

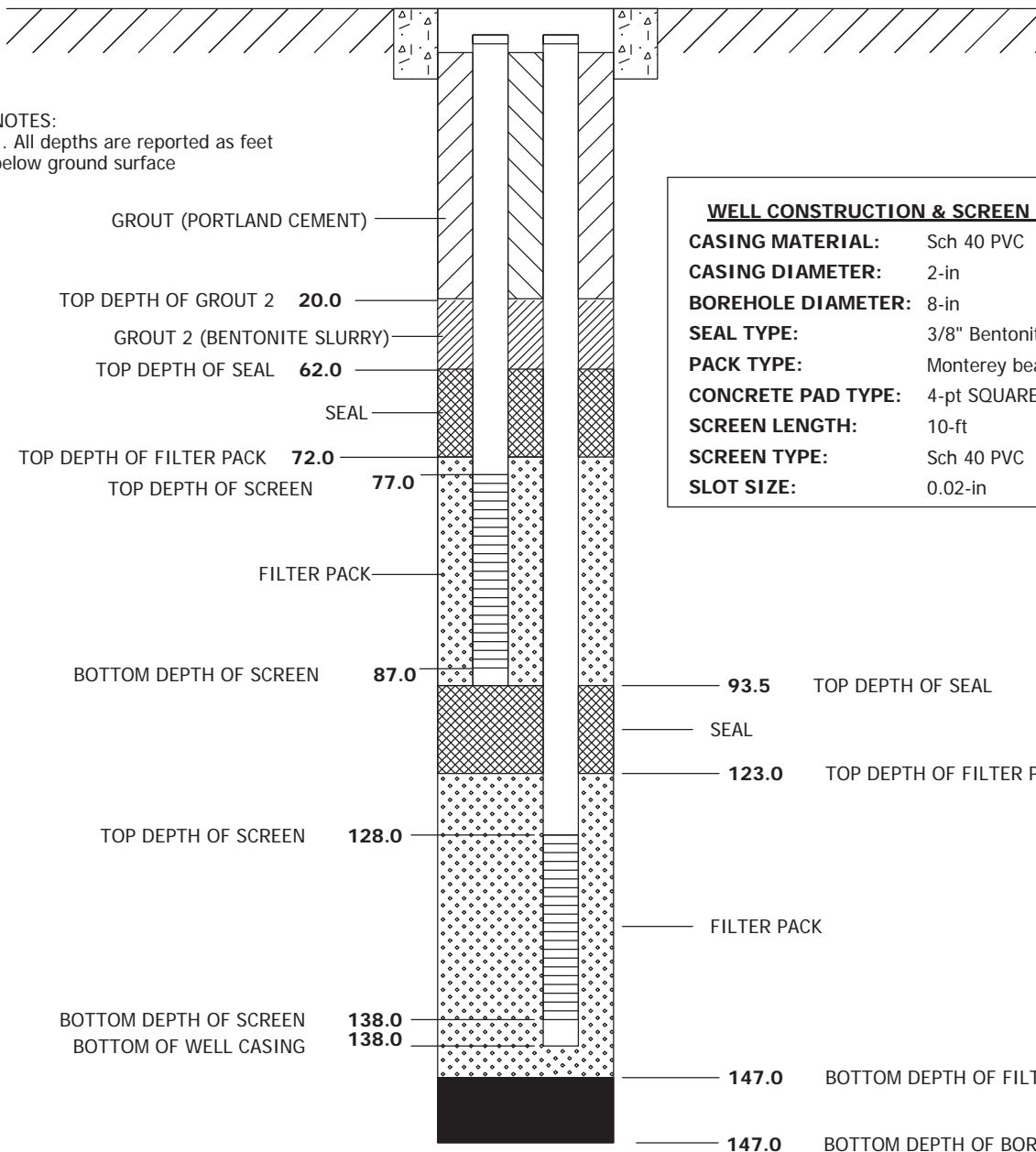
# WELL COMPLETION DIAGRAM

MW-54-85 and

<b>PROJECT NO:</b> 354948.FP.07.FW	<b>PROJECT:</b> Topock AZ Drilling	<b>WELL NO:</b> <i>MW-54-140</i>
<b>LOCATION:</b> Site 1		
<b>DRILLING CONTRACTOR:</b> Boart-Longyear	<b>DRILLING START:</b> 3/12/2008 08:10	
<b>DRILLING METHOD:</b> Rotosonic	<b>DRILLING END:</b> 3/28/2008 17:30	
<b>LOGGER:</b> A. Brewster	<b>WELL COMPLETION DATE:</b> 3/27/2008	
<b>GROUND SURFACE ELEVATION (NAVD 88):</b> 466.76	<b>GENERAL REMARKS:</b> MW-54-85 shown as nested well.	

## LOCKING FLUSH COMPLETION

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



<u>WELL CONSTRUCTION &amp; SCREEN DETAILS</u>	
<b>CASING MATERIAL:</b>	Sch 40 PVC
<b>CASING DIAMETER:</b>	2-in
<b>BOREHOLE DIAMETER:</b>	8-in
<b>SEAL TYPE:</b>	3/8" Bentonite Pellets
<b>PACK TYPE:</b>	Monterey beach sand # 3
<b>CONCRETE PAD TYPE:</b>	4-pt SQUARE
<b>SCREEN LENGTH:</b>	10-ft
<b>SCREEN TYPE:</b>	Sch 40 PVC
<b>SLOT SIZE:</b>	0.02-in

WELL DIAGRAM IS NOT TO SCALE

**SOIL BORING LOG**

PROJECT NAME: Topock AZ Drilling		HOLE DEPTH (ft): 237.0	DRILLING CONTRACTOR: Boart-Longyear (Dale Osteberg)	
SURFACE ELEVATION (NAVD88): 466.8 ft. MSL	NORTHING (CCS NAD 83 Z 5): 2,102,951.91	EASTING (CCS NAD 83 Z 5): 7,617,089.25	DATE STARTED: 3/12/2008	DATE COMPLETED: 3/18/2008
DRILLING METHOD: Rotosonic - continuous core			DRILLING EQUIPMENT: 6" core barrel, 8" casing	
LOCATION: Site 1			LOGGED BY: A. Brewster	

DEPTH BGS (feet)	SAMPLE				USCS CODE	SOIL DESCRIPTION  SOIL NAME, USCS SYMBOL, COLOR, PERCENT COMPOSITION, GRADING, GRAIN SHAPE, MINERALOGY, DENSITY/CONSISTENCY, STRUCTURE, MOISTURE.	COMMENTS  DRILLING OBSERVATIONS AND OPERATIONS, DAILY START AND END TIMES, DRILL RATE, REFUSALS, SAMPLING AND TESTING NOTES.
	INTERVAL	RECOVERY (ft)	ISOFLOW SAMPLE	SOIL SAMPLE			
5						<p><b>POORLY GRADED SAND (SP)</b> - Pale brn (10YR 6/3), 95% subang to subrd fn sand, 5% fines, poorly graded, predominantly qtz-based, loose, moist.</p>	<p>Soil descriptions based on observation of continuous Rotosonic core. See list of abbreviations at end of log. This log is from the deepest of two borings drilled at Site 1. Monitoring Well MW-54-195 was installed in the deeper boring and nested wells MW-54-85 and MW-54-140 were installed in the shallower boring.</p>
10		10					
15				CS	SP	- SP AS ABOVE: It yellowish brn (10YR 6/4)	Collect soil sample MW54-CS-15-17
20		10				- SP AS ABOVE: brn (10YR 5/3), sporadic gravel (max clast size = 3 cm); average grain size is larger but still predominantly fine-grained, sand predominantly qtz-based with minor presence of micas and feldspars.	Collect soil sample MW54-CS-25-27
25				CS			
30			MW54-GGW-01			- SP AS ABOVE: dk greyish brn (10YR 4/2)	<p>Isoflow #1: 27-37' bgs Water used to drill: 150 gallons Sample ID: MW54-GGW-01</p>
35		10					

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DRILLING METHOD: Rotasonic - continuous core			DRILLING EQUIPMENT: 6" core barrel, 8" casing	
LOCATION: Site 1			LOGGED BY: A. Brewster	

DEPTH BGS (feet)	SAMPLE				USCS CODE	SOIL DESCRIPTION	COMMENTS
	INTERVAL	RECOVERY (ft)	ISOFLOW SAMPLE	SOIL SAMPLE			
40		10	MW54-GGW-02	CS	SM	<p><b>SILTY SAND (SM)</b> - Yellowish brn (10YR 5/4), 85% subang to subrnd fn sand, 15% fines, poorly graded, sand is predominantly qtz-based with trace feldspar, loose, wet.</p> <p>- SM AS ABOVE: brn (10YR 4/3); 80% subang-subrnd fn sand, 20% fines, poorly graded, predominately quartz w/ trace feldspar, loose to med density, wet.</p> <p>- (at 52.5' bgs) SM AS ABOVE: increase in grain size in accordance with a fining-upwards sequence.</p>	<p>Collect soil sample MW54-CS-35-37</p> <p>Isoflow #2: 37-47' bgs Water used to drill 37-47': 150 gallons Sample ID: MW54-GGW-02</p>
45				CS			Collect soil sample MW54-CS-45-47
50		10					
55				CS	SW	<p><b>WELL GRADED SAND (SW)</b>- Yellowish brn (10YR 5/4), 5% gravel (up to 1 cm), 95% subrnd sand, well graded, predominantly qtz, 5% feldspars and 5% micas, loose, fining upwards, wet.</p>	Collect soil sample MW54-CS-55-57
60				CS	SP	<p><b>POORLY GRADED SAND (SP)</b> - Brn (10YR 5/3), 95% fn sand, 5% fines, poorly graded, subrnd to subang, predominantly qtz with trace feldspars and micas, loose to med density, no apparent structure, wet.</p>	<p>Isoflow #3: 57-67' bgs Water used to drill 47 - 67' bgs: 300 gallons Sample ID: MW54-GGW-03</p>
65		10	MW54-GGW-03		GW	<p><b>WELL GRADED GRAVEL (GW)</b> - Dk yellowish brn (10YR 4/4), 95% rnd-subrnd gravel (up to 11 cm), 5% fn sand, no fines, well graded, no dominant mineral type, loose, no apparent structure, sharp contact with SP sand at 59.75' bgs, wet.</p>	
70				CS	SW/GP	<p><b>WELL GRADED SAND with GRAVEL (SW/GP)</b> - Lt yellowish brn (2.5YR 6/3), 8% gravel (up to 3 cm), 90% rnd-subrnd sand, well graded, no dominant mineral type, loose, no apparent structure, wet.</p>	Collect soil sample MW54-CS-65-67
				CS	SP	<p><b>POORLY GRADED SAND (SP)</b> - Lt olive brn (2.5YR 5/3), 95% subrnd fn-med sand, 5% fines, poorly graded, predominantly qtz, loose, no apparent structure, wet.</p>	
					GW	<p><b>WELL GRADED GRAVEL (GW)</b> - Dk yellowish brn (10YR 4/4), 95% rnd-subrnd gravel (up to 7 cm), 5% fn sand, no fines, well graded, no dominant mineral type, loose, no structure, wet.</p>	

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<b>SURFACE ELEVATION (NAVD88):</b> 466.8 ft. MSL	<b>NORTHING (CCS NAD 83 Z 5):</b> 2,102,951.91	<b>EASTING (CCS NAD 83 Z 5):</b> 7,617,089.25	<b>DATE STARTED:</b> 3/12/2008	<b>DATE COMPLETED:</b> 3/18/2008
<b>DRILLING METHOD:</b> Rotasonic - continuous core			<b>DRILLING EQUIPMENT:</b> 6" core barrel, 8" casing	
<b>LOCATION:</b> Site 1			<b>LOGGED BY:</b> A. Brewster	

DEPTH BGS (feet)	SAMPLE				USCS CODE	SOIL DESCRIPTION	COMMENTS
	INTERVAL	RECOVERY (ft)	ISOFLOW SAMPLE	SOIL SAMPLE			
75		10			SP	<b>POORLY GRADED SAND with trace GRAVEL (SP)</b> - Pale brn (10YR 6/3) 3% gravel (up to 2 cm), 95% subrnd fn sand, 2% fines, poorly graded, predominantly qtz with trace feldspars and micas, loose, no structure, wet.	Collect soil sample MW54-CS-75-77
80		10	MW54-GGW-04		SP	- 2" clay lens encountered; trace silt content.	Isoflow #4: 77-87' bgs Water used to drill 67-87' bgs: 300 gallons Sample ID: MW54-GGW-04
85					SP		Collect soil sample MW54-CS-85-87
90		10	MW54-GGW-05		SP	<b>POORLY GRADED SAND (SP)</b> - Brn (10YR 5/3), 95% subang-subrnd fn sand, 5% fines, poorly graded, predominantly qtz, loose, no structure, wet.	Isoflow #5: 87-97' bgs. Water used to drill 87-97' bgs: 350 gallons Sample ID: MW54-GGW-05 Formation tougher to drill.
95					GW	<b>WELL GRADED GRAVEL (GW)</b> - Dk yellowish brn (10YR 4/4), 95% ang-subang gravel (up to 15 cm), 5% fn sand, well graded, no dominant mineral type, loose, no structure, wet.	Cobbles encountered at 95' bgs. Collect soil sample MW54-CS-95-97
100		10	MW54-GGW-06		GW	<b>COBBLES AND BOULDERS:</b> Color N/A, 100% ang-rnd gravel, poorly graded, clast supported, largest clast unknown (cored through boulders), various mineralogy (basalt, granite, shocked qtz, feldspars)	Isoflow #6: 97-107' bgs Water used to drill 97-107' bgs: 400 gallons Sample ID: MW54-GGW-06 Drilling continues to be difficult. 97-107' bgs interval very tough drilling; boulders recovered Presence of carbide bits in samples.

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DRILLING METHOD: Rotasonic - continuous core			DRILLING EQUIPMENT: 6" core barrel, 8" casing	
LOCATION: Site 1			LOGGED BY: A. Brewster	

DEPTH BGS (feet)	SAMPLE				USCS CODE	SOIL DESCRIPTION	COMMENTS
	INTERVAL	RECOVERY (ft)	ISOFLOW SAMPLE	SOIL SAMPLE			
110		10	MW54-GGW-07		--	<b>COBBLES AND BOULDERS:</b> Color N/A, 100% ang-rnd gravel, poorly graded, clast supported, largest clast unknown (cored through boulders), various mineralogy (basalt, granite, shocked qtz, feldspars)	Isoflow #7: 107-117' bgs Water used to drill 107-117' bgs: 500 gallons Sample ID: MW54-GGW-07
115				CS	GC	<b>POORLY GRADED GRAVEL with CLAY (GC/CH)</b> - Dk greyish brn (2.5Y 4/2), 50% subrnd-subang gravel (up to 10 cm), 10% fn sand, 40% soft clay, poorly graded, no dominant mineralogy, no apparent structure, wet.	Collect soil sample MW54-CS-115-117
120					GP	<b>POORLY GRADED GRAVEL with SAND (GP)</b> - Brn (10YR 5/3), 50% subang-subrnd gravel (up to 10 cm), 40% med sand, 10% fines, poorly graded, no structure, matrix supported, predominantly qtz, loose, wet.	
125					GW	<b>WELL GRADED GRAVEL (GW)</b> - Color N/A, 95% subrnd gravel (> 6 in), 5% fn sand, no fines, well graded, mostly igneous rocks present, loose, no structure, wet.	
130		20		CS	CH	<b>CLAY (CH)</b> - Brn (10YR 4/3), 100% medium stiff clay, finely laminated, wet.	Collect soil sample MW54-CS-125-127
135			MW54-GGW-08		SP	<b>POORLY GRADED SAND with trace GRAVEL (SP)</b> - Brn (10YR 4/3), 1% gravel (up to 5 cm), 96% subang med sand, 3% fines, poorly graded, predominantly qtz, trace feldspars and micas, loose, no structure, wet.	Isoflow #8: 127-137' bgs Water used to drill 117-137' bgs: 500 gallons Sample ID: MW54-GGW-08
140				CS	CH	<b>CLAY (CH)</b> - Brn (10YR 4/3), 100% medium stiff clay, finely laminated, wet.	Collect soil sample MW54-CS-135-137
					GP	<b>POORLY GRADED GRAVEL with SAND (GP)</b> - Color N/A, 50% subang-subrnd gravel (up to 8 cm), 30% fn sand, 20% fines, poorly graded, no dominant mineralogy, loose, clast supported, wet.	

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DRILLING METHOD: Rotosonic - continuous core			DRILLING EQUIPMENT: 6" core barrel, 8" casing	
LOCATION: Site 1			LOGGED BY: A. Brewster	

DEPTH BGS (feet)	SAMPLE				USCS CODE	SOIL DESCRIPTION	COMMENTS
	INTERVAL	RECOVERY (ft)	ISOFLOW SAMPLE	SOIL SAMPLE			
145						<p><b>WELL GRADED SAND (SW)</b> - Reddish brn (5YR 4/3), 5% gravel (up to 2 cm), 90% subang sand, 5% fines, well graded, moderate density, no dominant mineral type, no apparent structure, wet. Intermittent intervals of sand and clay concentrated zones.</p>	<p>Drilling more difficult.</p> <p>Collect soil sample MW54-CS-145-147</p> <p>Isoflow #9: 147-157' bgs Water used to drill 137-157' bgs: 600 gallons Sample ID: MW54-GGW-09 Drilling is easier</p>
150		20	MW54-GGW-09	CS			
155						<p>Collect soil sample MW54-CS-155-157</p>	
160				CS			
165					SW	<p>Collect soil sample MW54-CS-165-167</p> <p>Isoflow #10: 167-177' bgs Water used to drill 157-177' bgs: 1,000 gallons Sample ID: MW54-GGW-10</p>	
170		20	MW54-GGW-10	CS			
175							

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DRILLING METHOD: Rotosonic - continuous core			DRILLING EQUIPMENT: 6" core barrel, 8" casing	
LOCATION: Site 1			LOGGED BY: A. Brewster	

DEPTH BGS (feet)	SAMPLE				USCS CODE	SOIL DESCRIPTION	COMMENTS
	INTERVAL	RECOVERY (ft)	ISOFLOW SAMPLE	SOIL SAMPLE			
180				CS		<b>WELL GRADED SAND (SW)</b> - Reddish brn (5YR 4/3), 5% gravel (up to 2 cm), 90% subang sand, 5% fines, well graded, moderate density, no dominant mineral type, no apparent structure, wet. Intermittent intervals of sand and clay concentrated zones.	Collect soil sample MW54-CS-175-177
185				CS		- lens of lt green clay at 179.5' bgs	Drilling is difficult in this zone.
190		20	MW54-GGW-11			- SW AS ABOVE: reddish brn (2.5YR 4/4)	Collect soil sample MW54-CS-185-187  Isoflow #11: 187-197' bgs Water used to drill 177-197' bgs: 800 gallons Sample ID: MW54-GGW-11
195				CS		<b>SILT (ML)</b> - Dk reddish brn (5YR 3/4), 1% gravel, 4% subang sand, 95% silt, poorly graded, no dominant mineral type, moderate to hard density, no apparent structure, moist.	Collect soil sample MW54-CS-195-197
200							
205				CS		- 205 to 207' bgs sections are dry and powdered, indicative of consolidated material broken apart by drilling.	Increased rig chatter at 205' bgs. Collect soil sample MW54-CS-205-207
210		20				- more partially consolidated material, moist	Isoflow #12: 207-217' bgs Water used to drill 197-217' bgs: 250 gallons Sample ID: MW54-GGW-12

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DRILLING METHOD: Rotosonic - continuous core			DRILLING EQUIPMENT: 6" core barrel, 8" casing	
LOCATION: Site 1			LOGGED BY: A. Brewster	

DEPTH BGS (feet)	SAMPLE				USCS CODE	SOIL DESCRIPTION	COMMENTS
	INTERVAL	RECOVERY (ft)	ISOFLOW SAMPLE	SOIL SAMPLE			
215			MW54-GGW-12		ML	<p><b>SILT (ML)</b> - Dk reddish brn (5YR 3/4), 1% gravel, 4% subang sand, 95% silt, poorly graded, no dominant mineral type, moderate to hard density, no apparent structure, moist.</p> <p>- minor decomposed rock to clay. Matrix supported. Maximum gravel = 3.5 cm. Gravel is subangular to angular.</p> <p>- appearance of Miocene conglomerate cobble (max dia = 11 cm), matrix supported.</p>	<p>Collect soil sample MW54-CS-215-217</p>
220				CS			
225		20			CS	<p>Drill rate 217-227' bgs = 4 minutes.</p> <p>Collect soil sample MW54-CS-225-227</p> <p>Isoflow #13: 227-237' bgs</p> <p>Water used to drill: 300 gallons</p> <p>Sample ID: MW54-GGW-13</p>	<p>Drill rate 217-227' bgs = 4 minutes.</p> <p>Collect soil sample MW54-CS-225-227</p> <p>Isoflow #13: 227-237' bgs</p> <p>Water used to drill: 300 gallons</p> <p>Sample ID: MW54-GGW-13</p>
230			MW54-GGW-13	CS			
235					BR	<p><b>MIOCENE CONGLOMERATE (BR)</b> - Reddish brn (2.5YR 4/4), subang-ang, clast composition predominantly metamorphic, consolidated, clast supported, dry. Max clast size = 8 cm.</p>	<p>Collect soil sample MW54-CS-230-232</p> <p>Drill rate 227-232' bgs = 15 minutes</p>
Boring Terminated at 237 ft							
<p><b>ABBREVIATIONS</b></p> <p>cc = continuous core run</p> <p>brn = brown</p> <p>lt = light</p> <p>dk = dark</p> <p>vf = very fine-grained</p> <p>fn = fine-grained</p> <p>med = medium-grained</p> <p>cse = coarse-grained</p>							



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	INTERVAL	RECOVERY (ft)	ISOFLOW SAMPLE	SOIL SAMPLE			
						<i>vc = very coarse-grained</i> <i>ang = angular</i> <i>subang = subangular</i> <i>subrnd = subrounded</i> <i>rnd = rounded</i> <i>br = bedrock formation</i> <i>ss = sandstone</i> <i>conglom = conglomerate</i> <i>comptd = compacted</i> <i>qtz = quartz</i>	