole Diameter(s) : 8"x9" Corehole - Ream to 10" Drill w/Water - Bedrock w/mud		Drill Rig : BL Sonic		Date Hole Commenced : 9/8/2012		Driller on Break : 9/14-9/23	
Location Description : Old Core Yard at Airstrip		Driller : Sean Adams		Date Hole Finished : 9/26/2012		Fishing for Core Barrel : 9/26-9/28	
Coordinates : NAD 83: Lat, Long, TOC (MP) Elev, GS Elev 64-28-03.82301, 144-54-58.59117, 1359.29', 1357.76'		Erik Skogan Casey Wallace		Date Well Installed : 10/2/2012			
Depth (ft)	Core/Cuttings Recovery	Graphic	Description and Comments	Well Construction			
3.5			Fill				
8.0			rounded to sub-angular sand, coarse to fine; <5% non-plastic fines; v. loose, dry alluvium; GM				
12.0			rounded to sub-angular sand, coarse to fine; <5% non-plastic fines; v. loose, wet alluvium; GM				
15.0			rounded to sub-angular sand, coarse to fine; <5% non-plastic fines; v. loose, wet alluvium; GM				
18.0			Sandy gravel silty; ~80% hard, well-rounded to sub-angular gravels 8in max size; well-rounded to sub-angular sand, coarse to fine; ~5% non-plastic fines; v. loose, wet alluvium; GM				
18.5			Sand; 100% well-rounded to sub-angular sand, fine; <2% non-plastic fines; v. loose, wet alluvium; SP				
20.5			rounded to sub-angular sand, coarse to fine; <5% non-plastic fines; v. loose, wet alluvium; GM				
24.5			rounded to sub-angular sand, coarse to fine; <5% non-plastic fines; v. loose, wet alluvium; GM				
25.0			rounded to sub-angular sand, coarse to fine; <5% non-plastic fines; v. loose, wet alluvium; SW				
27.5			Sandy gravel silty; ~60% hard, well-rounded to sub-angular gravels 4in max size; well-rounded to sub-angular sand, coarse to fine; ~5% non-plastic fines; v. loose, wet alluvium; GM				
30.0			Sandy gravel silty; ~55% hard, well-rounded to sub-angular gravels 6in max size; well-rounded to sub-angular sand, coarse to fine; ~8% non-plastic fines; v. loose, wet alluvium; GM				
35.0			Gravelly sand silty; ~30% hard, well-rounded to sub-angular gravels 6in max size; well-rounded to sub-angular sand, coarse to fine; ~10% non-plastic fines; loose, wet alluvium; SW				
36.5			Gravelly sand silty; ~30% hard, well-rounded to sub-angular gravels 6in max size; well-rounded to sub-angular sand, coarse to fine; ~15% non-plastic fines; loose, wet alluvium; SM				
37.0			Gravelly sand silty; ~35% hard, well-rounded to sub-angular gravels 6in max size; well-rounded to sub-angular sand, coarse to fine; ~5% non-plastic fines; loose, wet alluvium; SW				
37.5			Gravel; ~100% hard, well-rounded to sub-angular gravels 4in max size to 3/4in; v. loose, wet alluvium; GW				
41.5			rounded to sub-angular sand, coarse to fine; <5% non-plastic fines; v. loose, wet alluvium; GM				
42.0			Sandy gravel; ~90% hard, well-rounded to sub-angular gravels 6in max size to 2in; <5% rounded, fine sand, silty; v. loose, wet alluvium; GM				
43.0			Sandy gravel silty; ~80% hard, well-rounded to sub-angular gravels 8in max size; well-rounded to sub-angular sand, coarse to fine; ~5% non-plastic fines; v. loose, wet alluvium; GM				
47.0			Gravelly sand silty; ~30% hard, well-rounded to sub-angular gravels 8in max size; well-rounded to sub-angular sand, coarse to fine; ~10% non-plastic fines; loose, wet alluvium; SW				
50.0			Gravel; ~100% hard, well-rounded to sub-angular gravels 8in max size to 1/4in; v. loose, wet alluvium; GW				
53.0			Sandy gravel silty; ~50% hard, well-rounded to sub-angular gravels 6in max size; well-rounded to sub-angular sand, coarse to fine; ~10% non-plastic fines; loose, wet alluvium; GM				
54.0			Sandy gravel silty; ~50% hard, well-rounded to sub-angular gravels 6in max size; well-rounded to sub-angular sand, coarse to fine; ~35% non-plastic fines; loose, wet alluvium; GM				
57.0			Silty gravel sandy; ~50% hard, well-rounded to sub-angular gravels 6in max size; well-rounded to sub-angular sand, coarse to fine; ~35% non-plastic fines; ~5% plastic fines, stiff, moist alluvium; GM				
61.5			Gravelly sand silty; ~20% hard, well-rounded to sub-angular gravels 5in max size; well-rounded to sub-angular sand, coarse to fine; ~10% non-plastic fines; loose, wet alluvium; SW				
64.5			Gravelly Clay silty/sandy; ~15% hard, well-rounded to sub-angular gravels 6in max size; well-rounded to sub-angular sand, coarse to fine; ~20% non-plastic fines; ~50% Lt Brn plastic fines, stiff, moist alluvium; CL				
66.8			Gravelly Clay silty/sandy; ~15% hard, well-rounded to sub-angular gravels 8in max size; well-rounded to sub-angular sand, coarse to fine; ~10% non-plastic fines; ~60% grey/brn plastic fines, stiff, moist alluvium; CL				
67.0			Sand; ~100% well-rounded to sub-angular sand, fine; <5% non-plastic fines; loose, wet alluvium; appears iron stained, noticeably cold; SP				
67.3			Gravel; ~100% hard, well-rounded to sub-angular gravels 8in max size; v. loose, wet alluvium; GW				

Depth (ft)	RQD	FF	FD	Graphic	Description and Comments	Well Construction
71.0					Silty Clay; ~20% non-plastic fines; ~80% White/Blue-Gray to Gray-Brn plastic fines, v. stiff, damp to dry alluvium; CL	<p>67.3'</p> <p>6" Sch 80 PVC Blank Csg</p> <p>Bentonite Grout</p> <p>134'</p> <p>130'</p> <p>3/8" Hole Plug (135' to 134')</p> <p>6" Sch 80 PVC 0.02" Slot Scn</p> <p>8x10 Sand</p> <p>160'</p> <p>165'</p> <p>Broken Drill Rod</p> <p>180'</p> <p>3"x9" Core Barrel</p> <p>217'</p> <p>220'</p> <p>8" Core Sample</p>
73.5					Silty Clay sandy; angular to sub-angular, coarse sand; ~25% non-plastic fines; ~65% Gray-Brn plastic fines, v. stiff, damp to dry alluvium; CL	
76.0					Clayey silt; Lt Gray, ~90% non-plastic fines; ~10% plastic fines, broken but v. stiff, dry alluvium; ML	
77.0					Clayey silt; Lt Tan, ~90% non-plastic fines; ~10% plastic fines, broken but v. stiff, dry alluvium; ML	
84.0	1.55/10'	8/10'	2" to 1'		Biotite, Quartz, Feldspar, Gneiss (BQFG - Pogo designation), Highly fractured, hard, weathered, slickensides evident, calcite and chlorite alterations	
87.0					Biotite, Quartz, Feldspar, Gneiss (BQFG - Pogo designation), Highly fractured, hard, weathered, slickensides evident, calcite and chlorite alterations	
93.0	0.77/10'	16/10'	2" to 1'		Biotite, Quartz, Feldspar, Gneiss (BQFG - Pogo designation), Highly fractured, hard, weathered, slickensides evident, calcite and chlorite alterations	
96.0					Biotite, Quartz, Feldspar, Gneiss (BQFG - Pogo designation), Highly fractured, hard, weathered, slickensides evident, calcite and chlorite alterations	
97.0					Biotite, Quartz, Feldspar, Gneiss (BQFG - Pogo designation), Highly fractured, hard, weathered, slickensides evident, calcite and chlorite alterations	
107.0	5.4/10'	12/10'	2" to 1'		9/9/12; Biotite, Quartz, Feldspar, Gneiss (BQFG - Pogo designation), Highly fractured, hard, weathered, slickensides evident, calcite and chlorite alterations	
110.0					Biotite, Quartz, Feldspar, Gneiss (BQFG - Pogo designation), Highly fractured, hard, weathered, slickensides evident, calcite and chlorite alterations	
116.0	4.8/10'	7/10'	1' to 3'		Biotite, Quartz, Feldspar, Gneiss (BQFG - Pogo designation), Blocky, hard, weathered, slickensides evident, calcite and chlorite alterations	
117.0					Biotite, Quartz, Feldspar, Gneiss (BQFG - Pogo designation), Highly fractured, hard, weathered, slickensides evident, calcite and chlorite alterations	
127.0	4.9/10'	15/10'	2" to 1'		Biotite, Quartz, Feldspar, Gneiss (BQFG - Pogo designation), Highly fractured, hard, less weathered, slickensides evident, calcite and chlorite alterations	
135.0					Biotite, Quartz, Feldspar, Gneiss (BQFG - Pogo designation), Highly fractured, hard, less weathered, slickensides evident, calcite and chlorite alterations	
136.5	5.1/10'	15/10'	1' to 3'		Biotite, Quartz, Feldspar, Gneiss (BQFG - Pogo designation), Blocky, hard, less weathered, slickensides evident, calcite and chlorite alterations	
137.0					Biotite, Quartz, Feldspar, Gneiss (BQFG - Pogo designation), Highly fractured, hard, less weathered, slickensides evident, calcite and chlorite alterations	
147.0	4.5/10'	13/10'	2" to 1'		Biotite, Quartz, Feldspar, Gneiss (BQFG - Pogo designation), Highly fractured, hard, less weathered, slickensides evident, calcite and chlorite alterations; 9/10/12	
157.0	3.9/10'	12/10'	2" to 1'		9/11/12; BQFG - Pogo designation, Highly fractured, hard, slickensides evident, calcite and chlorite alterations; increase in Qtz/Kspar banding and Biotite	
164.0	4.4/10'	7/10'	2" to 1'		BQFG - Pogo designation, Highly fractured, hard, slickensides evident, calcite and chlorite alterations; increase in Qtz/Kspar banding and Biotite	
167.0					BQFG - Pogo designation, Blocky, hard, slickensides evident, calcite and chlorite alterations; increase in Qtz/Kspar banding and Biotite	
175.0	4.9/10'	13/10'	1' to 3'		BQFG - Pogo designation, Blocky, hard, slickensides evident, calcite and chlorite alterations; increase in Qtz/Kspar banding and Biotite	
177.0					BQFG - Pogo designation, Highly fractured, hard, slickensides evident, calcite and chlorite alterations; increase in Qtz/Kspar banding and Biotite	
187.0	4/10'	12/10'	2" to 1'		BQFG - Pogo designation, Highly fractured, hard, slickensides evident, calcite and chlorite alterations; increase in Qtz/Kspar banding and Biotite	
192.0	5.9/10'	8/10'	2" to 1'		BQFG - Pogo designation, Highly fractured, hard, slickensides evident, calcite and chlorite alterations; increase in Qtz/Kspar banding and Biotite	
197.0					BQFG - Pogo designation, Blocky, hard, slickensides evident, calcite and chlorite alterations; increase in Qtz/Kspar banding and Biotite	
201.0	3.1/10'	14/10'	1' to 3'		BQFG - Pogo designation, Blocky, hard, slickensides evident, calcite and chlorite alterations; increase in Qtz/Kspar banding and Biotite	
207.0					BQFG - Pogo designation, Highly fractured, hard, slickensides evident, calcite and chlorite alterations; increase in Qtz/Kspar banding and Biotite	
217.0	3.8/10'	17/10'	2" to 1'		BQFG - Pogo designation, Highly fractured, hard, slickensides evident, calcite and chlorite alterations; increase in Qtz/Kspar banding and Biotite	
220.0	n/a	n/a	n/a		Rod connected to core barrel broke above the threads. Fishing was unsuccessful - core barrel not stuck, but fish could not hold onto it for more than 5 ft. Left 40ft of core barrel and 15ft of rod in the ground. Washed mud and cuttings out of the hole - installed well material and completed well	