

**BROWN AND
 CALDWELL**

Date: March 2008

Atlantic Richfield
 Company

Project: 134557

**Well B/W-18D
 Construction Details**

Brown and Caldwell

Carson City, Nevada

BORING LOG

Project Name: Yerington Second Step Hydrogeologic Framework Assessment

Project Number: 132025

Soil Boring: Monitoring Well: Piezometer:

Boring/Well Number: B/W-18D

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Boring Location: Located 1/4 mile North on Sunset Hills Road Junction and 1/8 west.		Northing:	Easting:
Drilling Contractor: Boart Longyear	Driller: R. Salois	Top of PVC Elevation: feet amsl	
Drilling Equipment: GP24-300RS	Borehole Diameter: 6-inches	Ground Surface Elevation: feet amsl	
Drilling Method: Sonic	Drilling Fluid: Water	Date Started: 11/27/07	Date Finished: 12/15/07
Sampling Method: Core Barrel		Completed Depth: 245 fbgs	Water Depth: fbmp
Well Seal: Bentonite and Cement		WELL CONSTRUCTION	
Logged By: C. Strauss		Type and Diameter of Well Casing: 2-inch Schedule 80 PVC	
		Slot Size: 0.010 inch	Filter Material: #10-20 Silica Sand

Depth (ft)	Elevation (ft)	USCS Group Symbol	Material Description	Sample Name	Sample Location	Lithology	Well Construction	Remarks
5		SM	Silty Sand (0 - 5.5) Dry, loose, no odor. Primarily medium to fine sand with ~5% coarse sand to 5 mm and ~15% silt and clay. The sand is subangular to subrounded. The fines are nonplastic to low plasticity and toughness, and do not react to HCl.					Description of drilled cuttings based on ASTM Method D-2488 (the visual-manual procedure), grain-size determinations and nomenclature based on the Unified Soil Classification System. Horizontal Survey data is expressed in the Nevada State Plane system, Nevada West zone, in feet. Sharp contacts indicated by solid lines, gradational contacts indicated by dashed line. All depths are below land surface unless stated otherwise. WELL DESIGN for B/W-18D: PVC Stickup: feet. Cement - Bentonite Grout: 0 - 145.5 feet Bentonite Chips: 145.5 - 149.5 feet No. 60 Silica Sand: 149.5 - 151 feet #10-20 Silica Sand Filter Pack: 151 - 177 feet 2-inch Nominal Schedule 80 PVC 0.010 Slotted Screen: 154.75 - 174.75 feet Native Collapse: 206 - 245 feet Additional Bentonite Fill: 177 - 206 feet Number of wells at this location: 3 Screen intervals for paired wells are labeled at the installed depths.
		SC	Lean Clay with Sand (5.5 - 12) Dry, dense, no odor. Primarily medium to fine sand with ~5% coarse sand to 5 mm with ~30% silt and clay. The sand is subangular to subrounded. The fines have low to medium plasticity and toughness, and do not react to HCl.					
		SP	Poorly Graded Sand (12 - 16) Dry to moist, loose, no odor. Primarily medium to fine sand with a maximum grain size of 2 mm and ~10% silt and clay. The sand is subangular to subrounded. The fines are nonplastic, and do not react to HCl.					

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Depth (ft)	Elevation (ft)	USCS Group Symbol	Material Description	Sample Name	Sample Location	Lithology	Well Construction	Remarks
								← B/W-18S screened from 15 - 40 feet.
		CL	<p>Lean Clay with Sand (16 - 18) Dry to moist, very dense, no odor. Primarily medium to fine sand with maximum grain size 1mm with ~40% silt and clay. The sand is subangular to subrounded. The fines have moderate to high plasticity, is very tough, and do not react to HCl.</p>			[Hatched pattern]	[Hatched pattern]	
20		SM	<p>Silty Sand (18 - 21) Moist, dense, no odor. Primarily medium to fine sand with ~5% coarse sand to 3mm and ~ 30% fine silt and clay. The sand is subangular to subrounded. The fines have low to medium plasticity and toughness, and do not react to HCl.</p>			[Dotted pattern]	[Hatched pattern]	
		SM	<p>Silty Sand (21 - 22) Moist, dense, no odor. Primarily medium to fine sand with ~5% coarse grain sand to 5mm with ~20% silt and clay. The sand is subangular to subrounded. The fines are nonplastic to low plasticity, is very tough, and do not react to HCl.</p>			[Dotted pattern]	[Hatched pattern]	
25		SM	<p>Silty Sand (22 - 28) Moist, dense, no odor. Primarily medium to fine sand with ~10% coarse grain sand to 2mm with ~25% silt and clay. The sand is subangular to subrounded. The fines have low plasticity and toughness, and do not react to HCl.</p>			[Dotted pattern]	[Hatched pattern]	
		SM	<p>Silty Sand (28 - 30) Moist to saturated, dense, no odor. Primarily medium to fine sand with ~10% coarse grain sand to 5mm with ~20% silt and clay. The sand is subangular to subrounded. The fines are nonplastic to low plasticity and toughness, and do not react to HCl.</p>			[Dotted pattern]	[Hatched pattern]	
30		SP	<p>Poorly Graded Sand (30 - 32.5) Moist to saturated, dense, no odor. Primarily medium to fine sand with ~10% coarse grain sand to 5mm with ~15% silt and clay. The sand is subangular to subrounded. The fines are nonplastic, and do not react to HCl.</p>			[Dotted pattern]	[Hatched pattern]	
		SM	<p>Silty Sand (32.5 - 35) Dry to moist, very dense, no odor. Primarily medium to fine sand with ~15% coarse grain sand to 5mm with ~30% silt and clay. The sand is angular to subangular. The fines are nonplastic to low plasticity and</p>			[Dotted pattern]	[Hatched pattern]	

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Project Name: Yerington Second Step Hydrogeologic Framework Assessment

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Soil Boring: Monitoring Well: Piezometer:

Boring/Well Number: BW-18D

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Depth (ft)	Elevation (ft)	USCS Group Symbol	Material Description	Sample Name	Sample Location	Lithology	Well Construction	Remarks
35			toughness, and do not react to HCl.					
		SM	Silty Sand (35 - 36.5) Moist to saturated, dense, no odor. Primarily medium to fine sand with ~10% coarse grain sand to 5mm with ~20% silt and clay. The sand is angular to subangular. The fines are nonplastic, and do not react to HCl.					
		CL	Sandy Lean Clay (36.5 - 49) Dry, very dense, no odor. Primarily silt and clay with ~40% medium to fine sand with maximum grain size of 1mm. The sand is angular to subangular. The fines have moderate to high plasticity, is very tough, and do not react to HCl.					
50		SP	Poorly Graded Sand (49 - 57) Saturated, dense, no odor. Primarily medium to fine sand with ~10% gravel to 35mm, ~20% coarse grain sand and ~15% silt and clay. The sand is subangular to subrounded. The fines are nonplastic, and do not react to HCl.					
								

BORING LOG

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Soil Boring: Monitoring Well: Piezometer:

Boring/Well Number: BW-18D

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Depth (ft)	Elevation (ft)	USCS Group Symbol	Material Description	Sample Name	Sample Location	Lithology	Well Construction	Remarks
55				BW-18D@50.5-55.5	▲	▲	▲	
		SM	<p>Silty Sand (57 - 62.5) Moist, very dense, no odor. Primarily medium to fine sand with ~5% gravel to 15 mm, and ~25% silt and clay. The sand and gravel are angular to subangular. The fines are nonplastic to low plasticity and toughness, and do not react to HCl.</p>			▲	▲	
60						▲	▲	
		CL	<p>Sandy Lean Clay (62.5 - 68.5) Dry to moist, very dense, no odor. Primarily silt and clay with ~35% medium to fine sand with maximum grain size ~ 2mm. The sand is angular to subangular. The fines have medium plasticity and toughness, and do not react to HCl.</p>			▲	▲	
65						▲	▲	
		SP	<p>Poorly Graded Sand (68.5 - 71) Moist to saturated, dense, no odor. Primarily medium to fine sand with ~10% gravel to 15 mm and ~15% silt and clay. The sand and gravel are subangular to subrounded. The fines are nonplastic, and do not react to HCl.</p>			▲	▲	
70						▲	▲	
		SM	<p>Silty Sand (71 - 74) Dry to moist, very dense, no odor. Primarily medium to fine sand with ~5% gravel to 10 mm and ~ 30% silt</p>			▲	▲	

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Soil Boring: Monitoring Well: Piezometer:

Boring/Well Number: B/W-18D

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Depth (ft)	Elevation (ft)	USCS Group Symbol	Material Description	Sample Name	Sample Location	Lithology	Well Construction	Remarks
115			~40% medium to fine grained sand with a maximum grain size of 1mm. The sand is angular to subangular. The fines have moderate to high plasticity, is very tough, and do not react to HCl.					
		SW	Well-Graded Sand (116 - 124) Saturated, dense, no odor. Primarily medium to fine sand with ~5% coarse grain sand 2mm with ~10% silt and clay. The sand is subangular to subrounded. The fines are nonplastic, and do not react to HCl.					← B/W-18I screened from 116 - 136 feet.
120				B/W-18D@118-123				
		SM	Silty Sand (124 - 126) Moist, very dense, no odor. Primarily medium to fine sand with a maximum grain size 1mm and ~30% silt and clay content. The sand is subangular to subrounded. The fines are nonplastic, and do not react to HCl.					
125		SP	Poorly Graded Sand with Silt (126 - 130) Saturated, dense, no odor. Primarily medium to fine sand with ~5% coarse grain sand to 5 mm with ~15% silt and clay. The sand is subangular to subrounded. The fines are nonplastic, and do not react to HCl.					

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Depth (ft)	Elevation (ft)	USCS Group Symbol	Material Description	Sample Name	Lithology	Well Construction	Remarks
130		SM	<p>Silty Sand (130 - 130.5) Moist, dense, no odor. Primarily medium to fine sand with ~5% coarse grain sand to 5 mm and ~25% silt and clay. The sand is subangular to subrounded. The fines are nonplastic, and do not react to HCl.</p>				
		SP					
		SM					
		SC	<p>Poorly Graded Sand with Silt (130.5 - 131) Moist to saturated, dense, no odor. Primarily medium to fine sand with ~5% gravel to 10 mm and ~15% silt and clay. The sand and gravel are subangular to subrounded. The fines are nonplastic, and do not react to HCl.</p>				
		SM					
		SP					
135		SM	<p>Silty Sand (131 - 132) Moist, dense, no odor. Primarily medium to fine sand with ~5% gravel to 15 mm and ~30% silt and clay. The sand and gravel are angular to subangular. The fines are nonplastic to low plasticity and toughness, and do not react to HCl.</p>				
		SP					
		SM	<p>Clayey Sand (132 - 135.5) Moist, dense, no odor. Primarily medium to fine sand with ~10% gravel to 10 mm and ~30% silt and clay. The sand and gravel are angular to subangular. The fines are nonplastic to low plasticity and toughness, and do not react to HCl.</p>				
		SM	<p>Poorly Graded Sand (135.5 - 136) Moist to saturated, dense, no odor. Primarily medium to fine sand with ~5% gravel to 10 mm and ~15% silt and clay. The sand and gravel are subangular to subrounded. The fines are nonplastic, and do not react to HCl.</p>				
		SM					
		SM					
140		SM	<p>Silty Sand (136 - 143) Moist, very dense, no odor. Primarily medium to fine sand with ~10% gravel to 20mm, ~10% coarse grain sand and ~20% silt and clay. The gravel is angular to subangular and the sand is subangular to subrounded. The fines are nonplastic, and do not react to HCl.</p>				
		SM					
		SM					
		SC	<p>Clayey Sand (143 - 145) Dry to moist, very dense, no odor. Primarily medium to fine sand with ~5% gravel to 10 mm and ~25% silt and clay. The sand and gravel are angular to subangular. The fines are nonplastic to low plasticity and toughness, and do not react to HCl.</p>				
		SM					
		SM					
145		SM	<p>Silty Sand (145 - 147) Moist to saturated, dense, no odor. Primarily medium to fine sand with ~5% gravel to 10 mm and ~20% silt and clay. The sand and gravel are subangular to subrounded. The fines are nonplastic, and do not react to HCl.</p>				
		SM					
		SC	<p>Clayey Sand (147 - 149) Moist, very dense, no odor. Primarily medium to fine sand with ~5% gravel to 15 mm and ~25% silt and clay. The gravel is angular to subangular and the sand</p>				

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Depth (ft)	Elevation (ft)	USCS Group Symbol	Material Description	Sample Name	Sample Location	Lithology	Well Construction	Remarks
150		SM	<p>is subangular to subrounded. The fines are nonplastic to low plasticity and toughness, and do not react to HCl.</p> <p>Silty Sand (149 - 151) Moist to saturated, dense, no odor. Primarily medium to fine sand with ~5% gravel to 10 mm and ~20% silt and clay. The sand and gravel are subangular to subrounded. The fines are nonplastic, and do not react to HCl.</p>	B/W-18D@149-154	[Diagram showing sample location in well]	[Lithology pattern]	[Well construction pattern]	
		SC	<p>Clayey Sand (151 - 159) Moist, dense, no odor. Primarily medium to fine sand with ~10% gravel to 30 mm and ~25% silt and clay. The sand and gravel are subangular to subrounded. The fines are nonplastic to low plasticity and toughness, and do not react to HCl.</p>					
155								
		SC	<p>Clayey Sand (159 - 161) Dry, very dense, no odor. Primarily medium to fine sand with ~10% gravel to 15 mm and ~30% silt and clay. The sand and gravel are angular to subangular. The fines are nonplastic to low plasticity and toughness, and do not react to HCl.</p>					
160		SW	<p>Well-Graded Sand (161 - 164) Saturated, dense, no odor. Primarily medium to fine sand with ~10% gravel to 20 mm and ~10% silt and clay. The sand and gravel are subangular to subrounded. The fines are nonplastic, and do not react to HCl.</p>					
165		SM	<p>Silty Sand (164 - 165) Moist, dense, no odor. Primarily medium to fine sand with ~10% gravel to 15 mm and ~20% silt and clay. The sand and gravel are subangular to subrounded. The fines are nonplastic, and do not react to HCl.</p>					
		SW	<p>Well-Graded Sand with Gravel (165 - 175) Saturated, dense, no odor. Primarily medium to fine sand with ~15% gravel to 20 mm and ~10% silt and clay. The sand and gravel are subangular to subrounded. The fines are nonplastic, and do not react to HCl.</p>					

B/W-18D screened from 154.75 to 174.75 feet.

BORING LOG

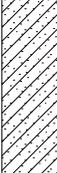
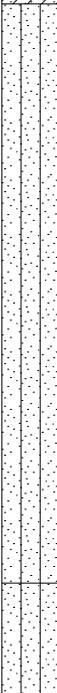
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Depth (ft)	Elevation (ft)	USCS Group Symbol	Material Description	Sample Name	Sample Location	Lithology	Well Construction	Remarks
190		SM SC	<p>Silty Sand (188.5 - 189) Moist to saturated, dense, no odor. Primarily medium to fine sand with ~10% gravel to 15mm and ~15% silt and clay. The sand and gravel are subangular to subrounded. The fines are nonplastic, and do not react to HCl.</p> <p>Clayey Sand (189 - 197) Dry to moist, very dense, no odor. Primarily medium to fine sand with ~10% gravel to 15 mm and ~30% silt and clay. The sand and gravel are subangular to subrounded. The fines are nonplastic to low plasticity and toughness, and do not react to HCl.</p>					
195		SM	<p>Silty Sand (197 - 204) Dry, dense, no odor. Primarily medium to fine sand with ~5% gravel to 10 mm and ~40% silt and clay. The sand and gravel are subangular to subrounded. The fines are nonplastic to low plasticity and toughness, and do not react to HCl.</p>					
200		SM	<p>Silty Sand (204 - 212.5) Dry to moist, dense, no odor. Primarily medium to fine sand with a maximum grain size of 2 mm and ~35% silt and clay content. The sand is subangular to</p>					
205		SM	<p>Silty Sand (204 - 212.5) Dry to moist, dense, no odor. Primarily medium to fine sand with a maximum grain size of 2 mm and ~35% silt and clay content. The sand is subangular to</p>					

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Depth (ft)	Elevation (ft)	USCS Group Symbol	Material Description	Sample Name	Sample Location	Lithology	Well Construction	Remarks
210			subrounded. The fines are nonplastic, and do not react to HCl.					
215		SM	Silty Sand (212.5 - 216.5) Dry to moist, dense, no odor. Primarily medium to fine sand with a maximum grain size of 1 mm and ~40% silt and clay content. The sand is subangular to subrounded. The fines are nonplastic to low plasticity and toughness, and do not react to HCl.					
220		SM	Silty Sand (216.5 - 217.5) Saturated, dense, no odor. Primarily fine sand with ~30% medium grain sand to 1 mm and ~15% silt and clay. The sand is subangular to subrounded. The fines are nonplastic, and do not react to HCl.					
220		SM	Silty Sand (217.5 - 226) Saturated, dense, no odor. Primarily medium to fine sand with ~10% gravel to 20 mm and ~15% silt and clay. The sand and gravel are subangular to subrounded. The fines are nonplastic, and do not react to HCl.	B/W-18D@215-220				

BORING LOG

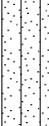
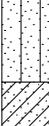
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Depth (ft)	Elevation (ft)	USCS Group Symbol	Material Description	Sample Name	Sample Location	Lithology	Well Construction	Remarks
225								
		SM	<p>Silty Sand (226 - 230) Dry to moist, very dense, no odor. Primarily medium to fine sand with ~10% gravel to 25 mm and ~25% silt and clay. The sand and gravel are angular to subangular. The fines are nonplastic to low plasticity and toughness, and do not react to HCl.</p>					
230		SC	<p>Clayey Sand (230 - 233) Dry to moist, very dense, no odor. Primarily medium to fine sand with ~5% gravel to 15 mm and ~30% silt and clay. The sand and gravel are angular to subangular. The fines have low plasticity and toughness, and do not react to HCl.</p>					
		SC	<p>Clayey Sand (233 - 237) Dry, very dense, no odor. Primarily medium to fine sand with ~10% gravel to 20 mm and ~35% silt and clay. The sand and gravel are angular to subangular. The fines are nonplastic to low plasticity and toughness, and do not react to HCl.</p>					
235								
		SM	<p>Silty Sand (237 - 240) Dry, dense, no odor. Primarily medium to fine sand with ~5% gravel to 15 mm and ~25% silt and clay. The sand and gravel are subangular to subrounded. The fines are nonplastic, and do not react to HCl.</p>					
240		SW	<p>Well-Graded Sand with Silt (240 - 245) Moist to saturated, dense, no odor. Primarily medium to fine sand with ~5% gravel to 10 mm and ~15% silt and clay. The sand and gravel are subangular to subrounded. The fines are nonplastic, and do not react to HCl.</p>					

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Depth (ft)	Elevation (ft)	USCS Group Symbol	Material Description	Sample Name	Sample Location	Lithology	Well Construction	Remarks
245			Bottom of Borehole at 245 feet below ground surface.					