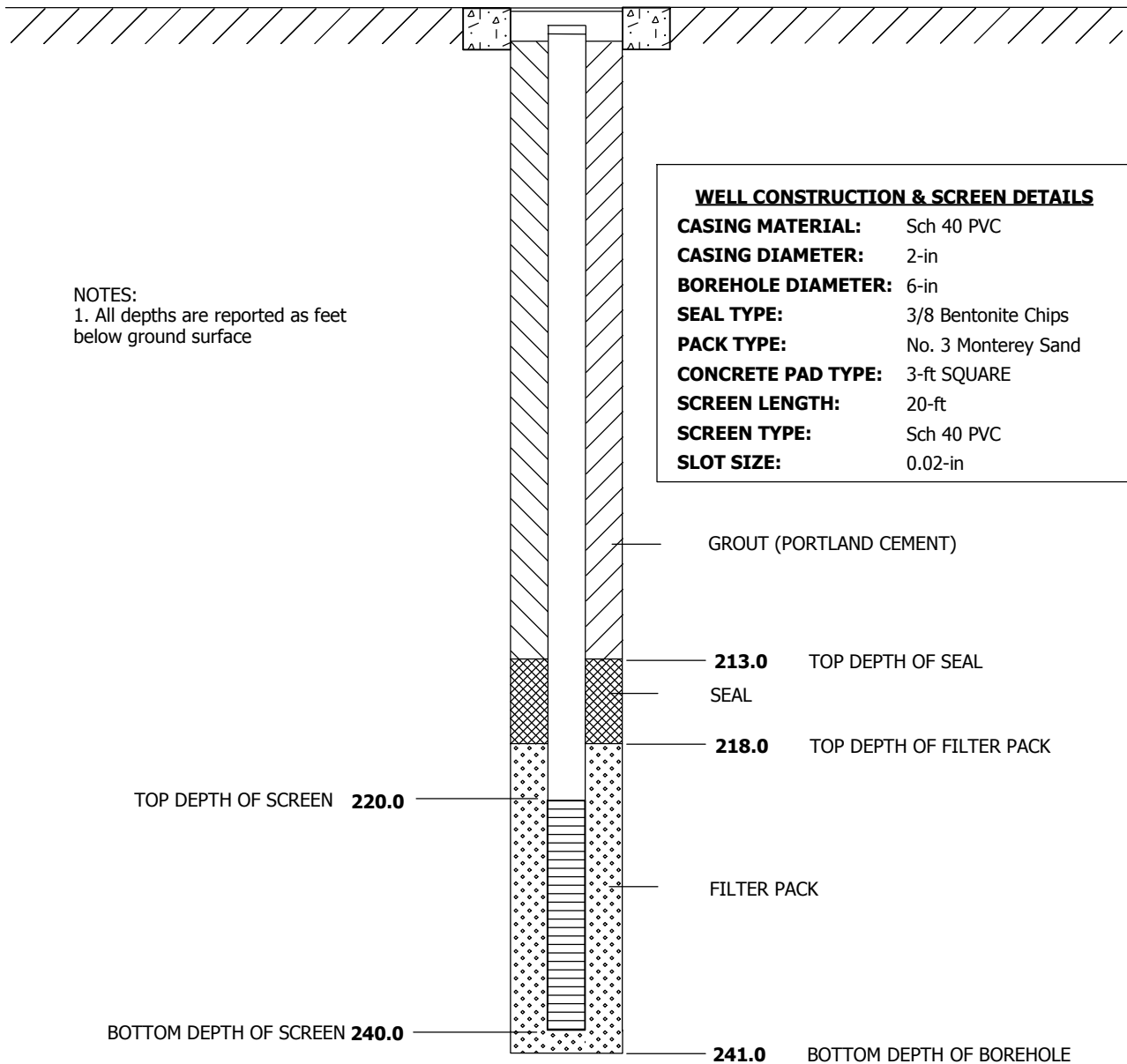


# WELL COMPLETION DIAGRAM

<b>PROJECT NO:</b> 417981.ER.02.FW	<b>PROJECT:</b> ER-TCS Groundwater Investigation	<b>WELL NO:</b> <i>MW-74-240</i>
<b>LOCATION:</b> Site J		
<b>DRILLING CONTRACTOR:</b> Boart Longyear (D. Osterberg)	<b>DRILLING START:</b> 10/7/2011	
<b>DRILLING METHOD:</b> Air Hammer/ Wireline Rotary Core/ Rotasonic	<b>DRILLING END:</b> 10/12/2011	
<b>LOGGER:</b> A. Brewster (Northstar)	<b>WELL COMPLETION DATE:</b> 10/12/2011	
<b>GROUND SURFACE ELEVATION (NAVD 88):</b> 672.9 ft AMSL	<b>GENERAL REMARKS:</b> Centralizers at 20, 40, 60, 80, 100, 120, 140, 160, 180, and 200 ft bgs.	
<b>NORTHING (CCS NAD 83 Z 5):</b> 2100017.52		

## 12-IN DIAMETER WELL VAULT (FLUSH WITH GRADE)



<b>WELL CONSTRUCTION &amp; SCREEN DETAILS</b>	
<b>CASING MATERIAL:</b>	Sch 40 PVC
<b>CASING DIAMETER:</b>	2-in
<b>BOREHOLE DIAMETER:</b>	6-in
<b>SEAL TYPE:</b>	3/8 Bentonite Chips
<b>PACK TYPE:</b>	No. 3 Monterey Sand
<b>CONCRETE PAD TYPE:</b>	3-ft SQUARE
<b>SCREEN LENGTH:</b>	20-ft
<b>SCREEN TYPE:</b>	Sch 40 PVC
<b>SLOT SIZE:</b>	0.02-in


**NOTES:**  
1. All depths are reported as feet below ground surface

WELL DIAGRAM IS NOT TO SCALE



PROJECT NUMBER: <b>417981.ER.02.FW</b>	BORING NUMBER: <b>BH-74</b>	SHEET 1 OF 12
<b>ROCK CORE LOG</b>		

PROJECT : PG&E Topock, ER-TCS Investigation      LOCATION : PG&E Topock, Site J (2100017.5 N, 7615237.7 E)  
 ELEVATION : 672.9 ft      DRILLING CONTRACTOR : Boart Longyear (D. Osterberg)  
 CORING EQUIPMENT AND METHOD : Sonic 0-19; Air Hammer 19-211; Wireline Rotary 211-240'      ORIENTATION : Vertical  
 WATER LEVELS : Approx. 213 ft BGS      START : 10/7/2011      END : 10/10/2011      LOGGER : A. Brewster (Northstar)

DEPTH BELOW SURFACE (ft)	CORE RUN LENGTH AND RECOVERY (%)	DISCONTINUITIES		SYMBOLIC LOG	LITHOLOGY	COMMENTS	
		R Q D (%)	FRACTURES PER FOOT				DESCRIPTION
							DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS
0.0					0.0-2.0' - Road Base	Drilled using sonic 9-inch x 6-inch to set surface conductor.	
					<b>Metadiorite</b> 0.0-2.0 Road Base' - dusky yellow green, (5GY 5/2), primarily quartz, feldspar, and amphiboles, presence of chlorite, calcite, and some iron and manganese staining on surfaces.		
5							
10	19 ft						
15							
19.0							
20						Switched to air hammer with 8-inch bit. Drill rate=1.09 FPM	





PROJECT NUMBER: <b>417981.ER.02.FW</b>	BORING NUMBER: <b>BH-74</b>	SHEET 3 OF 12
<b>ROCK CORE LOG</b>		

PROJECT : PG&E Topock, ER-TCS Investigation      LOCATION : PG&E Topock, Site J (2100017.5 N, 7615237.7 E)  
 ELEVATION : 672.9 ft      DRILLING CONTRACTOR : Boart Longyear (D. Osterberg)  
 CORING EQUIPMENT AND METHOD : Sonic 0-19; Air Hammer 19-211; Wireline Rotary 211-240'      ORIENTATION : Vertical  
 WATER LEVELS : Approx. 213 ft BGS      START : 10/7/2011      END : 10/10/2011      LOGGER : A. Brewster (Northstar)

DEPTH BELOW SURFACE (ft)	CORE RUN LENGTH AND RECOVERY (%)	DISCONTINUITIES		SYMBOLIC LOG	LITHOLOGY	COMMENTS	
		R Q D (%)	FRACTURES PER FOOT				DESCRIPTION
							DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS
41.0	10 ft				<b>Metadiorite</b> 0.0-240.0' - dusky yellow green, (5GY 5/2), primarily quartz, feldspar, and amphiboles, presence of chlorite, calcite, and some iron and manganese staining on surfaces.	Drill rate=1.11 FPM	
45							45' - Increase in K-feldspar content.
50	10 ft					Drill rate=1.67 FPM	
51.0							
55							
60							



PROJECT NUMBER: <b>417981.ER.02.FW</b>	BORING NUMBER: <b>BH-74</b>	SHEET 4 OF 12
<b>ROCK CORE LOG</b>		

PROJECT : PG&E Topock, ER-TCS Investigation      LOCATION : PG&E Topock, Site J (2100017.5 N, 7615237.7 E)  
 ELEVATION : 672.9 ft      DRILLING CONTRACTOR : Boart Longyear (D. Osterberg)  
 CORING EQUIPMENT AND METHOD : Sonic 0-19; Air Hammer 19-211; Wireline Rotary 211-240'      ORIENTATION : Vertical  
 WATER LEVELS : Approx. 213 ft BGS      START : 10/7/2011      END : 10/10/2011      LOGGER : A. Brewster (Northstar)

DEPTH BELOW SURFACE (ft)	CORE RUN LENGTH AND RECOVERY (%)	DISCONTINUITIES		SYMBOLIC LOG	LITHOLOGY	COMMENTS	
		R Q D (%)	FRACTURES PER FOOT				DESCRIPTION
							DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS
61.0	10 ft				<b>Metadiorite</b> 0.0-240.0' - dusky yellow green, (5GY 5/2), primarily quartz, feldspar, and amphiboles, presence of chlorite, calcite, and some iron and manganese staining on surfaces.	Drill rate=1.43 FPM	
65							
70	10 ft					Drill rate=2.0 FPM	
71.0							
75							
80							



PROJECT NUMBER: <b>417981.ER.02.FW</b>	BORING NUMBER: <b>BH-74</b>	SHEET 5 OF 12
<b>ROCK CORE LOG</b>		

PROJECT : PG&E Topock, ER-TCS Investigation      LOCATION : PG&E Topock, Site J (2100017.5 N, 7615237.7 E)  
 ELEVATION : 672.9 ft      DRILLING CONTRACTOR : Boart Longyear (D. Osterberg)  
 CORING EQUIPMENT AND METHOD : Sonic 0-19; Air Hammer 19-211; Wireline Rotary 211-240'      ORIENTATION : Vertical  
 WATER LEVELS : Approx. 213 ft BGS      START : 10/7/2011      END : 10/10/2011      LOGGER : A. Brewster (Northstar)

DEPTH BELOW SURFACE (ft)	CORE RUN LENGTH AND RECOVERY (%)	DISCONTINUITIES		SYMBOLIC LOG	LITHOLOGY	COMMENTS	
		R Q D (%)	FRACTURES PER FOOT				DESCRIPTION
							DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS
81.0	10 ft				<b>Metadiorite</b> 0.0-240.0' - dusky yellow green, (5GY 5/2), primarily quartz, feldspar, and amphiboles, presence of chlorite, calcite, and some iron and manganese staining on surfaces. 80.0-90.0' - Increase in K-feldspar content.	Drill rate=1.43 FPM	
91.0							
95	10 ft					Drill rate=1.67 FPM	
100							



PROJECT NUMBER: <b>417981.ER.02.FW</b>	BORING NUMBER: <b>BH-74</b>	SHEET 6 OF 12
<b>ROCK CORE LOG</b>		

PROJECT : PG&E Topock, ER-TCS Investigation      LOCATION : PG&E Topock, Site J (2100017.5 N, 7615237.7 E)  
 ELEVATION : 672.9 ft      DRILLING CONTRACTOR : Boart Longyear (D. Osterberg)  
 CORING EQUIPMENT AND METHOD : Sonic 0-19; Air Hammer 19-211; Wireline Rotary 211-240'      ORIENTATION : Vertical  
 WATER LEVELS : Approx. 213 ft BGS      START : 10/7/2011      END : 10/10/2011      LOGGER : A. Brewster (Northstar)

DEPTH BELOW SURFACE (ft)	CORE RUN LENGTH AND RECOVERY (%)	DISCONTINUITIES		SYMBOLIC LOG	LITHOLOGY	COMMENTS	
		R Q D (%)	FRACTURES PER FOOT				DESCRIPTION
							DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS
101.0	10 ft				<b>Metadiorite</b> 0.0-240.0' - dusky yellow green, (5GY 5/2), primarily quartz, feldspar, and amphiboles, presence of chlorite, calcite, and some iron and manganese staining on surfaces.	Drill rate=1.67 FPM	
105							
110	10 ft					Drill rate=2.50 FPM	
111.0							
115							
120							



PROJECT NUMBER: <b>417981.ER.02.FW</b>	BORING NUMBER: <b>BH-74</b>	SHEET 7 OF 12
<b>ROCK CORE LOG</b>		

PROJECT : PG&E Topock, ER-TCS Investigation      LOCATION : PG&E Topock, Site J (2100017.5 N, 7615237.7 E)  
 ELEVATION : 672.9 ft      DRILLING CONTRACTOR : Boart Longyear (D. Osterberg)  
 CORING EQUIPMENT AND METHOD : Sonic 0-19; Air Hammer 19-211; Wireline Rotary 211-240'      ORIENTATION : Vertical  
 WATER LEVELS : Approx. 213 ft BGS      START : 10/7/2011      END : 10/10/2011      LOGGER : A. Brewster (Northstar)

DEPTH BELOW SURFACE (ft)	CORE RUN LENGTH AND RECOVERY (%)	DISCONTINUITIES		SYMBOLIC LOG	LITHOLOGY	COMMENTS	
		R Q D (%)	FRACTURES PER FOOT				DESCRIPTION
							DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS
121.0	10 ft				<b>Metadiorite</b> 0.0-240.0' - dusky yellow green, (5GY 5/2), primarily quartz, feldspar, and amphiboles, presence of chlorite, calcite, and some iron and manganese staining on surfaces.	Drill rate=2.50 FPM	
125							
130	10 ft					Drill rate=2.00 FPM	
131.0							
135							
140							





PROJECT NUMBER: <b>417981.ER.02.FW</b>	BORING NUMBER: <b>BH-74</b>	SHEET 8 OF 12
<b>ROCK CORE LOG</b>		

PROJECT : PG&E Topock, ER-TCS Investigation      LOCATION : PG&E Topock, Site J (2100017.5 N, 7615237.7 E)  
 ELEVATION : 672.9 ft      DRILLING CONTRACTOR : Boart Longyear (D. Osterberg)  
 CORING EQUIPMENT AND METHOD : Sonic 0-19; Air Hammer 19-211; Wireline Rotary 211-240'      ORIENTATION : Vertical  
 WATER LEVELS : Approx. 213 ft BGS      START : 10/7/2011      END : 10/10/2011      LOGGER : A. Brewster (Northstar)

DEPTH BELOW SURFACE (ft)	CORE RUN LENGTH AND RECOVERY (%)	DISCONTINUITIES		SYMBOLIC LOG	LITHOLOGY	COMMENTS	
		R Q D (%)	FRACTURES PER FOOT				DESCRIPTION
							DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS
141.0	10 ft				<b>Metadiorite</b> 0.0-240.0' - dusky yellow green, (5GY 5/2), primarily quartz, feldspar, and amphiboles, presence of chlorite, calcite, and some iron and manganese staining on surfaces. 140.0-150.0' - Increase in average grain size.	Drill rate=2.00 FPM	
145							
150	10 ft					Drill rate=1.67 FPM	
151.0							
155							
160							



PROJECT NUMBER: <b>417981.ER.02.FW</b>	BORING NUMBER: <b>BH-74</b>	SHEET 9 OF 12
<b>ROCK CORE LOG</b>		

PROJECT : PG&E Topock, ER-TCS Investigation      LOCATION : PG&E Topock, Site J (2100017.5 N, 7615237.7 E)  
 ELEVATION : 672.9 ft      DRILLING CONTRACTOR : Boart Longyear (D. Osterberg)  
 CORING EQUIPMENT AND METHOD : Sonic 0-19; Air Hammer 19-211; Wireline Rotary 211-240'      ORIENTATION : Vertical  
 WATER LEVELS : Approx. 213 ft BGS      START : 10/7/2011      END : 10/10/2011      LOGGER : A. Brewster (Northstar)

DEPTH BELOW SURFACE (ft)	CORE RUN LENGTH AND RECOVERY (%)	DISCONTINUITIES		SYMBOLIC LOG	LITHOLOGY	COMMENTS	
		R Q D (%)	FRACTURES PER FOOT				DESCRIPTION
							DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS
161.0	10 ft				<b>Metadiorite</b> 0.0-240.0' - dusky yellow green, (5GY 5/2), primarily quartz, feldspar, and amphiboles, presence of chlorite, calcite, and some iron and manganese staining on surfaces.	Drill rate=1.43 FPM	
165							
170	10 ft					Drill rate=1.0 FPM	
171.0							
175							
180							



PROJECT NUMBER: <b>417981.ER.02.FW</b>	BORING NUMBER: <b>BH-74</b>	SHEET 10 OF 12
<b>ROCK CORE LOG</b>		

PROJECT : PG&E Topock, ER-TCS Investigation      LOCATION : PG&E Topock, Site J (2100017.5 N, 7615237.7 E)  
 ELEVATION : 672.9 ft      DRILLING CONTRACTOR : Boart Longyear (D. Osterberg)  
 CORING EQUIPMENT AND METHOD : Sonic 0-19; Air Hammer 19-211; Wireline Rotary 211-240'      ORIENTATION : Vertical  
 WATER LEVELS : Approx. 213 ft BGS      START : 10/7/2011      END : 10/10/2011      LOGGER : A. Brewster (Northstar)

DEPTH BELOW SURFACE (ft)	CORE RUN LENGTH AND RECOVERY (%)	DISCONTINUITIES		SYMBOLIC LOG	LITHOLOGY	COMMENTS	
		R Q D (%)	FRACTURES PER FOOT				DESCRIPTION
							DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS
181.0					<b>Metadiorite</b> 0.0-240.0' - dusky yellow green, (5GY 5/2), primarily quartz, feldspar, and amphiboles, presence of chlorite, calcite, and some iron and manganese staining on surfaces.	Drill rate=1.25 FPM	
185	10 ft						
190						Drill rate=0.71 FPM	
191.0	10 ft						
195							
200							



PROJECT NUMBER: <b>417981.ER.02.FW</b>	BORING NUMBER: <b>BH-74</b>	SHEET 11 OF 12
<b>ROCK CORE LOG</b>		

PROJECT : PG&E Topock, ER-TCS Investigation      LOCATION : PG&E Topock, Site J (2100017.5 N, 7615237.7 E)  
 ELEVATION : 672.9 ft      DRILLING CONTRACTOR : Boart Longyear (D. Osterberg)  
 CORING EQUIPMENT AND METHOD : Sonic 0-19; Air Hammer 19-211; Wireline Rotary 211-240'      ORIENTATION : Vertical  
 WATER LEVELS : Approx. 213 ft BGS      START : 10/7/2011      END : 10/10/2011      LOGGER : A. Brewster (Northstar)

DEPTH BELOW SURFACE (ft)	CORE RUN LENGTH AND RECOVERY (%)	DISCONTINUITIES			SYMBOLIC LOG	LITHOLOGY	COMMENTS			
		R Q D (%)	FRACTURES PER FOOT	DESCRIPTION						
				DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS						
201.0	10 ft	80	0	213.6, 214.0, 215.2' - Joint (3), 30,30, and 40 deg, rough and stepped for 213.6 and 215.2, planar for 214.0, <1mm in all calcite infilling, iron staining on 214.0, tight.	<b>Metadiorite</b> 0.0-240.0' - dusky yellow green, (5GY 5/2), primarily quartz, feldspar, and amphiboles, presence of chlorite, calcite, and some iron and manganese staining on surfaces.	Drill rate=1.25 FPM				
205										
210										
211.0							0	215.8-218.0' - Highly fractured, calcite infill (<2mm), iron stained.	211.0-240.0' - Rock is strong, slightly weathered, massive	Switched to wireline rotary with HQ-sized bit. Run 1=0.30 FPM
215							0			
217.0							2	216.7' - Chalky, fine-grained white sediment, greasy when wet.	214.4-214.7' - Foliated.	Run 2=0.25 FPM
218.0							0			
219.0							1	218.1, 218.3, 218.6, 219.1, 219.2' - Joint (6), 70, 30, 30, 30, 40, and 30 deg, rough, undulating to stepped, <1mm calcite infilling, iron staining, narrow.	219.3-219.4' - Foliated.	
220							>10			
							Run 1 6 ft 100%	54	3	
	Run 2 3.5 ft 100%	54	3							



PROJECT NUMBER: <b>417981.ER.02.FW</b>	BORING NUMBER: <b>BH-74</b>	SHEET 12 OF 12
<b>ROCK CORE LOG</b>		

PROJECT : PG&E Topock, ER-TCS Investigation      LOCATION : PG&E Topock, Site J (2100017.5 N, 7615237.7 E)  
 ELEVATION : 672.9 ft      DRILLING CONTRACTOR : Boart Longyear (D. Osterberg)  
 CORING EQUIPMENT AND METHOD : Sonic 0-19; Air Hammer 19-211; Wireline Rotary 211-240'      ORIENTATION : Vertical  
 WATER LEVELS : Approx. 213 ft BGS      START : 10/7/2011      END : 10/10/2011      LOGGER : A. Brewster (Northstar)

DEPTH BELOW SURFACE (ft)	CORE RUN LENGTH AND RECOVERY (%)	DISCONTINUITIES		SYMBOLIC LOG	LITHOLOGY	COMMENTS
		RQD (%)	DESCRIPTION			
220.5	Run 3 5.1 ft 100%	0	222.2, 222.7, 222.8' - Joint (3), 40, 60, and 50 deg, rough, undulating, <1mm calcite infilling, manganese and iron staining, narrow.  224.6, 224.7' - Joint, 50 deg and 50 deg, rough, stepped, <1mm calcite infilling, iron staining, narrow. 225.2-230.7' - Highly fractured, calcite infill (<2mm), iron and manganese staining.	[Symbolic Log Pattern]	<b>Metadiorite</b> 0.0-240.0' - dusky yellow green, (5GY 5/2), primarily quartz, feldspar, and amphiboles, presence of chlorite, calcite, and some iron and manganese staining on surfaces. 222.0-225.0' - Foliated.	Run 3=0.32 FPM
225		0				
225.6		3				
		0				
		2				
	Run 4 4.9 ft 100%	>10	231.4' - Joint, 50 deg, rough, undulating, <1mm calcite infilling, no staining, tight. 231.9-234.7' - Highly fractured, no infill, iron stained and heavily manganese stained.	[Symbolic Log Pattern]	225.6-228.3' - Increase in proportion of sodium feldspar.	Run 4=0.27 FPM
		>10				
		>10				
		>10				
		>10				
230	Run 5 4.2 ft 100%	>10	235.6, 235.8, 236.5' - Joint (3), 70, 20, and 60 deg, rough, undulating, <1mm calcite infilling, very little iron staining, heavy manganese staining, tight. 237.2-238.5' - Highly fractured, iron staining, some calcite infill.	[Symbolic Log Pattern]	234.7-236.2' - Foliated.	Run 5=0.20 FPM
		1				
		>10				
		>10				
		>10				
235	Run 6 5.3 ft 100%	>10		[Symbolic Log Pattern]		Run 6=0.28 FPM
		2				
		1				
		>10				
		>10				
240	240.0	0				
End Drilling on 10/10/2011 Total Borehole Depth: 240.0 ft bgs						This borehole was converted into the following monitoring well(s): MW-74-240