Appendix A
Soil Boring Logs, Geophysical Survey, Monitoring Sampling Forms Well Completion Diagrams, and Well Development Logs

Boring Logs

PROJECT NUMBER:	BORING NUMBER:
661508	EW-6U SHEET 1 OF 1

Soil Boring Log

PROJECT : UPRR Freeman
LOCATION : Freeman, WA
GROUND ELEVATION :
DRILLING CONTRACTOR : Environmental West Exploration, Inc
COORDINATES:
DRILLING METHOD AND EQUIPMENT : Air Rotary
WATER LEVEL :
START : 8/22/17 10:15
END : 8/22/17 14:20
LOGGER : S. Demus
Reviewed By :

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (%)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: SAMPLE TYPE, AIR MONITORING, PID (ppm) SOIL GAS MONITORING, FID (ppm)
					See soil boring log for MW-6U.	1015 - Begin drilling
						1130 - 25 ft bgs
5						1330 - Cased to 47 ft bgs, switch bits to open hole, manage IDW
						1400 - Resume drilling open hole
						1420 - 65 ft bgs
10						
15						
20						
25						
30						

UPRR 31ST, FREEMAN LOGS_LLT.GPJ, STOCK.GLB, 12/13/17

PROJECT NUMBER:	BORING NUMBER:
661508	EW-9U SHEET 1 OF 1

Soil Boring Log

PROJECT : UPRR Freeman
LOCATION : Freeman, WA
GROUND ELEVATION :
DRILLING CONTRACTOR : Environmental West Exploration, Inc
COORDINATES:
DRILLING METHOD AND EQUIPMENT : Air Rotary
WATER LEVEL :
START : 8/24/17 08:00
END : 8/24/17 12:45
LOGGER : S. Demus
Reviewed By :

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (%)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: SAMPLE TYPE, AIR MONITORING, PID (ppm) SOIL GAS MONITORING, FID (ppm)
					See soil boring log for MW-9U.	0800 - Begin drilling
						1130 - 42 ft bgs, change bits to drill open hole
5						1245 - 72 ft bgs
10						
15						
20						
25						
30						

UPRR 31ST, FREEMAN LOGS_LLT.GPJ, STOCK.GLB, 12/13/17

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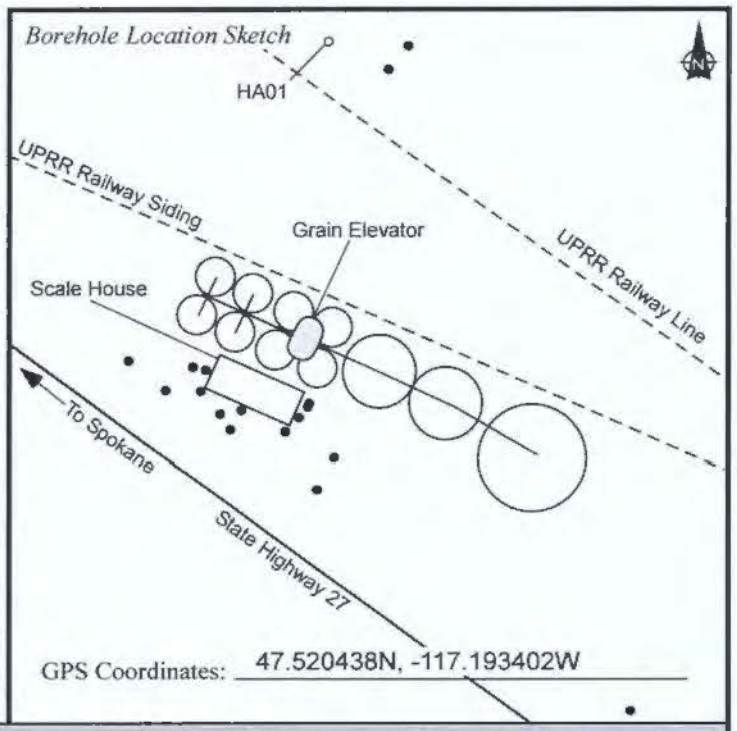
Drilling Log for HA01

Project Name: Freeman Ground Water
Site Location: Freeman, Washington
Date Started/Finished: 4/23/14
Driller's Name: NA
Geologist's Name: Jeff Fetters
Geologist's Signature:
Rig Type(s): Hand Auger
Depth to Water: NA
Total Depth of Borehole: 13.5-feet bgs



GPS Coordinates: 47.520438N, -117.193402W

Depth (Feet)	Sample Number	Sample Times	Core Recovery	Soil Type	Comments
1	NA	NA	NA		0-6" - Duff 6"-3' - SANDY GRAVEL with CLAY (GW-GC) - Gravel: rounded to sub-rounded, >3 cm; Sand: medium to fine, angular to sub-angular; Silt: tan, slightly moist, trace light tan clay, high mica content
2					
3					3-10' - CLAY (CL) - bluish gray, moist, stiff, trace fine sand
4					
5	NA	NA	NA		
6					
7					
8					
9	NA	NA	NA		
10					10-10.5' - CLAY with SILT with (CL-ML) - dark yellowish brown, moist, soft 10.5-13' - CLAY (CL) - bluish gray, moist, stiff, trace fine sand
11					
12					

Depth (Feet)	Sample Number	Sample Times	Core Recovery	Soil Type	Comments
12	HA01SB13.5	0930	NA		13-13.5' - CLAY with SILT with (CL-ML) - dark yellowish brown, moist, soft
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
31					Total depth = 13.5-feet bgs Borehole abandoned with Bentonite Chips from Total Depth to surface.
32					

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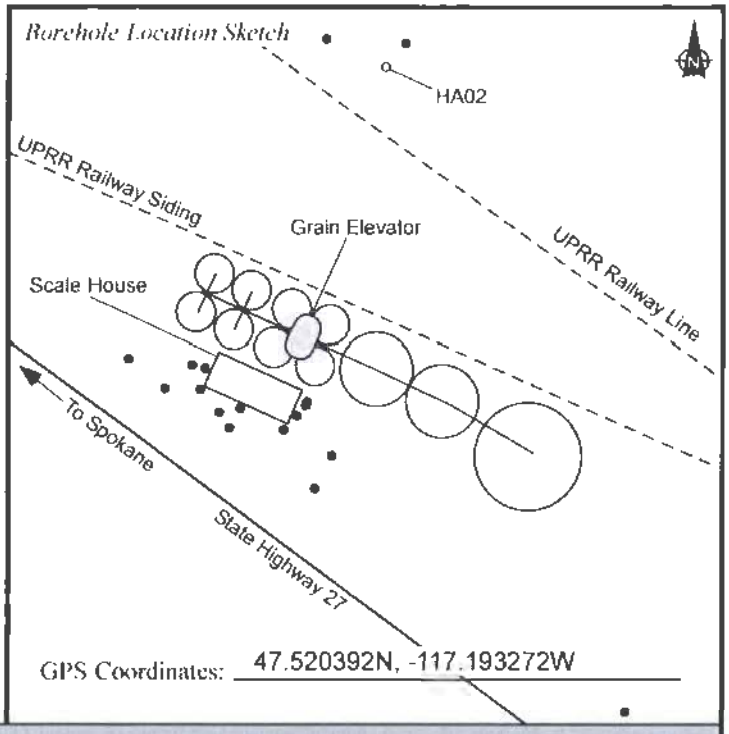
Drilling Log for HA02

Project Name: Freeman Ground Water
Site Location: Freeman, Washington
Date Started/Finished: 4/23/14
Driller's Name: NA
Geologist's Name: Jeff Fetters
Geologist's Signature:
Rig Type(s): Hand Auger
Depth to Water: NA
Total Depth of Borehole: 4-feet bgs



GPS Coordinates: 47.520392N, -117.193272W

Depth (Feet)	Sample Number	Sample Times	Core Recovery	Soil Type	Comments
1	HA02SB2.5	1135	NA		0-6" - Duff 6"-1.5' - SANDY GRAVEL with CLAY (GW-GC) - Gravel: rounded to sub-rounded, >3 cm; Sand: medium to fine, angular to sub-angular Silt: tan, slightly moist, trace light tan clay, high mica content 1.5-2.5' - SAND with SILT (SW-SM) - medium to fine, angular to sub-angular; Silt: light gray, moist 2.5-4' - SANDY GRAVEL with CLAY (GW-GC) - Gravel: rounded to sub-rounded, >3 cm; Sand: medium to fine, angular to sub-angular; Silt: tan, slightly moist, trace light tan clay, high mica content 4' - Refusal
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					Total depth = 4-feet bgs
12					Borehole abandoned with cuttings Total Depth to surface.

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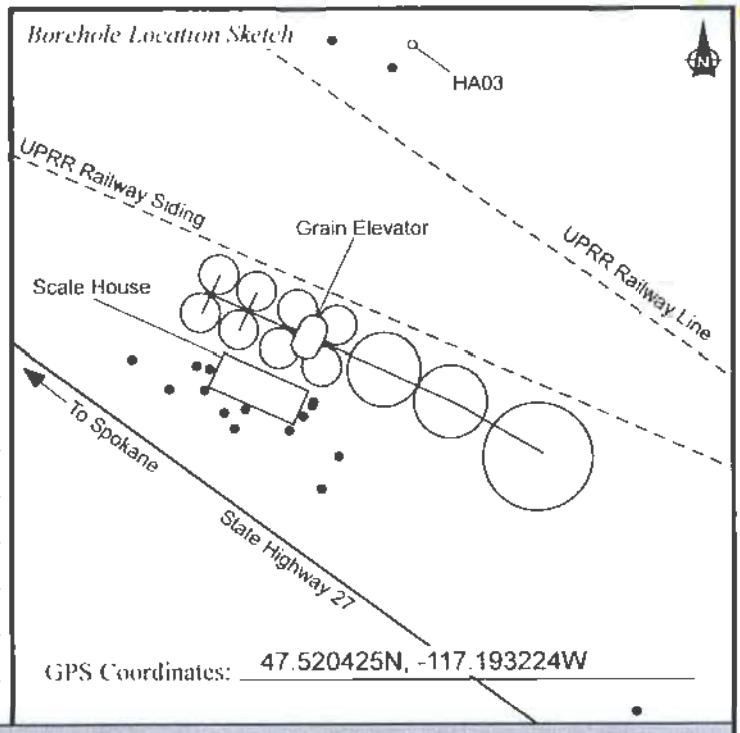
Drilling Log for HA03

Project Name: Freeman Ground Water
Site Location: Freeman, Washington
Date Started Finished: 4/23/14
Driller's Name: NA
Geologist's Name: Jeff Fetters
Geologist's Signature:
Rig Type(s): Hand Auger
Depth to Water: NA
Total Depth of Borehole: 9-feet bgs



GPS Coordinates: 47.520425N, -117.193224W

Depth (Feet)	Sample Number	Sample Times	Core Recovery	Soil Type	Comments
1					0-4" - Duff 4"-2' - SANDY GRAVEL with CLAY (GW-GC) - Gravel: rounded to sub-rounded, >3 cm; Sand: medium to fine, angular to sub-angular; Silt: tan, slightly moist, trace light tan clay, high mica content
2	NA	NA	NA		2-2.5' - CLAY with SILT (CL-ML) - light gray, moist, soft, trace fine sand
3					2.5-8' - CLAY (CL) - bluish gray, moist, stiff, trace fine sand
4					
5					
6	NA	NA	NA		
7					
8					8-9' - SAND with SILT (SW-SM) - medium to fine, angular to sub-angular; Silt: dark yellowish brown, moist, trace clay, high mica content
9	HA03SB09	1135			
10			NA		
11					
12					Total depth = 9-feet bgs Borehole abandoned with cuttings from Total Depth to surface.

PROJECT NUMBER:	BORING NUMBER:
661508	MW-1D SHEET 1 OF 4

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman
LOCATION : 30' E Off RR, NE of Facility

ELEVATION : 2598.99 ft mslft NAVD88 (ground surface)
DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 211096.785, 2539524.622 (ft NAVD88)
DRILLING METHOD AND EQUIPMENT : 15k Speedstar, Sonic

WATER LEVEL:
START : 7/13/16 08:45
END : 7/14/16 16:40
LOGGER : Ruben Greer

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
					SILT with SAND (ML) - brown and gray, dry, lightly cemented, hard,.	
5						0-2 #1 5'/7' Recovery
					Gray SILT/CLAY with light gray mottling (ML/CL) - pale fine sand, moist, slightly cohesive, with increasing CLAY in depth.	
10					SAME AS ABOVE - increasing orange oxidation.	
					Gray and oxidized: SILTY CLAY (ML/CL) - increasing oxidation, slight increase in moisture with depth, increasing tan wring (sp?).	
15						
					SAME AS ABOVE - moist CLAY (CL).	7-17 #2 11'/10' Recovery
20						
					FAT CLAY (CH), Moist, with white mottling and trace oxidation..	
25					Sharp transition to orange/brown SILT with fine SAND (ML) - decreasing moisture, lightly cemented, non-plastic, increasing sand with depth..	
					SAME AS ABOVE - SILT with fine Sand (ML).	17-27 #3 12'/10' Recovery
30					Increasing gray fat CLAY (CH) - with white mottling and oxidation, increasing gray clay with depth, moist, very stiff.	

PROJECT NUMBER:	BORING NUMBER:
661508	MW-1D SHEET 2 OF 4

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman
LOCATION : 30' E Off RR, NE of Facility

ELEVATION : 2598.99 ft mslft NAVD88 (ground surface)
DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 211096.785, 2539524.622 (ft NAVD88)
DRILLING METHOD AND EQUIPMENT : 15k Speedstar, Sonic

WATER LEVEL:
START : 7/13/16 08:45
END : 7/14/16 16:40
LOGGER : Ruben Greer

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
					Increasing gray fat CLAY (CH) - with white mottling and oxidation, increasing gray clay with depth, moist, very stiff.	
					Gray CLAY, fat (CH) - with white, orange, and black mottling, decreasing moisture, stiff.	
35					Reddish brown CLAY/SILT with fine SAND (CL/ML) - with mica, moist, hard. Increasing gray sandy silt at 37' bgs..	
					Sandy SILT (ML) - 25% fine sand, moist, gray plus orangish/brown coloring, very stiff.	27-37 Core #4 9'/10' Recovery
40					Increasing white mottling.	
					Gray sandy SILT (ML) - very hard, slight moisture, increasing mica, decreasing orange/brown coloring.	Very hard drilling
					Increasing CLAY (CL) - gray with fine sand.	
45					White, brown and gray SILT/CLAY (ML/CL) - possible decomposed granite,.	Hard drilling
					Decomposed GRANITE - significant mica, gray and white, very hard, moist.	37-47 Core #5 9'/10' Recovery
					Transition to decomposed sandstone, decreasing oxidation, fine, with fine mica sand observed moist.	TD @ 47 - 10:30
50					SAME AS ABOVE - moist.	
55					SAME AS ABOVE - with thin granite intrusions and trace oxidation, moist.	
	57.0				SAME AS ABOVE - decomposed sandstone, gray with veins of granite (decomposed) and localized oxidation, moist.	
60						

PROJECT NUMBER:	BORING NUMBER:
661508	MW-1D SHEET 3 OF 4

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman
LOCATION : 30' E Off RR, NE of Facility

ELEVATION : 2598.99 ft mslft NAVD88 (ground surface)
DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 211096.785, 2539524.622 (ft NAVD88)
DRILLING METHOD AND EQUIPMENT : 15k Speedstar, Sonic

WATER LEVEL:
START : 7/13/16 08:45
END : 7/14/16 16:40
LOGGER : Ruben Greer

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
					Decomposed sandstone, gray with mica, moist.	
		11.5				
					Sharp transition to decomposed granite, significant mica, oxidized, white and light gray, moist.	
65						
	67.0				Transition to gray decomposed sandstone, moist.	
70					SAME AS ABOVE.	
		9.0				
75						
	77.0					
					Transition to decomposed granite, white and gray mica flakes up to 1" diameter, moist, easily crumbled.	
80		6.0				
					Transition to decomposed granite, decreasing mica, trace oxidation, more cohesive, moist.	
85						
	87.0				Transition to gray decomposed sandstone, easily crumbled, decreasing mica and oxidation, moist.	
					Decomposed sandstone/trace mica, moist, hard but crumbly, veins of oxidation throughout, gray, light gray, white.	
90						

PROJECT NUMBER:	BORING NUMBER:
661508	MW-1D SHEET 4 OF 4

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman
LOCATION : 30' E Off RR, NE of Facility

ELEVATION : 2598.99 ft mslft NAVD88 (ground surface)
DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 211096.785, 2539524.622 (ft NAVD88)
DRILLING METHOD AND EQUIPMENT : 15k Speedstar, Sonic

WATER LEVEL:
START : 7/13/16 08:45 END : 7/14/16 16:40 LOGGER : Ruben Greer

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
					Transition to gray decomposed sandstone, easily crumbled, decreasing mica and oxidation, moist.	
					SAME AS ABOVE - becoming more gray and oxidized, moist.	
95					Decomposed granite, white, black and gray with mica flakes, becoming more oxidized with depth, moist.	
					Sandstone/decomposed sandstone, gray, trace oxidation, decreasing with depth, fine sand, moist.	
100					Becoming darker gray, decomposed sandstone, fine, moist, loose, cemented sandstone, easily crumbled, slight increase in mica.	
105					Transition to decomposed granite with sandstone, increase in oxidation, moderately cemented, but able to be crumbled..	
					Bottom of borehole at 107 ft bgs.	
110						
115						
120						

PROJECT NUMBER:	BORING NUMBER:
661508	MW-1S SHEET 1 OF 2

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman
LOCATION : E of RR Tracks, NE Area of UPRR Freeman RI

ELEVATION : 2598.85 ft mslft NAVD88 (ground surface)
DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 211100.555, 2539516.893 (ft NAVD88)
DRILLING METHOD AND EQUIPMENT : Speedstar, Sonic

WATER LEVEL:
START : 7/1/16 08:55
END : 7/1/16 10:30
LOGGER : Ruben Greer

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
					SILT with SAND (ML) - brown and gray, dry, lightly cemented, hard,.	
5						0-2 #1 5'/7' Recovery
					Gray SILT/CLAY with light gray mottling (ML/CL) - pale fine sand, moist, slightly cohesive, with increasing CLAY in depth.	
10					SAME AS ABOVE - increasing orange oxidation.	
					Gray and oxidized: SILTY CLAY (ML/CL) - increasing oxidation, slight increase in moisture with depth, increasing tan wring (sp?).	
15						
					SAME AS ABOVE - moist CLAY (CL).	7-17 #2 11'/10' Recovery
20						
					FAT CLAY (CH), Moist, with white mottling and trace oxidation..	
25					Sharp transition to orange/brown SILT with fine SAND (ML) - decreasing moisture, lightly cemented, non-plastic, increasing sand with depth..	
					SAME AS ABOVE - SILT with fine Sand (ML).	17-27 #3 12'/10' Recovery
30					Increasing gray fat CLAY (CH) - with white mottling and oxidation, increasing gray clay with depth, moist, very stiff.	

PROJECT NUMBER:	BORING NUMBER:
661508	MW-1S SHEET 2 OF 2

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman
LOCATION : E of RR Tracks, NE Area of UPRR Freeman RI

ELEVATION : 2598.85 ft mslft NAVD88 (ground surface)
DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 211100.555, 2539516.893 (ft NAVD88)
DRILLING METHOD AND EQUIPMENT : Speedstar, Sonic

WATER LEVEL:
START : 7/1/16 08:55
END : 7/1/16 10:30
LOGGER : Ruben Greer

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
					Increasing gray fat CLAY (CH) - with white mottling and oxidation, increasing gray clay with depth, moist, very stiff.	
					Gray CLAY, fat (CH) - with white, orange, and black mottling, decreasing moisture, stiff.	
35					Reddish brown CLAY/SILT with fine SAND (CL/ML) - with mica, moist, hard. Increasing gray sandy silt at 37' bgs..	
					Sandy SILT (ML) - 25% fine sand, moist, gray plus orangish/brown coloring, very stiff.	27-37 Core #4 9'/10' Recovery
40					Increasing white mottling.	
					Gray sandy SILT (ML) - very hard, slight moisture, increasing mica, decreasing orange/brown coloring.	Very hard drilling
					Increasing CLAY (CL) - gray with fine sand.	
45					White, brown and gray SILT/CLAY (ML/CL) - possible decomposed granite,.	Hard drilling
					Bottom of borehole at 47 ft bgs.	
50						
55						
60						

PROJECT NUMBER:	BORING NUMBER:
661508	MW-2D SHEET 1 OF 5

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman

LOCATION : SE of Facility 30' NE of RR

ELEVATION : 2598.09 ft mslft NAVD88 (ground surface)

DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 210893.631, 2539795.088 (ft NAVD88)

DRILLING METHOD AND EQUIPMENT : 15k Speedstar, Sonic

WATER LEVEL:

START : 7/1/16 09:15

END : 7/12/16 11:50

LOGGER : Nicole Badon/

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
0	0.0	2.8	#1		Silty CLAY (CL) - light brown, some fine to coarse sand, trace fine to coarse sub angular gravel, hard, dry.	
5	5.0	2.5	#2		SILT (ML) and fine to coarse SAND - trace fine to coarse angular gravel/rock fragments (weak/breakable), yellowish orange changing to light gray at 6.5', loose, dry.	
	7.0	7.7	#3		SILT (ML) and very fine SAND - trace clay, decomposed rock fragments (basalt?) throughout, weak/breakable, light brown to grayish brown with some oxidation, trace greenish yellow mottling, slightly moist, loose.	
10						
15	17.0	8.7	#4		SILT (ML) - very fine Sand and decomposed rock (basalt?), trace coarse gravel-sized anular basalt fragments from 26' to 27', grayish brown with some light gray and greenish yellow mottling, very moist, color change at ~ 24' to blue gray with reddish brown oxidation, loose to medium dense.	
20						
25	27.0				SILT (ML) - little Clay, and decomposed basalt (weathered to Silt but structure present), dark brown with reddish brown oxidation and white mottling, soft, very moist/wet, trace hard basalt fragments.	
30						

PROJECT NUMBER:	BORING NUMBER:
661508	MW-2D SHEET 2 OF 5

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman
LOCATION : SE of Facility 30' NE of RR

ELEVATION : 2598.09 ft mslft NAVD88 (ground surface)
DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 210893.631, 2539795.088 (ft NAVD88)
DRILLING METHOD AND EQUIPMENT : 15k Speedstar, Sonic

WATER LEVEL:
START : 7/1/16 09:15
END : 7/12/16 11:50
LOGGER : Nicole Badon/

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
35	37.0	10.8	#5		SILT (ML) - little Clay, and decomposed basalt (weathered to Silt but structure present), dark brown with reddish brown oxidation and white mottling, soft, very moist/wet, trace hard basalt fragments.	
40	47.0	11.9	#6		SILT (ML) and very fine SAND - little Clay, trace fine to coarse gravel-sized basalt fragments, light brown and gray with reddish brown oxidation, trace yellow and white mottling, medium dense, wet.	
50	57.0	11.9	#7		SILT (ML) - very fine Sand and highly weathered rock, dark gray, yellowish green, with reddish brown oxidation, medium dense, wet, weathered rock fragments are fine to coarse gravel-sized and easily breakable.	
60					SILT (ML) and highly weathered basalt, some very fine sand, medium gray with reddish brown oxidation throughout, some fine to coarse fravel-sized basalt fragments throughout (hand breakable), wet, medium dense, trace clay (slight plasticity).	

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-2D	SHEET 3 OF 5

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman

LOCATION : SE of Facility 30' NE of RR

ELEVATION : 2598.09 ft mslft NAVD88 (ground surface)

DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 210893.631, 2539795.088 (ft NAVD88)

DRILLING METHOD AND EQUIPMENT : 15k Speedstar, Sonic

WATER LEVEL:

START : 7/1/16 09:15

END : 7/12/16 11:50

LOGGER : Nicole Badon/

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
65	67.0	10.0	#8		SILT (ML) and highly weathered basalt, some very fine sand, medium gray with reddish brown oxidation throughout, some fine to coarse fravel-sized basalt fragments throughout (hand breakable), wet, medium dense, trace clay (slight plasticity).	
70	77.0	11.3	#9		Clayey SILT (ML) and highly decomposed basalt, some very fine sand, ~ 15% fine gravel-sized basalt fragments, grayish brown with white mottling 67' to 71.5', blue/gray with white mottling and oxidation 71.5' to 75', reddish brown mottled white 75' to 77', medium dense, very moist/wet.	
80	87.0	8.8	#10		Sandy CLAY (CL) - fine to medium sand, yellowish orange oxidated with light gray mottling, medium plasticity, trace (~ 15%) fine sub angular gravel, abundant muscovite mica from 84' to 87', hard, moist.	quartzrich
85	89.0	2.4	#11		Very fine to fine SAND (SP) - little Clay, abundant muscovite mica, light gray with yellowish orange oxidation, slightly moist, dense to very dense..	
90						Refusal @ 89'

PROJECT NUMBER:	BORING NUMBER:
661508	MW-2D SHEET 4 OF 5

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman
LOCATION : SE of Facility 30' NE of RR

ELEVATION : 2598.09 ft mslft NAVD88 (ground surface)
DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 210893.631, 2539795.088 (ft NAVD88)
DRILLING METHOD AND EQUIPMENT : 15k Speedstar, Sonic

WATER LEVEL:
START : 7/1/16 09:15 END : 7/12/16 11:50 LOGGER : Nicole Badon/

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
95			#1-D		Sandy CLAY (CL) - fine to medium sand, yellowish orange, oxidized with light gray mottling, medium plasticity, fine sub angular quartz with gravel, abundant musovite mica, hard, moist.	Total Depth = 89 feet
	97.0					
100			#2-D		Sandy CLAY (CL) - fine to medium sand, yellowish orange oxidation, no gray mottling, significantly less muscovite mica than previous core. Slight plasticity transitions to fine sandy Clay and light brown color at ~ 104', moist.	
105						
	107.0					
110			#3-D		Sandy CLAY (CL) - fine sand, light brown with some oxidation, moist, increased silt content at 109', transitions to a silty Clay, damp, layering of medium brown and orange.	
					GRUS - light gray to white, dry, decomposed granite, all minerals decomposed, fine grained, abundant muscovite mica.	
115					SAME AS ABOVE - light tan.	
					SAME AS ABOVE - with gravel up to 2" diameter.	
	117.0				SAME AS ABOVE - all fine grained, light tan.	
120					GRUS - light gray to withe with some oxidation, dry, decomosed granit, mostly fine grained, abundant muscovite mica, up to 0.5", about 15%-20% coarse sand to fine gravel.	

PROJECT NUMBER:	BORING NUMBER:
661508	MW-2D SHEET 5 OF 5

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman
LOCATION : SE of Facility 30' NE of RR

ELEVATION : 2598.09 ft mslft NAVD88 (ground surface)
DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 210893.631, 2539795.088 (ft NAVD88)
DRILLING METHOD AND EQUIPMENT : 15k Speedstar, Sonic

WATER LEVEL:
START : 7/1/16 09:15
END : 7/12/16 11:50
LOGGER : Nicole Badon/

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
125		6.1	#4-D		SILT (ML) - with very fine sand, abundant muscovite mica, dry, grayish brown to light brown.	
	127.0					
130		10.0	#5-D		Sandy CLAY (CL) - heavily oxidated with some light gray mottling, damp, fine to medium sand.	
135					Very fine SAND (SW) - well graded, damp, light brown to oxidized.	
	137.0					
140		9.9	#6-D		GRUS - decomposed granite, dense, fine grained material, tan. Fine SAND with SILT (SM) - well graded, ~ 15% silt, damp but cuttings hot due to refusal encountered at 145'. Color ranges from oxidized to grayish tan to gray, abundant muscovite nica at 143' to 147'..	
145						
	147.0					
150						

Bottom of borehole at 150 ft bgs.

PROJECT NUMBER:	BORING NUMBER:
661508	MW-3D SHEET 1 OF 7

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman

LOCATION : N of Grain Facility, E of Hwy 27, N of Concrete Pad

ELEVATION : 2605.11 ft mslft NAVD88 (ground surface)

DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 210902.9, 2539415.035 (ft NAVD88)

DRILLING METHOD AND EQUIPMENT : Speedstar, Sonic

WATER LEVEL:

START : 5/10/16 10:00

END : 5/10/16 14:00

LOGGER : Ruben Greer

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
					Lean CLAY (CL) - medium plasticity, medium cohesive, trace fine sand, brown and gray, moist, stiff.	
5					Lean CLAY (CL) - brown, medium plasticity, medium cohesiveness, trace to no fine sand, moist, stiff.	Sample: MW3-5S-5 @ 5 feet 10:25 am
					SAME AS ABOVE (CL).	0-7 (7'/7' Recovery)
10					SAME AS ABOVE - trace coarse sand, less than 1% (CL), very stiff.	Sample: MW3-5S-5 @ 10:45 am
15					Lean CLAY with GRAVEL (CL) - gravel/cobble well graded, trace coarse sand, granite, moist, clay is brown, very stiff.	Sample: MW3-SS-15 @ 10:50 am
					Sandy SILT (ML) - very fine sand, gray and brown, very soft, possible increase in moisture.	7-17 approximately 7'/10' Recovery
20					Sandy CLAY (CL) - trace olive/green decomposed rock, decreasing moisture, increasing stiffness, clay is brown.	
25					SAME AS ABOVE (CL) - becoming reddish brown, moist.	17-27 DTW 23.15 TOC TOC ~ 4.3' abs Allow boring to
30					CLAY (CL) - reddish brown with yellow, olive and gray coloring, stiff, moist, trace coarse sand less than 1%.	

PROJECT NUMBER:	BORING NUMBER:
661508	MW-3D SHEET 2 OF 7

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman

LOCATION : N of Grain Facility, E of Hwy 27, N of Concrete Pad

ELEVATION : 2605.11 ft mslft NAVD88 (ground surface)

DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 210902.9, 2539415.035 (ft NAVD88)

DRILLING METHOD AND EQUIPMENT : Speedstar, Sonic

WATER LEVEL:

START : 5/10/16 10:00

END : 5/10/16 14:00

LOGGER : Ruben Greer

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
					CLAY (CL) - reddish brown with yellow, olive and gray coloring, stiff, moist, trace coarse sand less than 1%.	
35					Sandy CLAY (CL) - very fine sand, with trace mica, very stiff, moist.	
					CLAY (CL) - with yellow, bronze mottling, stiff, becoming softer, dark reddish brown clay, moist.	27'-37' 10'/10' Recovery
40					CLAY (CL) - reddish brown, light gray, brown, moist, stiff, trace fine sand, trace mica.	
					SAME AS ABOVE (CL) - becoming very stiff, decreasing mica, decreasing sand.	
45					CLAY/SILT (CL/ML) - very stiff, non plastic, slightly cohesive, moist, reddish brown, light gray and brown color, trace fine sand.	37'-47' - 10'/10' Recovery
					Single BASALT clast - 2.5" diameter.	
50					Clayey SILT (ML) - non plastic to slight plasticity, slightly cohesive, gray, hard to very stiff, moist, trace brown/reddish brown coloring, trace fine sand.	
					Increasing BASALT clasts.	Hard drilling/advancement - rocks
55					Gray gravelly CLAY (CL) - basalts clasts up to 3" diameter, sub angular, dark gray clay, increasing basalt with depth.	Hard drilling
					BASALT - dry, fractured, with basaltic gravel/rubble and pulverized basaltic sand.	
60					BASALT - fractured with trace weathering, sub round to sub angular, consistent.	

PROJECT NUMBER:	BORING NUMBER:
661508	MW-3D SHEET 3 OF 7

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman

LOCATION : N of Grain Facility, E of Hwy 27, N of Concrete Pad

ELEVATION : 2605.11 ft mslft NAVD88 (ground surface)

DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 210902.9, 2539415.035 (ft NAVD88)

DRILLING METHOD AND EQUIPMENT : Speedstar, Sonic

WATER LEVEL:

START : 5/10/16 10:00

END : 5/10/16 14:00

LOGGER : Ruben Greer

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
60.0			GB		BASALT - fractured with trace weathering, sub round to sub angular, consistent.	TD @ 58.5' bgs @ 14:00 (Sonic) Resume 5/16/16 with Air Rotary
61.0						
62.0					BASALT - with SAND, with SILT, moist.	
63.0			GB			
65						
66.0					Decreasing SAND, possible increase in moisture. BASALT, angular to sub angular, 1/4" to 1/2" diameter, becoming fine with depth.	
67.0			GB			
70						
					CLAY.	Driller indicates CLAY - 1055
75						Start 8:44 am No conveyance of cuttings, "Sticky" material - Hose (logged) probably clay zone
80						No cuttings - clogging 8:51 - 9:20
85						
90						

PROJECT NUMBER:	BORING NUMBER:
661508	MW-3D SHEET 4 OF 7

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman

LOCATION : N of Grain Facility, E of Hwy 27, N of Concrete Pad

ELEVATION : 2605.11 ft mslft NAVD88 (ground surface)

DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 210902.9, 2539415.035 (ft NAVD88)

DRILLING METHOD AND EQUIPMENT : Speedstar, Sonic

WATER LEVEL:

START : 5/10/16 10:00

END : 5/10/16 14:00

LOGGER : Ruben Greer

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
					CLAY.	
					SILT.	
95						
100						
105						
					Sand with some Gravel.	Driller indicates "Gravel." Appears to be possible granite/sandstone, gray
110						
115						Drinner indicates color change and indicates presence of sand. Becoming more light tan than brown.
120						

PROJECT NUMBER:	BORING NUMBER:
661508	MW-3D SHEET 5 OF 7

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman

LOCATION : N of Grain Facility, E of Hwy 27, N of Concrete Pad

ELEVATION : 2605.11 ft mslft NAVD88 (ground surface)

DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 210902.9, 2539415.035 (ft NAVD88)

DRILLING METHOD AND EQUIPMENT : Speedstar, Sonic

WATER LEVEL:

START : 5/10/16 10:00

END : 5/10/16 14:00

LOGGER : Ruben Greer

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
					Sand with some Gravel.	
125						
130						
135						
140						
145					Fine Sand.	
150						

PROJECT NUMBER:	BORING NUMBER:
661508	MW-3D SHEET 6 OF 7

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman

LOCATION : N of Grain Facility, E of Hwy 27, N of Concrete Pad

ELEVATION : 2605.11 ft mslft NAVD88 (ground surface)

DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 210902.9, 2539415.035 (ft NAVD88)

DRILLING METHOD AND EQUIPMENT : Speedstar, Sonic

WATER LEVEL:

START : 5/10/16 10:00

END : 5/10/16 14:00

LOGGER : Ruben Greer

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
					Clay with some gravel.	
					Clay.	
155						
160						
165						
					Silty Sand.	
170						
					Fine Sand.	
175						
					Silty Sand.	Water generated when air applied. Driller indicates sand zone from 168-170 contained water. Cuttings becoming dryer.
180						

PROJECT NUMBER:	BORING NUMBER:
661508	MW-3D SHEET 7 OF 7

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman

LOCATION : N of Grain Facility, E of Hwy 27, N of Concrete Pad

ELEVATION : 2605.11 ft mslft NAVD88 (ground surface)

DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 210902.9, 2539415.035 (ft NAVD88)

DRILLING METHOD AND EQUIPMENT : Speedstar, Sonic

WATER LEVEL:

START : 5/10/16 10:00

END : 5/10/16 14:00

LOGGER : Ruben Greer

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
185					Silty Sand.	9:32 Small quantity of water generated.
190						
195						
200					Bottom of borehole at 200 ft bgs.	
205						
210						

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-4D (SB-16)	SHEET 1 OF 7

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman

LOCATION : School fields, South of School

ELEVATION : 2576.44 ft mslft NAVD88 (ground surface)

DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 209664.124, 2539671.043 (ft NAVD88)

DRILLING METHOD AND EQUIPMENT : Schramm T300 Rotodrill, Sonic/Air Rotary

WATER LEVEL:

START : 6/27/16 09:15

END : 7/15/16 15:00

LOGGER : Nicole Badon/

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
0.0					Clayey SILT (ML) - medium brown, stiff to loose, some fine sand, trace organics, moist to dry.	
	7.0	7.0				
5						
7.0					Clayey SILT/Silty CLAY (ML/CL) - medium brown, stiff to very stiff, trace fine to medium sand, moist.	
10						
	7.0					
15						
17.0					Silty CLAY/Clayey SILT (ML/CL) - SAME AS ABOVE.	
20						
					Sandy CLAY (SC) - fine to medium sand, ~ 50% nica flaces thoughout, moist to wet at ~ 23 feet, reddish brown.	
	11.7					
25						
27.0					Sandy CLAY (SC) - at 26' bgs. Some fine to coarse sub rounded gravel, stiff to very stiff, grades back to medium brown and moist.	
					Clayey, fine to coarse SAND (SC) - medium brown with some light gray.	
30						

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-4D (SB-16)	SHEET 2 OF 7

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman

LOCATION : School fields, South of School

ELEVATION : 2576.44 ft mslft NAVD88 (ground surface)

DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 209664.124, 2539671.043 (ft NAVD88)

DRILLING METHOD AND EQUIPMENT : Schramm T300 Rotodrill, Sonic/Air Rotary

WATER LEVEL:

START : 6/27/16 09:15

END : 7/15/16 15:00

LOGGER : Nicole Badon/

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
		10.1			Clayey, fine to coarse SAND (SC) - medium brown with some light gray.	
35	37.0				SILT and weathered BASALT - dark gray, loose, dry, fine gravel to cobble sized clasts.	Driller notes rock at 34.5 bgs during drilling
					Weathered BASALT - with coarse sand and medium gravel, angular to sub angular.	
40					BASALT - decreasing weathering, decreasing fine sand and basaltic gravel.	Increase in water production
45						
50					SAME AS ABOVE - abundant vesicles in basalt.	
55					Fractured/weathered BASALT - angular to sub angular up to 1" diameter.	
60					Competent BASALT - angular to sub angular up to 1/2" diameter.	Harder drilling

PROJECT NUMBER:	BORING NUMBER:
661508	MW-4D (SB-16) SHEET 3 OF 7

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman

LOCATION : School fields, South of School

ELEVATION : 2576.44 ft mslft NAVD88 (ground surface)

DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 209664.124, 2539671.043 (ft NAVD88)

DRILLING METHOD AND EQUIPMENT : Schramm T300 Rotodrill, Sonic/Air Rotary

WATER LEVEL:

START : 6/27/16 09:15

END : 7/15/16 15:00

LOGGER : Nicole Badon/

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
					Competent BASALT - angular to sub angular up to 1/2" diameter.	Bentonite seal installed at 60 feet bgs to prevent water infiltration
65					SAME AS ABOVE - Competent BASALT.	
70						
75					SAME AS ABOVE - Competent BASALT.	
					BASALT - cuttings up to 1", sub angular with oxidation observed.	Easiser drilling at 76 feet bgs
					Competent BASALT - angular and elongated, up to 1/2" diameter.	Hard drilling at 78 feet bgs
80						
85					SAME AS ABOVE.	
90						

PROJECT NUMBER:	BORING NUMBER:
661508	MW-4D (SB-16) SHEET 4 OF 7

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman
LOCATION : School fields, South of School

ELEVATION : 2576.44 ft mslft NAVD88 (ground surface)
DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 209664.124, 2539671.043 (ft NAVD88)
DRILLING METHOD AND EQUIPMENT : Schramm T300 Rotodrill, Sonic/Air Rotary

WATER LEVEL:
START : 6/27/16 09:15
END : 7/15/16 15:00
LOGGER : Nicole Badon/

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
					Competent BASALT - angular and elongated, up to 1/2" diameter.	
					SAME AS ABOVE.	Hard drilling
95						
100						
105					SAME AS ABOVE - Competent BASALT 1/4" to 1/2" cuttings.	
110						
115					SAME AS ABOVE.	
120						

PROJECT NUMBER:	BORING NUMBER:
661508	MW-4D (SB-16) SHEET 5 OF 7

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman

LOCATION : School fields, South of School

ELEVATION : 2576.44 ft mslft NAVD88 (ground surface)

DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 209664.124, 2539671.043 (ft NAVD88)

DRILLING METHOD AND EQUIPMENT : Schramm T300 Rotodrill, Sonic/Air Rotary

WATER LEVEL:

START : 6/27/16 09:15

END : 7/15/16 15:00

LOGGER : Nicole Badon/

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
					Competent BASALT - angular and elongated, up to 1/2" diameter.	
125						
130					SAME AS ABOVE.	Continued hard drilling
135						
140					SAME AS ABOVE - Competent BASALT.	
145						Easier drilling
150					BASALT and Basalt SAND - fractured basalt, trace oxidation with yellow weathered basalt.	

PROJECT NUMBER:	BORING NUMBER:
661508	MW-4D (SB-16) SHEET 6 OF 7

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman
LOCATION : School fields, South of School

ELEVATION : 2576.44 ft mslft NAVD88 (ground surface)
DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 209664.124, 2539671.043 (ft NAVD88)
DRILLING METHOD AND EQUIPMENT : Schramm T300 Rotodrill, Sonic/Air Rotary

WATER LEVEL:
START : 6/27/16 09:15
END : 7/15/16 15:00
LOGGER : Nicole Badon/

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
155					Fractured BASALT and Basalt SAND - becoming sub rounded, vesicled.	Steady, but slow drilling
160					SAME AS ABOVE.	
165						
170					Competent BASALT - angular, decreasing sand.	Harder drilling
175					Competent BASALT - angular cuttings.	Fracture zone Hard drilling
180						

PROJECT NUMBER:	BORING NUMBER:
661508	MW-4D (SB-16) SHEET 7 OF 7

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman

LOCATION : School fields, South of School

ELEVATION : 2576.44 ft mslft NAVD88 (ground surface)

DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 209664.124, 2539671.043 (ft NAVD88)

DRILLING METHOD AND EQUIPMENT : Schramm T300 Rotodrill, Sonic/Air Rotary

WATER LEVEL:

START : 6/27/16 09:15

END : 7/15/16 15:00

LOGGER : Nicole Badon/

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
					SAME AS ABOVE.	
185					BASALT - becoming fractured, increasing diameter and less angular with depth.	Slightly easier drilling
					BASALT - fractured with brown sand, yellow mineralization, sub angular, water is brown.	Easier drilling - fast advancement
190					Bottom of borehole at 188.5 ft bgs.	TD 188.5 feet bgs - hole collapsing
195						
200						
205						
210						

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-5D	SHEET 1 OF 6

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman
LOCATION : Freeman, Washington

ELEVATION : 2627.62 ft mslft NAVD88 (ground surface)
DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 210981.24, 2538577.23 (ft NAVD88)
DRILLING METHOD AND EQUIPMENT : Schramm T300, Air Rotary

WATER LEVEL:
START : 6/20/16 09:31
END : 6/21/16 13:54
LOGGER : J Freed

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
					Asphalt for ~ 0.2 feet. 0.2 - 2 feet is well graded gravel (road base).	
					Fat CLAY (CH), brown, dry.	
5						
10						
	11.0					
	12.0		GB		Silty SAND (SM) - poorly graded, brown, predominately fine sand, approximately 25% silt, trace fine gravel..	
	13.0					
	14.0		GB		Sandy SILT (ML) - approximately 40% sand, well graded, brown, dry.	
15						
	16.0					
	17.0		GB			
					Fat CLAY (CH) - brown, moist.	
20						Wet at 19 feet
						Moist at 21 feet
25						
						Dry at 25 feet
	29.0					
30			GB		Poorly graded SAND with Gravel (SP) - brown, dry, predominately fine sand, approximately 15% gravel, upt to 1/2"	

PROJECT NUMBER:	BORING NUMBER:
661508	MW-5D SHEET 2 OF 6

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman
LOCATION : Freeman, Washington

ELEVATION : 2627.62 ft mslft NAVD88 (ground surface)
DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 210981.24, 2538577.23 (ft NAVD88)
DRILLING METHOD AND EQUIPMENT : Schramm T300, Air Rotary

WATER LEVEL:
START : 6/20/16 09:31 END : 6/21/16 13:54 LOGGER : J Freed

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
	30.0				diameter.	
	31.0		GB		Well graded SAND with Gravel (SW) - brown, moist, approximately 25% to 30% gravel, up to 1/2", rounded to sub angular.	Moist at 30-32 feet
	32.0					
	33.0		GB		Poorly graded SAND (SP) - light gray, very fine sand, predominately high mica content, trace gravel sized particles up 1/4", rounded.	
	34.0					
35			GB			Very soft, smooth cuttings
	36.0					
	37.0		GB		Well graded SAND (SW) - predominately coarse, light gray.	
40						
	42.0					
	43.0		GB		Poorly graded SAND (SP) - dry, light gray, very fine sand, light mica content.	
45						
	47.0					
	48.0		GB		Silty SAND (SM) - predominately fine sand, moist, light brown, approximately 30% to 40% silt.	
	49.0		GB		Fat CLAY (CH) - very light gray, moist.	
50	50.0					
	51.0		GB		Poorly graded SAND with SILT (SP-SM) - predominately fine, light tan, approximately 10% to 15% silt, moist.	
	52.0		GB		Poorly graded SAND with SILT (SP-SM) - gray, moist, very fine sand, approximately 10% to 15% silt.	
55						
60						

PROJECT NUMBER:	BORING NUMBER:
661508	MW-5D SHEET 3 OF 6

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman
LOCATION : Freeman, Washington

ELEVATION : 2627.62 ft mslft NAVD88 (ground surface)
DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 210981.24, 2538577.23 (ft NAVD88)
DRILLING METHOD AND EQUIPMENT : Schramm T300, Air Rotary

WATER LEVEL:
START : 6/20/16 09:31 END : 6/21/16 13:54 LOGGER : J Freed

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
	60.0 61.0		GB		SAME AS ABOVE.	
65	65.0					approximately 64 feet bgs
	66.0		GB		SAME AS ABOVE.	approximate WL - measured following 3 hour shutdown due to broken shoe at 9:15
70	71.0					
	72.0		GB		Poorly graded SAND (SP) - predominately fine, red, trace fine gravel, sub rounded, high mica content.	
75	76.0					
	77.0		GB		Poorly graded SAND (SP) - fine, moist, light gray, well sorted, less than 10% silt.	
80	83.0					Becomes light tan
	84.0		GB		Poorly graded SAND with SILT (SP-SM) - moist, medium gray, predominately very fine sand, pulverized mica, approximately 10% to 15% silt sized particles.	Increasing moisture (slightly), becomes medium gray
85						Becomes dark gray
90						

PROJECT NUMBER:	BORING NUMBER:
661508	MW-5D SHEET 4 OF 6

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman
LOCATION : Freeman, Washington

ELEVATION : 2627.62 ft mslft NAVD88 (ground surface)
DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 210981.24, 2538577.23 (ft NAVD88)
DRILLING METHOD AND EQUIPMENT : Schramm T300, Air Rotary

WATER LEVEL:
START : 6/20/16 09:31 END : 6/21/16 13:54 LOGGER : J Freed

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
95	95.0				Poorly graded SAND with SILT (SP-SM) - moist, medium gray, predominately very fine sand, pulverized mica, approximately 10% to 15% silt sized particles.	Shoe broke at 91 feet shortly after drilling resumed. Contine from 91 feet 6/21/16 at 9:14 am Water accumulated to approximately 64 feet (TO = 76 feet due to caving/slaughing)
	96.0		GB		Silty SAND(SM) - wet, light gray, very fine sand, approximately 30% silt, soft.	Soft, putty-like consistency
100						Note: Discharge hose plugged. Water/clay causing issues. Note: Wet from 95 to 96 feet, decreasing water content to 100 feet.
	102.0					
	103.0		GB		SAME AS ABOVE - increasing sand grain size, decreasing moisture, wet.	Very clumpy, putty-like cuttings
105	105.0					
	106.0		GB		Silty SAND (ML) - wet, light gray, very fine sand, approximately 20% to 35% silt, soft, firm.	Increase in water content at 105 feet, decreasing silt content Note: wet from 105 to 108 feet, very 100k cuttings (soupy)
	107.0		GB		Poorly graded SAND with SILT (SP-SM) - very light gray, wet, loose, very fine sand, approximately 10% to 15% silt.	Decreasing water at 108 feet
110	110.0					
	111.0		GB		Silty SAND (SM) - wet, very fine sand, very light gray, approximately 30% to 40% silt, increasing firmness with depth.	Note: Drillers allowed time for settling at 110 feet and cleared the air lines, no water observed at surface while at 110 feet
115	115.0					
	116.0		GB		SAME AS ABOVE.	
120						

PROJECT NUMBER:	BORING NUMBER:
661508	MW-5D SHEET 5 OF 6

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman
LOCATION : Freeman, Washington

ELEVATION : 2627.62 ft mslft NAVD88 (ground surface)
DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 210981.24, 2538577.23 (ft NAVD88)
DRILLING METHOD AND EQUIPMENT : Schramm T300, Air Rotary

WATER LEVEL:
START : 6/20/16 09:31
END : 6/21/16 13:54
LOGGER : J Freed

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
	120.0 121.0		GB		SAME AS ABOVE.	Note: Water/much surfaces at start of drilling approximately 120-121 feet
125					SAME AS ABOVE.	Water/much at surface when air engaged, approximately 125 to 126 feet
130	130.0 131.0		GB			Note: water at surface when air engaged, approximately 130 to 131 feet
135						Note: water not observed at surface at start of drilling
140	140.0 141.0		GB		Poorly graded SAND (SP) - wet, very fine grained to fine grained, medium gray, clean.	Decreasing silt at approximately 139 feet 10-20 gallons gushes out at start of drilling
145	145.0 146.0		GB		Poorly graded SAND (SP) - wet, fine grained, medium gray, less than 10% silt.	2-5 gallons of wather gushes out at start of drilling
150						

PROJECT NUMBER:	BORING NUMBER:
661508	MW-5D SHEET 6 OF 6

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman
LOCATION : Freeman, Washington

ELEVATION : 2627.62 ft mslft NAVD88 (ground surface)
DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 210981.24, 2538577.23 (ft NAVD88)
DRILLING METHOD AND EQUIPMENT : Schramm T300, Air Rotary

WATER LEVEL:
START : 6/20/16 09:31
END : 6/21/16 13:54
LOGGER : J Freed

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
					Poorly graded SAND (SP) - wet, fine grained, medium gray, less than 10% silt.	Approximately 10 gallons of water at surface at start of drilling, less than previous depth (145) Water at top of casing during drilling
155	155.0				Well graded SAND with SILT (SW-SM) - wet, medium gray, soft, approximately 10% to 15% silt, sand particles are predominately coarse, angular clasts comprised primarily of quartz, calcite, feldspar, and mica, possible decomposed granite interface.	Note: increasing sand grain size - possible decomposed granite interface TD at 155 feet at 13:54 pm WL = 104.04 feet bgs
	156.0		GB			
160					Bottom of borehole at 160 ft bgs.	
165						
170						
175						
180						

PROJECT NUMBER:	BORING NUMBER:
661508	MW-5S SHEET 1 OF 2

SOIL BORING LOG

PROJECT : UPRR Freeman RI, Freeman, WA
LOCATION : 25' NE of Maintenance Shop

ELEVATION : 2627.62 ft NAVD88
DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 210992.76, 2538574.852 State Plane (ft)
DRILLING METHOD AND EQUIPMENT : Schramm T300, Sonic

WATER LEVEL:
START : 5/20/16 15:50
END : 5/20/16 18:00
LOGGER : Ruben Greer

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
					ASPHALT.	
					Sandy Gravel Road Base.	
					Sharp transition to Brown Fat CLAY (CL) - medium to high cohesiveness, medium plasticity, moist, trace coarse sand, very stiff.	
5						
					Brown lean CLAY (CL) - medium to low plasticity, medium to low cohesiveness, moist, very stiff.	0-8 Recovery 6'/8'
10						
15						
					SAME AS ABOVE (CL).	8-18 Recovery 10'/10'
20						
25						
					3" Clayey GRAVEL zone (GC) - poorly graded, fine sub angular, brown clay, moist possible wet zone..	
					Sharp transition to lean CLAY (CL) - brown with 10% coarse sub angular gravel, very stiff, decreasing moisture.	18-28 Recovery 11'/10'
30					Sandy CLAY (CL) - up to 20% very fine sand, moist, stiff, brown, low plasticity, low cohesiveness.	

PROJECT NUMBER:	BORING NUMBER:
661508	MW-5S SHEET 2 OF 2

SOIL BORING LOG

PROJECT : UPRR Freeman RI, Freeman, WA
LOCATION : 25' NE of Maintenance Shop

ELEVATION : 2627.62 ft NAVD88
DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 210992.76, 2538574.852 State Plane (ft)
DRILLING METHOD AND EQUIPMENT : Schramm T300, Sonic

WATER LEVEL:
START : 5/20/16 15:50
END : 5/20/16 18:00
LOGGER : Ruben Greer

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
					Clayey GRAVEL (GC) - well graded, 30% clay and brown clay, coarse sand, possible broken/weathered granite, up to 3" diameter clasts, sub angular to sub rounded.	
					Lean CLAY (CL) - gray with black and brown, with trace mica (black), moist, hard.	
35					Fat CLAY (CL) - white with trace brown coloring, medium to high plasticity, medium to high cohesiveness, moist, very stiff to hard.	
					SAME AS ABOVE (CL).	28-38 Recovery 11'/10'
40					Gray and brown lean CLAY (CL) - low plasticity, low cohesiveness, moist, medium stiff.	
					SAME AS ABOVE (CL) - increasing plasticity, increasing mica.	
45					Sharp transition to gray fine SAND, poorly graded (SP) - with possible trace sandstone, lightly cemented, moist, decreasing mica.	
					Gray lean CLAY (CL) - moist, medium stiff, with black mica and increasing brown clay with 5" fine sand.	38-48 Recovery 11'/10'
50					White CLAY with mica (CL) - medium plasticity, medium cohesive, moist, medium stiff.	
55					Transition to gray SAND, poorly graded, fine (SP) - with trace mica-flakes up to 1/2" diameter, moist, appears loose.	
60						48-58 Recovery 11'/10' TD @ 58 @ 1800 on 5-20-16

Boring terminated at 60 ft bgs.

PROJECT NUMBER:	BORING NUMBER:
661508	MW-6D SHEET 1 OF 8

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman

LOCATION :

ELEVATION : 2590.03 ft mslft NAVD88 (ground surface)

DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 209427.864, 2539181.874 (ft NAVD88)

DRILLING METHOD AND EQUIPMENT : Schramm T300 Rotodrill, Air Rotary

WATER LEVEL:

START : 7/11/2016

END : 7/11/2016

LOGGER :

DEPTH BELOW SURFACE (FT) / INTERVAL (FT) / RECOVERY (FT) / #TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
		SILTY CLAY (CL) with little fine to coarse sand, loose 0' to 6' then very stiff, dry to moist ~6', dark brown, trace organics.	
5			
		SILTY CLAY (CL) some fine to coarse sand throughout, little fine coarse subrounded gravel, reddish brown (oxidized) slightly moist, hard.	
10			
		SANDY CLAY (CL) grading to fine to medium sand, w/little silt/clay. Reddish brown Sandy Clay (CL), hard, some fine to coarse sand, little fine gravel, slightly moist..	
15		Fine to medium sand, little silt, abundant muscovite mica, moist, hard/dense.	
		Fine to medium sand with some fine to coarse angular gravel (SW) light gray with reddish brown oxidation, moist to wet, medium dense, abundant mica flakes, trace silt.	
20			
25		Silty Clay (CL), yellowish orange, moist, very stiff, trace dark gray mottling.	
		CLAY (ML) Blue gray with yellowish orange mottling, medium stiff, wet.	
30			

PROJECT NUMBER:	BORING NUMBER:
661508	MW-6D SHEET 2 OF 8

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman

LOCATION :

ELEVATION : 2590.03 ft mslft NAVD88 (ground surface)

DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 209427.864, 2539181.874 (ft NAVD88)

DRILLING METHOD AND EQUIPMENT : Schramm T300 Rotodrill, Air Rotary

WATER LEVEL:

START : 7/11/2016 END : 7/11/2016 LOGGER :

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
35					CLAYEY SILT (ML) with some fine to medium sand and trace weathered basalt fragments/fine to coarse gravel sized, yellowish orange and dark brown (oxidized), very moist to wet, medium stiff.	
40					CLAYEY SILT (ML), slightly plastic, some very fine to medium sand (30-40%) throughout, trace fine subangular to subrounded gravel, trace weathered basalt fragments, medium brown with oxidation, wet, soft to medium stiff..	
45					CLAYEY SILT (ML), with some very fine to medium sand, same as above, decreasing moisture from wet to slightly moist, medium stiff to dense, increasing weathered basalt fragments with depth..	
50					BASALT, dark gray and oxidized, dry, coarse gravel sized clasts, some silt.	
55					Become more competent, decreasing sand.	
60						

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-6D	SHEET 3 OF 8

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman
LOCATION :

ELEVATION : 2590.03 ft mslft NAVD88 (ground surface)
DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 209427.864, 2539181.874 (ft NAVD88)
DRILLING METHOD AND EQUIPMENT : Schramm T300 Rotodrill, Air Rotary

WATER LEVEL:
START : 7/11/2016
END : 7/11/2016
LOGGER :

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
					Competent BASALT, dry, angular, up to 1/2" diameter.	
65						
70					Same as above.	
					Fracture zone, wet, angular clasts up to 1" diameter.	
75					Competent, angular, up to 1/2" diameter, water from above.	
80					Same as above.	
85						
90						

PROJECT NUMBER:	BORING NUMBER:
661508	MW-6D SHEET 4 OF 8

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman LOCATION :

ELEVATION : 2590.03 ft mslft NAVD88 (ground surface) DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 209427.864, 2539181.874 (ft NAVD88) DRILLING METHOD AND EQUIPMENT : Schramm T300 Rotodrill, Air Rotary

WATER LEVEL: START : 7/11/2016 END : 7/11/2016 LOGGER :

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION
95						PID (ppm) Breathing Zone FID (ppm)
100						
105						
110					Same as above, water produced constantly.	
115						
120						

PROJECT NUMBER:	BORING NUMBER:
661508	MW-6D SHEET 5 OF 8

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman LOCATION :

ELEVATION : 2590.03 ft mslft NAVD88 (ground surface) DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 209427.864, 2539181.874 (ft NAVD88) DRILLING METHOD AND EQUIPMENT : Schramm T300 Rotodrill, Air Rotary

WATER LEVEL: START : 7/11/2016 END : 7/11/2016 LOGGER :

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION
						PID (ppm) Breathing Zone FID (ppm)
125						
130						
135						
140						
145						
150						

PROJECT NUMBER:	BORING NUMBER:
661508	MW-6D SHEET 6 OF 8

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman LOCATION :

ELEVATION : 2590.03 ft mslft NAVD88 (ground surface) DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 209427.864, 2539181.874 (ft NAVD88) DRILLING METHOD AND EQUIPMENT : Schramm T300 Rotodrill, Air Rotary

WATER LEVEL: START : 7/11/2016 END : 7/11/2016 LOGGER :

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
155					Same as above.	
160					Competent basalt, more subrounded, not as flake shaped. Same as above, increase in diameter, water.	
165					Subrounded BASALT, up to 1/3" diameter, as gravel, with tan and brown siltstone,.	
170					Same as above. Competent BASALT, more competent, less mineralization, more angular, harder drilling, thin fracture zones 172-175'.	
175					BASALT, more competent, decreasing tan mineralization/weathering, up to 1/2" diameter angular to subangular cuttings..	
180						

PROJECT NUMBER:	BORING NUMBER:
661508	MW-6D SHEET 7 OF 8

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman LOCATION :

ELEVATION : 2590.03 ft mslft NAVD88 (ground surface) DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 209427.864, 2539181.874 (ft NAVD88) DRILLING METHOD AND EQUIPMENT : Schramm T300 Rotodrill, Air Rotary

WATER LEVEL: START : 7/11/2016 END : 7/11/2016 LOGGER :

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
185					BASALT, more competent, decreasing tan mineralization/weathering, up to 1/2" diameter angular to subangular cuttings..	
190						
195						
200						
205						
210						

PROJECT NUMBER:	BORING NUMBER:
661508	MW-6D SHEET 8 OF 8

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman LOCATION :

ELEVATION : 2590.03 ft mslft NAVD88 (ground surface) DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 209427.864, 2539181.874 (ft NAVD88) DRILLING METHOD AND EQUIPMENT : Schramm T300 Rotodrill, Air Rotary

WATER LEVEL: START : 7/11/2016 END : 7/11/2016 LOGGER :

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
215					BASALT, more competent, decreasing tan mineralization/weathering, up to 1/2" diameter angular to subangular cuttings..	
220						
225						
230						
235					Bottom of borehole at 234 ft bgs.	
240						

PROJECT NUMBER:	BORING NUMBER:
661508	MW-6S SHEET 1 OF 2

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman

LOCATION : near school tennis courts

ELEVATION : 2590.45 ft mslft NAVD88 (ground surface)

DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.

COORDINATES : 209430.793, 2539171.036 (ft NAVD88)

DRILLING METHOD AND EQUIPMENT : Schramm T300 Rotodrill, Sonic

WATER LEVEL:

START : 6/27/16 00:25

END : 6/27/16 14:30

LOGGER : Nicole Badon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
0.0					SILTY CLAY (CL) with little fine to coarse sand, loose 0' to 6' then very stiff, dry to moist ~6', dark brown, trace organics.	
5		33.0				
7.0					SILTY CLAY (CL) some fine to coarse sand throughout, little fine coarse subrounded gravel, reddish brown (oxidized) slightly moist, hard.	
10		96.0				
12.0					SANDY CLAY (CL) grading to fine to medium sand, w/little silt/clay. Reddish brown Sandy Clay (CL), hard, some fine to coarse sand, little fine gravel, slightly moist..	
15		5.0				
					Fine to medium sand, little silt, abundant muscovite mica, moist, hard/dense.	
17.0					Fine to medium sand with some fine to coarse angular gravel (SW) light gray with reddish brown oxidation, moist to wet, medium dense, abundant mica flakes, trace silt.	
20		7.0				
25					Silty Clay (CL), yellowish orange, moist, very stiff, trace dark gray mottling.	
27.0					CLAY (ML) Blue gray with yellowish orange mottling, medium stiff, wet.	
30						

PROJECT NUMBER:	BORING NUMBER:
661508	MW-6S SHEET 2 OF 2

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman

LOCATION : near school tennis courts

ELEVATION : 2590.45 ft mslft NAVD88 (ground surface)

DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.

COORDINATES : 209430.793, 2539171.036 (ft NAVD88)

DRILLING METHOD AND EQUIPMENT : Schramm T300 Rotodrill, Sonic

WATER LEVEL:

START : 6/27/16 00:25

END : 6/27/16 14:30

LOGGER : Nicole Badon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
35		120.0			CLAYEY SILT (ML) with some fine to medium sand and trace weathered basalt fragments/fine to coarse gravel sized, yellowish orange and dark brown (oxidized), very moist to wet, medium stiff.	
	37.0					
40		113.0			CLAYEY SILT (ML), slightly plastic, some very fine to medium sand (30-40%) throughout, trace fine subangular to subrounded gravel, trace weathered basalt fragments, medium brown with oxidation, wet, soft to medium stiff..	
45	47.0					
50		146.0			CLAYEY SILT (ML), with some very fine to medium sand, same as above, decreasing moisture from wet to slightly moist, medium stiff to dense, increasing weathered basalt fragments with depth..	
	54.0				BASALT, dark gray and oxidized, dry, coarse gravel sized clasts, some silt.	
55					Bottom of borehole at 54 ft bgs.	
60						

PROJECT NUMBER:	BORING NUMBER:
661508	MW-6U SHEET 1 OF 4

Soil Boring Log

PROJECT : UPRR Freeman | LOCATION : Freeman, WA

GROUND ELEVATION : | DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES: | DRILLING METHOD AND EQUIPMENT : Air Rotary

WATER LEVEL : | START : 8/15/17 14:00 | END : 8/16/17 10:30 | LOGGER : S. Demus | Reviewed By :

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (%)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: SAMPLE TYPE, AIR MONITORING, PID (ppm) SOIL GAS MONITORING, FID (ppm)
	0.0				CLAY (CL), medium brown, dry, very firm, medium plasticity.	1400 - Begin drilling
5	5.0					
10	10.0				POORLY GRADED SAND (SP), with trace fines, sand up to 3mm in diameter, rounded, trace calcite and mica, medium brown.	
15	15.0				SAND WITH CLAY, predominantly fine micaceous and, white/light gray clay, dry, brittle clasts, grades with increased clay content, cuttings consisted of 1/2-1" clods, abundant mica.	
					SAND WITH CLAY, predominantly fine micaceous and, white/light gray clay, dry, brittle clasts, grades with increased clay content, cuttings consisted of 1/2-1" clods, abundant mica.	
20	20.0				CLAY (CL), with trace fine to medium micaceous sand, orange brown, dry, medium plasticity.	
25	25.0				CLAY (CL), lean, tan, plastic dry.	
					CLAY (CL), lean, tan, plastic dry.	
30						

UPRR 31ST, FREEMAN LOGS_LLT.GPJ, STOCK.GLB, 12/13/17

PROJECT NUMBER:	BORING NUMBER:
661508	MW-6U SHEET 2 OF 4

Soil Boring Log

PROJECT : UPRR Freeman | LOCATION : Freeman, WA

GROUND ELEVATION : | DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES: | DRILLING METHOD AND EQUIPMENT : Air Rotary

WATER LEVEL : | START : 8/15/17 14:00 | END : 8/16/17 10:30 | LOGGER : S. Demus | Reviewed By :

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (%)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: SAMPLE TYPE, AIR MONITORING, PID (ppm) SOIL GAS MONITORING, FID (ppm)
	30.0				SILTY CLAY (CL), damp, gray, slight plasticity.	
					CLAY (CL), trace medium to fine sand, slight plasticity, damp, medium brown, iron oxide deposits.	
35	35.0				CLAY (CL), with trace fine sand, medium brown, slight plasticity, damp, iron oxide deposits.	1600
40	40.0				CLAY (CL), with trace fine sand, medium brown, slight plasticity, damp, iron oxide deposits.	
45	45.0				CLAY (CL), with sand and gravel, fine basalt gravel, fine to coarse sand, iron oxide deposits, wet.	
50	50.0					8/16/17, 0745
					WEATHERED BASALT, angular fragments up to 1/2", heavily oxidized, platy, gray, wet.	
55	55.0				WEATHERED BASALT, poorly graded, gray with heavy oxidation, subrounded, wet.	Soft drilling
60						

PROJECT NUMBER:	BORING NUMBER:
661508	MW-6U SHEET 3 OF 4

Soil Boring Log

PROJECT : UPRR Freeman | LOCATION : Freeman, WA

GROUND ELEVATION : | DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES: | DRILLING METHOD AND EQUIPMENT : Air Rotary

WATER LEVEL : | START : 8/15/17 14:00 | END : 8/16/17 10:30 | LOGGER : S. Demus | Reviewed By :

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (%)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: SAMPLE TYPE, AIR MONITORING, PID (ppm) SOIL GAS MONITORING, FID (ppm)
	60.0				BASALT, vesicular, angular fragments up to 1/2", somewhat platy, wet.	Hard drilling
65	65.0				BASALT, vesicular, angular fragments up to 1/2", platy, wet.	Driller set seal around outer casing, drilling open hole
70	70.0				BASALT, vesicular, angular fragments up to 1/2", platy, wet.	
75	75.0				BASALT, less vesicles, up to 1/4" platy rock fragments, dry, black.	
80	80.0				BASALT, no vesicles, platy rock fragments up to 1/4", dry, black.	Hard drilling
85	85.0				BASALT, no vesicles, platy rock fragments up to 1/4", dry, black.	
90					BASALT, vesicular, subangular rock fragments up to 1/4", predominantly coarse sand sized, dry.	

PROJECT NUMBER:	BORING NUMBER:
661508	MW-6U SHEET 4 OF 4

Soil Boring Log

PROJECT : UPRR Freeman | LOCATION : Freeman, WA

GROUND ELEVATION : | DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES: | DRILLING METHOD AND EQUIPMENT : Air Rotary

WATER LEVEL : | START : 8/15/17 14:00 | END : 8/16/17 10:30 | LOGGER : S. Demus | Reviewed By :

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (%)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: SAMPLE TYPE, AIR MONITORING, PID (ppm) SOIL GAS MONITORING, FID (ppm)
	90.0				BASALT, vesicular, subangular rock fragments up to 1/4", predominantly coarse sand sized, dry.	Soft drilling
					BASALT, same as above, predominately fine gravel, up to 1/2".	
95	95.0				BASALT, trace vesicles, dry, black, predominately fine gravel up to 1/2", angular.	
					- no vesicles.	
100	100.0				BASALT, trace vesicles, dry, black, predominately fine gravel up to 1/2", angular, no vesicles.	
					BASALT, vesicular: subangular to angular, predominantly fine gravel fragments up to 1/2", dry, black.	
105	106.0				BASALT, no vesicles, subangular to angular, predominantly fine gravel fragments up to 1/2", dry, black.	
					Boring terminated at 106 ft bgs.	TD at 1030
110						
115						
120						

UPRR 31ST, FREEMAN LOGS_LLT.GPJ, STOCK.GLB, 12/13/17

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-7S (SB-03)	SHEET 1 OF 2

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman

LOCATION : E. of Silos, Just east of RR spur, 70 feet south of SB 01

ELEVATION : 2597.29 ft mslft NAVD88 (ground surface)

DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.

COORDINATES : 210943.125, 2539559.497 (ft NAVD88)

DRILLING METHOD AND EQUIPMENT : Schramm T300 Rotodrill, Sonic

WATER LEVEL:

START : 5/13/16 13:15

END : 5/13/16 15:15

LOGGER : RSG

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
0.0					Well graded sand w/gravel + silt, (SW), wet, topsoil.	
		100.0			Brown lean clay (CL), moist, stiff, medium plasticity, medium cohesive, trace mica + F. Sand.	
5						
8.0					Brown + gray lean clay (CL) w/ trace cementation, gray intermixed, moist, med plasticity, med cohesive, stiff.	
10					Same as above.	
					Sandy Clay (CL) gray, very fine, increase in moisture, soft, medium cohesive, med plasticity.	
		85.0			Transition to brown, olive/yellow+gray clay (CL) intermixed, weathered, moist, very stiff, some cementation decrease in moisture.	
15						
18.0					Reddish brown clay (CL), trace fine sand, trace cementation, low plasticity, low cohesiveness, moist.	
20					Reddish brown clay (CL) with gray + olive/yellow intermixed coloring, low plasticity, low cohesiveness, moist, stiff.	
		120.0			Same as above, decreasing olive/yellow + gray coloring, stiff.	
25					Gray clay with yellow mottling, moist, very stiff, low plasticity, low cohesiveness.	
					Same as above with decreasing to trace yellow monitoring.	
28.0					Gray reddish brown, brown clay (CL) w/ trace cemented clay, moist, low plasticity, low cohesive, stiff to very stiff.	
30						

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-7S (SB-03)	SHEET 2 OF 2

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman

LOCATION : E. of Silos, Just east of RR spur, 70 feet south of SB 01

ELEVATION : 2597.29 ft mslft NAVD88 (ground surface)

DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.

COORDINATES : 210943.125, 2539559.497 (ft NAVD88)

DRILLING METHOD AND EQUIPMENT : Schramm T300 Rotodrill, Sonic

WATER LEVEL:

START : 5/13/16 13:15

END : 5/13/16 15:15

LOGGER : RSG

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
					Gray reddish brown, brown clay (CL) w/ trace cemented clay, moist, low plasticity, low cohesive, stiff to very stiff.	
		100.0			Same as above.	
35					Tannish brown + reddish brown clay (CL) with clay stone clasts, moderately cemented up to 1/2" diameter, moist, low plasticity.	
	38.0				Gray clay (CL) with trace brown/reddish brown mottling, med plasticity, med cohesive, stiff, moist.	
40					Gray clay with gravel (CL) and basalt clasts, clasts up to 2" diameter, rounded to sub rounded, clay is low plasticity, low cohesive, moist.	
					Basalt, fractured, clasts up to 3" diameter, angular to subrounded, from 1/8" to 3" diameter, dry..	Hard Drilling
45						Harder Drilling
					Bottom of borehole at 48.5 ft bgs.	
50						
55						
60						

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-8S (SB-05)	SHEET 1 OF 2

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman

LOCATION : SE from MWS. S of garage door near chute

ELEVATION : 2603.66 ft mslft NAVD88 (ground surface)

DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 210890.721, 2539492.176 (ft NAVD88)

DRILLING METHOD AND EQUIPMENT : Schramm T300, Sonic

WATER LEVEL:

START : 5/17/16 11:00

END : 5/17/16 14:00

LOGGER : RSG

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
					Gravels.	
					Disturbed backfill clay, dark gray to gray, moist.	
5						
					Transition to native brown clay, lean, stiff, med plastic, med cohesive, moist.	
					Same as above (CL), moist, brown.	0-8' recovery 7'/8'
10						
					Increasing orange brown coloring (CL) same as above.	
15						
					Lean clay (CL), orange brown, olive and gray coloring intermixed, low plasticity, low cohesiveness, moist.	
					Tan sandy clay (CL), moist, soft, low plasticity, low cohesiveness.	8-18 11'/10' recovery
					Gravelly clay (CL), angular to subangular, up to 7 dia. possible increase in moisture.	
20					Brown sandy clay, very fine sand moist, soft.	
					Dark brown clay, with some cemented clay, trace olive yellow, low plastic, low cohesiveness, decreasig moisture.	
25						
					Brown clay (CL), trace fine sand, trace gray clay medium plastic, med cohesiveness.	
						18-28 recovery 9'/10'
30					Dark brown clay (CL) w/ orange/brown coloring intermixed moist.	

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-8S (SB-05)	SHEET 2 OF 2

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman

LOCATION : SE from MWS. S of garage door near chute

ELEVATION : 2603.66 ft mslft NAVD88 (ground surface)

DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 210890.721, 2539492.176 (ft NAVD88)

DRILLING METHOD AND EQUIPMENT : Schramm T300, Sonic

WATER LEVEL:

START : 5/17/16 11:00

END : 5/17/16 14:00

LOGGER : RSG

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
					Dark brown clay (CL) w/ orange/brown coloring intermixed moist.	
					Dark brown clay, moist, w/ yellow mottling, low plasticity, low cohesiveness.	
35					Clay, gray, yellow and reddish brown moist, stiff, low plasticity, low cohesiveness, some lightly cemented clay intermixed.	
					Clay (CL), brown with reddish brown and gray clay intermixed, low plasticity, low cohessiveness, moist.	28-38 recovery 12'/10'
40					Sandy/Clay (CL), moist, soft, very fine sand, med plasticity, med cohesiveness, gray, 40-41' bgp.	
					Clay (CL), gray with reddish brown coloring intermixed soft, med plastic, med cohesive.	
45					Gray and brown clay (CL), stiff, most, low plasticity, low cohesiveness, becoming siffer with depth.	
					Same as above (CL).	30-48 11'/10' recovery
50					Clay/silt, very stiff, no plasticity, low cohession.	
					Clayey gravel, basalt, angular, gray stiff clay fractured basalt, clasts up to 4 dia. moist, angular.	Hard drilling slow advancement
					Bottom of borehole at 53 ft bgs.	
55						
60						

PROJECT NUMBER:	BORING NUMBER:
661508	MW-9D SHEET 1 OF 4

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman
LOCATION : Freeman, WA

ELEVATION : 2599.24 ft mslft NAVD88 (ground surface)
DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 210758.768, 2539617.725 (ft NAVD88)
DRILLING METHOD AND EQUIPMENT : Mobile B-90, 5" hammer (7 1/2" hole)

WATER LEVEL:
START : 12/12/16 07:30
END :
LOGGER : R. McComb

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
0.0					LEAN CLAY (CL), dark reddish-gray (5YR 4/2), medium plasticity, moist, soft.	Background PID = 0.0 ppm Drilling starts at 0935 Sample for lithology taken every 5' or noticeable change in drilling character
5 5.0					LEAN CLAY (CL), brown (7.5YR 4/4), medium plasticity, moist, soft.	Breathing Zone = 0.1 ppm 5-10' - Breathing Zone = 0.1-0.2 ppm
10 10.0					LEAN CLAY (CL), brown (7.5YR 4/4), low plasticity, moist, soft; quartzitic sand, angular, with gray (7.5YR 4/1) silt/clay (ML/CL) then interbeds/laminae.	1005 - 10' bgs Breathing Zone = 0.1-0.2 ppm
15 15.0					LEAN CLAY (CL), brown (7.5YR 4/4), low to medium plasticity, most, soft, trace sand.	Breathing Zone = 0.1-0.2 ppm
20 20.0					LEAN CLAY (CL), strong brown (7.5YR 4/6), low to medium plasticity, moist to wet, soft; trace fine sand and silt.	At ~ 23', driller notes change in drilling characteristics "hard clay" and starts injecting water, water noted in borehole after drilling started at 20' (driller did not inject at that point)
25 25.0						
30						

PROJECT NUMBER:	BORING NUMBER:
661508	MW-9D SHEET 2 OF 4

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman
LOCATION : Freeman, WA

ELEVATION : 2599.24 ft mslft NAVD88 (ground surface)
DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 210758.768, 2539617.725 (ft NAVD88)
DRILLING METHOD AND EQUIPMENT : Mobile B-90, 5" hammer (7 1/2" hole)

WATER LEVEL:
START : 12/12/16 07:30
END :
LOGGER : R. McComb

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
	30.0				LEAN CLAY (CL), strong brown (7.5YR 4/6), wet, very soft.	
35	35.0				LEAN CLAY (CL), as above but with some coarse rock fragments (basaltic).	
40					LEAN CLAY (CL), as above, increase in percentage coarse sand-sized grains (basaltic rock fragments) - black, angular.	Very little returns at 40', drilling chatter changes at 41-42' to heavy chatter, top basalt - 41-42' possibly
45	45.0				45' - COARSE SAND - Basaltic Rock Fragments with some Weathered/Oxidized Rock Fragments 45-50' - BASALT, olive gray (5Y 3/2), angular to rounded fine sand to fine gravel; hard.	Breathing Zone = 0.6 ppm - Background
50					BASALT, as 45-50' with some light brown (5YR 5/6) rock fragment (oxidized).	50-55' Basalt is fractured and water bearing, driller adding no extra water
55	55.0				BASALT, same as -50-55' with some trace metallic sulfides (pyrite-like minerals).	0936 at 55' 50-55' - borehole reaches abundant water
60						DTW = 33' bgs at 58' depth (1015) MW9D-GW-58-121316 collected DTW = 33' bgs (1105)

PROJECT NUMBER:	BORING NUMBER:
661508	MW-9D SHEET 3 OF 4

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman
LOCATION : Freeman, WA

ELEVATION : 2599.24 ft mslft NAVD88 (ground surface)
DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 210758.768, 2539617.725 (ft NAVD88)
DRILLING METHOD AND EQUIPMENT : Mobile B-90, 5" hammer (7 1/2" hole)

WATER LEVEL:
START : 12/12/16 07:30
END :
LOGGER : R. McComb

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
65	65.0				BASALT, olive gray (5Y 3/2) up to coarse gravel-sized rock fragments; angular, little oxidation; trace pyrite-like metallic minerals.	60-70' - borehole produces abundant water
70					BASALT, olive gray (5Y 3/2) up to coarse gravel-sized rock fragments; angular, little oxidation; trace pyrite-like metallic minerals.	Borehole continues to produce water while drilling from 70-75' (driller estimates 10-15 gpm and notes volume of water has increased with depth)
75	75.0				BASALT, same as 60-70'; pyrite-like materials, more abundant (20-25%); some coarse gravel-sized rock fragments.	
80					BASALT, same as 75-80'.	
85	85.0				BASALT, olive gray (5Y 3/2) to dark yellowish-brown (10YR 4/2); pyrite absent; some vesicular basalt rock fragments; perhaps lightly oxidized grains.	At 85' - borehole continues water production Borehole produces water from 85-90'
90						

PROJECT NUMBER:	BORING NUMBER:
661508	MW-9D SHEET 4 OF 4

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman
LOCATION : Freeman, WA

ELEVATION : 2599.24 ft mslft NAVD88 (ground surface)
DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 210758.768, 2539617.725 (ft NAVD88)
DRILLING METHOD AND EQUIPMENT : Mobile B-90, 5" hammer (7 1/2" hole)

WATER LEVEL:
START : 12/12/16 07:30
END :
LOGGER : R. McComb

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
					BASALT, as 80-85' with some pyrite.	
					BASALT, (weathered) dark yellow brown; similar in angularity and grain size to the above basalt but with definite color change (oxidation).	Driller says color change in water at ~92' and drilling becomes "softer" Abundant water from 92-95'
95	95.0				BASALT, (weathered) olive gray (5Y 3/2) and dusky yellow brown (10YR 2/2) rock fragments; with weak weathered basaltic rock fragments easily broken, platy, clayey (dense), clay to fine/medium gravel sized grains.	95-100' - borehole continues to make water
100					WEATHERED BASALTIC ROCK FRAGMENTS, dark yellowish-brown (10YR 4/2) to grayish green (5Y 3/2), clayey to medium gravel sized, weak, clayey with trace serpentine-like sand-sized grains.	Borehole continues to make water from 100-105' bgs (screen from 85-95', 10 slot - 10' of screen), with 10-20, centralizer around screen
105	105.0				Bottom of borehole at 105 ft bgs.	
110						
115						
120						

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-9S (SB-04)	SHEET 1 OF 2

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman

LOCATION : SW of silds near Hwy 27 Row

ELEVATION : 2599.83 ft mslft NAVD88 (ground surface)

DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 210768.127, 2539599.562 (ft NAVD88)

DRILLING METHOD AND EQUIPMENT : Schramm T300, Sonic

WATER LEVEL:

START : 5/16/16 12:45

END : 5/16/16 14:30

LOGGER : RSG

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
					Gravelly clay (CL), moist, gray, gravel poorly graded, fine.	
					Transition to CL, (CL), lean, med plasticity, med cohesiveness brown, moist very stiff.	
					Same as above (CL).	
5						
					Same as above (CL).	
						0.8' recovery 6.5'/8.0'
10						
					2 Zone - clayey gravel (GC) rounded, poorly graded-coarse, brown, clay, moist, stiff.	
					Clayey gravel (CL), most, poorly graded, coarse, subangular, clsts up to 3'.	
15						
					Reddish brown clay w/fine sand (CL), no cohesion, low plasticity, moist.	
					Brown clay with sand (CL), med sand, brown, no cohesiveness, low plasticity, moist decreasing sand with depth, stiff.	8-18 recovery 9-5/10'
20						
					Brown, orange brown clay (CL), w/trace fine gravel, trace gray clay, non plastic, non cohesive, moist, stiff.	
25						
					Same as above.	
					Brown, gray, reddish-brown clay (CL) stiff, moist, low plasticity, low cohesivenes, moderately to light cemented clay intermixed withing, stiff.	18-28 10'/10' recovery
30						

PROJECT NUMBER:	BORING NUMBER:
661508	MW-9S (SB-04) SHEET 2 OF 2

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman

LOCATION : SW of silds near Hwy 27 Row

ELEVATION : 2599.83 ft mslft NAVD88 (ground surface)

DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 210768.127, 2539599.562 (ft NAVD88)

DRILLING METHOD AND EQUIPMENT : Schramm T300, Sonic

WATER LEVEL:

START : 5/16/16 12:45

END : 5/16/16 14:30

LOGGER : RSG

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
					Brown, gray, reddish-brown clay (CL) stiff, moist, low plasticity, low cohesivenes, moderately to light cemented clay intermixed withing, stiff. Same as above (CL) increasing yellow mottling intermixed.	
35					Reddish brown and gray clay (CL) stiff, moist, low plasticity, low cohesiveness, decreasing gray clay with depth.	
						28-38 10'/10' recovery
40					Gray sandy clay (CL), v fine sand, moist, stiff, low plasticity low cohesiveness.	
					Basalt-fractured and rubble w/powered basaltic gravel and sand, dry clasts up to 3-4 dia. ????.	Hard drilling
					Bottom of borehole at 43 ft bgs.	
45						
50						
55						
60						

PROJECT NUMBER:	BORING NUMBER:
661508	MW-9U SHEET 1 OF 3

Soil Boring Log

PROJECT : UPRR Freeman | LOCATION : Freeman, WA

GROUND ELEVATION : | DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES: | DRILLING METHOD AND EQUIPMENT : Air Rotary

WATER LEVEL : | START : 8/24/17 08:00 | END : 8/24/17 12:45 | LOGGER : S. Demus | Reviewed By :

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (%)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: SAMPLE TYPE, AIR MONITORING, PID (ppm) SOIL GAS MONITORING, FID (ppm)
	0.0					Background BZ = 0.0 ppm Begin drilling at 1015
5	5.0				LEAN CLAY (CL), medium plasticity, damp, hard, reddish-brown.	
						Breathing zone = 0.1 ppm
10	10.0				LEAN CLAY (CL), medium plasticity, damp, hard.	
15	15.0				CLAYEY SAND (SC), trace gravel, medium to coarse rounded/subrounded sand, abundant mica, fine rounded gravel, reddish-brown, damp.	
					LEAN CLAY (CL), medium plasticity, damp, soft, brown.	
20	20.0				- low plasticity, orange-brown, damp medium plasticity, olive, moist.	Noticeable water content increase
					LEAN CLAY (CL), medium plasticity, orange-brown, moist.	
25	25.0				LEAN CLAY (CL), medium plasticity, orange-brown, soft, moist.	Breathing zone = 0.1 ppm
30						

UPRR 31ST, FREEMAN LOGS_LLT.GPJ, STOCK.GLB, 12/13/17

PROJECT NUMBER:	BORING NUMBER:
661508	MW-9U SHEET 2 OF 3

Soil Boring Log

PROJECT : UPRR Freeman | LOCATION : Freeman, WA

GROUND ELEVATION : | DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES: | DRILLING METHOD AND EQUIPMENT : Air Rotary

WATER LEVEL : | START : 8/24/17 08:00 | END : 8/24/17 12:45 | LOGGER : S. Demus | Reviewed By :

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (%)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS SAMPLE TYPE, AIR MONITORING, PID (ppm) SOIL GAS MONITORING, FID (ppm)
	30.0				LEAN CLAY (CL), medium plasticity, orange-brown, soft, moist.	Breathing zone = 0.1 ppm
35	35.0				LEAN CLAY (CL), medium plasticity, orange-brown, sand-sized oxidized clods, wet, very soft.	1200 - discharge hose clogged with clay, drillers resolve
40	40.0				COARSE SAND, basaltic, trace fine gravel fragments, angular, dark gray/black with oxidation.	
45	45.0				WEATHERED BASALT, predominately fine angular gravel rock fragment to 1/4" with larger weathered/oxidized rock.	Breathing zone = 0.0 ppm
50	50.0				WEATHERED BASALT, predominately coarse sand and fine gravel sized, angular, black, trace weathering, black, dry.	
					BASALT, angular rock fragments up to 1/4", black, somewhat platy, dry.	
55	55.0					
60						

UPRR 31ST, FREEMAN LOGS_LLT.GPJ, STOCK.GLB, 12/13/17

PROJECT NUMBER:	BORING NUMBER:
661508	MW-9U SHEET 3 OF 3

Soil Boring Log

PROJECT : UPRR Freeman
LOCATION : Freeman, WA

GROUND ELEVATION :
DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES:
DRILLING METHOD AND EQUIPMENT : Air Rotary

WATER LEVEL : START : 8/24/17 08:00 END : 8/24/17 12:45 LOGGER : S. Demus Reviewed By :

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (%)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: SAMPLE TYPE, AIR MONITORING, PID (ppm) SOIL GAS MONITORING, FID (ppm)
	60.0				WEATHERED BASALT, predominately coarse sand sized angular rock fragments, some fine gravel size, trace oxidation, dry, black.	
					Beginning at fracture zone, abundant water BASALT, predominantly coarse sand with some fine grained, angular, wet, black heavy oxidation.	62' = abundant water Breathing zone = 0.0 ppm
65	65.0					
70	70.0					
75	75.0					Breathing zone = 0.0 ppm
80	80.0				Boring terminated at 80 ft bgs.	TD at 1430
85						
90						

UPRR 31ST, FREEMAN LOGS_LLT.GPJ, STOCK.GLB, 12/13/17

PROJECT NUMBER:	BORING NUMBER:
661508	MW-10S (SB-07) SHEET 1 OF 3

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman

LOCATION : N side of bus road

ELEVATION : 2615.77 ft mslft NAVD88 (ground surface)

DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 210659.14, 2539516.673 (ft NAVD88)

DRILLING METHOD AND EQUIPMENT : Schramm T300, Sonic

WATER LEVEL:

START : 5/20/16 09:10 END : 5/20/16 12:30 LOGGER : D. Butler

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
					Lean clay (CL), dark brown, low to med plasticity, moist, soft, roots.	
5					Fat clay (CH), light brown, med to high plasticity, damp, stiff.	0-8' recovery 8/8', some wire in core hard drilling
10					Fat clay (CH), gray, med plasticity, damp, stiff to very stiff.	
					Lean clay (CL), reddish brown, low plasticity, dry to damp, very soft, trace silt and sand.	
					Lean clay (CL), gray w/reddish brown, med, plasticity, soft, moist, trace sand.	
15					Lean clay w/sand (CL), gray to reddish brown, low plast., firm, dry to damp.	
					Lean clay w/sand (CL), reddish brown, non-plastic, firm to hard, dry, subangular to subrounded, mod. cementation.	
					Lean clay w/sand (CL), reddish brown, non-plastic, soft, damp, weak cementation, subang to subrounded.	8-18' recovery 9/10'
20						
					Lean clay (CL), reddish brown, low to med. plastic, soft, moist, trace sand.	
25					Same as above.	
					Same as above.	18-28' recovery 10/10'
30						

PROJECT NUMBER:	BORING NUMBER:
661508	MW-10S (SB-07) SHEET 2 OF 3

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman

LOCATION : N side of bus road

ELEVATION : 2615.77 ft mslft NAVD88 (ground surface)

DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 210659.14, 2539516.673 (ft NAVD88)

DRILLING METHOD AND EQUIPMENT : Schramm T300, Sonic

WATER LEVEL:

START : 5/20/16 09:10

END : 5/20/16 12:30

LOGGER : D. Butler

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
					Lean clay (CL), reddish brown, low to med. plastic, soft, moist, trace sand.	
					Lean clay w/sand (CL), light gray, low plast., very soft, damp, SA to SR.	
35						
					Same as above, (CL), reddish brown, yellow weathering/oxidation?/patches.	
						28-38' recovery 11/10'
					Lean clay (CL), reddish brown some gray, low to med. plast., firm, med. cementation, trace sand SA to SR, damp, green weathering intermittent.	
40						
45						
					Same as above.	
						38-48 recovery 11/10'
50						
					Lean clay (CL), reddish brow to gray, med. plastic, firm, moist.	
					Lean clay (CL), black to dark gray, med. plast., firm, moist, some yellow to red weathering, trace sand.	
55						
					Same as above (CL), gray.	
						48-58' recovery 11/10'
60						

PROJECT NUMBER:	BORING NUMBER:
661508	MW-10S (SB-07) SHEET 3 OF 3

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman

LOCATION : N side of bus road

ELEVATION : 2615.77 ft mslft NAVD88 (ground surface)

DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 210659.14, 2539516.673 (ft NAVD88)

DRILLING METHOD AND EQUIPMENT : Schramm T300, Sonic

WATER LEVEL:

START : 5/20/16 09:10 END : 5/20/16 12:30 LOGGER : D. Butler

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
					Lean clay (CL), black to dark gray, med. plast., firm, moist, some yellow to red weathering, trace sand.	
65					Same as above (CL), some mod. cementation.	
					Lean clay (CL), gray med. plast, very soft, moist.	58-68' recovery 10/10'
70						
					Weathered rock, reddish brown, med. cement (1/2 ft zone), Basalt cobbles w/ lean clay, black 3 in drain, ang. clasts.	
75					Transitioning to weathered basalt with lean clay, moist.	Possible thin water boring zone, hard drilling
					Fractured basalt, 3 in diam. max, lack of sand, angular, a light oxid. in some fracs., damp.	
					Bottom of borehole at 78 ft bgs.	
80						
85						
90						

PROJECT NUMBER:	BORING NUMBER:
661508	MW-11S (SB-17) SHEET 1 OF 3

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman

LOCATION : Bus parking area at school

ELEVATION : 2623.90 ft mslft NAVD88 (ground surface)

DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 210221.495, 2539509.983 (ft NAVD88)

DRILLING METHOD AND EQUIPMENT : Schramm T300 Rotodrill, Rotosonic

WATER LEVEL:

START : 6/28/16 11:23

END : 6/28/16 15:05

LOGGER : Nicole Badon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
					Silt (ML) with fine to coarse sand and fine angular gravel, loose, dry, medium brown, trace organics.	
					Silty clay (CL), slightly platic, medium brown, moist, very stiff to hard.	
5						
					Silty clay (CL), same as 2' to 7' slightly moist, trace coarse sand.	
10						
					Silty clay (CL), slightly plastic, medium brown, trace coarse sand, very stiff to hard, moist, very moist but no free water from ~ 13' to 15'.	
15						
					Silty clay (CL), same as 12' to 17', hard, moist.	
20						
25						
					Silty clay (CL), slightly plastic, medium brown, hard, trace medium to coarse sand, moist.	
30						

PROJECT NUMBER:	BORING NUMBER:
661508	MW-11S (SB-17) SHEET 2 OF 3

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman

LOCATION : Bus parking area at school

ELEVATION : 2623.90 ft mslft NAVD88 (ground surface)

DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 210221.495, 2539509.983 (ft NAVD88)

DRILLING METHOD AND EQUIPMENT : Schramm T300 Rotodrill, Rotosonic

WATER LEVEL:

START : 6/28/16 11:23

END : 6/28/16 15:05

LOGGER : Nicole Badon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
35					Silty clay (CL), slightly plastic, medium brown, hard, trace medium to coarse sand, moist.	
40					Silty clay (CL), same as above, trace fine to coarse subrounded to subangular gravel from 43'-45', oxidixed sand and gravel clasts present.	
45					Clay (CL), reddish brown (oxidized) with trace blue/gray mottling, trace medium sand, trace oxidized gravel, basalt fragments near 55' to 57', moist, very stiff to hard.	
50						
55					Silt (ML), slight plasticity, medium brown with blue/gray and white mottling, some decompossed basalt (~50%) throughout (black oxidized and soft), little very fine sand, trace clay, very moist/wet throughout.	
60						

PROJECT NUMBER:	BORING NUMBER:
661508	MW-11S (SB-17) SHEET 3 OF 3

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman

LOCATION : Bus parking area at school

ELEVATION : 2623.90 ft mslft NAVD88 (ground surface)

DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 210221.495, 2539509.983 (ft NAVD88)

DRILLING METHOD AND EQUIPMENT : Schramm T300 Rotodrill, Rotosonic

WATER LEVEL:

START : 6/28/16 11:23

END : 6/28/16 15:05

LOGGER : Nicole Badon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
65					Silt (ML), slight plasticity, medium brown with blue/gray and white mottling, some decompossed basalt (~50%) throughout (black oxidized and soft), little very fine sand, trace clay, very moist/wet throughout.	
70					Silt (ML), same as above with trace weathered basalt gravel (fine gravel sized), very moist/wet.	
75						
80					Silt (ML), reddish brown with light gray mottling, little very fine sand, some fine to coarse gravel, angular, black (weathered basalt), very moist to wet.	
85					Silt and decomposed basalt (weak), meduim gray with light brown oxidation, dry, little very fine sand.	Drilliner Notes rock @ 83'bgs
90					Silt and fine to coarse gravel-sized and cobble sized basalt, dark gray with some reddish brown oxidation, basalt is hard, little very fine sand, dry. Bottom of borehole at 87 ft bgs.	

PROJECT NUMBER:	BORING NUMBER:
661508	MW-12S (SB-24) SHEET 1 OF 2

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman
LOCATION :

ELEVATION : 2621.48 ft mslft NAVD88 (ground surface)
DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 211036.523, 2538995.318 (ft NAVD88)
DRILLING METHOD AND EQUIPMENT :

WATER LEVEL:
START : 7/20/2016
END : 7/20/16 11:20
LOGGER :

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
0.0					TOPSOIL.	
		3.0			Brown lean CLAY (CL) - with trace medium sand, very hard, lightly moist.	
5						
7.0					Tan-brown lean CLAY (CL) - with trace medium sand, hard, moist.	
10		6.0				
15					AS ABOVE - CLAY (CL) - becoming very hard.	
17.0					AS ABOVE.	
20		5.0				
					Sharp transition to decomposed GRANITE, significant MICA and oxidized medium SAND, becoming light gray granite with highly cemented granite gravel, moist, very hard.	Hard drilling
23.0					Highly weathered GRANITE to decomposing MICA, moist, firm, increasing oxidation.	
25		6.0				
					Gray weathered SAND/SILTSTONE, decreasing oxidation, very fine sand, gray, decreasing mica, moist.	Hard drilling
27.0					Increasing oxidation - dark brownish red color.	
					Weathered GRANITE mixed with very fine SAND/SILTSTONE, very hard, oxidized, dark red coloring with orange and gray, granite clasts up to 2" diameter with mica.	
30						Hard drilling

PROJECT NUMBER:	BORING NUMBER:
661508	MW-12S (SB-24) SHEET 2 OF 2

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman

LOCATION :

ELEVATION : 2621.48 ft mslft NAVD88 (ground surface)

DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 211036.523, 2538995.318 (ft NAVD88)

DRILLING METHOD AND EQUIPMENT :

WATER LEVEL:

START : 7/20/2016

END : 7/20/16 11:20

LOGGER :

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
		8.5			Becoming gray SANDSTONE/SILTSTONE - weathered, with oxidation, mica observed with trace granite gravel throughout.	
35						
	37.0				Transition to very hard mica SANDSTONE - weathered, light gray.	
					SANDSTONE - weathered, light gray with trace SILT content, very hard, moist, with mica.	
40					Transition to decomposed SANDSTONE - fine, light gray, loose, moist, trace to no mica, possible increase in moisture with depth.	
					SAME AS ABOVE - increasing moisture, increasing mica.	
45					SAME AS ABOVE - becoming more hard, decreasing moisture.	
	47.0				SAME AS ABOVE.	Allow boring to rearrange - 15 minutes - no water
50					Decomposed gray SANDSTONE, loose, probable increase in moisture, possibly wet, trace mica.	Easier advancement
		9.5			Gray decomposed/weathered SANDSTONE, fine, firm, increase in mica, decrease in moisture.	
55					Sharp transition to weathered/decomposed GRANITE - gray and orange brown, with sand with mica, moist, some oxidation.	
					Soft decomposed GRANITE, oxidized with mica, probable increase in moisture, gray and orange-brown.	
	57.0				Decomposed SANDSTONE - gray, decreasing mica, increasing hardness, decreasing moisture, decreasing oxidation.	
					Bottom of borehole at 57 ft bgs.	
60						

PROJECT NUMBER:	BORING NUMBER:
661508	MW-13S (SB-41) SHEET 1 OF 2

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman | LOCATION : Freeman, WA

ELEVATION : 2580.43 ft mslft NAVD88 (ground surface) | DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.

COORDINATES : 210219.558, 2540408.479 (ft NAVD88) | DRILLING METHOD AND EQUIPMENT : Schramm T300 4" x 6", Sonic

WATER LEVEL: | START : 2/14/2017 | END : 2/14/2017 | LOGGER :

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
0.0					LEAN CLAY (CL), very dark brown (7.5YR 2.5/2) to (7.5YR 2.5/3), moist; soft with root material, medium plasticity.	Drilling without using water
		6.0				
5					SILT (ML), strong brown (7.5YR 4/6), moist to dry, cohesive, stiff.	
6.0						SB41-SS-05
					SILT (ML), strong brown (7.5YR 4/6), moist to dry, cohesive, stiff.	
10						
		6.5				SB41-SS-10
					SILT (ML)/WELL GRADED SAND WITH SILT AND SAND (SW-SC), variegated strong brown to very dark gray (7.5YR 4/6) to (7.5YR 3/1), moist to slightly wet, cohesive, soft to slightly stiff, some gravel (weathered basalt).	Assumed 6.5 run was corresponded to (samples split amoung the 6.5 length of core estimated 10-15' ?)
15						
16.0						SB41-SS-15
					WELL GRADED SAND WITH SILT AND CLAY (SW-SC), variegated very dark gray (7.5YR 3/1) to (2.5Y 3/1) with depth; some strong brown layer/veins; with relic phenocrysts of yellow clay-rich material (2.5Y 8/6 to 2.5Y 7/8); moist, becoming wet with depth at ~25-26', trace well indurated/very hard siltstone-like rock fragment, possibly weathered basaltic rock fragments; fine to very fine grained sand material, cohesive, soft.	
20						
		10.0				SB41-SS-20
25						
26.0						SB41-SS-25
					WELL GRADED SAND WITH SILT AND CLAY (SW-SC), variegated very dark gray (7.5YR 3/1); black (7.5YR 2.5/1), strong brown (7.5YR 5/8), with veins/discontinuous thin laminae of silt/clay, yellow (2.5Y 8/6 to 2.5Y 7/8); wet at 26', moist with depth.	
30						

PROJECT NUMBER:	BORING NUMBER:
661508	MW-13S (SB-41) SHEET 2 OF 2

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman — LOCATION : Freeman, WA

ELEVATION : 2580.43 ft mslft NAVD88 (ground surface) — DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.

COORDINATES : 210219.558, 2540408.479 (ft NAVD88) — DRILLING METHOD AND EQUIPMENT : Schramm T300 4" x 6", Sonic

WATER LEVEL: — START : 2/14/2017 — END : 2/14/2017 — LOGGER :

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
35		10.0			WELL GRADED SAND WITH SILT AND CLAY (SW-SC), variegated very dark gray (7.5YR 3/1); black (7.5YR 2.5/1), strong brown (7.5YR 5/8), with veins/discontinuous thin laminae of silt/clay, yellow (2.5Y 8/6 to 2.5Y 7/8); wet at 26', moist with depth.	SB41-SS-30
	36.0				WEATHERED BASALT, silty to clayey, soft to very hard; with gravel up to 2-3" in length; black (10YR 2/1), mottled dark to slightly most.	Slower/harder drilling from 36-46' bgs SB41-SS-37 Collected (grap sample with bonifide oopen from 0-37') DTW at time of sampling was 26' bgs
40						SB41-SS-40
45	46.0				COMPETENT BASALT, greenish-gray to dark greenish gray (5G 6/1) to (5GY 4/1), dry, hard. Bottom of borehole at 46 ft bgs.	SB41-SS-45
50						
55						
60						

PROJECT NUMBER:	BORING NUMBER:
661508	MW-14D SHEET 1 OF 5

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman
LOCATION : Freeman, WA

ELEVATION : 2579.96 ft mslft NAVD88 (ground surface)
DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 210437.694, 2540106.311 (ft NAVD88)
DRILLING METHOD AND EQUIPMENT : Mobile B-90 Air Rotary, 6"

WATER LEVEL:
START : 1/25/17 09:00
END : 1/26/17 15:17
LOGGER : R. McComb

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
0.0					LEAN CLAY (CL), dark brown to very dark brown (7.5YR 3/3 to 7.5YR 2.5/3), moist, soft, medium plasticity.	0-7' - little resistance, soft quick drilling Breathing Zone = 0 ppm VOCs
5 5.0						
					LEAN CLAY (CL), brown (7.5YR 4/3), moist, soft, medium plasticity; with interlayered SILT (ML), brown (7.5YR 5/3), cohesive, soft.	Hard surface at ~7' bgs
10 10.0						
					LEAN CLAY (CL), brown (7.5YR 4/3), moist, soft, medium plasticity; with interlayered SILT (ML), brown (7.5YR 5/3), cohesive, soft.	Breathing Zone = 0.0 ppm VOCs
					LEAN CLAY (CL), very dark grayish brown (10YR 3/2) mottled brownish yellow (10YR 6/8) to yellow (10YR 7/8) silty inclusion; moist, soft, moderate plasticity; inclusions silty, stiff/medium dense, cohesive; trace black (10YR 2/1) silty inclusions, inclusion up to 1/8".	
15 15.0						
20 20.0						0925-0931 = 10-20'
					LEAN CLAY (CL), dark gray (10YR 4/1), soft, wet, medium plasticity with brownish-yellow (10YR 6/8) to yellow (10YR 7/8) silty inclusions, few to little weakly indurated very dark gray (10YR 3/1) rock fragments and silty reddish-brown to yellowish red (5YR 4/4 to 5YR 4/6) rock fragments.	Breathing Zone = 0 ppm VOCs Water at 20'; observed after rod connection made at 20-30' 0954-1005 = 20-28' Drilling paved at 10:05, drillers to use water to facilitate cuttings removal
25 25.0						
30						

PROJECT NUMBER:	BORING NUMBER:
661508	MW-14D SHEET 2 OF 5

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman
LOCATION : Freeman, WA

ELEVATION : 2579.96 ft mslft NAVD88 (ground surface)
DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 210437.694, 2540106.311 (ft NAVD88)
DRILLING METHOD AND EQUIPMENT : Mobile B-90 Air Rotary, 6"

WATER LEVEL:
START : 1/25/17 09:00
END : 1/26/17 15:17
LOGGER : R. McComb

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
	30.0				WEATHERED BASALT WITH CLAY, basalt is greenish black (5GY 2/1 with strong brown (7.5YR 5/8) clay; trace yellowish-green secondary minerals; few dark reddish-brown rock fragments; fine sand to fine gravel-sized rock fragments, wet.	Breathing Zone = 0 ppm 1247 - MW14D-30-012517 3 x 40 ml vials (HCl) for 8260 1256-1300 - 30-35' 32-33 1/2 - driller reports firmer material
35	35.0					1310-1314 - 35-40' Water is being injected into borehole below 30' bgs to facilitate cuttings removal
					LEAN CLAY (CL), with weathered rock fragments; clay very dark gray (10YR 3/1) to dark yellowish-brown (10YR 3/6), moist/wet; soft; low to moderate plasticity; subrounded to subangular weathered basaltic rock fragments, dark greenish-gray; few yellowish red rock fragments (10YR 7/8); trace white/light gray clay.	
40	40.0				CLAY (CL), olive gray (5Y 5/6), moist/wet, soft, low to moderate plasticity; with weathered basaltic rock fragments, dark greenish gray (5G 4/1), moderate greenish-yellow (10Y 7/9) to moderate yellow green (5GY 7/4) fine to coarse sand sized rock fragments; trace dark reddish brown (10YR 3/4) rock fragments.	Breathing Zone = 0.0 ppm 1322-1326 - 40-45' Driller says borehole is producing water from 40-45' (and possibly some from 35-40')
45	45.0				CLAY (CL), same as 40-45' but more dark reddish-brown (10R 3/4) rock fragments and less greenish/yellowish rock fragments.	Note: 40-45' abundant greenish rock fragments Water produced from 40-45' 1337-1346 - 45-50'
50	50.0				CLAY WITH WEATHERED ROCK FRAGMENTS, brown (10YR 4/3) to very dark gray (10YR 3/1) clay; soft, low plasticity; rock fragments, light brown (5YR 5/6) to dark reddish-brown (10R 3/4), fine sand to fine gravel-sized rock fragments; trace greenish/yellowish ?/clay.	Breathing Zone = 0.0 ppm Change to brown color in water
55	55.0				CLAY WITH WEATHERED ROCK FRAGMENTS, brown (10YR 4/3) to very dark gray (10YR 3/1) clay; soft, low plasticity; rock fragments, light brown (5YR 5/6) to dark reddish-brown (10R 3/4), fine sand to fine gravel-sized rock fragments; trace greenish/yellowish clay.	1420 at 55' 50-55' - significant drop in water production (casing is being advanced while drilling) 1428-1435 - 55-60'
60						

PROJECT NUMBER:	BORING NUMBER:
661508	MW-14D SHEET 3 OF 5

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman
LOCATION : Freeman, WA

ELEVATION : 2579.96 ft mslft NAVD88 (ground surface)
DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 210437.694, 2540106.311 (ft NAVD88)
DRILLING METHOD AND EQUIPMENT : Mobile B-90 Air Rotary, 6"

WATER LEVEL:
START : 1/25/17 09:00
END : 1/26/17 15:17
LOGGER : R. McComb

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
	60.0				Predominately yellowish-brown (10YR 5/8) ROCK FRAGMENTS WITH CLAY, dark to olive gray (5Y 4/1 to 5Y 4/2).	1443-1452 - 60-65' Breathing Zone = 0.0 ppm At 55-60' - little to no water being produced
65	65.0				As 60-65' with trace white/light gray clay (10YR 8/1 to 10YR 7/1).	60-65' - very little water evacuated from borehole while drilling through interval
70	70.0				CLAY (CL), light gray (10YR 7/1) silty with trace coarse sand/fine gravel rock fragments, moist/wet.	End at 71' on 1/25/17 Begin at 71' on 1/26/17 Water in borehole initially; dissipated below 71'
75	75.0				CLAY (CL), yellowish red to reddish yellow (5YR 5/8 to 5YR 6/8), moist/wet, silty.	
					CLAY (CL), light gray (10YR 7/1) silty with trace coarse sand/fine gravel rock fragments, moist/wet.	1536 -NA - 75'
					SILT (ML), yellow to brownish yellow (10YR 7/8 to 10YR 6/8), moist to dry, slightly cohesive; clayey.	
80	80.0				SILT (ML), yellow to brownish yellow (10YR 7/8 to 10YR 6/8), wet, slightly cohesive; clayey, trace/few fine sand grains.	0900 - 80' bgs Breathing Zone = 0.0 ppm
85	85.0				SILT (ML), as above (80-85'), little/no returns to base lithology, color change to predominately yellowish-brown (10YR 5/8) to brownish yellow (10YR 6/8).	0913 - 85' bgs Breathing Zone = 0.0 ppm Connection at 85-90' - No water was evacuated At 86' - driller needs to add water in order to get cuttings out of hole At 88 1/2' - driller says there was a change in drilling characteristics
90						

PROJECT NUMBER:	BORING NUMBER:
661508	MW-14D SHEET 4 OF 5

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman
LOCATION : Freeman, WA

ELEVATION : 2579.96 ft mslft NAVD88 (ground surface)
DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 210437.694, 2540106.311 (ft NAVD88)
DRILLING METHOD AND EQUIPMENT : Mobile B-90 Air Rotary, 6"

WATER LEVEL:
START : 1/25/17 09:00
END : 1/26/17 15:17
LOGGER : R. McComb

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
	90.0				SILT (ML), same as 85-90', yellowish brown to brownish yellow (10YR 5/8 to 6/8) silty sandy.	0931-0942 - 85-90' Breathing Zone = 0.0 ppm 85-90' - little cuttings returned, no water either 0952-1001 - 90-95' 1016-1029 - 95-100' Breathing Zone = 0.0 ppm
95	95.0				SILT (ML), same as 90-95',trace coarse sand material.	Driller continues to periodically add water to get cuttings out of hole
100	100.0				SILT (ML), same as 95-100',trace coarse sand material, micaceous.	1037-1157 - 100-105'
105	105.0				WELL GRADED SAND WITH SILT AND CLAY (SW), gray (10YR 6/1) to light gray (10YR 7/1), wet, medium to coarse grained, angular; quartzitic with mica; feldspathic.	1159-1207 - 105-110' Breathing Zone = 0.0 ppm VOC 105' - Washed away abundant fine grained interval in cuttings in order to see granular material At 105.5 - driller reports hearing granular material in discharge piping
110	110.0				WELL GRADED SAND WITH SILT AND CLAY (SW), gray (10YR 6/1) to light gray (10YR 7/1), wet, medium to coarse grained, angular; quartzitic with mica; feldspathic.	1216-1255 - 110-115' (paused at 114' to drain borehole with project management) Breathing Zone = 0.0 ppm VOCs
115	115.0				WELL GRADED SAND WITH SILT AND CLAY (SW), gray (10YR 6/1) to light gray (10YR 7/1), wet, medium to coarse grained, angular; quartzitic with mica; feldspathic.	1320-1338 - 115-20' Paused at ~119' for 10 minutes - blew water (borehole produced water)
120						

PROJECT NUMBER:	BORING NUMBER:
661508	MW-14D SHEET 5 OF 5

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman
LOCATION : Freeman, WA

ELEVATION : 2579.96 ft mslft NAVD88 (ground surface)
DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 210437.694, 2540106.311 (ft NAVD88)
DRILLING METHOD AND EQUIPMENT : Mobile B-90 Air Rotary, 6"

WATER LEVEL:
START : 1/25/17 09:00
END : 1/26/17 15:17
LOGGER : R. McComb

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
	120.0				WELL GRADED SAND WITH SILT AND CLAY (SW), gray (10YR 6/1) to light gray (10YR 7/1), wet, medium to coarse grained, angular; quartzitic with mica; feldspathic.	1347-1352 - 120-125' Breathing Zone = 0.0 ppm VOC
125	125.0				WELL GRADED SAND WITH SILT AND CLAY (SW), gray (10YR 6/1) to light gray (10YR 7/1), wet, medium to coarse grained, angular; quartzitic with mica; feldspathic.	
130	130.0				WELL GRADED SAND WITH SILT AND CLAY (SW), gray (10YR 6/1) to light gray (10YR 7/1), wet, medium to coarse grained, angular; quartzitic with mica; feldspathic.	1400-1407 - 130' Breathing Zone = 0.0 ppm VOC Borehole producing water
135	135.0				WELL GRADED SAND WITH SILT AND CLAY (SW), same as 130-135' with abundant coarse sand/fine gravel white feldspar grains, quartzitic, micaceous.	1412-1416 - 135' Borehole produces water 130-135' - perhaps more water made in this interval Breathing Zone = 0.0 ppm VOC
140	140.0				WELL GRADED SAND WITH SILT AND CLAY (SW), same as above, with less coarse sand/fine gravel-sized feldspar.	1425-1431 - 140' Breathing Zone = 0.0 ppm VOC 135-140' - borehole produces abundant water
145	145.0				Bottom of borehole at 145 ft bgs.	1510-1517 - 145' Breathing Zone = 0.0 ppm VOC 140-145' - abundant water
150						

PROJECT NUMBER:	BORING NUMBER:
661508	MW-15D SHEET 1 OF 5

SOIL BORING LOG

PROJECT : Freeman, Washington
LOCATION : Freeman, WA

ELEVATION : 2551.70 ft mslft NAVD88 (ground surface)
DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.

COORDINATES : 209006.34898, 2539355.881931 (ft NAVD88)
DRILLING METHOD AND EQUIPMENT : Schramm T300, Air Rotary

WATER LEVEL:
START : 6/26/17 11:02
END : 6/27/17 12:52
LOGGER : J. Freed

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
0.0			GB		CUTTINGS: SILT (ML), dark brown, moist, soft, non-plastic and massive.	1102
5 5.0			GB		CUTTINGS: FAT CLAY (CH), olive-tan, moist, stiff, high plasticity, increasing stiffness with depth, massive.	1105 1115 *Note: Issue with cuttings hose, crew replaced connecting end.
10 10.0			GB			1118 1125
15 15.0			GB		CUTTINGS: WELL GRADED SAND (SW), brown, moist, medium dense, possible transition zone 13-15' from clay to sand, subangular, up to 1/4" clasts, <15% pea-sized gravel.	*Minor amounts of pea-sized basalt clasts.
			GB		BASALT, gray, vesicular, 1/8" to 3/4" angular to sub-rounded rubble, possible weathered basalt, horizon, wet.	1130 - *Water present at start f drilling.
20 20.0			GB		CUTTINGS: BASALT, gray/bluish-gray, 1/8-1/4" subangular clasts, massive, competent, wet to ~21.5' bgs where becomes dry, becomes black at ~24.5' bgs.	Hard drilling, increasing with depth.
25 25.0			GB			1453 1534 Collected GW sample (grab) - WL = 16.5' bgs (rising) MW15U-GW-2D-062617 @ 1515 Note: Driller tripped out at 20' bgs & converted to open-hole.
30			GB			1542 1550 *Water pressure at start of drilling *Cuttings do not appear to be competent basalt based on physical appearance.

PROJECT NUMBER:	BORING NUMBER:
661508	MW-15D SHEET 2 OF 5

SOIL BORING LOG

PROJECT : Freeman, Washington
LOCATION : Freeman, WA

ELEVATION : 2551.70 ft mslft NAVD88 (ground surface)
DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.

COORDINATES : 209006.34898, 2539355.881931 (ft NAVD88)
DRILLING METHOD AND EQUIPMENT : Schramm T300, Air Rotary

WATER LEVEL:
START : 6/26/17 11:02
END : 6/27/17 12:52
LOGGER : J. Freed

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
	30.0		GB		CUTTINGS: BASALT, gray/bluish-gray, 1/8-1/4" subangular clasts, massive, competent, wet to ~21.5' bgs where becomes dry, becomes black at ~24.5' bgs.	
35	35.0		GB		CUTTINGS: BASALT, layer clast size ranging from 1/4" to 1/2", flat, sub-angular, black.	Harder drilling 34-36', possible increase in water.
			GB		CUTTINGS: BASALT, as above, clast size decreased to 1/8-1/4".	1602 1613 *Water present at start-up, dries out after 1 ft or so.
40	40.0		GB		CUTTINGS: BASALT, as above.	
45	45.0		GB		CUTTINGS: BASALT, as above.	1626 1629 *Water present at start-up, dries out after 1 ft or so.
50	50.0		GB		CUTTINGS: BASALT, as above.	
55	55.0		GB			1645 *Water present and start-up, dries out after ~1 ft.
60						

PROJECT NUMBER:	BORING NUMBER:
661508	MW-15D SHEET 3 OF 5

SOIL BORING LOG

PROJECT : Freeman, Washington
LOCATION : Freeman, WA

ELEVATION : 2551.70 ft mslft NAVD88 (ground surface)
DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.

COORDINATES : 209006.34898, 2539355.881931 (ft NAVD88)
DRILLING METHOD AND EQUIPMENT : Schramm T300, Air Rotary

WATER LEVEL:
START : 6/26/17 11:02
END : 6/27/17 12:52
LOGGER : J. Freed

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
	60.0		GB			
65	65.0		GB			1705 - DTW = 64.95 ft btc at 1730 0910 - Drilling resumes (pre DTW = 18.45 bgs)
70	70.0		GB		CUTTINGS: BASALT, dark gray, pulverized fine to 1/2" clast, sub-angular, wet.	
75	75.0		GB		CUTTINGS: BASALT, as above, minor amounts of mineralization on random clasts, <5%, dry.	925 929
80	80.0		GB		CUTTINGS: BASALT, dark gray, 1/8-1/2" clasts, sub-angular, dry, no sign of oxidation or mineralization.	
85	85.0		GB		CUTTINGS: BASALT, dark gray, oxidation present on approximately 45% of hard sample, 1/8-1/4" clasts, angular, dry.	945 950
90						

PROJECT NUMBER:	BORING NUMBER:
661508	MW-15D SHEET 4 OF 5

SOIL BORING LOG

PROJECT : Freeman, Washington
LOCATION : Freeman, WA

ELEVATION : 2551.70 ft mslft NAVD88 (ground surface)
DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.

COORDINATES : 209006.34898, 2539355.881931 (ft NAVD88)
DRILLING METHOD AND EQUIPMENT : Schramm T300, Air Rotary

WATER LEVEL:
START : 6/26/17 11:02
END : 6/27/17 12:52
LOGGER : J. Freed

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
	90.0		GB		CUTTINGS: BASALT, gray/bluish-gray, 1/8-1/4" subangular clasts, massive, competent, wet to ~21.5' bgs where becomes dry, becomes black at ~24.5' bgs.	Oxidation present ~90-95'
95	95.0				CUTTINGS: BASALT, dark gray, 1/8-1/4" angular to sub-angular clasts, no oxidation or mineralization present, dry.	[no oxidation ~94-100']
			GB			1002 1005
100	100.0					
			GB		CUTTINGS: BASALT, dark gray, 1/8" sized clasts predominately, oxidation present on the majority of hard sample, dry.	Oxidation present at 101 ft [no oxidation ~102-105']
105	105.0					
			GB		CUTTINGS: BASALT, as above, wet (driller assumes water is form above - sat for 13 minutes).	1017 1030 Oxidation present at 106' Note: Possible fracture at 107', loss of drilling dust at surface and softer drilling conditions, oxidized cuttings.
110	110.0					
			GB			[less oxidized 110-112']
115	115.0					Softer drilling 115-116', possible fracture.
			GB		CUTTINGS: BASALT, dark gray to rust-orange oxidized clasts (50%), 1/8-1/2", angular to sub-angular, wet (water bearing zone), vesicular.	1038 1040 *Increased water at start of drilling, and throughout drilling
120					CUTTINGS: BASALT, as above with smaller sized oxidized clasts.	

PROJECT NUMBER:	BORING NUMBER:
661508	MW-15D SHEET 5 OF 5

SOIL BORING LOG

PROJECT : Freeman, Washington
LOCATION : Freeman, WA

ELEVATION : 2551.70 ft mslft NAVD88 (ground surface)
DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.

COORDINATES : 209006.34898, 2539355.881931 (ft NAVD88)
DRILLING METHOD AND EQUIPMENT : Schramm T300, Air Rotary

WATER LEVEL:
START : 6/26/17 11:02
END : 6/27/17 12:52
LOGGER : J. Freed

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
120.0			GB		CUTTINGS: BASALT, dark gray, 1/16-1/8" vesicular clasts, angular to sub-angular, 15-20% oxidation.	Decreased clast size and oxidized particles. *Saturated 116-126'
					CUTTINGS: BASALT with gouge and oxidized particles, gouge/clay up to 1" clasts, easily breaks with light hand pressure, vesicular, basalt, clasts up to 1/4", possible water bearing fracture zone.	Softer drilling at 122'
125 125.0					CUTTINGS: BASALT, dark gray, 1/8-1/2", sub-angular, vesicular, white mineralization present on approximately 30% of clasts in hand sample, wet.	1048 1230 *Out of rods, drilling will resume when supplies are obtain.
			GB			1230 - Drilling resumes at 126'
130 130.0						
			GB		CUTTINGS: BASALT, dark gray, vesicular, oxidized clasts approximately 50% in hard sample, rust-orange to tan/white particles up to 1/2" diameter, angular, wet.	
135 135.0						
			GB			1240 1242 Decreasing oxidation with depth.
140 140.0						
			GB			*Harder drilling at 141' bgs.
					CUTTINGS: BASALT, dark gray, 1/8-1/4" angular clasts, massive, minor oxidized particles, <5%, wet, no vesicles observed.	
145						
146.0					CUTTINGS: BASALT, dark gray, 1/16-1/4" angular chips, very minor oxidized particles present (<5%), wet, no vesicles observed.	
					Boring terminated at 146 ft bgs.	
150						

PROJECT NUMBER:	BORING NUMBER:
661508	MW-16D SHEET 1 OF 4

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman
LOCATION : Steve Ashur Property

ELEVATION : 2566.45 ft mslft NAVD88 (ground surface)
DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.

COORDINATES : 206442.299, 2536284.241 (ft NAVD88)
DRILLING METHOD AND EQUIPMENT : Schramm T300 6"

WATER LEVEL:
START : 12/20/16 13:10
END : 12/28/16 11:15
LOGGER : S. Demus/R. Greer

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
					LEAN CLAY (CL), orange-brown, medium plasticity, moist, soft.	Background VOC - 0.0 ppm
5	5.0					Breathing zone (BZ) = 0.0 ppm
10						
15						1340 BZ = 0.0 ppm
	17.0				SANDY LEAN CLAY (CL), 10-15% fine sand, low plasticity, moist, soft.	
20						
	23.0				LEAN CLAY (CL), orange-brown, medium plasticity, wet, soft.	1510 BZ = 0.1 ppm
25						No cuttings generated, limited air return, wet soil surfacing beneath rear of drill rig
30						

PROJECT NUMBER:	BORING NUMBER:
661508	MW-16D SHEET 2 OF 4

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman
LOCATION : Steve Ashur Property

ELEVATION : 2566.45 ft mslft NAVD88 (ground surface)
DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.

COORDINATES : 206442.299, 2536284.241 (ft NAVD88)
DRILLING METHOD AND EQUIPMENT : Schramm T300 6"

WATER LEVEL:
START : 12/20/16 13:10
END : 12/28/16 11:15
LOGGER : S. Demus/R. Greer

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
					LEAN CLAY (CL), orange-brown, medium plasticity, wet, soft.	
35						
40						1545
					No cuttings.	1635 - resume at 0820 12/21/16 No circulation - no cuttings, very slow advancement PID at 41' bgs = NDS, O_z = 20.9 0930 = PID ~ 43' = NDS, O_z = 20.9
	44.0					
45					CUTTINGS: BROWN LEAN CLAY (CL), moist, appears very stiff, trace fine sand, trace biotite (limited cuttings produced).	
	48.0					Easier drilling
					CUTTINGS: BROWN LEAN CLAY WITH BASALTIC GRAVEL/CLASTS, highly weathered, moist.	
50	50.0					
					CUTTINGS: BASALT CLASTS, subrounded to subangular, some vesicles with clay, 1/4" to 1/2" diameter.	
55						
	56.0					
					Transitioning to BASALT, rounded to subrounded, 1/16" to 1/4" diameter, weathered with sand and brown clay.	Easy advancement
60						

PROJECT NUMBER:	BORING NUMBER:
661508	MW-16D SHEET 3 OF 4

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman
LOCATION : Steve Ashur Property

ELEVATION : 2566.45 ft mslft NAVD88 (ground surface)
DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.

COORDINATES : 206442.299, 2536284.241 (ft NAVD88)
DRILLING METHOD AND EQUIPMENT : Schramm T300 6"

WATER LEVEL:
START : 12/20/16 13:10 END : 12/28/16 11:15 LOGGER : S. Demus/R. Greer

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
					Transitioning to BASALT, rounded to subrounded, 1/16" to 1/4" diameter, weathered with sand and brown clay.	
	64.0					
65					BASALT, becoming more fine basaltic sand and gravel <1/4" diameter, subrounded to rounded, weathered.	Easy advancement
70	70.0				BASALT, 1/16" to 1/4" diameter, weathered, increasing diameter, subrounded.	
75	75.0				Increasing diameter - BASALT, BASALT GRAVEL, subrounded, coarse - 3/8" diameter with fine to coarse sand.	Driller indicates gravelly conditions, cyclone getting clogged muffled drill action
80	80.0				BASALT, BASALT GRAVEL, subrounded, coarse - 3/8" diameter with fine to coarse sand.	Steady advancement
85	85.0				BASALT, 1/8" to 3/8" diameter, becoming more angular, subangular to angular, fractured, weathered.	
	87.0				BASALT, angular, more competent, 1/8" to 3/8" diameter, with fine sand decreasing.	Harder drilling - slower, hard material increase in water - mud
	89.0				BASALT, more weathered, subrounded, up to 1/2" diameter.	Breakthrough - fracture/rubble conditions
90						

PROJECT NUMBER:	BORING NUMBER:
661508	MW-16D SHEET 4 OF 4

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman
LOCATION : Steve Ashur Property

ELEVATION : 2566.45 ft mslft NAVD88 (ground surface)
DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.

COORDINATES : 206442.299, 2536284.241 (ft NAVD88)
DRILLING METHOD AND EQUIPMENT : Schramm T300 6"

WATER LEVEL:
START : 12/20/16 13:10
END : 12/28/16 11:15
LOGGER : S. Demus/R. Greer

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
	91.0				BASALT, more weathered, subrounded, up to 1/2" diameter.	Water generated when air applied 1503
					BASALT, subangular to subrounded, 1/8" to 1/2" diameter, oxidation observed.	Hard drilling Water constantly generated
					BASALT, becoming more fine, angular, decreasing oxidation, 1/8" to 3/8" diameter.	Increasing water production
95						Easier drilling fracture area Harder drilling
	98.0					Harder drilling
					BASALT, angular, "flakes" of BASALT trace oxidation 1/8" to 1/4" diameter.	
100						1605
					CUTTINGS: Same as above.	Hard drilling
105						Fracture zone - easy advancement
	107.0					Increase in water at 106' fracture zone
					BASALT, angular to subangular, ~1/4" diameter, trace oxidation, more competent at 109'.	Harder drilling - slower rate at 107'
	109.0					
110					CUTTINGS: BASALT, trace oxidation, 1/8" to 1/4" diameter, subangular to angular, "flakes", increasing competent.	
	110.5					
					Bottom of borehole at 110.5 ft bgs.	Terminated drilling at 110' at 1625 12/22/16 12/17/16 at 1047 DTW = 96.9' bgs TD = 110.5' bgs PID in BZ, HS = 0.0 ppm Installed a 2" schedule 40 PVC monitoring well with 0.010" slotted screen from 105' to 90' bgs, see UPRR Freeman field notebook for installation details
115						
120						

PROJECT NUMBER:	BORING NUMBER:
661508	MW-17D SHEET 1 OF 8

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman | LOCATION : Freeman, WA

ELEVATION : | DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.

COORDINATES : (ft NAVD88) | DRILLING METHOD AND EQUIPMENT : Air Rotary, Hammer Bit

WATER LEVEL: | START : 4/3/17 10:10 | END : 4/3/2017 | LOGGER : R. McComb

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
5	5.0				LEAN CLAY (CL), brown (2.5YR 4/3), moist, soft, low to medium plasticity.	Drilling with no water being added, advancing outer casing
10	10.0				SILT (ML), brown (7.5YR 4/3), moist, medium stiff, little clay; with trace very fine quartzite sand, become strong brown (7.5YR 4/6) with depth.	10:31 at 10' BZ = 0.0 ppm 10:38 - resume drilling
					LEAN CLAY (CL), gray to dark gray (7.5YR 5/1) to 7.5YR 4/1), dry, stiff, low plasticity; with gravel up to 1/2-3/4", low to angular quartzite.	
15	15.0				LEAN CLAY (CL), as 12-13' (quartzite absent), becoming grayish brown (10YR 5/2) to brown (10YR 5/3) with depth (> .5').	Role of penetration increase from 12-13', then decrease below 13'
					LEAN CLAY (CL)/SILT (ML), brown (7.5YR 5/4) to strong brown (7.5YR 5/6), dry, stiff, low plasticity clay; thinly laminated with gray clay.	
					LEAN CLAY (CL), grayish brown to dark brown (10YR 5/2 to 10YR 5/3), dry, stiff to very stiff, nonplastic.	
20	20.0				LEAN CLAY (CL), grayish to dark gray (10YR 5/1 to 10YR 4/1), moist, soft, low plasticity, trace/few silt.	Moist cuttings 19-20'
					LEAN CLAY (CL) with SILT (ML), mottled brown (10YR 5/3) to light brownish gray (10YR 6/2), moist, soft, nonplastic.	11:36 at 20' 11:47 - resume drilling - no water in borehole - moist cuttings
25	25.0				SILT (ML), reddish brown (5YR 5/4)) to yellowish red (10YR 5/6), moist, slightly cohesive, trace clay.	
30						

PROJECT NUMBER:	BORING NUMBER:
661508	MW-17D SHEET 2 OF 8

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman
LOCATION : Freeman, WA
ELEVATION :
DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.
COORDINATES : (ft NAVD88)
DRILLING METHOD AND EQUIPMENT : Air Rotary, Hammer Bit
WATER LEVEL:
START : 4/3/17 10:10
END : 4/3/2017
LOGGER : R. McComb

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
	30.0				SILT (ML), reddish brown (5YR 5/4)) to dark reddish brown (5YR 3/4), moist, soft, slightly cohesive, some clay with depth.	11:56 at 30' (rapid drilling from 20-30'), moist cuttings 12:05 - resume drilling - no visible water in borehole
35	35.0				SILT (ML), as above with dark brown (7.5YR 3/2) clayey silt from ~35-36', few little coarse sand-sized, angular rock fragments.	12:09 at 35' (5' section of rock) 12:15 - resume drilling - no visible water
40	40.0				SILT (ML), brown (7.5YR 4/4) to dark brown (7.5YR 3/4), moist, cohesive, soft with few trace medium sand-sized lithic fragments, reddish yellow (7.5YR 6/6 to 7.5YR 6/8).	12:20 at 40' ; 2 full drums of IDW product 12:30 - resume drilling, no visible water
45	45.0				SILT (ML), as above co-mingled with gray (5Y 5/1) clay, trace quartzite sand-sized lithic fragments.	12:35 at 45' 12:49 - resume drilling - no visible water
50	50.0				SANDSTONE, light olive brown (2.5Y 5/4 to 2.5Y 5/6), weakly indurated, fine grained. CLAY (CL), light olive brown (2.5Y 5/4) to 2.5Y 5/6), wet, soft; silty, low plasticity.	12:56 at 50', take break at 13:05 13:22 - resume drilling after short break - trace free water Little returns below 50' Few returns from 51-55'
55	55.0				GRAVELLY LEAN CLAY (CL), olive (5Y 4/3), wet, silty/sandy, with moderate reddish brown (10R 4/6) and dark reddish-brown (10YR 3/4), lithic fragments up to 1/2", angular, trace to few black rock fragments (weathered basalt).	13;15 at 55' At 55', attempt to get grab groundwater sample 14:15 collected MW17D-GW55-040317 3-40 ml vials for 8260B 14:32 - resume drilling - water blown from borehole 55-60' - few returns
60						

PROJECT NUMBER:	BORING NUMBER:
661508	MW-17D SHEET 3 OF 8

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman
LOCATION : Freeman, WA
ELEVATION :
DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.
COORDINATES : (ft NAVD88)
DRILLING METHOD AND EQUIPMENT : Air Rotary, Hammer Bit
WATER LEVEL:
START : 4/3/17 10:10
END : 4/3/2017
LOGGER : R. McComb

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
	60.0				WELL GRADED GRAVEL WITH CLAY AND SAND (GW/GC), variegated moderate reddish brown (10R 4/6) to dark reddish brown (10R 3/4) to pale yellowish-brown (10YR 6/2) and pale greenish yellow (10Y 8/2); trace silt; angular gravel up to 1/4-1/2" with some mudstone.	Driller injects water in order to facilitate returns 15:15 at 60'
65	65.0				WELL GRADED GRAVEL WITH CLAY AND SAND (GW/GC), as above 60-65' but with some black (N1) coarse sand-sized rock fragments (basaltic?), wet.	15:28 at 65' 15:43 - resume drilling, not injecting water for this run
70	70.0				WEATHERED BASALT, black (N1) with abundant weathered rock fragments, variegated pale yellowish-brown (10YR 6/2), reddish brown (10R 4/6) to dark reddish brown (10R 3/4), wet.	15:55 at 70', few returns from 65-70' 16:04 - resume drilling at 72', driller adds little water to clear hole 72-75' - driller adds no water, water is blown from hole while drilling 72-75' (formation water)
75	75.0				BASALT, black (N1) angular rock fragments up to 1", generally 1/4" or less, somewhat platy, with trace to few red to reddish brown (2.5Y 4/6 to 2.5Y 4/4) sand-sized rock fragments; wet, moderate weathered to fresh basalt.	Resuming drill mode, will get water level - check on AM on 4/4 ?? at 75' - DTW - Start 75' on 4/4/17 MW17D-GW75-040417 for 8260B; 3-40 ML vials
80	80.0				BASALT, black (N1) angular rock fragments up to 1", generally 1/4" or less, somewhat platy, with trace to few red to reddish brown (2.5Y 4/6 to 2.5Y 4/4) sand-sized rock fragments; wet, moderate weathered to fresh basalt.	08:42 at 80' 75-80' - water bearing, still advancing outer casing 08:52 - resume drilling
85	85.0				BASALT, same as 75-80', basalt rock fragments generally less than 1/8", platy, with trace quartz coating/variegated filling, trace to few poorly indurated stiff clay grain, yellow (2.5Y 7/8) to olive yellow (2.5Y 6/8); wet (fracture fill material?).	09:00 at 85' 80-85' - water bearing 09:08 - resume drilling 85-90' - water bearing, perhaps more so than above 85'
90						

PROJECT NUMBER:	BORING NUMBER:
661508	MW-17D SHEET 4 OF 8

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman
LOCATION : Freeman, WA
ELEVATION :
DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.
COORDINATES : (ft NAVD88)
DRILLING METHOD AND EQUIPMENT : Air Rotary, Hammer Bit
WATER LEVEL:
START : 4/3/17 10:10
END : 4/3/2017
LOGGER : R. McComb

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
	90.0				BASALT, same as 85-90' with trace light olive brown clay from ~94.5-95'; wet, soft.	08:18 at 90' - water bearing 09:30 - resume drilling 90-95'
95	95.0				BASALT, black (N1), angular platy rock fragment generally 1/8-1/16" length, trace to no accessory/secondary mineralization; water bearing zone, some rock fragments with grainy texture; brittle.	10:27 - resume drilling 95-100' 10:37 - pause drilling to empty - 500 gallon poly tank at 100' 95-100' - prolific (?) water bearing zone
100	100.0				BASALT, same as 95-100', platy fragments up to 3/4", brittle (easily broken) water bearing interval, trace pyrite/metallic secondary mineralization.	11:07 - return to drilling 100-105' - intense start - abundant water evaluated through borehole
105					BASALT, as 95-100', perhaps not as brittle (more difficult to break), dry, no secondary mineralization observed.	Collected MW17D-GW104-040417 in 3-40 ml vials for 9260B Driller decided to seal off upper zoe above 104' because of quantity of water produced (~500 gallon/5' interval) Poured 1 bucket of time release bentonite pellets and allow to hydrate, will set p
110	110.0					11:27 at 105' - another 500 gallon poly tank filled 104-106' - very little water returned 1322 - drilling resumes (106-116')
115						13:50 at 116' 13:53 - resume drilling (116-126'), no water ~117' - dust cut
120						119' - heavy dusting

PROJECT NUMBER:	BORING NUMBER:
661508	MW-17D SHEET 5 OF 8

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman
LOCATION : Freeman, WA

ELEVATION :
DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.

COORDINATES : (ft NAVD88)
DRILLING METHOD AND EQUIPMENT : Air Rotary, Hammer Bit

WATER LEVEL:
START : 4/3/17 10:10 END : 4/3/2017 LOGGER : R. McComb

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
120.0					BASALT, as 95-100', perhaps not as brittle (more difficult to break), dry, no secondary mineralization observed.	
125						
					BASALT, as 104-126', perhaps not as brittle (more difficult to break), dry, no secondary mineralization observed.	1420 at 126' 14:22 - resume drilling (127-136') (no water observed after connection)
130 130.0						
135						
					BASALT, as 104-126', perhaps not as brittle (more difficult to break), dry, no secondary mineralization observed.	14:50 at 136' 14:53 - resume drilling 136-146' 15:19 at 146' - dust cut continued below 138'
140 140.0						
145						1524 - resume drilling 146-156' - no water observed after connection 147' - wet cuttings
150						149' - water from borehole

PROJECT NUMBER:	BORING NUMBER:
661508	MW-17D SHEET 6 OF 8

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman
LOCATION : Freeman, WA

ELEVATION :
DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.

COORDINATES : (ft NAVD88)
DRILLING METHOD AND EQUIPMENT : Air Rotary, Hammer Bit

WATER LEVEL:
START : 4/3/17 10:10 END : 4/3/2017 LOGGER : R. McComb

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION
						PID (ppm) Breathing Zone FID (ppm)
	150.0				BASALT, black (N1), angular platy rock fragments, somewhat blochy at 150', generally 1/8-1/16" in length, none to trace secondary mineralization.	150-151' - less water produced, drying as advanced deeper
155						155' - no visible water being blown from hole
					- wet cuttings at 157' - still BASALT, but drying up wit depth.	15:53 - at 156' - diverter pipe, perhaps cyclone becoming closed with cuttings 16:07 - resume drilling 156-166' - no water
					- trace water at 158'.	blown from hole; however first cuttings were wet
160	160.0					160' - dusting very slightly; water absent from cuttings
						163' - dusting increases
165						
					BASALT, as 150-166'.	16:45 at 166'
170	170.0					07:20 - resume drilling on 4/5/17 - very little water evacuated upon start of drilling Little to no free water below ~170-171'
						Dusting at 172' 07:50 at 176'; 07:54 - resume (drilling 176-186', no water after connection)
175						
					- cuttings are wet from 177-178'.	
					- a "deeper" black color of basalt being cut at 178-179' (smoother texture).	Very wet cuttings from 178' - but no water dripping from cyclone, few return below 180' - moisture dissipates below 182'
180						

PROJECT NUMBER:	BORING NUMBER:
661508	MW-17D SHEET 7 OF 8

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman
LOCATION : Freeman, WA

ELEVATION :
DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.

COORDINATES : (ft NAVD88)
DRILLING METHOD AND EQUIPMENT : Air Rotary, Hammer Bit

WATER LEVEL:
START : 4/3/17 10:10 END : 4/3/2017 LOGGER : R. McComb

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
	180.0				BASALT, as 150-166'.	
185					- cuttings wet at 186'.	08:18 at 186' - no water after connection 1870190' - driller reports very soft zone
					WEATHERED BASALT WITH CLAY, variegated olive gray, moderate yellow-brown (10YR 5/4) weathered and basaltic rock fragments, grainy in texture.	
190	190.0				- rapid drip from 188-190'. - hard bottom - very few to no returns at 191'. - at 192', driller reports softer/ ?? of hammer on bottom.	
					CLAY (CL), yellowish-brown (10YR 5/8) to brownish-yellow (10YR 6/6), wet, soft to stiff, with few weathered black/dark gray basaltic rock fragments.	09:55 at 193'; after trying to get circulation without injecting water, driller proceeds to inject water to get circulation back
195						
					CLAY (CL), WITH SILT (ML) and GRAVEL, variegated light olive brown (2.5Y 5/6) to red (2.5YR 4/6 to 2.5YR 4/8), soft to stiff, with weathered basaltic rock fragments, wet.	10:17 - drilling begins 196-206', water in hole, driller not injecting any water, needed very little to regain circulation 197' - Driller injects again to get circulation 10:28 - injecting water at 197'
200	200.0					
						Soft at 201' - not injecting at this point
						203' - few returns, driller injects at ??
205						
						10:54 - drilling 206-216' - water turns as brownish yellow color
					WELL GRADED SAND (SW) WITH TRACE CLAY, pale brown to light yellowish-brown (10YR 6/3 to 10YR 6/4), micaceous, quartzitic, medium to fine grained, angular to subangular quartz, wet.	First mica/sand
210						

PROJECT NUMBER:	BORING NUMBER:
661508	MW-17D SHEET 8 OF 8

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman
LOCATION : Freeman, WA
ELEVATION :
DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.
COORDINATES : (ft NAVD88)
DRILLING METHOD AND EQUIPMENT : Air Rotary, Hammer Bit
WATER LEVEL:
START : 4/3/17 10:10
END : 4/3/2017
LOGGER : R. McComb

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
210.0					CLAY (CL) WITH FINE SAND AND SILT, red (10R 4/6), moist, soft to medium.	
215						
					WELL GRADED SAND (SW) WITH TRACE CLAY, as 208-210', wet.	At 216' - abundant quartz sand and mica 11:55 - begin drilling 216-226' - little amount of water being produced
220	220.0					
					CLAY (CL)/SILT (ML) and LITTLE SAND, pale yellow (2.5Y 8/2), (on Munsel white scale), fine sand, trace/few mica.	Clay-like - white - little to no water 221' - water changes to milky white/yellow color 221-231' - very little returns, driller injects periodically to get returns to surface
225						
						228' - injecting water
230						
231.0					Bottom of borehole at 231 ft bgs.	
235						
240						

PROJECT NUMBER:	BORING NUMBER:
661508	MW-18D SHEET 1 OF 6

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman
LOCATION : Duane Lashaw Property

ELEVATION : 2513.40 ft mslft NAVD88 (ground surface)
DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.

COORDINATES : 206366.217, 2538415.462 (ft NAVD88)
DRILLING METHOD AND EQUIPMENT : B-90 6", Air Rotary

WATER LEVEL:
START : 1/4/17 10:27
END : 1/9/17 15:15
LOGGER : H. Endo

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
0.0					CLAYEY SILT (ML), dark brown (10YR 3/3), moist, very soft, no odor, low plasticity.	Original soils, sparse grass - agricultural field at surface Background VOC = 0.0 ppm Begin drilling on 1/4/17 at 1027 5 1/2" drill head with ~6" ream, drive casing with advance
5 5.0					CLAYEY SILT (ML), same as 0' to 5' but very dark grayish brown (10YR 3/2), trace coarse sand.	
10 10.0					WELL GRADED SAND WITH SILT (SW-SM), very dark gray (5Y 3/1), medium dense, oily, no odor, fine to coarse sand, low to nonplastic silt.	Driller: Hard drilling at 12' - 1100
15 15.0					POORLY GRADED SAND WITH SILT AND BASALTIC FINE GRAVEL (SP-SM), very dark gray (5Y 3/1), dense, dry, no odor, fine to medium sand, nonplastic silt, 50% rounded to slightly angular basaltic gravel/clasts 1/16" to 3/16", basalt clasts 1/4" to 1/2" diameter.	1130 Driller: Water bearing fracture at 17.5'
20 20.0					Transition to WEATHERED BASALT, greenish black (10Y 2.5/1), coarse sand to fine gravel size fragments (1/16" to 1/2") with medium to coarse sand sized quartz or feldspar/calcite.	Driller: Cuttings water bearing, fractures, faster drilling 1140 Stop drilling at 22' to pull rods for groundwater grab sample. DTW = 4.8' bgs
25 25.0					WEATHERED BASALT, greenish black (10Y 2.5/1), 1/8" to 1/2" diameter fragments.	At 1320, resume drilling Driller: Harder drilling, less fracture, still water bearing at 22' to 25' 1355 Driller: continued hard drilling, more competent, less fractured, unknown if water bearing or residual water in casing at 25' bgs to 30' bgs
30						

PROJECT NUMBER:	BORING NUMBER:
661508	MW-18D SHEET 2 OF 6

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman
LOCATION : Duane Lashaw Property

ELEVATION : 2513.40 ft mslft NAVD88 (ground surface)
DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.

COORDINATES : 206366.217, 2538415.462 (ft NAVD88)
DRILLING METHOD AND EQUIPMENT : B-90 6", Air Rotary

WATER LEVEL:
START : 1/4/17 10:27
END : 1/9/17 15:15
LOGGER : H. Endo

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
	30.0				WEATHERED BASALT, greenish black (10Y 2.5/1), 3/4" diameter fragments, transitioning to competent basalt.	1445 Driller: Same hard, slow drilling, either water bearing or residual water in casing, possible flow down casing, stop drilling
35	35.0				COMPETENT BASALT, greenish black to black (10Y 2.5/1), 1/16" to 1/4" diameter subangular fragments.	1/6/17 - resume drilling at 0908, air comp. on and water flowing up Driller: Hard drilling
40	40.0				COMPETENT BASALT, greenish black to black (10Y 2.5/1), up to 3/8" diameter subangular fragments with trace pale green to grayish green (olivine), with trace pyrite - like metallic minerals.	0935 Driller: At ~40', moderately easier drilling
45	45.0				COMPETENT BASALT, greenish black to black (10Y 2.5/1), up to 3/8" diameter subangular fragments with trace pale green to grayish green (olivine), with trace pyrite - like metallic minerals.	1005 Driller: At 44', set casing and proceed with open hole drilling, 490 gal of formation water from 34' to 44' (no driller water), most likely water cascading down casing. Pull casing up 2' and pour pellet bentonite to seal casing and borehole, pause at 1110
50	50.0				COMPETENT BASALT, greenish black to black (10Y 2.5/1), up to 3/8" diameter subangular fragments with trace pyrite - like metallic minerals.	1215 Driller: Hard drilling, little to no water
55	55.0				COMPETENT BASALT, greenish black (10Y 2.5/1), 1/16" to 1/4" diameter fragments, fine to coarse sand diameter, trace pyrite-like metallic minerals.	Driller: Blowing air comes up, mostly oily
60						

PROJECT NUMBER:	BORING NUMBER:
661508	MW-18D SHEET 3 OF 6

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman
LOCATION : Duane Lashaw Property

ELEVATION : 2513.40 ft mslft NAVD88 (ground surface)
DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.

COORDINATES : 206366.217, 2538415.462 (ft NAVD88)
DRILLING METHOD AND EQUIPMENT : B-90 6", Air Rotary

WATER LEVEL:
START : 1/4/17 10:27
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DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
	60.0				COMPETENT BASALT, greenish black (10Y 2.5/1), 1/16" to 1/4" diameter fragments.	11240 Driller: Hard drilling, fine particles are probably pulverized
65	65.0				COMPETENT BASALT, greenish black (10Y 2.5/1), 1/8" to 1/4" diameter fragments, fine to coarse sand diameter, trace pyrite-like metallic minerals.	12:50 Driller: Hard drilling
70	70.0				COMPETENT BASALT, greenish black (10Y 2.5/1), 1/8" to 1/4" diameter fragments, fine to coarse sand diameter, trace pyrite-like metallic minerals.	1305 Drilling: Hard drilling
75	75.0				COMPETENT BASALT, greenish black (10Y 2.5/1), 1/8" to 1/4" diameter fragments, fine to coarse sand diameter, trace pyrite-like metallic minerals.	1320 Driller: Hard drilling, maybe fractures, some water being produced, not enough to sample
80	80.0				COMPETENT BASALT, greenish black (10Y 2.5/1), 1/8" to 1/4" diameter fragments, fine to coarse sand diameter, trace pyrite-like metallic minerals.	
85	85.0				COMPETENT BASALT, greenish black (10Y 2.5/1), 1/8" to 1/4" diameter fragments, fine to coarse sand diameter, trace pyrite-like metallic minerals.	1356 Driller: Hard drilling, producing more water from 80' to 85', take grab water sample TD = 85.0' bgs DTW = 59.1' bgs
90						

PROJECT NUMBER:	BORING NUMBER:
661508	MW-18D SHEET 4 OF 6

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman
LOCATION : Duane Lashaw Property

ELEVATION : 2513.40 ft mslft NAVD88 (ground surface)
DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.

COORDINATES : 206366.217, 2538415.462 (ft NAVD88)
DRILLING METHOD AND EQUIPMENT : B-90 6", Air Rotary

WATER LEVEL:
START : 1/4/17 10:27
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DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
	90.0				COMPETENT BASALT, greenish black (10Y 2.5/1), 1/8" to 1/4" diameter fragments, fine to coarse sand diameter, trace pyrite-like metallic minerals.	1457 Driller: Same hard drilling
95	95.0				COMPETENT BASALT, grayish black to black (N2-N1), 1/16" to 1/4" platy rock fragments, angular, no accessory minerals.	1520 Stop drilling, TD - 95' bgs Driller: Hard drilling, may have produced more water near TD 1010 Resume drilling on 1/9/17 at 95', borehole produces several gallons per minute water
100	100.0				COMPETENT BASALT, grayish black to black (N2-N1), 1/16" to 1/4" platy rock fragments, angular, with pale green non-metallic accessory minerals at ~102'.	1/9/17 Pale green accessory minerals at ~102' (non-metallic), 100-105', no noticeable change in water volume from borehole
105	105.0				COMPETENT BASALT, grayish black to black (N2-N1), 1/16" to 1/4" platy rock fragments, angular, no accessory minerals, trace pyrite at 105' to 106', 109.5' to 110' trace brown (5YR 6/4) rock fragments.	105' to 106' - Trace pyrite Driller Reports - minor fractures, small (<1-2" drop) in drill from ~105' to 106' bgs
110	110.0				COMPETENT BASALT, grayish black to black (N2-N1), 1/16" to 1/4" platy rock fragments, angular, no accessory minerals, with little medium bluish gray (5B 5/1) ? fragments form 112' to 115'.	109.5' to 110' Driller Reports: Soft drilling 110' to 115' - no change in water volume produced ~112' Color change (pale green?) (medium bluish gray 5B 5/1) grains
115	115.0				WEATHERED BASALT (?), grayish black to black (N2-N1) with abundant grayish green (5G 5/2) rock fragments, little clay, olive to olive gray (5Y 4/2 to 5Y 4/3), soft, with trace pale brown (weathered/oxidized) basaltic rock fragments.	115' to 116' Clay, volume of cutting greatly reduced, volume of water reduced somewhat from 115' to 120'; very few cuttings being removed from borehole
120						

PROJECT NUMBER:	BORING NUMBER:
661508	MW-18D SHEET 5 OF 6

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman
LOCATION : Duane Lashaw Property

ELEVATION : 2513.40 ft mslft NAVD88 (ground surface)
DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.

COORDINATES : 206366.217, 2538415.462 (ft NAVD88)
DRILLING METHOD AND EQUIPMENT : B-90 6", Air Rotary

WATER LEVEL:
START : 1/4/17 10:27
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DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
	120.0				COMPETENT BASALT, black to grayish black (N1 to N2) layered with some grayish green basaltic rock fragments, trace dense gray clay grains.	No noticeable increase in water from 120' to 125' Driller says at 122' to 127', the drilling was softer
125					COMPETENT BASALT, black to grayish black (N1 to N2) layered with some grayish green basaltic rock fragments, trace dense olive to olive gray clay grains.	
	127.0				COMPETENT BASALT, black to grayish black (N1 to N2), 1/8" to 1/4" angular rock fragments, with trace very light gray to white secondary mineralization and trace brown-gray rock fragments.	127' - hard drilling - no noticeable difference in water volume
130	130.0				COMPETENT BASALT, black to grayish black (N1 to N2), 1/8" to 1/4" angular rock fragments, with trace very light gray to white secondary mineralization.	No change in volume of water from 130' to 135'
135	135.0				COMPETENT BASALT, as 127' to 130' with trace brownish gray rock fragments and few medium bluish gray (5B 5/1) rock fragments.	No change in water volume from 135' to 140'
140	140.0				COMPETENT BASALT, as 127' to 130' with trace brownish gray rock fragments and few medium bluish gray (5B 5/1) rock fragments.	
145	145.0				COMPETENT BASALT, black to grayish black (N1 to N2), 1/8" to 1/4" length predominately, angular little greenish-black (5G 2/1), dense, brittle (weak) weathered basaltic rock fragments (148' to 150').	20' screen interval from ~145' to 165' (see field log book for construction details) 148 - Soft No change in water volume from 145' to 150'
150						

PROJECT NUMBER:	BORING NUMBER:
661508	MW-18D SHEET 6 OF 6

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman
LOCATION : Duane Lashaw Property

ELEVATION : 2513.40 ft mslft NAVD88 (ground surface)
DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.

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150.0					COMPETENT BASALT, black to grayish black (N1 to N2), 1/8" to 1/4" length predominately, angular little greenish-black (5G 2/1), dense.	Maybe a slight increase in volume 150' to 155'
155 155.0					COMPETENT BASALT, black to grayish black (N1 to N2), 1/8" to 1/4" length predominately, angular little greenish-black (5G 2/1), dense.	155' to 158' - Soft drilling, harder at 158' to 160', perhaps an increase in volume of water from 155' to 160'
160 160.0					COMPETENT BASALT, black to grayish black (N1 to N2), with few greenish black (5G 2/1) weak (brittle) rock fragments.	
165 165.0					Bottom of borehole at 165 ft bgs.	
170						
175						
180						

PROJECT NUMBER:	BORING NUMBER:
661508	MW-19D SHEET 1 OF 8

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman
LOCATION : Freeman, WA

ELEVATION : 2623.72 ft mslft NAVD88 (ground surface)
DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 210343.449, 2539718.491 (ft NAVD88)
DRILLING METHOD AND EQUIPMENT : B-90, 6", Air Rotary

WATER LEVEL:
START : 1/17/17 09:10
END : 11/17/2017
LOGGER : R. McComb

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
0.0					LEAN CLAY (CL), brown (7.5YR 4/3), moist, soft, medium plasticity.	Breathing Zone = 0 ppm Advancing outer casing while drilling
5 5.0					SILT (ML), strong brown (7.5YR 4/6), dry, medium consistency.	0930 at 5' bgs
					SILTY SAND (SM), strong brown (7.5YR 4/6), dry, loose, well-graded, angular.	
10 10.0					SILT (ML), light brown (7.5YR 6/4), dry, loose to medium dense, with little clay and rare angular quartz up to 1/4".	0945 at 10' bgs
15 15.0						
20 20.0					SILT (ML), light brown (7.5YR 6/4) to brown (7.5YR 5/4), dry to slightly moist, loose to medium dense, trace clay.	1005 at 20' bgs
25 25.0						Used a few gallons water at ~25' to help remove cuttings
30						

PROJECT NUMBER:	BORING NUMBER:
661508	MW-19D SHEET 2 OF 8

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman
LOCATION : Freeman, WA

ELEVATION : 2623.72 ft mslft NAVD88 (ground surface)
DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 210343.449, 2539718.491 (ft NAVD88)
DRILLING METHOD AND EQUIPMENT : B-90, 6", Air Rotary

WATER LEVEL:
START : 1/17/17 09:10
END : 11/17/2017
LOGGER : R. McComb

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
	30.0				SILT (ML) with few stringers/layers of LEAN CLAY (CL), brown (7.5YR 4/4) to (7.5YR 5/4), moist, medium dense to loose; with trace to few quartzite rock fragments, angular up to 1/16-1/4" in length.	1035 at 30' bgs
35	35.0					At 33' - some lithic fragments in cuttings
40	40.0				SILT (ML) with few stringers/layers of LEAN CLAY (CL), as above with lithic fragments; few returns.	1100 at 40' bgs Driller injected some water at 40' bgs to facilitate cuttings removal
45	45.0					40-50' - relatively rapid drilling, multiple "sot" interval, driller injects abundant water to remove cuttings
50	50.0				CLAY (CL), olive (5Y 5/4 to 5Y 5/6); abundant weathered rock fragments up to 1/4", angular, wet.	1123 at 50' bgs 50-60 - Drill adds water to facilitate cuttings removal After lunch the driller said that ?? started drilling and added air, no water was blown from hole
55	55.0					
60						

PROJECT NUMBER:	BORING NUMBER:
661508	MW-19D SHEET 3 OF 8

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman
LOCATION : Freeman, WA

ELEVATION : 2623.72 ft mslft NAVD88 (ground surface)
DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 210343.449, 2539718.491 (ft NAVD88)
DRILLING METHOD AND EQUIPMENT : B-90, 6", Air Rotary

WATER LEVEL:
START : 1/17/17 09:10 END : 11/17/2017 LOGGER : R. McComb

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
	60.0				CLAY (CL), olive (5Y 5/4 to 5Y 5/6); abundant weathered rock fragments up to 1/4", angular, wet.	1230 at 60' bgs, little to no water made after connection at 60'
65	65.0					
70	70.0				CLAY (CL), as above; abundant weathered rock fragments, dark grayish-brown (10YR 4/2), light olive brown (5Y 5/6) and moderate brown (5YR 3/4).	Rapid drilling from 60-70' bgs Driller continues to add water to facilitate cuttings removal At 70' (1247), borehole allowed to rest to see if water is produced... 1300, blew well - no water produced 1310 - after connection at 70' bgs, blew borehole - no water
75	75.0					
80	80.0				SAND (SW) with SILT AND CLAY; wet; with few black (N1) to grayish black (N2) weathered basaltic rich fragments; predominately dark grayish brown (10YR 4/2), light olive brown (5YR 3/4) angular rock fragments 1/16-1/4" in length.	1520 at 80' bgs - Driller reports seeing no water being produced Driller worked rods up and down multiple times, blowing air and no water was observed from borehole
85	85.0					82-83' - Rig chatter increases Hard drilling
90					BASALT, black (N1) to grayish black (N2), fresh, fine to coarse sand-sized grains.	

PROJECT NUMBER:	BORING NUMBER:
661508	MW-19D SHEET 4 OF 8

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman
LOCATION : Freeman, WA

ELEVATION : 2623.72 ft mslft NAVD88 (ground surface)
DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 210343.449, 2539718.491 (ft NAVD88)
DRILLING METHOD AND EQUIPMENT : B-90, 6", Air Rotary

WATER LEVEL:
START : 1/17/17 09:10
END : 11/17/2017
LOGGER : R. McComb

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
	90.0				BASALT, black (N1) to grayish-black (N2); 1/16-1/4" in length, fresh.	90' - Driller runs 5' rod to 98' bgs - advancer outer casing to 95' bgs also
					BASALT, black (N1) to grayish-black (N2) with abundant grayish-brown (5YR 3/2) to moderate brown (5YR 3/4) weathered basaltic rock fragments and trace moderate yellow green (5GY 7/4) secondary minerals.	92-95' - Driller reports hard drilling
					BASALT, black (N1) to grayish-black (N2), fresh, 1/16-1/4" in length.	
95	95.0				BASALT, black (N1) to grayish-black (N2), fragments 1/16-1/4" strong/fresh, trace dark reddish brown oxidation.	Drilling stops at 95' bgs Rods pulled, 2 buckets bentonite added to temporarily seal bottom of 6" casing, casing elevated 6' overnight to allow bentonite to hydrate casing at 89' bgs, tagged bottom of borehole at 94.8' bgs, tagged water at 80.75' bgs Advancing open borehole from 95' at 0918
100	100.0					97' - Water production occurred
105	105.0					
						Some brown staining at 107' bgs
110	110.0				- trace grayish-brown (5YR 3/2) coated grains at 109'.	1000 at 110' bgs
					- trace grayish brown (5YR 3/2) coated grains from 112-113'.	112-113' - some more oxidized rock fragments
115	115.0				BASALT, black (N1) to grayish-black (N2) fragments 1/32-1/4" - fabular, angular with trace grayish-brown stained rock fragments.	1004 at 115' bgs
120						

PROJECT NUMBER:	BORING NUMBER:
661508	MW-19D SHEET 5 OF 8

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman
LOCATION : Freeman, WA

ELEVATION : 2623.72 ft mslft NAVD88 (ground surface)
DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 210343.449, 2539718.491 (ft NAVD88)
DRILLING METHOD AND EQUIPMENT : B-90, 6", Air Rotary

WATER LEVEL:
START : 1/17/17 09:10
END : 11/17/2017
LOGGER : R. McComb

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
	120.0				BASALT, black (N1) to grayish-black (N2) fragments 1/32-1/4" - fabular, angular with trace grayish-brown stained rock fragments.	1009 at 120' bgs, driller estimates 10-15 gpm 1118 - Drilling resumes at 120' bgs
125	125.0					1123 at 125' bgs
130	130.0					1131 at 130' bgs - borehole continues to produce abundant water 131-132' - Some white fracture lining mineralization
135						1140 at 135' bgs
140	140.0				- trace vesicular basalt fragments from 139-140'. - white lean clay clasts observed at ~140.5'.	1154 at 140' bgs 1308 - Drilling resumes at 140' bgs
145					BASALT, black (N1) to grayish-black (N2), fresh, trace to no secondary mineralization/oxidation.	1328 at 145' - Harder drilling from 140-145' bgs reports driller
150						

PROJECT NUMBER:	BORING NUMBER:
661508	MW-19D SHEET 6 OF 8

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman
LOCATION : Freeman, WA

ELEVATION : 2623.72 ft mslft NAVD88 (ground surface)
DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 210343.449, 2539718.491 (ft NAVD88)
DRILLING METHOD AND EQUIPMENT : B-90, 6", Air Rotary

WATER LEVEL:
START : 1/17/17 09:10
END : 11/17/2017
LOGGER : R. McComb

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
	150.0				BASALT, black (N1) to grayish-black (N2), fresh, trace to no secondary mineralization/oxidation.	1337-1350 at 150' bgs
155						1435-1446 at 155' bgs
					- few little light brown to moderate (5YR 5/6 to 5YR 3/4) rock fragments at ~158'.	
160	160.0					1447-1500 at 160' bgs
165						1501-1513 at 165' bgs - end 1/18/17
170	170.0					
					BASALT (as above) with 20-30% dark reddish-brown (10R 3/4) rock fragments (possibly weathered basalt).	
175					BASALT (as 145-173').	0759-0815 at 175' bgs - begin 1/19/17 10' runs beginning 1/19/17 Change in color of water from gray to slight brownish tint at ~173-173.5' bgs 0820-0942 at 175-185' bgs
					Possible WEATHERED BASALT, moderate yellow (5Y 7/60 to pale yellowish orange (10YR 8/6) interbedded with fresh basalt, black (N1) to grayish-black (N2), stiff to hard/dense; fine to coarse sand-sized material, angular, trace dense clay.	
180						

PROJECT NUMBER:	BORING NUMBER:
661508	MW-19D SHEET 7 OF 8

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman
LOCATION : Freeman, WA

ELEVATION : 2623.72 ft mslft NAVD88 (ground surface)
DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 210343.449, 2539718.491 (ft NAVD88)
DRILLING METHOD AND EQUIPMENT : B-90, 6", Air Rotary

WATER LEVEL:
START : 1/17/17 09:10
END : 11/17/2017
LOGGER : R. McComb

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
	180.0				Possible WEATHERED BASALT, moderate yellow (5Y 7/60 to pale yellowish orange (10YR 8/6) interbedded with fresh basalt, black (N1) to grayish-black (N2), stiff to hard/dense; fine to coarse sand-sized material, angular, trace dense clay.	Noticeable increase in water production while drilling from 173-185' bgs Softer - quicker drilling 177-183' bgs
					BASALT, fresh, as above (145-173').	183-195' - BASALT again (177-180' - Predominately weathered material 180-183 - interbedded with fresh basalt, 183-185' bgs - fresh basalt)
185					BASALT, black (N1) to grayish black (N2) with few weathered basaltic rock fragments, moderate yellow (5Y 7/6); weathered grains abundant at ~187'.	0930-0943' - 185-190' bgs 5' rod 185-190' bgs Abundant water production from borehole while drilling 185-190' bgs
190	190.0				BASALT, black (N1) to grayish-black (N2), fresh, few to little weathered rock fragments from 193-195'.	1020-1058 - 195-200' bgs Softer drilling from 195-200' bgs 10' rod from 200-210' bgs 1201-1218 - 200-210' bgs
195					Same as 190-195' interspersed with weathered basalt rock fragments.	
200	200.0				BASALT, fresh with trace to few weathered rock fragments.	
205					WEATHERED ROCK FRAGMENTS, brown/yellows with gray clay and tan clay, few cuttings, no fresh basalt.	Gray clay at 204-205' bgs, water turns brown, few cuttings 205-210' - Harder drilling than from 205-208' bgs Note: Not sure if weathered basalt or some other parent rock
210						

PROJECT NUMBER:	BORING NUMBER:
661508	MW-19D SHEET 8 OF 8

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman
LOCATION : Freeman, WA

ELEVATION : 2623.72 ft mslft NAVD88 (ground surface)
DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 210343.449, 2539718.491 (ft NAVD88)
DRILLING METHOD AND EQUIPMENT : B-90, 6", Air Rotary

WATER LEVEL:
START : 1/17/17 09:10
END : 11/17/2017
LOGGER : R. McComb

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
210.0					WEATHERED ROCK FRAGMENTS, brown/yellows with gray clay and tan clay, few cuttings, no fresh basalt, clayey light pink and white clay clasts, very few attempts returned to surface.	1225-1235 - 210-210' bgs - 5' rod Light pink/white clays at ~210-212' bgs
212.0					Bottom of borehole at 212 ft bgs.	
215						
220						
225						
230						
235						
240						

PROJECT NUMBER:	BORING NUMBER:
661508	MW-20D SHEET 1 OF 6

SOIL BORING LOG

PROJECT : Freeman, Washington
LOCATION : Freeman, WA

ELEVATION : 2616.45 ft mslft NAVD88 (ground surface)
DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.

COORDINATES : 209898.038157, 2538322.439851 (ft NAVD88)
DRILLING METHOD AND EQUIPMENT : Hammer Bit, Air Rotary

WATER LEVEL:
START : 6/12/17 11:00
END : 6/15/17 16:35
LOGGER : J. Ulrich

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
0.0					POORLY-GRADED GRAVEL (GP) FILL (?), sub-rounded, gray, very loose, very coarse-grained, dry.	Drilling with no water; Lead rod is ~4.5' long - bit ~0.5' = 5' lead stick
					LEAN CLAY (CL), dark brown, soft, low plasticity, moist.	
5 5.0					SILT (ML), brown, medium stiff, dry, trace clay (<10%).	PID at breathing zone = 0.0 ppm (VOCs)
10 10.0					LEAN CLAY (CL), reddish-brown, medium plasticity, moist.	PID at breathing zone = 0.0 ppm (VOCs)
15 15.0					SILT (ML), brown, very soft, non-cohesive, stiff, trace clay.	
20 20.0					LEAN CLAY (CL), brown, high plasticity, moist, trace silt, decrease in plasticity with depth.	
25 25.0					LEAN CLAY (CL), same as above; increase in plasticity, dry.	PID at breathing zone = 0.0 ppm (VOCs)
					WELL-SORTED GRAVEL (GW), reddish-orange, medium to coarse grained, sub-angular, dry.	PID at breathing zone = 0.0 ppm (VOCs)
30						

PROJECT NUMBER:	BORING NUMBER:
661508	MW-20D SHEET 2 OF 6

SOIL BORING LOG

PROJECT : Freeman, Washington
LOCATION : Freeman, WA

ELEVATION : 2616.45 ft mslft NAVD88 (ground surface)
DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.

COORDINATES : 209898.038157, 2538322.439851 (ft NAVD88)
DRILLING METHOD AND EQUIPMENT : Hammer Bit, Air Rotary

WATER LEVEL:
START : 6/12/17 11:00
END : 6/15/17 16:35
LOGGER : J. Ulrich

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
	30.0				WELL-GRADED SAND (SW), light brown, medium to coarse grained, sub-rounded, dry with gravel (max 3/8").	
					WELL-GRADED SILTY GRAVEL (GW-GM), medium to coarse grained, sub-rounded, gray, dry (max particle size 1/2").	
					LEAN CLAY (CL), brown, low plasticity, dry, trace gravel (max 3/8").	
35	35.0				SILT (ML), reddish brown, soft, non-cohesive, dry, trace sand/gravel.	PID at breathing zone = 0.0 ppm (VOCs)
					LEAN CLAY (CL), brown, medium to high plasticity, dry, trace gravel at ~40' bgs.	
40	40.0					
45	45.0				- same as above with increase in gravel content (max 3/8") and trace mineralization (calcium sand-sized particles), decrease in plasticity with depth.	
50	50.0				SILT (ML), dark gray, soft, non-cohesive, dry.	PID at breathing zone = 0.0 ppm (VOCs) 1350: Troubleshoot issue with hydraulics, need to take rig into shop. Stop at ~53' bgs, resume drilling on 6/14/17 at 1045.
55	55.0					
60					WELL-SORTED GRAVEL (GW), dark gray, sub-rounded, medium to coarse grained (max 1/2"), dry.	PID at breathing zone = 0.0 ppm (VOCs)

PROJECT NUMBER:	BORING NUMBER:
661508	MW-20D SHEET 3 OF 6

SOIL BORING LOG

PROJECT : Freeman, Washington
LOCATION : Freeman, WA

ELEVATION : 2616.45 ft mslft NAVD88 (ground surface)
DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.

COORDINATES : 209898.038157, 2538322.439851 (ft NAVD88)
DRILLING METHOD AND EQUIPMENT : Hammer Bit, Air Rotary

WATER LEVEL:
START : 6/12/17 11:00
END : 6/15/17 16:35
LOGGER : J. Ulrich

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
	60.0				SILT (ML), olive gray, very soft, dry.	
65	65.0				WELL-GRADED SILTY GRAVEL (GW-GM), olive gray, sub-angular to angular, fine to coarse grained, dry.	PID at breathing zone = 0.0 ppm (VOCs)
70	70.0				WELL GRADED GRAVEL WITH CLAY (GW-GC), grayish brown, sub-rounded to sub-angular, coarse grained, low plasticity, moist, trace iron staining.	PID at breathing zone = 0.0 ppm (VOCs)
75	75.0				- same as above; some calcium mineralization (~15%) observed at 75' bgs.	
80	80.0				SILT (ML), grayish brown, very soft, dry.	Driller indicates decrease in speed of drilling.
85	85.0				WELL GRADED GRAVEL (GW), olive gray, medium to coarse grained, sub-angular to sub-rounded, dry, some silt (very soft), begin to see WEATHERED BASALT at 88',.	
					BASALT, black, sub-angular to sub-rounded rock fragments, trace mineralization (calcium?), dry.	
90						

PROJECT NUMBER:	BORING NUMBER:
661508	MW-20D SHEET 4 OF 6

SOIL BORING LOG

PROJECT : Freeman, Washington
LOCATION : Freeman, WA

ELEVATION : 2616.45 ft mslft NAVD88 (ground surface)
DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.

COORDINATES : 209898.038157, 2538322.439851 (ft NAVD88)
DRILLING METHOD AND EQUIPMENT : Hammer Bit, Air Rotary

WATER LEVEL:
START : 6/12/17 11:00
END : 6/15/17 16:35
LOGGER : J. Ulrich

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
	90.0				WEATHERED BASALT, black to mottled (orangish-red, yellow), rock fragments (max 1/2"), increasing mineral content and silt with depth, dry.	
95	95.0					1330: Rotation on drill rig fouls, need to bring rig into the shop to assess repair needs.
					WELL-GRADED GRAVEL (GW), mottled (gray/olive/brown), fine to coarse grained, sub-rounded, trace mineral content, dry.	6/15/17 at 0935: Continue advancing borehole from 93'.
					BASALT, black, sub-rounded to sub-angular, fine to coarse grained, trace silt, mineralization absent, dry.	Water level prior to advancing - dry.
100	100.0					
					WEATHERED BASALT, black to mottled gray/olive/brown/yellow, abundant mineralization, fine to coarse with rock fragments, dry.	
					BASALT, somewhat platy, black, sub-angular to angular rock fragment (max 1/2 inch), trace mineralization (calcium), some metallic secondary mineralization, dry.	PID at breathing zone = 0.0 ppm (VOCs)
105	105.0					
110	110.0				BASALT, same as above, increase in silt content (<15%) with depth, moist.	1000: Moisture at 109; but dry immediately after.
					BASALT, same as above, dry, no mineralization apparent.	Let stand at 111' to see if potential slow recharge, 1010 - no water, continue advance.
115	115.0					
					BASALT, same as above, decrease in silt content, dry.	
120					BASALT, same as above, moist.	

PROJECT NUMBER:	BORING NUMBER:
661508	MW-20D SHEET 5 OF 6

SOIL BORING LOG

PROJECT : Freeman, Washington
LOCATION : Freeman, WA

ELEVATION : 2616.45 ft mslft NAVD88 (ground surface)
DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.

COORDINATES : 209898.038157, 2538322.439851 (ft NAVD88)
DRILLING METHOD AND EQUIPMENT : Hammer Bit, Air Rotary

WATER LEVEL:
START : 6/12/17 11:00
END : 6/15/17 16:35
LOGGER : J. Ulrich

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
	120.0				BASALT, same as above, moist.	
					BASALT, same as above, increase in silt content (<10%), dry.	
125	125.0					
					BASALT, same as above.	
130	130.0					
					WEATHERED BASALT, mottled gray/yellow, orange, olive, brown (highly weathered), coarse grained sand and rock fragments, sub-angular (max 1/4"), trace silt, wet.	1046: First indication of water bearing unit. 1100: Have 139' total rod on hand, will advance to 139' and wait for additional 40' of rod to be delivered. Tag WL DTW: 94.51' bgs Collect grab GW sample from first ~2.5' of water column (see sample details at 94.5-97' interval log) 1325: resume drilling
135	135.0					
					BASALT, black, coarse grained/rock fragments, somewhat platy, trace metallic (pyrite?) mineralization, wet.	
140	140.0					Gray GW sample MW20U-GW-depth-061517 at 1215 (8W8260C)
					WEATHERED BASALT, black with calcium/iron staining, medium to coarse grained/rock fragment (max 1/8"), sub-angular to angular, trace clay and silt, wet.	
145	145.0					
					WEATHERED BASALT, same as above, increase in silt content (<10%).	
					WEATHERED BASALT, same as above, silt decreases to trace.	
150						Driller notes change in hardness.

PROJECT NUMBER:	BORING NUMBER:
661508	MW-20D SHEET 6 OF 6

SOIL BORING LOG

PROJECT : Freeman, Washington
LOCATION : Freeman, WA

ELEVATION : 2616.45 ft mslft NAVD88 (ground surface)
DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.

COORDINATES : 209898.038157, 2538322.439851 (ft NAVD88)
DRILLING METHOD AND EQUIPMENT : Hammer Bit, Air Rotary

WATER LEVEL:
START : 6/12/17 11:00
END : 6/15/17 16:35
LOGGER : J. Ulrich

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
	150.0				WEATHERED BASALT, same as above.	
155	155.0				WEATHERED BASALT, black, platy, rounded to sub-rounded, no mineralization, wet.	
					WEATHERED BASALT, same as above, transitioning into less platy, increasing mineralization and decreasing competent basalt, wet.	
160	160.0				BASALT, somewhat platy, sub-rounded, no clear mineralization, wet.	
165	165.0				HIGHLY OR NEW FORMATION (?) WEATHERED BASALT WITH SILT (?), highly weathered, coarse grained sand particles/rock fragments, feldspars (?), quartz, iron staining, trace clay, wet.	1425: Driller indicates 167-169' very soft/fast drilling (feels like silt). Water in cuttings difficult to see % silt, but obviously present.
170	170.0					
175	175.0				CLAYEY WELL-GRADED GRAVEL (GW-GC), varied (pink, orange, gray, olive, white, brown), medium to coarse grained, sub-rounded to sub-angular.	Very difficult drilling due to clay.
	178.0				Boring terminated at 178 ft bgs.	
180						

PROJECT NUMBER:	BORING NUMBER:
661508	MW-21D SHEET 1 OF 5

SOIL BORING LOG

PROJECT : Freeman, Washington
LOCATION : Freeman, WA

ELEVATION : 2523.07 ft mslft NAVD88 (ground surface)
DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.

COORDINATES : 208058.834473, 2535784.669781 (ft NAVD88)
DRILLING METHOD AND EQUIPMENT : Schramm, Air Rotary

WATER LEVEL:
START : 7/5/17 10:00
END : 7/6/17 09:30
LOGGER : S. Davis

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
0.0					CLAYEY SILT (ML), brown, damp. slightly plastic.	1000 a.m. - Begin drilling, no water used.
5 5.0					LEAN CLAY (CL), brown, moist, medium plasticity.	
10 10.0					LEAN CLAY (CL), brown, wet, medium plasticity.	Water level prior to sampling
15 15.0					SANDY CLAY (CL), brown clay, wet, poorly graded basalt and, predominately coarse, trace fine basalt gravel.	
20 20.0					SANDY GRAVEL, black oxidation, wet, well graded fine gravel, medium to coarse sand, basaltic, angular to sub-angular, weathered basalt. - grades with increased gravel content and trace medium gravel.	1045 - Stop drilling to collect grab groundwater sample.
					WEATHERED BASALT, black, yellow brown to reddish brown, wet, coarse sand to medium gravel up to 3/4", abundant weathered rock fragments.	1115 - Collect sample MW-21D-GW-20 Water level at 15' bgs 070517
25 25.0					BASALT, black, wet, platy rock fragments up to 5/8", trace oxidation, angular, yellow brown to reddish brown trace sand particles.	1125 - Resume drilling
30					BASALT, same as above, rock fragments up to 1/2".	1200 - Remove drill rod at 29.5' bgs to install bentonite seal to drill open hole.

PROJECT NUMBER:	BORING NUMBER:
661508	MW-21D SHEET 2 OF 5

SOIL BORING LOG

PROJECT : Freeman, Washington
LOCATION : Freeman, WA

ELEVATION : 2523.07 ft mslft NAVD88 (ground surface)
DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.

COORDINATES : 208058.834473, 2535784.669781 (ft NAVD88)
DRILLING METHOD AND EQUIPMENT : Schramm, Air Rotary

WATER LEVEL:
START : 7/5/17 10:00
END : 7/6/17 09:30
LOGGER : S. Davis

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
	30.0				BASALT, black, dry, angular rock fragments up to 1/2", predominately less than 1/4", platy, no weathering observed.	1325 - Resume drilling, seal successful, dry cuttings during open hole drilling.
35	35.0				BASALT, same as above, fragments up to 3/8".	
40	40.0				BASALT, same as above, fragments up to 1/4".	1400
45	45.0					
50	50.0				BASALT, black, dry, angular rock fragments up to 1/2", predominately less than 1/4", somewhat platy.	1420 Hard drilling
55	55.0				BASALT, same as above, increased moisture in cuttings but no evidence of fractures, likely due to bentonite seal failure.	
60						

PROJECT NUMBER:	BORING NUMBER:
661508	MW-21D SHEET 3 OF 5

SOIL BORING LOG

PROJECT : Freeman, Washington
LOCATION : Freeman, WA

ELEVATION : 2523.07 ft mslft NAVD88 (ground surface)
DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.

COORDINATES : 208058.834473, 2535784.669781 (ft NAVD88)
DRILLING METHOD AND EQUIPMENT : Schramm, Air Rotary

WATER LEVEL:
START : 7/5/17 10:00
END : 7/6/17 09:30
LOGGER : S. Davis

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
	60.0				BASALT, same as above, increased moisture in cuttings but no evidence of fractures, likely due to bentonite seal failure.	
65	65.0				BASALT, black, dry, angular rock fragments up to 1/2", predominately less than 1/4", somewhat platy.	
70	70.0				BASALT, same as above.	1515 Hard drilling Add 10' drill rod
75	75.0				BASALT, black, dry, angular rock fragments up to 1/2", predominately less than 1/4", somewhat platy.	Hard drilling
80	80.0				BASALT, same as above.	1535 - Add 10' drill rod
85	85.0				BASALT, same as above.	
90						

PROJECT NUMBER:	BORING NUMBER:
661508	MW-21D SHEET 4 OF 5

SOIL BORING LOG

PROJECT : Freeman, Washington
LOCATION : Freeman, WA

ELEVATION : 2523.07 ft mslft NAVD88 (ground surface)
DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.

COORDINATES : 208058.834473, 2535784.669781 (ft NAVD88)
DRILLING METHOD AND EQUIPMENT : Schramm, Air Rotary

WATER LEVEL:
START : 7/5/17 10:00
END : 7/6/17 09:30
LOGGER : S. Davis

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
	90.0				BASALT, same as above.	1600 - add 10' drill rod Hard drilling
95	95.0				BASALT, same as above.	
100	100.0				BASALT, black, dry, angular rock fragments up to 1/2", predominately less than 1/4", somewhat platy.	1620 - add 10' drill rod Hard drilling
105	105.0				BASALT, same as above.	
					BASALT, black, dry, predominately coarse sand with some 1/4" gravel, trace vesicular basalt.	Hard drilling
110	110.0				BASALT, black, dry, predominately coarse sand with some 1/4" gravel, trace vesicular basalt.	Soft drilling - 109'
					BASALT, same as above, wet, increased vesicular.	1645 - End of day at 111' bgs 7-5-17, start drilling at 900
115	115.0				BASALT, black, wet, vesicular, sub-angular to angular rock fragments up to 1/2", predominately less tan 1/4".	Soft drilling, abundant water
120						Soft drilling, abundant water

PROJECT NUMBER:	BORING NUMBER:
661508	MW-21D SHEET 5 OF 5

SOIL BORING LOG

PROJECT : Freeman, Washington
LOCATION : Freeman, WA

ELEVATION : 2523.07 ft mslft NAVD88 (ground surface)
DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.

COORDINATES : 208058.834473, 2535784.669781 (ft NAVD88)
DRILLING METHOD AND EQUIPMENT : Schramm, Air Rotary

WATER LEVEL:
START : 7/5/17 10:00
END : 7/6/17 09:30
LOGGER : S. Davis

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
	120.0				BASALT, black, wet, non-vesicular, sub-angular to angular rock fragments up to 1/2", predominately less tan 1/4", trace mineralization.	
					SILTY GRAVEL, gray wet, black vesicular basalt, sub-angular to angular rock fragments up to 1/4", predominately coarse sand, increased mineralization, highly	Soft drilling, abundant water
125	125.0				*likely slug of rock power from cyclone*.	
					BASALT, black, wet, sub-angular to angular rock fragments up to 1/2", non-vesicular, abundant mineralization.	Soft drilling, abundant water
					BASALT, same as above, less mineralization.	
					BASALT, same as above, trace mineralization.	
130	130.0				BASALT, black, wet, vesicular, sub-angular to angular rock fragments up to 14", no mineralization.	
						Alternating hard and soft drilling fro 130-141' bgs, no evidence of fractures.
135	135.0					
140	141.0				Boring terminated at 141 ft bgs.	
145						
150						

PROJECT NUMBER:	BORING NUMBER:
661508	MW-22S SHEET 1 OF 1

SOIL BORING LOG

PROJECT : UPRR Freeman, Freeman, Washington
LOCATION : Freeman, WA
ELEVATION :
DRILLING CONTRACTOR : Environmental West Exploration, Inc
COORDINATES : (ft NAVD88)
DRILLING METHOD AND EQUIPMENT : Air Rotary, Fraste Track Rig, 6" diameter
WATER LEVEL:
START : 12/1/17 07:40
END : 12/1/17 08:50
LOGGER : S. Demus

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
0.0						Begin drilling at 0740
5 5.0					CLAYEY SILT, medium brown, medium plasticity, moist.	
10 10.0					CLAY, medium brown with some olive, plastic, moist.	
					SANDY GRAVEL, moist, poorly graded micaceous sand, wet, quartz gravel up to 1/2", subangular to subrounded.	
13.0					WEATHERED BASALT, black with mineralization and oxidation, wet, subangular gravel to 3/4".	
					BASALT, black, dry, hard drilling, competent rock.	
15					Boring terminated at 13 ft bgs.	
20						
25						
30						

PROJECT NUMBER:	BORING NUMBER:
661508	MW-23S SHEET 1 OF 1

SOIL BORING LOG

PROJECT : UPRR Freeman, Freeman, Washington
LOCATION : Freeman, WA

ELEVATION :
DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : (ft NAVD88)
DRILLING METHOD AND EQUIPMENT : Air Rotary, Fraste Track Rig, 6" diameter

WATER LEVEL:
START : 12/1/17 12:40
END : 12/1/17 14:00
LOGGER : S. Demus

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
0.0						Begin drilling at 1240
5.0					CLAY, light brown, medium plasticity, damp.	
					CLAY, medium brown, moist, medium plasticity, trace fine micaceous sand.	
10.0					CLAY WITH TRACE FINE TO MEDIUM QUARTZ SAND, micaceous, slightly plastic, damp.	
					CLAYEY SAND, medium brown, trace quartz gravel, abundant mica, wet.	
15.0					SANDY CLAY, medium brown, slightly plastic, quartz sand with abundant mica, wet.	
					WEATHERED BASALT, predominately heavily oxidized gravel with sand, subrounded to subangular gravel to 1".	
18.0					BASALT, black, competent. Boring terminated at 18 ft bgs.	
20						
25						
30						

JACOBS

PROJECT NUMBER:	BORING NUMBER:
661508	MW-24S SHEET 1 OF 2

SOIL BORING LOG

PROJECT : UPRR Freeman | LOCATION : Freeman, WA

ELEVATION : ft NAVD88 | DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES: | DRILLING METHOD AND EQUIPMENT : 6" diameter, Sonic

WATER LEVEL: | START : 12/11/18 09:45 | END : 12/11/18 12:00 | LOGGER : J. E.

DEPTH BELOW SURFACE (FT)	INTERVAL (FT) / RECOVERY (%) / #TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION
0.0			CLAY, brown, v. stiff, wet.	Flush Mount Bentonite (2 - 38 ft bgs)
5 5.0				
10 10.0			CLAY, brown/tan, hard, lots of gravel, wet.	
			CLAY, brown/tan, soft, wet, little plasticity.	
15 15.0			CLAY, brown/tan, soft, some medium/fine sand.	
			CLAY, brown/tan, soft, some medium/fine sand.	
			CLAY, tan, soft, some fine sand, low plasticity, wet.	
20 20.0				
25 25.0			CLAY, brown, medium, some find sand, low plasticity.	
			CLAY, brown, medium, medium plasticity, red/tan silt inclusions.	
30				

JACOBS

PROJECT NUMBER:	BORING NUMBER:
661508	MW-24S SHEET 2 OF 2

SOIL BORING LOG

PROJECT : UPRR Freeman | LOCATION : Freeman, WA

ELEVATION : ft NAVD88 | DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES: | DRILLING METHOD AND EQUIPMENT : 6" diameter, Sonic

WATER LEVEL: | START : 12/11/18 09:45 | END : 12/11/18 12:00 | LOGGER : J. E.

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (%)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION
	30.0				CLAY, brown, medium, mottled.	
35	35.0				CLAY, reddish brown, medium, low plasticity, mottled.	Bentonite (2 - 38 ft bgs)
40	40.0					Sand Pack (10/20) (38 - 46 ft bgs) Screen (2" Sch. 40 PVC 10-Slot) (41 - 46 ft bgs)
45	45.0					
	46.0				CLAY, gray/brown, medium, low plasticity, mottled, some weathered basalt gravel/cobbles.	
					Boring terminated at 46 ft bgs.	
50						
55						
60						

JACOBS

PROJECT NUMBER:	BORING NUMBER:
661508	MW-25S SHEET 1 OF 2

SOIL BORING LOG

PROJECT : UPRR Freeman | LOCATION : Freeman, WA

ELEVATION : ft NAVD88 | DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES: | DRILLING METHOD AND EQUIPMENT : 6" diameter, Sonic

WATER LEVEL: | START : 12/11/18 15:30 | END : 12/12/18 11:50 | LOGGER : S. D.

DEPTH BELOW SURFACE (FT)	INTERVAL (FT) / RECOVERY (%) / #TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION
0.0			CLAY, light brown, dense, plastic (presence of quartz gravel at 17 ft bgs.).	Flush Mount Concrete (0 - 2 ft bgs) Bentonite (2 - 39 ft bgs)
5 5.0				
10 10.0				
15 15.0				
			CLAY, orange/yellow/brown, some sand and gravel, soft, plastic, wet.	
20 20.0				
25 25.0				
			CLAYEY SAND, some gravel, oxidized.	
			CLAY, orange/brown/olive, dense, plastic.	
30				

JACOBS

PROJECT NUMBER:	BORING NUMBER:
661508	MW-25S SHEET 2 OF 2

SOIL BORING LOG

PROJECT : UPRR Freeman | LOCATION : Freeman, WA

ELEVATION : ft NAVD88 | DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES: | DRILLING METHOD AND EQUIPMENT : 6" diameter, Sonic

WATER LEVEL: | START : 12/11/18 15:30 | END : 12/12/18 11:50 | LOGGER : S. D.

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (%)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION
	30.0				CLAY, orange/brown/olive, dense, plastic.	
35	35.0					
40	40.0					Bentonite (2 - 39 ft bgs) Sand Pack (10/20) (39 - 47.5 ft bgs) Screen (2" Sch. 40 PVC) (42 - 47 ft bgs)
45	45.0				CLAYEY SAND, olive, some gravel, oxidized.	
					BASALT, weathered/fractured, intermixed with clay.	
50	50.0				BASALT, weathered/fractured.	
					Boring terminated at 50 ft bgs.	
55						
60						

JACOBS

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-26	SHEET 1 OF 8

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Washington
LOCATION : RC-03 boring (209814.4 N, 2539649.3 E)

ELEVATION : 2585.1 ft
DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary, 6" boring diameter

WATER LEVELS : 21.2 ft bgs
START : 5/16/2019
END : 5/16/2019
LOGGER : J. Espinoza

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
2585.1				See RC-03 boring for lithology. Well constructed in RC-03 boring.			
5 2580.1							
10 2575.1							
15 2570.1							
20 2565.1 ▽							
25 2560.1							
30							

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-26	SHEET 2 OF 8

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Washington
LOCATION : RC-03 boring (209814.4 N, 2539649.3 E)

ELEVATION : 2585.1 ft
DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary, 6" boring diameter

WATER LEVELS : 21.2 ft bgs
START : 5/16/2019
END : 5/16/2019
LOGGER : J. Espinoza

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
2555.1							
35 2550.1							
40 2545.1							
45 2540.1							
50 2535.1							
55 2530.1							
60							

JACOBS

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-26	SHEET 3 OF 8

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Washington
LOCATION : RC-03 boring (209814.4 N, 2539649.3 E)

ELEVATION : 2585.1 ft
DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary, 6" boring diameter

WATER LEVELS : 21.2 ft bgs
START : 5/16/2019
END : 5/16/2019
LOGGER : J. Espinoza

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
2525.1							
65 2520.1							
70 2515.1							
75 2510.1							
80 2505.1							
85 2500.1							
90							

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-26	SHEET 4 OF 8

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Washington
LOCATION : RC-03 boring (209814.4 N, 2539649.3 E)

ELEVATION : 2585.1 ft
DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary, 6" boring diameter

WATER LEVELS : 21.2 ft bgs
START : 5/16/2019
END : 5/16/2019
LOGGER : J. Espinoza

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
2495.1							
95 2490.1							
100 2485.1							
105 2480.1							
110 2475.1							
115 2470.1							
120							

JACOBS

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-26	SHEET 5 OF 8

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Washington
LOCATION : RC-03 boring (209814.4 N, 2539649.3 E)

ELEVATION : 2585.1 ft
DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary, 6" boring diameter

WATER LEVELS : 21.2 ft bgs
START : 5/16/2019
END : 5/16/2019
LOGGER : J. Espinoza

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
2465.1							
125							
2460.1							
130							
2455.1							
135							
2450.1							
140							
2445.1							
145							
2440.1							
150							

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-26	SHEET 6 OF 8

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Washington
LOCATION : RC-03 boring (209814.4 N, 2539649.3 E)

ELEVATION : 2585.1 ft
DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary, 6" boring diameter

WATER LEVELS : 21.2 ft bgs
START : 5/16/2019
END : 5/16/2019
LOGGER : J. Espinoza

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
2435.1							
155 2430.1							
160 2425.1							
165 2420.1							
170 2415.1							
175 2410.1							
180							

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-26	SHEET 7 OF 8

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Washington
LOCATION : RC-03 boring (209814.4 N, 2539649.3 E)

ELEVATION : 2585.1 ft
DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary, 6" boring diameter

WATER LEVELS : 21.2 ft bgs
START : 5/16/2019
END : 5/16/2019
LOGGER : J. Espinoza

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
2405.1							
185 2400.1							
190 2395.1							
195 2390.1							
200 2385.1							
205 2380.1							
210							

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-26	SHEET 8 OF 8

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Washington
LOCATION : RC-03 boring (209814.4 N, 2539649.3 E)

ELEVATION : 2585.1 ft
DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary, 6" boring diameter

WATER LEVELS : 21.2 ft bgs
START : 5/16/2019
END : 5/16/2019
LOGGER : J. Espinoza

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
2375.1							
215							
2370.1							
220							
2365.1							
225							
2360.1				Bottom of Boring at 225.0 ft bgs on 5/16/2019			
230							
235							
240							

JACOBS™

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-27/RC-02	SHEET 1 OF 9

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Freeman, WA

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary

WATER LEVELS : --- START : 5/29/2019 END : 5/30/2019 LOGGER : JE

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
				See RC-02 boring log for lithology			
5							
10							
15							
20							
25							
30							

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-27/RC-02	SHEET 2 OF 9

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Freeman, WA

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary

WATER LEVELS : --- START : 5/29/2019 END : 5/30/2019 LOGGER : JE

DEPTH BELOW EXISTING GRADE (ft) / INTERVAL (ft) / RECOVERY (ft) / SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
35				
40				
45				
50				
55				
60				

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-27/RC-02	SHEET 3 OF 9

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Freeman, WA

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary

WATER LEVELS : --- START : 5/29/2019 END : 5/30/2019 LOGGER : JE

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
65							
70							
75							
80							
85							
90							

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-27/RC-02	SHEET 4 OF 9

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Freeman, WA

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary

WATER LEVELS : --- START : 5/29/2019 END : 5/30/2019 LOGGER : JE

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
95							
100							
105							
110							
115							
120							

JACOBS™

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-27/RC-02	SHEET 5 OF 9

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Freeman, WA

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary

WATER LEVELS : --- START : 5/29/2019 END : 5/30/2019 LOGGER : JE

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
125							
130							
135							
140							
145							
150							

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-27/RC-02	SHEET 6 OF 9

JACOBS™

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Freeman, WA

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary

WATER LEVELS : --- START : 5/29/2019 END : 5/30/2019 LOGGER : JE

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
155							
160							
165							
170							
175							
180							

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-27/RC-02	SHEET 7 OF 9

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Freeman, WA

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary

WATER LEVELS : --- START : 5/29/2019 END : 5/30/2019 LOGGER : JE

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
185							
190							
195							
200							
205							
210							

JACOBS™

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-27/RC-02	SHEET 8 OF 9

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Freeman, WA

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary

WATER LEVELS : --- START : 5/29/2019 END : 5/30/2019 LOGGER : JE

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
215							
220							
225							
230							
235							
240							

JACOBS™

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-27/RC-02	SHEET 9 OF 9

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Freeman, WA

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary

WATER LEVELS : --- START : 5/29/2019 END : 5/30/2019 LOGGER : JE

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
				Bottom of Boring at 243.0 ft bgs on			
245							
250							
255							
260							
265							
270							

JACOBS™

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-28	SHEET 1 OF 7

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Freeman, WA

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary

WATER LEVELS : --- START : 5/31/2019 END : 6/3/2019 LOGGER : JE

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
				See RC-02 boring log for lithology			
5							
10							
15							
20							
25							
30							

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-28	SHEET 2 OF 7

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Freeman, WA

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary

WATER LEVELS : --- START : 5/31/2019 END : 6/3/2019 LOGGER : JE

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
35							
40							
45							
50							
55							
60							

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-28	SHEET 3 OF 7

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Freeman, WA

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary

WATER LEVELS : --- START : 5/31/2019 END : 6/3/2019 LOGGER : JE

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
65							
70							
75							
80							
85							
90							

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-28	SHEET 4 OF 7

JACOBS™

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Freeman, WA

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary

WATER LEVELS : --- START : 5/31/2019 END : 6/3/2019 LOGGER : JE

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
95							
100							
105							
110							
115							
120							

JACOBS™

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-28	SHEET 5 OF 7

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Freeman, WA

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary

WATER LEVELS : --- START : 5/31/2019 END : 6/3/2019 LOGGER : JE

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
125							
130							
135							
140							
145							
150							

JACOBS™

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-28	SHEET 6 OF 7

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Freeman, WA

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary

WATER LEVELS : --- START : 5/31/2019 END : 6/3/2019 LOGGER : JE

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
155							
160							
165							
170							
175							
180							

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-28	SHEET 7 OF 7

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Freeman, WA

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary

WATER LEVELS : --- START : 5/31/2019 END : 6/3/2019 LOGGER : JE

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
185							
190				Bottom of Boring at 190.0 ft bgs on			
195							
200							
205							
210							

JACOBS™

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-29	SHEET 1 OF 5

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Freeman, WA

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary

WATER LEVELS : --- START : 6/6/2019 END : 6/7/2019 LOGGER : JE

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
				See RC-02 boring log for lithology			
5							
10							
15							
20							
25							
30							

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-29	SHEET 2 OF 5

JACOBS™

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Freeman, WA

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary

WATER LEVELS : --- START : 6/6/2019 END : 6/7/2019 LOGGER : JE

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
35							
40							
45							
50							
55							
60							

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-29	SHEET 3 OF 5

JACOBS™

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Freeman, WA

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary

WATER LEVELS : --- START : 6/6/2019 END : 6/7/2019 LOGGER : JE

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
65							
70							
75							
80							
85							
90							

JACOBS™

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-29	SHEET 4 OF 5

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Freeman, WA

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary

WATER LEVELS : --- START : 6/6/2019 END : 6/7/2019 LOGGER : JE

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
95							
100							
105							
110							
115							
120							

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-29	SHEET 5 OF 5

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Freeman, WA

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary

WATER LEVELS : --- START : 6/6/2019 END : 6/7/2019 LOGGER : JE

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
125							
130							
135							
140				Bottom of Boring at 140.0 ft bgs on			
145							
150							

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-30	SHEET 1 OF 4

JACOBS™

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Freeman, WA

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary

WATER LEVELS : --- START : 6/24/2019 END : 6/26/2019 LOGGER : JE

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
				See RC-02 boring log for lithology			
5							
10							
15							
20							
25							
30							

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-30	SHEET 2 OF 4

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Freeman, WA

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary

WATER LEVELS : --- START : 6/24/2019 END : 6/26/2019 LOGGER : JE

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
35							
40							
45							
50							
55							
60							

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-30	SHEET 3 OF 4

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Freeman, WA

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary

WATER LEVELS : --- START : 6/24/2019 END : 6/26/2019 LOGGER : JE

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
65							
70							
75							
80							
85							
90							

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-30	SHEET 4 OF 4

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Freeman, WA

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary

WATER LEVELS : --- START : 6/24/2019 END : 6/26/2019 LOGGER : JE

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
95							
100				Bottom of Boring at 100.0 ft bgs on			
105							
110							
115							
120							

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-31/RC-04	SHEET 1 OF 13

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Freeman, WA

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary

WATER LEVELS : --- START : 6/28/2019 END : 7/1/2019 LOGGER : JE

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
				See RC-04 boring log for lithology			
5							
10							
15							
20							
25							
30							

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-31/RC-04	SHEET 2 OF 13

JACOBS™

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Freeman, WA

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary

WATER LEVELS : --- START : 6/28/2019 END : 7/1/2019 LOGGER : JE

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
35							
40							
45							
50							
55							
60							

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-31/RC-04	SHEET 3 OF 13

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Freeman, WA

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary

WATER LEVELS : --- START : 6/28/2019 END : 7/1/2019 LOGGER : JE

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
65							
70							
75							
80							
85							
90							

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-31/RC-04	SHEET 4 OF 13

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Freeman, WA

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary

WATER LEVELS : --- START : 6/28/2019 END : 7/1/2019 LOGGER : JE

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
95							
100							
105							
110							
115							
120							

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-31/RC-04	SHEET 5 OF 13

JACOBS™

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Freeman, WA

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary

WATER LEVELS : --- START : 6/28/2019 END : 7/1/2019 LOGGER : JE

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
125							
130							
135							
140							
145							
150							

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-31/RC-04	SHEET 6 OF 13

JACOBS™

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Freeman, WA

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary

WATER LEVELS : --- START : 6/28/2019 END : 7/1/2019 LOGGER : JE

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
155							
160							
165							
170							
175							
180							

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-31/RC-04	SHEET 7 OF 13

JACOBS™

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Freeman, WA

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary

WATER LEVELS : --- START : 6/28/2019 END : 7/1/2019 LOGGER : JE

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
185							
190							
195							
200							
205							
210							

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-31/RC-04	SHEET 8 OF 13

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Freeman, WA

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary

WATER LEVELS : --- START : 6/28/2019 END : 7/1/2019 LOGGER : JE

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
215							
220							
225							
230							
235							
240							

JACOBS™

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-31/RC-04	SHEET 9 OF 13

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Freeman, WA

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary

WATER LEVELS : --- START : 6/28/2019 END : 7/1/2019 LOGGER : JE

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
245							
250							
255							
260							
265							
270							

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-31/RC-04	SHEET 10 OF 13

JACOBS™

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Freeman, WA

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary

WATER LEVELS : --- START : 6/28/2019 END : 7/1/2019 LOGGER : JE

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
275							
280							
285							
290							
295							
300							

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-31/RC-04	SHEET 11 OF 13

JACOBS™

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Freeman, WA

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary

WATER LEVELS : --- START : 6/28/2019 END : 7/1/2019 LOGGER : JE

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
305							
310							
315							
320							
325							
330							

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-31/RC-04	SHEET 12 OF 13

JACOBS™

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Freeman, WA

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary

WATER LEVELS : --- START : 6/28/2019 END : 7/1/2019 LOGGER : JE

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
335							
340							
345							
350							
355							
360							

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-31/RC-04	SHEET 13 OF 13

JACOBS™

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Freeman, WA

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary

WATER LEVELS : --- START : 6/28/2019 END : 7/1/2019 LOGGER : JE

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
365							
370							
375							
380							
385				Bottom of Boring at 385.0 ft bgs on			
390							

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-32	SHEET 1 OF 10

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Freeman, WA

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary

WATER LEVELS : --- START : 7/3/2019 END : 7/8/2019 LOGGER : JE

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
				See RC-04 boring log for lithology			
5							
10							
15							
20							
25							
30							

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-32	SHEET 2 OF 10

JACOBS™

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Freeman, WA

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary

WATER LEVELS : --- START : 7/3/2019 END : 7/8/2019 LOGGER : JE

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
35							
40							
45							
50							
55							
60							

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-32	SHEET 3 OF 10

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Freeman, WA

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary

WATER LEVELS : --- START : 7/3/2019 END : 7/8/2019 LOGGER : JE

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
65							
70							
75							
80							
85							
90							

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-32	SHEET 4 OF 10

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Freeman, WA

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary

WATER LEVELS : --- START : 7/3/2019 END : 7/8/2019 LOGGER : JE

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
95							
100							
105							
110							
115							
120							

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-32	SHEET 5 OF 10

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Freeman, WA

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary

WATER LEVELS : --- START : 7/3/2019 END : 7/8/2019 LOGGER : JE

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
125							
130							
135							
140							
145							
150							

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-32	SHEET 6 OF 10

JACOBS™

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Freeman, WA

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary

WATER LEVELS : --- START : 7/3/2019 END : 7/8/2019 LOGGER : JE

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
155							
160							
165							
170							
175							
180							

JACOBS™

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-32	SHEET 7 OF 10

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Freeman, WA

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary

WATER LEVELS : --- START : 7/3/2019 END : 7/8/2019 LOGGER : JE

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
185							
190							
195							
200							
205							
210							

JACOBS™

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-32	SHEET 8 OF 10

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Freeman, WA

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary

WATER LEVELS : --- START : 7/3/2019 END : 7/8/2019 LOGGER : JE

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
215							
220							
225							
230							
235							
240							

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-32	SHEET 9 OF 10

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Freeman, WA

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary

WATER LEVELS : --- START : 7/3/2019 END : 7/8/2019 LOGGER : JE

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
245							
250							
255							
260							
265							
270							

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-32	SHEET 10 OF 10

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Freeman, WA

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary

WATER LEVELS : --- START : 7/3/2019 END : 7/8/2019 LOGGER : JE

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
275							
280							
285							
290							
295				Bottom of Boring at 295.0 ft bgs on			
300							

JACOBS™

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-33	SHEET 1 OF 10

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Freeman, WA

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary

WATER LEVELS : --- START : 7/10/2019 END : 7/12/2019 LOGGER : JE

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
				See RC-04 boring log for lithology			
5							
10							
15							
20							
25							
30							

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-33	SHEET 2 OF 10

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Freeman, WA

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary

WATER LEVELS : --- START : 7/10/2019 END : 7/12/2019 LOGGER : JE

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
35							
40							
45							
50							
55							
60							

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-33	SHEET 3 OF 10

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Freeman, WA

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary

WATER LEVELS : --- START : 7/10/2019 END : 7/12/2019 LOGGER : JE

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
65							
70							
75							
80							
85							
90							

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-33	SHEET 4 OF 10

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Freeman, WA

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary

WATER LEVELS : --- START : 7/10/2019 END : 7/12/2019 LOGGER : JE

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
95							
100							
105							
110							
115							
120							

JACOBS™

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-33	SHEET 5 OF 10

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Freeman, WA

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary

WATER LEVELS : --- START : 7/10/2019 END : 7/12/2019 LOGGER : JE

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
125							
130							
135							
140							
145							
150							

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-33	SHEET 6 OF 10

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Freeman, WA

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary

WATER LEVELS : --- START : 7/10/2019 END : 7/12/2019 LOGGER : JE

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
155							
160							
165							
170							
175							
180							

JACOBS™

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-33	SHEET 7 OF 10

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Freeman, WA

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary

WATER LEVELS : --- START : 7/10/2019 END : 7/12/2019 LOGGER : JE

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
185							
190							
195							
200							
205							
210							

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-33	SHEET 8 OF 10

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Freeman, WA

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary

WATER LEVELS : --- START : 7/10/2019 END : 7/12/2019 LOGGER : JE

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
215							
220							
225							
230							
235							
240							

JACOBS™

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-33	SHEET 9 OF 10

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Freeman, WA

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary

WATER LEVELS : --- START : 7/10/2019 END : 7/12/2019 LOGGER : JE

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
245							
250							
255							
260							
265							
270							

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-33	SHEET 10 OF 10

JACOBS™

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Freeman, WA

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary

WATER LEVELS : --- START : 7/10/2019 END : 7/12/2019 LOGGER : JE

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
275				Bottom of Boring at 274.0 ft bgs on			
280							
285							
290							
295							
300							

JACOBS

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-34	SHEET 1 OF 7

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Washington
LOCATION : Near RC-04 (209442.1 N, 2539177.8 E)

ELEVATION : 2589.3 ft
DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary with 6" boring diameter

WATER LEVELS : 125.0 ft bgs
START : 7/15/2019
END : 7/17/2019
LOGGER : J. Espinoza

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
2589.3				See RC-04 boring log for lithology			Well screened at 165 - 185'
5 2584.3							
10 2579.3							
15 2574.3							
20 2569.3							
25 2564.3							
30							

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-34	SHEET 2 OF 7

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Washington
LOCATION : Near RC-04 (209442.1 N, 2539177.8 E)

ELEVATION : 2589.3 ft
DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary with 6" boring diameter

WATER LEVELS : 125.0 ft bgs
START : 7/15/2019
END : 7/17/2019
LOGGER : J. Espinoza

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
2559.3							
35 2554.3							
40 2549.3							
45 2544.3							
50 2539.3							
55 2534.3							
60							

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-34	SHEET 3 OF 7

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Washington
LOCATION : Near RC-04 (209442.1 N, 2539177.8 E)

ELEVATION : 2589.3 ft
DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary with 6" boring diameter

WATER LEVELS : 125.0 ft bgs
START : 7/15/2019
END : 7/17/2019
LOGGER : J. Espinoza

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
2529.3							
65 2524.3							
70 2519.3							
75 2514.3							
80 2509.3							
85 2504.3							
90							

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-34	SHEET 4 OF 7

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Washington
LOCATION : Near RC-04 (209442.1 N, 2539177.8 E)

ELEVATION : 2589.3 ft
DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary with 6" boring diameter

WATER LEVELS : 125.0 ft bgs
START : 7/15/2019
END : 7/17/2019
LOGGER : J. Espinoza

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
2499.3							
95 2494.3							
100 2489.3							
105 2484.3							
110 2479.3							
115 2474.3							
120							

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-34	SHEET 5 OF 7

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Washington
LOCATION : Near RC-04 (209442.1 N, 2539177.8 E)

ELEVATION : 2589.3 ft
DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary with 6" boring diameter

WATER LEVELS : 125.0 ft bgs
START : 7/15/2019
END : 7/17/2019
LOGGER : J. Espinoza

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
2469.3							
125							
2464.3							
130							
2459.3							
135							
2454.3							
140							
2449.3							
145							
2444.3							
150							

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-34	SHEET 6 OF 7

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Washington
LOCATION : Near RC-04 (209442.1 N, 2539177.8 E)

ELEVATION : 2589.3 ft
DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary with 6" boring diameter

WATER LEVELS : 125.0 ft bgs
START : 7/15/2019
END : 7/17/2019
LOGGER : J. Espinoza

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
2439.3							
155							
2434.3							
160							
2429.3							
165							
2424.3							
170							
2419.3							
175							
2414.3							
180							

JACOBS

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-34	SHEET 7 OF 7

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Washington
LOCATION : Near RC-04 (209442.1 N, 2539177.8 E)

ELEVATION : 2589.3 ft
DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary with 6" boring diameter

WATER LEVELS : 125.0 ft bgs
START : 7/15/2019
END : 7/17/2019
LOGGER : J. Espinoza

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
2409.3							
185							
2404.3				Bottom of Boring at 185.0 ft bgs on 7/17/2019			
190							
195							
200							
205							
210							

JACOBS™

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-35	SHEET 1 OF 6

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Freeman, WA

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary

WATER LEVELS : --- START : 7/24/2019 END : 8/7/2019 LOGGER : JE

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
				See RC-03 boring log for lithology			
5							
10							
15							
20							
25							
30							

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-35	SHEET 2 OF 6

JACOBS™

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Freeman, WA

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary

WATER LEVELS : --- START : 7/24/2019 END : 8/7/2019 LOGGER : JE

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
35							
40							
45							
50							
55							
60							

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-35	SHEET 3 OF 6

JACOBS™

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Freeman, WA

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary

WATER LEVELS : --- START : 7/24/2019 END : 8/7/2019 LOGGER : JE

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
65							
70							
75							
80							
85							
90							

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-35	SHEET 4 OF 6

JACOBS™

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Freeman, WA

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary

WATER LEVELS : --- START : 7/24/2019 END : 8/7/2019 LOGGER : JE

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
95							
100							
105							
110							
115							
120							

JACOBS™

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-35	SHEET 5 OF 6

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Freeman, WA

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary

WATER LEVELS : --- START : 7/24/2019 END : 8/7/2019 LOGGER : JE

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
125							
130							
135							
140							
145							
150							

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-35	SHEET 6 OF 6

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Freeman, WA

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary

WATER LEVELS : --- START : 7/24/2019 END : 8/7/2019 LOGGER : JE

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
155							
160							
165							
170							
175							
180				Bottom of Boring at 179.0 ft bgs on			

JACOBS™

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-36	SHEET 1 OF 3

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Freeman, WA

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary

WATER LEVELS : --- START : 8/8/2019 END : 8/15/2019 LOGGER : JE

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
				See RC-03 boring log for lithology			
5							
10							
15							
20							
25							
30							

JACOBS™

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-36	SHEET 2 OF 3

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Freeman, WA

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary

WATER LEVELS : --- START : 8/8/2019 END : 8/15/2019 LOGGER : JE

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
35							
40							
45							
50							
55							
60							

PROJECT NUMBER:	BORING NUMBER:	
661508	MW-36	SHEET 3 OF 3

JACOBS™

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Freeman, WA

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary

WATER LEVELS : --- START : 8/8/2019 END : 8/15/2019 LOGGER : JE

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
65							
70							
75							
80				Bottom of Boring at 79.0 ft bgs on			
85							
90							

JACOBS

PROJECT NUMBER:	BORING NUMBER:	
661508	RC-01	SHEET 1 OF 3

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Washington
LOCATION : Near MW-9 Cluster (210748.8 N, 2539627.7 E)

ELEVATION : 2599.2 ft
DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Sonic, 8" boring diameter

WATER LEVELS : 44.6 ft bgs
START : 11/8/2018
END : 11/8/2018
LOGGER : J. Espinoza

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
2599.2	0.0						
5	5.0						
2594.2				**CLAY (CL)** 5.0' - brown, dry, very soft, high plasticity			Picture taken at 5'
10	10.0						
2589.2				**CLAY (CL)** 10.0' - same as above			Picture taken at 10'
15	15.0						
2584.2				**SAND (SP)** 15.0' - brown, dry, medium grained, some plastic clay			Picture taken at 15'
20	20.0						
2579.2				**CLAY (CL)** 20.0' - tan, dry, medium density, high plasticity			Picture taken at 20'
25	25.0						
2574.2				**CLAY (CL)** 25.0' - brown, dry, very soft to soft, high plasticity			Picture taken at 25'
30							

JACOBS

PROJECT NUMBER:	BORING NUMBER:	
661508	RC-01	SHEET 2 OF 3

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Washington
LOCATION : Near MW-9 Cluster (210748.8 N, 2539627.7 E)

ELEVATION : 2599.2 ft
DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Sonic, 8" boring diameter

WATER LEVELS : 44.6 ft bgs
START : 11/8/2018
END : 11/8/2018
LOGGER : J. Espinoza

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
2569.2	30.0			**CLAY (CL)** 30.0' - same as above, wet			Picture taken at 30'
35	35.0						
2564.2				**CLAY (CL)** 35.0' - same as above			Picture taken at 35'
40	40.0						
2559.2				**CLAY (CL)** 40.0' - brown, wet, soft, medium plasticity			Picture taken at 40'
				BASALT 43.0' - 45.0' - black, small angular chips, weathered, some clay, some larger chips			
45	45.0						
2554.2				**BASALT** 45.0' - 47.0' - black, small angular chips, some large chips			Picture taken at 45'
	47.0						
				BASALT 47.0 - 52.0' - very dark gray with brown/orange iron staining, strong, aphanitic, massive, moderately decomposed, intensely fractured, fractures horizontal and vertical, no cementation, but iron staining on surfaces, RQD = 0%			Picture taken at 47'. Rock begins at 47.5'
50 2549.2							
	52.0						
				BASALT 52.0 - 57.0' - same as above, slightly decreased weathering and decreased fracture density. RQD = 28%			
55 2544.2							Driller loses water to the formation, rods stuck in hole at approximated 55-60'
	57.0						
				BASALT 57.0 - 62.0' - medium to dark gray, strong aphanitic with some porphyritic weathered plagioclase crystals in intervals. Massive, moderately decomposed, intensely fractured (RQO = 44%). No discernable fractures pattern in core, iron staining		
60							

PROJECT NUMBER:	BORING NUMBER:	
661508	RC-01	SHEET 3 OF 3

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Washington

LOCATION : Near MW-9 Cluster (210748.8 N, 2539627.7 E)

ELEVATION : 2599.2 ft

DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Sonic, 8" boring diameter

WATER LEVELS : 44.6 ft bgs

START : 11/8/2018

END : 11/8/2018

LOGGER : J. Espinoza

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
2539.2							
	62.0			Bottom of Boring at 62.0 ft bgs on 11/8/2018			
65							
70							
75							
80							
85							
90							

JACOBS

PROJECT NUMBER:	BORING NUMBER:	
661508	RC-02	SHEET 1 OF 8

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Washington
LOCATION : Near MW-19D (210375.0 N, 2539671.7 E)

ELEVATION : 2625.1 ft
DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Sonic, 8" boring diameter to 123', Air Rotary, 5.5" boring diameter to 230'

WATER LEVELS : 59.8 ft bgs
START : 11/14/2018
END : 3/21/2019
LOGGER : J. Espinoza

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
2625.1	0.0					0	
5	5.0						
2620.1				**CLAY (CL)** 5.0' - brown, dry, stiff, medium plasticity		0	
				CLAY (CL) 8.0' - brown, dry, hard, low plasticity			
10	10.0						
2615.1				**CLAY (CL)** 10.0' - brown, dry, hard, no plasticity		0	
15	15.0						
2610.1				**CLAY (CL)** 15.0' - same as above		0	
20	20.0						
2605.1				**CLAY (CL)** 20.0' - brown, soft, dry, medium plasticity		0	
25	25.0						
2600.1				**CLAY (CL)** 25.0' - brown, soft to very soft, dry, medium to high plasticity		0	
30							

JACOBS

PROJECT NUMBER:	BORING NUMBER:	
661508	RC-02	SHEET 2 OF 8

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Washington
LOCATION : Near MW-19D (210375.0 N, 2539671.7 E)

ELEVATION : 2625.1 ft
DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Sonic, 8" boring diameter to 123', Air Rotary, 5.5" boring diameter to 230'

WATER LEVELS : 59.8 ft bgs
START : 11/14/2018
END : 3/21/2019
LOGGER : J. Espinoza

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
2595.1	30.0			**CLAY (CL)** 30.0' - same as above		0	
35 2590.1	35.0			**CLAY (CL)** 34.0' - tan, dry, stiff to hard, low plasticity **CLAY (CL)** 35.0' - gray, dry, very soft, high plasticity **CLAY (CL)** 36.0' - brown, dry, very soft, medium plasticity		0	
40 2585.1	40.0			**CLAY (CL)** 40.0' - brown, dry, very soft, high plasticity		0	
45 2580.1	45.0			**CLAY (CL)** 45.0' - same as above		0	
50 2575.1	50.0			**CLAY (CL)** 50.0' - gray, dry, medium density, medium plasticity		0	
55 2570.1	55.0			**SAND (SP)** 55.0' - brown, dry, medium to fine sand, some clay		0	
60							

JACOBS

PROJECT NUMBER:	BORING NUMBER:	
661508	RC-02	SHEET 3 OF 8

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Washington
LOCATION : Near MW-19D (210375.0 N, 2539671.7 E)

ELEVATION : 2625.1 ft
DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Sonic, 8" boring diameter to 123', Air Rotary, 5.5" boring diameter to 230'

WATER LEVELS : 59.8 ft bgs
START : 11/14/2018
END : 3/21/2019
LOGGER : J. Espinoza

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
2565.1	60.0			**CLAY (CL)** 60.0' - gray, dry, very soft, high plasticity		0	
65	65.0						
2560.1				**CLAY (CL)** 65.0' - same as above		0	
70	70.0						
2555.1				**CLAY (CL)** 70.0' - brown, dry, very soft, high plasticity		0	
75	75.0						
2550.1				**CLAY (CL)** 75.0' - brown, moist, very soft, high plasticity		0	
80	80.0						
2545.1				**CLAY (CL)** 80.0' - brown, saturated, very soft, plastic, some highly weathered basalt chips		0	
85	85.0						
2540.1				**BASALT** 85.0' - brown/red, wet, oxidized, variable sizes, rounded, weathered		0	
90							

PROJECT NUMBER:	BORING NUMBER:	
661508	RC-02	SHEET 4 OF 8

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Washington
LOCATION : Near MW-19D (210375.0 N, 2539671.7 E)

ELEVATION : 2625.1 ft
DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Sonic, 8" boring diameter to 123', Air Rotary, 5.5" boring diameter to 230'

WATER LEVELS : 59.8 ft bgs
START : 11/14/2018
END : 3/21/2019
LOGGER : J. Espinoza

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
2535.1	90.0			**BASALT** 90.0 - 94.0'		0	
95	95.0			**BASALT** 94.0 - 96.0' - black, angular chips, decreasing oxidation, similar size			
2530.1				**BASALT** 97.0' - black, saturated, angular chips, similar size		0	
				BASALT 97.7 - 100.7' - medium dark gray, very strong, fresh, light disintegration, moderately fractured, trace oxidation, pyrite, fractures very narrow to narrow, some surface oxidation, undulating fracture surfaces			Rock begins at 97.7', heavy water leakage noted
100	100.0						
2525.1			RC-02-GWA-100101.5	**BASALT** 100.7 - 105.7' - medium dark gray with some orange brown iron staining, strong, aphanitic, massive, moderately to slightly decomposed, slight disintegration, fractured, RQD = 0%		0	Quick release jammed, all casing removed and tripped back in with casing to continue coring Groundwater grab sample RC-02-GWA-100101.5 collected on 12/19/18
105	105.0						
2520.1				**BASALT** 105.7 - 110.7' - dark gray with orange brown oxidation, weak, weathered, aphanitic, massive, moderately dcomposed, moderately disntegrated, very intensely fractured and 80-90% vesicular, partial greenish colored silica cementation, RQD = 14 - 29%.		0	
110	110.0						
2515.1				**BASALT** 111.0 - 121.0' - black with some red oxidation, aphanitic, massive, slightly to moderately decomposed, wet		0	Driller estimates fluid loss into formation at 500 - 600 gallons from 100.7 to 110.7. Producing water at 111'
115	115.0						
2510.1						0	
120							

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PROJECT NUMBER:	BORING NUMBER:	
661508	RC-02	SHEET 5 OF 8

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Washington
LOCATION : Near MW-19D (210375.0 N, 2539671.7 E)

ELEVATION : 2625.1 ft
DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Sonic, 8" boring diameter to 123', Air Rotary, 5.5" boring diameter to 230'

WATER LEVELS : 59.8 ft bgs
START : 11/14/2018
END : 3/21/2019
LOGGER : J. Espinoza

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
2505.1	120.0						
				No Recovery		0	5.5" boring hole diameter air rotary rig used for drilling
125	125.0						
2500.1						0	
130	130.0						
2495.1				**BASALT** 130.0 - 143.0' - black with some reddish color due to possible oxidation, aphanitic, slightly to moderately decomposed, wet		0	Picture taken at 131'
135	135.0						
2490.1							Picture taken at 136'
						0	
140	140.0						
2485.1							Picture taken at 140'
						0	
				BASALT 143.0 - 177.0' - black to dark gray, med to strong, aphanitic, massive, wet			Color change in water, black/gray, picture taken at 143'
145	145.0						
2480.1						0	
150							

PROJECT NUMBER:	BORING NUMBER:	
661508	RC-02	SHEET 6 OF 8

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Washington
LOCATION : Near MW-19D (210375.0 N, 2539671.7 E)

ELEVATION : 2625.1 ft
DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Sonic, 8" boring diameter to 123', Air Rotary, 5.5" boring diameter to 230'

WATER LEVELS : 59.8 ft bgs
START : 11/14/2018
END : 3/21/2019
LOGGER : J. Espinoza

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
2475.1	150.0						Picture taken at 150'
							Harder drilling at 151'
						0	
							Color change in water to brown at 153'. Softer drilling
155	155.0						
2470.1							Color change in water to gray at 156'
						0	
							Harder drilling at 159'
160	160.0						
2465.1							Picture taken at 160'
						0	
165	165.0						
2460.1							Picture taken at 165'
						0	
170	170.0						
2455.1							Picture taken at 170'
						0	
175	175.0						
2450.1							Picture taken at 175'
				BASALT 177.0 - 185.0' - black with some reddish brown, moderate strength, possible oxidation, aphenitic, massive, wet		0	Picture taken at 177', softer drilling
180							

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PROJECT NUMBER:	BORING NUMBER:	
661508	RC-02	SHEET 7 OF 8

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Washington
LOCATION : Near MW-19D (210375.0 N, 2539671.7 E)

ELEVATION : 2625.1 ft
DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Sonic, 8" boring diameter to 123', Air Rotary, 5.5" boring diameter to 230'

WATER LEVELS : 59.8 ft bgs
START : 11/14/2018
END : 3/21/2019
LOGGER : J. Espinoza

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
2445.1	180.0					0	
185	185.0						
2440.1				**BASALT** 185.0 - 201.0' - black, moderate to strong, aphanitic, massive, slightly decomposed, slightly disintegrated, wet		0	Picture taken at 185', very soft drilling
190	190.0						
2435.1							Picture taken at 190' Firmer drilling at 191'
195	195.0					0	
2430.1							Picture taken at 195'
200	200.0					0	Very soft drilling at 197'
2425.1							Picture taken at 200'
205	205.0			**BASALT** 201.0 - 207.0' - black with some reddish brown, moderate, aphanitic, massive, slightly decomposed, slightly disintegrated, wet		0	
2420.1							Picture taken at 205', color change in water to brown
210				**CLAY** 207.0 - 215.0' - brown, wet, very soft, medium to low plasticity, little recovery		0	Picture taken at 207', little recovery

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PROJECT NUMBER:	BORING NUMBER:	
661508	RC-02	SHEET 8 OF 8

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Washington
LOCATION : Near MW-19D (210375.0 N, 2539671.7 E)

ELEVATION : 2625.1 ft
DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Sonic, 8" boring diameter to 123', Air Rotary, 5.5" boring diameter to 230'

WATER LEVELS : 59.8 ft bgs
START : 11/14/2018
END : 3/21/2019
LOGGER : J. Espinoza

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
2415.1	210.0					0	Picture taken at 210', lots of water
215	215.0						
2410.1				**BASALT** 215.0 - 220.0' - green, some red and brown, moderate, aphanitic, massive, moderately to highly decomposed, wet		0	Picture taken at 215', driller notes loss of circulation in hole
220	220.0						
2405.1				**CLAY** 220.0 - 225.0' - very soft, brown, wet, low plasticity, some rock fragments		0	Picture taken at 220'
225	225.0						
2400.1				**CLAY** 225.0 - 230.0' - soft to very soft, brown, wet, low plasticity, some rock fragments and weathered basalt		0	Picture taken at 225'
230	230.0						
2395.1				Bottom of Boring at 230.0 ft bgs on 3/21/2019			Picture taken at 230', hole is collapsing
235							
240							

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PROJECT NUMBER:	BORING NUMBER:	
661508	RC-03	SHEET 1 OF 9

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Washington
LOCATION : Near MW-4D (209814.4 N, 2539649.3 E)

ELEVATION : 2585.1 ft
DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary, 5.5" boring diameter

WATER LEVELS : 21.2 ft bgs
START : 11/16/2018
END : 4/15/2019
LOGGER : J. Espinoza

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft) / RECOVERY (ft) / SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
2585.1	0.0			0	
5	5.0				
2580.1		**CLAY (CL)** 5.0' - brown, moist, soft, high plasticity		0	
10	10.0				
2575.1		**CLAY (CL)** 10.0' - brown, wet, soft, medium plasticity		0	
15	15.0				
2570.1		**CLAY (CL** 15.0' - brown, wet, soft, plastic		0	
20	20.0				
2565.1		**CLAY (CL)** 20.0' - same as above		0	
▽					
25	25.0				
2560.1		**CLAY (CL)** 25.0' - same as above		0	
30					

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PROJECT NUMBER:	BORING NUMBER:	
661508	RC-03	SHEET 2 OF 9

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Washington
LOCATION : Near MW-4D (209814.4 N, 2539649.3 E)

ELEVATION : 2585.1 ft
DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary, 5.5" boring diameter

WATER LEVELS : 21.2 ft bgs
START : 11/16/2018
END : 4/15/2019
LOGGER : J. Espinoza

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
2555.1	30.0			**CLAY (CL)** 30.0' - same as above, some rock fragments		0	
35	35.0						
2550.1				**CLAY (CL)** 35.0' - same as above		0	
40	40.0						
2545.1				**CLAY (CL)** 40.0' - same as above		0	
45	45.0						
2540.1				**CLAY (CL)** 45.0' - same as above		0	
50	50.0						
2535.1				**BASALT** 50.0' - low recovery, highly weathered, variable sizes,			
				BASALT 52.0' - same as above, good recovery		0	
55	55.0						
2530.1	56.0					0	
				BASALT 56.0' - black, trace oxidation, sharp chips, similar size			
60							

PROJECT NUMBER:	BORING NUMBER:	
661508	RC-03	SHEET 3 OF 9

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Washington
LOCATION : Near MW-4D (209814.4 N, 2539649.3 E)

ELEVATION : 2585.1 ft
DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary, 5.5" boring diameter

WATER LEVELS : 21.2 ft bgs
START : 11/16/2018
END : 4/15/2019
LOGGER : J. Espinoza

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
2525.1	60.0		RC-03-GW-A-60-62				Grab groundwater sample RC-03-GW-A-60-62 collected on 12/20/18
	62.0						
65 2520.1							
70 2515.1							
75 2510.1							
80 2505.1							
85 2500.1	85.0			**BASALT** 85.0 - 115.0' - gray, dry, very weak, aphanitic, massive, highly decomposed			Rock begins at 85', Picture taken at 85'
90							

PROJECT NUMBER:	BORING NUMBER:	
661508	RC-03	SHEET 4 OF 9

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Washington
LOCATION : Near MW-4D (209814.4 N, 2539649.3 E)

ELEVATION : 2585.1 ft
DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary, 5.5" boring diameter

WATER LEVELS : 21.2 ft bgs
START : 11/16/2018
END : 4/15/2019
LOGGER : J. Espinoza

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
2495.1	90.0						Picture taken at 90'
95	95.0						
2490.1							Picture taken at 95'
100	100.0						
2485.1							Picture taken at 100'
105	105.0						
2480.1							Picture taken at 105'
110	110.0						
2475.1							Picture taken at 110'
115	115.0						
2470.1				**BASALT** 115.0 - 145.0' - black to dark gray, some red oxidation, dry, moderate strength, aphanitic, massive, slighty decomposed			Picture taken at 115'
120							

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PROJECT NUMBER:	BORING NUMBER:	
661508	RC-03	SHEET 5 OF 9

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Washington
LOCATION : Near MW-4D (209814.4 N, 2539649.3 E)

ELEVATION : 2585.1 ft
DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary, 5.5" boring diameter

WATER LEVELS : 21.2 ft bgs
START : 11/16/2018
END : 4/15/2019
LOGGER : J. Espinoza

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
2465.1	120.0						Picture taken at 120'
125	125.0						
2460.1							Picture taken at 125'
130	130.0						
2455.1							Water in cuttings
135	135.0						
2450.1							Picture taken at 135'
140	140.0						
2445.1							Picture taken at 140'
145	145.0						
2440.1				**BASALT** 145.0 - 155.0' - gray, wet, moderate strength, aphanitic, massive, moderately decomposed			Picture taken at 145'
150							

JACOBS

PROJECT NUMBER:	BORING NUMBER:	
661508	RC-03	SHEET 6 OF 9

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Washington
LOCATION : Near MW-4D (209814.4 N, 2539649.3 E)

ELEVATION : 2585.1 ft
DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary, 5.5" boring diameter

WATER LEVELS : 21.2 ft bgs
START : 11/16/2018
END : 4/15/2019
LOGGER : J. Espinoza

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
2435.1	150.0						Picture taken at 150'
155	155.0						
2430.1				**BASALT** 155.0 - 165.0' - gray, wet, moderate/weak, aphanitic, massive, decomposed, trace/few brown clay, low plasticity			Picture taken at 155', cuttings clogging cyclone
160	160.0						
2425.1							Picture taken at 160', cuttings clogging cyclone
165	165.0						
2420.1				**BASALT** 165.0 - 170.0' - gray with some red/white, wet, moderate/weak, aphanitic, massive, mod. decomposed			Picture taken at 165'
170	170.0						
2415.1				**BASALT** 170.0 - 175.0' - brown with red/white, wet, weak, aphanitic, massive, highly decomposed			Picture taken at 170'
175	175.0						
2410.1				**BASALT** 175.0 - 180.0' - some white, wet, weak/moderate, aphanitic, massive, moderately decomposed			Picture taken at 175'
180							

JACOBS

PROJECT NUMBER:	BORING NUMBER:	
661508	RC-03	SHEET 7 OF 9

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Washington
LOCATION : Near MW-4D (209814.4 N, 2539649.3 E)

ELEVATION : 2585.1 ft
DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary, 5.5" boring diameter

WATER LEVELS : 21.2 ft bgs
START : 11/16/2018
END : 4/15/2019
LOGGER : J. Espinoza

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
2405.1	180.0			**BASALT** 180.0 - 185.0' - gray with white/red, wet, aphanitic, massive, highly decomposed			Picture taken at 180'
185	185.0						
2400.1				**BASALT** 185.0 - 205.0' - red with some white/black, wet, weak, aphanitic, massive, highly decomposed, trace white soft plastic clay			Picture taken at 185'
190	190.0						
2395.1							Picture taken at 190'
195	195.0						
2390.1							Picture taken at 195'
200	200.0						
2385.1							Picture taken at 200'
205	205.0						
2380.1				**BASALT** 205.0 - 245.0' - black/gray with some red/white, wet, weak, aphanitic, massive, decomposed, little soft white/tan plastic clay, increasing at bottom			Picture taken at 205'
210							

JACOBS

PROJECT NUMBER:	BORING NUMBER:	
661508	RC-03	SHEET 8 OF 9

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Washington

LOCATION : Near MW-4D (209814.4 N, 2539649.3 E)

ELEVATION : 2585.1 ft

DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary, 5.5" boring diameter

WATER LEVELS : 21.2 ft bgs

START : 11/16/2018

END : 4/15/2019

LOGGER : J. Espinoza

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
2375.1	210.0						Picture taken at 210'
215	215.0						
2370.1							Picture taken at 215'
220	220.0						
2365.1							Picture taken at 220'
225	225.0						
2360.1							Picture taken at 225'
230	230.0						
2355.1							Picture taken at 230'
235	235.0						
2350.1							Picture taken at 235'
240							

JACOBS

PROJECT NUMBER:	BORING NUMBER:	
661508	RC-03	SHEET 9 OF 9

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Washington
LOCATION : Near MW-4D (209814.4 N, 2539649.3 E)

ELEVATION : 2585.1 ft
DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary, 5.5" boring diameter

WATER LEVELS : 21.2 ft bgs
START : 11/16/2018
END : 4/15/2019
LOGGER : J. Espinoza

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
2345.1	240.0						Picture taken at 240'
245	245.0						
2340.1				**GRANITIC GNEISS** 245.0 - 250.0' - clear to white, wet, strong, nonfoliated, massive, slightly decomposed, few black/red decomposed basalt, lots of quartz and muscovite			Picture taken at 245'
250	250.0						
2335.1				Bottom of Boring at 250.0 ft bgs on 11/17/2018			Picture taken at 250', hole collapsed to 240.5' depth
255							
260							
265							
270							

JACOBS

PROJECT NUMBER:	BORING NUMBER:	
661508	RC-04	SHEET 1 OF 13

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Washington
LOCATION : Near MW-6U (209424.1 N, 2539198.4 E)

ELEVATION : 2589.3 ft
DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary, 8" boring diameter to 80', 5.5" boring diameter to 390'

WATER LEVELS : ---
START : 11/9/2018
END : 4/4/2019
LOGGER : J. Espinoza

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
2589.3	0.0					0	
5	5.0						
2584.3				**CLAY (CL)** 5.0' - brown, dry, stiff, low to medium plasticity		0	
10	10.0						
2579.3				**CLAY (CL)** 10.0' - same as above		0	
15	15.0						
2574.3				**CLAY (CL** 15.0' - same as above, wet		0	
20	20.0						
2569.3				**CLAY (CL)** 20.0' - brown, wet, soft, red/orange mottling, high plasticity		0	
25	25.0						
2564.3				**CLAY (CL)** 25.0' - brown, wet, very soft, some orange mottline, some fine sand, plastic		0	
30							

JACOBS

PROJECT NUMBER:	BORING NUMBER:	
661508	RC-04	SHEET 2 OF 13

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Washington
LOCATION : Near MW-6U (209424.1 N, 2539198.4 E)

ELEVATION : 2589.3 ft
DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary, 8" boring diameter to 80', 5.5" boring diameter to 390'

WATER LEVELS : ---
START : 11/9/2018
END : 4/4/2019
LOGGER : J. Espinoza

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
2559.3	30.0			**CLAY (CL)** 30.0' - brown, wet, very soft, plastic, some rock fragments		0	
35	35.0						
2554.3				**CLAY (CL)** 35.0' - same as above		0	
40	40.0						
2549.3				**CLAY (CL)** 42.0' - brown, saturated, very soft, plastic, some rock fragments		0	
				BASALT 43.0' - black angular chips, varying sizes, lots of clay			
45	45.0						
2544.3						0	
50	50.0						
2539.3				**BASALT** 50.0' - black, varying sizes, some oxidized, little to no clay			
				BASALT 52.0' - same as above		0	
55	55.0						
2534.3				**BASALT** 55.0' - black, sharp, angular chips, low oxidation			
				BASALT 57.0' - same as above		0	
60							

PROJECT NUMBER:	BORING NUMBER:	
661508	RC-04	SHEET 3 OF 13

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Washington
LOCATION : Near MW-6U (209424.1 N, 2539198.4 E)

ELEVATION : 2589.3 ft
DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary, 8" boring diameter to 80', 5.5" boring diameter to 390'

WATER LEVELS : ---
START : 11/9/2018
END : 4/4/2019
LOGGER : J. Espinoza

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
2529.3	60.0						Rock begins at 60.1'.
				BASALT 61.1 - 66.1' - medium bluish gray, very strong, aphanitic (vesicular), massive, fresh, competent, unfractured, RQD = 100%			
65 2524.3							
				BASALT 66.1 - 70.1' - same as above, one fracture at 68' with silica cementation, stopped fracture surface, sub horizontal, constant fluid return, no loss to the formation, RQD = 100%			
70 2519.3							
				BASALT 70.1 - 75.1' - same as above, hairline fractures present completely filled with silica cement, no orientation (random, RQD = 100%		0	
75 2514.3							
				BASALT 75.1 - 80.1' - same as above			
80 2509.3							Borehole diameter changed to 5.5"
85	85.0						
2504.3				**BASALT** 85.0 - 150.0' - black, dry, very strong, aphanitic, fresh			Picture taken at 85'
90							

PROJECT NUMBER:	BORING NUMBER:	
661508	RC-04	SHEET 4 OF 13

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Washington
LOCATION : Near MW-6U (209424.1 N, 2539198.4 E)

ELEVATION : 2589.3 ft
DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary, 8" boring diameter to 80', 5.5" boring diameter to 390'

WATER LEVELS : ---
START : 11/9/2018
END : 4/4/2019
LOGGER : J. Espinoza

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
2499.3	90.0						Picture taken at 90'
95	95.0						
2494.3							Picture taken at 95'
100	100.0						
2489.3							Picture taken at 100'
105	105.0						
2484.3							
110	110.0						
2479.3							Picture taken at 110'
115	115.0						
2474.3							
120							

JACOBS

PROJECT NUMBER:	BORING NUMBER:	
661508	RC-04	SHEET 5 OF 13

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Washington
LOCATION : Near MW-6U (209424.1 N, 2539198.4 E)

ELEVATION : 2589.3 ft
DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary, 8" boring diameter to 80', 5.5" boring diameter to 390'

WATER LEVELS : ---
START : 11/9/2018
END : 4/4/2019
LOGGER : J. Espinoza

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
2469.3	120.0						Picture taken at 120'
125	125.0						
2464.3							
130	130.0						
2459.3							Picture taken at 130'
135	135.0						
2454.3							
140	140.0						
2449.3							Picture taken at 140'
145	145.0						
2444.3							Picture taken at 145'
150							

JACOBS

PROJECT NUMBER:	BORING NUMBER:	
661508	RC-04	SHEET 6 OF 13

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Washington
LOCATION : Near MW-6U (209424.1 N, 2539198.4 E)

ELEVATION : 2589.3 ft
DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary, 8" boring diameter to 80', 5.5" boring diameter to 390'

WATER LEVELS : ---
START : 11/9/2018
END : 4/4/2019
LOGGER : J. Espinoza

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
2439.3	150.0			**BASALT** 150.0 - 155.0' - very dark gray/black, wet, very strong, aphanitic, slightly disintegrated, slightly fractured, totally healed			Picture taken at 150', hole producing some water
155	155.0						
2434.3				**BASALT** 155.0 - 160.0' - very dark gray/black, wet, very strong, aphanitic, fresh			hole producting lots of water, pump turned off
160	160.0						
2429.3				**BASALT** 160.0 - 165.0' - black, wet, very strong, aphanitic, slightly disintegrated, slightly fractured, moderately healed, pyrite mineralization			Picture taken at 160', lots of water
165	165.0						
2424.3				**BASALT** 165.0 - 170.0' - black, wet, very strong, aphanitic, some weathered green/red chips, slightly decomposed, slightly disintegrated, slightly fractured, contains some silt, green paleosol			Picture taken at 165', difficult to keep hole open
170	170.0						
2419.3				**BASALT** 170.0 - 188.0' - black, wet, very strong, some weathered green, aphanitic			Picture taken at 170', difficult to keep hole open
175	175.0						
2414.3							Picture taken at 175', alternating hard/soft drilling to 180'
180							

JACOBS

PROJECT NUMBER:	BORING NUMBER:	
661508	RC-04	SHEET 7 OF 13

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Washington
LOCATION : Near MW-6U (209424.1 N, 2539198.4 E)

ELEVATION : 2589.3 ft
DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary, 8" boring diameter to 80', 5.5" boring diameter to 390'

WATER LEVELS : ---
START : 11/9/2018
END : 4/4/2019
LOGGER : J. Espinoza

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
2409.3	180.0						Picture taken at 180'
185	185.0						
2404.3							Picture taken at 185'
				BASALT 188.0 - 245.0' - black with some red/white, wet, strong, aphanitic, massive, moderately decomposed			Picture taken at 188'
190	190.0						
2399.3							Picture taken at 190', very soft drilling
195	195.0						
2394.3							Picture taken at 195', very soft drilling
200	200.0						
2389.3							Picture taken at 200'
205	205.0						
2384.3							Picture taken at 205'
210							

JACOBS

PROJECT NUMBER:	BORING NUMBER:	
661508	RC-04	SHEET 8 OF 13

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Washington
LOCATION : Near MW-6U (209424.1 N, 2539198.4 E)

ELEVATION : 2589.3 ft
DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary, 8" boring diameter to 80', 5.5" boring diameter to 390'

WATER LEVELS : ---
START : 11/9/2018
END : 4/4/2019
LOGGER : J. Espinoza

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
2379.3	210.0						Picture taken at 210'
215	215.0						
2374.3							Picture taken at 215'
220	220.0						
2369.3							Picture taken at 220'
225	225.0						
2364.3							Picture taken at 225'
230	230.0						
2359.3							Picture taken at 230'
235	235.0						
2354.3							Picture taken at 235'
240							

JACOBS

PROJECT NUMBER:	BORING NUMBER:	
661508	RC-04	SHEET 9 OF 13

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Washington
LOCATION : Near MW-6U (209424.1 N, 2539198.4 E)

ELEVATION : 2589.3 ft
DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary, 8" boring diameter to 80', 5.5" boring diameter to 390'

WATER LEVELS : ---
START : 11/9/2018
END : 4/4/2019
LOGGER : J. Espinoza

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
2349.3	240.0						Picture taken at 240'
245	245.0			**BASALT** 245.0 - 270.0' - black with some white, wet, strong, weathered, aphanitic, massive, slightly decomposed			Picture taken at 245'
2344.3							
250	250.0						Picture taken at 250'
2339.3							
255	255.0						Picture taken at 255'
2334.3							
260	260.0						Picture taken at 260'
2329.3							
265	265.0						Picture taken at 265'
2324.3							Hard drilling at 267'
270							

PROJECT NUMBER:	BORING NUMBER:	
661508	RC-04	SHEET 10 OF 13

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Washington
LOCATION : Near MW-6U (209424.1 N, 2539198.4 E)

ELEVATION : 2589.3 ft
DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary, 8" boring diameter to 80', 5.5" boring diameter to 390'

WATER LEVELS : ---
START : 11/9/2018
END : 4/4/2019
LOGGER : J. Espinoza

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
2319.3	270.0			**BASALT** 270.0 - 277.0' - black, wet, mod to strong, aphanitic, massive, fresh, competent			Picture taken at 270', hard drilling continues
275	275.0						
2314.3							Picture taken at 275'
				BASALT 277.0 - 278.0' - black with some weathered white, wet, strong to moderate, aphanitic, massive, slightly decomposed			Picture taken at 277', soft drilling
280	280.0			**CLAY (CL)** 278.0 - 280.0' - brown, wet, some f sand, medium plasticity			
2309.3				**CLAY (CL)** 280.0 - 285.0' - gray, wet, fine sand, low plasticity, cohesive, trace silt, contains wood debris			Picture taken at 280'
285	285.0						
2304.3				**BASALT** 285.0 - 290.0' - gray, wet, weak, aphanitic, massive, highly decomposed, disintegrated, contains large pieces of wood			Picture taken at 285'
290	290.0						
2299.3				**BASALT** 290.0 - 295.0' - black, wet, moderate, aphanitic, massive, slightly weathered, some wood debris			Picture taken at 290'
295	295.0						
2294.3				**BASALT** 295.0 - 360.0' - black, wet, strong, aphanitic, massive, fresh			Picture taken at 295'
300							

JACOBS

PROJECT NUMBER:	BORING NUMBER:	
661508	RC-04	SHEET 11 OF 13

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Washington
LOCATION : Near MW-6U (209424.1 N, 2539198.4 E)

ELEVATION : 2589.3 ft
DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary, 8" boring diameter to 80', 5.5" boring diameter to 390'

WATER LEVELS : ---
START : 11/9/2018
END : 4/4/2019
LOGGER : J. Espinoza

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
2289.3	300.0						Picture taken at 300', approximately 1300 gal of water from 295 - 300'
305	305.0						
2284.3							Picture taken at 305', approximately 1200 gal of water
310	310.0						
2279.3							Picture taken at 310'
315	315.0						
2274.3							Picture taken at 315', approximately 1200 gal of water
320	320.0						
2269.3							Picture taken at 320'
325	325.0						
2264.3							Picture taken at 325'
330							

JACOBS

PROJECT NUMBER:	BORING NUMBER:	
661508	RC-04	SHEET 12 OF 13

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Washington
LOCATION : Near MW-6U (209424.1 N, 2539198.4 E)

ELEVATION : 2589.3 ft
DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary, 8" boring diameter to 80', 5.5" boring diameter to 390'

WATER LEVELS : ---
START : 11/9/2018
END : 4/4/2019
LOGGER : J. Espinoza

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
2259.3	330.0						Picture taken at 330'
335	335.0						
2254.3							Picture taken at 335'
340	340.0						
2249.3							Picture taken at 340'
345	345.0						
2244.3							Picture taken at 345'
350	350.0						
2239.3							Picture taken at 350'
355	355.0						
2234.3							Picture taken at 355'
360							

JACOBS

PROJECT NUMBER:	BORING NUMBER:	
661508	RC-04	SHEET 13 OF 13

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Washington
LOCATION : Near MW-6U (209424.1 N, 2539198.4 E)

ELEVATION : 2589.3 ft
DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Air Rotary, 8" boring diameter to 80', 5.5" boring diameter to 390'

WATER LEVELS : ---
START : 11/9/2018
END : 4/4/2019
LOGGER : J. Espinoza

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
2229.3	360.0			**BASALT** 360.0 - 372.0' - dark gray, wet, strong, aphanitic, massive, fresh			Picture taken at 360'
365	365.0						
2224.3							Picture taken at 365'
370	370.0						
2219.3							Picture taken at 370'
				CLAY (CL) 372.0 - 375.0' - dark gray/gray, wet, medium/soft, medium plasticity, few basalt			
375	375.0						
2214.3				**CLAY (CL)** 375.0 - 380.0' - dark gray/gray, wet, medium density, med plasticity			Picture taken at 375'
380	380.0						
2209.3				**CLAY (CL)** 380.0 - 381.0' - brown/tan, wet, soft, med to low plasticity, some weathered basalt, quartz, and muscovite present			Picture taken at 380'
				GRANITIC GNEISS 381.0 - 390.0' - white, wet, very weak, nonfoliated, massive, highly decomposed, disintegrated, free quartz and muscovite, trace to few basalt and soft clay			Temporary well screen set 381.5 - 383.5 with bentonite plug and sand layer. End cap at 384'
385	385.0						
2204.3							Picture taken at 385'
390	390.0						Picture taken at 390'
				Bottom of Boring at 390.0 ft bgs on 11/9/2018			

PROJECT NUMBER:	BORING NUMBER:
661508	SB-01 SHEET 1 OF 2

SOIL BORING LOG

PROJECT : UPRR Freeman RI, Freeman, WA
LOCATION : East of Silo, Near Sump Nose, East of RR
ELEVATION : 2602 ft NAVD88
DRILLING CONTRACTOR : Environmental West Exploration, Inc
COORDINATES : 210972.9413, 2539474.133 State Plane (ft)
DRILLING METHOD AND EQUIPMENT : Speed Star, Sonic
WATER LEVEL:
START : 5/11/16 11:20
END : 5/11/16 13:50
LOGGER : RSG

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
5					Lean CLAY (CL) - brown, moist, stiff to very stiff, trace mica, medium cohesive, medium plastic.	Soil sample collected from 5 - 5.5 feet bgs
					SAME AS ABOVE - CLAY (CL), stiff.	
10					CLAY (CL) - with decomposed rock, olive/yellow and gray, decomposed SANDSTONE at 11.5' to 12' bgs, increasing reddish-brown coloring with depth, slightly cohesive, slight plasticity, moist.	0-8 #1 10'/8' Recovery - stretched out Soil sample collected from 10 - 10.5 feet bgs
15						Soil sample collected from 15 - 15.5 feet bgs
					CLAY (CL) - reddish brown with trace black and gray intermixed mottling, moist, little to no cohesiveness, little to no plasticity, some cementation observed.	8-18 #2 10'/10' Recovery
20					CLAY (CL) - dark reddish brown and gray, low plasticity, low cohesiveness, moist.	Soil sample collected from 20 - 20.5 feet bgs
					Increasing dark gray clay.	
25					CLAY (CL) - reddish brown, moist, trace mica, low plasticity, low cohesiveness.	Soil sample collected from 25 - 25.5 feet bgs
					CLAY (CL) - brown, moist, stiff, with reddish brown-yellow trace mottling, medium plasticity, medium cohesive.	18-28 #3 9'/10' Recovery
30						

PROJECT NUMBER:	BORING NUMBER:
661508	SB-01 SHEET 2 OF 2

SOIL BORING LOG

PROJECT : UPRR Freeman RI, Freeman, WA
LOCATION : East of Silo, Near Sump Nose, East of RR

ELEVATION : 2602 ft NAVD88
DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 210972.9413, 2539474.133 State Plane (ft)
DRILLING METHOD AND EQUIPMENT : Speed Star, Sonic

WATER LEVEL:
START : 5/11/16 11:20 END : 5/11/16 13:50 LOGGER : RSG

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
						Soil sample collected from 30 - 30.5 feet bgs
					Decomposing clast, ~2" diameter, GRANITIC.	
35					Increasing gray CLAY, decreasing yellow and reddish brown coloring and mottling.	Soil sample collected from 35 - 35.5 feet bgs
						28-38 #4 14'/10' Recovery - core stretched during extrusion
40					Brown CLAY (CL) - with gray and reddish brown coloring, stiff, moist, low plasticity, low cohesive.	Soil sample collected from 40 - 40.5 feet bgs
					Reddish brown CLAY (CL), with possible decomposing rock, moist, slightly plastic, slightly cohesive.	
45					CLAY (CL) - with trace oxidation and yellow mottling, hard, low plasticity, low cohesive, moist.	Soil sample collected from 45 - 45.5 feet bgs
					Sandy CLAY (CL), very fine sand, gray, trace reddish brown, clay appears very moist, soft.	
					Weathered BASALT/BASALT clasts, up to 2" diameter, basalt hard t weathered, oxidation, reddish brown coloring, moist.	Soil sample collected from 47 - 47.5 feet bgs
50					Boring terminated at 49 ft bgs.	38-48 #4 10'/10' Recovery Hard drilling 47.5-49'
55						
60						

PROJECT NUMBER:	BORING NUMBER:
661508	SB-02 SHEET 1 OF 3

SOIL BORING LOG

PROJECT : UPRR Freeman RI, Freeman, WA
LOCATION : East of RR Spur, along N Line of NW Silo

ELEVATION : 2603 ft NAVD88
DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 210998.9829, 2539415.973 State Plane (ft)
DRILLING METHOD AND EQUIPMENT : Schramm T300, Sonic

WATER LEVEL:
START : 5/10/16 09:10 END : 5/10/16 15:15 LOGGER : RSG

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
					TOPSOIL, moist, well graded SAND with GRAVEL (SW) - gravel is fine, subrounded, trace clay, increasing with depth, gray.	
					Transition to lean CLAY (CL) - brown, trace sand and gravel, decreasing with depth, moist, very stiff, medium plasticity, low cohesiveness.	
5						Soil sample collected from 5 - 5.5 feet bgs
					SAME AS ABOVE - CLAY (CL).	0-8 #1 7.5'/8' Recovery
10					Brown gray CLAY with trace fine GRAVEL (CL) with traces of CLAY with GRAVEL (CL), gravel is fine, subrounded, moist, stiff, medium plasticity, medium cohesive.	Soil sample collected from 10 - 10.5 feet bgs
					7 clast at 11' bgs.	
					CLAY (CL) - increasing reddish brown and gray, decreasing gravel, increasing stiffness, medium plasticity, medium cohesive, moist.	
15						Soil sample collected from 15 - 15.5 feet bgs
					SAME AS ABOVE - CLAY (CL).	8-18 #2 12'/10' Recovery - Sample stretched/expanded
20					Brown CLAY (CL) - with gray with black mica coloring, fine subangular gravel, moist, stiff.	
					Brown CLAY with gray CLAY with white and yellow mottling (decomposed BASALT), moist, trace to no gravel, trace mica, medium soft.	Soil sample collected from 20 - 20.5 feet bgs
25						Soil sample collected from 25 - 25.5 feet bgs
					SAME AS ABOVE - CLAY (CL) - increasing orange coloring/mottles.	18-28 #3 13.5'/10' Recovery - core stretched
30						

PROJECT NUMBER:	BORING NUMBER:
661508	SB-02 SHEET 2 OF 3

SOIL BORING LOG

PROJECT : UPRR Freeman RI, Freeman, WA
LOCATION : East of RR Spur, along N Line of NW Silo
ELEVATION : 2603 ft NAVD88
DRILLING CONTRACTOR : Environmental West Exploration, Inc
COORDINATES : 210998.9829, 2539415.973 State Plane (ft)
DRILLING METHOD AND EQUIPMENT : Schramm T300, Sonic
WATER LEVEL:
START : 5/10/16 09:10
END : 5/10/16 15:15
LOGGER : RSG

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
					CLAY (CL) - intermixed gray, reddish brown, and orange/brown coloring, moist, trace mica, possible trace fine angular gravel, low plasticity, low cohesiveness.	Soil sample collected from 30 - 30.5 feet bgs
					Gray CLAY (CL) - with reddish brown coloring with yellow mottling, possible increasing silt, low plasticity, low cohesiveness, moist, stiff.	
35						Soil sample collected from 35 - 35.5 feet bgs
					Gray, reddish brown CLAY (CL) - little to medium plasticity, trace yellow mottling, stiff, low cohesiveness, moist.	28-38 #4 12'/10' Recovery
40						Soil sample collected from 40 - 40.5 feet bgs
						TD at 43.0' - Refusal at 14:30
45					CLAY (CL) - increasing gray coloring, little/no plasticity, little to no cohesiveness, moist, trace mica, possible increase in silt.	Soil sample collected from 45 - 45.5 feet bgs
					SAME AS ABOVE - CLAY (CL).	38-48 #4 10'/10' Recovery
50						Soil sample collected from 50 - 50.5 feet bgs
55					CLAY (CL) - reddish brown, medium plasticity, medium cohesiveness.	Soil sample collected from 55 - 55.5 feet bgs
					CLAY (CL) - gray with yellow intermixed and mottled, possible decomposed basalt?.	
					Reddish brown CLAY (CL) - some yellow mottling, decreasing gray clay, medium plastic.	
					Black, gray, bronze with yellow/white mottling CLAY/decomposed BASALT, low plasticity, low cohesiveness, moist.	48-58 #5 9'/10' Recovery
60						

PROJECT NUMBER:	BORING NUMBER:
661508	SB-02 SHEET 3 OF 3

SOIL BORING LOG

PROJECT : UPRR Freeman RI, Freeman, WA
LOCATION : East of RR Spur, along N Line of NW Silo
ELEVATION : 2603 ft NAVD88
DRILLING CONTRACTOR : Environmental West Exploration, Inc
COORDINATES : 210998.9829, 2539415.973 State Plane (ft)
DRILLING METHOD AND EQUIPMENT : Schramm T300, Sonic
WATER LEVEL:
START : 5/10/16 09:10
END : 5/10/16 15:15
LOGGER : RSG

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
						Soil sample collected from 60 - 60.5 feet bgs
					Olive yellow CLAY and SILT with cemented clasts with bronze oxidation (weathered).	
					Gray with white mottling CLAY with intermixed reddish-brown CLAY, decreasing olive/yellow weathered material.	
65						Soil sample collected from 65 - 65.5 feet bgs
					SAME AS ABOVE - possible increase in moisture.	
						58-68 #6 10'/10' Recovery
					SAME AS ABOVE - CLAY (CL) - moist.	
70						
					Brown CLAY (CL) - reddish brown with gray intermixed, moist, very stiff.	Soil sample collected from 70 - 70.5 feet bgs
					Clayey SAND (SC) - 20% clay, sand very fine, moist, increasing clay with depth.	
					Sandy CLAY (CL) - 30% sand, fine, moist, hard. CLAY with mica at 73.5-73.75'.	
75					SANDSTONE with fine clayey SAND, lightly to moderately cemented, moist, gray SANDSTONE clasts up to 3 diameter.	
					No sample 75-77.5' - Sample fell out, 2nd attempt with basket, no sample, damaged basket.	Soil sample collected from 75 - 75.5 feet bgs Hard drilling
					Boring terminated at 77.5 ft bgs.	Hard drilling Very hard drilling at 77' Refusal at 77.5' 1515
80						
85						
90						

PROJECT NUMBER:	BORING NUMBER:
661508	SB-06 SHEET 1 OF 3

SOIL BORING LOG

PROJECT : UPRR Freeman RI, Freeman, WA
LOCATION : E of Parking Lot, 25' E of Marlow Well in Grass

ELEVATION : 2635 ft NAVD88
DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.

COORDINATES : 210704.7121, 2539349.133 State Plane (ft)
DRILLING METHOD AND EQUIPMENT : Scuramm T300, Sonic

WATER LEVEL:
START : 5/18/16 14:45 END : 5/19/16 09:30 LOGGER : RSG

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
0.0					FAT CLAY (CL), medium to high plasticity, medium to high cohesiveness, moist, stiff.	Hard drilling
		9.0				22-22' - Recovery 7"/6'
5						Soil sample collected from 5 - 5.5 feet bgs
8.0					LEAN CLAY (CL), low plasticity, low cohesiveness, moist, very stiff, brown.	
						Core damaged and dropped when extruding
10					LEAN CLAY (CL), same as above.	Soil sample collected from 10 - 10.5 feet bgs
		9.0			GRAVELLY CLAY (CL), brown, stiff, gravel well graded, subangular to subrounded, trace fine sand, moist.	
15					LAY (CL), low plasticity, low cohesiveness, moist, stiff to very stiff.	Soil sample collected from 15 - 15.5 feet bgs
					SANDY CLAY (CL), very fine sand with mica, moist, stiff, reddish brown.	
18.0					GRAY CLAY, FAT (CL), medium to few plasticity, medium to high plasticity, very stiff, moist.	Very difficult to extrude, hard drilling
20		2.0				
					LIGHT GRAY WITH REDDISH BROWN FAT CLAY (CL), hard, highly cohesive, medium plasticity, moist.	Very stiff - unable to rotate core, very stiff, sampling very difficult
22.0						Soil sample collected from 21 - 21.5 feet bgs
					LIGHT GRAY WITH REDDISH BROWN FAT CLAY (CL), same as above, hard.	
25		7.0				Soil sample collected from 25 - 25.5 feet bgs
					CLAY (CL), hard, gray with reddish brown.	Hard drilling
28.0						
					CLAY (CL), same as above.	
30						

PROJECT NUMBER:	BORING NUMBER:
661508	SB-06 SHEET 2 OF 3

SOIL BORING LOG

PROJECT : UPRR Freeman RI, Freeman, WA
LOCATION : E of Parking Lot, 25' E of Marlow Well in Grass
ELEVATION : 2635 ft NAVD88
DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.
COORDINATES : 210704.7121, 2539349.133 State Plane (ft)
DRILLING METHOD AND EQUIPMENT : Scuramm T300, Sonic
WATER LEVEL:
START : 5/18/16 14:45
END : 5/19/16 09:30
LOGGER : RSG

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION (SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY)	COMMENTS (DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION)
						PID (ppm) Breathing Zone FID (ppm)
		9.0			CLAY (CL), hard, gray with reddish brown.	Soil sample collected from 30 - 30.5 feet bgs
					CLAY (CL), brown, gray and orange brown, stiff, medium plastic, medium cohesiveness, moist.	
35	35.0				ORANGE REDDISH BROWN, AND GRAY CLAY WITH LIGHTLY CEMENTED CLAY (CL), moist, stiff.	
					REDDISH BROWN AND GRAY CLAY (CL), low plasticity, low cohesiveness, moist, stiff.	Soil sample collected from 35 - 35.5 feet bgs
					REDDISH BROWN AND GRAY CLAY (CL), same as above.	
40						Soil sample collected from 40 - 40.5 feet bgs
					GRAY AND DARK GRAY CLAY (CL), stiff, low cohesiveness, low plasticity, moist, trace orange-brown clay.	
45						Soil sample collected from 45 - 45.5 feet bgs
	48.0				GRAY AND DARK GRAY CLAY (CL), same as above.	
50					TRANSITION TO CLAYEY GRAVEL (CL), angular to subangular, coarse, up to 2 diameter, plastic, increasing basalt, moist.	
					FRACTURED BASALT WITH CLAY, trace oxidation/weathering, moist, angular, clasts up to 3 diameter.	Soil sample collected from 50 - 50.5 feet bgs
					BASALT COBBLE/FORMATION, fractured.	
					FRACTURED BASALT, ?? rubble with sand and fine gravel.	
		10.0			WEATHERED BASALT, reddish brown, orange brown, angular clasts, up to 2 diameter.	
55					BASALT CLASTS, up to 4 diameter, 1 wide.	
					TRANSITION TO GRAY CLAY (CL), decreasing basalt.	
					CLAY (CL), gray, brown, reddish brown, very stiff, moist, medium to low plasticity, medium to low cohesive.	Soil sample collected from 56 - 56.5 feet bgs
	58.0					
60					REDDISH BROWN CLAY (CL), medium plasticity, moist, stiff, trace gray clay.	TD at 58' at 1730 Resume at 0840

PROJECT NUMBER:	BORING NUMBER:
661508	SB-06 SHEET 3 OF 3

SOIL BORING LOG

PROJECT : UPRR Freeman RI, Freeman, WA
LOCATION : E of Parking Lot, 25' E of Marlow Well in Grass
ELEVATION : 2635 ft NAVD88
DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.
COORDINATES : 210704.7121, 2539349.133 State Plane (ft)
DRILLING METHOD AND EQUIPMENT : Scuramm T300, Sonic
WATER LEVEL:
START : 5/18/16 14:45
END : 5/19/16 09:30
LOGGER : RSG

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
65					REDDISH BROWN CLAY (CL), medium plasticity, moist, stiff, trace gray clay.	Soil sample collected from 61 - 61.5 feet bgs
	68.0				DARK BROWN CLAY (CL), with yellow-orange mottling, medium plasticity, medium cohesive, moist, stiff with increasing orange/brown clay with depth.	Soil sample collected from 65 - 65.5 feet bgs
70					Boring terminated at 68 ft bgs.	
75						
80						
85						
90						

PROJECT NUMBER:	BORING NUMBER:
661508	SB-08 SHEET 1 OF 2

SOIL BORING LOG

PROJECT : UPRR Freeman RI, Freeman, WA
LOCATION : South of grain loading area

ELEVATION : 2608 ft NAVD88
DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.

COORDINATES : 210886.1357, 2539459.376 State Plane (ft)
DRILLING METHOD AND EQUIPMENT : Schramm T300 Rotodrill, Sonic

WATER LEVEL:
START : 5/23/2016
END : 5/23/2016
LOGGER : Nicole Badon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
0.0					Asphalt and clay.	
					CLAYEY SILT (ML), dark gray, medium stiff to stiff, trace mica, trace fine gravel, moist.	
					CLAY (CL), light brown, trace light gray mottling, moist, very stiff.	
5		7.5				Soil sample collected from 5 - 5.5 feet bgs
8.0						
					CLAY (CL), same as above.	
					SILTY CLAY (CL), trace fine angular gravel, wet, stiff to very stiff, light brown.	
10						Soil sample collected from 10 - 10.5 feet bgs
		11.8				
15					Fine to coarse SILTLY SAND and fine to coarse subangular GRAVEL (GM), light brown to grayish brown, moist, dense, trace subangular cobbles.	Soil sample collected from 15 - 15.5 feet bgs
					SANDY SILT, (ML), very fine sand, light brown and yellowish green decomposed rock, moist.	
18.0						
					SILTY fine SAND, (SM), yellowish brown, mottled light gray, wet, medium dense.	
20						
					SILTY CLAY to silty fine SAND, trace cobbles, (SC/SM), light brown/reddish brown with light gray mottling, moist.	Soil sample collected from 20 - 20.5 feet bgs
		11.2				
25						Soil sample collected from 25 - 25.5 feet bgs
28.0						
					SILTY FINE SAND, (SM), trace CLAY, some decomposed basalt (dark reddish brown w/ white clasts), reddish brown, mottled dark gray, moist, dense..	
30						

PROJECT NUMBER:	BORING NUMBER:
661508	SB-08 SHEET 2 OF 2

SOIL BORING LOG

PROJECT : UPRR Freeman RI, Freeman, WA
LOCATION : South of grain loading area

ELEVATION : 2608 ft NAVD88
DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.

COORDINATES : 210886.1357, 2539459.376 State Plane (ft)
DRILLING METHOD AND EQUIPMENT : Schramm T300 Rotodrill, Sonic

WATER LEVEL:
START : 5/23/2016
END : 5/23/2016
LOGGER : Nicole Badon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
35		11.2			SILTY FINE SAND, (SM), trace CLAY, some decomposed basalt (dark reddish brown w/ white clasts), reddish brown, mottled dark gray, moist, dense..	Soil sample collected from 30 - 30.5 feet bgs Soil sample collected from 35 - 35.5 feet bgs
	38.0					
40		11.0			Sandy SILT/Silty SAND, (ML/SM), light brown to brownish gray, mottled, dense, moist, trace fine gravvel, trace cobbles toward 48' (sandstone cobble).	Soil sample collected from 40 - 40.5 feet bgs
45						Soil sample collected from 45 - 45.5 feet bgs
	48.0					
50		5.3			Sandy SILT (ML), silty SAND (SM), dark gray, some coarse angular gravel, moist, dense.. Weathered BASALT, dark gray with iron staining, coarse gravel to cobble sized pieces, some silt, dry..	Soil sample collected from 50 - 50.5 feet bgs
	52.0					Driller notes harder material at 50' bgs.
55					Boring terminated at 52 ft bgs.	
60						

PROJECT NUMBER:	BORING NUMBER:
661508	SB-09 SHEET 1 OF 2

SOIL BORING LOG

PROJECT : UPRR Freeman RI, Freeman, WA
LOCATION : Freeman, WA
ELEVATION : 2601 ft NAVD88
DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.
COORDINATES : 210821.0315, 2539634.723 State Plane (ft)
DRILLING METHOD AND EQUIPMENT : Scuramm T300, Sonic
WATER LEVEL:
START : 5/23/16 14:07
END : 5/23/16 15:30
LOGGER : Nicole Badon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
0.0					SILTY CLAY AND FINE TO COARSE SUBROUNDED GRAVEL (FILL), dark gray, wet, medium dense.	Compacted sample
		3.8			CLAY (CL), little silt, stiff to very stiff, light brown to grayish brown, moist.	
5						Soil sample collected from 5 - 5.5 feet bgs
8.0					CLAY (CL), same as 0.5-8'.	
					SANDY CLAY (SC), fine to coarse subangular to rounded gravel (SC/GC), wet, light medium gray, dense.	
10					SILTY CLAY (CL), very stiff, moist to wet at 16'.	Soil sample collected from 10 - 10.5 feet bgs
		10.7				
15						Soil sample collected from 15 - 15.5 feet bgs
18.0					SILT (ML) and decomposed rock (basalt?), some fine angular basalt gravel, light brown/oxidized brown, moist, dense.	
					SANDY SILT (ML) and decomposed basalt, light brown to oxidized, some light gray mottling, stiff to medium stiff, moist to wet, basalt as fine subangular to angular gravel (in places), trace white clasts.	
20						Soil sample collected from 20 - 20.5 feet bgs
		10.5				
25						Soil sample collected from 25 - 25.5 feet bgs
28.0					SANDY SILT (ML), trace fine angular and subangular gravel (sandstone gravel), light brown, mottled light gray, moist, stiff to very stiff, trace white clasts.	
30						

PROJECT NUMBER:	BORING NUMBER:
661508	SB-09 SHEET 2 OF 2

SOIL BORING LOG

PROJECT : UPRR Freeman RI, Freeman, WA
LOCATION : Freeman, WA
ELEVATION : 2601 ft NAVD88
DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.
COORDINATES : 210821.0315, 2539634.723 State Plane (ft)
DRILLING METHOD AND EQUIPMENT : Scuramm T300, Sonic
WATER LEVEL:
START : 5/23/16 14:07
END : 5/23/16 15:30
LOGGER : Nicole Badon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
35		11.5			SANDY SILT (ML), trace fine angular and subangular gravel (sandstone gravel), light brown, mottled light gray, moist, stiff to very stiff, trace white clasts.	Soil sample collected from 30 - 30.5 feet bgs Soil sample collected from 35 - 35.5 feet bgs
40	38.0	3.0			SILTY VERY FINE SAND (SM), trace fine to coarse sandstone gravel (subangular), dense, moist, dark gray (wet at 39 to 39.7'). WEATHERED BASALT, fine to coarse gravel-sized pieces, dark gray with some oxidation, dry, some silt, dense to very dense, some sandstone gravel.	Soil sample collected from 39 - 39.5 feet bgs
45	41.0				Boring terminated at 41 ft bgs.	
50						
55						
60						

PROJECT NUMBER:	BORING NUMBER:
661508	SB-10 SHEET 1 OF 2

SOIL BORING LOG

PROJECT : UPRR Freeman RI, Freeman, WA
LOCATION : Freeman, WA

ELEVATION : 2601 ft NAVD88
DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.

COORDINATES : 210914.7815, 2539626.911 State Plane (ft)
DRILLING METHOD AND EQUIPMENT : Schramm T300 Rotodrill, Sonic

WATER LEVEL:
START : 5/24/16 07:54
END : 6/27/16 09:30
LOGGER : Nicole Badon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
0.0					Gravel and silt (fill) dark gray, some fine to coarse sand.	
					CLAY (CL), light brown, stiff, plastic, moist, little silt.	
		100.0				
5						Soil sample collected from 5 - 5.5 feet bgs
8.0					SILTY CLAY (CL) with little fine sub angular gravel, slightly plastic, light brown, moist.	
					SANDY SILT (ML), little clay, slightly plastic, very fine sand and trace fine sub angular gravel, light brown/oxidized with some intermittent brownish gray, moist to wet, trace white clasts.	
10						Soil sample collected from 10 - 10.5 feet bgs
		124.0				
15						Soil sample collected from 15 - 15.5 feet bgs
18.0					SILTY CLAY (CL) w/ decomposed rock, stiff to moist, slightly plastic, dark grayish, brown with white clasts.	
					SILTY CLAY (CL), slight plasticity, trace fine to coarse sub angular gravel, light brown w/ trace white clasts intermittent gray, stiff, moist.	
20						Soil sample collected from 20 - 20.5 feet bgs
		118.0				
25						Soil sample collected from 25 - 25.5 feet bgs
28.0					SILTY CLAY (CL), with little fine sand, trace basalt gravel and sandstone gravel, little decomposed basalt @ ~30 bgs, light brown, oxidized, little gray coloring, slightly plastic, stiff, moist.	
30						

PROJECT NUMBER:	BORING NUMBER:
661508	SB-10 SHEET 2 OF 2

SOIL BORING LOG

PROJECT : UPRR Freeman RI, Freeman, WA
LOCATION : Freeman, WA

ELEVATION : 2601 ft NAVD88
DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.

COORDINATES : 210914.7815, 2539626.911 State Plane (ft)
DRILLING METHOD AND EQUIPMENT : Schramm T300 Rotodrill, Sonic

WATER LEVEL:
START : 5/24/16 07:54
END : 6/27/16 09:30
LOGGER : Nicole Badon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
35					SILTY CLAY (CL), with little fine sand, trace basalt gravel and sandstone gravel, little decomposed basalt @ ~30 bgs, light brown, oxidized, little gray coloring, slightly plastic, stiff, moist.	Soil sample collected from 30 - 30.5 feet bgs Soil sample collected from 35 - 35.5 feet bgs
38.0						
40		109.0			SILTY CLAY (CL) trace fine sand, little fine to coarse rubrounded gravel (sandstone), medium gray with light brown oxidation in places, slight plasticity, stiff, moist.	Soil sample collected from 40 - 40.5 feet bgs
45						Soil sample collected from 45 - 45.5 feet bgs
48.0					Silt and weathered Basalt and siltstone/sandstone gravel (GM), fine to coarse sized gravel, trace cobble-sized pieces, sub angular, dry, medium gray, dense. Boring terminated at 48 ft bgs.	
50						
55						
60						

PROJECT NUMBER:	BORING NUMBER:
661508	SB-11 SHEET 1 OF 3

SOIL BORING LOG

PROJECT : UPRR Freeman RI, Freeman, WA
LOCATION : NE of grain elevators
ELEVATION : 2602 ft NAVD88
DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.
COORDINATES : 211044.1218, 2539337.848 State Plane (ft)
DRILLING METHOD AND EQUIPMENT : Schramm T300 Rotodrill, Sonic
WATER LEVEL:
START : 5/25/2016
END : 5/25/2016
LOGGER : Nicole Badon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
0.0					Fine to coarse sand and fine to coarse subrounded gravel, medium dense, black, moist, trace silt.	
		9.4			CLAY (CL), plastic, cohesive, very stiff, light to medium brown, trace mica flakes, trace silt, includes some fine to coarse sand and gravel, subrounded.	
5						Soil sample collected from 5 - 5.5 feet bgs
8.0					Decomposed rock, silt to sand sized particles, abundant mica, light brownish gray to yellowish orange, very stiff, moist.	
					Grayish blue, stiff to very stiff, cohesive, plastic CLAY (CL), some white mottling and oxidation.	
10						Soil sample collected from 10 - 10.5 feet bgs First 1.5' appears to be slough from above
		10.5			CLAY, cohesive, plastic, white to yellowish orange, trace mica, trace fine sand and fine gravel, very stiff, moist.	
15						Soil sample collected from 15 - 15.5 feet bgs
18.0						
					SILTY CLAY, (CL), medium plasticity, cohesive, yellowish orange with some white mottling, abundant mica, little very fine sand, very stiff to hard, slightly moist..	
20						Soil sample collected from 20 - 20.5 feet bgs
		10.0			VERY FINE SAND AND SILT (SM), decomposed rock, some minerals present, white with yellowish orange mottling, very stiff to hard, slightly cohesive, trace clay, slightly moist, abundant mica.	
25						Soil sample collected from 25 - 25.5 feet bgs
28.0						
					SILTY VERY FINE SAND (SM), looks like decomposed rock, some decomposed materials present, abundant mica, very light gray with oxidation stringers, medium dense/stiff, moist.	
30						

PROJECT NUMBER:	BORING NUMBER:
661508	SB-11 SHEET 2 OF 3

SOIL BORING LOG

PROJECT : UPRR Freeman RI, Freeman, WA
LOCATION : NE of grain elevators
ELEVATION : 2602 ft NAVD88
DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.
COORDINATES : 211044.1218, 2539337.848 State Plane (ft)
DRILLING METHOD AND EQUIPMENT : Schramm T300 Rotodrill, Sonic
WATER LEVEL:
START : 5/25/2016
END : 5/25/2016
LOGGER : Nicole Badon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
35		10.5			SILTY VERY FINE SAND (SM), looks like decomposed rock, some decomposed materials present, abundant mica, very light gray with oxidation stringers, medium dense/stiff, moist.	Soil sample collected from 30 - 30.5 feet bgs Soil sample collected from 35 - 35.5 feet bgs
	38.0				DECOMPOSED GRANITE/GRANODIORITE, light gray, white and yellowish orange, abundant muscovite mica in sheets, some minerals present, moist, medium stiff.	
40					DECOMPOSED GRANITE/GRANODIORITE, as above, larger quartz gravel, more minerals in tact.	
45		11.3			VERY FINE SAND TO FINE SAND (SW), trace silt, trace muscovite mica flakes throughout, light gray with yellowish orange oxidation, dense, to medium dense, moist, alternating very fine and fine sand layers.	Soil sample collected from 40 - 40.5 feet bgs Soil sample collected from 45 - 45.5 feet bgs
	48.0				FINE TO COARSE SAND, LITTLE SILT (SW), trace clay, trace coarse sandstone gravel, light gray and yellowish orange medium dense, moist, trace white silt mottling.	
50					CLAYEY SAND (SC), fine grained, cohesive, slightly to medium plasticity, white with yellowish orange oxidation, moist, very stiff.	Soil sample collected from 50 - 50.5 feet bgs
55		11.7			DECOMPOSED ROCK (GRANITE OR SCHIST), abundant muscovite mica, some fine to coarse angular gravel, moist, dense, white and yellowish orange. Changes back to CLAYEY SAND (SC) at 55' to 56'.	Soil sample collected from 55 - 55.5 feet bgs
	58.0				FINE TO COARSE SAND (SW), same as 48' to 51' except no visible clay, trace sandstone cobbles/weathered sandstone (oxidized), dense, slightly moist, some mica flakes throughout.	
60					DECOMPOSED ROCK (GRANITE OR SCHIST), same as 53' to 55', yellowish orange, moist.	

PROJECT NUMBER:	BORING NUMBER:
661508	SB-11 SHEET 3 OF 3

SOIL BORING LOG

PROJECT : UPRR Freeman RI, Freeman, WA
LOCATION : NE of grain elevators

ELEVATION : 2602 ft NAVD88
DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.

COORDINATES : 211044.1218, 2539337.848 State Plane (ft)
DRILLING METHOD AND EQUIPMENT : Schramm T300 Rotodrill, Sonic

WATER LEVEL:
START : 5/25/2016
END : 5/25/2016
LOGGER : Nicole Badon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
					CLAYEY SAND (SC), same as 51' to 53'.	Soil sample collected from 60 - 60.5 feet bgs
		11.5			FINE TO COARSE SAND, LITTLE SILT (SW), same as 48' to 51', no visible clay, some mica flakes, sandstone cobbles 62' to 63'.	
65						Soil sample collected from 65 - 65.5 feet bgs
	68.0				Boring terminated at 68 ft bgs.	
70						
75						
80						
85						
90						

PROJECT NUMBER:	BORING NUMBER:
661508	SB-12 SHEET 1 OF 2

SOIL BORING LOG

PROJECT : UPRR Freeman RI, Freeman, WA
LOCATION : NE of grain elevators

ELEVATION : 2603 ft NAVD88
DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.

COORDINATES : 211068.4274, 2539277.953 State Plane (ft)
DRILLING METHOD AND EQUIPMENT : Schramm T300 Rotodrill, Sonic

WATER LEVEL:
START : 5/25/2016
END : 5/25/2016
LOGGER : Nicole Badon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
0.0					SILTY FINE TO COARSE SAND AND FINE TO COARSE SUBANGULAR GRAVEL, wet, loose, brownish gray (fill).	
					CLAY (CL), plastic, little very fine, micaceous sand and silt, moist, stiff to very stiff, moist, light brown, trace organics/wood.	
		6.0				
5					VERY FINE SAND/SILT (DECOMPOSED RODK), muscovite mica, hard, very light gray/white, moist.	Soil sample collected from 5 - 5.5 feet bgs
8.0						
					VERY FINE SAND/SILT (DECOMPOSED RODK), same as 4' to 8', dense, wet from 8' to 9', some oxidation.	
10						Soil sample collected from 10 - 10.5 feet bgs
		8.9				
15					DECOMPOSED GRAINITE?, wite with ~25% to 30% muscovite mica, trace oxidation, medium stiff, moist.	Soil sample collected from 15 - 15.5 feet bgs
18.0						
					DECOMPOSED ROCK GRANITE/GRANODIORITE, white with some oxidation, muscovite throughout and black clasts, stiff to medium stiff, moist.	
20						Soil sample collected from 20 - 20.5 feet bgs
		112.0				
25						Soil sample collected from 25 - 25.5 feet bgs
28.0						
					DECOMPOSED GRANITE/GRANODIORITE, very light gray to white with some oxidation, mica throughout, stiff to very stiff, mostly weathered to silt/clay.	
30						

PROJECT NUMBER:	BORING NUMBER:
661508	SB-12 SHEET 2 OF 2

SOIL BORING LOG

PROJECT : UPRR Freeman RI, Freeman, WA
LOCATION : NE of grain elevators

ELEVATION : 2603 ft NAVD88
DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.

COORDINATES : 211068.4274, 2539277.953 State Plane (ft)
DRILLING METHOD AND EQUIPMENT : Schramm T300 Rotodrill, Sonic

WATER LEVEL:
START : 5/25/2016 END : 5/25/2016 LOGGER : Nicole Badon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
35		11.3			DECOMPOSED GRANITE/GRANODIORITE, very light gray to white with some oxidation, mica throughout, stiff to very stiff, mostly weathered to silt/clay.	Soil sample collected from 30 - 30.5 feet bgs Soil sample collected from 35 - 35.5 feet bgs
38.0						
40		11.6			DECOMPOSED GRANITE/GRANODIORITE, same as above.	Soil sample collected from 40 - 40.5 feet bgs Soil sample collected from 45 - 45.5 feet bgs
45						
48.0						
50		11.4			POORLY GRADED SAND (SP), medium grained, little silt, trace mica flakes, medium dense, light gray and yellowish orange, moist.	
55					DECOMPOSED GRANITE/GRANODIORITE, wite, dark gray, and yellowish orange, stiff, decomposed mostly to silt/sand/clay, mica flakes throughout, moist, some minerals still present.	Soil sample collected from 50 - 50.5 feet bgs Soil sample collected from 55 - 55.5 feet bgs
58.0					VERY FINE SAND (SP), trace silt, dense, light gray and yellowish orange oxidation, trace mica flakes, moist.	
60					Boring terminated at 58 ft bgs.	

PROJECT NUMBER:	BORING NUMBER:
661508	SB-13 SHEET 1 OF 2

SOIL BORING LOG

PROJECT : UPRR Freeman RI, Freeman, WA
LOCATION : NW of Silos

ELEVATION : 2611 ft NAVD88
DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.

COORDINATES : 210935.6149, 2539379.515 State Plane (ft)
DRILLING METHOD AND EQUIPMENT : Schramm T300 Rotodrill, Sonic

WATER LEVEL:
START : 5/26/16 07:39
END : 5/26/16 10:00
LOGGER : Nicole Badon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
0.0					FILL, asphalt at top 1, silt, fine to coarse sand, and fine to coarse subangular gravel, very dark brown, slightly moist.	First 1.5' compressed in sample bag
5		5.8			SANDY SILT (ML/SM), slightly plastic, slightly cohesive, dark gray with some white and yellowish orange mottling, stiff to very stiff, slightly moist, fine to coarse sand, ~30% trace fine subangular gravel, little clay.	Soil sample collected from 5 - 5.5 feet bgs
8.0						
10		10.6			CLAY (CL), light brown, stiff to very stiff, trace silt, very cohesive, plastic (medium).	Soil sample collected from 10 - 10.5 feet bgs
15					SANDY CLAY (CL), yellowish orange, slight plasticity, cohesive, very stiff to stiff, moist, ~25% fine to coarse sand, trace coarse subrounded gravel, some gray mottling.	Soil sample collected from 15 - 15.5 feet bgs
18.0						
20		11.6			SILTY CLAY (CL), ~15-20% silt, trace fine to coarse sand, cohesive, medium plasticity, light gray, mottled white, yellow, and yellowish orange, moist, medium stiff.	Soil sample collected from 20 - 20.5 feet bgs
25					Yellowish orange/light brown SILTY CLAY (CL), little fine to coarse sand and fine gravel, very stiff to hard, moist, trace yellow mottling, trace claystone cobble (1).	Soil sample collected from 25 - 25.5 feet bgs
28.0						
30					CLAYEY SILT (ML) TO SILTSTONE, little fine sand, siltstone fragments in fine to coarse gravel size, yellowish orange to light brown, some light gray and grayish blue mottling, slight plasticity, slightly cohesive, moist, wet at 34' to 34.5', very stiff to hard.	

PROJECT NUMBER:	BORING NUMBER:
661508	SB-13 SHEET 2 OF 2

SOIL BORING LOG

PROJECT : UPRR Freeman RI, Freeman, WA
LOCATION : NW of Silos

ELEVATION : 2611 ft NAVD88
DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.

COORDINATES : 210935.6149, 2539379.515 State Plane (ft)
DRILLING METHOD AND EQUIPMENT : Schramm T300 Rotodrill, Sonic

WATER LEVEL:
START : 5/26/16 07:39
END : 5/26/16 10:00
LOGGER : Nicole Badon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
35		11.3			CLAYEY SILT (ML) TO SILTSTONE, little fine sand, siltstone fragments in fine to coarse gravel size, yellowish orange to light brown, some light gray and grayish blue mottling, slight plasticity, slightly cohesive, moist, wet at 34' to 34.5', very stiff to hard.	Soil sample collected from 30 - 30.5 feet bgs Soil sample collected from 35 - 35.5 feet bgs
40	38.0				SILT (ML), with siltstone fragments, yellowish orange with some light gray and white mottling, slight plasticity, little clay, ~30% very fine sand, very stiff to hard, moist. Boring terminated at 41 ft bgs.	Soil sample collected from 40 - 40.5 feet bgs
45						
50						
55						
60						

PROJECT NUMBER:	BORING NUMBER:
661508	SB-14 SHEET 1 OF 2

SOIL BORING LOG

PROJECT : UPRR Freeman RI, Freeman, WA
LOCATION : Freeman School Event Parking Lot
ELEVATION : 2637 ft NAVD88
DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.
COORDINATES : 210815.8232, 2539246.703 State Plane (ft)
DRILLING METHOD AND EQUIPMENT : Schramm T300 Rotodrill, Sonic
WATER LEVEL:
START : 5/26/16 12:18
END : 5/26/16 15:20
LOGGER : Nicole Badon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
0.0					CLAY (CL), dark brown, medium stiff to hard, medium plasticity, cohesive, little silt, moist.	
5		5.0				Soil sample collected from 5 - 5.5 feet bgs
9.0						
10					CLAY (CL), same as above, trace coarse sand throughout (~15%), trace organics from 9' to 10' (wood), medium stiff to hard. Sandstone gravel at ~9.8 to 10', and sandy non-cohesive clay.	Soil sample collected from 10 - 10.5 feet bgs
15		9.5				Soil sample collected from 15 - 15.5 feet bgs
19.0						
20					CLAY (CL), dark brown, same as 0' to 9'.	Soil sample collected from 20 - 20.5 feet bgs
					CLAYEY SAND CONGLOMERATE, partially cemented clay, fine to coarse sand, and fine to coarse subrounded gravel, reddish gray to yellowish orange, dense, dry.	Hard drilling Sample stick in core rods, using water pressure through rods above sample to try to extract it
25		9.5				~12:50 to 13:07, sample out of rods 13:07
					CLAY (CL), yellowish orange with some light gray mottling, little silt, hard, slightly moist, cohesive, medium plasticity.	Soil sample collected from 25 - 25.5 feet bgs
28.0						
30					CLAY (CL), mottled yellowish orange and light gray 28' to 31.5' then bluish gray with trace yellowish orange mottling, little silt, medium plastic, very cohesive, hard, trace yellowish white mottling in blue/gray section, slightly moist (yellowish orange 37.5' to 38').	

PROJECT NUMBER:	BORING NUMBER:
661508	SB-14 SHEET 2 OF 2

SOIL BORING LOG

PROJECT : UPRR Freeman RI, Freeman, WA
LOCATION : Freeman School Event Parking Lot
ELEVATION : 2637 ft NAVD88
DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.
COORDINATES : 210815.8232, 2539246.703 State Plane (ft)
DRILLING METHOD AND EQUIPMENT : Schramm T300 Rotodrill, Sonic
WATER LEVEL:
START : 5/26/16 12:18
END : 5/26/16 15:20
LOGGER : Nicole Badon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION (SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY)	COMMENTS (DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION) PID (ppm) Breathing Zone FID (ppm)
35		10.0			CLAY (CL), mottled yellowish orange and light gray 28' to 31.5' then bluish gray with trace yellowish orange mottling, little silt, medium plastic, very cohesive, hard, trace yellowish white mottling in blue/gray section, slightly moist (yellowish orange 37.5' to 38').	Soil sample collected from 30 - 30.5 feet bgs Soil sample collected from 35 - 35.5 feet bgs
40	38.0	10.7			CLAY (CL), yellowish orange, some yellowish white mottling, broken up/crumbly, some silt, little fine sand, moist to slightly moist, non-cohesive.	Soil sample collected from 40 - 40.5 feet bgs
45	47.0				SILT (ML) AND GRAVEL, with very fine sand, not cohesive, slightly moist to dry, some fine to coarse gravel ~40% (basalt gravel) subangular, medium gray, dense. Basalt gravel appears at ~43'.	Soil sample collected from 45 - 45.5 feet bgs
50		8.8			CLAY AND CLAYSTONE/SILTSTONE, with trace weathered basalt gravel near 47' (minerals weathered away) medium gray and light brown oxidation throughout, some dark brown clay, hard, slightly cohesive, clay is slightly plastic, some stiff, slightly moist.	Soil sample collected from 50 - 50.5 feet bgs
55	55.0				Boring terminated at 55 ft bgs.	Soil sample collected from 54 - 54.5 feet bgs
60						

PROJECT NUMBER:	BORING NUMBER:
661508	SB-15 SHEET 1 OF 4

SOIL BORING LOG

PROJECT : UPRR Freeman RI, Freeman, WA
LOCATION : Side of Hwy 27

ELEVATION : 2618 ft NAVD88
DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.

COORDINATES : 210835.7885, 2539380.383 State Plane (ft)
DRILLING METHOD AND EQUIPMENT : Schramm T300 Rotodrill, Sonic

WATER LEVEL:
START : 6/30/16 07:25
END : 6/30/16 10:00
LOGGER : Nicole Badon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
0.0					ROAD FILL, asphalt, silt and fine to coarse subangular gravel, moist, dark brown.	
	7.0	5.0			CLAY (CL), some silt, little medium to coarse sand, very stiff, moist, grayish brown.	
5						Soil sample collected from 5 - 5.5 feet bgs
7.0					SILTY CLAY (CL), yellowish and orange to light brown with some light gray mottling, little medium sand, trace fie to coarse gravel from 13' to 14', slightly moist, soft to very stiff.	
10		13.0				Soil sample collected from 10 - 10.5 feet bgs
15						Soil sample collected from 15 - 15.5 feet bgs
17.0					SILT AND VERY FINE SAND (ML), trace clay, slight plasticity, light gray with heavy yellowish orange oxidation, very moist/wet from 21' to 27'.	
20		11.0				Soil sample collected from 20 - 20.5 feet bgs
25						Soil sample collected from 25 - 25.5 feet bgs
27.0					SILT (ML) AND VERY FINE SAND, trace fine angular gravel (decomposed basalt), reddish brown with light gray mottling, very moist/wet, from 35' to 37', dark brown with white and yellowish orange oxidation, soft to medium stiff throughout (decomposed basalt), trace clay throughout, slight plasticity.	
30						

PROJECT NUMBER:	BORING NUMBER:
661508	SB-15 SHEET 2 OF 4

SOIL BORING LOG

PROJECT : UPRR Freeman RI, Freeman, WA
LOCATION : Side of Hwy 27

ELEVATION : 2618 ft NAVD88
DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.

COORDINATES : 210835.7885, 2539380.383 State Plane (ft)
DRILLING METHOD AND EQUIPMENT : Schramm T300 Rotodrill, Sonic

WATER LEVEL:
START : 6/30/16 07:25
END : 6/30/16 10:00
LOGGER : Nicole Badon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
35	37.0	11.8			SILT (ML) AND VERY FINE SAND, trace fine angular gravel (decomposed basalt), reddish brown with light gray mottling, very moist/wet, from 35' to 37', dark brown with white and yellowish orange oxidation, soft to medium stiff throughout (decomposed basalt), trace clay throughout, slight plasticity.	Soil sample collected from 30 - 30.5 feet bgs Soil sample collected from 35 - 35.5 feet bgs
40 45	47.0	10.9			SILT (ML), trace clay, some very fine sand (~90%) throughout, little decomposed basalt fragments throughout, medium dense, very moist, dark brown with blue/gray, yellow, and yellowish orange mottling.	Soil sample collected from 40 - 40.5 feet bgs Soil sample collected from 45 - 45.5 feet bgs
50 55	57.0	14.5			SILT (ML) with very fine sand and trace decomposed rock fragments (fine gravel-sized, angular), medium brown with yellowish orange oxidation throughout and some white mottling, very moist/wet, medium dense, slight plasticity.	Soil sample collected from 50 - 50.5 feet bgs Soil sample collected from 55 - 55.5 feet bgs
60					SILT (ML) and very fine sand, medium gray with heavy yellowish orange oxidation, some decomposed basalt fragments throughout, from 60' to 61' - highly weathered basalt, weak, fine gravel sized fragments, reddish brown, very moist/wet medium dense, slight plasticity.	

PROJECT NUMBER:	BORING NUMBER:
661508	SB-15 SHEET 3 OF 4

SOIL BORING LOG

PROJECT : UPRR Freeman RI, Freeman, WA
LOCATION : Side of Hwy 27

ELEVATION : 2618 ft NAVD88
DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.

COORDINATES : 210835.7885, 2539380.383 State Plane (ft)
DRILLING METHOD AND EQUIPMENT : Schramm T300 Rotodrill, Sonic

WATER LEVEL:
START : 6/30/16 07:25
END : 6/30/16 10:00
LOGGER : Nicole Badon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
65		9.9			SILT (ML) and very fine sand, medium gray with heavy yellowish orange oxidation, some decomposed basalt fragments throughout, from 60' to 61' - highly weathered basalt, weak, fine gravel sized fragments, reddish brown, very moist/wet medium dense, slight plasticity.	Soil sample collected from 60 - 60.5 feet bgs Soil sample collected from 65 - 65.5 feet bgs
	67.0					
70		11.0			SILT (ML) and very fine sand, trace clay (slightly plastic), some decomposed basalt (weak) fragments to fine gravel size throughout, medium dense, very moist/wet, mottled yellowish orange and blue/gray, some basalt fragments are bluish red, trace white and yellow mottling.	Soil sample collected from 70 - 70.5 feet bgs Soil sample collected from 75 - 75.5 feet bgs
75						
	77.0					
80					SILT (ML) and very fine sand, trace decomposed rock fragments (fine gravel sized), slight plasticity, light gray with yellowish orange oxidation, trace white and yellow mottling, blue from 86' to 87' with white mottling, medium dense, very moist.	Soil sample collected from 80 - 80.5 feet bgs Soil sample collected from 85 - 85.5 feet bgs
85						
90					SILT AND FINE TO MEDIUM SAND (SM), little fine to coarse subangular gravel, abundant muscovite mica, trace clay, slightly plastic, dense, moist, yellowish orange with light gray and white mottling.	

PROJECT NUMBER:	BORING NUMBER:
661508	SB-15 SHEET 4 OF 4

SOIL BORING LOG

PROJECT : UPRR Freeman RI, Freeman, WA
LOCATION : Side of Hwy 27

ELEVATION : 2618 ft NAVD88
DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.

COORDINATES : 210835.7885, 2539380.383 State Plane (ft)
DRILLING METHOD AND EQUIPMENT : Schramm T300 Rotodrill, Sonic

WATER LEVEL:
START : 6/30/16 07:25
END : 6/30/16 10:00
LOGGER : Nicole Badon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
95					SILT AND FINE TO MEDIUM SAND (SM), little fine to coarse subangular gravel, abundant muscovite mica, trace clay, slightly plastic, dense, moist, yellowish orange with light gray and white mottling.	Soil sample collected from 90 - 90.5 feet bgs Soil sample collected from 95 - 95.5 feet bgs
					Boring terminated at 97 ft bgs.	
100						
105						
110						
115						
120						

PROJECT NUMBER:	BORING NUMBER:
661508	SB-16 SHEET 1 OF 2

SOIL BORING LOG

PROJECT : UPRR Freeman RI, Freeman, WA
LOCATION : School play field

ELEVATION : 2576 ft NAVD88
DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.

COORDINATES : 209676.669, 2539669.9 State Plane (ft)
DRILLING METHOD AND EQUIPMENT : Schramm T300 Rotodrill, Sonic

WATER LEVEL:
START : 6/27/16 09:15
END : 6/27/16 10:25
LOGGER : Nicole Badon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
0.0					CLAYEY SILT (ML), medium brown, stiff to loose, some fine sand, trace organics, moist to dry.	
		100.0				
5						Soil sample collected from 5 - 5.5 feet bgs
7.0						
					CLAYET SILY/SILTY CLAY (ML/CL) medium brown, stiff to very stiff, trace fine to medium sand, moist.	
10						Soil sample collected from 10 - 10.5 feet bgs
		70.0				
15						Soil sample collected from 15 - 15.5 feet bgs
17.0						
					SILTY CLAY/CLAYEY SILT (ML/CL) as above; 20'-27' SANDY CLAY (SC), fine to medium sand ~50%, mica flakes throughout, moist to wet at ~23 ft., reddish brown, at 26' bgs some fine to coarse sub rounded gravel, stiff to very stiff graderback to med brown and moist.	
20						Soil sample collected from 20 - 20.5 feet bgs
		117.0				
25						Soil sample collected from 25 - 25.5 feet bgs
27.0						
					CLAYEY FINE TO COARSE SAND (SC) medium to brown with some light gray mottling, little silt, wet, medium stiff to stiff, trace fine to coarse sub angular to subrounded gravel.	
30						

PROJECT NUMBER:	BORING NUMBER:
661508	SB-16 SHEET 2 OF 2

SOIL BORING LOG

PROJECT : UPRR Freeman RI, Freeman, WA
LOCATION : School play field

ELEVATION : 2576 ft NAVD88
DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.

COORDINATES : 209676.669, 2539669.9 State Plane (ft)
DRILLING METHOD AND EQUIPMENT : Schramm T300 Rotodrill, Sonic

WATER LEVEL:
START : 6/27/16 09:15
END : 6/27/16 10:25
LOGGER : Nicole Badon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
		101.0			CLAYEY FINE TO COARSE SAND (SC) medium to brown with some light gray mottling, little silt, wet, medium stiff to stiff, trace fine to coarse sub angular to subrounded gravel.	Soil sample collected from 30 - 30.5 feet bgs
35					Silt and weathered Basalt, dark gray, loose, dry, fine gravel to cobble sized clasts.	driller notes rock at 34.5 bgs during drilling
	37.0				Boring terminated at 37 ft bgs.	
40						
45						
50						
55						
60						

PROJECT NUMBER:	BORING NUMBER:
661508	SB-18 SHEET 1 OF 2

SOIL BORING LOG

PROJECT : UPRR Freeman RI, Freeman, WA
LOCATION : W. Side Hwy 27

ELEVATION : 2609 ft NAVD88
DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.

COORDINATES : 210725.9733, 2539539.585 State Plane (ft)
DRILLING METHOD AND EQUIPMENT : Schramm T300 Rotodrill, Sonic

WATER LEVEL:
START : 6/30/2016
END : 6/30/2016
LOGGER : Nicole Badon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
0.0					Dark gray asphalt and fine angular gravel.	
		4.3			SILTY CLAY (CL), medium plasticity, some fine to coarse sand, trace fine subangular gravel, moist, very stiff, light brown.	
5						Soil sample collected from 5 - 5.5 feet bgs
7.0						
		9.4			SILTY CLAY (CL), some medium to coarse sand from 16-17', decomposed rock fragments, light brown with yellowish orange and white mottling from 15-17', moist, medium stiff.	
10						Soil sample collected from 10 - 10.5 feet bgs
15						Soil sample collected from 15 - 15.5 feet bgs
17.0						
		10.8			SILT (ML), and very fine sand, trace decomposed rock fragments throughout (basalt), light brown with yellowish orange and light gray mottling, very moist/wet, loose to med. dense.	
20						Soil sample collected from 20 - 20.5 feet bgs
25						Soil sample collected from 25 - 25.5 feet bgs
27.0						
30					SILT (ML), slight plasticity, some very fine sand throughout, decomposed basalt fragments throughout, fine gravel sized fragments - weak/breakable w/ fingers, medium dense, very moist/wet, light brown with white and yellowish orange mottling. Decomposed basalt from 25-27, soft, dark brown with white mottling (weathered to silt but structure present).	

PROJECT NUMBER:	BORING NUMBER:
661508	SB-18 SHEET 2 OF 2

SOIL BORING LOG

PROJECT : UPRR Freeman RI, Freeman, WA
LOCATION : W. Side Hwy 27

ELEVATION : 2609 ft NAVD88
DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.

COORDINATES : 210725.9733, 2539539.585 State Plane (ft)
DRILLING METHOD AND EQUIPMENT : Schramm T300 Rotodrill, Sonic

WATER LEVEL:
START : 6/30/2016
END : 6/30/2016
LOGGER : Nicole Badon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
35	37.0	10.0			SILT (ML), slight plasticity, some very fine sand throughout, decomposed basalt fragments throughout, fine gravel sized fragments - weak/breakable w/ fingers, medium dense, very moist/wet, light brown with white and yellowish orange mottling. Decomposed basalt from 25-27, soft, dark brown with white mottling (weathered to silt but structure present).	Soil sample collected from 30 - 30.5 feet bgs Soil sample collected from 35 - 35.5 feet bgs
40 45	47.0	10.7			SILT (ML), slight plasticity, some very fine sand, little weathered/weak fine gravel-sized basalt fragments throughout, light brown with oxidation and white mottling, medium dense, wet, trace medium gray mottling.	Soil sample collected from 40 - 40.5 feet bgs Soil sample collected from 45 - 45.5 feet bgs
50	54.0	9.5			SILT (ML), same as above, no white mottling, wet, soft color change to dark gray at 49'. BASALT with silt, dark gray, dry, basalt fragments from fine gravel to cobble sized, hard, dry, wet at 57'.	Soil sample collected from 50 - 50.5 feet bgs Hard drilling
55 60					Boring terminated at 54 ft bgs.	

PROJECT NUMBER:	BORING NUMBER:
661508	SB-19 SHEET 1 OF 2

SOIL BORING LOG

PROJECT : UPRR Freeman RI, Freeman, WA
LOCATION : W Side of Hwy 27

ELEVATION : 2602 ft NAVD88
DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.

COORDINATES : 210623.9829, 2539684.203 State Plane (ft)
DRILLING METHOD AND EQUIPMENT : Schramm T300 Rotodrill, Sonic

WATER LEVEL:
START : 6/30/16 14:08
END : 6/30/16 14:55
LOGGER : Nicole Badon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
0.0					ROAD FILL, fine to coarse angular gravel and asphalt, some silt, dark gray, dry.	
		5.6			SILT (ML), little clay, low plasticity, medium dense to hard, little medium to coarse sand, dark gray to grayish brown, moist.	
5						Soil sample collected from 5 - 5.5 feet bgs
7.0					CLAYEY SILT (ML), slight plasticity, light brown, little medium sand throughout, dense, slightly moist, color change at ~15.5' to oxidized light brown and trace weathered basalt fragments (fine to coarse gravel-sized) present (15.5' to 17').	
10		11.7				Soil sample collected from 10 - 10.5 feet bgs
15						Soil sample collected from 15 - 15.5 feet bgs
17.0					SILT (ML), oxidized yellowish orange to reddish brown, some medium gray, dark gray, and white mottling, little medium sand, some highly weathered basalt fragments (fine gravel-sized) throughout, color change to dark gray at ~25.5', moist, medium dense, 25.5', moist, medium dense, 25.5' to 27' = decomposed basalt, weathered to silt but structure present.	
20		13.1				Soil sample collected from 20 - 20.5 feet bgs
25						Soil sample collected from 25 - 25.5 feet bgs
27.0					SILT (ML), some very fine sand, little ~20% fine to coarse gravel-sized basalt fragments (weathered, easily breakable), slight plasticity, light brown with yellowish orange/reddish brown oxidation throughout, some medium gray, white, and black mottling, medium dense, very moist/wet.	
30						

PROJECT NUMBER:	BORING NUMBER:
661508	SB-19 SHEET 2 OF 2

SOIL BORING LOG

PROJECT : UPRR Freeman RI, Freeman, WA
LOCATION : W Side of Hwy 27

ELEVATION : 2602 ft NAVD88
DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.

COORDINATES : 210623.9829, 2539684.203 State Plane (ft)
DRILLING METHOD AND EQUIPMENT : Schramm T300 Rotodrill, Sonic

WATER LEVEL:
START : 6/30/16 14:08
END : 6/30/16 14:55
LOGGER : Nicole Badon

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
35		10.9			SILT (ML), some very fine sand, little ~20% fine to coarse gravel-sized basalt fragments (weathered, easily breakable), slight plasticity, light brown with yellowish orange/reddish brown oxidation throughout, some medium gray, white, and black mottling, medium dense, very moist/wet.	Soil sample collected from 30 - 30.5 feet bgs Soil sample collected from 35 - 35.5 feet bgs
	37.0					
40		8.0			SILT (ML), with weathered basalt fragments, same as 27' to 37', wet, no white mottling.	
					BASALT AND SILT, fine to coarse gravel sized fragments, dry to wet, ~41' bgs, hard.	Soil sample collected from 40 - 40.5 feet bgs
	42.0				Boring terminated at 42 ft bgs.	
45						
50						
55						
60						

PROJECT NUMBER:	BORING NUMBER:
661508	SB-20 SHEET 1 OF 2

SOIL BORING LOG

PROJECT : UPRR Freeman RI, Freeman, WA
LOCATION : W of Hwy 27, 60' S of SB04

ELEVATION : 2603 ft NAVD88
DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.

COORDINATES : 210712.5246, 2539662.501 State Plane (ft)
DRILLING METHOD AND EQUIPMENT : Speed Star, Sonic

WATER LEVEL:
START : 7/6/2016
END : 7/6/2016
LOGGER : RSG

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
0.0					SILTY GRAVEL AND SAND (GM).	
		6.0	CORE-1		FAT CLAY WITH FINE SAND (CH), dark brown, moist, stiff.	
5					SILTY GRAVEL WITH SAND (GM), gray, well graded gravel.	Soil sample collected from 5 - 5.5 feet bgs
7.0					Sharp transition to BROWN CLAY (CL), trace sand, lean, very stiff, moist.	
					GRAVELLY CLAY (CL), dark brown, poorly graded, fine brown stiff clay, moist.	
10						Soil sample collected from 10 - 10.5 feet bgs
		7.0	CORE-2		BROWN FAT CLAY (CH), trace to no sand, very stiff, moist, increase in trace orange mottling with depth, with trace gravel.	
15						Soil sample collected from 15 - 15.5 feet bgs
17.0						
					GRAY FAT CLAY (CH), with white and yellow mottling, moist, stiff, becoming light gray clay (CH) with trace yellow and white mottling.	
20						Soil sample collected from 20 - 20.5 feet bgs
		12.0	CORE-3		Increasing orangish-brown coloring, moist.	
					BROWN FAT CLAY (CH), stiff, moist, with reddish brown clay mixed within.	
25						Soil sample collected from 25 - 25.5 feet bgs
27.0						
					BROWN FAT CLAY (CH), same as above, moisture seeping from above.	
30						

PROJECT NUMBER:	BORING NUMBER:
661508	SB-20 SHEET 2 OF 2

SOIL BORING LOG

PROJECT : UPRR Freeman RI, Freeman, WA
LOCATION : W of Hwy 27, 60' S of SB04

ELEVATION : 2603 ft NAVD88
DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.

COORDINATES : 210712.5246, 2539662.501 State Plane (ft)
DRILLING METHOD AND EQUIPMENT : Speed Star, Sonic

WATER LEVEL:
START : 7/6/2016
END : 7/6/2016
LOGGER : RSG

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
					BROWN FAT CLAY (CH), same as above, moisture seeping from above.	Soil sample collected from 30 - 30.5 feet bgs
		10.5	CORE-4		GRAY AND BROWN SILTY SAND, wet, fine sand, from 31-32.5' gray, brown, orange/brown clay, trace fine sand, stiff, moist.	
35						Soil sample collected from 35 - 35.5 feet bgs
	37.0				BROWN SILTY SAND (SM), very fine, wet, 35.5-36.0', transitions back to gray, brown and orange-brown clay, moist, stiff with coarse basalt clasts at 35.5' bgs, up to 3" diameter, 1/2" thick.	
		5.0	CORE-5		FRACTURED BASALT, clasts up to 3" diameter, decreasing moisture.	
40						Soil sample collected from 39 - 39.5 feet bgs
	41.0					Soil sample collected from 40 - 40.5 feet bgs
					Boring terminated at 41 ft bgs.	
45						
50						
55						
60						

PROJECT NUMBER:	BORING NUMBER:
661508	SB-21 SHEET 1 OF 3

SOIL BORING LOG

PROJECT : UPRR Freeman RI, Freeman, WA
LOCATION : Freeman, WA

ELEVATION : 2636 ft NAVD88
DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.

COORDINATES : 211592.7329, 2539756.251 State Plane (ft)
DRILLING METHOD AND EQUIPMENT : Speed Star, Sonic

WATER LEVEL:
START : 7/7/16 10:00 END : 7/7/16 14:00 LOGGER : J. Freed

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
0.0					SILT WITH SAND (ML), dry, brown, loose, well graded sand.	
		3.0			LEAN CLAY WITH SAND (CL), brown, wet, soft, cohesive, ~15-20% predominately fine sand.	
5					FAT CLAY (CH), dry, very firm, does not break with strong hand pressure, massive, dark brown, <10% coarse grained particles.	
7.0					As above, moist.	Moist at 7'
		5.5			FAT CLAY (CH), dry, crumbly, loose, light brown, highly cohesive, crumbles easily with light hand pressure, massive.	Dry at ~8'
10						
					FAT CLAY (CH), dark brown, moist, very hard, crumbles with moderate hand pressure, cohesive.	
15					WELL GRADED SAND WITH GRAVEL (SW), dry, rust-brown, loose, gravel up to 2.5, rounded to subangular, well graded, ~40% gravel, <10% silt.	
17.0						
		5.5			FAT CLAY (CH), light brown to rust-orange, very hard, does not crumble with hand pressure, dry, bonded light gray/rust/light brown, irregular laminations.	
20						
25					GNEISS, light gray to white with oxidation, dry, decomposed granite, large patches of 1/2 quartz crystals, minor clay within loosely compacted granite particles. GNEISS, as above, coarse crystals not observed in core, all minerals decomposed.	
27.0						
30						

PROJECT NUMBER:	BORING NUMBER:
661508	SB-21 SHEET 2 OF 3

SOIL BORING LOG

PROJECT : UPRR Freeman RI, Freeman, WA
LOCATION : Freeman, WA

ELEVATION : 2636 ft NAVD88
DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.

COORDINATES : 211592.7329, 2539756.251 State Plane (ft)
DRILLING METHOD AND EQUIPMENT : Speed Star, Sonic

WATER LEVEL:
START : 7/7/16 10:00
END : 7/7/16 14:00
LOGGER : J. Freed

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
35		8.5			GNEISS, light gray to white with oxidation, dry, decomposed granite, large patches of 1/2 quartz crystals, minor clay within loosely compacted granite particles. GNEISS, as above, becomes dark gray and easily compacted, dry, does not crumble with hand pressure. GNEISS, as above, densely compacted, crumbles with moderate hand pressure, dry, light gray, compacts granitic minerals observed, becomes oxidized at ~33.5' and very densely compacted. 34.5-36.5' - possible infilled fracture core, very dense decomposed granitic particles, compacted, loosely cemented with clay, muscovite mica observed up to 1/2 wide, crumbles with moderate hand pressure, increasing mica with depth, moist.	
	37.0					
40						
45		12.0			LEAN CLAY (CL), moist, rust-orange, minor particles with clay-granitic, crumbles when rolled. Decomposed granitic, gray, moderately firm, crumbles with moderate hand pressure, fine grained minerals.	
	47.0				LEAN CLAY (CL), crumbles with hand pressure and when rolled, massive, light tan 45.5' to 46', becomes mottled at 46 (light tan and rust orange). POORLY GRADED SAND (SP), most, very fine grained, orange mottling, gray, becomes medium grained at 46.5', white, dark gray. 46.75-47' - sharp transition, very fine grained.	Increase in mineral grain size 45' to 45.5'
50		12.0			WEATHERED SANDSTONE, well rounded, predominately fine grained, crumbles with light to hand pressure, large consolidated clasts preset in core up to 1 1/2, crumbles with strong hand pressure, moist, light gray.	Becomes oxidized at 52' Minor granitic vein at 52' ~2'
55					WEATHERED SANDSTONE, dark to olive gray, abundant mica present, sandstone clasts crumble with light hand pressure, moist, possible light alteration from nearby granitic, ??/vein, predominately fine grained, granitic vein at 55', decomposed mafic mineral content up to 1/2, sharp transition, 4 thick vein/intrusion, weathered sandstone continues to 57', moist, gray, fine grained.	Sharp transition to dark gray weathered sandstone particles Mica contact possibly due to granitic vein at 44' and released metamorphism/metasomatism
	57.0					
60						Minor vein at 58.5', granitic, 2' thick, oxidation

PROJECT NUMBER:	BORING NUMBER:
661508	SB-21 SHEET 3 OF 3

SOIL BORING LOG

PROJECT : UPRR Freeman RI, Freeman, WA
LOCATION : Freeman, WA
ELEVATION : 2636 ft NAVD88
DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.
COORDINATES : 211592.7329, 2539756.251 State Plane (ft)
DRILLING METHOD AND EQUIPMENT : Speed Star, Sonic
WATER LEVEL:
START : 7/7/16 10:00
END : 7/7/16 14:00
LOGGER : J. Freed

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
65		10.0			WEATHERED SANDSTONE, moist, predominately fine grained, crumbles easily with hand pressure, medium gray, consolidated lumps of sandstone throughout.	Note: oxidized at 62' ~4' thick
	67.0				WEATHERED SANDSTONE, as above, becomes grayish-tan colored.	
					Boring terminated at 67 ft bgs.	
70						
75						
80						
85						
90						

PROJECT NUMBER:	BORING NUMBER:
661508	SB-22 SHEET 1 OF 2

SOIL BORING LOG

PROJECT : UPRR Freeman RI, Freeman, WA
LOCATION : S of S access to Site, 30' E of Hwy 27

ELEVATION : 2601 ft NAVD88
DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.

COORDINATES : 210686.4829, 2539732.814 State Plane (ft)
DRILLING METHOD AND EQUIPMENT : Speed Star, Sonic

WATER LEVEL:
START : 7/20/2016 END : 7/20/2016 LOGGER : RSG

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
0.0						
		2.0	CORE-1		WELL GRADED GRAVEL WITH SAND AND SILT (GW), moist, 10% silt, 20% medium sand.	
5						
					WELL GRADED GRAVEL WITH SAND AND SILT (GW), same as above, increasing coarse gravel/small cobbles.	Soil sample collected from 5 - 5.5 feet bgs
7.0						Very loose - driller uses catcher
10						
		0.0	CORE-2		WELL GRADED GRAVEL WITH SAND AND SILT (GW), same as above, probable.	
15						
17.0					WELL GRADED GRAVEL WITH SAND AND SILT (GW), same as above, probable.	
						7-17' - very soft limited recovery, driller cases 0-20' to prevent soughing
20						
		5.5	CORE-3		BROWN CLAY, FAT (CH), wet, soft, with decomposed basalt clasts, trace oxidation, yellow and orange medium to high plasticity.	Soil sample collected from 20 - 20.5 feet bgs
25						
27.0						Soil sample collected from 25 - 25.5 feet bgs
					BROWN CLAY, FAT (CH), same as above (wet). Increasing fine and medium sand (wet).	
30						

PROJECT NUMBER:	BORING NUMBER:
661508	SB-22 SHEET 2 OF 2

SOIL BORING LOG

PROJECT : UPRR Freeman RI, Freeman, WA
LOCATION : S of S access to Site, 30' E of Hwy 27
ELEVATION : 2601 ft NAVD88
DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.
COORDINATES : 210686.4829, 2539732.814 State Plane (ft)
DRILLING METHOD AND EQUIPMENT : Speed Star, Sonic
WATER LEVEL:
START : 7/20/2016 END : 7/20/2016 LOGGER : RSG

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
					BROWN CLAY, FAT (CH), same as above (wet).	Soil sample collected from 30 - 30.5 feet bgs
					BROWN SANDY CLAY - FAT (CH), fine to medium sand, trace fine gravel, trace oxidation.	
35						Soil sample collected from 35 - 35.5 feet bgs
37.0					BASALT FRACTURED, clasts up to 4" with brown sandy clay, moist, decreasing moisture with depth.	Hard drilling
					Boring terminated at 37 ft bgs.	
40						
45						
50						
55						
60						

PROJECT NUMBER:	BORING NUMBER:
661508	SB-23 SHEET 1 OF 3

SOIL BORING LOG

PROJECT : UPRR Freeman RI, Freeman, WA
LOCATION : NE Corner of North Overflow Parking Lot
ELEVATION : 2643 ft NAVD88
DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.
COORDINATES : 210844.469, 2539091.321 State Plane (ft)
DRILLING METHOD AND EQUIPMENT : Speed Star, Sonic
WATER LEVEL:
START : 7/20/16 12:45
END : 7/20/16 15:15
LOGGER : RSG

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
0.0					BROWN LEAN CLAY (CL), trace fine sand, moist, stiff, low plasticity.	
		5.0				
5						Soil sample collected from 5 - 5.5 feet bgs
7.0					BROWN LEAN CLAY (CL), same as above.	
10						Soil sample collected from 10 - 10.5 feet bgs
		4.0				
15					BROWN LEAN CLAY (CL), same as above, becoming hard.	Soil sample collected from 15 - 15.5 feet bgs
17.0					BROWN LEAN CLAY (CL), as above.	
20						Soil sample collected from 20 - 20.5 feet bgs
		5.5				
25						Soil sample collected from 25 - 25.5 feet bgs
27.0					BROWN LEAN CLAY (CL), as above.	
30						

PROJECT NUMBER:	BORING NUMBER:
661508	SB-23 SHEET 2 OF 3

SOIL BORING LOG

PROJECT : UPRR Freeman RI, Freeman, WA
LOCATION : NE Corner of North Overflow Parking Lot

ELEVATION : 2643 ft NAVD88
DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.

COORDINATES : 210844.469, 2539091.321 State Plane (ft)
DRILLING METHOD AND EQUIPMENT : Speed Star, Sonic

WATER LEVEL:
START : 7/20/16 12:45 END : 7/20/16 15:15 LOGGER : RSG

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
		9.0			Increasing coarse sand - 29-30' - FAT CLAY WITH SAND (CH), transition to orange-brown clay, FAT (CH) with trace granite gravel and mica, granite clasts from 1/2 to 2, moist, hard.	Soil sample collected from 30 - 30.5 feet bgs PID = 0.3 ppm VOCs
35						Soil sample collected from 35 - 35.5 feet bgs
	37.0				Transitions to GRAY FAT CLAY (CH), little to no sand, no mica, very hard, moist.	
					Gray with white mottling CLAY (CH), possibly decomposed basalt, moist, stiff.	
					Becoming brown and gray CLAY, FAT (CH), increase in moisture, medium plasticity, firm, becoming soft with depth.	
40						Soil sample collected from 40 - 40.5 feet bgs PID = 0.7 ppm VOC
		11.0			Gravel transition to REDDISH BROWN CLAY, very moist, possibly wet starting at ~43' bgs, soft, trace medium sand.	
45						Soil sample collected from 45 - 45.5 feet bgs
	47.0				REDDISH BROWN CLAY, LEAN (CL), very hard, decreasing moisture, little to no sand, moist.	PID = 1.3 ppm VOC
					GRAY, BROWN, REDDISH BROWN FAT CLAY (CH), moist, soft with trace basalt clasts - up to 1 diameter, possible highly weathered.	
50					GRAY, BROWN, REDDISH BROWN FAT CLAY (CH), same as above, decreasing gray, increasing yellow.	Soil sample collected from 50 - 50.5 feet bgs
		10.5			LIGHT GRAY CLAYEY SAND (CH), soft, with tan clayey sand, very fine, moist.	
55					REDDISH BROWN CLAY (CL), possible decomposed basalt, moist, firm, light gray lightly cemented siltstone, possible oxidation.	Soil sample collected from 55 - 55.5 feet bgs
	57.0				FRACTURED BASALT WITH BROWN CLAY AND SAND, decreasing moisture basalt clasts up to 2.	
60					Becomes FRACTURED BASALT, with gray sand and silt clasts up to 1/2 diameter, decreasing moisture.	Hard drilling

PROJECT NUMBER:	BORING NUMBER:
661508	SB-23 SHEET 3 OF 3

SOIL BORING LOG

PROJECT : UPRR Freeman RI, Freeman, WA
LOCATION : NE Corner of North Overflow Parking Lot
ELEVATION : 2643 ft NAVD88
DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.
COORDINATES : 210844.469, 2539091.321 State Plane (ft)
DRILLING METHOD AND EQUIPMENT : Speed Star, Sonic
WATER LEVEL:
START : 7/20/16 12:45
END : 7/20/16 15:15
LOGGER : RSG

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
					FRACTURED BASALT CLAST from 2-4.5 diameter.	Soil sample collected from 60 - 60.5 feet bgs Very hard drilling
					Boring terminated at 62 ft bgs.	
65						
70						
75						
80						
85						
90						

PROJECT NUMBER:	BORING NUMBER:
661508	SB-25 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman
LOCATION : Cenex Facility

ELEVATION : 2597.90 ft mslft NAVD88 (ground surface)
DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 210872.601, 2539629.111 (ft NAVD88)
DRILLING METHOD AND EQUIPMENT :

WATER LEVEL:
START : 11/19/16 10:40 END : 11/19/16 13:22 LOGGER : L. Baumann

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
0.0					Gray surface gravel giving way to SILTY CLAY (CL), brown, moist, little sand.	PID = 0.0
4.0					SILTY CLAY (CL), brown, very dense, mica flecks.	
8.0					SILTY CLAY (CL), brown/tan, very dense, mica flecks.	
12.0					SILTY CLAY (CL), brown/orange with fine to coarse SAND and SILTY SAND gravel, weathered, mica flecks.	
16.0					RHYOLITIC CLAYS (CL), brown/orange/white streak.	
20.0					CLAY WITH SAND (CL), little gravel, crumbly.	
22.3					Bottom of borehole at 22.33 ft bgs.	
30						

PROJECT NUMBER:	BORING NUMBER:
661508	SB-26 SHEET 1 OF 2

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman
LOCATION : Cenex Facility

ELEVATION : 2598.79 ft mslft NAVD88 (ground surface)
DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 210840.371, 2539572.708 (ft NAVD88)
DRILLING METHOD AND EQUIPMENT :

WATER LEVEL:
START : 11/19/16 14:16
END : 11/19/16 16:07
LOGGER : L. Baumann

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
0	0.0				ORGANICS (OL) AND GRAVEL WITH CLAY, dark brown, crumbly.	
					SILT/CLAY, brown, soft, wet with some sand.	
					CLAYEY SILT (ML), tan/brown, very dense, crumbly with some sand, mica flecks.	
5	5.0					1445-SB26-SS-5
10	10.0				SILTY SAND (SM), weathered, fine grained, firm.	1500-SB26-SS-10 PID = .3 VOC Taking sample below soil change
					- gray clay lense is SANDY SILT, soft.	
					- dense, SILTY SAND (SM).	
15	15.0				SANDY SILT (ML), tan/light brown, soft.	1515-SB26-SS-15
					SILTY SAND (SM), orange, dense. - alternating.	
20	20.0				SILTY SAND (SM), orange, dense, well cemented, oxidized sharp, friable condensed silt with sand, orange to burnt color, wet, dense.	1530-SB26-SS-20
					- soft silty orange brown sand, wet.	
	24.0				CLAY (CL), dark brown with flecks, of clay, moderate density.	
25	25.0					Depth measuring tape can no longer go down the boring, the sides are too goopy
					Alternating dark and light brown, gray and tan CLAY (CL) with white clay mottles, density varying, wet.	1150-SB26-SS-25
30						

PROJECT NUMBER:	BORING NUMBER:
661508	SB-26 SHEET 2 OF 2

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman
LOCATION : Cenex Facility

ELEVATION : 2598.79 ft mslft NAVD88 (ground surface)
DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 210840.371, 2539572.708 (ft NAVD88)
DRILLING METHOD AND EQUIPMENT :

WATER LEVEL:
START : 11/19/16 14:16 END : 11/19/16 16:07 LOGGER : L. Baumann

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
					Alternating dark and light brown, gray and tan CLAY (CL) with white clay mottles, density varying, wet.	1610-SB26-SS-30
31.4					Bottom of borehole at 31.42 ft bgs.	
35						
40						
45						
50						
55						
60						

PROJECT NUMBER:	BORING NUMBER:
661508	SB-27 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman

LOCATION : Between the 1st and 2nd Southwest Structures

ELEVATION : 2598.04 ft mslft NAVD88 (ground surface)

DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 210905.093, 2539565.824 (ft NAVD88)

DRILLING METHOD AND EQUIPMENT :

WATER LEVEL:

START : 11/20/16 07:58 END : 11/20/16 08:41 LOGGER : L. Baumann

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
0.0					CLAY (CL), WITH GRAVEL, grains for 3", to brown SILTY CLAY (CL), wet, soft, some sand, mica flecks, downward increasing stiffness.	
4.0					CLAY (CL), grayish, some fine sand, extremely wet and soft.	PID test = 0.0 Bagged PID test = 0.0
5					Increasing stiffness, transitioning to tan-brown SILTY CLAY (CL) with mica.	0815-SB27-SS-5
8.0					- stiff, nail deformation only 2-5% muscovite mica, flecks up to 3mm muscovite mica.	
10					SILTY CLAY (CL), brown, stiff, 5-10% muscovite mica, some fine sand grains, 1' subrounded tan gravel, rust red.	SB27-SS-10
12.0					CLAYEY GRAVEL (GC), with coarse sand, brown, angular, decomposed granite.	PID test = 0.0 12-18' - PID = 0.0
15					SANDY CLAY (CL), tan, with reddish mottles of decomposed siltstone.	PID test of bagged gravel = 0.0 1.5" - coarse sand feldspar
16.0					SILTY CLAY (SC), orangish brown, with white, olive, reddish brown mottles, pieces of decomposed rock, siltstone.	
18.0					Bottom of borehole at 19 ft bgs.	
20						
25						
30						

PROJECT NUMBER:	BORING NUMBER:
661508	SB-28 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman

LOCATION : Between 3rd and 4th Silos from South

ELEVATION : 2600.10 ft mslft NAVD88 (ground surface)

DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 210934.132, 2539476.749 (ft NAVD88)

DRILLING METHOD AND EQUIPMENT :

WATER LEVEL:

START : 11/20/16 09:40 END : 11/20/16 11:05 LOGGER : L. Baumann

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
0	0.0				SILTY ORGANICS (OL) to 1/2" minus gravel.	
					SILTY CLAY (CL), very soft, increasing firmness, plastic.	
	4.0					
5					SILTY CLAY (CL), firm, hemogenous brown, plastic, mica flakes, some black specks.	0954-SB28-SS-5
	8.0					
					SILTY CLAY (CL), firm, hemogenous brown, plastic, mica flakes, some black specks.	
10						1008-SB28-SS-10
	12.0					
					8" layer of olive green/tanist CLAY (CL) with decomposed basalt, gravel, very stiff, one rounded oz 1.5" gravel.	
					SILTY CLAYEY SAND (SC), tan, soft to very soft, wet, plastic.	
15	15.0					
					CLAY (CL), 4" layer, olive, very stiff, dense.	
	16.0					1034-SB28-SS-15
					CLAYEY SAND (SC), wet, gray to tan, soft.	
	19.5				1-2" layers of olive-orangey CLAY (CL).	
20					Bottom of borehole at 19.5 ft bgs.	1113-SB28-SS-19
25						
30						

PROJECT NUMBER:	BORING NUMBER:
661508	SB-29 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman

LOCATION : North lab side of north most Silo

ELEVATION : 2600.20 ft mslft NAVD88 (ground surface)

DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 210975.153, 2539392.51 (ft NAVD88)

DRILLING METHOD AND EQUIPMENT :

WATER LEVEL:

START : 11/20/16 12:53

END : 11/20/16 13:40

LOGGER : L. Baumann

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
0.0					ORGANICS (OL), dark brown, wet, weed, gravel, silt.	
					SILTY CLAY (CL), brown, firm, mica flecks, plastic.	
4.0						
5 5.0						1310-SB29-SS-5
8.0						
10 10.0						1320-SB29-SS-10
					6" stiff brown CLAY (CL) with gravel, subrounded.	
12.0					4" tan SILTY CLAY (CL), soft, fine to few coarse sand, good plasticity.	
					Quartz cobble, oxidized decomposed GRANITE.	
13.5					Bottom of borehole at 13.5 ft bgs.	1330-SB29-SS-13
15						
20						
25						
30						

PROJECT NUMBER:	BORING NUMBER:
661508	SB-30 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman
LOCATION : Cenex Facility

ELEVATION : 2599.69 ft mslft NAVD88 (ground surface)
DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 210878.462, 2539524.362 (ft NAVD88)
DRILLING METHOD AND EQUIPMENT :

WATER LEVEL:
START : 11/20/16 13:46 END : 11/20/16 14:49 LOGGER : L. Baumann

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
0.0					SILTY CLAY (CL) WITH GRAVEL, brown, gravel includes concrete.	
4.0					SILTY CLAY (CL), brown and tan, writh mottles of black, orange and gray, firm.	
5						1412-SB30-SS-5
8.0					CLAY (CL), grayish brown, with ~5-10% mica, muscovite firm to very firm.	
10 10.0					CLAY (CL), brown, homogeneous, cohesive and firm.	1420-SB30-SS-10
12.0					CLAY (CL), brown, homogeneous, cohesive and firm.	Clays expanding 4' of soil in 3' of depth
15 15.0						
16.0						1434-SB30-SS-15
					Bottom of borehole at 16 ft bgs.	
20						
25						
30						

PROJECT NUMBER:	BORING NUMBER:
661508	SB-31 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman

LOCATION : Next to road - west from SB-30

ELEVATION : 2603.25 ft mslft NAVD88 (ground surface)

DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 210840.371, 2539508.979 (ft NAVD88)

DRILLING METHOD AND EQUIPMENT :

WATER LEVEL:

START : 11/20/16 14:50

END : 11/20/16 15:40

LOGGER : L. Baumann

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
0	0.0				1' GRAVEL, and asphalt.	
					SILTY CLAY (CL), brown, moist, stiff, homogeneous.	
5	5.0				SILTY CLAY (CL), brown, moist, stiff, homogeneous.	1510-SB31-SS-5
	8.0				SILTY CLAY (CL), brown, very stiff, cohesive plastic and homogeneous.	
10						1520-SB31-SS-10
	12.0				Increasing grain size of coarse sand in brown SILTY CLAY (CL) to some small gravel, quartz, column shaking.	
					4-6" layers of rounded quartz gravel in SILTY CLAY (CL), mixed with decomposed rock.	
15	15.0				Bottom of borehole at 15 ft bgs.	
20						
25						
30						

PROJECT NUMBER:	BORING NUMBER:
661508	SB-32 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman

LOCATION : ~170' s.f. south most Silo, below paring area

ELEVATION : 2591.56 ft mslft NAVD88 (ground surface)

DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 210714.379, 2539750.708 (ft NAVD88)

DRILLING METHOD AND EQUIPMENT :

WATER LEVEL:

START : 11/21/16 09:50 END : 11/20/16 10:35 LOGGER : L. Baumann

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
0	0.0				SILTY CLAY (CL), mixed gravel, grass, brown, wet, soft.	
	4.0				SILTY CLAY (CL), light brown with little coarse sand, almost dry, friable, too dry for plasticity.	
5	5.0				- increasing moisture to moist, firm.	1000-SB32-SS-5
	8.0				SILTY CLAY (CL) brown with orange, black and tan mottling, moist to wet, soft, some decomposed rock, some pieces/layers <1/2" gray clay.	
10	10.0					1008-SB32-SS-10
	12.0					
15	15.0				SILTY CLAY (CL), dark brown, wet, increasing firmness with 20% white/yellow CLAY (CL), black and red/orange mottling.	
	16.0					1015-SB32-SS-15
					SILTY CLAY (CL), brown, with laminate, olive black, orange and white in places, firm to semi-firm, decomposed rock, gneissic.	
20	20.0					
					SILTY CLAY (CL), brown, with laminate, olive black, orange and white in places, firm to semi-firm, decomposed rock, gneissic.	1022-SB32-SS-20
	23.0					
					Bottom of borehole at 23 ft bgs.	
25						
30						

PROJECT NUMBER:	BORING NUMBER:
661508	SB-33 SHEET 1 OF 1

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman

LOCATION : Edge of parking area ~90' south of south most Silo

ELEVATION : 2592.02 ft mslft NAVD88 (ground surface)

DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 210786.897, 2539693.572 (ft NAVD88)

DRILLING METHOD AND EQUIPMENT :

WATER LEVEL:

START : 11/21/16 11:01 END : 11/21/16 11:50 LOGGER : L. Baumann

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
0.0					SILTY GRAVEL (GH), black to brown, angular.	PID reading of gravel 0.1 ppm
5 5.0					CLAYEY SILT (ML), brown, soft.	4-8' - PID reading of 0.0 ppm 1121-SB33-SS-5
8.0					CLAYEY SILT (ML), brown, too dry to roll, firm, mica present, columns snaking in the case.	
10 10.0					CLAYEY SILT TO SILTY CLAY (ML/CL), brown, very firm, semi-plastic, very cohesive, some quartz gravel.	1111-SB33-SS-10
12.0					SNAKING CLAY (CL), orangey-tan, very firm in places, decomposed minerals, blooded black ~2mm long, 25 mm wide, horn blade?.	
15 15.0					- gray/white globular, ~4mm orangey matrix, strength - snaps upon separation.	1150-SB33-SS-15
16.0						
17.0					Bottom of borehole at 17 ft bgs.	
20						
25						
30						

PROJECT NUMBER:	BORING NUMBER:
661508	SB-34 SHEET 1 OF 3

Soil Boring Log

PROJECT : UPRR Freeman, Freeman, WA | LOCATION : South of Grain Facility/Highway 27

GROUND ELEVATION : | DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.

COORDINATES: | DRILLING METHOD AND EQUIPMENT : Schramm T300 4" x 6", Sonic Rotary

WATER LEVEL : | START : 1/19/17 14:10 | END : 1/10/17 10:30 | LOGGER : L. Lubell | Reviewed By :

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS SAMPLE TYPE, AIR MONITORING, PID (ppm) SOIL GAS MONITORING, FID (ppm)
	0.0				CLAY (CL), very dark brown (7.5YR 2.5/3), moist to wet, stiff, low plasticity, trace organic material, basalt fragments, ? to ?.	
					CLAY WITH SILT (CL), dark brown (10YR 3/3), moist, very stiff.	
					CLAY (CL), dark brown (10YR 3/3), dry, very stiff.	
		4.8				
5					NO RECOVERY.	
	8.0					
					CLAY WITH SILT (CL), dark brown (10YR 3/3), wet, stiff.	
10					CLAY (CL), dark brown (10YR 3/3), to strong brown (?), ?, moist, stiff to very stiff.	
		6.7				
15					NO RECOVERY.	
	18.0					
					CLAY WITH SILT (CL), dark yellowish brown (10YR 4/6 with gray (2.5Y 5/1) mottling, moist, medium stiff to very stiff.	
20						
		10.0			CLAY WITH SILT (CL), dark yellowish brown (10YR 4/6 with gray (2.5Y 5/1) strong brown (2.5YR 4/6), moist, stiff to very stiff to dark gray (5Y 4/1) with white mottling at 27.5'.	
25						
	28.0					
					CLAY WITH SILT (CL), very dark gray (5Y 3/1) with white mottling (5Y 8/1), medium stiff to stiff, moist, low plasticity.	
30						

UPRR RECOVERY FT, FREEMAN LOGS.GPJ, STOCK.GLB, 1/17/17

PROJECT NUMBER:	BORING NUMBER:
661508	SB-34 SHEET 2 OF 3

Soil Boring Log

PROJECT : UPRR Freeman, Freeman, WA | LOCATION : South of Grain Facility/Highway 27

GROUND ELEVATION : | DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.

COORDINATES: | DRILLING METHOD AND EQUIPMENT : Schramm T300 4" x 6", Sonic Rotary

WATER LEVEL : | START : 1/19/17 14:10 | END : 1/10/17 10:30 | LOGGER : L. Lubell | Reviewed By :

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS SAMPLE TYPE, AIR MONITORING, PID (ppm) SOIL GAS MONITORING, FID (ppm)
		10.0			CLAY WITH SILT (CL), very dark gray (5Y 3/1) with white mottling (5Y 8/1), medium stiff to stiff, moist, low plasticity.	
35					CLAY WITH SILT (CL), dark brown (10YR 3/2) with gray (2.5Y 5/1) , dark yellowish brown (10YR 4/4) mottling, moist, medium stiff, low plasticity.	
	38.0					
		10.0			CLAY (CL), light olive (10Y 5/4), moist, medium stiff, some silt.	
					SILT WITH CLAY (ML), grayish brown (2.5Y 5/2), wet, soft.	
40					CLAY WITH SILT (CL), light olive brown (2.5Y 5/3) with white mottling, moist, medium stiff to very stiff, low plasticity.	
45					CLAY WITH SILT (CL), gray (2.5Y 5/1), strong brown (2.5YR 4/6), moist, medium stiff to stiff, low plasticity.	
	48.0				CLAY (CL), very dark gray (5Y 3/1) with white mottling (5Y 8/1), medium stiff to stiff, moist, low plasticity.	
50		10.0			CLAY WITH SILT (CL), brown (10YR 4/3) with gray (2.5Y 5/1), moist, medium stiff, low plasticity, strong brown mottling (7.5YR 5/6).	
55					CLAY WITH SILT (CL), very dark gray (5Y 3/1), white (5Y 8/1) mottling, with dark red (2.5YR 3/6) veins, moist, stiff, low plasticity.	
	58.0					
60					CLAY WITH SILT (CL), very dark gray (5Y 3/1), white (5Y 8/1) mottling, with dark red (2.5YR 3/6) veins, moist, stiff, low plasticity.	

UPRR RECOVERY FT, FREEMAN LOGS.GPJ, STOCK.GLB, 1/17/17

PROJECT NUMBER:	BORING NUMBER:
661508	SB-34 SHEET 3 OF 3

Soil Boring Log

PROJECT : UPRR Freeman, Freeman, WA
LOCATION : South of Grain Facility/Highway 27
GROUND ELEVATION :
DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.
COORDINATES:
DRILLING METHOD AND EQUIPMENT : Schramm T300 4" x 6", Sonic Rotary
WATER LEVEL :
START : 1/19/17 14:10
END : 1/10/17 10:30
LOGGER : L. Lubell
Reviewed By :

DEPTH BELOW GROUND SURFACE (ft)	INTERVAL (ft)	RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS SAMPLE TYPE, AIR MONITORING, PID (ppm) SOIL GAS MONITORING, FID (ppm)
		6.1			CLAY (CL), dark bluish gray (5B 4/1), moist, stiff, low plasticity, trace white mottling.	
	63.0				CLAY (CL), very pale brown (10YR 7/3)/light gray (10YR 7/2), moist, very stiff, low plasticity, trace mica flakes, trace silt.	
65		5.0			CLAY (CL), reddish brown (2.5YR 4/4) with reddish yellow mottles (7.5YR 3/6), dry to moist, stiff, low plasticity, some mica flakes, trace silt/very fine sand.	
	68.0				CLAY (CL), reddish brown (2.5YR 4/4), thin laminated gray (2.5Y 5/1), dry, stiff, lots mica flakes 65.2 to 66', trace silt and very fine sand, (weathered sandstone?).	
70		10.0			SANDSTONE (SS), brownish yellow (10YR 6/8)/light gray (2.5Y 7/1) mottled, moist, medium dense, fine grained sand, little clay/silt.	
					SANDSTONE (SS), light gray (2.5Y 7/2), dry, dense, weathered sandstone, fine to very fine grained, few silt/clay.	
					CLAY (CL), dark brown (2.5Y 7/3), dry, very stiff, trace fine grained black fragments, silt, very weathered sandstone.	Very hard drilling
75					SANDSTONE (SS), gray (2.5Y 6/2) to light brownish gray (2.5Y 6/2), dry, medium dense, fine grained sand, silt, weakly cemented, trace mica flakes.	
	78.0					
					SANDSTONE (SS), gray (2.5Y 6/2) to light brownish gray (2.5Y 6/2), dry, medium dense, fine grained sand, silt, weakly cemented, trace mica flakes.	Very hard drilling
80		5.0			WEATHERED GRANITE, olive gray (5Y 5/2), moist, soft, very micaceous, stilty.	
	83.0					
					Boring terminated at 83 ft bgs.	
85						
90						

UPRR RECOVERY FT, FREEMAN LOGS.GPJ, STOCK.GLB, 1/17/17

PROJECT NUMBER:	BORING NUMBER:
661508	SB-35 SHEET 1 OF 3

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman
LOCATION : Freeman, WA

ELEVATION : 2619.34 ft mslft NAVD88 (ground surface)
DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.

COORDINATES : 210456.989, 2539724.01 (ft NAVD88)
DRILLING METHOD AND EQUIPMENT : Schramm T300M 4" x 6", Sonic Rotary

WATER LEVEL:
START : 1/12/17 15:23
END : 1/13/17 13:00
LOGGER : J. Nowinski

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
0.0					CLAY (CL), brown (7.5YR 4/3), moist to dry, stiff to very stiff, low to no plasticity, trace organic 0-1'.	
	3.5				NO RECOVERY.	
5						No 5' sample
8.0					CLAY (CL), brown (7.5YR 4/4), dry, very stiff, no plasticity.	
10						No 5' sample
	3.5				NO RECOVERY.	
15						
18.0					CLAY (CL), brown (7.5YR 4/4), moist, stiff, low plasticity.	
20					CLAY (CL), brown (7.5YR 4/4), dry, stiff, friable, no plasticity.	
	6.5				CLAY (CL), brown (7.5YR 4/4), dry, very stiff, no plasticity.	
25					NO RECOVERY.	25' sample collected at 24.5 ft
28.0					CLAY (CL), brown (7.5YR 4/4), dry to moist, stiff, low plasticity.	
30						

PROJECT NUMBER:	BORING NUMBER:
661508	SB-35 SHEET 2 OF 3

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman
LOCATION : Freeman, WA

ELEVATION : 2619.34 ft mslft NAVD88 (ground surface)
DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.

COORDINATES : 210456.989, 2539724.01 (ft NAVD88)
DRILLING METHOD AND EQUIPMENT : Schramm T300M 4" x 6", Sonic Rotary

WATER LEVEL:
START : 1/12/17 15:23
END : 1/13/17 13:00
LOGGER : J. Nowinski

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
35		10.0			CLAY (CL), brown (7.5YR 4/4), dry to moist, stiff, low plasticity.	
	38.0				CLAY (CL), orangish brown with pistachio green mottling, hard with low plasticity, some black coarse basalt, some fragments (angular), fibrous root ?? material near 37 1/2" sandy silt layer at 37.5 (0.7).	
40						
45		10.0			SILTY CLAY (CL), intermixed orangish brown and pistachio green with black layers, moist, moderate plasticity, bluish-gray sandy clay layers from 41-41.5' and 43-43.5', with thinner layers throughout interval.	
	48.0					
50					SILTY CLAY (CL), reddish brown, moist, firm, ~1" bluish gray sandy clay layers near 53', 56' and 57'.	
55		10.0				
	58.0					
60					CLAY (CL), brown with intermixed reddish-brown, bluish gray, orangish brown and dark brown intervals, moist, soft to firm, outside of core is wet - likely in water, some angular rock fragments near 79'.	

PROJECT NUMBER:	BORING NUMBER:
661508	SB-35 SHEET 3 OF 3

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman
LOCATION : Freeman, WA

ELEVATION : 2619.34 ft mslft NAVD88 (ground surface)
DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.

COORDINATES : 210456.989, 2539724.01 (ft NAVD88)
DRILLING METHOD AND EQUIPMENT : Schramm T300M 4" x 6", Sonic Rotary

WATER LEVEL:
START : 1/12/17 15:23
END : 1/13/17 13:00
LOGGER : J. Nowinski

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
65	10.0				CLAY (CL), brown with intermixed reddish-brown, bluish gray, orangish brown and dark brown intervals, moist, soft to firm, outside of core is wet - likely in water, some angular rock fragments near 79'.	
68.0						Hydropunch sample SB35-GW-69-70
70						
75	9.0					
78.0						
80	6.0					
					WEATHERED BASALT, basalt fragments in clay matrix, gray, wet.	
84.0					BASALT, black, competent.	
85					Bottom of borehole at 84 ft bgs.	
90						

PROJECT NUMBER:	BORING NUMBER:
661508	SB-36 SHEET 1 OF 2

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman
LOCATION : Freeman, WA

ELEVATION : 2624.25 ft mslft NAVD88 (ground surface)
DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 210458.906, 2539237.083 (ft NAVD88)
DRILLING METHOD AND EQUIPMENT : Schramm T300 4" x 6", Sonic Rotary

WATER LEVEL:
START : 1/11/17 08:45
END : 1/11/17 10:35
LOGGER : D. Lubell

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
0.0					CLAY WITH SILT (CL), black (7.5YR 2.5/1), moist, medium stiff, some fine subrounded gravels, trace organics.	
					CLAY (CL), brown (7.5YR 5/4), dry, very stiff, no plasticity, friable.	
5						
					NO RECOVERY.	
9.0						
10					CLAY WITH SILT (CL), dark brown (7.5YR 6/3), moist, soft, low plasticity.	
					CLAY (CL), brown (7.5YR 5/3), dry, very stiff, low plasticity, little quartz fragments, trace mica 18.5-19'.	
15						
19.0						
20					CLAY WITH SILT (CL), very dark gray (7.5YR 3/1), moist, medium stiff, low plasticity.	
					CLAY WITH SAND (CL), gray (2.5Y 6/1), moist, stiff, fine grained sand, micaceous, quartz fragments, low plasticity, weathered.	
25					CLAY (CL), dark greenish (5GY 5/1), dry, very stiff, iron oxidation mottling at 28-20' bgs.	
29.0						
30					CLAY (CL), greenish gray (5GY 5/1), dry, very stiff, little oxidation mottling, low plasticity.	

PROJECT NUMBER:	BORING NUMBER:
661508	SB-36 SHEET 2 OF 2

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman
LOCATION : Freeman, WA

ELEVATION : 2624.25 ft mslft NAVD88 (ground surface)
DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 210458.906, 2539237.083 (ft NAVD88)
DRILLING METHOD AND EQUIPMENT : Schramm T300 4" x 6", Sonic Rotary

WATER LEVEL:
START : 1/11/17 08:45 END : 1/11/17 10:35 LOGGER : D. Lubell

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
					CLAY (CL), greenish gray (5GY 5/1), dry, very stiff, little oxidation mottling, low plasticity.	
					CLAY (CL), greenish gray (10GY 5/1/), moist, medium stiff, trace silt, trace fine grained sand, low plasticity.	
35						
					CLAY WITH SILT (CL), yellowish red (5R 4/6), trace gray (2.5Y 6/1) mottling, dry, medium stiff, friable.	
	39.0					
40					CLAY (CL), brown (7.5YR 4/2), gray (5Y 5/1) mottling, moist, medium, low plasticity.	
					CLAY WITH SILT (CL), yellowish red (5YR 4/6), gray (5Y 5/1) mottling, moist, medium, low plasticity.	
45						
					CLAY (CL), very dark gray (10YR 3/1), dry, medium to stiff, friable, low to no plasticity, little iron oxidation.	
	48.0					
					SANDY CLAY (CL), interbedded layers of cementation (gray (2.5Y 5/1) iron oxidation, hard, with fine grained sand, clay.	48-52' - very hard drilling
50						
	52.0				CLAY (CL), basalt fragments interbedded, black.	
					Bottom of borehole at 52 ft bgs.	
55						
60						

PROJECT NUMBER:	BORING NUMBER:
661508	SB-37 SHEET 1 OF 3

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman
LOCATION : Freeman, WA

ELEVATION : 2623.48 ft mslft NAVD88 (ground surface)
DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.

COORDINATES : 210484.671, 2539486.189 (ft NAVD88)
DRILLING METHOD AND EQUIPMENT : Schramm T300M Rotodrill 4" x 6", Sonic Rotary

WATER LEVEL:
START : 1/11/17 14:43
END : 1/12/17 12:35
LOGGER :

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
0.0					CLAY (CL), dark brown (7.5YR 3/3), moist, stiff, trace organic roots 0-4", trace mica 0-3', low plasticity.	
5		5.2				
					NO RECOVERY.	
8.0						
					CLAY (CL) with Silt, dark brown (7.5YR 3/3), moist, stiff, trace organic root material, low plasticity.	
10					CLAY (CL), brown (7.5YR 4/3), dry, very stiff, no plasticity.	
		7.0				
15					NO RECOVERY.	
18.0						
					CLAY (CL), brown (7.5YR 4/3), moist to dry, medium stiff to very stiff, low to no plasticity, trace quartz fragments at 24.5-25', trace black fragments (soft) - manganese?.	
20						
		7.0				
25					NO RECOVERY.	
28.0						
		2.0			CLAY (CL), yellowish red (5YR 5/8) with bluish gray (5B 5/1), dry, very stiff, no plasticity.	
30						

PROJECT NUMBER:	BORING NUMBER:
661508	SB-37 SHEET 2 OF 3

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman
LOCATION : Freeman, WA

ELEVATION : 2623.48 ft mslft NAVD88 (ground surface)
DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.

COORDINATES : 210484.671, 2539486.189 (ft NAVD88)
DRILLING METHOD AND EQUIPMENT : Schramm T300M Rotodrill 4" x 6", Sonic Rotary

WATER LEVEL:
START : 1/11/17 14:43
END : 1/12/17 12:35
LOGGER :

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
	30.0				CLAY (CL), brown (7.5YR 4/3), moist, stiff, low plasticity.	
		8.0				
35					CLAY (CL) with Silt, yellowish red (5YR 5/8), very dry, very stiff, bluish gray mottling at 36.4-38'.	
	38.0					
		10.0			CLAY (CL) with Silt, dark yellowish brown (10YR 4/4), white (2.5Y 8/1) mottles, little iron oxidation, moist, soft to medium stiff, low plasticity.	
40						
45						
	48.0					
		10.0			CLAY (CL) with Silt, brown (10YR 4/3), white (2.5Y 8/1) mottling, black mottling, moist to dry, soft to stiff with depth, low plasticity.	
50						
55						
	58.0					
					CLAY (CL) with Silt, brown (10YR 4/3) with gray (5Y 5/1) mottles, moist, soft, low to medium plasticity.	Hard drilling at 58'
60						

PROJECT NUMBER:	BORING NUMBER:
661508	SB-37 SHEET 3 OF 3

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman
LOCATION : Freeman, WA

ELEVATION : 2623.48 ft mslft NAVD88 (ground surface)
DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.

COORDINATES : 210484.671, 2539486.189 (ft NAVD88)
DRILLING METHOD AND EQUIPMENT : Schramm T300M Rotodrill 4" x 6", Sonic Rotary

WATER LEVEL:
START : 1/11/17 14:43
END : 1/12/17 12:35
LOGGER :

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
65		10.0			CLAY (CL) with Silt, dark reddish brown (5YR 3/4) with gray (2.5Y 4/1), pale brown (2.5Y 8/2), black, yellow (5Y 7/6) mottling, moist, stiff, low plasticity oxidation.	
	68.0					
70					CLAY (CL), dark reddish brown (5YR 3/4), gray (2.5Y 4/1) mottling, wet, soft, low plasticity, trace silt.	
75		10.0			CLAY (CL), dark reddish brown (5YR 3/4) and gray (2.5Y 4/1) moist, stiff, low to no plasticity.	
	78.0					
80		1.5			CLAY (CL), very dark gray (7.5YR 3/1), dry to moist, very stiff, no plasticity. BASALT, black with yellow crystalline, competent, bedrock. NO RECOVERY.	Driller indicates part of sample fell out shoe while tripping out (~15 ft)
	81.0					
85					Bottom of borehole at 81 ft bgs.	
90						

PROJECT NUMBER:	BORING NUMBER:
661508	SB-40 SHEET 1 OF 4

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman
LOCATION : Freeman, WA

ELEVATION : 2580.41 ft mslft NAVD88 (ground surface)
DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.

COORDINATES : 210427.453, 2540100.558 (ft NAVD88)
DRILLING METHOD AND EQUIPMENT : Schramm T300 4" x 6", Sonic

WATER LEVEL:
START : 2/13/17 09:45
END : 2/13/17 13:45
LOGGER :

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION (SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY)	COMMENTS (DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION) PID (ppm) Breathing Zone FID (ppm)
0.0					GRAVEL (GC) WITH CLAY, dark gray (7.5YR 3/1), wet, loose, road bed.	
					LEAN CLAY (CL) WITH TRACE SILT, brown to strong brown (7.5YR 4/4 to 7.5YR 4/6), moist, soft, low plasticity.	
		6.0				
5					SILT (ML), strong brown (7.5YR 4/6), moist, cohesive, medium stiff, trace organic material.	
						10:00 - Collect SB40-SS-05
7.0					NO RECOVERY.	
					CLAY (CL), strong brown (7.5YR 4/6), wet, soft, low to medium plasticity.	
					- at 7.5' SAND (SP), wet, medium to coarse grained, quartzitic.	
					SILT (ML) WITH FINE SAND, yellowish-brown to light yellowish-brown (7.5YR 5/4 to 7.5YR 6/4), moist to dry, stiff.	
10						
						~10:10 - SB40-SS-10
		9.0				
15					WELL GRADED SAND (SW) WITH SILT AND CLAY, moist, variegated very dark gray (7.5YR 3/1) to very dark grayish-brown (7.5YR 3/3) with possible relic phenocrysts - yellow (7.5YR 7/6 to 7.5YR 8/6), clay also red to light red, fine grained material; with angular gravel-sized rock fragment (weathered basalt, possibly).	
						10:15 - SB40-SS-15
17.0					NO RECOVERY.	
					SILT (ML) with CLAY, moist to wet, soft, cohesive; variegated black (7.5YR 2.5/1) to yellowish-red (5YR 5/8) with relic phenocryst of light gray to white (10YR 7/2 to 10YR 8/1) clay.	
20						
						SB40-SS-20
		10.0				
					SILT (ML) with CLAY, moist, variegated gray (7.5YR 6/1) with yellow (2.5Y 7/6 to 2.5Y 8/6) velic phenocryst - clay rich.	
					SILT (ML) with CLAY, moist to wet, soft, cohesive; variegated black (7.5YR 2.5/1) to yellowish-red (5YR 5/8) with relic phenocryst of light gray to white (10YR 7/2 to 10YR 8/1) clay.	
25						
					SILT (ML) with CLAY, moist, variegated gray (7.5YR 6/1) with yellow (2.5Y 7/6 to 2.5Y 8/6) relic phenocryst - clay rich.	SB40-SS-25
27.0					SAND (SW), very dark gray (7.5YR 3/1), wet, loose; fine grained, clayey/silty; trace reddish-brown mottling; some very stiff/well indurated rock fragment (gravel-sized).	
					WEATHERED BASALT, dark gray to black (7.5YR 4/1 to 7.5YR 2.5/1), dry, hard to soft, with clay and silt; angular rock fragments up to several inches; trace olive yellow mottling (2.5Y 6/6 to 2.5Y 6/8.	
30						

PROJECT NUMBER:	BORING NUMBER:
661508	SB-40 SHEET 2 OF 4

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman
LOCATION : Freeman, WA

ELEVATION : 2580.41 ft mslft NAVD88 (ground surface)
DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.

COORDINATES : 210427.453, 2540100.558 (ft NAVD88)
DRILLING METHOD AND EQUIPMENT : Schramm T300 4" x 6", Sonic

WATER LEVEL:
START : 2/13/17 09:45
END : 2/13/17 13:45
LOGGER :

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
		9.5			WEATHERED BASALT, dark gray to black (7.5YR 4/1 to 7.5YR 2.5/1), dry, hard to soft, with clay and silt; angular rock fragments up to several inches; trace olive yellow mottling (2.5Y 6/6 to 2.5Y 6/8.	SB40-SS-30
35					SILT (ML), dark grayish-brown to olive brown (2.5Y 4/2) to (2.5Y 4/3), dry, hard; silt to gravel sized rock fragments; angular, trace reddish-brown mottling.	SB40-SS-35
	37.0				NO RECOVERY.	
					SILT (ML) WITH SAND AND GRAVEL very dark grayish-brown (2.5Y 3/2), moist to wet, loose to cohesive silt; angular rock fragment up to 1-2".	
40					SILT (ML) with CLAY, moist, variegated very dark gray (2.5Y 3/1) to strong brown (7.5YR 4/6) to yellow (5Y 7/6) clay rich relic phenocryst.	SB40-SS-40
					SILT (ML) WITH SAND, gray (5Y 5/1) with olive (10Y 4/4). - coarse sand sized grains at 43';.	
45					- dark yellowish-brown (10YR 4/6) laminae from 45-47', wet, slightly cohesive.	SB40-SS-45 TMS/MSD
	47.0				SILT (ML) WITH SAND, gray (5Y 5/1) with olive (10Y 4/4).	
					SILT (ML), clayey, dark gray (2.5Y 4/1) to dark grayish-brown (2.5Y 4/2), moist, soft. - some yellow mottling at 49'.	
50						SB40-SS-50
		10.0			SILT (ML), dark brown to strong brown (7.5YR 3/4) to (7.5YR 4/6), moist, cohesive.	
					SILT (ML) WITH SAND AND CLAY, dark gray (7.5Y 4/1) with some yellowish-brown (10YR 5/8) mottling and relic-like clay to silty phenocysts, some very stiff/well indurated weathered basaltic rock fragments.	
55						SB40-SS-55
	57.0					
					SILT (ML) WITH FINE SAND (SW), gray to dark gray (5Y 5/1 to 5Y 4/1); moist, cohesive, soft to stiff; rare white mottled veins. - mottling at 58' yellow (5Y 7/6 to 5Y 7/8) and strong brown (7.5YR 5/8);.	
60						

PROJECT NUMBER:	BORING NUMBER:
661508	SB-40 SHEET 3 OF 4

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman
LOCATION : Freeman, WA

ELEVATION : 2580.41 ft mslft NAVD88 (ground surface)
DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.

COORDINATES : 210427.453, 2540100.558 (ft NAVD88)
DRILLING METHOD AND EQUIPMENT : Schramm T300 4" x 6", Sonic

WATER LEVEL:
START : 2/13/17 09:45
END : 2/13/17 13:45
LOGGER :

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
		10.0			SILT (ML) WITH FINE SAND (SW), gray to dark gray (5Y 5/1 to 5Y 4/1); moist, cohesive, soft to stiff; rare white mottled veins.	SB40-SS-60 and field duplicate
65					- light olive (10Y 5/4) mottling at ~64' (stiff clay).	relic - ?? mineralization (?)
	67.0				WELL GRADED SAND (SW-SM), dark grayish-brown to olive brown (2.5Y 4/2) to (2.5Y 4/3), moist, loose to moderately cohesive, very fine grained, silty to clayey.	SB40-SS-65
					SILT (ML) WITH FINE SAND (SW), gray to dark gray (5Y 5/1 to 5Y 4/1); moist, cohesive, soft to stiff; rare white mottled veins.	
70		10.0			LEAN CLAY (CL), white to light gray (2.5Y 8/1) to (2.5Y 7/1), moist, very stiff to hard, some mottling to brownish-yellow to yellowish-brown (10YR 6/8) to (10YR 5/8).	SB40-SS-70
75					SILTY TO SANDY CLAY (CL)/CLAYEY/SILTY SAND (SC-SW), white (N8); moist, very stiff to hard, some strong brown (7.5YR 5/8) to pale yellow brown (10YR 5/8) mottling; very fine grained sand; quartzitic.	SB40-SS-75
	77.0				SILTY TO SANDY CLAY (CL)/CLAYEY/SILTY SAND (SC-SW), white (N8); moist, very stiff to hard, some strong brown (7.5YR 5/8) to pale yellow brown (10YR 5/8) mottling; very fine grained sand; quartzitic.	
80		10.0			SILT (ML) with CLAY, white (N8), laminated brownish-yellow to yellow (10YR 6/8 to 10YR 7/8), moist, very stiff to hard, laminae more abundant with depth, becoming more yellowish with depth and clay-rich.	SB40-SS-80
85					CLAY (CL) WITH SOME SILT/FINE SAND, reddish-yellow (7.5YR 6/8), dry to slightly moist, becoming mottled white with depth.	SB40-SS-85
	87.0				SILTY TO CLAYEY SAND (SM-SC), variegated reddish yellow (7.5YR 7/0) to pinkish gray (7.5YR 7/2), moist, cohesive, fine to coarse-grained quartz muscovite, weathered feldspar (weathered granite).	
90					SILTY TO CLAYEY SAND (SM-SC), variegated reddish yellow (7.5YR 7/0) to pinkish gray (7.5YR 7/2), moist, cohesive, fine to coarse-grained quartz muscovite, weathered feldspar	

PROJECT NUMBER:	BORING NUMBER:
661508	SB-40 SHEET 4 OF 4

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman
LOCATION : Freeman, WA

ELEVATION : 2580.41 ft mslft NAVD88 (ground surface)
DRILLING CONTRACTOR : Enviornmental West Exploration, Inc.

COORDINATES : 210427.453, 2540100.558 (ft NAVD88)
DRILLING METHOD AND EQUIPMENT : Schramm T300 4" x 6", Sonic

WATER LEVEL:
START : 2/13/17 09:45
END : 2/13/17 13:45
LOGGER :

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
					(weathered granite).	
		8.5			WELL GRADED SAND WITH CLAY (SW-SC), variegated white to pink (5YR 8/1 to 5YR 7/3), moist, clay to medium sand sized grains, quartzitic, abundant muscovite, weathered (clayey) feldspar.	SB40-SS-90
95					CLAY (CL) WITH SOME SILT/FINE SAND, reddish-yellow (7.5YR 6/8), dry to slightly moist, becoming mottled white with depth.	
	97.0				NO RECOVERY.	SB40-SS-95
					Bottom of borehole at 97 ft bgs.	
100						
105						
110						
115						
120						

PROJECT NUMBER:	BORING NUMBER:
661508	SB-43 SHEET 1 OF 2

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman
LOCATION : Freeman, WA

ELEVATION : 2553.77 ft mslft NAVD88 (ground surface)
DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 209040.988, 2539568.883 (ft NAVD88)
DRILLING METHOD AND EQUIPMENT : Mobile B-90 Air Rotary, 6"

WATER LEVEL:
START : 1/20/17 13:00
END :
LOGGER : R. McComb

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
0.0					LEAN CLAY (CL), dark grayish-brown (10YR 4/2), moist, soft, low to moderate plasticity with trace silt; with some rootlets, trace mica.	Breathing Zone = 0 ppm VOCs Fluctuates from 0.1'
5 5.0					LEAN CLAY (CL), very dark gray (10YR 3/1) to very dark grayish-brown (10YR 3/2), moist, soft; moderate plasticity, trace mica.	1315 - 5' bgs
10 10.0					LEAN CLAY (CL), dark grayish (2.5Y 4/1), moist, low to medium plasticity, soft.	1332 at 16' - no water drilling with no water being used Hard drilling at 10-11'
					LEAN CLAY (CL), as 10-13' with few little light gray (2.5Y 7/1) angular lithic fragments.	
15 15.0					LEAN CLAY (CL), with some very dark angular to saturated little fragments (weathered basalt?) with minor iron oxide coating.	1345 at 15' 13-15' - rapid drops in drilling, water absent
20 20.0					BASALT, black (2.5Y 2.5/1), hard, fragment silt - 1/8", angular, with trace reddish-brown oxidation, weak lithic fragments.	
					WEATHERED AND COMPETENT BASALT WITH LEAN CLAY, black (2.5Y 2.5/1) basalt with dense dark grayish-brown (2.5Y 4/2) lean clay and few oxidized (reddish brown) lithic fragments.	1400 - 20' Borehole still void of water at 20'
25 25.0					COMPETENT BASALT, black (N1) angular lithic fragments, very fine silt to ~1/2" in grain size.	
30						

PROJECT NUMBER:	BORING NUMBER:
661508	SB-43 SHEET 2 OF 2

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman
LOCATION : Freeman, WA

ELEVATION : 2553.77 ft mslft NAVD88 (ground surface)
DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : 209040.988, 2539568.883 (ft NAVD88)
DRILLING METHOD AND EQUIPMENT : Mobile B-90 Air Rotary, 6"

WATER LEVEL:
START : 1/20/17 13:00
END :
LOGGER : R. McComb

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
	30.0				COMPETENT BASALT, black (N1) angular lithic fragments, very fine silt to ~1/2" in grain size.	MW17D-25-01127 - Collected 8260 Driller noted trace water while drilling 20-25' 1415 - 25' Measured ~0.5' of water during connection of drill rods Collected GRAB GW sample at 1445 25' - Switched to open borehole drilling @1452 - resume drilling, very little water blown from borehole, blow day and resume advancing borehole
35	35.0				BASALT WITH LEAN CLAY, clay is olive brown (2.5Y 4/3), soft, wet.	Abundant water encountered at 37' bgs, driller noted ~1/2' drip in rods associated with water production
40	40.0				Bottom of borehole at 40 ft bgs.	Artesian conditions noted upon arrival at MW-17D on 1/13/17 Flow at surface estimated at < 1 gpm
45						
50						
55						
60						

JACOBS

PROJECT NUMBER:	BORING NUMBER:	
661508	SB-44	SHEET 1 OF 3

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Freeman, WA

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Sonic

WATER LEVELS : --- START : 4/7/2017 END : 4/7/2017 LOGGER : R. McComb

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
0	0.0	5.5	SB44-SS-05 at 9:10	**Silt (ML)** 0.0 - 7.0' - brown (7.5 YR 5/4) to strong brown (7.5 YR 5/8), moist, grading from soft to stiff with depth			
5	**7.0**						
		5.0	SB44-SS-10 at 9:20	**Silty Clay (CL)** 7.0 - 9.0' - brown (7.5 YR 4/4), moist to wet, soft, some gravel **Sandy Silt (ML)** 9.0 - 10.5' - strong brown (7.5 YR 5/6) to reddish yellow (7.5 YR 6/6), dry, very stiff **Clay (CL) with Silt (ML)** 10.5 - 12.0' - strong brown (7.5 YR 4/6), dry, very stiff, dense with trace sand			
10	**12.0**						
		3.0		**Clay (CL)** 12.0 - 13.0' - yellowish red to dark yellowish brown (5 YR 4/6 to 3/4), moist, soft to medium **Gravel with Silt and Sand (GW)** 13.0 - 13.5' - gray (5 YR 5/1 to 6/1), loose to dense, gravel up to 1"			
15	15.0		SB44-SS-15 at 9:30				
		0.7		**Silt (ML) to Clay (CL)** 13.5 - 15.0' - gray (7.5 YR 5/1) becoming mottled strong brown (7.5 YR 3/8), dry, very dense to hard			
	17.0			**Silt (ML)** 15.0 - 17.0' - mottled gray (7.5 YR 5/1) becoming red (2.5 YR 4/8) at 16', dry, stiff to hard but brittle **Silt (ML)** 17.0 - 20.0' - red (2.5 YR 4/8), dry, cohesive/medium dense, trace fine sand and gray mottling			
20			SB44-SS-20 at 9:40	**Clay (CL)** 20.0 - 21.5' - gray (N5), slightly moist, soft to medium dense, some red mottling, trace silt, fine sand			
		10.0		**Silt (ML)** 21.5 - 27.0' - strong brown (7.5 YR 5/6), medium dense, slightly cohesive			
25			SB44-SS-25 at 9:45				
	27.0			**Silt (ML)** 27.0 - 30.5' - strong brown (10 YR 4/6), moist, soft, trace fine sand			
30							

JACOBS

PROJECT NUMBER:	BORING NUMBER:	
661508	SB-44	SHEET 2 OF 3

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Freeman, WA

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Sonic

WATER LEVELS : --- START : 4/7/2017 END : 4/7/2017 LOGGER : R. McComb

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
35		10.0	SB44-SS-30 at 10:05	**Silt (ML)** 30.5 - 37.0' - dark brown (7.5 YR 3/3) to very dark gray (7.5 YR 4/1), dry to very slightly moist, cohesive, soft to medium dense			
			SB44-SS-35 at 10:10				
	37.0						
40		5.5	SB44-SS-40 at 10:25	**Clay (CL)** 37.0 - 41.5' - strong brown (7.5 YR 5/6), moist, soft with trace silt			
				Well-Graded Sand with Silt (SW) 41.5 - 43.0' - brown (5 Y 4/6) to (5 YR 3/4), very moist to slightly wet, soft, slightly cohesive			
45			SB44-SS-45 at 10:30	**Well-Graded Sand with Silt (SW)** 43.0 - 47.0' - moist to dry, slightly cohesive to loose, little moisture			
	47.0						
50		10.0	SB44-SS-50 at 10:45	**Silt (ML)** 47.0 - 49.0' - strong brown (7.5 YR 5/6) to gray (7.5 YR 5/1), moist, cohesive, soft, some clay			
				Silt (ML) 49.0 - 56.5' - dark gray (7.5 YR 4/1), moist to wet at 55', cohesive, soft, some very fine sand			
55			SB44-SS-55 at 10:50				
	57.0			**Silt (ML)** 56.5 - 57.0' - strong brown (7.5 YR 5/8) to brown (2.5 Y 5/4), moist, cohesive, soft			
60				**Silt (ML)** 57.0 - 58.5' - dark gray (7.5 YR 4/1) to dark brown (7.5 YR 3/2), moist, cohesive, soft, trace angular gravel			

JACOBS

PROJECT NUMBER:	BORING NUMBER:	
661508	SB-44	SHEET 3 OF 3

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Freeman, WA

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Sonic

WATER LEVELS : --- START : 4/7/2017 END : 4/7/2017 LOGGER : R. McComb

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
		10.0	SB44-SS-60 at 11:15	**Silt (ML)** 58.5 - 63.0' - mottled yellowish brown (10 YR 5/8) to pale yellow (5 Y 8/3 to 8/4), moist, soft, very fine sand			
				Silt (ML) 63.0 - 64.5' - red (2.5 YR 4/6 to 2.5 YR 4/8), dry to moist, slightly cohesive, some black clay			
65			SB44-SS-65 at 11:20	**Silt (ML)** 64.5 - 67.0' - strong brown (7.5 YR 4/6) to very dark gray (7.5 YR 3/1) grading to brown (7.5 YR 5/2), dry to slightly moist, slightly cohesive, with poorly indurated/very stiff angular rock fragments			
	67.0						
				Silt (ML) 67.0 - 71.5' - gray (2.5 Y 5/1) with dark yellowish brown mottling (10 YR 3/4 to 10 YR 3/6) and yellow (10 YR 7/6), moist, cohesive, trace weathered gravel			
70		7.0	SB44-SS-70 at 11:50				
				Well-Graded Gravel (GW) 71.5 -74.0' - very dark gray (10 YR 3/1) to brownish gray (10 YR 6/2), dry, loose, silt and sand sized weathered rock fragments, angular 2-3" gravel			
			SB44-SS-73 at 11:55				
	74.0						
75				Bottom of Boring at 74.0 ft bgs on 4/7/2017			
80							
85							
90							

PROJECT NUMBER:	BORING NUMBER:
661508	SB-101B SHEET 1 OF 2

SOIL BORING LOG

PROJECT : UPRR Freeman, Freeman, Washington | LOCATION : Freeman, WA

ELEVATION : | DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : (ft NAVD88) | DRILLING METHOD AND EQUIPMENT : Sonic, 4" diameter

WATER LEVEL: | START : 1/23/2018 | END : 1/23/2018 | LOGGER : JE/JU

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
0.0					ASPHALT.	
					GRAVEL FILL.	
		100.0			CLAY, brown, soft, medium plasticity, dry.	
5 5.0						Vapor screen set at 5'
					CLAY, brown, soft, medium plasticity, dry.	
		100.0			CLAY, brown, stiff, low plasticity, dry.	
10 10.0						
		100.0			CLAY, brown, stiff, low plasticity, dry.	
					CLAY, brown, soft, high plasticity, dry.	
15 15.0					CLAY, brown, stiff, low plasticity, dry.	Vapor screen set at 15'
					CLAY, tan, stiff, high plasticity, orange mottling, dry.	
		100.0			CLAY, brown, stiff, medium plasticity, dry.	
20 20.0					CLAY, tan, very soft, high plasticity, trace silt, moist.	
		100.0			CLAY, red/orange, oxidation and reducing zones, stiff, high plasticity, dry.	
25 25.0						
					CLAY, red/orange, oxidation and reducing zones, stiff, high plasticity, dry.	Vapor screen set at 25'
		100.0			CLAY, red/orange, oxidation and reducing zones, stiff, very soft form 30-37', high plasticity, dry.	
30						

PROJECT NUMBER:	BORING NUMBER:
661508	SB-101B SHEET 2 OF 2

SOIL BORING LOG

PROJECT : UPRR Freeman, Freeman, Washington | LOCATION : Freeman, WA

ELEVATION : | DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : (ft NAVD88) | DRILLING METHOD AND EQUIPMENT : Sonic, 4" diameter

WATER LEVEL: | START : 1/23/2018 | END : 1/23/2018 | LOGGER : JE/JU

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
30.0					CLAY, red/orange, oxidation and reducing zones, stiff, very soft form 30-37', high plasticity, dry.	Vapor screen set at 30'
		100.0				
35 35.0						Vapor screen set at 34'
		100.0				DTW in 8s = 37.19 Water in SV-101B at 17' bgs, will call Steve to discuss (17.36'), will step over 2' and drill 101C
37.0					Boring terminated at 37 ft bgs.	
40						
45						
50						
55						
60						

PROJECT NUMBER:	BORING NUMBER:
661508	SB-102B SHEET 1 OF 1

SOIL BORING LOG

PROJECT : UPRR Freeman, Freeman, Washington | LOCATION : Freeman, WA

ELEVATION : | DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : (ft NAVD88) | DRILLING METHOD AND EQUIPMENT : Sonic, 4" diameter

WATER LEVEL: | START : 1/24/2018 | END : 1/24/2018 | LOGGER : JE/JU

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
0.0					ASPHALT.	
					GRAVEL FILL.	
		100.0			CLAY, brown, stiff, low plasticity, dry.	
5	5.0				CLAY, tan, stiff, medium plasticity, dry.	Geotech sample collected 5-10' Vapor screen set at 5'
		100.0			CLAY, tan, stiff, medium plasticity, dry.	
10	10.0					
		100.0			CLAY, red/tan, medium dense, little to no plasticity, dry.	
15	15.0					Vapor screen set at 15'
		100.0				
20	20.0					
		100.0				Shelby tube at 22.5'-24.5'
25	25.0					Vapor screen set at 24'
		100.0			CLAY, brown, no plasticity, dry, oxidizing/reducing zones, some silt.	Geotech sample collected 25-30'
30	30.0				CLAY, tan, no plasticity, soft, saturated.	

Boring terminated at 30 ft bgs.

PROJECT NUMBER:	BORING NUMBER:
661508	SB-103B SHEET 1 OF 1

SOIL BORING LOG

PROJECT : UPRR Freeman, Freeman, Washington | LOCATION : Freeman, WA

ELEVATION : | DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : (ft NAVD88) | DRILLING METHOD AND EQUIPMENT : Sonic, 11" diameter

WATER LEVEL: | START : 1/25/2018 | END : 1/25/2018 | LOGGER : JE/JU

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
0.0					GRAVEL FILL.	
		100.0			CLAY, brown, stiff, medium plasticity, dry.	
5 5.0						Geotech sample collected 5-10' Vapor screen set at 5'
		100.0			CLAY, brown, stiff, medium plasticity, dry, cobbles at 12', weathered, rounded.	
10 10.0						
		100.0			CLAY, tan, very soft, no plasticity, trace silt, saturated, oxidizing/reducing zones.	
15 15.0						Vapor screen set at 15'
		100.0			CLAY, tan, soft, high plasticity, moist, some gravel at 22'.	
20 20.0						
		80.0			NO RECOVERY.	Vapor screen set at 22' Geotech sample collected 22-27' Shelby tube at 22-24'
25 25.0					SANDY CLAY, tan, no plasticity, very soft, fine to medium sand, some silt, saturated.	
					CLAY, soft, brown, medium plasticity, weathered zones, white to orange in color, approximately 2-3" in size.	
					Boring terminated at 27 ft bgs.	
30						

PROJECT NUMBER:	BORING NUMBER:
661508	SB-104B SHEET 1 OF 1

SOIL BORING LOG

PROJECT : UPRR Freeman, Freeman, Washington | LOCATION : Freeman, WA

ELEVATION : | DRILLING CONTRACTOR : Environmental West Exploration, Inc

COORDINATES : (ft NAVD88) | DRILLING METHOD AND EQUIPMENT : Sonic, 4" diameter

WATER LEVEL: | START : 1/25/2018 | END : 1/25/2018 | LOGGER : JE/JU

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	#TYPE	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION PID (ppm) Breathing Zone FID (ppm)
0.0					GRAVEL FILL.	
					CLAY, brown, stiff, medium plasticity, dry.	
		100.0				
					CLAY, brown, very stiff, high plasticity, dry.	
5 5.0						Geotech sample collected 5-10' Vapor screen set at 5'
		100.0			CLAY, brown, medium dense, medium plasticity, gravel lense at approximately 8', 2=3" in length.	
10 10.0					CLAY, very stiff, brown, medium plasticity, cobble at 14' approximately 13-14' in length.	
		100.0				
15 15.0					CLAY, very stiff, brown, medium plasticity, cobble at 14' approximately 13-14' in length, some gravel.	
					CLAY, very soft, tan, no plasticity, some gravel, wet.	Vapor screen set at 15'
		100.0			CLAY, soft, brown, weathered oxidized zones, medium plasticity, wet, trace fines.	
20 20.0						
					CLAY, soft, brown, weathered oxidized zones, medium plasticity, wet, trace fines, some gravel.	
		100.0				Geotech sample collected 22-27' Vapor screen set at 22' Shelby tube at 22-24'
25 25.0						
27.0		100.0				
					Boring terminated at 27 ft bgs.	
30						

PROJECT NUMBER:	BORING NUMBER:	
661508	SB-201	SHEET 1 OF 1

JACOBS™

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Freeman, WA

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Sonic

WATER LEVELS : --- START : 12/13/2018 END : 12/13/2018 LOGGER : JE

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
				GRAVEL (GW) 0.0 - 0.5' - Access road			
				GRAVEL (GW) 0.5 - 6.0' - brown/black, dry, some medium/fine sand, some cobbles, low recovery			
5			SB201-S-5'				
				CLAY (CL) 6.0 - 7.0' - brown, dry, medium density, plastic			
				CLAY (CL) 7.0 - 15.0' - brown, dry, hard, plastic, mottled at 13.0'			
10							
15			SB201-S-15' MS/MSD	**CLAY (CL)** 15.0 - 17.0' - brown, moist, soft, plastic, mottled			
				Bottom of Boring at 17.0 ft bgs on 12/13/2018			
20							
25							
30							

PROJECT NUMBER:	BORING NUMBER:	
661508	SB-202	SHEET 1 OF 1

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Freeman, WA

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Sonic

WATER LEVELS : --- START : 12/13/2018 END : 12/13/2018 LOGGER : JE

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
				GRAVEL 0.0 - 0.5' - Access road			
				CLAY (CL) 0.5 - 3.0' - brown, very stiff, brittle, non-plastic			
				SAND with Clay (SC) 3.0 - 5.0' - brown, dry, medium /fine sand, some hard clay			
5			SB202-S-5'	**CLAY with Sand (CL)** 5.0 - 7.0' - brown, dry, stiff/medium density, nonplastic, some medium/fine sand			
				CLAY (CL) 7.0 - 13.0' - brown, dry, medium density, plastic			
10							
				CLAY (CL) 13.0 - 14.0' - brown, wet, very soft, plastic			
15			SB202-S-15'	**CLAY (CL)** 14.0 - 17.0' - brown, medium density, medium plasticity, red/tan silt inclusions			
				Bottom of Boring at 17.0 ft bgs on 12/13/2018			
20							
25							
30							

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PROJECT NUMBER:	BORING NUMBER:	
661508	SB-203	SHEET 1 OF 1

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Freeman, WA

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Sonic

WATER LEVELS : --- START : 12/13/2018 END : 12/13/2018 LOGGER : JE

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
				GRAVEL (GW) 0.0 - 0.5' - Access road			
				CLAY (CL) 0.5 - 1.0' - brown, dry, medium density, plastic			
				SILT (ML) 1.0 - 6.0' - tan, dry, some clay, low recovery			
5			SB203-S-5'				
				CLAY (CL) 6.0 - 7.0' - brown, very stiff			
				CLAY (CL) 7.0 - 8.0' - brown, moist, very soft, silt lense at 8.5 - 9.0'			
				CLAY (CL) 8.0 - 11.0' - brown, moist, very stiff			
10							
				CLAY (CL) 11.0 - 13.0' - brown, wet, very soft, some sand, plastic			
				CLAY (CL) 13.0 - 17.0' - brown, medium density, medium plasticity, red/tan silt inclusions			
15			SB203-S-15'				
				Bottom of Boring at 17.0 ft bgs on 12/13/2018			
20							
25							
30							

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PROJECT NUMBER:	BORING NUMBER:	
661508	SB-204	SHEET 1 OF 1

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Freeman, WA

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Sonic

WATER LEVELS : --- START : 12/13/2018 END : 12/13/2018 LOGGER : JE

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
0				**GRAVEL (GW)** 0.0 - 0.5' - Access road			
				CLAY (CL) 0.5 - 4.0' - brown, dry, soft, plastic			
5			SB204-S-5'	**CLAY (CL)** 4.0 - 9.0' - brown, dry, medium/hard, plastic			
10				**Sandy CLAY (CL)** 9.0 - 15.0' - brown, hard, mottled, medium/fine sand			
15			SB204-S-15', SB204-S-FD	**CLAY (CL)** 15.0 - 17.0' - brown, medium density, medium plasticity, red/tan silt inclusions			
				Bottom of Boring at 17.0 ft bgs on 12/13/2018			
20							
25							
30							

JACOBS™

PROJECT NUMBER:	BORING NUMBER:	
661508	SB-205	SHEET 1 OF 1

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Freeman, WA

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : Sonic

WATER LEVELS : --- START : 12/13/2018 END : 12/13/2018 LOGGER : JE

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
0				**CLAY (CL)** 0.0 - 3.0' - brown, very soft, plastic, lots of wood debris			
				CLAY (CL) 3.0 - 6.0' - brown, dry, medium density, plastic			
5			SB205-S-5'				
				CLAY (CL) 6.0 - 15.0' - brown, dry, hard, plastic			
10							
15			SB205-S-15'	**CLAY (CL)** 15.0 - 16.0' - brown, very soft, mottled, some med/fine sand			
				CLAY with Sand (CL) 16.0 - 17.0' - brown, dry, very soft, mottled, medium/fine sand			
				Bottom of Boring at 17.0 ft bgs on 12/13/2018			
20							
25							
30							

JACOBS

PROJECT NUMBER:	BORING NUMBER:	
661508	SB-206	SHEET 1 OF 3

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Near MW-14D

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : 4" diameter, Sonic

WATER LEVELS : --- START : 6/19/19 09:30 END : 6/19/19 14:30 LOGGER : JE/KS

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
0	0.0			GRAVEL, tan, dry, some fine to medium sand			
				CLAY, brown, dry, soft, medium to low plasticity			
		5.0					
5			SB206-5' at 9:40				
	7.0						
				CLAY, brown, dry, soft, medium to low plasticity			
10			SB206-10' at 9:50				
				GRAVEL, gray, dry, some fine to medium sand			
				CLAY, brown, wet at 17', soft to very soft, medium plasticity, trace silt, mottled (weathered basalt)			
		3.0					
15			SB206-15' at 10:00				
	17.0						
				CLAY, brown, wet, soft, medium plasticity, trace silt, mottled (weathered basalt)			
20			SB206-20' at 10:15				
		10.0					
25			SB206-25' at 10:20				
	27.0						
				CLAY, gray, wet, medium plasticity, some silt, green silt nodules from 33.5' to 34', mottled			
30							

JACOBS

PROJECT NUMBER:	BORING NUMBER:	
661508	SB-206	SHEET 2 OF 3

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Near MW-14D

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : 4" diameter, Sonic

WATER LEVELS : --- START : 6/19/19 09:30 END : 6/19/19 14:30 LOGGER : JE/KS

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
35		10.0	SB206-30' at 10:35				
			SB206-35' at 10:45				
	37.0						
				CLAY, gray, wet, medium plasticity, trace silt, mottled			
40			SB206-40' at 11:15				
		10.0					
45			SB206-45' at 11:25				
	47.0						
				SILT, gray/brown, wet, noncohesive, trace to few low plasticity clay			
50			SB206-50' at 11:45				
		10.0					
55			SB206-55' at 12:10				
	57.0						
				SILT, gray/brown, wet, noncohesive, trace to few low plasticity clay			
60							

JACOBS

PROJECT NUMBER:	BORING NUMBER:	
661508	SB-206	SHEET 3 OF 3

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Near MW-14D

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : 4" diameter, Sonic

WATER LEVELS : --- START : 6/19/19 09:30 END : 6/19/19 14:30 LOGGER : JE/KS

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
65		10.0	SB206-60' at 12:40				
			SB206-65' at 12:45				
	67.0			SILT, gray/brown, wet, noncohesive, trace to few low plasticity clay			
70			SB206-70' at 14:00	CLAY, white, wet, medium plasticity, few silt, quartz and muscovite present from 75' to 77'			
		10.0					
75	77.0		SB206-77' at 14:05	Bottom of Boring at 77.0 ft bgs on 6/19/19 14:30			At 77' - GSA Sample
80							
85							
90							

PROJECT NUMBER:	BORING NUMBER:	
661508	SB-207	SHEET 1 OF 3

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Near the bus barn

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : 4" diameter, Sonic

WATER LEVELS : --- START : 6/21/19 09:00 END : 6/21/19 12:30 LOGGER : JE/KS

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
0.0				GRASS/TOPSOIL, some gravel			
				CLAY, brown, dry, soft, low plasticity, trace silt			
		2.0		CLAY, brown, dry, soft, medium plasticity			
5			SB207-5' at 9:10				
7.0							
10			SB207-10' at 9:20	CLAY, brown, dry, medium dense, medium plasticity			
		8.0					
15			SB207-15' at 9:25				
17.0							
				CLAY, brown, dry, very soft, low to no plasticity, trace to little silt			
20			SB207-20' at 9:30	CLAY, brown, dry, stiff, medium to high plasticity			
		10.0					
25			SB207-25' at 9:35				
27.0							
				CLAY, brown, dry, soft, medium plasticity			
30							

JACOBS

PROJECT NUMBER:	BORING NUMBER:	
661508	SB-207	SHEET 2 OF 3

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Near the bus barn

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : 4" diameter, Sonic

WATER LEVELS : --- START : 6/21/19 09:00 END : 6/21/19 12:30 LOGGER : JE/KS

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
35		10.0	SB207-30' at 9:55	CLAY, brown, dry, high plasticity, mottled with gray or white			
			SB207-35' at 10:00				
	37.0						
40		10.0	SB207-40' at 10:20	CLAY, brown, dry, soft, high plasticity			
45			SB207-45' at 10:30	CLAY, reddish brown, dry, stiff, low plasticity			
	47.0			CLAY, reddish brown, moist, stiff, low plasticity, increasing silt content			
50		10.0	SB207-50' at 10:45				
55			SB207-55' at 10:55				
	57.0						
60				SILT, gray with reddish brown, moist, noncohesive, few clay, wet clay seam at 69' to 69.5'			

PROJECT NUMBER:	BORING NUMBER:	
661508	SB-207	SHEET 3 OF 3

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Near the bus barn

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : 4" diameter, Sonic

WATER LEVELS : --- START : 6/21/19 09:00 END : 6/21/19 12:30 LOGGER : JE/KS

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
65		10.0	SB207-60' at 11:35				At 62' - GSA sample
			SB207-65' at 11:45				
	67.0						At 67' - GSA sample
70			SB207-70' at 12:00				
		10.0					At 71' - GSA Sample
75			SB207-75' at 12:10				
	77.0			CLAY with BASALT, brown, moist, very soft, some silt, weathered basalt			At 76' - GSA Sample
				Bottom of Boring at 77.0 ft bgs on 6/21/19 12:30			
80							
85							
90							

PROJECT NUMBER:	BORING NUMBER:	
661508	SB-208	SHEET 1 OF 4

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Near Marlow #2

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : 4" diameter, Sonic

WATER LEVELS : --- START : 6/20/19 09:00 END : 6/20/19 14:30 LOGGER : JE/KS

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
0.0				GRAVEL			
				CLAY, brown, dry, medium dense, low plasticity			
				CLAY, brown, dry, hard, low plasticity			
		5.0					
5			SB208-5' at 9:10				
8.0				CLAY, brown, dry, hard, low plasticity			
10			SB208-10' at 9:35				
		10.0					
15			SB208-15' at 9:45				
18.0				CLAY, brown, dry, hard, low plasticity			
20			SB208-20' at 10:00				
		10.0					
25			SB208-25' at 10:05				
28.0				CLAY, brown, dry, hard, low plasticity			
30				CLAY, reddish brown, moist, stiff, medium to high plasticity			

PROJECT NUMBER:	BORING NUMBER:	
661508	SB-208	SHEET 2 OF 4

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Near Marlow #2

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : 4" diameter, Sonic

WATER LEVELS : --- START : 6/20/19 09:00 END : 6/20/19 14:30 LOGGER : JE/KS

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
			SB208-30' at 10:30				
		10.0		CLAY, reddish brown, moist, medium dense, low plasticity, trace to few silt			
35			SB208-35' at 10:55				
				CLAY, brown, moist, soft, high plasticity, mottled			
	38.0						
40			SB208-40' at 11:05	CLAY, brown, moist, soft, medium to low plasticity, mottled, trace to few silt			
		10.0					
45			SB208-45' at 11:10				
	48.0						
50			SB208-50' at 11:35	CLAY, brown, moist, very soft, high plasticity, some gravel			
		10.0		CLAY, brown, moist, medium dense, low plasticity, mottled, trace to few silt			
55			SB208-55' at 11:45				
	58.0						
				CLAY, brown, wet, very soft, plastic, trace to few sand, dry above and below interval			
60							

JACOBS

PROJECT NUMBER:	BORING NUMBER:	
661508	SB-208	SHEET 3 OF 4

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Near Marlow #2

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : 4" diameter, Sonic

WATER LEVELS : --- START : 6/20/19 09:00 END : 6/20/19 14:30 LOGGER : JE/KS

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
65	68.0	10.0	SB208-60' at 12:00 SB208-65' at 12:10	CLAY, brown, moist, medium dense, low plasticity, mottled, trace to few silt			At 63' - GSA sample At 68' - GSA sample
70	78.0	10.0	SB208-70' at 12:50 SB208-75' at 13:00	CLAY, brown, wet, very soft, low plasticity, white silt nodules			At 72' - GSA Sample At 77' - GSA Sample
80	88.0	10.0	SB208-80' at 13:55 SB208-85' at 14:05	CLAY, gray, wet, very soft, low to no plasticity, lots of white silt nodules			
90							

JACOBS

PROJECT NUMBER:	BORING NUMBER:	
661508	SB-208	SHEET 4 OF 4

SOIL BORING LOG

PROJECT : Grain Handling Facility at Freeman, Freeman, Washington LOCATION : Near Marlow #2

ELEVATION : DRILLING CONTRACTOR : Environmental West Exploration, Inc

DRILLING METHOD AND EQUIPMENT : 4" diameter, Sonic

WATER LEVELS : --- START : 6/20/19 09:00 END : 6/20/19 14:30 LOGGER : JE/KS

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	RECOVERY (ft)	SAMPLE ID (TIME)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	PID (ppm)	COMMENTS
		3.0	SB208-90' at 14:45	CLAY, black or dark gray, wet, very soft, lots of weathered basalt chips			At 90' - GSA Sample
	92.0			WEATHERED BASALT Bottom of Boring at 92.0 ft bgs on 6/20/19 14:30			
95							
100							
105							
110							
115							
120							

Geophysical Survey

Geophysical Survey LLC
711 S Tacoma Street
Kennewick, Washington 99336

August 24, 2017

Steve Demus
CH2M
999 West Riverside Ave, Suite 500
Spokane, WA 99201

Re: ***Geophysical Investigation***
UPRR Site
Freeman, Washington

Mr. Demus:

Geophysical Survey LLC conducted a geophysical investigation at the UPRR site in Freeman, Washington on August 17, 2017. The objective of the survey was to detect and delineate underground storage tanks (USTs).

METHODOLGY

Frequency Domain Electromagnetic Method (EM-31)

The EM-31 has a dipole length of approximately 13 feet, the depth of investigation in the vertical dipole mode is approximately 19 feet. The method is based on a transmitting coil radiating an electromagnetic (EM) field which induces eddy currents in the earth. A resulting secondary EM field is measured at a receiving coil as a voltage which is linearly related to the subsurface conductivity.

Terrain (or ground) conductivity is a function of the natural soil matrix and pore fluid electrical conductivity. The depth of investigation is dependent upon the electrical conductivity of the subsurface, the distance between the transmitting and receiving coils, sensitivity of the equipment, and the power of the source. The conductivity value resulting from a measurement is a composite, and represents the combined effects of the thickness of the stratigraphic layers, their depths, their specific conductivity, and any man-made conductive objects that may be present such as metal objects. The quadrature component indicates the bulk apparent conductivity of the volume of ground sampled, in milli-Siemens per meter (mS/m). The in-phase component, magnetic susceptibility, is expressed in parts per thousand (ppt). Phase changes between the primary and secondary field are used to indicate the presence of metallic objects. Phase changes are measured from -20 to 20 parts per thousand, the value is not as important as the change in value. In-phase component data provide information on the likely presence of buried metal objects.

Time Domain Electromagnetic Method (EM61)

Time domain electromagnetic methods involve generating a signal of known frequency and voltage from a transmitter. In the presence of metallic objects an EM signal is induced when the transmitted signal is applied. When the transmitter is turned off the induced signal decays at a rate proportional to the metal mass in which it was induced.

The Geonics EM61MK2 consists of a transmitter (Tx) and receiver (Rx) coil and a coincident receiver coil located 30 cm above the bottom coil. The transmitter coil is energized by a pulse of current and the receiver coils measure the response decay at fixed time intervals. Three time gates of data from the bottom coil and the top coil are recorded, differential data is the top coil minus channel 3 bottom coil data. Differential data is useful in negating affects of surface metal.

FIELD SURVEY

Mapping Control

A Trimble Pro6H GPS with sub-foot level accuracy was used for location control and mapping of surface features.

EM61 Data Acquisition

Electromagnetic data were collected using a Geonics EM61MK II metal detector. Data were collected at 0.6 foot intervals on transects spaced 5 feet apart. EM data were collected using NAV61 software from Geomar on an Allegro CX datalogger.

EM31 Data Acquisition

Electromagnetic data were collected using a Geonics EM31 Terrain conductivity meter. Data were collected at 0.6 foot intervals on transects spaced 10 feet apart. EM data were collected using NAV31 software from Geomar on an Allegro CX datalogger.

DATA PROCESSING

EM Data Processing

Electromagnetic data were processed using Trackmaker61MK2 & Trackmaker31 software from Geomar. EM 61 Channels 1-3 and top channel data were output to .xyz format and transformed to geo-referenced format using Didger from Golden Software. Data was gridded and contoured using a Kriging algorithm in Surfer 13 from Golden software. EM 31 Apparent conductivity and in-phase response data were output to .xyz format and transformed to geo-referenced format using Didger from Golden Software. Data was gridded and contoured using a Kriging algorithm in Surfer 13 from Golden software.

RESULTS AND INTERPRETATION

No USTs were detected in the survey. A metallic anomaly was detected at: E2539654 N210729 to E2539673 N210755. The anomaly is approximately 30 feet long and 3 feet wide. It exhibits a differential response of approximately 50 milli-volts and a peak in-phase response of 3 parts per thousand. The responses are less than a typical UST but in the range of drums or a section of large diameter piping. The EM61 coil response indicates an approximate depth of 3.0 feet.
Railroad tracks, rail cars and associated parts caused considerable interference along the northern portion of the survey area as did reinforced foundations and metal buildings of the grain silos.
Elevated apparent conductivity values at the center of the site appear to be associated with the recent boring locations.

CLOSURE

Geophysical surveys performed as part of this survey may or may not successfully detect or delineate any or all subsurface objects or features present. Locations, depths and scale of buried objects or subsurface features mapped as a result of this survey are a result of geophysical interpretation only, and should be considered as confirmed, actual, or accurate only where recovered by excavation or drilling.

Geophysical Survey LLC performed this work in a manner consistent with the level of skill ordinarily exercised by members of the profession currently practicing under similar conditions. No warranty, express or implied, beyond exercise of reasonable care and professional diligence, is made. This report is intended for use only in accordance with the purposes of the study described within.

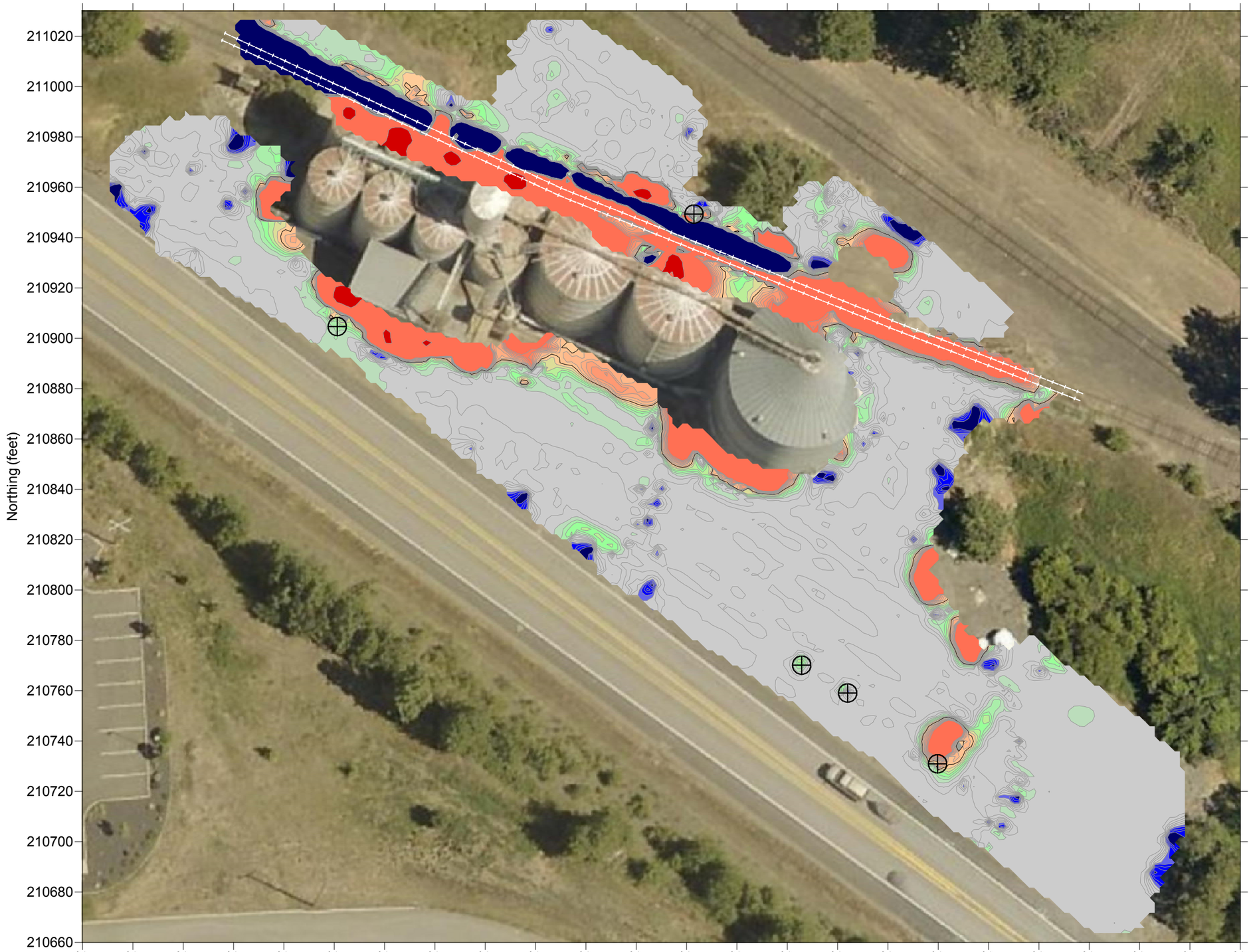
Respectfully,

Geophysical Survey LLC

Mark Villa L.G.
Geophysicist

Geophysical Investigation
UPRR Site
Freeman , Washington

LIST OF FIGURES



Differential Channel (mV)

1000
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-2500

N

US Feet

0 10 20 30 40

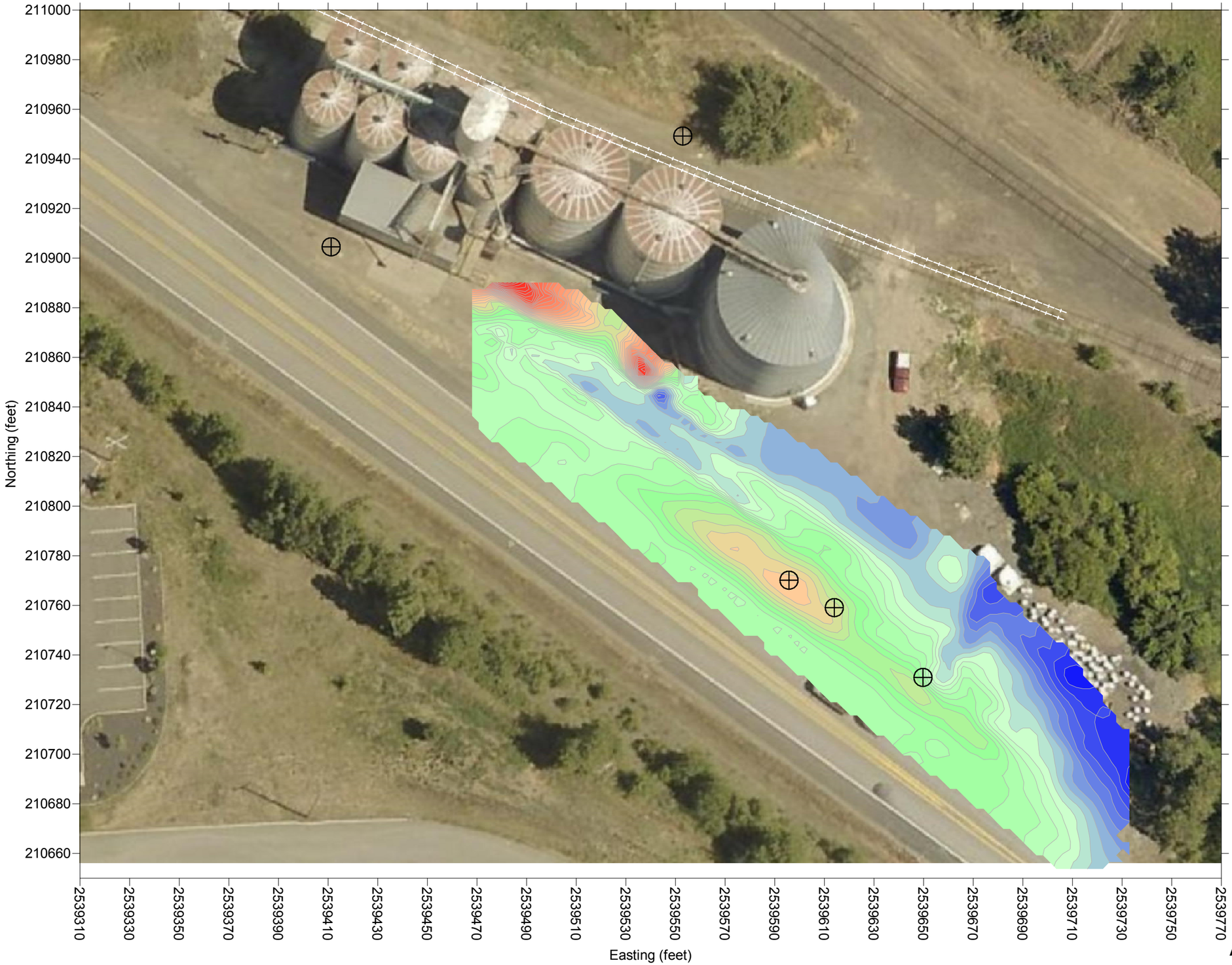
Washington State Plane
NAD83

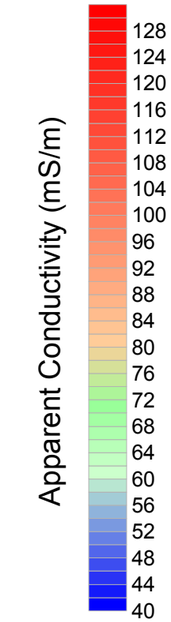
LEGEND

⊕ Monitoring Well

GEOPHYSICAL SURVEY LLC

FIGURE 1
EM-61 Data Contours
Freeman, Washington
August 2016





N

US Feet

0 10 20 30 40

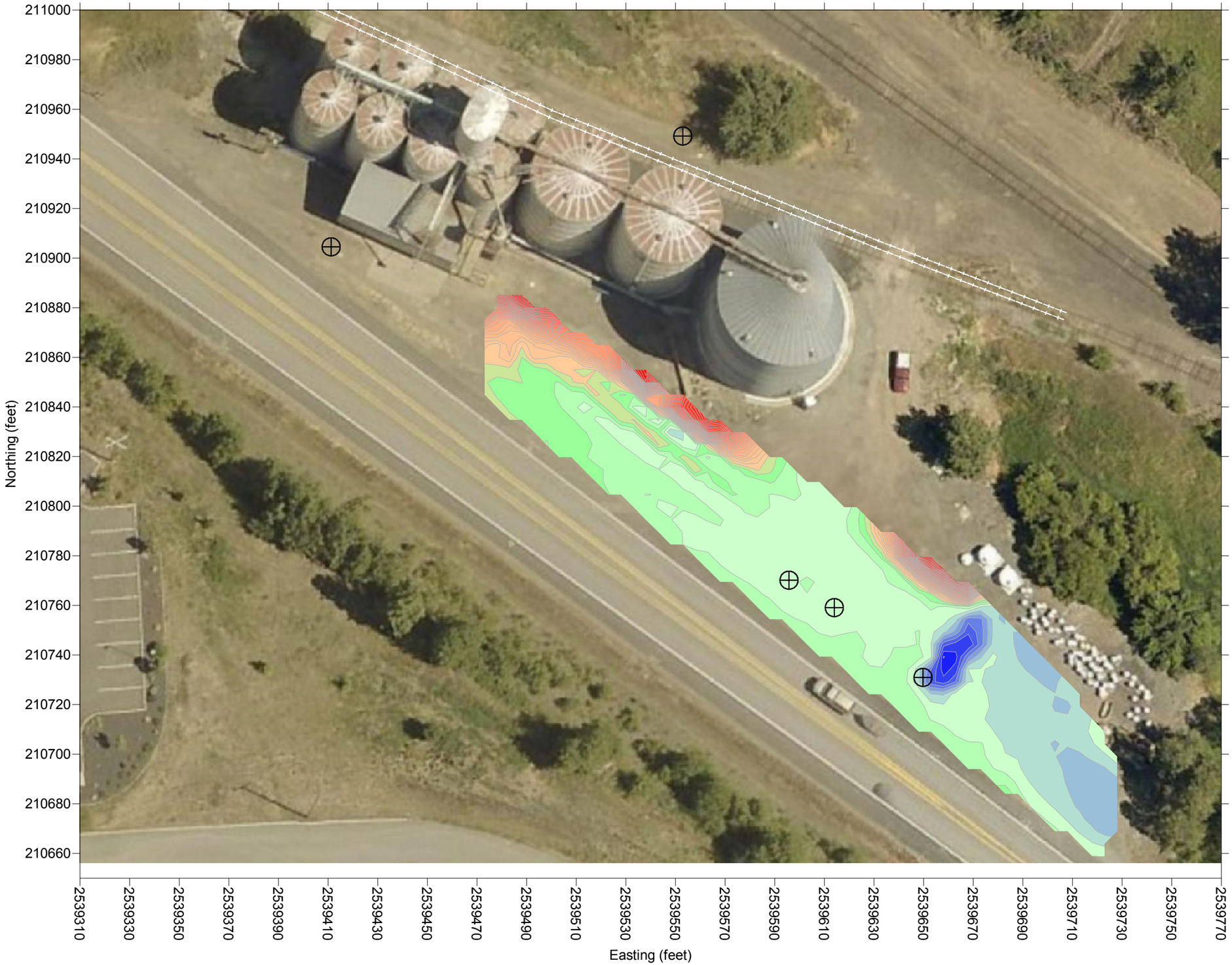
Washington State Plane
NAD83

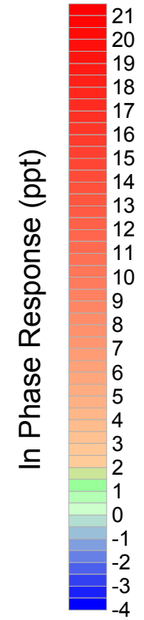
LEGEND

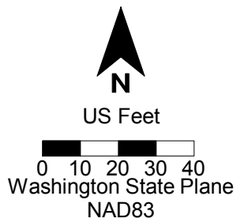
⊕ Monitoring Well

FIGURE 2
Apparent Conductivity Data Contours
Freeman, Washington
August 2016

GEOPHYSICAL SURVEY LLC







LEGEND

⊕ Monitoring Well

FIGURE 3
In-Phase Response Data Contours
Freeman, Washington
August 2016

GEOPHYSICAL SURVEY LLC

Monitoring Sampling Forms

Groundwater Purging and Sampling Form

CH2MHILL

SITE: UPRR-Fremont **Well ID:** MW-15

Field Team: McComb/Baumann Date: 12/06/15

Weather/Temp: clear, cold - mid 20s F, windy Arrival Time: 1253

Well Condition: Good **Initial DTW (ft btc):** 23.23

Purge Method: Bailer Purge Rate [5]: N/A

Field Parameters [1]									
Time	DTW [2]	Purge Vol. (gal)	Temp (°C)	pH	Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
	Begin Pumping								
	~~23.23~~			DRY WELL					
	well DRY well DRY								
				PM 12/06/17					
Stabilization Criteria [3]	-	-	-	± 0.1 units	± 3%	± 10% [4]	± 0.3 mg/L	± 10 mV	-

[1] collect field parameters in 3-5 minute intervals

[2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs

[5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: N/A **Sample Time:**

Analysis: N/A

QC SAMPLE (CIRCLE): FD MS/MSD EQ Blank TOTAL PURGED (GAL):

Field Duplicate ID : Field Duplicate Time:

Comments: < 20-30 ml of water bailed from well, abundant sediment in water, tan/beige in color; No odor.

Groundwater Purging and Sampling Form

CH2MHILL

SITE: UPRR **Well ID:** MW-1D

Field Team: McCord/Endo Date: 12/09/16

Weather/Temp: 20s°F, overcast, light winds Arrival Time: 0810

Well Condition: Good **Initial DTW (ft btc):** 23.53

Purge Method: Submersible Pump Purge Rate[5]:

Field Parameters[1]									
Time	DTW[2]	Purge Vol. (gal)	Temp (°C)	pH	mS/cm Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
	Begin Pumping								
0848	23.53	initial	7.7	6.88	0.451	1.4	1.63	-552	clear, no odor
0853	23.50	1.1 liters	6.2	7.21	0.492	Ø	0.60	-521	" "
0858	24.30	2 liters	7.1	7.21	0.471	4.2	0.46	-466	"
* 0903	25.05	2.3L	7.50	7.20	0.474	366 NTUs	NA	-325 -457 (MW)	cloudy gray, no odor
0908	25.40	2.5 Liters	7.0	7.21	0.461	333	1.77	-87	cloudy gray, no odor
0915	26.02	4.0 liters	7.0	7.14	0.474	315	1.35	-81	" "
0920	26.20	4.3 liters	7.0	7.14	0.475	303	0.83	-80	" "
0925	26.26	4.8 liters	7.0	7.13	0.474	290	0.87	-65	" "
0930	26.26	5.0 liters	6.8	7.11	0.475	265	0.73	-62	
0935	26.25	5.5 liters	6.5	7.11	0.479	274	0.62	-62	
	0935 = SAMPLE TIME								
Stabilization Criteria[3]	-	-	-	± 0.1 units	± 3%	± 10%[4]	± 0.3 mg/L	± 10 mV	-

start 20.73 23.13 198

[1] collect field parameters in 3-5 minute intervals

[2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs

[5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: MW1D-GW-120916 **Sample Time:** 0935

Analysis: 8260B; 6010; 2320B/310.1; 40CFR136/415.2; 300.0; 376.2; RSK175 GC-FID

QC SAMPLE (CIRCLE): FD MS/MSD EQ Blank TOTAL PURGED (GAL):

Field Duplicate ID : N/A Field Duplicate Time: N/A

Comments: 736 ppm CO; 0.6 ppm VOC; 3% LEL in well at well head = 0 ppm; Breathing Zone = 0%; Ferrous Fe = 1.39 mg/L (HACH DR890)

pump @ 34Hz - 35Hz - = lowest level at which water will flow.

* SENSOR ERROR, EMPTY FLOWCELL - WATER CLOUDY GRAY.

Groundwater Purging and Sampling Form

CH2MHILL

SITE: UPRR - Freeman **Well ID:** MW-2D

Field Team: McCourt / Endo Date: 12/09/16

Weather/Temp: Upper 20's / low 30's - Snow - Light wind Arrival Time: 1120

Well Condition: Good **Initial DTW (ft btc):** 32.16

Purge Method: Submersible Pump Purge Rate[5]:

Field Parameters[1]									
Time	DTW[2]	Purge Vol. (gal) / liters	Temp (°C)	pH	mS/cm Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
	Begin Pumping								
1137	32.16	initial	7.1	8.99	0.280	5.3	~~0.275~~ 1.99 (M)	-143	clear, NO odor
1142	33.73	2.8L	8.1	9.03	0.304	0.0	0.76	-176	" "
1148	33.89	4.0 liters	8.6	8.97	0.340	24.9	0.80	-180	" "
1153	33.94	5.1 liters	8.6	8.55	0.360	24.9	0.75	-176	" "
1158	34.00	6.2 liters	8.7	8.36	0.366	13.0	1.07	-181	" "
1203	34.02	7.5 liters	8.7	8.28	0.374	9.3	1.06	-181	" "
1208	34.05	8.8 liters	8.7	8.21	0.381	1.9	0.91	-178	" "
1213	34.11	9.8 liters	8.9	8.11	0.384	0.3	1.05	-174	" "
1218	34.11	11.2 liters	9.0	8.08	0.387	0.0	1.00	-172	" "
1223	34.10	12.1	8.8	8.04	0.393	0.4	0.91	-168	" "
1225	Sample time								
Stabilization Criteria[3]	-	-	-	± 0.1 units	± 3%	± 10%[4]	± 0.3 mg/L	± 10 mV	-

[1] collect field parameters in 3-5 minute intervals [2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs [5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: MW2D-GW-~~1206~~ 120916 **Sample Time:** 1225

Analysis: 8260B; 6010; 2320B/31, 40CFR136/415.2; 300.0; 376.2; RSK175-GC-FID

QC SAMPLE (CIRCLE): FD MS/MSD EQ Blank TOTAL PURGED (GAL):

Field Duplicate ID: N/A Field Duplicate Time: N/A

Comments: @ 1130 CO = 63 ppm, All else K. (in well ID, BZ - all ck)

44 HZ: 33.04 DTW 1138. Slight sheen on WLI tip. Ferrous iron = 1.37 mg/L

Groundwater Purging and Sampling Form

CH2MHILL

SITE: UPRR-Freemont **Well ID:** MW-3D

Field Team: McCord/Endo Date: 12/10/16

Weather/Temp: 20°F; overcast, 2-3" snow in ground Arrival Time: 0745

Well Condition: Good **Initial DTW (ft btc):** 33.61

Purge Method: Submersible Pump Purge Rate[5]:

Field Parameters[1]									
Time	DTW[2]	Purge Vol. (gal/liters)	Temp (°C)	pH	mS/cm Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
	Begin Pumping								
0833	32.65	initial	7.4	6.72	0.385	3.1	5.41	284	clear, no odor
0838	33.82	1.5liters	7.6	6.92	0.377	3.4	4.77	285	" "
0843	34.08	2.0liters	6.3	6.98	0.386	3.2	4.91	292	" "
0848	34.22	2.8liters	4.4	6.98	0.398	4.1	5.13	298	" "
0853	35.32	3.1liters	6.2	6.89	0.365	4.6	4.95	299	" "
0858	35.53	3.8liters	6.5	6.89	0.367	5.3	4.72	299	" "
0903	35.58	4.2liters	6.3	6.91	0.368	7.6	4.76	298	" "
0905	SAMPLE Time								
				RM 12/14/16					
Stabilization Criteria[3]	-	-	-	± 0.1 units	± 3%	± 10%[4]	± 0.3 mg/L	± 10 mV	-

[1] collect field parameters in 3-5 minute intervals [2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs [5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: MW3D-GW-121016 **Sample Time:** 0905

Analysis: 8260B; 6010(Diss); 2320B/310.1; 40CFR136/415.2; 300.0; 376.2; RSK175 GC-FID

QC SAMPLE (CIRCLE): FD MS/MSD EQ Blank TOTAL PURGED (GAL):

Field Duplicate ID : N/A Field Duplicate Time: N/A

Comments: 35.12 Ferrous Iron = 0.03 mg/L

32.65 of the pump is in.

Groundwater Purging and Sampling Form

CH2MHILL

SITE: UPRR-Freeman **Well ID:** MW-4D

Field Team: McComb/Endo Date: 12/08/16

Weather/Temp: 14°F; clear, Windy Arrival Time: 1130

Well Condition: Good **Initial DTW (ft btc):** 113.03 @1136

Purge Method: Submersible Pump Bailer (pH) Purge Rate [5]:

Field Parameters [1]										
Time	DTW [2]	Purge Vol. (gal) Liters	Temp (°C)	pH	mS/cm Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
	Begin Pumping								
1200	113.03	initial	6.2	7.57	0.455	4.3	4.76	286	clear, no odor
1205	115.40	2 Liters	7.5	7.08	0.478	Ø	4.24	297	clear, no odor
1210	115.28	3.5 liters	8.4	7.03	0.493	0.0	3.90	297	" "
1215	115.12	5.2 l	8.9	7.03	0.494	0.0	2.76	290	" "
1218	115.04	6.6 L	8.8	7.03	0.507	0.0	2.73	283	" "
1224	114.85	7.5 l	8.6	7.02	(2nd) 0.503	0.0	2.60	220	" "
1227	114.82	8.0 l	8.6	7.03	0.498	0.0	2.70	201	" "
1232	114.33	8.9 l	8.3	7.08	0.500	4.3	3.29	183	" "
1235	114.07	9.1 l	8.1	7.10	0.505	5.4	3.19	179	" "
1238	113.72	9.2 l	8.1	7.10	0507	4.8	3.34	180	" "
			SAMPLE @ 1245						
Stabilization Criteria [3]	-	-	-	± 0.1 units	± 3%	± 10% [4]	± 0.3 mg/L	± 10 mV	-

112.55

[1] collect field parameters in 3-5 minute intervals

[2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs

[5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: MW4D-GW-120816 **Sample Time:** 1245

Analysis: 8260B; 6010; 2320B; 310.1; 40CFR136/415.2; 300.0; 376.2; RSK-175 GC-FID

QC SAMPLE (CIRCLE): FD MS/MSD EQ Blank TOTAL PURGED (GAL):

Field Duplicate ID: N/A Field Duplicate Time: N/A

Comments: Ferrous Iron = 9.0 mg/L

Groundwater Purging and Sampling Form

CH2MHILL

SITE: UPRR-Freeman **Well ID:** MW-5D

Field Team: McComb/Endo Date: 12/08/16

Weather/Temp: mid-teens°F; windy, mostly clear Arrival Time: 1353

Well Condition: Good **Initial DTW (ft btc):** 63.45

Purge Method: Submersible Pump Purge Rate[5]:

Field Parameters[1]									
Time	DTW[2]	Purge Vol. (gal)	Temp (°C)	pH	mS/cm Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
	Begin Pumping								
1405	63.45	NA	→						
1429	65.73	4.8L	10.9	7.24	0.579	15.4	1.58	166	MOSTLY CLEAR; NO ODOR
1434	65.65	7.5L	11.4	7.25	0.594	27.3	1.48	175	"
1439	65.62	9.3L	11.4	7.26	0.606	59.3	1.36	169	"
1444	65.61	12.2L	11.4	7.25	0.616	76.5	1.27	159	"
1449	65.52	14.8L	11.5	7.29	0.621	105	1.39	150	"
1454	65.72	15.8L	11.7	7.29	0.609	76.0	1.35	148	"
1459	65.80	17.5	11.7	7.28	0.607	72.2	1.42	144	"
1504	65.80	19.0	11.8	7.30	0.605	76.2	1.48	140	"
1505	SAMPLE TIME								
Stabilization Criteria[3]	-	-	-	± 0.1 units	± 3%	± 10%[4]	± 0.3 mg/L	± 10 mV	-

[1] collect field parameters in 3-5 minute intervals

[2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs

[5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: MW5D-GW-120816 **Sample Time:** 1505

Analysis: 8260B; 6010; 2320B/310.1; 40CFR136/415.2; 300.0; 376.2; RSK-175

QC SAMPLE (CIRCLE): FD MS/MSD EQ Blank TOTAL PURGED (GAL):

Field Duplicate ID: N/A Field Duplicate Time: N/A

Comments: Ferrous Fe = 0.0 mg/L

Groundwater Purging and Sampling Form

CH2MHILL

SITE: UPRR-Freeman **Well ID:** MW-65

Field Team: McCurdy/Baumann Date: 12/04/16

Weather/Temp: Good Arrival Time: 1430

Well Condition: overcast (hail), 30's, light to mod. wind **Initial DTW (ft btc):** 36.02

Purge Method: Bailer Purge Rate [5]: N/A

Field Parameters [1]									
Time	DTW [2]	Purge Vol. (gal)	Temp (°C)	pH	mS/cm Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
	Begin Pumping								
1435	36.02	initial	8.9	7.33	0.372	814	6.03	238	light gray, no odor
1502	42.95	2½	8.6	7.55	0.365	offscale	6.07	-87	brown, sediment, no odor
1515	43.95	3	9.2	7.54	0.350	offscale	5.76	-99	strong brown, no odor
			End Purge @ 1515 on 12/4/16						
12/05 1302	36.32								
1334	38.43	more removed for containers	7.6	7.41	0.407	offscale	5.78	125	strong brown, no odor; sediment
				pH 12/4/16					
Stabilization Criteria [3]	-	-	-	± 0.1 units	± 3%	± 10% [4]	± 0.3 mg/L	± 10 mV	-

[1] collect field parameters in 3-5 minute intervals

[2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs

[5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: MW65-GW-120516 **Sample Time:** 1310 12/5/16

Analysis: 8260B; 6010; 2320B/310.1; 40CFR136/415.2; 300.0; 376.2; RSK-175 GC-FID

QC SAMPLE (CIRCLE): FD MS/MSD EQ Blank TOTAL PURGED (GAL): N/A

Field Duplicate ID: N/A Field Duplicate Time: N/A

Comments: 1.36 g = 1 well volume

Groundwater Purging and Sampling Form

CH2MHILL

SITE: UPRR - Freeman **Well ID:** MW-6D

Field Team: McCord / Endo Date: 12/08/16

Weather/Temp: 16°F, partly cloudy, windy Arrival Time: 0848

Well Condition: GOOD **Initial DTW (ft btc):** 128.24

Purge Method: Submersible Pumps Purge Rate[5]:

Field Parameters[1]									
Time	DTW[2]	Purge Vol. (gal)	Temp (°C)	pH	mS/cm Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
		Begin Pumping							
0848/0916	128.24	initial	7.9	7.02	0.447	7.2	2.70	257	0912 water to surface
0920	128.45	5 liters	9.8	7.31	0.437	0.0	1.05	256	clear, no odor
0925	123.37	9.1 liters	9.9	7.34	0.429	0	1.00	253	"
0932	128.36	13.0L	9.4	7.31	0.427	0.0	1.01	255	"
0939	128.33	15.8L	9.2	7.27	0.409	0.0	1.06	256	"
0944	128.35	19.0L	9.1	7.25	0.406	0.0	1.09	255	"
0949	128.34	21.0L	9.4	7.22	0.402	0.0	1.10	253	"
			End Purge						
					RA 12/08/16				
Stabilization Criteria[3]	-	-	-	± 0.1 units	± 3%	± 10%[4]	± 0.3 mg/L	± 10 mV	-

[1] collect field parameters in 3-5 minute intervals [2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs [5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: MW6D-GW-120816 **Sample Time:** 0950/0955

Analysis: 8260B; 6010, 2320B/310.1, 40CFR136/415.2, 300.0; 376.2; RSK-175

QC SAMPLE (CIRCLE): (FD) MS/MSD EQ Blank TOTAL PURGED (GAL): 21 Liters

Field Duplicate ID: MW6D-GW-FD-120816 Field Duplicate Time: 0955

Comments: pumping @ 133 Hz. @ 0912 Began readings. 0916

FERROUS IRON = 0.00 mg/L

Groundwater Purging and Sampling Form

CH2MHILL

SITE: UPRR Freeman **Well ID:** MW-75

Field Team: McCord/Baumann Date: 12/06/15-12/07

Weather/Temp: Mostly clear, mid 30s, windy Arrival Time: 1145

Well Condition: Good **Initial DTW (ft btc):** 30.15

Purge Method: Bailer Purge Rate[5]: N/A

Field Parameters[1]									
Time	DTW[2]	Purge Vol. (gal)	Temp (°C)	pH	mS/cm Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
	Begin Pumping								
11:45	30.15	initial	7.6	6.52	0.373	~~30.3~~ 28.1	6.13	291	
12:12	42.4	5 gal	5.1	6.53	0.368	error, Too turbid	5.89	273	
12:23	44.42	7 gal	7.5	6.23	0.378	" "	5.09	287	
09:29 ~~0905~~ 12/07/16		End pumping on 12/06/15							
	30.39	N/A							
1012	32.60	—	7.8	5.89	0.524	67.5	6.77	276	
				pH 12/7/16					
Stabilization Criteria[3]	-	-	-	± 0.1 units	± 3%	± 10%[4]	± 0.3 mg/L	± 10 mV	-

[1] collect field parameters in 3-5 minute intervals

[2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs

[5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: MW75-GW-120716 **Sample Time:** 0930

Analysis: 8260B; 6010; 2330B/310.1; 40CFR 136/415.2; 300.0; 376.2; RSK175

QC SAMPLE (CIRCLE): FD MS/MSD EQ Blank TOTAL PURGED (GAL): 7g

Field Duplicate ID: N/A Field Duplicate Time:

Comments: 2.68 g = 1 well volume

Ferrous IRON = ND = 0 mg/L

Groundwater Purging and Sampling Form

CH2MHILL

SITE: UPRR - Freeman **Well ID:** MW-8S

Field Team: McComb/Baumann Date: 12/04/16

Weather/Temp: Overcast, upper 30s, windy Arrival Time: 1140

Well Condition: Good **Initial DTW (ft btc):** 36.53

Purge Method: Bailer Purge Rate[5]: N/A

Field Parameters[1]									
Time	DTW[2]	Purge Vol. (gal)	Temp (°C)	pH	mS/cm Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
	Begin Pumping								
1143	36.53	initial	9.7	6.23	0.447	Ø *	5.81	319	clear, no odor
1220	49.80	5	10.2	6.40	0.398	447	5.80	297	cloudy, no odor
1230	50.70	6	10.8	6.45	0.409	496	5.77	281	light brown, no odor
			End	purging	this date	12/4	@ 12:30		
12/05 1152	36.43								
1230	39.51	only enough for total containers	8.7	6.17	0.429	offscale	5.66	328	very light brown, no odor
				RM 12/4/16					
Stabilization Criteria[3]	-	-	-	± 0.1 units	± 3%	± 10%[4]	± 0.3 mg/L	± 10 mV	-

[1] collect field parameters in 3-5 minute intervals

[2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs

[5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: MW8S-GW-120516 **Sample Time:** 1200

Analysis: 8260B; 6010; 2320B/310.1; 40CFR136/415.2; 300.0; 376.2; RSK175 GC-FID

QC SAMPLE (CIRCLE): FD MS/MSD EQ Blank TOTAL PURGED (GAL):

Field Duplicate ID: N/A Field Duplicate Time: N/A

Comments: * not sure turbidimeter probe is reading correctly

2.56 = 1 well volume

Groundwater Purging and Sampling Form

CH2MHILL

SITE: UPRR-Freeman **Well ID:** MW-9S

Field Team: McCord/Baumann Date: 12/04/16

Weather/Temp: Overcast, 37°F, windy Arrival Time: 0920

Well Condition: Good **Initial DTW (ft btc):** 32.73

Purge Method: Bailer Purge Rate[5]: N/A

Field Parameters[1]									
Time	DTW[2]	Purge Vol. (gal)	Temp (°C)	pH	mS/cm Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
	Begin Pumping								
0925	32.73	initial	12.8	5.82	0.675	Ø	6.09	304	clear, no odor
1015	36.60	5	11.7	5.91	0.572	slt cloudy	5.76	275	brown, no odor ~~some sediment~~
1105	38.70	11	9.9	6.17	0.568	slt cloudy	5.37	316	brown, no odor some sediment
			End purge @ 12/04/16						
12/5/16 0945	32.64	N/A							
1105	34.09	for sampler only	10.5	6.17	0.726	4%	6.48	290	light brown, no odor
Stabilization Criteria[3]	-	-	-	± 0.1 units	± 3%	± 10%[4]	± 0.3 mg/L	± 10 mV	-

pH 12/4/16 (3)

[1] collect field parameters in 3-5 minute intervals [2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs [5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: MW9S-GW-120516 **Sample Time:** 0945 12/05/16

Analysis: 8260B; 6010; 2320B/310.1; 40CFR136/415.2; 300.0; 376.2; RSK-175 GC-FID;

QC SAMPLE (CIRCLE): FD MS/MSD EQ Blank TOTAL PURGED (GAL): 11

Field Duplicate ID: MW9S-GW-FD-120516 COD/BOD & CSIA only Field Duplicate Time: 0950 12/05/16

Comments: ~1.27g = 1 well volume; water level appears stable @ ~38.70
Each bailer pull after ~8-9 gallons was approx the same level in bailer. Decided to move on to another location.

+ 40CFR136/410; 40CFR136/405.1; C13/C12 + H2/H1

* Ambient VOCs were 0.0 ppm during sampling.

Groundwater Purging and Sampling Form

CH2MHILL

SITE: UPRR - Freeman **Well ID:** MW-10S

Field Team: McCord / Baumann Date: 12-6-16

Weather/Temp: 29° Sunny Arrival Time: 13 10

Well Condition: **Initial DTW (ft btc):** 49.43

Purge Method: Bailer Purge Rate [5]:

Field Parameters [1]									
Time	DTW [2]	Purge Vol. (gal)	Temp (°C)	pH	Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
	Begin Pumping								
1320	49.43	start	7.7	7.21	0.681	meter unreadable	1.95	162	
1343	66.41	≈4.25	9.2	7.32	0.635	" "	4.63	168	Slight Tan Sulfur odor
1359	68.90	6.25	9.5	7.39	0.649	" "	4.69	192	Tan/Brown
1418	71.30	8.75	9.8	7.47	0.631	" "	4.90	136	Brown/Tan
12/07 1137	49.42	—	—	—	—	—	—	—	—
1215	53.22	—	7.3	7.40	0.613	39.6	5.58	270	Light brown to clear; no odor, some effervescence
				PW 12/16/16	12/7/16				
Stabilization Criteria [3]	-	-	-	± 0.1 units	± 3%	± 10% [4]	± 0.3 mg/L	± 10 mV	-

[1] collect field parameters in 3-5 minute intervals [2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs [5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: MW10S-GW-120716 **Sample Time:** 1145

Analysis: 8260B; 6010; 2320B/310.1, 40CFR136/415.2; 300.0; 376.2; RSK175

QC SAMPLE (CIRCLE): FD MS/MSD EQ Blank TOTAL PURGED (GAL): 8.75

Field Duplicate ID : Field Duplicate Time: N/A

Comments: 1 well volume = 4.25'

Ferrous Iron = 0.0 mg/L

Groundwater Purging and Sampling Form

CH2MHILL

SITE: UPRR-Freeman **Well ID:** MW-11S

Field Team: McComb/Baumann Date: 12/06/16

Weather/Temp: Clear, upper 30°F; windy Arrival Time: 1440

Well Condition: Good **Initial DTW (ft btc):** 57.85

Purge Method: Bailer Purge Rate[5]:

Field Parameters[1]									
Time	DTW[2]	Purge Vol. (gal)	Temp (°C)	pH	mS/cm Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
	Begin Pumping								
1442	57.85	initial	6.7	7.75	0.476	Light Kaki ish	5.33	-17	
1505		3.5	7.2	7.48	0.470	"	4.77	-33	
1518	74.78	7.0	6.5	7.55	0.484	"	5.03	-95	
12/07/16 1345	58.05	—	—	—	—	—	—	—	
1426	60.59	—	5.6	7.43	0.465	33.4	6.34	197	
Stabilization Criteria[3]	-	-	-	± 0.1 units	± 3%	± 10%[4]	± 0.3 mg/L	± 10 mV	-

pH 12/8/16

[1] collect field parameters in 3-5 minute intervals

[2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs

[5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: MW11S-GW-120716 **Sample Time:** 1350

Analysis: 8260B; 6010; 7320B/310.1; 40CFR 136/415.2; 300.0; 376.2; RSK175

QC SAMPLE (CIRCLE): FD MS/MSD EQ Blank TOTAL PURGED (GAL): 7.0

Field Duplicate ID: N/A Field Duplicate Time: N/A

Comments: 3.63 = 1 WV (PM) 3.63 gallons = 1 well volume

Ferrous IRON = 0.01 mg/L

(discoloration observed between zero ampule and reagent ampule - suspect DR900 may be malfunctioning.

Groundwater Purging and Sampling Form

CH2MHILL

SITE: UPRR - Freeman **Well ID:** MW-12S

Field Team: McCord / Baumann Date: 12/04/16

Weather/Temp: overcast, windy, 30s °F Arrival Time: 1300

Well Condition: Good **Initial DTW (ft btc):** 42.95'

Purge Method: Bailer Purge Rate [5]: N/A

Field Parameters [1]									
Time	DTW [2]	Purge Vol. (gal)	Temp (°C)	pH	mS/cm Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
	Begin Pumping								
1325	42.95	initial	9.1	6.89	0.729	off scale	6.23	87	light tan, no odor, slight sediment
1355	55.20	2.75	9.5	7.12	0.716	off scale	5.87	-40	tan, no odor, heavy silt/clay
			End Purge on 12/04/16						
12/05/16 1403	42.20								
1434	46.15	4 containers only	5.8	6.89	0.885	954	5.95	31	light beige, no odor
				pH 12/4/16					
Stabilization Criteria [3]	-	-	-	± 0.1 units	± 3%	± 10% [4]	± 0.3 mg/L	± 10 mV	-

[1] collect field parameters in 3-5 minute intervals [2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs [5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: MW12S-GW-120516 **Sample Time:** 1415

Analysis: 8260B; 6010; 2320B/310.1; 40CFR 136/415.2; 300.0; 376.2; RSK175 GC-FID

QC SAMPLE (CIRCLE): FD MS/MSD EQ Blank TOTAL PURGED (GAL): _____

Field Duplicate ID : _____ Field Duplicate Time: _____

Comments: 1355 - 12/04/16 purge water is thick, w abundant suspended silt/clay; tan/beige color, no odor.

Groundwater Purging and Sampling Form

CH2MHILL

SITE: UPRR Freeman **Well ID:** WS5

Field Team: Mcamly/Endo Date: 12/07/16

Weather/Temp: 20°F, clear, (Inside bldg-warm) Arrival Time: 1250

Well Condition: N/A **Initial DTW (ft btc):** N/A

Purge Method: N/A Purge Rate [5]:

Field Parameters [1]									
Time	DTW [2]	Purge Vol. (gal)	Temp (°C)	pH	mS/cm Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
	Begin Pumping								
Influent → 1255	N/A		9.5	6.96	0.394	0	5.57	299	
		Ferrous Iron = 0.0 mg/L							
Effluent → 1300			16.5	7.68	0.381	0.0	5.74	500	
				pH 12/7/16					
Stabilization Criteria [3]	-	-	-	± 0.1 units	± 3%	± 10% [4]	± 0.3 mg/L	± 10 mV	-

[1] collect field parameters in 3-5 minute intervals [2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs [5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: WS5-GW-IN-120716; WS5-GW-EF-120716 **Sample Time:** 1255; 1300

Analysis: 8260B, 6010; 9320B/310.1; 40CFR136/415.2; 300.0; 376.2; RSK175

QC SAMPLE (CIRCLE): FD MS/MSD EQ Blank TOTAL PURGED (GAL): N/A

Field Duplicate ID: N/A Field Duplicate Time: N/A

Comments: Effluent for VOCs only;
Influent = All parameters + Ferrous Iron

Groundwater Purging and Sampling Form

CH2MHILL

SITE: UPRR **Well ID:** W-20

Field Team: McCord / Endo Date: 12/10/16

Weather/Temp: 20°F, light winds, snow engrnd, overcast Arrival Time: 1018

Well Condition: Good **Initial DTW (ft btc):** 19.10

Purge Method: Submersible Pump Purge Rate [5]:

Field Parameters [1]										
Time	DTW [2]	Purge Vol. (gal) [5]	Temp (°C)	pH	mS/cm Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
1103	**Begin Pumping**								
1108	19.92	4.8 L	8.2	6.98	0.445	46.4	4.65	147	SLIGHTLY CLOUDY BROWNISH BLACK NO ODOR
1113	20.20	7.0L	7.9	6.85	0.453	32.1	4.28	147	MOSTLY CLEAR, SLIGHT BROWNISH COLOR, NO ODOR
1118	20.33	8.9L	7.7	6.86	0.457	34.5	4.20	138	"
1123	20.49	9.5L	7.4	6.86	0.459	45.8	3.99	125	CLEAR, SLIGHT BROWNISH COLOR, NO ODOR.
1128	20.58	10.4L	7.5	6.87	0.456	52.8	3.68	115	"
1133	20.66	11.3L	7.2	6.88	0.458	56.7	3.59	111	"
1138	20.70	12.2	6.8	6.90	0.458	66.8	3.44	106	"
1143	20.73	12.9	6.7	6.90	0.454	61.9	3.29	104	"
		PARAMETERS STABLE, PROCEED TO SAMPLE							
Stabilization Criteria [3]	-	-	-	± 0.1 units	± 3%	± 10% [4]	± 0.3 mg/L	± 10 mV	-

[1] collect field parameters in 3-5 minute intervals

[2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs

[5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: W20-GW-1210/6 **Sample Time:** 1145

Analysis: 8260B; 6010; 2320B/ 310.1; 40 CFR 136/415.2; 300.0; 376.2; RSK175 GE-RE

QC SAMPLE (CIRCLE): FD MS/MSD EQ Blank TOTAL PURGED (GAL):

Field Duplicate ID : N/A Field Duplicate Time: N/A

Comments: MULTIRAE READINGS = OK.

Ferrous Fe = 0.79 mg/L

Groundwater Purging and Sampling Form

CH2MHILL

SITE: UPRR **Well ID:** W-26

Field Team: Melonie | Enda Date: 12/09/16

Weather/Temp: upper 20s/low 30s, snowy, light winds Arrival Time: 1355

Well Condition: Good **Initial DTW (ft btc):** 66.93

Purge Method: Submersible Pump Purge Rate[5]:

Field Parameters[1]									
Time	DTW[2]	Purge Vol. (gal) liter	Temp (°C)	pH	ms/cm Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
	Begin Pumping								
1413	66.93	initial	9.9	7.05	0.383	7.3	5.40	203	clear, no odor
1418	67.07	10	10.9	6.94	0.388	∅	5.14	206	"
1423	67.02	15.8	10.9	6.92	0.389	∅	4.94	214	"
1428	67.00	20.8	10.8	6.92	0.390	∅	5.37	220	"
1433	67.00	24.9	10.9	6.92	0.390	∅	5.04	225	"
1438	67.01	30.0	11.0	6.93	0.391	∅	5.12	229	
1440	Sample time								
Stabilization Criteria[3]	-	-	-	± 0.1 units	± 3%	± 10%[4]	± 0.3 mg/L	± 10 mV	-

[1] collect field parameters in 3-5 minute intervals

[2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs

[5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: W26-GW-120616 **Sample Time:** 1440

Analysis: 8260B; 6010; 2320B | 310.1; 40CFR 136/415.2; 300.0; 376.2; RSK175 GC-FID

QC SAMPLE (CIRCLE): FD MS/MSD EQ Blank TOTAL PURGED (GAL):

Field Duplicate ID : Field Duplicate Time:

Comments: 66.95 after pump

PID → Pump exhaust, Ferrous Iron = 0.00 mg/L

Groundwater Purging and Sampling Form

CH2MHILL

SITE: UPRR Freeman **Well ID:** Lang Well, Freeman store spigot

Field Team: LB/KM Date: ~~12-01~~ 12-01-16

Weather/Temp: 36° light snow Arrival Time: 1000

Well Condition: Freeman store outside spigot **Initial DTW (ft btc):** N/A

Purge Method: Grab Purge Rate [5]: Grab

Field Parameters [1]									
Time	DTW [2]	Purge Vol. (gal)	Temp (°C)	pH	Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
	Begin Pumping								
1012	✓	✓	8.7	7.43	8.85	0.0	6.47	261	
					LK/B				
Stabilization Criteria [3]	-	-	-	± 0.1 units	± 3%	± 10% [4]	± 0.3 mg/L	± 10 mV	-

[1] collect field parameters in 3-5 minute intervals

[2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs

[5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: Lang-GW-120116 **Sample Time:** 1000

Analysis:

QC SAMPLE (CIRCLE): FD MS/MSD EQ Blank TOTAL PURGED (GAL): ✓

Field Duplicate ID : Field Duplicate Time: ✓

Comments:

Groundwater Purging and Sampling Form

CH2MHILL

SITE: UPRR - Freeman **Well ID:** MARLOW Treatment

Field Team: LB / RM Date: 11/30/16

Weather/Temp: Upper 30s, Lt snow Arrival Time: 0950

Well Condition: Treatment house **Initial DTW (ft btc):** N/A

Purge Method: N/A Purge Rate [5]: N/A

Field Parameters [1]									
Time	DTW [2]	Purge Vol. (gal)	Temp (°C)	pH	mS/cm Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
	Begin Pumping								
1120	N/A	N/A	8.7	6.55	9.0	6.1	7.44	307	clear, no odor
Stabilization Criteria [3]	-	-	-	± 0.1 units	± 3%	± 10% [4]	± 0.3 mg/L	± 10 mV	-

RM 11/30/16

[1] collect field parameters in 3-5 minute intervals

[2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs

[5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: MARLOW-GW-113016 **Sample Time:** 1000

Analysis: 8260B; 6010; 7196A; 13208/310.1; SM3500FeD; 40CFR136/415.2; EPA300.0; EPA376.2

QC SAMPLE (CIRCLE): (FD) (MS/MSD) EQ Blank TOTAL PURGED (GAL): N/A

Field Duplicate ID: MARLOW-GW-FD-113016 Field Duplicate Time: 1005

Comments: Analysis (continued) RSK 175 TCA Method (GC-FID)

Field Parameters collected after all samples were collected.

Groundwater Purging and Sampling Form

CH2MHILL

SITE: UPRR-Freeman **Well ID:** Asher Spigot

Field Team: LB/RM Date: 11/30/16

Weather/Temp: Upper 30's, some snow Arrival Time: 1147

Well Condition: House Spigot **Initial DTW (ft btc):** N/a

Purge Method: n/a Purge Rate [5]: N/a, grab

Field Parameters [1]									
Time	DTW [2]	Purge Vol. (gal)	Temp (°C)	pH	mS/cm Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
	Begin Pumping								
1225	N/A	N/A	19.4	7.29	0.687	0.2	4.20	303	clear, no odor
Stabilization Criteria [3]	-	-	-	± 0.1 units	± 3%	± 10% [4]	± 0.3 mg/L	± 10 mV	-

RM 11/30/16

[1] collect field parameters in 3-5 minute intervals

[2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs

[5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: Asher-GW-113016 **Sample Time:** 11:55

Analysis: 8260B; 6010; 7196A, 2320B/310.1; SM3500 Fe D; 40CFR136/415.2; EPA 300.0; EPA 376.2

QC SAMPLE (CIRCLE): FD MS/MSD EQ Blank TOTAL PURGED (GAL): N/A

Field Duplicate ID : N/A Field Duplicate Time: N/A

Comments: Field parameters collected after all samples were collected.

Groundwater Purging and Sampling Form

CH2MHILL

SITE: UPRR-Freeman **Well ID:** Lashaw well spigot

Field Team: LB/RM Date: 11/30/16

Weather/Temp: Upper 30's, Arrival Time: 1250

Well Condition: Outdoor spigot - middle of backlawn **Initial DTW (ft btc):** N/A

Purge Method: N/A Purge Rate [5]:

Field Parameters [1]										
Time	DTW [2]	Purge Vol. (gal)	Temp (°C)	pH	mS/cm Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
✓	**Begin Pumping**								
1330	N/A	N/A	8.2	7.71	0.353	0.0	6.88	165	no odor, clear
Stabilization Criteria [3]	-	-	-	± 0.1 units	± 3%	± 10% [4]	± 0.3 mg/L	± 10 mV	-

RM 11/30/16

[1] collect field parameters in 3-5 minute intervals

[2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs

[5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: Lashaw-GW-113016 **Sample Time:** 1300

Analysis: 8260B; 6010; 7196A, 2320B/310.1; SM3500FeD; 40CFR136/415.2, EPA 300.0; EPA 376.

QC SAMPLE (CIRCLE): FD MS/MSD EQ Blank TOTAL PURGED (GAL): NA

Field Duplicate ID : ✓ Field Duplicate Time: ✓

Comments: Field parameters collected after samples were collected

Groundwater Purging and Sampling Form

CH2MHILL

SITE: UPRR-Freeman **Well ID:** Silva Residence Spigot

Field Team: LB/RM Date: 11/30/16

Weather/Temp: Upper 30's Arrival Time: 1340

Well Condition: Outdoor Residence Spigot **Initial DTW (ft btc):** NA

Purge Method: NA Purge Rate [5]:

Field Parameters [1]									
Time	DTW [2]	Purge Vol. (gal)	Temp (°C)	pH	Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
	Begin Pumping								
1420	✓	✓	15.5	7.31	0.493	12.9	4.42	273	✓
					YK15				
Stabilization Criteria [3]	-	-	-	± 0.1 units	± 3%	± 10% [4]	± 0.3 mg/L	± 10 mV	-

[1] collect field parameters in 3-5 minute intervals

[2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs

[5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: Silva-GW-113016 **Sample Time:** 1400

Analysis: 8260B; 6010; 7196A; 2320B/310.1; SM3500 Fe D; 40 CFR 136/415.2; EPA 300.0; EPA-376.2

QC SAMPLE (CIRCLE): FD MS/MSD EQ Blank TOTAL PURGED (GAL):

Field Duplicate ID : ✓ Field Duplicate Time: ✓

Comments: Parameters Collected after Sampling

Groundwater Purging and Sampling Form

CH2MHILL

SITE: UPRR - Freeman **Well ID:** Reed (w30)

Field Team: LB/KM Date: 12-1-16

Weather/Temp: 32° Lt Snow Arrival Time: 0855

Well Condition: Outside spigot **Initial DTW (ft btc):** /

Purge Method: / Grab Purge Rate [5]: NA

Field Parameters [1]									
Time	DTW [2]	Purge Vol. (gal)	Temp (°C)	pH	Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
	Begin Pumping								
0924	/	/	9.2	6.35	.392	0.0	7.82	196	
					AKB				
Stabilization Criteria [3]	-	-	-	± 0.1 units	± 3%	± 10% [4]	± 0.3 mg/L	± 10 mV	-

[1] collect field parameters in 3-5 minute intervals

[2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs

[5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: Reed (W-30) - GW - 120116 **Sample Time:** 0905

Analysis:

QC SAMPLE (CIRCLE): FD MS/MSD EQ Blank TOTAL PURGED (GAL):

Field Duplicate ID : Field Duplicate Time:

Comments:

Groundwater Purging and Sampling Form

CH2MHILL

SITE: UPRR Freeman WA **Well ID:** LANG Well, Freeman Store spigot

Field Team: RMcCord **Date:** 2/24/17

Weather/Temp: upper 20s °F, light snow, breezy **Arrival Time:** 0825

Well Condition: Freeman Store outside spigot **Initial DTW (ft btc):** N/A

Purge Method: GRAB **Purge Rate**[5]: GRAB

Field Parameters[1]									
Time	DTW[2]	Purge Vol. (gal)	Temp (°C)	pH	Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
	Begin Pumping								
0840					mS/m	6.63			
2/25 1000	N/A	GRAB	8.1	6.9	49.7	8.2	15.59	351	clear, no odor
Stabilization Criteria[3]	-	-	-	± 0.1 units	± 3%	± 10%[4]	± 0.3 mg/L	± 10 mV	-

[1] collect field parameters in 3-5 minute intervals

[2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs

[5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: LANG-GW-022417 **Sample Time:** 0830

Analysis: 8260B; EPA6010; 2320B/310.1; 300.0; SM2540C; 40CFR136/415.2; 376.2; RSK-175 GC-FID

QC SAMPLE (CIRCLE): FD MS/MSD EQ Blank TOTAL PURGED (GAL): N/A

Field Duplicate ID: N/A Field Duplicate Time:

Comments: Inoperable Water quality meter @ time of sampling on 2/24/17.
Ferrous IRON = 0.00 mg/L

Groundwater Purging and Sampling Form

CH2MHILL

SITE: UPRR Freeman, WA **Well ID:** SILVA, back of house spigot

Field Team: RMcCaul Date: 2/24/17

Weather/Temp: 28°F, overcast, light winds Arrival Time: 0950

Well Condition: Spigot at back of house **Initial DTW (ft btc):** N/A

Purge Method: GRAB Purge Rate[5]: GRAB

Field Parameters[1]									
Time	DTW[2]	Purge Vol. (gal)	Temp (°C)	pH	Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
	Begin Pumping				mS/m				
2/25 1110	N/A	GRAB	15.5	7.1	46.3	0.0	7.44	298	
Stabilization Criteria[3]	-	-	-	± 0.1 units	± 3%	± 10%[4]	± 0.3 mg/L	± 10 mV	-

[1] collect field parameters in 3-5 minute intervals [2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs [5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: SILVA-GW-022417 **Sample Time:** 1010

Analysis: 8260B; EPA6010; 2320B/310.1, 300.0; SM 2540C; 40CFR 136/415.2; 376.2; RSK-175 GC FI

QC SAMPLE (CIRCLE): (FD) MS/MSD EQ Blank TOTAL PURGED (GAL): N/A

Field Duplicate ID: GWFD-01-022417 Field Duplicate Time: 1015

Comments: Ferrous Iron = 0.02 mg/L

Groundwater Purging and Sampling Form

CH2MHILL

SITE: UPRR Freeman, WA **Well ID:** LASHAW-spigot in front yd

Field Team: RMcCord Date: 2/24/17

Weather/Temp: 28°F, overcast, light wind Arrival Time: 1100

Well Condition: Spigot in front yd - near antique disc **Initial DTW (ft btc):** N/A

Purge Method: GRAB Purge Rate[5]: GRAB

Field Parameters[1]

Time	DTW[2]	Purge Vol. (gal)	Temp (°C)	pH	Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
	Begin Pumping				mS/M				
1125	N/A	GRAB	5.7	7.6	40.4	6.3	11.33	296	clear, no [illegible]
Stabilization Criteria[3]	-	-	-	± 0.1 units	± 3%	± 10%[4]	± 0.3 mg/L	± 10 mV	-

[1] collect field parameters in 3-5 minute intervals

[2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs

[5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: LASHAW-GW-022417 **Sample Time:** 1115

Analysis: 8260B, EPA6010; 2320B/310.1, 300.0, SM2540C, 40CFR136/415.2, 376.2, RSK175 GC-FID

QC SAMPLE (CIRCLE): FD MS/MSD EQ Blank TOTAL PURGED (GAL): N/A

Field Duplicate ID : N/A Field Duplicate Time:

Comments: Ferrous Iron = 0.09 mg/L

Groundwater Purging and Sampling Form

CH2MHILL

SITE: UPRR Freeman, WA **Well ID:** Reed Spigot from side of

Field Team: RMcCord Date: 2/24/17

Weather/Temp: 30°F, mostly cloudy, calm Arrival Time: 1200

Well Condition: Spigot from side of yard **Initial DTW (ft btc):** N/A

Purge Method: GRAB Purge Rate[5]: GRAB

Field Parameters[1]									
Time	DTW[2]	Purge Vol. (gal)	Temp (°C)	pH	Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
	Begin Pumping				mS/m				
2/25 1050	N/A	GRAB	3.7	7.2	37.2	0.0	12.64	281	Clear, no odor
Stabilization Criteria[3]	-	-	-	± 0.1 units	± 3%	± 10%[4]	± 0.3 mg/L	± 10 mV	-

[1] collect field parameters in 3-5 minute intervals

[2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs

[5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: REED-GW-022417 **Sample Time:** 1210

Analysis: 8260B; EPA600; 2320B/310.1; 300.0; SM2540C; 40CFR 136/415.2; 376.2; RSK-175GC-FID

QC SAMPLE (CIRCLE): FD MS/MSD EQ Blank TOTAL PURGED (GAL): N/A

Field Duplicate ID: N/A Field Duplicate Time:

Comments: Ferrous IRON = 0.000 mg/L

Groundwater Purging and Sampling Form

CH2MHILL

SITE: UPRR Freeman **Well ID:** Davey well - spigot east side house

Field Team: RMcCord Date: 2/24/17

Weather/Temp: 30°F; partly cloudy, light wind Arrival Time: 1310

Well Condition: Spigot on east side of house **Initial DTW (ft btc):** N/A

Purge Method: GRAB Purge Rate[5]: GRAB

Field Parameters[1]									
Time	DTW[2]	Purge Vol. (gal)	Temp (°C)	pH	Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
	Begin Pumping				mS/cm				
2/25 1015	N/A	GRAB	6.5	7.3	54.0	9.6	13.52	360	clear, no odor
Stabilization Criteria[3]	-	-	-	± 0.1 units	± 3%	± 10%[4]	± 0.3 mg/L	± 10 mV	-

[1] collect field parameters in 3-5 minute intervals

[2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs

[5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: DAVEY-GW-022417 **Sample Time:** 1315

Analysis: 8260B, EPA Cond; 2320B/310.1; 300; SM2540C, 40CFR 136/415.2; 376.2, RSK-175 GC-FID

QC SAMPLE (CIRCLE): FD MS/MSD EQ Blank TOTAL PURGED (GAL): N/A

Field Duplicate ID: N/A Field Duplicate Time:

Comments: Ferrous IRON = 0.11 mg/L

Groundwater Purging and Sampling Form

CH2MHILL

SITE: UPRR Freeman **Well ID:** Asher

Field Team: RMcComb Date: 2/24/17

Weather/Temp: 30's F; partly cloudy, light wind Arrival Time: 1430

Well Condition: Spigot, front of house, next to garage door **Initial DTW (ft btc):** N/A

Purge Method: GRAB Purge Rate[5]: GRAB

Field Parameters[1]									
Time	DTW[2]	Purge Vol. (gal)	Temp (°C)	pH	Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
	Begin Pumping				mS/m				
2/25 1230	N/A	GRAB	18.6	7.2	87.0	0.0	6.97	304	clear, no odor
Stabilization Criteria[3]	-	-	-	± 0.1 units	± 3%	± 10%[4]	± 0.3 mg/L	± 10 mV	-

[1] collect field parameters in 3-5 minute intervals

[2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs

[5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: ASHER-GW-022417 **Sample Time:** 1440

Analysis: 8260B; EPA6010; 2320B/310.1; 300.0; SM2540C; 40 CFR 136/415.2; 376.2; RSK-175 GC-FID

QC SAMPLE (CIRCLE): FD MS/MSD EQ Blank TOTAL PURGED (GAL): N/A

Field Duplicate ID: N/A Field Duplicate Time:

Comments: Ferrous Iron = 0.00 mg/L

Groundwater Purging and Sampling Form

CH2MHILL

SITE: UPRR Freeman **Well ID:** MW-9D

Field Team: R McComb / S Bartow Date: 2/27/17

Weather/Temp: snowing, 30° F Arrival Time: 0930

Well Condition: Good **Initial DTW (ft btc):** 30.91

Purge Method: Submersible pump Purge Rate[5]: 400 mL/min

Field Parameters[1]									
Time	DTW[2]	Purge Vol. (gal)	Temp (°C)	pH	mS/cm Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
1035	**Begin Pumping** 30.9								
1035	30.9	~1	8.61	6.54	0.526	23.7	19.09	147	400mL/min
1043	31.01	1	8.82	6.89	0.535	25.7	10.99	144	
1051	31.01	1.5	8.09	6.94	0.529	15.4	8.54	134	
1056	31.01	1.8	8.20	6.93	0.531	15.9	8.18	132	
1101	31.01	2.2	8.12	6.95	0.528	15.1	7.95	131	
1106	31.01	2.5	7.82	6.95	0.523	4.8	7.86	129	
1111	30.96	2.7	7.86	6.95	0.534	7.0	7.67	129	
1116	30.98	3.0	7.62	6.95	0.530	9.7	7.84	128	
Stabilization Criteria[3]	-	-	-	± 0.1 units	± 3%	± 10%[4]	± 0.3 mg/L	± 10 mV	-

[1] collect field parameters in 3-5 minute intervals

[2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs

[5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: MW9D-GW-022717 **Sample Time:** 1120

Analysis: 8260B; EPA 6010; 2320B/310.1; SM 2540C, 400 CFR 136/415.2; 376.2 RSK-175 GCFI

QC SAMPLE (CIRCLE): FD MS/MSD EQ Blank TOTAL PURGED (GAL):

Field Duplicate ID : Field Duplicate Time:

Comments: Ferrous Iron → Ferrous Iron = 0.01 mg/L

pump stopped @ 47

pump at 70'

Groundwater Purging and Sampling Form

CH2MHILL

SITE: UPRR- Fremont **Well ID:** MW-14D

Field Team: R McComb / S Barton Date: 2/27/17

Weather/Temp: snowing, 30°F Arrival Time: 1230

Well Condition: good **Initial DTW (ft btc):** 18.52

Purge Method: submersible pump Purge Rate[5]:

Field Parameters[1]									
Time	DTW[2]	Purge Vol. (gal)	Temp (°C)	pH	Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
1250	**Begin Pumping**								SS tan
1250	20.98	-	7.42	7.44	0.324	887 H.S	15.70	124	slightly ~~gray~~ tan slightly cloudy
1258	20.54	1.1	7.13	7.42	0.324	>887	8.37	121	cloudy, tan
1304	20.53	1.75	7.21	7.42	0.321	780	5.49	117	" "
1309	20.53	2.0	7.21	7.42	0.320	640	5.15	116	" "
1314	20.45	2.5	7.29	7.43	0.318	493	4.78	113	" "
1319	20.21	2.75	7.19	7.43	0.316	395	4.74	110	" light tan
1324	19.84	3.25	6.93	7.45	0.316	336	4.76	108	" "
1329	19.83	3.5	7.03	7.44	0.317	274	4.69	112	" "
1334	19.83	3.75	7.06	7.45	0.318	237	4.61	114	" "
1339	19.75	4.0	6.97	7.46	0.320	200	4.63	112	" "
1344	19.80	4.25	6.95	7.45	0.323	174	4.55	111	" " → see back
Stabilization Criteria[3]	-	-	-	± 0.1 units	± 3%	± 10%[4]	± 0.3 mg/L	± 10 mV	-

[1] collect field parameters in 3-5 minute intervals

[2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs

[5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: MW14D-GW-022717 **Sample Time:** 1425

Analysis: 8260B; EPA6010; 2320B/310.1; SM 2540C; 40CFR136/415.2; 376.2; RSK-175 GC-FID

QC SAMPLE (CIRCLE): FD MS/MSD EQ Blank TOTAL PURGED (GAL): 6.0

Field Duplicate ID: N/A Field Duplicate Time:

Comments: pump at 127' & 35

Horiba sonde not reading turbidity accurately

Ferrous IRON = 0.12 mg/L

(See BACK)

Groundwater Purging and Sampling Form

CH2MHILL

SITE: UFRR Freeman **Well ID:** MW-13S

Field Team: R. McComb, S. Bartow Date: 2/28/17

Weather/Temp: 24° F, sunny Arrival Time: _____

Well Condition: good **Initial DTW (ft btc):** 9.76

Purge Method: bailer Purge Rate[5]: _____

Field Parameters[1]									
Time	DTW[2]	Purge Vol. (gal)	Temp (°C)	pH	Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
	Begin Pumping								
0905			4.95	6.71	0.382	40.8	12.36	157	clear, odorless
0914 post sampling	12.77		~~4.~~						
Stabilization Criteria[3]	-	-	-	± 0.1 units	± 3%	± 10%[4]	± 0.3 mg/L	± 10 mV	-

[1] collect field parameters in 3-5 minute intervals

[2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs

[5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: MW13S-GW-022817 **Sample Time:** 0900

Analysis: 8260B; EPA6010, 2320B/310.1, SM2540C; 40CFR136/415.2; 376.2; RSK-175 GC FI

QC SAMPLE (CIRCLE): FD MS/MSD EQ Blank TOTAL PURGED (GAL): _____

Field Duplicate ID: N/A Field Duplicate Time: _____

Comments: 5 gallons removed by bailer @ 1345

10 gallons " " " @ 1430

8 gallons removed by bailer @ 1500

Ferrous Iron = 0.08 mg/L

Groundwater Purging and Sampling Form

CH2MHILL

SITE: UPRR Freeman **Well ID:** MW-2D

Field Team: S Burton, R McComb Date: 2/28/17

Weather/Temp: 26°F, sunny Arrival Time: 1000

Well Condition: good **Initial DTW (ft btc):** 31.43

Purge Method: submersible pump Purge Rate[5]:

Field Parameters[1]									
Time	DTW[2]	Purge Vol. (gal)	Temp (°C)	pH	Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
1040	**Begin Pumping** DTW = 31.95 at start of pumping								
1045	33.15	0.6	7.76	8.83	0.292	28.6	12.36	-208	clear, colorless
1050	33.16	1.0	7.80	8.31	0.307	21.7	7.13	-209	" "
1055	33.53	1.25	7.78	8.26	0.323	15.6	5.34	-207	" "
1100	33.65	1.6	8.27	8.20	0.346	13.6	4.37	-202	" "
1105	33.7	2.1	8.28	8.15	0.353	10.5	3.49	-201	" "
1110	33.4	2.6	8.13	8.12	0.358	8.76	3.06	-200	" "
1115	33.81	3.0	8.45	8.11	0.361	5.52	2.89	-198	
1120	33.81	3.3	8.53	8.06	0.361	6.93	2.76	-191	
Stabilization Criteria[3]	-	-	-	± 0.1 units	± 3%	± 10%[4]	± 0.3 mg/L	± 10 mV	-

[1] collect field parameters in 3-5 minute intervals [2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs [5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: MW2D-GW-022817 **Sample Time:** 1125

Analysis: 8260B; EPA6010, 2320B/310.1, SM2540C; 40 CFR136/415.2, 376.2; RSK-175

QC SAMPLE (CIRCLE): FD MS/MSD EQ Blank TOTAL PURGED (GAL): 4 gal GC-FID

Field Duplicate ID : Field Duplicate Time:

Comments: vault was 1/2 full of water

pump at 45

Hach used for turbidity

Ferrous Iron = 0.28mg/L

Groundwater Purging and Sampling Form

CH2MHILL

SITE: UPRR Freeman **Well ID:** MW-1D

Field Team: McCord/Bartow Date: 2/28/17

Weather/Temp: Clear, light to moderate wind, upper 20s Arrival Time: 1240

Well Condition: Good **Initial DTW (ft btc):** 22.30

Purge Method: submersible pump Purge Rate[5]:

Field Parameters[1]									
Time	DTW[2]	Purge Vol. (gal)	Temp (°C)	pH	Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
1319	**Begin Pumping**	DTW = 19.17 & start							
1325	23.89	0.5	8.57	7.58	0.373	54.5	20.52	-102	clear, light yellow
1328	24.68	0.75	8.23	7.47	0.396	36.2	10.37	-53	" "
1333	25.70	0.90	8.27	7.39	0.398	61.8	6.66	161	" "
1338	25.95	1.2	8.26	7.36	0.402	43.1	5.09	444	" "
1343	26.84	1.25	7.88	7.36	0.402	39.7	4.35	486	" very light yellow
1348	27.45	1.75	8.48	7.38	0.399	27.0	4.06	187	
1353	27.34	2.0	8.26	7.46	0.402	51.4	3.75	101	
1358	27.36	2.25	8.15	7.42	0.401	20.5	3.17	-8	
1403	28.84	2.5	8.82	7.43	0.402	15.6	2.76	-77	
1408	29.01	3.0	8.54	7.48	0.407	12.4	2.55	-107	
1413	29.03	3.2	8.54	7.49	0.404	29.5	2.52	-117	
Stabilization Criteria[3]	-	-	-	± 0.1 units	± 3%	± 10%[4]	± 0.3 mg/L	± 10 mV	-

→ see back

[1] collect field parameters in 3-5 minute intervals

[2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs

[5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: MW1D-GW-022817 **Sample Time:** 1440

Analysis: 8260B; SM6000, 2320B/310.1; SM2540C; 40CFR136/415.2; 376.2; RSK-175 (Fe, CH4)

QC SAMPLE (CIRCLE): FD MS/MSD EQ Blank TOTAL PURGED (GAL):

Field Duplicate ID : Field Duplicate Time:

Comments: pump at 38 → bumped up to 40 → 42 → 43 Due to low flow

Ferrous Iron = 0.58 mg/L

(SEE BACK)

Groundwater Purging and Sampling Form

CH2MHILL

SITE: UPRR Freeman **Well ID:** MW-9S

Field Team: McComb/Barton Date: 02/28 - 03/01

Weather/Temp: 33° F / cloudy Arrival Time: 0715

Well Condition: Water in vault **Initial DTW (ft btc):** 31.53'

Purge Method: Bailer Purge Rate[5]:

Field Parameters[1]									
Time	DTW[2]	Purge Vol. (gal)	Temp (°C)	pH	Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
0815	**Begin Pumping**								
0852	—	—	7.42	6.13	0.578	230	7.17	176	tan, cloudy
Stabilization Criteria[3]	-	-	-	± 0.1 units	± 3%	± 10%[4]	± 0.3 mg/L	± 10 mV	-

[1] collect field parameters in 3-5 minute intervals

[2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs

[5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: MW9S-GW-030117 **Sample Time:** 0815

Analysis: 8260B, EPA6010; 2320B; 310.1; SM2540C; 40CFR 136/415.2; 376.2; RSK-175 GC-FID, CSIA, BOD, COD

QC SAMPLE (CIRCLE): FD MS/MSD EQ Blank TOTAL PURGED (GAL): —

Field Duplicate ID : Field Duplicate Time:

Comments: Bailer 8 gallons on 2/28 - (purge before sampling)

Ferrous IRON = 0.00 mg/L

Groundwater Purging and Sampling Form

CH2MHILL

SITE: UPRR Freeman **Well ID:** MW-7S

Field Team: McComb/Barlow Date: 2/28-03/01

Weather/Temp: 33° F cloudy Arrival Time: 0900

Well Condition: Good **Initial DTW (ft btc):** 29.05

Purge Method: Bailer Purge Rate[5]:

Field Parameters[1]									
Time	DTW[2]	Purge Vol. (gal)	Temp (°C)	pH	Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
0915	**Begin Pumping**								
0942	—	—	6.72	6.86	0.352	27.6	7.60	134	slightly cloudy light tan
Stabilization Criteria[3]	-	-	-	± 0.1 units	± 3%	± 10%[4]	± 0.3 mg/L	± 10 mV	-

[1] collect field parameters in 3-5 minute intervals

[2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs

[5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: MW7S-GW-030117 **Sample Time:** 0925

Analysis: 8260B; 6PAH6010; 2320B/310.1; SM 2540C, 40CFR136/415.2; 376.2; RSK175-GC-FID

QC SAMPLE (CIRCLE): FD MS/MSD EQ Blank TOTAL PURGED (GAL):

Field Duplicate ID : Field Duplicate Time:

Comments: 10 gallons purged 2/28/17 @ 1430 - (Purge before sampling)

Ferrous Iron = 0.08 mg/L

Groundwater Purging and Sampling Form

CH2MHILL

SITE: UPRR Freeman **Well ID:** MW-5D

Field Team: R. McComb/S. Barton Date: 3/1/17

Weather/Temp: 36°F sunny Arrival Time:

Well Condition: good **Initial DTW (ft btc):** 63.33

Purge Method: submersible pump Purge Rate[5]:

Field Parameters[1]									
Time	DTW[2]	Purge Vol. (gal)	Temp (°C)	pH	Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
1058	**Begin Pumping** 61.30								
1059	65.05	0.5	9.30	7.43	0.461	29.0	10.36	66	vsc, very light yello
1104	64.4	0.75	9.12	7.39	0.459	31.4	6.61	81	" "
1109	64.44	1.0	9.12	7.38	0.460	30.3	5.21	91	" "
1114	64.45	1.25	9.37	7.38	0.459	22.2	4.41	97	" "
1119	64.23	1.5	9.38	7.39	0.458	30.6	3.87	101	" "
1124	64.35	1.8	9.35	7.39	0.456	15.3	3.67	102	clear, colorless
1127	64.3	2.05	9.42	7.39	0.458	13.3	3.65	103	" "
1130	64.32	2.25	9.42	7.40	0.458	11.7	3.59	103	" "
1133	64.32	2.4	9.34	7.40	0.457	10.2	3.54	104	" "
1136	64.32	2.6	9.34	7.40	0.457	9.78	3.49	105	" "
Stabilization Criteria[3]	-	-	-	± 0.1 units	± 3%	± 10%[4]	± 0.3 mg/L	± 10 mV	-

[1] collect field parameters in 3-5 minute intervals

[2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs

[5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: MW5D-GW-030117 **Sample Time:** 1140

Analysis: 8260B; EPA600 2320B/3107, SM2540C, 40CFR136/415.2, 3762; RSK-175-GC-FID

QC SAMPLE (CIRCLE): FD MS/MSD EQ Blank TOTAL PURGED (GAL): 3.0

Field Duplicate ID : Field Duplicate Time:

Comments: pump at 81

Ferrous Iron = 0.00 mg/L

Groundwater Purging and Sampling Form

CH2MHILL

WS5-Effluent-VOCs only

SITE: UPRR Fremont **Well ID:** WS5-Influent

Field Team: Barton, McComb Date: 3/1/17

Weather/Temp: 41° F cloudy, windy Arrival Time: 1200

Well Condition: **Initial DTW (ft btc):** N/A

Purge Method: Purge Rate[5]:

Field Parameters[1]									
Time	DTW[2]	Purge Vol. (gal)	Temp (°C)	pH	Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
	Begin Pumping								
1245	—	—	9.73	7.30	0.362	0	6.95	~~197~~ 109	clear, colorless
Stabilization Criteria[3]	-	-	-	± 0.1 units	± 3%	± 10%[4]	± 0.3 mg/L	± 10 mV	-

[1] collect field parameters in 3-5 minute intervals

[2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs

[5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: WS5 Influent - GW-030117 **Sample Time:** 1215

Analysis: 8260B; EPA 6010; 2320B/310.7; SM 2540C, 40CFR136/415.2; 376.2; RSK-175 6 containers

QC SAMPLE (CIRCLE): FD MS/MSD EQ Blank TOTAL PURGED (GAL): —

Field Duplicate ID : Field Duplicate Time:

Comments:

0.05 mg/L = Ferrous Iron (Influent)

→ + WS5 Effluent - GW-030117 (for VOCs only) - parameters = ferrous iron were not measured

Groundwater Purging and Sampling Form

CH2MHILL

SITE: UPRR Freeman **Well ID:** MW-6D

Field Team: S. Barton, R. McComb Date: 3/1/17

Weather/Temp: 41°F cloudy, windy Arrival Time: 1345

Well Condition: good **Initial DTW (ft btc):** 131.4

Purge Method: submersible pump Purge Rate[5]:

Field Parameters[1]									
Time	DTW[2]	Purge Vol. (gal)	Temp (°C)	pH	Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
1418	**Begin Pumping**								
1428	131.6	0.25	7.18	7.46	0.345	7.62	8.99	130	clear/colorless
1433	131.45	0.5	7.55	7.54	0.375	3.59	6.36	100	" "
1438	131.48	0.75	7.12	7.49	0.381	3.09	4.89	93	" "
1443	131.43	1.0	6.80	7.49	0.379	3.11	6.51	92	" "
1448	131.43	1.1	6.64	7.50	0.378	3.09	5.86	96	" "
1453	131.45	1.25	6.49	7.49	0.386	2.37	4.39	95	" "
1458	131.46	1.5	6.59	7.45	0.395	1.81	4.13	89	" "
1503	131.48	1.75	7.28	7.45	0.396	2.57	4.52	87	" "
Stabilization Criteria[3]	-	-	-	± 0.1 units	± 3%	± 10%[4]	± 0.3 mg/L	± 10 mV	-

[1] collect field parameters in 3-5 minute intervals

[2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs

[5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: MW6D-GW-030117 **Sample Time:** 1510

Analysis: 8260B, EPA 6010; 2320B/310.1, SM2540C, 40 CFR 136/415.2; 376.2; RSK-175-GC-FID

QC SAMPLE (CIRCLE): FD MS/MSD EQ Blank TOTAL PURGED (GAL): 5

Field Duplicate ID: FD-030117 Field Duplicate Time: 1000

Comments: pump at 221 → 235

Ferrous Iron = 0.00 mg/L

FD-030117 @1000

MS/MSD: MW6D-GW-030117-MS & MW6D-GW-030117-MSD

Groundwater Purging and Sampling Form

CH2MHILL

SITE: UPRR Freeman **Well ID:** MW18D

Field Team: S Barton R McComb Date: 3/2/17

Weather/Temp: 43°F, mostly cloudy Arrival Time: 1440

Well Condition: good **Initial DTW (ft btc):** 50.20

Purge Method: submersible pump Purge Rate[5]:

Field Parameters[1]									
Time	DTW[2]	Purge Vol. (gal)	Temp (°C)	pH	Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
1520	**Begin Pumping** 50.35 DTW								
1525	50.25	0.5	7.70	7.82	0.387	113	4.68	11	light tan slightly cloudy
1530	50.30	1.0	7.97	7.82	0.386	105	3.57	-5	" "
1535	50.30	1.25	7.96	7.82	0.385	87.3	3.14	-30	very light tan slightly cloudy
1540	50.30	2.25	8.32	7.83	0.382	35.6	2.26	-58	" clear
1545	50.20	2.5	8.13	7.84	0.380	28.0	2.16	-64	clear colorless
1550	50.25	2.75	7.87	7.88	0.377	25.4	1.80	-73	" "
1555	50.25	3.0	7.71	7.84	0.375	19.0	1.62	-78	" "
1600	50.25	3.5	~~7.55~~ 8.04	7.85	0.376	14.5	1.47	-77	" "
1603	50.25	3.75	7.58	7.85	0.373	12.2	1.50	-77	" "
1606	50.25	4.0	7.99	7.85	0.377	12.2	1.34	-81	" "
1609	50.25	4.25	7.93	7.85	0.374	12.2	1.31	-84	
Stabilization Criteria[3]	-	-	-	± 0.1 units	± 3%	± 10%[4]	± 0.3 mg/L	± 10 mV	-

[1] collect field parameters in 3-5 minute intervals [2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs [5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: MW18D-GW-030217 **Sample Time:** 1620

Analysis: 8260B; EPA6010, EPA2320B/310.1; EPA300.0, SM2540C; 40CFR136/415.2 RSK 175 GCFID, Ferrous Iron

QC SAMPLE (CIRCLE): FD MS/MSD EQ Blank TOTAL PURGED (GAL):

Field Duplicate ID : Field Duplicate Time:

Comments: pump @ 64 w/ cover off 56 w cover on

Ferrous IRON = 0.00 mg/L

Groundwater Purging and Sampling Form

CH2MHILL

SITE: UPRR Fruman **Well ID:** MW-16D

Field Team: S Bartan, R. McComb Date: 3/2/17

Weather/Temp: 43°F, mostly cloudy Arrival Time: 1246

Well Condition: good **Initial DTW (ft btc):** 46.05

Purge Method: submersible pump Purge Rate[5]:

Field Parameters[1]									
Time	DTW[2]	Purge Vol. (gal)	Temp (°C)	pH	Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
1305	**Begin Pumping**								
1310	46.35	0.25	8.54	7.44	0.609	92.9	8.44	~~8.44~~ 136	light tan, clear
1315	46.35	0.5	8.54	7.45	0.608	75.3	6.05	129	" "
1320	46.35	0.8	8.75	7.45	0.607	46.9	5.19	107	very light tan, clear
1325 ~~1326~~	46.35	1.25	8.58	7.46	~~0.612~~ 0.610	20.8	4.66	96	" "
1330	46.35	1.5	8.82	7.46	0.612	13.3	4.50	95	clear, odorless
1335	46.30	1.8	8.81	7.45	0.613	11.6	4.33	93	" "
1340 ~~1346~~	46.25	2	8.81	7.46	0.612	10.3	4.28	93	" "
1341	46.15	2.25	8.80	7.46	0.611	8.09	4.22	94	" "
Stabilization Criteria[3]	-	-	-	± 0.1 units	± 3%	± 10%[4]	± 0.3 mg/L	± 10 mV	-

[1] collect field parameters in 3-5 minute intervals

[2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs

[5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: MW16D-GW-030217 **Sample Time:** 1345

Analysis: 8260B; EPA6010; EPA232DB/310.1; EPA 300.0; SM2540C; 40CFR136/415.2
RSK 175 GC/FID Ferrous Fe

QC SAMPLE (CIRCLE): FD MS/MSD EQ Blank TOTAL PURGED (GAL): 3.0

Field Duplicate ID: FD-030217 Field Duplicate Time: 1100

Comments: pumped 61 → turned down to 59

Ferrous Iron 0.00 mg/L

Groundwater Purging and Sampling Form

CH2MHILL

SITE: UPRR Fruitvale **Well ID:** MW-12S

Field Team: S. Barton, R. McComb Date: 3/2/17

Weather/Temp: 38° F Cloudy Arrival Time: 0940

Well Condition: good **Initial DTW (ft btc):** 42.62

Purge Method: bail Purge Rate[5]: —

Field Parameters[1]									
Time	DTW[2]	Purge Vol. (gal)	Temp (°C)	pH	mS/cm Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
	Begin Pumping								
1000	42.62	end of GRAB	7.80	7.12	0.778	190	10.99	52	tan, no odor
Stabilization Criteria[3]	-	-	-	± 0.1 units	± 3%	± 10%[4]	± 0.3 mg/L	± 10 mV	-

[1] collect field parameters in 3-5 minute intervals

[2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs

[5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: MW12S-GW-030217 **Sample Time:** 1000

Analysis: 8260B; EPA6010, EPA2320B/3101; EPA 300.0; SM2540C, 40CFR136/415.2; 376.2 RSK175 GC/FID, Ferrous Fe

QC SAMPLE (CIRCLE): FD MS/MSD EQ Blank TOTAL PURGED (GAL): —

Field Duplicate ID: — Field Duplicate Time: —

Comments: bailed 3 gallons on 3/1/17

Ferrous Flow = 0.27 mg/L

Groundwater Purging and Sampling Form

CH2MHILL

SITE: UPRR - Freeman **Well ID:** MW11S

Field Team: S Bartal, R. McComb Date: 3/2/17

Weather/Temp: 40° mostly cloudy Arrival Time: 1035

Well Condition: good **Initial DTW (ft btc):** 57.10

Purge Method: bailer Purge Rate[5]: —

Field Parameters[1]									
Time	DTW[2]	Purge Vol. (gal)	Temp (°C)	pH	Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
	Begin Pumping				mS/cm				
1050	57.10	end of GRAB	8.02	7.54	0.437 (EW) 12t (EW)	27.5 (EW)	11.76	117	Light tan, no odor
Stabilization Criteria[3]	-	-	-	± 0.1 units	± 3%	± 10%[4]	± 0.3 mg/L	± 10 mV	-

[1] collect field parameters in 3-5 minute intervals

[2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs

[5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: MW11S-GW-030217 **Sample Time:** 1050

Analysis: 8260B · EPA6010; EPA2320B/310.1 · EPA-300.0; SM2540C, 40CFR136/415.2; 376.2, RSK 175 GC FID, Ferrous Fe

QC SAMPLE (CIRCLE): FD MS/MSD EQ Blank TOTAL PURGED (GAL): —

Field Duplicate ID: — Field Duplicate Time:

Comments: bailed 10 gallons on 3/1/17

Ferrous Iron = 0.100 mg/L

Groundwater Purging and Sampling Form

CH2MHILL

SITE: UPPER Frenchman **Well ID:** MW-65

Field Team: McCord/Barton Date: 03/03/17

Weather/Temp: Overcast, W wind, low 30s Arrival Time: 0815

Well Condition: Good **Initial DTW (ft btc):** 35.40

Purge Method: Bailer Purge Rate[5]: N/A GRAB

Field Parameters[1]									
Time	DTW[2]	Purge Vol. (gal)	Temp (°C)	pH	Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
	Begin Pumping								
0852	—	—	7.20	7.47	0.327	116	6.44	123	light tan, cloudy
Stabilization Criteria[3]	-	-	-	± 0.1 units	± 3%	± 10%[4]	± 0.3 mg/L	± 10 mV	-

[1] collect field parameters in 3-5 minute intervals

[2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs

[5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: MW65-GW-030317 **Sample Time:** 0845

Analysis: 8260B, EPA 6010, EPA 1320B/3101, EPA 300.0, SM2540G, 40CFR136/415.2, 376.2, RSK175, GC FID, Ferrous Fe

QC SAMPLE (CIRCLE): FD MS/MSD EQ Blank TOTAL PURGED (GAL): —

Field Duplicate ID: N/A Field Duplicate Time: —

Comments: Ferrous IRON = 0.10 mg/L

Groundwater Purging and Sampling Form

CH2MHILL

SITE: UPRR Fremont **Well ID:** MW-10S

Field Team: McCord/Demers Date: 03/03/17

Weather/Temp: Windy - upper 30s, overcast Arrival Time: 1000

Well Condition: Good **Initial DTW (ft btc):** 48.05

Purge Method: Bailer/ GRAB Purge Rate[5]: GRAB

Field Parameters[1]									
Time	DTW[2]	Purge Vol. (gal)	Temp (°C)	pH	mS/cm Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
	Begin Pumping								
1000	48.05	GRAB	7.92	7.54	0.574	225	1635	146	light brown, no odor
Stabilization Criteria[3]	-	-	-	± 0.1 units	± 3%	± 10%[4]	± 0.3 mg/L	± 10 mV	-

RM 3/3/17

[1] collect field parameters in 3-5 minute intervals

[2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs

[5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: MW10S-GW-030317 **Sample Time:** 1010

Analysis: 8260B; EPA6010; EPA2320B/310.1; EPA300.0; SM2540C; 40CFR136/415.2; 376.2; ASK-175GC-FE

QC SAMPLE (CIRCLE): FD MS/MSD EQ Blank TOTAL PURGED (GAL):

Field Duplicate ID : N/A Field Duplicate Time: N/A

Comments:

Ferrous IRON = 0.14 mg/L

Groundwater Purging and Sampling Form

CH2MHILL

SITE: UPRR Freeman **Well ID:** MW-85

Field Team: McCord / Demers Date: 03/03/17

Weather/Temp: Overcast, breezy, mid 30's Arrival Time: 0910

Well Condition: Good **Initial DTW (ft btc):** 35.18

Purge Method: Bailer Purge Rate[5]: GRAB

Field Parameters[1]									
Time	DTW[2]	Purge Vol. (gal)	Temp (°C)	pH	ms/cm Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
	Begin Pumping								
0930	35.18	After GRAB	17.67	6.46	0.373	28.0	10.47	175	light brown, muddy
Stabilization Criteria[3]	-	-	-	± 0.1 units	± 3%	± 10%[4]	± 0.3 mg/L	± 10 mV	-

pH 3/3/17

[1] collect field parameters in 3-5 minute intervals

[2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs

[5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: _____ **Sample Time:** 0925

Analysis: 8260B, EPA 6010; EPA 332.0/310.1; EPA 300.0; SM2540C; 40CFR136/415.2; 376.2; RSK-175 DOC FE

QC SAMPLE (CIRCLE): FD MS/MSD EQ Blank TOTAL PURGED (GAL): _____

Field Duplicate ID: N/A Field Duplicate Time: N/A

Comments: _____

Ferrous IRON = 0.10 mg/L

Groundwater Purging and Sampling Form

CH2MHILL

SITE: UPRR Freeman **Well ID:** W20

Field Team: McConnell/Dennis Date: 03/03/17

Weather/Temp: Overcast, Cold/windy, upper 30's Arrival Time:

Well Condition: Good **Initial DTW (ft btc):** 18.46

Purge Method: Submersible pump Purge Rate[5]:

Field Parameters[1]									
Time	DTW[2]	Purge Vol. (gal)	Temp (°C)	pH	mS/cm Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
	Begin Pumping								
1150	18.46	initial	7.14	7.77	0.333	20.7	10.54	26	clear, no odor
1155	19.14	0.5	7.52	7.06	0.386	0.9	7.74	77	"
1200	19.58	1.25	7.54	7.02	0.385	6.1	6.52	66	"
1205	19.92	2.0	7.57	7.00	0.384	0.8	5.83	58	"
1210	20.25	3.0	7.54	7.00	0.383	1.9	5.43	49	"
1215	20.42	3.5	7.38	7.01	0.381	0.2	5.11	42	"
1220	20.55	4.0	7.17	7.02	0.381	9.3	4.95	39	"
1225	20.60	4.5	7.13	7.02	0.380	9.2	4.75	35	"
1230	20.60	5.0	7.03	7.03	0.379	8.4	4.68	34	
Stabilization Criteria[3]	-	-	-	± 0.1 units	± 3%	± 10%[4]	± 0.3 mg/L	± 10 mV	-

[1] collect field parameters in 3-5 minute intervals

[2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs

[5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: W20-GW-030317 **Sample Time:** 12:35

Analysis: 8260B; EPA6010; EPA2320B/310.1; EPA300.0; SM2540C; 40CFR136/445.2; 376.2; RSK175-GCFID

QC SAMPLE (CIRCLE): FD MS/MSD EQ Blank TOTAL PURGED (GAL):

Field Duplicate ID : N/A Field Duplicate Time:

Comments:

Ferrous IRON = 0.34 mg/L

Groundwater Purging and Sampling Form

CH2MHILL

SITE: UPRR Freeman **Well ID:** MW-3D

Field Team: McGrail/Dennis Date: 03/03/17

Weather/Temp: Overcast, breezy, mid 30s Arrival Time: 0715

Well Condition: Good-Water in vault **Initial DTW (ft btc):** 31.62

Purge Method: Submersible pump Purge Rate[5]:

Field Parameters[1]									
Time	DTW[2]	Purge Vol. ~~(gal)~~ (Liters)	Temp (°C)	pH	Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
	Begin Pumping								
0735	31.62	initial	6.99	7.19	0.310	0.3	10.44	243	Clear, no odor
0740	32.20	2	7.74	7.31	0.295	ø	10.03	232	"
0745	32.85	3	7.43	7.10	0.292	ø	8.42	227	"
0745 ~~0850~~ (PM)	33.48	4	7.03	7.18	0.287	0.4	7.48	221	"
0755 ~~0855~~ (PM)	33.89	5	7.34	7.12	0.287	1.2	7.94	216	"
0800	34.75	6	7.36	7.11	0.288	0.5	7.21	210	"
0805	35.19	7	7.74	7.11	0.290	ø	7.14	201	"
0810	35.25	8	7.65	7.12	0.289	0.4	6.62	194	"
0815	35.24	9	7.67	7.12	0.287	ø	6.58	187	"
0820	35.29	10	7.55	7.12	0.288	ø	6.59	182	
			GND						
Stabilization Criteria[3]	-	-	-	± 0.1 units	± 3%	± 10%[4]	± 0.3 mg/L	± 10 mV	-

[1] collect field parameters in 3-5 minute intervals [2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs [5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: MW3D-GW-030317 **Sample Time:** 0820

Analysis: 8260B; EPA6010; EPA2320 B/310.1; EPA300.0; SM2540C; 40CFR136/415.2; 3762; RSK-1 GCFI

QC SAMPLE (CIRCLE): FD MS/MSD EQ Blank TOTAL PURGED (~~GAL~~): 10 liters

Field Duplicate ID : N/A Field Duplicate Time: N/A

Comments: Ferrous Iron = 0.04 mg/L

Pump on 42.

Groundwater Purging and Sampling Form

CH2MHILL

SITE: UPRR Freeman **Well ID:** MW-4D

Field Team: McComb / Demus Date: 3-3-17

Weather/Temp: Overcast, wind 0-5mph, upper 30's Arrival Time:

Well Condition: Good **Initial DTW (ft btc):** 110.68

Purge Method: Submersible - 187 Purge Rate[5]:

Field Parameters[1]									
Time	DTW[2]	Purge Vol. (gal)	Temp (°C)	pH	mS/cm Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
	Begin Pumping								
13:33	110.68	Initial	7.44	7.59	0.399	0.6	9.65	84	clear, no odor
13:38	111.90	0.5	8.00	7.36	0.423	0.4	9.75	101	"
13:43	111.85	0.75	8.16	7.27	0.427	0.2	8.03	106	"
13:51	111.80	1.0	8.12	7.25	0427	0.0	6.48	107	"
13:56	111.78	1.25	8.26	7.25	0.428	0.1	6.22	105	"
14:01	111.85	1.50	8.28	7.25	0.429	0.2	5.89	104	"
14:06	111.95	1.75	8.33	7.25	0.427	0.2	5.72	102	"
14:11	111.95	2.0	8.44	7.24	0.425	0.2	5.59	102	"
14:16	111.98	2.25	8.46	7.25	0.420	0.0	5.42	102	"
Stabilization Criteria[3]	-	-	-	± 0.1 units	± 3%	± 10%[4]	± 0.3 mg/L	± 10 mV	-

[1] collect field parameters in 3-5 minute intervals

[2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs

[5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: MW4D-GW-030317 **Sample Time:** 14:20

Analysis: 8260B, EPA 6010, EPA 2320 B/310.1, EPA 300.0, SM 2540C, 40CFR 136/415.2, 376.2, RSK 175

QC SAMPLE (CIRCLE): FD MS/MSD EQ Blank TOTAL PURGED (GAL): 2.25

Field Duplicate ID: NA Field Duplicate Time:

Comments: Ferrous Iron = 0.00 mg/L

Groundwater Purging and Sampling Form

CH2MHILL

SITE: UPRR Freeman **Well ID:** W-26

Field Team: Dennis / Grace Date: 3-9-17

Weather/Temp: 33° F, overcast, breezy Arrival Time: 0740

Well Condition: PVC well JAGGED, LOOSE **Initial DTW (ft btc):** Steel ~~59.98~~ 65.98 PVC ~~59.78~~ 65.78

Purge Method: Submersible pump Purge Rate[5]:

Field Parameters[1]									
Time	* DTW[2]	Purge Vol. (gal)	Temp (°C)	pH	mS/cm Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
	Begin Pumping								
8:15	~~59.98~~ 65.98	Initial	7.05	6.47	349	0	9.18	202	
820	66.01	0.75	7.20	6.74	344	0	7.96	185	
825	66.00	1.00	6.83	6.81	344	0	6.71	173	
830	66.00	1.33	7.55	6.83	344	0	6.32	160	
835	66.00	1.50	7.42	6.86	343	0	5.64	151	
840	66.00	2.00	7.63	6.86	343	0	5.43	145	
845	66.00	~~2.50~~ 2.25	7.54	6.87	343	0	5.23	142	
850	66.00	2.50	7.27	6.87	341	0	5.10	137	
8.55	66.00	2.75	7.42	6.87	342	0	5.04	135	
Stabilization Criteria[3]	-	-	-	± 0.1 units	± 3%	± 10%[4]	± 0.3 mg/L	± 10 mV	-

[1] collect field parameters in 3-5 minute intervals

[2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs

[5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: W26-GW-030917 **Sample Time:** 900

Analysis: 8260B, 6010, 2320B/310.1, EPA300.0, SM2540C, 40 CFR 136/415.2, 376.2, RSK175

QC SAMPLE (CIRCLE): FD (MS/MSD) EQ Blank TOTAL PURGED (GAL): 2.75

Field Duplicate ID : — Field Duplicate Time:

Comments: Possible sheen on water surface. < 0.01 foot.

* DTW COLLECTED FROM STEEL CASING

FERROUS IRON: 0.04 mg/L

Groundwater Purging and Sampling Form

CH2MHILL

SITE: UPRR Freeman **Well ID:** Marlow No. 2

Field Team: Demus/Greer/Brown Date: 3-9-17

Weather/Temp: 35°F, Overcast, Breezy Arrival Time:

Well Condition: **Initial DTW (ft btc):** 42.33

Purge Method: Submersible Pump Purge Rate[5]:

Field Parameters[1]									
Time	DTW[2]	Purge Vol. (gal)	Temp (°C)	pH	Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
	Begin Pumping								
10:23	42.33	initial	7.79	7.36	0.273	572	7.7.2	85	Very turbid, oxidation
10:28	42.32	0.5	7.59	7.52	0.275	545	4.7.0	46	Turbid, oxidation
10:33	42.38	1.0	7.31	7.46	0.273	560	3.1.2	24	Turbid, oxidation
10:38	42.38	1.5	7.47	7.37	0.274	421	2.2.8	-1	Turbid, oxidation
10:43	42.38	2.0	7.43	7.36	0.275	244	1.8.1	-6	Clearing
10:48	42.38	2.5	7.30	7.35	0.275	203	1074 ~~15.5~~	-6	Clearing
10:53	42.38	3.0	7.15	7.36	0.275	191	1.53	-5	Clearing
10:58	42.38	3.25	6.67	7.36	0.276	184	1.48	-4	Clearing
Stabilization Criteria[3]	-	-	-	± 0.1 units	± 3%	± 10%[4]	± 0.3 mg/L	± 10 mV	-

[1] collect field parameters in 3-5 minute intervals

[2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs

[5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: Marlow No2 - GW - 030917 **Sample Time:** 11:00

Analysis: 8260B, 6010, 2320B, 310.1, EPA300.0, SM2540C, 40CFR136/1652, RSK175

QC SAMPLE (CIRCLE): FD MS/MSD EQ Blank TOTAL PURGED (GAL): 3.25

Field Duplicate ID : — Field Duplicate Time:

Comments: Water in well vault and entering well.

Ferrous iron = 0.10 mg/L

Groundwater Purging and Sampling Form

CH2MHILL

SITE: UPRR Freeman **Well ID:** MW-13s

Field Team: S. Demus Date: 5-31-17

Weather/Temp: 68°F, partly cloudy, breezy Arrival Time: 12:00

Well Condition: Good **Initial DTW (ft btc):**

Purge Method: Bail Purge Rate[5]: —

Field Parameters[1]									
Time	DTW[2]	Purge Vol. (gal)	Temp (°C)	pH	mS/cm Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
	Begin Pumping								
12:25	—	—	14.81	7.40	0.334	14.5	10.83	224	
Stabilization Criteria[3]	-	-	-	± 0.1 units	± 3%	± 10%[4]	± 0.3 mg/L	± 10 mV	-

[1] collect field parameters in 3-5 minute intervals [2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs [5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: MW13S-GW-053117 **Sample Time:** 12:15

Analysis: 8260, 6010/7470, 2320, 300.0, 2540, 5310, 4500, KSK175, 353.2

QC SAMPLE (CIRCLE): FD MS/MSD EQ Blank TOTAL PURGED (GAL): 19

Field Duplicate ID : — Field Duplicate Time:

Comments: Ferrous Iron = 0.03 mg/L

19 gallons bailed on 5/30/17, Sampled recharge.

Groundwater Purging and Sampling Form

CH2MHILL

SITE: UPRR Freeman **Well ID:** MW-12S

Field Team: S. Demus Date: 5-31-17

Weather/Temp: 58°F, overcast Arrival Time: 8:30

Well Condition: Good **Initial DTW (ft btc):** 38.55

Purge Method: Bail Purge Rate [5]: —

Field Parameters [1]									
Time	DTW [2]	Purge Vol. (gal)	Temp (°C)	pH	Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
	Begin Pumping								
9:15	—	—	14.89	7.52	.831	227	10.54	148	
Stabilization Criteria [3]	-	-	-	± 0.1 units	± 3%	± 10% [4]	± 0.3 mg/L	± 10 mV	-

[1] collect field parameters in 3-5 minute intervals [2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs [5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: MW12S-GW-053117 **Sample Time:** 9:05

Analysis: 8260, 6010/7470, 2320, E314300.0, 2540, 5310, 4500, RSK175, 353.2

QC SAMPLE (CIRCLE): FD MS/MSD EQ Blank TOTAL PURGED (GAL): 4

Field Duplicate ID : Field Duplicate Time:

Comments: Ferrous Iron = 0.08 mg/L

4 gallons bailed on 5-30-17. Sampled recharge.

Groundwater Purging and Sampling Form

CH2MHILL

SITE: UPRR Fremont **Well ID:** MW-11S

Field Team: S. Demus Date: 5-31-17

Weather/Temp: Arrival Time: 9:50

Well Condition: Good **Initial DTW (ft btc):** 55.40

Purge Method: Bail Purge Rate [5]: —

Field Parameters [1]									
Time	DTW [2]	Purge Vol. (gal)	Temp (°C)	pH	Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
	Begin Pumping								
			14.81	7.19	0.426	60.10	9.96	197	
Stabilization Criteria [3]	-	-	-	± 0.1 units	± 3%	± 10% [4]	± 0.3 mg/L	± 10 mV	-

[1] collect field parameters in 3-5 minute intervals

[2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs

[5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: MW11S-GW-053117 **Sample Time:** 10:10

Analysis: 8260, 6010/7470, 2320, 300.0, 2540, 5310, 4500, RSK175, 353.2

QC SAMPLE (CIRCLE): FD MS/MSD EQ Blank TOTAL PURGED (GAL): 12

Field Duplicate ID : Field Duplicate Time:

Comments: Ferrous Iron = 0.10 mg/L

12 gallons bailed on 5-30-17. Sampled recharge.

Groundwater Purging and Sampling Form

CH2MHILL

SITE: UPRR Freeman **Well ID:** MW-10s

Field Team: S. Demus Date: 5-31-17

Weather/Temp: Partly cloudy, breezy Arrival Time: 11:00

Well Condition: Good **Initial DTW (ft btc):** 46.53

Purge Method: Bail Purge Rate[5]: —

Field Parameters[1]									
Time	DTW[2]	Purge Vol. (gal)	Temp (°C)	pH	Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
	Begin Pumping								
	—	—	15.16	7.65	.533	19.5		220	
Stabilization Criteria[3]	-	-	-	± 0.1 units	± 3%	± 10%[4]	± 0.3 mg/L	± 10 mV	-

[1] collect field parameters in 3-5 minute intervals

[2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs

[5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: MW10S-GW-053117 **Sample Time:** 11:10

Analysis: 8260, 6010/7470, 2320, 300.0, 2540, 5310, 4500, RSK175, 353.2

QC SAMPLE (CIRCLE): FD MS/MSD EQ Blank TOTAL PURGED (GAL): 1.3

Field Duplicate ID : — Field Duplicate Time:

Comments: Ferrous Iron = 0.04 mg/L

gallons bailed on 5-30-17. Sample recovery

Groundwater Purging and Sampling Form

CH2MHILL

SITE: UPRR Freeman **Well ID:** MW-7S

Field Team: S. Demus Date: 5-31-17

Weather/Temp: 70°F, partly cloudy Arrival Time: 12:55

Well Condition: Good **Initial DTW (ft btc):** 27.05

Purge Method: Bail Purge Rate[5]: —

Field Parameters[1]									
Time	DTW[2]	Purge Vol. (gal)	Temp (°C)	pH	mS/cm Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
	Begin Pumping								
13:20	—	—	15.48	8.05	0.333	0.0	11.78	181	
Stabilization Criteria[3]	-	-	-	± 0.1 units	± 3%	± 10%[4]	± 0.3 mg/L	± 10 mV	-

[1] collect field parameters in 3-5 minute intervals

[2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs

[5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: MW75-GW-053117 **Sample Time:** 13:10

Analysis: 8260, 6010/7470, 2320, 300.0, 2540, 5310, 4500, RSK175, 3532

QC SAMPLE (CIRCLE): FD MS/MSD EQ Blank TOTAL PURGED (GAL): 28

Field Duplicate ID : Field Duplicate Time: —

Comments: Ferrous Iron = 0.0 mg/L

28 gallons bailed on 5-30-17. Sampled recovery.

Groundwater Purging and Sampling Form

CH2MHILL

SITE: ORR Freeman **Well ID:** Silva

Field Team: L. Baumann Date: 6-1-17

Weather/Temp: 58°, Clouds. Arrival Time: 930

Well Condition: Spigot on back porch **Initial DTW (ft btc):** /

Purge Method: Grab at spigot Purge Rate [5]:

Field Parameters [1]									
Time	DTW [2]	Purge Vol. (gal)	Temp (°C)	pH	Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
	Begin Pumping								
0958			19.13	7.49	0.401	0.6	7.51	194	
Stabilization Criteria [3]	-	-	-	±0.1 units	±3%	±10% [4]	±0.3 mg/L	±10 mV	-

[1] collect field parameters in 3-5 minute intervals

[2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs

[5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: Silva-GW-060117 **Sample Time:** 1000

Analysis:

QC SAMPLE (CIRCLE): FD MS/MSD EQ Blank TOTAL PURGED (GAL):

Field Duplicate ID : Field Duplicate Time:

Comments: Resident seems to not want to visually interact w/ samplers. Prefers to pretend to not be at home.

Fe = 0.0

Groundwater Purging and Sampling Form

CH2MHILL

SITE: UPRR - Freeman **Well ID:** Stark Residence

Field Team: L. Baumann Date: 6-1-17

Weather/Temp: Clouds 55° Arrival Time: 1040

Well Condition: / house spigot **Initial DTW (ft btc):** /

Purge Method: Spigot Purge Rate [5]: /

Field Parameters[1]									
Time	DTW[2]	Purge Vol. (gal)	Temp (°C)	pH	Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
	Begin Pumping								
1058	/	/	18.79	6.30	0.453	2.2	32.39	253	
Stabilization Criteria[3]	-	-	-	±0.1 units	±3%	±10%[4]	±0.3 mg/L	±10 mV	-

[1] collect field parameters in 3-5 minute intervals

[2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs

[5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: Stark-GW-060117 **Sample Time:** 1100

Analysis:

QC SAMPLE (CIRCLE): FD MS/MSD EQ Blank TOTAL PURGED (GAL):

Field Duplicate ID: FD02-GW-060117 Field Duplicate Time: ~~1120~~ 0800

Comments:

Groundwater Purging and Sampling Form

CH2MHILL

SITE: UPRR Freeman **Well ID:** MW-1S

Field Team: Demus / Brown Date: 6-2-17

Weather/Temp: Mostly sunny 68° Arrival Time: 11:38

Well Condition: Good **Initial DTW (ft btc):** 16.94

Purge Method: Bail Purge Rate [5]: —

Field Parameters [1]									
Time	DTW [2]	Purge Vol. (gal)	Temp (°C)	pH	Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
	Begin Pumping								
11:55	—	—	15.89	7.45	0.873	62.9	5.69	154	
Stabilization Criteria [3]	-	-	-	± 0.1 units	± 3%	± 10% [4]	± 0.3 mg/L	± 10 mV	-

[1] collect field parameters in 3-5 minute intervals

[2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs

[5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: MW1S-GW-060217 **Sample Time:** 11:45

Analysis: 8260, 6010/7420, 2320, 300.0, 2540, 5310, 4500, RSK175, 3532

QC SAMPLE (CIRCLE): FD MS/MSD EQ Blank TOTAL PURGED (GAL): 2.5

Field Duplicate ID : — Field Duplicate Time: —

Comments: Ferrous Iron = 0.00 mg/L

2.5 gallons bailed on 6-1-17 Sampled recovery.

Groundwater Purging and Sampling Form

CH2MHILL

SITE: UPRR Freeman **Well ID:** MW-65

Field Team: Demus/Brown Date: 6-2-17

Weather/Temp: Mostly Sunny 65° Arrival Time: 10:55

Well Condition: Good **Initial DTW (ft btc):** 33.84

Purge Method: Bail Purge Rate [5]:

Field Parameters [1]									
Time	DTW [2]	Purge Vol. (gal)	Temp (°C)	pH	Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
	Begin Pumping								
11:20	-	-	14.75	7.25	0.288 ~~ms~~	113	7.00	170	
Stabilization Criteria [3]	-	-	-	± 0.1 units	± 3%	± 10% [4]	± 0.3 mg/L	± 10 mV	-

[1] collect field parameters in 3-5 minute intervals

[2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs

[5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: MW65-GW-060217 **Sample Time:** 11:05

Analysis: 8260, 6010/7420, 2320, 300.0, 2540, 5310, 4500, RSK 175, 3532

QC SAMPLE (CIRCLE): FD MS/MSD EQ Blank TOTAL PURGED (GAL): 3.5

Field Duplicate ID : Field Duplicate Time: —

Comments: Ferrous Iron = 0.17 mg/L

3.5 gallons bailed on ~~5-30~~ 6-1 -17. Sampled recovery.

Groundwater Purging and Sampling Form

CH2MHILL

SITE: UPRR Freeman **Well ID:** MW-8S

Field Team: DEMUS / BROWN Date: 6-2-17

Weather/Temp: Mostly Sunny 65° Arrival Time: 10:00

Well Condition: Good **Initial DTW (ft btc):** 33.67

Purge Method: Bail Purge Rate[5]: —

Field Parameters[1]									
Time	DTW[2]	Purge Vol. (gal)	Temp (°C)	pH	Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
	Begin Pumping								
10:36	—	—	16.99	6.64	0.429 mS	27.1	6.50	161	
Stabilization Criteria[3]	-	-	-	± 0.1 units	± 3%	± 10%[4]	± 0.3 mg/L	± 10 mV	-

[1] collect field parameters in 3-5 minute intervals

[2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs

[5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: MW8S-GW-060217 **Sample Time:** 10:15

Analysis: 8260, 6010/7420, 2320, 300.0, 2540, 5310, 4500, RSK175, 3532

QC SAMPLE (CIRCLE): FD MS/MSD EQ Blank TOTAL PURGED (GAL): 4

Field Duplicate ID : Field Duplicate Time: —

Comments: Ferrous Iron = 0.02 mg/L

4 gallons bailed on ~~5-30-17~~ 6-1 JB. Sampled recovery.

Groundwater Purging and Sampling Form

CH2MHILL

SITE: UPRR Freeman **Well ID:** MW-95

Field Team: Demus/Brown Date: 06-02-17

Weather/Temp: Sunny 70° Arrival Time: 12:10

Well Condition: Good **Initial DTW (ft btc):** 30.02

Purge Method: Bail Purge Rate[5]:

Field Parameters[1]									
Time	DTW[2]	Purge Vol. (gal)	Temp (°C)	pH	Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
	Begin Pumping								
12:30	-	-	~~17.28~~ 16.40	6.35	0.549	144	5.92	157	
Stabilization Criteria[3]	-	-	-	± 0.1 units	± 3%	± 10%[4]	± 0.3 mg/L	± 10 mV	-

[1] collect field parameters in 3-5 minute intervals [2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs [5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: MW95-GW-060217 **Sample Time:** 12:25

Analysis: 8260, 6010/7420, 2320, 300.0, 2540, 5310, 4500, RSK 175, 3532

QC SAMPLE (CIRCLE): FD MS/MSD EQ Blank TOTAL PURGED (GAL): 7.0

Field Duplicate ID : Field Duplicate Time:

Comments: Ferrous Iron = 0.06 mg/L

7.0 gallons bailed on 6-1-17. Sampled recovery.

Groundwater Purging and Sampling Form

CH2MHILL

SITE: UPRR - Freeman **Well ID:** Asher - Residence

Field Team: L. Baumann/K. Stevens Date: 6-5-17

Weather/Temp: 67°F, sunny Arrival Time: ~~1555~~ 1555

Well Condition: Outside Faucett **Initial DTW (ft btc):**

Purge Method: Purge Rate [5]:

Field Parameters [1]									
Time	DTW [2]	Purge Vol. (gal)	Temp (°C)	pH	Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
	Begin Pumping								
1600			25.21	5.36	0.650	2.6	37.79	286	
Stabilization Criteria [3]	-	-	-	± 0.1 units	± 3%	± 10% [4]	± 0.3 mg/L	± 10 mV	-

[1] collect field parameters in 3-5 minute intervals

[2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs

[5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: Asher-GW-060517 **Sample Time:** 1600

Analysis:

QC SAMPLE (CIRCLE): FD MS/MSD EQ Blank TOTAL PURGED (GAL):

Field Duplicate ID : Field Duplicate Time:

Comments: Fe = 0.0

Groundwater Purging and Sampling Form

CH2MHILL

SITE: UPRR Freemon

Well ID: Lashow-~~Dom GW-0~~ Domestic

Field Team: L Baumann, K. Stevens

Date: 6-6-17

Weather/Temp: Sun, 75° F.

Arrival Time: 1245

Well Condition: Good

Initial DTW (ft btc):

Purge Method: Faucett

Purge Rate [5]:

Field Parameters [1]									
Time	DTW [2]	Purge Vol. (gal)	Temp (°C)	pH	Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
	Begin Pumping								
1310			23.15	6.53	0.297	0.8	11.33	168	
						0.86			
Stabilization Criteria [3]	-	-	-	± 0.1 units	± 3%	± 10% [4]	± 0.3 mg/L	± 10 mV	-

[1] collect field parameters in 3-5 minute intervals

[2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs

[5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: Lashow-Dom-Gw-060617

Sample Time: 1300

Analysis:

QC SAMPLE (CIRCLE): FD ~~MS/MSD~~ EQ Blank

TOTAL PURGED (GAL):

Field Duplicate ID :

Field Duplicate Time:

Comments: (Fe) 0.06

Groundwater Purging and Sampling Form

CH2MHILL

SITE: UPRR Freeman **Well ID:** Lashaw AGRICULTURA

Field Team: L. Baumann, K. Stevens Date: 6/6/17

Weather/Temp: Sun, 85 Arrival Time: 1425

Well Condition: good **Initial DTW (ft btc):** ~

Purge Method: Spigot Purge Rate [5]: —

Field Parameters [1]									
Time	DTW [2]	Purge Vol. (gal)	Temp (°C)	pH	Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
	Begin Pumping								
			20.20	5.02	.327	0.71	39.11	236	
Stabilization Criteria [3]	-	-	-	± 0.1 units	± 3%	± 10% [4]	± 0.3 mg/L	± 10 mV	-

[1] collect field parameters in 3-5 minute intervals

[2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs

[5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: Lashaw-ag-GW-060617 **Sample Time:** 1430

Analysis:

QC SAMPLE (CIRCLE): FD MS/MSD EQ Blank TOTAL PURGED (GAL):

Field Duplicate ID : Field Duplicate Time:

Comments: Ferrous Fe = 0.07

Groundwater Purging and Sampling Form

CH2MHILL

SITE: UPRR Freemont **Well ID:** Lang Well

Field Team: L. Baumann, K. Stevens Date: 6-6-17

Weather/Temp: Sun, 75°F Arrival Time: 1532

Well Condition: _____ **Initial DTW (ft btc):** /

Purge Method: _____ Purge Rate [5]: _____

Field Parameters [1]									
Time	DTW [2]	Purge Vol. (gal)	Temp (°C)	pH	Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
	Begin Pumping								
1540			20.09	6.57	0.357	7.88	14.13	179	none
Stabilization Criteria [3]	-	-	-	± 0.1 units	± 3%	± 10% [4]	± 0.3 mg/L	± 10 mV	-

[1] collect field parameters in 3-5 minute intervals

[2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs

[5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: Lang-Gw-060617 **Sample Time:** 1550

Analysis: all

QC SAMPLE (CIRCLE): FD MS/MSD EQ Blank TOTAL PURGED (GAL): _____

Field Duplicate ID : _____ Field Duplicate Time: _____

Comments: (Fe) 0.0

Groundwater Purging and Sampling Form

CH2MHILL

SITE: UPRR-Freeman **Well ID:** MW-16D

Field Team: L. Baumann, K. Stevens **Date:** 6-7-17

Weather/Temp: Sun, 70° - F **Arrival Time:** 0803

Well Condition: Good **Initial DTW (ft btc):** ~~45~~ 44.87

Purge Method: portable pump **Purge Rate**[5]: Pump Setting '47'

Field Parameters[1]									
Time	DTW[2]	Purge Vol. (gal)	Temp (°C)	pH	Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
	Begin Pumping								
0947	44.82								
1027	45.14		12.71	7.54	0.549	0/0	14.65	180	
1030	45.	3.5	13.22	7.53	0.546 +0.1	0/0	13.77	182	
1033	45.30	3.75	13.52	7.47	0.547	0/0	13.72	186	
1036	45.26	4.5	13.50	7.49	0.549	1.54	13.69	195	
1043	45.26	4.75	13.97	7.65	0.544	5.19	13.15	201	
1046	45.26	5.0	15.11	7.53	0.532	3.62	12.34	203	
1048	45.26	5.25	15.85	~~7.46~~ 7.44	0.519	1.27 1.44	11.68	203	
1051	45.26	5.50	16.92	7.44	0.510	0.76/1.0	11.15	209	NO
1055	SAMPLE								
1123	44.63	10 gal End							
Stabilization Criteria[3]	-	-	-	± 0.1 units	± 3%	± 10%[4]	± 0.3 mg/L	± 10 mV	-

[1] collect field parameters in 3-5 minute intervals

[2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs

[5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: MW16D-GW-060717 **Sample Time:** 1055

Analysis:

QC SAMPLE (CIRCLE): (FD) MS/MSD EQ Blank TOTAL PURGED (GAL):

Field Duplicate ID: FD03-GW-060717 Field Duplicate Time: 0800

Comments: Total Depth of well 104.50 Iron - 0.08

Groundwater Purging and Sampling Form

CH2MHILL

SITE: UPRR Freeman **Well ID:** MW-18D

Field Team: K. Stevens **Date:** 6/7/17

Weather/Temp: 87° Sunny **Arrival Time:** 1245

Well Condition: Good **Initial DTW (ft btc):** 48.20

Purge Method: Geosub pump **Purge Rate**[5]:

Field Parameters[1]									
Time	DTW[2]	Purge Vol. (gal)	Temp (°C)	pH	Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
1415	***Begin Pumping***								
1430	48.25	1.0	15.67	9.39	0.330	12.2	20.94	-32	none
1435	48.25	1.5	15.06	9.20	0.329	6.49	14.80	-46	
1440	48.25	2.0	15.17	9.05	0.327	7.61	13.89	-48	
1445	48.25	2.5	15.31	8.84	0.331	6.73	13.02	-47	
1450	48.25	3.0	15.12	8.73	0.330	6.95	12.00	-47	
1455	48.25	3.5	14.99	8.62	0.328	5.83	11.34	-50	
1500	48.25	3.75	14.90	8.59	0.329	4.68	11.20	-52	
1505	48.25	4.0	14.83	8.56	0.330	4.00	10.99	-53	
1510	48.25	4.25	14.97	8.51	0.330	3.43	10.71	-53	
1515	48.25	4.5	15.01	8.52	0.329	3.44	10.52	-54	
1540	48.18	7.0	STOP PUMP						
Stabilization Criteria[3]	-	-	-	± 0.1 units	± 3%	± 10%[4]	± 0.3 mg/L	± 10 mV	-

[1] collect field parameters in 3-5 minute intervals

[2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs

[5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: MW18D-GW-060717 **Sample Time:** 1520

Analysis:

QC SAMPLE (CIRCLE): FD MS/MSD EQ Blank TOTAL PURGED (GAL): 7.0

Field Duplicate ID : NA Field Duplicate Time: NA

Comments: TD: 166.10' TOC

(Fe) 0.07

Groundwater Purging and Sampling Form

CH2MHILL

SITE: OPRR Freeman **Well ID:** MW-02D

Field Team: L Baumann/K. Stevens Date: 6/8/17

Weather/Temp: Cloudy, 65°F Arrival Time: 0920

Well Condition: Good **Initial DTW (ft btc):** 28.64

Purge Method: Portable pump Purge Rate[5]: Pump set at 37

Field Parameters[1]									
Time	DTW[2]	Purge Vol. (gal)	Temp (°C)	pH	Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
0951	**Begin Pumping**								
0958	31.38	.65	16.00	8.50	0.325	10.4	16.43	-139	
1000	32.06	1.1	14.98	8.03	0.337	9.60	12.42	-127	
1003	32.23	1.35	14.58	7.97	0.343	6.44	11.08	-128	
1006	32.81	1.5	14.57	7.84	0.344	6.06	10.20	-125	
1009	32.71	1.90	14.34	7.69	0.342	4.44	9.95	-119	
1012	32.65	2.25	14.19	7.57	0.351	2.85	9.80	-113	
1015	32.65	2.45	14.09	7.51	0.353	2.26	9.68	-108	
1015	SAMPLE								
1032	29.57	3.5 gal							Possible grey tinge
Stabilization Criteria[3]	-	-	-	± 0.1 units	± 3%	± 10%[4]	± 0.3 mg/L	± 10 mV	-

[1] collect field parameters in 3-5 minute intervals

[2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs

[5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: MW02D-GW-060817 **Sample Time:** 1015

Analysis:

QC SAMPLE (CIRCLE): ~~FD~~ MS/MSD EQ Blank TOTAL PURGED (GAL):

Field Duplicate ID : Field Duplicate Time:

Comments: Fe test - Reaction - turned orange, = 2.26

Groundwater Purging and Sampling Form

CH2MHILL

SITE: UPRR Freeman **Well ID:** MW-01D

Field Team: L. Baumann / K. Stevens Date: 6-8-17

Weather/Temp: 70°F clouds Arrival Time: 1130

Well Condition: Good **Initial DTW (ft btc):** 17.94

Purge Method: portable pump Purge Rate[5]:

Field Parameters[1]									
Time	DTW[2]	Purge Vol. (gal)	Temp (°C)	pH	Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
	Begin Pumping								
1205	17.39		13.41	7.10			5.00	524	sulfur smell
	24.15	Stopped, called S.D. about fast draw down.							
1218	23.40	1.75	13.26	8.02	.381	28.8	35.37	456	Tan color
1220	25.36	2.0	12.54	8.93	.385	22.9	11.79	476	
1222	25.91	2.25	12.56	8.92	.385	16.5	11.38	458	
1224	26.32	2.5	12.70	8.88	.385	13.9	10.60	293	
1226	26.51	2.65	12.82	8.84	.385	13.2	10.34	105	
1228	26.64	2.75	12.88	8.82	.386	16.2	10.21	62	
1231	26.73	3.0	13.00	8.79	.387	23.1	10.00	-2	
1234	26.78	3.1	13.00	8.73	.391	30.0	9.82	-41	
1236	26.79	3.25	13.04	8.71	.393	28.2	9.71	-50	
Stabilization Criteria[3]	-	-	-	± 0.1 units	± 3%	± 10%[4]	± 0.3 mg/L	± 10 mV	-

[1] collect field parameters in 3-5 minute intervals [2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs [5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

1254 22.50 Recharge Fast! Siphon action

Sample ID: MW01D-GW-060817 **Sample Time:** 1240

Analysis:

QC SAMPLE (CIRCLE): FD MS/MSD EQ Blank TOTAL PURGED (GAL): 5.5

Field Duplicate ID : Field Duplicate Time:

Comments:

Groundwater Purging and Sampling Form

CH2MHILL

SITE: OPRR-Freeman **Well ID:** MW-05D

Field Team: L. Baumann / Kristen Stevens Date: 6-9-17

Weather/Temp: Sun ~~60°~~ 50° Arrival Time: 0830

Well Condition: Good **Initial DTW (ft btc):** 62.69

Purge Method: portable pump Purge Rate [5]:

Field Parameters [1]									
Time	DTW [2]	Purge Vol. (gal)	Temp (°C)	pH	Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
	Begin Pumping								
0926	62.60		15.42	1.87	.475		8.40	290	
0928	64.86	.5	15 ↓	↓	↓		↓	↓	
0930	64.49	.75	15.10	1.99	.466	4.23	8.41	285	
0932	64.45	.85	15.06	2.07	.459	3.95	8.35	281	
0934	64.45	1.00	14.90	2.14	.453	2.63	8.33	276	
0935	SAMPLE								
0954	62.95	2.75							
Stabilization Criteria [3]	Final stick-up 62.81 pulled	-	-	± 0.1 units *	± 3%	± 10% [4]	± 0.3 mg/L	± 10 mV	-

[1] collect field parameters in 3-5 minute intervals

[2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs

[5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: MW05D-GW-060917 **Sample Time:** 0935

Analysis:

QC SAMPLE (CIRCLE): FD ~~MS/MSD~~ EQ Blank TOTAL PURGED (GAL):

Field Duplicate ID : Field Duplicate Time:

Comments: Fe = 0.0

* Had trouble calibrating pH.

Groundwater Purging and Sampling Form

CH2MHILL

SITE: OPLK Freeman **Well ID:** MW03D-

Field Team: L. Baumann / K. Stevens Date: 6-9-17

Weather/Temp: Sun w/ clouds 65° Arrival Time: 1108

Well Condition: Water in Casing, Not over well head **Initial DTW (ft btc):** 27.89

Purge Method: Portable Pump Purge Rate[5]:

Field Parameters[1]									
Time	DTW[2]	Purge Vol. (gal)	Temp (°C)	pH *	Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
1145	**Begin Pumping**								
1157	29.30	0.7	14.34	3.76	.304	0.70	14.25	321	No odor, color
1159	30.02	0.90	14.47	3.81	.296	3.41	12.96	318	
1201	30.45	1.0	14.55	3.57	.292	5.28	12.16	315	
1204	30.78	1.15	14.59	3.64	.288	4.17	11.51	312	
1207	31.02	1.25	14.71	3.70	.287	4.23	10.94	308	
1210	31.12	1.5	14.92	3.72	.285	5.47	10.28	304	
1213	31.16	1.55	14.99	3.71	.284	3.66	9.99	300	
1216	31.18	1.65	15.04	3.71	.284	3.73	9.83	297	
1218	SAMPLES								
1232	32.15	2.90							
Stabilization Criteria[3]	30.10 ead w/o pump	-	-	± 0.1 units	± 3%	± 10%[4]	± 0.3 mg/L	± 10 mV	-

[1] collect field parameters in 3-5 minute intervals [2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs [5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: MW03D-GW-060917 **Sample Time:** 1218

Analysis:

QC SAMPLE (CIRCLE): FD ~~MS/MSD~~ EQ Blank TOTAL PURGED (GAL): 2.90

Field Duplicate ID : ✓ Field Duplicate Time: ✓

Comments: PID Readings well head = 0.4 Fe = 0.02

Breathing Zone = 0.0

* pH Sensor seems to be off. Trouble calibrating.

Groundwater Purging and Sampling Form

CH2MHILL

SITE: OPRR-Freeman **Well ID:** MW 14D

Field Team: L. Baumann/K. Stevens Date: 6-9-17

Weather/Temp: Some clouds, 70° Arrival Time: 13 ~~40~~ 35

Well Condition: Good **Initial DTW (ft btc):** 13.81

Purge Method: Portable pump Purge Rate[5]:

Field Parameters[1]									
Time	DTW[2]	Purge Vol. (gal)	Temp (°C)	pH	Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
1414	***Begin Pumping***								
1416	16.09	- - -	Hole	in line -		Stopped Pumping			
1419	17.03	-	-	-	-	-	-	-	silty tan color
1421	17.82	1.4	12.47	5.23	.356	284	12.5	-34	
1423	18.40	1.8	12.34	5.15	.333	119	11.34	-32 ~~-33~~	
1425	18.66	2.15	12.28	5.09	.328	99.6	10.82	-32	
1427	18.79	2.5	12.31	5.03	.334	84.6	10.44	-39	
1429	18.85	3.0	12.32	4.99	.338	74.0	10.20	-39	
1431	18.91	3.5	12.33	4.94	.340	69.3	10.07	-35	
1434	SAMPLE								
1450	15.80	6.0			END	Sampling			
Stabilization Criteria[3]	-	-	-	± 0.1 units	± 3%	± 10%[4]	± 0.3 mg/L	± 10 mV	-

[1] collect field parameters in 3-5 minute intervals [2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs [5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: MW14D-GW-060917 **Sample Time:** 1434

Analysis:

QC SAMPLE (CIRCLE): FD ~~MS/MSD~~ ~~EQ Blank~~ TOTAL PURGED (GAL): 6.0

Field Duplicate ID : Field Duplicate Time:

Comments: Fe = 0.08

PID - Vocs = 0.1 - 0.0 Breathing zone

0.4 - 0.0 ~~@~~ well head

Groundwater Purging and Sampling Form

CH2MHILL

SITE: UPRR-Freeman **Well ID:** MW-04D

Field Team: L. Baumann / K. Stevens Date: 6-9-17

Weather/Temp: Sun w/clouds, 65° Arrival Time: ~~1644~~ 1705

Well Condition: Good **Initial DTW (ft btc):** 109.70

Purge Method: portable pump, low flow Purge Rate[5]:

Field Parameters[1]									
Time	DTW[2]	Purge Vol. (gal)	Temp (°C)	pH	Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
	Begin Pumping								
1738	108.93	-	-	-	-	-	-	-	-
1741	112.54	.4	18.60	5.99	.430	10.6	11.97	135	clear No
1744	112.10	.70	17.31	5.79	.417	4.57	10.18	140	odor
1746	111.85	.85	17.96	5.67	.406	3.07	9.30	142	
1748	112.15	1.20	17.69	5.63	0.399	2.31	9.08	140	
1751	112.35	1.5	16.75	5.60	.401	2.	9.19	135	
1755	SAMPLE								
1800	110.00	2.5							
Stabilization Criteria[3]	-	-	-	± 0.1 units	± 3%	± 10%[4]	± 0.3 mg/L	± 10 mV	-

[1] collect field parameters in 3-5 minute intervals [2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs [5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: MW04D-GW-060917 **Sample Time:** 1755

Analysis:

QC SAMPLE (CIRCLE): FD MS/MSD EQ Blank TOTAL PURGED (GAL): 2.5

Field Duplicate ID : Field Duplicate Time:

Comments: multi-Rae - ~~from~~ per well head - 0.7 Fe = 0.0

Breathing Zone - 0.3

Groundwater Purging and Sampling Form

CH2MHILL

SITE: UPRR Freeman **Well ID:** WS5-Eff

Field Team: L. Bauman **Date:** 6-14-17

Weather/Temp: ~~60~~ 49°F **Arrival Time:** 0650

Well Condition: good **Initial DTW (ft btc):** /

Purge Method: ~~faucet~~ faucet **Purge Rate**[5]: /

Field Parameters[1]									
Time	DTW[2]	Purge Vol. (gal)	Temp (°C)	pH *	Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
	Begin Pumping								
0738	/		13.39	5.64	.364	0.39	50.00+	413	
Recal									
0740			13.89	3.13	2.44	0.39	10.99	399	
		.7							
Stabilization Criteria[3]	-	-	-	± 0.1 units	± 3%	± 10%[4]	± 0.3 mg/L	± 10 mV	-

[1] collect field parameters in 3-5 minute intervals

[2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs

[5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: WS5-EFF-GW-061417 **Sample Time:** 0740

Analysis: 8260, COD, N+N

QC SAMPLE (CIRCLE): FD MS/MSD EQ Blank TOTAL PURGED (GAL):

Field Duplicate ID : Field Duplicate Time:

Comments: Fe=0.0

* pH not calibrating properly

Groundwater Purging and Sampling Form

CH2MHILL

SITE: Freeman-UPRR **Well ID:** WS5-Inf-

Field Team: L. Baumann Date: 6-14-17

Weather/Temp: 51°F Arrival Time: 0820

Well Condition: good **Initial DTW (ft btc):** /

Purge Method: faucet Purge Rate [5]: /

Field Parameters [1]									
Time	DTW [2]	Purge Vol. (gal)	Temp (°C)	pH	Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
	Begin Pumping								
0838	/	1	13.50	5.29	.362	0.67	7.73	311	
0855	/	1							
Stabilization Criteria [3]	-	-	-	± 0.1 units	± 3%	± 10% [4]	± 0.3 mg/L	± 10 mV	-

[1] collect field parameters in 3-5 minute intervals

[2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs

[5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: WS5-Inf-GW-061417 **Sample Time:** 840

Analysis:

QC SAMPLE (CIRCLE): FD MS/MSD EQ Blank TOTAL PURGED (GAL):

Field Duplicate ID : Field Duplicate Time:

Comments: Fe = 0.0

Groundwater Purging and Sampling Form

CH2MHILL

SITE: UPRR Freeman **Well ID:** MW17D-

Field Team: L. Baumann Date: 6-14-17

Weather/Temp: Sun, 56°F Arrival Time: 0937

Well Condition: good **Initial DTW (ft btc):** 63.21

Purge Method: Portable pump Purge Rate[5]:

Field Parameters[1]									
Time	DTW[2]	Purge Vol. (gal)	Temp (°C)	pH	Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
	Begin Pumping								
1205	67.43 ~~1551~~	.75	15.16	5.41	.939	121	1409	-205	
1208	68.37	1.0	15.17	5.32	.960	112	11.25	-212	Grey color
1210	68.95	1.15	15.16	5.21	.963	128	9.25	-222	odor = sulfur
1212	69.42	1.25	15.06	5.21	.952	169	8.46	-234	
1216	70.61	1.5	15.10	5.24	.912	157	7.84	-244	
1219	71.15	1.65	15.24	5.26	.834	158	7.43	-243	
1221	71.89	1.80	14.95	5.33	.806	155	7.37	-247	
1223	72.40	1.90	14.89	5.37	.783	146	7.27	-249	
1225	72.75	2.0	14.99	5.42	.756	136	7.09	-250	
1230	SAMPLE								
1253	Batt. Died 74.90	3.5							
Stabilization Criteria[3]	-	-	-	± 0.1 units	± 3%	± 10%[4]	± 0.3 mg/L	± 10 mV	-

[1] collect field parameters in 3-5 minute intervals [2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs [5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: MW17D-GW-061417 **Sample Time:** 1230

Analysis:

QC SAMPLE (CIRCLE): FD MS/MSD EQ Blank TOTAL PURGED (GAL): 3.5

Field Duplicate ID : Field Duplicate Time:

Comments: $F_e = 0.19$

Groundwater Purging and Sampling Form

CH2MHILL

SITE: UPRR FREEMAN **Well ID:** ~~MW~~ W20

Field Team: L. Baumann/Jen. Ulrich Date: 6-14-17

Weather/Temp: Partly cloudy, 61°F Arrival Time: AM 1520

Well Condition: **Initial DTW (ft btc):** 18.40

Purge Method: Purge Rate [5]:

Field Parameters [1]									
Time	DTW [2]	Purge Vol. (gal)	Temp (°C)	pH	Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
	Begin Pumping								
1539	18.23	.50	11.56	6.71	.372	51.6	8.04	-45	
1541	18.38	.85	11.28	6.58	.374	27.0	7.68	-33	
1544	18.65	1.25	11.21	6.48	.374	20.5	7.37	-22	Tan color
1547	18.85	1.5	11.05	6.30	.373	14.8	7.07	-9	& odor
1550	19.09	1.8	10.94	6.11	.374	12.7	6.97	-3	
1553	19.28	2.3	10.97	5.98	.373	15.6	6.92	0	
1555	SAMPLE								
1609	20.23	4.0							
Stabilization Criteria [3]	-	-	-	± 0.1 units	± 3%	± 10% [4]	± 0.3 mg/L	± 10 mV	-

[1] collect field parameters in 3-5 minute intervals

[2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs

[5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: W20-GW-061417 **Sample Time:** 1555

Analysis:

QC SAMPLE (CIRCLE): FD MS/MSD EQ Blank TOTAL PURGED (GAL):

Field Duplicate ID : 1 Field Duplicate Time:

Comments: Fe = 0.31

Groundwater Purging and Sampling Form

CH2MHILL

SITE: UPRR Freeman **Well ID:** MW-06D

Field Team: L. Baumann / Jen. Ulrich Date: 6-15-17

Weather/Temp: 57° - cloudy Rain Arrival Time: 0650

Well Condition: good **Initial DTW (ft btc):** 129.95

Purge Method: _____ Purge Rate[5]: _____

Field Parameters[1]									
Time	DTW[2]	Purge Vol. (gal)	Temp (°C)	pH	Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
	Begin Pumping								
~~1307~~	130.4	.5							
747	130.85	.5	14.04	6.62	.387	1.52	7.80	221	
750	130.31	1.10	12.99	7.17	.366	0.55	7.37	203	
753	130.86	1.25	12.72	7.17	.377	.80	7.46	196	
756	130.88	1.75	12.76	6.98	.381	.60	7.38	191	
759	130.86	2.25	12.84	6.96	.386	.52	7.44	185	
0801	130.88		12.87	6.94	.386		7.37	183	
0805	SAMPLES								
0816	130.4	5.0							
Stabilization Criteria[3]	-	-	-	± 0.1 units	± 3%	± 10%[4]	± 0.3 mg/L	± 10 mV	-

cal
6.28
0.379
7.86

[1] collect field parameters in 3-5 minute intervals [2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs [5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: MW06D-GW-061517 **Sample Time:** 0805

Analysis: _____

QC SAMPLE (CIRCLE): FD MS/MSD EQ Blank TOTAL PURGED (GAL): _____

Field Duplicate ID : _____ Field Duplicate Time: _____

Comments: Fe= 0.0

Groundwater Purging and Sampling Form

CH2MHILL

SITE: UPRR - Freeman **Well ID:** MW-19D

Field Team: L. Baumann / Jamie Brown Date: 6-15-17

Weather/Temp: 57°, clouds Arrival Time: 920

Well Condition: good **Initial DTW (ft btc):** 56.05

Purge Method: low flow portable pump Purge Rate[5]: ✓

Field Parameters[1]									
Time	DTW[2]	Purge Vol. (gal)	Temp (°C)	pH	Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
	Begin Pumping								
	56.02								
1015	56.34	.35	13.42	8.55	.452	3.10	5.31	138	
1018	56.34	.70	12.50	8.50	.456	28.2	5.25	139	
1021	56.34	1.0	12.07	8.34	.450	12.2	5.22	143	
1024	56.34	1.3	11.90	8.12	.448	3.18	5.12	150	
1027	56.34	1.70	11.86	7.81	.447	1.77	5.09	160	
1030	56.33	2.0	11.80	7.30	.448	1.16	5.07	178	
1033	56.33	2.20	11.78	7.19	.447	1.28	5.10	180	
1036	56.34	2.60	11.77	7.15	.447	1.81	5.12	180	
1040		SAMPLE							
1055	56.03	3.5							
Stabilization Criteria[3]	-	-	-	± 0.1 units	± 3%	± 10%[4]	± 0.3 mg/L	± 10 mV	-

[1] collect field parameters in 3-5 minute intervals [2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs [5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: MW19D-GW-061517 **Sample Time:** 1040

Analysis:

QC SAMPLE (CIRCLE): FD MS/MSD EQ Blank TOTAL PURGED (GAL):

Field Duplicate ID : Field Duplicate Time:

Comments: Fe = 0.04

Groundwater Purging and Sampling Form

CH2MHILL

SITE: _____ **Well ID:** W26

Field Team: L. Baumann / S. Brown Date: ~~1700~~ 6-15-17

Weather/Temp: clouds 57° Arrival Time: 1200

Well Condition: _____ **Initial DTW (ft btc):** 64.52

Purge Method: _____ Purge Rate[5]: _____

Field Parameters[1]									
Time	DTW[2]	Purge Vol. (gal)	Temp (°C)	pH	Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
	Begin Pumping								
	64.53								
1251	64.60	.75	14.49	7.90	.346	1.14	16.37	166	
1253	64.60	1.25	13.07	8.44	.351	2.10	13.41	142	Clear No odor
1255	64.59	1.65	12.93	8.14	.344	0.66	11.94	152	
1257	64.59	2.15	12.92	7.89	.344	1.14	11.12	160	
1259	64.58	2.75	12.90	7.45	.344	1.01	10.62	177	Lower flow rate
1301	64.57	3.15	13.00	7.04	.342	4.07	10.00	193	
1303	64.57	3.35	13.16	6.95	.343	.56	9.57	196	
1305	64.57	3.55	13.31	6.92	.342	.61	9.17	196	
1307	64.56	3.80	13.40	6.88	.341	2.21	8.76	196	
1309	64.55	4.0	13.43	7.22	.342	0.54	8.63	180	
Stabilization Criteria[3]	-	-	-	± 0.1 units	± 3%	± 10%[4]	± 0.3 mg/L	± 10 mV	-

[1] collect field parameters in 3-5 minute intervals

[2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs

[5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: W26-GW-061517 **Sample Time:** 1320

Analysis: _____

QC SAMPLE (CIRCLE): FD MS/MSD EQ Blank TOTAL PURGED (GAL): _____

Field Duplicate ID : _____ Field Duplicate Time: _____

Comments: _____

Groundwater Purging and Sampling Form

CH2MHILL

SITE: OPRR Freeman **Well ID:** Reed well

Field Team: L. Baumann Date: 06-20-17

Weather/Temp: 80°, sun Arrival Time: 1301

Well Condition: spigot across driveway from house **Initial DTW (ft btc):** /

Purge Method: _____ Purge Rate[5]: _____

Field Parameters[1]									
Time	DTW[2]	Purge Vol. (gal)	Temp (°C)	pH	Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
	Begin Pumping								
1310	/	/	17.38	9.12	.301	1.02	9.85	223	∅ odor
									∅ color
Stabilization Criteria[3]	-	-	-	± 0.1 units	± 3%	± 10%[4]	± 0.3 mg/L	± 10 mV	-

[1] collect field parameters in 3-5 minute intervals

[2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs

[5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: Reed-GW-062017 **Sample Time:** 1315

Analysis: _____

QC SAMPLE (CIRCLE): FD MS/MSD EQ Blank TOTAL PURGED (GAL): _____

Field Duplicate ID : _____ Field Duplicate Time: _____

Comments: Fe = 0.0

Groundwater Purging and Sampling Form

CH2MHILL

SITE: UPRR **Well ID:** THORSON RES WELL

Field Team: GREER/BROWN Date: 6-26-17

Weather/Temp: PARTLY SUNNY 80° Arrival Time: 12:35

Well Condition: GOOD **Initial DTW (ft btc):** —

Purge Method: GRAB Purge Rate [5]: —

Field Parameters [1]									
Time	DTW [2]	Purge Vol. (gal)	Temp (°C)	pH	Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
	Begin Pumping								
12:42	—	—	16.83	4.50	0.280	0.0	20.93	28	
Stabilization Criteria [3]	-	-	-	± 0.1 units	± 3%	± 10% [4]	± 0.3 mg/L	± 10 mV	-

[1] collect field parameters in 3-5 minute intervals [2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs [5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: THORSON-GW-062617 **Sample Time:** 1240

Analysis:

QC SAMPLE (CIRCLE): FD MS/MSD EQ Blank TOTAL PURGED (GAL):

Field Duplicate ID : Field Duplicate Time:

Comments: purged approx 2 gallons prior to readings + sample

Fe^{2+} = 1.22 mg/L

Groundwater Purging and Sampling Form

CH2MHILL

JKB

SITE: UPRR FREEMAN **Well ID:** MW-9D

Field Team: GREER/BROWN Date: 6 26 17

Weather/Temp: OVERCAST 75° Arrival Time: 1030

Well Condition: GOOD **Initial DTW (ft btc):** 30.02

Purge Method: Submersible Purge Rate [5]:

Field Parameters [1]									
Time	DTW [2]	Purge Vol. (gal)	Temp (°C)	pH	Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
11:13	***Begin Pumping***								
11:15	30.30	0.5	15.41	6.77	0.470	7.6	7.81	213	
11:18	30.27	1.0	15.27	6.99	0.451	4.9	7.30	203	
11:21	30.20	~~1.5~~ 1.25 DB	15.58	6.99	0.449	1.4	7.12	202	
11:24	30.20	1.5	15.77	6.93	0.450	0.0	7.10	202	
Stabilization Criteria [3]	-	-	-	± 0.1 units	± 3%	± 10% [4]	± 0.3 mg/L	± 10 mV	-

[1] collect field parameters in 3-5 minute intervals

[2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs

[5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

JKB JKB

Sample ID: MW-9D-GW-062617 **Sample Time:** 1140

Analysis:

QC SAMPLE (CIRCLE): FD MS/MSD EQ Blank TOTAL PURGED (GAL):

Field Duplicate ID : Field Duplicate Time:

Comments: Fe^{2+} = 0.00 mg/L

Groundwater Purging and Sampling Form

CH2MHILL

SITE: UPRR **Well ID:** MARLOW WELL #2

Field Team: GREER/BROWN Date: 6-26-17

Weather/Temp: SUNNY 85° Arrival Time: 14:02

Well Condition: GOOD **Initial DTW (ft btc):** 41.47

Purge Method: SUBMERSIBLE Purge Rate [5]:

Field Parameters [1]									
Time	DTW [2]	Purge Vol. (gal)	Temp (°C)	pH	Sp. Cond.	Turbidity (NTU)	DO (mg/L)	ORP (mV)	Note color, odor, sheen, etc.
1415	***Begin Pumping***								
1420	41.59	0.25	17.24	4.16	0.328	148	25.00	44	
1423	41.53	0.5	17.10	6.40	0.313	183	12.19	-40	
1426	41.52	0.6	16.78	6.71	0.312	138	9.97	-48	
1429	41.52	0.75	17.02	7.05	0.294	62.8	8.97	-59	
1432	41.52	0.8	17.15	7.13	0.309	39.3	8.52	-63	
1435	41.52	1.0	17.06	7.16	0.304	51.5	8.54	-64	
1438	41.52	1.1	17.58	7.05	0.313	34.0	7.97	-61	
1441	41.52	1.2	17.30	6.95	0.305	30.5	8.09	-58	
1444	41.52	1.3	17.09	6.93	0.305	30.1	8.01	-56	
1447	41.52	1.5	17.89	6.80	0.315	29.7	7.34	-50	
1450	41.52	1.6	17.86	6.81	0.308	27.2	7.33	-51	
Stabilization 1453 Criteria [3]	41.52 -	1.7 -	17.95 -	6.79 ± 0.1 units	0.308 ± 3%	25.2 ± 10% [4]	7.14 ± 0.3 mg/L	-51 ± 10 mV	-

[1] collect field parameters in 3-5 minute intervals

[2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.33 ft

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs

[5] target purge rate is 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

Sample ID: MARLOW#2 - GW - 062617 **Sample Time:** 1500

Analysis:

QC SAMPLE (CIRCLE): FD MS/MSD EQ Blank TOTAL PURGED (GAL):

Field Duplicate ID : Field Duplicate Time:

Comments: FE^{2+} = 0.74 mg/L

Groundwater Purging and Sampling Form

ch2m:

Project Name: **UPRR Freeman** | **Well ID:** MW-1D

Field Team: Demus, Humphreys | Date: 10-10-17

Weather/Temp: cloudy, cool | Arrival Time: 11:50

Well Condition: good | **Initial DTW (ft btc):** 21.39

Purge Method: bladder pump

Field Parameters[1]									
Time	DTW[2]	Purge Vol. (gal)	Temp (°C)	pH	ORP (mV)	Sp. Cond. (uS/cm)	Turbidity (NTU)	DO (mg/L)	Comments (color, odor, sheen, etc.)
12:05	–	0	-	-	-	-	-	-	following setup, just prior to purging
12:07	23.30	0.3	11.52	7.41	521	0.355	667	2.86	mildly turbid
12:12	24.02	0.4	11.18	7.30	520	0.357	534	2.92	" "
12:17	25.84	0.6	10.98	7.21	518	0.355	218	3.23	clear
12:22	26.95	0.9	10.98	7.18	523	0.353	320	3.04	clear
12:27	27.96	1.2	10.96	7.17	518	0.355	0.0	2.89	mildly turbid
Stabilization Criteria[3]	-	-	-	± 0.1 units	± 10 mV	± 3%	± 10%[4]	± 0.3 mg/L	-

[1] collect field parameters in 3-5 minute intervals

[2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.1 m (0.33 ft); target purge rate: 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs

Sample ID: MW1D-GW-101017 | Sample Time: 12:30

QC Sample (circle): FD MS/MSD EQ Blank | Total Purged (gal): ~1.4

Field Duplicate ID: Ferrous iron - 0.34 mg/L | Field Duplicate Time:

Comments:

Groundwater Purging and Sampling Form

ch2m:

Project Name: UPRR Freeman

Well ID: MW-1S

Field Team: Demus, Humphreys

Date: 10-12-17

Weather/Temp: cloudy, drizzle, 36°F

Arrival Time: 13:58

Well Condition: good

Initial DTW (ft btc): 20.28 (bailed previous day)

Purge Method: bailer

Field Parameters[1]									
Time	DTW[2]	Purge Vol. (gal)	Temp (°C)	pH	ORP (mV)	Sp. Cond. (uS/cm)	Turbidity (NTU)	DO (mg/L)	Comments (color, odor, sheen, etc.)
		0	-	-	-	-	-	-	following setup, just prior to purging
~~14:15~~			9.30	6.47	202				probe not submerged
14:20			9.14	6.90	40	0.820	215	4.30	
Stabilization Criteria[3]	-	-	-	± 0.1 units	± 10 mV	± 3%	± 10%[4]	± 0.3 mg/L	-

[1] collect field parameters in 3-5 minute intervals

[2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.1 m (0.33 ft); target purge rate: 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs

Sample ID: MW1S-GW-101217

Sample Time: 14:10

QC Sample (circle): FD MS/MSD EQ Blank

Total Purged (gal):

Field Duplicate ID:

Field Duplicate Time:

Comments: well bailed dry on previous day

Fe^{2+}: 0.54 mg/L

Location Freeman, WA Date 9-14-17

Project / Client UPRR Freeman

MW-2D DTW - 29.99 Diff -

Time	pH Basin	Cond pumping	D.O	Turb	ORP	DTW	TEMP
8:35							
8:44	7.86	.274	3.26	3.4	-167	30.04	13.51
8:49	7.88	0.277	1.94	3.5	-133	30.01	13.11
8:58	7.93	0.272	1.84	3.8	-135	30.11	13.31
9:03	7.91	0.284	1.79	3.6	-153	30.28	12.89
9:08	7.89	0.272	1.32	3.6	-150	30.15	12.47
9:13	7.87	0.269	2.00	3.3	-146	30.05	12.83
9:18	7.87	0.269	1.31	3.4	-145	30.03	12.96
9:23	7.87	0.268	1.26	3.3	-143	30.01	13.24
9:28	7.86	0.268	1.20	3.5	-145	30.0	13.40

MW2D-GW-091417
SAMPLE TIME 0930
TOTAL PURGED = 0.5 gal

Location Freeman, WA Date 9-14-17

Project / Client UPRR Freeman

MW-14D DTW - 15.22

Time	DTW Basin pumping	pH	Cond	DO	Temp	Turb	ORP	
12:34	16.24	7.79	.262	5.85	12.45	10.2	63	
12:39	15.90	7.58	0.263	3.25	11.95	21.3	-52	
12:44	15.50	7.43	0.282	3.60	13.09	10.6	-69	
12:49	15.36	7.39	0.295	3.60	14.10	13.8	-70	
12:54	15.34	7.39	0.295	3.62	14.67	12.1	-67	
12:59	15.32	7.40	0.295	3.76	15.16	10.2	-62	gray/ cloudy

MW14D-GW-091417
SAMPLE TIME 1305
TOTAL PURGED 0.25 gal

Location Freeman, WA Date 9-14-17

Project / Client UPRR Freeman

MW-30 OTW, = 30.7ft FI

Time	DTW Basin	pH pumping	Cond	DO	Temp	Turb	ORP	
13:40				6.34	17.75 ~~18.09~~	1.5	67	gray mud
13:50	31.50	7.50	1.056					
13:55	31.60	7.20	0.247	7.28	18.92	1.4	87	
14:00	31.79	7.14	0.247	6.20	17.56	7.1	94	
14:05	31.78	7.09	0.249	6.17	18.00	59.9	102	
14:10	31.90	7.05	0.253	7.17	17.75	264	7	
14:15	31.68	7.02	0.271	5.48	17.76	0.0	-28	
14:20	31.88	6.99	0.298	3.95	18.40	0.0	-42	
14:25	32.0	6.99	0.298	3.48	18.66	0.0	-42	
14:30	31.98	7.00	0.286	3.91	18.57	0.0	-36	
14:35	32.50	7.01	0.277	5.60	18.31	0.0	-21	
14:40	32.07	7.01	0.271	5.06	17.57	648	-13	
14:45	32.03	7.02	0.266	6.00	17.70	1000	-3	

MW3D-GW-091417
SAMPLE TIME = 1450
TOTAL PURGED = 1.0 gal

Location Freeman, WA Date 9-25-17

Project / Client UPRR Freeman

Project: UPRR Freeman
Task: Re-sample Silva well, aquifer test support
Weather: 60°F, mostly cloudy
Crew: S. Demus
1130 S. Demus onsite. Mob to Silva Residence.
1140 Collect sample Silva-GW-092517 for VOCs. Mob to aquifer testing at EW-9C
1300 Depart site

Location Freeman, WA Date 10-5-17

Project / Client UPRR Freeman

MW-4D Purge Log

DTW: 114.09
purge volume = 2.5gal
Ferrous iron = 0.05mg/L

Time	DTW	pH	Cond	DO	Temp	Turb	ORP
10:42	114.33	7.23	396	3.89	10.83	5.1	60
10:47	115.15	7.16	395	3.88	11.23	2.9	55
10:52	114.95	7.17	405	3.29	11.13	1.23	82
10:57	114.93	7.14	406	2.75	11.02	2.44	105
11:02	114.92	7.16	403	2.77	11.27	1.25	116
11:07	114.82	7.16	397	2.94	11.61	88.2	123
11:12	114.91	7.19	392	3.41	11.74	70.0	127
11:17	114.91	7.21	388	3.59	11.43	54.5	132
11:22	115.00	7.23	384	3.70	11.46	32.6	134

Sample ID = MW4D-GW-100517
Sample time = 11:25

Location Freeman, WA Date 10-5-17

Project / Client

MW-9D Purge log

DTW: 32.74
purge volume: 3.2gal
Ferrous Iron = 0.06

Time	DTW	pH	Cond	D.O.	Temp	Turb	ORP
12:10	32.91	7.55	360	17.38	13.03	41.1	132
12:15	33.00	7.27	368	6.39	12.19	6.0	174
12:20	33.30	7.13	373	5.53	11.91	6.2	172 — reduced flow
12:25	32.85	7.08	375	4.98	12.58	0.0	172
12:30	32.82	7.03	377	4.72	13.10	0.0	170
12:35	32.80	7.05	381	4.63	13.01	0.0	165

Sample ID: MW9D-GW-100517
Sample Time: 12:40

Groundwater Purging and Sampling Form

ch2m:

Project Name: **UPRR Freeman** | **Well ID:** MW-5D

Field Team: Demus, Humphreys | Date: 10-10-17

Weather/Temp: cloudy, cool | Arrival Time: 08:10

Well Condition: good | **Initial DTW (ft btc):** 62.60

Purge Method: bladder pump

Field Parameters[1]									
Time	DTW[2]	Purge Vol. (gal)	Temp (°C)	pH	ORP (mV)	Sp. Cond. (uS/cm)	Turbidity (NTU)	DO (mg/L)	Comments (color, odor, sheen, etc.)
08:43	62.57	0	-	-	-	-	-	-	following setup, just prior to purging
08:59	63.36	0.5	11.25	6.49	289	0.412	20.5	6.70	
09:03	63.49	0.7	11.84	6.84	294	0.398	24.8	6.22	
09:08	63.60	0.8	11.95	7.08	297	0.395	26.1	6.00	
09:13	63.65	1.0	12.11	7.21	295	0.392	16.6	5.92	
09:18	63.63	1.2	12.11	7.24	292	0.391	11.7	5.81	
09:23	63.63	1.4	12.12	7.27	286	0.389	6.0	6.02	
Stabilization Criteria[3]	-	-	-	± 0.1 units	± 10 mV	± 3%	± 10%[4]	± 0.3 mg/L	-

[1] collect field parameters in 3-5 minute intervals

[2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.1 m (0.33 ft); target purge rate: 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs

Sample ID: MW5D-GW-101017 | Sample Time: 09:25

QC Sample (circle): FD MS/MSD EQ Blank | Total Purged (gal): 1.8

Field Duplicate ID: | Field Duplicate Time:

Comments: installed mini bladder pump

Ferrous iron = 0.03 mg/L

Location Freeman, WA Date 10-5-17

Project / Client UPRR Freeman

Task: 3Q Groundwater Sampling
Weather: AM- 46°F, mostly cloudy
Crew: Steve Demes
0830 Arrive onsite. Begin setup at MW-6D
Calibrate Horiba U-52 # - C102484
calibration fluid Lot # - 7GD191
pH - 4.00
Cond - 4.57
Turb - 0.0
D.O - 13.32

Location Freeman, WA Date 10-5-17

Project / Client UPRR Freeman

MW-6D Purge Log

DTW: -129.22
Purge Volume - 20 gallons
Ferrous iron - 0.0 mg/L

Time	DTW	pH	Cond	D.O.	Temp	Turb	ORP
9:07	129.23	5.85	349	5.77	10.25	14.6	248
9:12	129.27	6.70	360	4.99	10.32	18.4	223
9:17	129.23	6.96	355	4.53	10.49	14.5	218
9:22	129.25	7.03	352	4.19	10.50	10.5	215
9:27	129.24	7.15	351	4.10	10.64	7.6	213
9:32	129.25	7.19	351	4.03	10.67	6.4	211

Sample ID: MW6D-GW-100517
Sample Time = 9:35

Groundwater Purging and Sampling Form

ch2m:

Project Name: UPRR Freeman

Well ID: MW-6S

Field Team: Demus, Humphreys

Date: 10-12-17

Weather/Temp: cloudy, 36°F

Arrival Time: 10:45

Well Condition: good

Initial DTW (ft btc):

Purge Method: bailer

Field Parameters [1]									
Time	DTW [2]	Purge Vol. (gal)	Temp (°C)	pH	ORP (mV)	Sp. Cond. (uS/cm)	Turbidity (NTU)	DO (mg/L)	Comments (color, odor, sheen, etc.)
		0	-	-	-	-	-	-	following setup, just prior to purging
11:05			7.90	7.22	170	0.236	flashing 800's	4.60	
Stabilization Criteria [3]	-	-	-	± 0.1 units	± 10 mV	± 3%	± 10% [4]	± 0.3 mg/L	-

[1] collect field parameters in 3-5 minute intervals

[2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.1 m (0.33 ft); target purge rate: 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs

Sample ID: MW6S-GW-101217

Sample Time: 10:55

QC Sample (circle): FD MS/MSD EQ Blank

Total Purged (gal):

Field Duplicate ID:

Field Duplicate Time:

Comments: well ~~barbed~~ pumped dry previous day

ferrous iron: 0.17 mg/L

Groundwater Purging and Sampling Form

ch2m:

Project Name: **UPRR Freeman**

Well ID: MW-6U

Field Team: Demus, Humphreys

Date: 10-10-17

Weather/Temp: partly cloudy, cool

Arrival Time: 10:37

Well Condition: good

Initial DTW (ft btc): 37.51

Purge Method: bladder pump

Field Parameters[1]									
Time	DTW[2]	Purge Vol. (gal)	Temp (°C)	pH	ORP (mV)	Sp. Cond. (uS/cm)	Turbidity (NTU)	DO (mg/L)	Comments (color, odor, sheen, etc.)
10:58	37.49	0	-	-	-	-	-	-	following setup, just prior to purging
Stabilization Criteria[3]	-	-	-	± 0.1 units	± 10 mV	± 3%	± 10%[4]	± 0.3 mg/L	-

[1] collect field parameters in 3-5 minute intervals

[2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.1 m (0.33 ft); target purge rate: 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs

Sample ID: _____ Sample Time: _____

QC Sample (circle): FD MS/MSD EQ Blank Total Purged (gal): _____

Field Duplicate ID: _____ Field Duplicate Time: _____

Comments: installed new bladder pump
- pump did not work

Groundwater Purging and Sampling Form

ch2m:

Project Name: UPRR Freeman

Well ID: MW-6U

Field Team: Demus, Humphreys

Date: 10-12-17

Weather/Temp: mostly cloudy, 36°F

Arrival Time: 11:10

Well Condition: good

Initial DTW (ft btc):

Purge Method: bailer

Field Parameters[1]									
Time	DTW[2]	Purge Vol. (gal)	Temp (°C)	pH	ORP (mV)	Sp. Cond. (uS/cm)	Turbidity (NTU)	DO (mg/L)	Comments (color, odor, sheen, etc.)
		0	-	-	-	-	-	-	following setup, just prior to purging
11:30			9.91	6.93	172	0.476	26.6	3.59	
Stabilization Criteria[3]	-	-	-	± 0.1 units	± 10 mV	± 3%	± 10%[4]	± 0.3 mg/L	-

[1] collect field parameters in 3-5 minute intervals

[2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.1 m (0.33 ft); target purge rate: 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs

Sample ID: MW6U-GW-101217

Sample Time: 11:20

QC Sample (circle): FD MS/MSD EQ Blank

Total Purged (gal):

Field Duplicate ID:

Field Duplicate Time:

Comments: well ~~bailed~~ pumped dry previous day

ferrous iron 0.07 mg/L

Groundwater Purging and Sampling Form

ch2m:

Project Name: **UPRR Freeman** | **Well ID:** MW-75

Field Team: Demus, Humphreys | Date: 10-10-17

Weather/Temp: cloudy, cool | Arrival Time: 13:58

Well Condition: good | **Initial DTW (ft btc):** —

Purge Method: bailed yesterday

Field Parameters[1]									
Time	DTW[2]	Purge Vol. (gal)	Temp (°C)	pH	ORP (mV)	Sp. Cond. (uS/cm)	Turbidity (NTU)	DO (mg/L)	Comments (color, odor, sheen, etc.)
—	—	0	-	-	-	-	-	-	following setup, just prior to purging
14:02	—	1 bailer for persons	10.21	8.10	51	0.319	38.4	9.32	
Stabilization Criteria[3]	-	-	-	± 0.1 units	± 10 mV	± 3%	± 10%[4]	± 0.3 mg/L	-

[1] collect field parameters in 3-5 minute intervals

[2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.1 m (0.33 ft); target purge rate: 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs

Sample ID: MW75-GW-101017 | Sample Time: 14:05

QC Sample (circle): FD (MS/MSD) EQ Blank | Total Purged (gal): _____

Field Duplicate ID: _____ | Field Duplicate Time: _____

Comments: bailer sample following bailing nearly dry yesterday

Ferrous Iron = 0.10 mg/L

Groundwater Purging and Sampling Form

ch2m:

Project Name: UPRR Freeman

Well ID: MW-85

Field Team: Demus, Humphreys

Date: 10-12-17

Weather/Temp: cloudy, 36°F

Arrival Time: 13:05

Well Condition: good

Initial DTW (ft btc):

Purge Method: bailer

Field Parameters [1]									
Time	DTW [2]	Purge Vol. (gal)	Temp (°C)	pH	ORP (mV)	Sp. Cond. (uS/cm)	Turbidity (NTU)	DO (mg/L)	Comments (color, odor, sheen, etc.)
		0	-	-	-	-	-	-	following setup, just prior to purging
13:24			10.60	6.44	208	0.346	64.7	3.43	
Stabilization Criteria [3]	-	-	-	± 0.1 units	± 10 mV	± 3%	± 10% [4]	± 0.3 mg/L	-

[1] collect field parameters in 3-5 minute intervals

[2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.1 m (0.33 ft); target purge rate: 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs

Sample ID: MW85-GW-101217

Sample Time: 13:20

QC Sample (circle): FD MS/MSD EQ Blank

Total Purged (gal):

Field Duplicate ID:

Field Duplicate Time:

Comments: well pumped dry on previous day

Fe^{2+}: 0.03 mg/L

Location Freeman, WA Date 10-5-17

Project / Client UPRR Freeman

MW-4D Purge Log

DTW: 114.09
purge volume = 2.5gal
Ferrous iron = 0.05mg/L

Time	DTW	pH	Cond	DO	Temp	Turb	ORP
10:42	114.33	7.23	396	3.89	10.83	5.1	60
10:47	115.15	7.16	395	3.88	11.23	2.9	55
10:52	114.95	7.17	405	3.29	11.13	1.23	82
10:57	114.93	7.14	406	2.75	11.02	2.44	105
11:02	114.92	7.16	403	2.77	11.27	1.25	116
11:07	114.82	7.16	397	2.94	11.61	88.2	123
11:12	114.91	7.19	392	3.41	11.74	70.0	127
11:17	114.91	7.21	388	3.59	11.43	54.5	132
11:22	115.00	7.23	384	3.70	11.46	32.6	134

Sample ID = MW4D-GW-100517
Sample time = 11:25

Location Freeman, WA Date 10-5-17

Project / Client

MW-9D Purge log

DTW: 32.74
purge volume: 3.2gal
Ferrous Iron = 0.06

Time	DTW	pH	Cond	D.O.	Temp	Turb	ORP
12:10	32.91	7.55	360	17.38	13.03	41.1	132
12:15	33.00	7.27	368	6.39	12.19	6.0	174
12:20	33.30	7.13	373	5.53	11.91	6.2	172 — reduced flow
12:25	32.85	7.08	375	4.98	12.58	0.0	172
12:30	32.82	7.03	377	4.72	13.10	0.0	170
12:35	32.80	7.05	381	4.63	13.01	0.0	165

Sample ID: MW9D-GW-100517
Sample Time: 12:40

Groundwater Purging and Sampling Form

ch2m:

Project Name: UPRR Freeman

Well ID: MW-95

Field Team: Demus, Humphreys

Date: 10-12-17

Weather/Temp: cloudy, 36°F

Arrival Time: 13:30

Well Condition: good

Initial DTW (ft btc):

Purge Method: bailer

Field Parameters [1]									
Time	DTW [2]	Purge Vol. (gal)	Temp (°C)	pH	ORP (mV)	Sp. Cond. (uS/cm)	Turbidity (NTU)	DO (mg/L)	Comments (color, odor, sheen, etc.)
		0	-	-	-	-	-	-	following setup, just prior to purging
13:45			11.06	6.24	215	0.514	501	14.32	
Stabilization Criteria [3]	-	-	-	± 0.1 units	± 10 mV	± 3%	± 10% [4]	± 0.3 mg/L	-

[1] collect field parameters in 3-5 minute intervals

[2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.1 m (0.33 ft); target purge rate: 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs

Sample ID: MW95-GW-101217

Sample Time: 13:40

QC Sample (circle): FD MS/MSD EQ Blank

Total Purged (gal):

Field Duplicate ID:

Field Duplicate Time:

Comments: well pumped dry on previous day

Fe^{2+}: ~~0.00 mg/L~~ 0.11 mg/L

Groundwater Purging and Sampling Form

ch2m:

Project Name: UPRR Freeman

Well ID: MW-9U

Field Team: Demus, Humphreys

Date: 10-12-17

Weather/Temp: cloudy, cool

Arrival Time: 08:00

Well Condition: good

Initial DTW (ft btc): 31.61

Purge Method: submersible

Field Parameters [1]									
Time	DTW [2]	Purge Vol. (gal)	Temp (°C)	pH	ORP (mV)	Sp. Cond. (uS/cm)	Turbidity (NTU)	DO (mg/L)	Comments (color, odor, sheen, etc.)
08:27	31.61	0	-	-	-	-	-	-	following setup, just prior to purging
08:29	32.52	2.5	11.48	6.39	141	0.399	18.1	8.74	
08:34	32.58	10	11.61	6.22	141	0.397	9.4	7.3	
08:39	32.59	16	11.63	6.85	156	0.395	6.9	7.22	
08:44	32.61	25	11.61	6.93	170	0.395	4.4	7.13	
08:49	32.63	31	11.62	7.04	166	0.400	2.4	6.93	
08:54	32.63	37	11.64	7.02	163	0.401	2.5	6.92	
Stabilization Criteria [3]	-	-	-	± 0.1 units	± 10 mV	± 3%	± 10% [4]	± 0.3 mg/L	-

[1] collect field parameters in 3-5 minute intervals

[2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.1 m (0.33 ft); target purge rate: 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs

Sample ID: MW9U-GW-101217

Sample Time: 9:00

QC Sample (circle): FD MS/MSD EQ Blank

Total Purged (gal): 45

Field Duplicate ID:

Field Duplicate Time:

Comments: bladder pump not available

IIII III

Groundwater Purging and Sampling Form

ch2m:

Project Name: UPRR Freeman | **Well ID:** MW-105

Field Team: Dennis, Humphreys | Date: 10-12-17

Weather/Temp: cloudy, 38°F | Arrival Time: 12:00

Well Condition: good | **Initial DTW (ft btc):**

Purge Method: bailer

Field Parameters [1]									
Time	DTW [2]	Purge Vol. (gal)	Temp (°C)	pH	ORP (mV)	Sp. Cond. (uS/cm)	Turbidity (NTU)	DO (mg/L)	Comments (color, odor, sheen, etc.)
		0	-	-	-	-	-	-	following setup, just prior to purging
12:20			10.31	7.43	171	0.521	10.9	11.76	
Stabilization Criteria [3]	-	-	-	± 0.1 units	± 10 mV	± 3%	± 10% [4]	± 0.3 mg/L	-

[1] collect field parameters in 3-5 minute intervals

[2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.1 m (0.33 ft); target purge rate: 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs

Sample ID: MW105-GW-101217 | Sample Time: 12:15

QC Sample (circle): FD MS/MSD EQ Blank | Total Purged (gal):

Field Duplicate ID: | Field Duplicate Time:

Comments: well pumped dry previous day

ferrous iron: 0.02 mg/L

Groundwater Purging and Sampling Form

ch2m:

Project Name: UPRR Freeman

Well ID: MW-11S

Field Team: Demus, Humphreys

Date: 10-12-17

Weather/Temp: mostly cloudy, 36°F

Arrival Time: 11:40

Well Condition: good

Initial DTW (ft btc):

Purge Method: bailer

Field Parameters [1]									
Time	DTW [2]	Purge Vol. (gal)	Temp (°C)	pH	ORP (mV)	Sp. Cond. (uS/cm)	Turbidity (NTU)	DO (mg/L)	Comments (color, odor, sheen, etc.)
		0	-	-	-	-	-	-	following setup, just prior to purging
Stabilization Criteria [3]	-	-	-	± 0.1 units	± 10 mV	± 3%	± 10% [4]	± 0.3 mg/L	-

[1] collect field parameters in 3-5 minute intervals

[2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.1 m (0.33 ft); target purge rate: 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs

Sample ID: ~~MW-65~~ MW11S-GW-101217

Sample Time: 11:50

QC Sample (circle): FD MS/MSD EQ Blank

Total Purged (gal):

Field Duplicate ID:

Field Duplicate Time:

Comments: well pumped dry previous day

ferrous iron: 0.00 mg/L

Groundwater Purging and Sampling Form

ch2m:

Project Name: UPRR Freeman

Well ID: MW-125

Field Team: Demus, Humphreys

Date: 10-12-17

Weather/Temp: cloudy, 36°F

Arrival Time:

Well Condition: good

Initial DTW (ft btc):

Purge Method: bailer

Field Parameters [1]									
Time	DTW [2]	Purge Vol. (gal)	Temp (°C)	pH	ORP (mV)	Sp. Cond. (uS/cm)	Turbidity (NTU)	DO (mg/L)	Comments (color, odor, sheen, etc.)
		0	-	-	-	-	-	-	following setup, just prior to purging
			9.31	6.99	176	0.681	242	6.32	
Stabilization Criteria [3]	-	-	-	± 0.1 units	± 10 mV	± 3%	± 10% [4]	± 0.3 mg/L	-

[1] collect field parameters in 3-5 minute intervals

[2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.1 m (0.33 ft); target purge rate: 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs

Sample ID: MW125-GW-101217

Sample Time: 09:35

QC Sample (circle): FD MS/MSD EQ Blank

Total Purged (gal):

Field Duplicate ID:

Field Duplicate Time:

Comments: ~~baited~~ well pumped dry previous day

ferrous iron = 0.20 mg/L

Groundwater Purging and Sampling Form

ch2m:

Project Name: UPRR Freeman

Well ID: MW-13S

Field Team: Demus, Humphreys

Date: 10-12-17

Weather/Temp: cloudy, 36°F

Arrival Time: 10:10

Well Condition: good

Initial DTW (ft btc):

Purge Method: bailer

Field Parameters [1]									
Time	DTW [2]	Purge Vol. (gal)	Temp (°C)	pH	ORP (mV)	Sp. Cond. (uS/cm)	Turbidity (NTU)	DO (mg/L)	Comments (color, odor, sheen, etc.)
		0	-	-	-	-	-	-	following setup, just prior to purging
10:18			8.13	7.24	168	0.324	116	6.21	
Stabilization Criteria [3]	-	-	-	± 0.1 units	± 10 mV	± 3%	± 10% [4]	± 0.3 mg/L	-

[1] collect field parameters in 3-5 minute intervals

[2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.1 m (0.33 ft); target purge rate: 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs

Sample ID: MW13S-GW-101217

Sample Time: 10:20

QC Sample (circle): FD MS/MSD EQ Blank

Total Purged (gal):

Field Duplicate ID:

Field Duplicate Time:

Comments: ferrous iron: 0.09 mg/L

well ~~pulled dry~~ ~~bailed~~ previous day pumped dry

Location Freeman, WA Date 9-14-17

Project / Client UPRR Freeman

MW-2D DTW - 29.99 Diff -

Time	pH Basin	Cond pumping	D.O	Turb	ORP	DTW	TEMP
8:35							
8:44	7.86	.274	3.26	3.4	-167	30.04	13.51
8:49	7.88	0.277	1.94	3.5	-133	30.01	13.11
8:58	7.93	0.272	1.84	3.8	-135	30.11	13.31
9:03	7.91	0.284	1.79	3.6	-153	30.28	12.89
9:08	7.89	0.272	1.32	3.6	-150	30.15	12.47
9:13	7.87	0.269	2.00	3.3	-146	30.05	12.83
9:18	7.87	0.269	1.31	3.4	-145	30.03	12.96
9:23	7.87	0.268	1.26	3.3	-143	30.01	13.24
9:28	7.86	0.268	1.20	3.5	-145	30.0	13.40

MW2D-GW-091417
SAMPLE TIME 0930
TOTAL PURGED = 0.5 gal

Location Freeman, WA Date 9-14-17

Project / Client UPRR Freeman

MW-14D DTW - 15.22

Time	DTW Basin pumping	pH	Cond	DO	Temp	Turb	ORP	
12:34	16.24	7.79	.262	5.85	12.45	10.2	63	
12:39	15.90	7.58	0.263	3.25	11.95	21.3	-52	
12:44	15.50	7.43	0.282	3.60	13.09	10.6	-69	
12:49	15.36	7.39	0.295	3.60	14.10	13.8	-70	
12:54	15.34	7.39	0.295	3.62	14.67	12.1	-67	
12:59	15.32	7.40	0.295	3.76	15.16	10.2	-62	gray/ cloudy

MW14D-GW-091417
SAMPLE TIME 1305
TOTAL PURGED 0.25 gal

Location Freeman, WA Date 10-2-17

Project / Client UPRR Freeman

MW-18D Purge log

DTW$_i$ - 53.08

purge volume - 3.5 gallons

Ferrous iron - 0.1

Time	DTW	pH	Cond	DO	Temp	Turb	ORP
1300	53.15	7.71	1310	3.25	10.34	0	130
1305	53.15	7.75	311	4.00	10.33	20	80
1310	53.20	7.77	1307	3.58	10.17	4.2	-76
1315	53.22	7.80	306	3.07	10.24	2.7	-92
1320	53.25	7.83	305	2.83	10.20	0	-98
1325	53.15	7.85	304	2.64	10.10	0	-101
1330	53.24	7.85	304	2.50	10.21	0	-100
1335	53.18	7.84	1304	2.41	10.14	0	-105

Sample ID: MW18D-GW-100217

Sample time: 13:40

Location Freeman, WA Date 10-2-17

Project / Client UPRR Freeman

MW-15D Purge Log

DTW$_i$ = 91.57

purge volume: 3 gallons

Ferrous Iron = 0.0 mg/L

Time	DTW	pH	Cond	DO	Temp	Turb	ORP
14:10	91.57	7.76	1348	4.87	10.02	0	127
14:15	91.57	7.40	1346	5.00	10.19	0	110
14:20	91.57	7.35	1348	5.03	10.26	0	114
14:25	91.57	7.30	1349	5.25	10.29	0	118

Sample ID = MW15D-GW-100217

Sample Time = 14:30

Location Freeman, WA Date 10-2-17

Project / Client UPRR Freeman

MW-21D Purge Log

DTW: - 66.18

Purge volume - 3gal.

Ferrous iron = 0.42 mg/L

Time	DTW	pH	Cond	DO	Temp	Turb	ORP
10:32	66.48	6.02	.437	6.15	10:07	20	207
10:37	66.53	7.08	.407	4.44	10:14	34	-114
10:42	66.38	7.39	.402	3.65	10:27	31	-147
10:47	66.53	7.55	.401	3.39	10:17	17.1	-157
10:52	66.55	7.68	.399	3.16	10:33	15.1	-164
10:57	66.55	7.76	.397	3.00	10:25	9.4	-168
11:02	66.55	7.80	.393	2.86	10:36	9.9	-164
11:07	66.55	7.85	.392	2.75	10:23	10.8	-170

Sample ID - MW21D-GW-100217

Sample time - 11:10

Location Freeman, WA Date 10-2-17

Project / Client UPRR Freeman

MW-18D Purge Log

DTW - 47.30

purge volume - 3.5 gallons

Ferrous iron - 0.06 mg/L

Time	DTW	pH	Cond	DO.	Temp	Turb	ORP
11:33	47.75	7.73	.469	14.08	10.85	18.2	139
11:43	47.56	7.37	.472	7.33	10.70	0	140
11:48	47.62	7.32	.470	6.69	10.34	0	137
11:53	47.70	7.28	.474	6.63	10.68	0	137
11:58	47.75	7.30	.475	6.51	10.59	0	138

Sample ID: MW18D-GW-100217

Sample Time: 12:05

Groundwater Purging and Sampling Form

ch2m

Project Name: **UPRR Freeman** | **Well ID:** MW-17D

Field Team: Demus, Humphreys | Date: 10-10-17

Weather/Temp: cloudy, cool | Arrival Time: 13:03

Well Condition: good | **Initial DTW (ft btc):** 63.63

Purge Method: bladder pump

Field Parameters[1]									
Time	DTW[2]	Purge Vol. (gal)	Temp (°C)	pH	ORP (mV)	Sp. Cond. (uS/cm)	Turbidity (NTU)	DO (mg/L)	Comments (color, odor, sheen, etc.)
13:09	—	0	-	-	-	-	-	-	following setup, just prior to purging
13:11	65.87	0.2	12.97	7.47	231	0.589	37.1	5.35	clear
13:16	67.22	0.4	12.70	7.37	-72	0.612	45.2	4.56	clear
13:21	70.88	0.7	12.34	7.53	-160	0.681	32.6	1.89	clear
13:26	73.53	1.1	12.33	7.63	-170	0.631	62.0	1.65	septic odor clear
13:31	75.81	1.4	12.34	7.73	-170	0.619	83.0	1.51	septic odor clear
13:36	79.07	1.9	12.36	7.67	-163	0.635	97.0	1.47	septic odor clear
Stabilization Criteria[3]	-	-	-	± 0.1 units	± 10 mV	± 3%	± 10%[4]	± 0.3 mg/L	-

[1] collect field parameters in 3-5 minute intervals

[2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.1 m (0.33 ft); target purge rate: 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs

Sample ID: MW17D - GW - 101017 | Sample Time: 13:40

QC Sample (circle): FD MS/MSD EQ Blank | Total Purged (gal): 2.3

Field Duplicate ID: Ferrous iron = 0.23 mg/L | Field Duplicate Time:

Comments:

Location Freeman, WA Date 10-2-17

Project / Client UPRR Freeman

MW-18D Purge log

DTW$_i$ - 53.08

purge volume - 3.5 gallons

Ferrous iron - 0.1

Time	DTW	pH	Cond	DO	Temp	Turb	ORP
1300	53.15	7.71	1310	3.25	10.34	0	130
1305	53.15	7.75	311	4.00	10.33	20	80
1310	53.20	7.77	1307	3.58	10.17	4.2	-76
1315	53.22	7.80	306	3.07	10.24	2.7	-92
1320	53.25	7.83	305	2.83	10.20	0	-98
1325	53.15	7.85	304	2.64	10.10	0	-101
1330	53.24	7.85	304	2.50	10.21	0	-100
1335	53.18	7.84	1304	2.41	10.14	0	-105

Sample ID: MW18D-GW-100217

Sample time: 13:40

Location Freeman, WA Date 10-2-17

Project / Client UPRR Freeman

MW-15D Purge Log

DTW$_i$ = 91.57

purge volume: 3 gallons

Ferrous Iron = 0.0 mg/L

Time	DTW	pH	Cond	DO	Temp	Turb	ORP
14:10	91.57	7.76	1348	4.87	10.02	0	127
14:15	91.57	7.40	1346	5.00	10.19	0	110
14:20	91.57	7.35	1348	5.03	10.26	0	114
14:25	91.57	7.30	1349	5.25	10.29	0	118

Sample ID = MW15D-GW-100217

Sample Time = 14:30

Location Freeman, WA Date 10-5-17

Project / Client UPRR Freeman

MW-19D Purge Log

- needs discharge hose

DTW$_i$ = 53.32
Ferrous iron - 0.05mg/L
Purge volume = 2.5 gallons

Time	DTW	pH	Cond	DO	Temp	Turb	ORP
13:14	58.04	7.56	.1403	6.82	12.47	0.0	138
13:19	58.39	7.28	.1387	3.07	12.76	37.4	150
13:24	58.43	7.23	.1397	3.51	12.72	93.6	145
13:29	58.42	7.17	.1397	3.98	12.75	120	142
13:34	58.54	7.30	.1414	3.36	12.35	79.5	141
13:45	58.35	7.35	.1406	3.32	10.96	8.3	141
13:50	58.37	7.32	.1396	3.11	11.88	14.4	142

Sample ID: MW19D-GW-100517
Sample Time = 13:55

QC - FD-GW-100517
QC time - 17:00

Location Date 10-5-17

Project / Client

MW-20D Purge Log

DTW$_i$ = 92.47
Purge volume - 3 gal
Ferrous iron - 0.05mg/L

Time	DTW	pH	Cond	DO	Temp	Turb	ORP
14:40	93.00	7.73	.1489	5.54	12.10	60	84
14:45	93.38	7.28	.1444	4.39	12.34	30.3	89
14:50	93.80	7.33	.1450	4.40	11.93	53	112
14:55	93.25	7.40	.1480	4.06	12.22	31.0	120
15:00	93.24	7.40	.1487	3.87	13.22	32.6	125
15:05	93.02	7.42	.1489	4.16	11.95	31.4	123

Sample ID: MW20D-GW-100517
Sample Time - 15:10

Location Freeman, WA Date 10-5-17

Project / Client UPRR Freeman

MW-19D Purge Log

- needs discharge hose

DTW$_i$ = 53.32
Ferrous iron - 0.05mg/L
Purge volume = 2.5 gallons

Time	DTW	pH	Cond	DO	Temp	Turb	ORP
13:14	58.04	7.56	.1403	6.82	12.47	0.0	138
13:19	58.39	7.28	.1387	3.07	12.76	37.4	150
13:24	58.43	7.23	.1397	3.51	12.72	93.6	145
13:29	58.42	7.17	.1397	3.98	12.75	120	142
13:34	58.54	7.30	.1414	3.36	12.35	79.5	141
13:45	58.35	7.35	.1406	3.32	10.96	8.3	141
13:50	58.37	7.32	.1396	3.11	11.88	14.4	142

Sample ID: MW19D-GW-100517
Sample Time = 13:55

QC - FD-GW-100517
QC time - 17:00

Location Date 10-5-17

Project / Client

MW-20D Purge Log

DTW$_i$ = 92.47
Purge volume - 3 gal
Ferrous iron - 0.05mg/L

Time	DTW	pH	Cond	DO	Temp	Turb	ORP
14:40	93.00	7.73	.1489	5.54	12.10	60	84
14:45	93.38	7.28	.1444	4.39	12.34	30.3	89
14:50	93.80	7.33	.1450	4.40	11.93	53	112
14:55	93.25	7.40	.1480	4.06	12.22	31.0	120
15:00	93.24	7.40	.1487	3.87	13.22	32.6	125
15:05	93.02	7.42	.1489	4.16	11.95	31.4	123

Sample ID: MW20D-GW-100517
Sample Time - 15:10

Location Freeman, WA Date 10-2-17

Project / Client UPRR Freeman

MW-21D Purge Log

DTW: - 66.18

Purge volume - 3gal.

Ferrous iron = 0.42 mg/L

Time	DTW	pH	Cond	DO	Temp	Turb	ORP
10:32	66.48	6.02	.437	6.15	10:07	20	207
10:37	66.53	7.08	.407	4.44	10:14	34	-114
10:42	66.38	7.39	.402	3.65	10:27	31	-147
10:47	66.53	7.55	.401	3.39	10:17	17.1	-157
10:52	66.55	7.68	.399	3.16	10:33	15.1	-164
10:57	66.55	7.76	.397	3.00	10:25	9.4	-168
11:02	66.55	7.80	.393	2.86	10:36	9.9	-164
11:07	66.55	7.85	.392	2.75	10:23	10.8	-170

Sample ID - MW21D-GW-100217

Sample time - 11:10

Location Freeman, WA Date 10-2-17

Project / Client UPRR Freeman

MW-18D Purge Log

DTW - 47.30

purge volume - 3.5 gallons

Ferrous iron - 0.06 mg/L

Time	DTW	pH	Cond	DO.	Temp	Turb	ORP
11:33	47.75	7.73	.469	14.08	10.85	18.2	139
11:43	47.56	7.37	.472	7.33	10.70	0	140
11:48	47.62	7.32	.470	6.69	10.34	0	137
11:53	47.70	7.28	.474	6.63	10.68	0	137
11:58	47.75	7.30	.475	6.51	10.59	0	138

Sample ID: MW18D-GW-100217

Sample Time: 12:05

Groundwater Purging and Sampling Form

ch2m:

Project Name: UPRR Freemen | Well ID: W26

Field Team: Humphreys, Brown | Date: 10-16-17

Weather/Temp: sunny, mild | Arrival Time: 14:30

Well Condition: good | Initial DTW (ft btc): ~~66.8~~ 67.02

Purge Method: submers. bl

Field Parameters[1]									
Time	DTW[2]	Purge Vol. (gal)	Temp (°C)	pH	ORP (mV)	Sp. Cond. (uS/cm)	Turbidity (NTU)	DO (mg/L)	Comments (color, odor, sheen, etc.)
14:55	67.02	0	-	-	-	-	-	-	following setup, just prior to purging
14:56	67.28	0.5	11.47	7.59	77	.304	0.0	7.27	clear
14:59	67.25	3	11.14	7.41	110	.304	0.0	6.86	clear
15:02	67.25	5	11.17	7.32	120	.304	0.0	6.78	clear
15:05	67.24	7	11.19	7.25	126	.304	0.0	6.74	clear
15:08	67.24	9	11.19	7.14	130	.305	0.0	6.69	clear
15:11	67.24	11	11.20	7.11	131	.304	0.0	6.67	clear
15:14	67.24	13	11.20	7.00	132	.305	0.0	6.61	clear
15:17	67.24	15	11.21	7.03	132	.303	0.0	6.61	
Stabilization Criteria[3]	-	-	-	± 0.1 units	± 10 mV	± 3%	± 10%[4]	± 0.3 mg/L	-

[1] collect field parameters in 3-5 minute intervals

[2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.1 m (0.33 ft); target purge rate: 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs

Sample ID: W26-GW-101617 | Sample Time: 15:20

QC Sample (circle): FD MS/MSD EQ Blank | Total Purged (gal): 18

Field Duplicate ID: _____ | Field Duplicate Time: _____

Comments: _____

Groundwater Purging and Sampling Form

ch2m:

Project Name: UPRR Fremont
Well ID: W20
Field Team: Humphreys, Brown
Date: 10-16-17
Weather/Temp: sunny, mild
Arrival Time: 12:15
Well Condition: good
Initial DTW (ft btc): 20.21
Purge Method: SM

Field Parameters[1]									
Time	DTW[2]	Purge Vol. (gal)	Temp (°C)	pH	ORP (mV)	Sp. Cond. (uS/cm)	Turbidity (NTU)	DO (mg/L)	Comments (color, odor, sheen, etc.)
12:47	19.99	0	-	-	-	-	-	-	following setup, just prior to purging
12:48	20.80	1	9.78	7.75	18	.321	66.8	6.36	brownish-grey
12:54	24.02	4	9.73	7.59	28	.322	36.2	6.02	brownish grey
12:57	26.46	8	9.29	7.39	28	.311	22.0	5.12	brownish-grey
13:00	28.68	14	9.29	7.32	27	.313	17.0	5.19	"
13:03	31.15	20	9.30	7.27	15	.294	15.1	4.36	"
13:06	33.19	26	9.27	7.37	-24	.260	13.8	2.93	"
13:09	34.80	32	9.27	7.49	-37	.248	12.8	2.64	"
13:12	36.68	37	9.28	7.53	-34	.246	12.0	2.71	
13:16	38.35	52	9.27	7.48	-29	.243	10.1	2.72	
Stabilization Criteria[3]	-	-	-	± 0.1 units	± 10 mV	± 3%	± 10%[4]	± 0.3 mg/L	-

[1] collect field parameters in 3-5 minute intervals

[2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.1 m (0.33 ft); target purge rate: 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs

Sample ID: W20-GW-101617
Sample Time: 13:20

QC Sample (circle): FD MS/MSD EQ Blank
Total Purged (gal): 60

Field Duplicate ID:
Field Duplicate Time:

Comments:

Groundwater Purging and Sampling Form

ch2m:

Project Name: UPRR Fraemon

Well ID: Marlow #2

Field Team: Humphreys, Brown

Date: 10-16-17

Weather/Temp: sunny, cool

Arrival Time: 09:40

Well Condition: good

Initial DTW (ft btc): 43.70

Purge Method: submersible

Field Parameters[1]									
Time	DTW[2]	Purge Vol. (gal)	Temp (°C)	pH	ORP (mV)	Sp. Cond. (uS/cm)	Turbidity (NTU)	DO (mg/L)	Comments (color, odor, sheen, etc.)
10:28	43.70	0	-	-	-	-	-	-	following setup, just prior to purging
10:30	—	1	9.91	8.50	-12	0.444	39.8	5.52	
10:35	44.38	4	10.05	8.14	13	0.445	35.5	4.93	
10:38	44.31	9	10.06	7.77	27	0.445	18.5	3.46	
10:43	—	12	10.08	7.65	28	.445	10.7	3.30	
10:47	44.33	15	10.09	7.62	13	.444	14.7	3.18	
10:51	—	18	10.10	7.68	18	.444	21.2	3.31	
Stabilization Criteria[3]	-	-	-	± 0.1 units	± 10 mV	± 3%	± 10%[4]	± 0.3 mg/L	-

[1] collect field parameters in 3-5 minute intervals

[2] DTW: depth to water measured from top of casing; total drawdown should not exceed 0.1 m (0.33 ft); target purge rate: 0.1 - 0.5 L/min (0.03 - 0.13 gal/min)

[3] stabilization achieved once field parameters stabilize for 3 successive readings; minimum parameter subset: pH, sp. cond., and turbidity or DO

[4] for turbidity readings > 10 NTUs

Sample ID: Marlow2-GW-101617

Sample Time: 10:55

QC Sample (circle): FD MS/MSD EQ Blank

Total Purged (gal): 23

Field Duplicate ID:

Field Duplicate Time:

Comments: submersible flow higher than optimal

GROUNDWATER PURGING AND SAMPLING FORM

GENERAL INFORMATION

Project Name: UPRR-Freeman Date: 9-13-17

Well ID: Reed Res. Well Field Team: L. Baumann

Time Arrived at Well: 1000 Weather Conditions: 70° some clouds

PURGE INFORMATION

Initial DTW (ft btc): ~

Time Begin Purging: 1026

Purge Method: _____

Time	DTW (ft btc)	Purge Volume (gal)	pH	Sp. Cond. ~~(µS/cm)~~ mS/cm	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temp (°C)	ORP (mV)	TDS (mg/L)	Comm. (color, odor)
1027	~	2	8.10	.257	1.2	2743	15.58	157		NO

Sample Identification: Reed-GW-091317 Sample Time: 1030

Analysis: _____ Sample Volume: _____

QA/QC Sample ID: _____ QA/QC Sample Time: _____

Field Duplicate: _____ Equipment Blank: ____ MS/MSD: ____

Comments: _____

ch2m:

GROUNDWATER PURGING AND SAMPLING FORM

GENERAL INFORMATION

Project Name: UPRR Freeman

Date: 09-12-17

Well ID: ASHER

Field Team: L. BAUMANN, J. BROWN

Time Arrived at Well: 1500

Weather Conditions: SUNNY 80°

PURGE INFORMATION

Initial DTW (ft btc): _____

Time Begin Purging: _____

Purge Method: _____

Time	DTW (ft btc)	Purge Volume (gal)	pH	Sp. Cond. ~~(µS/cm)~~ mS/cm	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temp (°C)	ORP (mV)	TDS (mg/L)	Comm. (color, odor)
1515		2.5	7.57	0.479	75.3	6.44	20.96	194		no odor, cloudy - cleared up after 2 minutes

Sample Identification: ASHER-GW-091217

Sample Time: 1520

Analysis: _____

Sample Volume: _____

QA/QC Sample ID: _____

QA/QC Sample Time: _____

Field Duplicate: _____

Equipment Blank: ____

MS/MSD: ____

Comments: _____

74

714 678 [illegible] 2247

ch2m

GROUNDWATER PURGING AND SAMPLING FORM

GENERAL INFORMATION

Project Name: UPRR Freeman

Date: 09-12-17

Well ID: THORSON

Field Team: L. Baumann, J. Brown

Time Arrived at Well: 1400

Weather Conditions: SUNNY 80°

PURGE INFORMATION

Initial DTW (ft btc): _____

Time Begin Purging: _____

Purge Method: _____

Time	DTW (ft btc)	Purge Volume (gal)	pH	Sp. Cond. ~~(µS/cm)~~ mS/cm	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temp (°C)	ORP (mV)	TDS (mg/L)	Comm. (color, odor)
1415		3	7.9	0.262	0.0	7.82	16.38	-71		no odor, clear

Sample Identification: THORSON-GW-091217

Sample Time: 1420

Analysis: _____

Sample Volume: _____

QA/QC Sample ID: _____

QA/QC Sample Time: _____

Field Duplicate: _____ Equipment Blank: ____ MS/MSD: ____

Comments: _____

ch2m:

GROUNDWATER PURGING AND SAMPLING FORM

GENERAL INFORMATION

Project Name: UPRR Freeman

Date: 09-12-17

Well ID: STARK

Field Team: L. BAUMANN, J. BROWN

Time Arrived at Well: 1430

Weather Conditions: SUNNY 80°

PURGE INFORMATION

Initial DTW (ft btc): _____

Time Begin Purging: 1450

Purge Method: _____

Time	DTW (ft btc)	Purge Volume (gal)	pH	Sp. Cond. ~~(µS/cm)~~ mS/cm	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temp (°C)	ORP (mV)	TDS (mg/L)	Comm. (color, odor)
1450		3.0	7.84	.285	0.0	6.13	17.63	198		0/0

Sample Identification: STARK-GW-091217

Sample Time: 1454

Analysis: _____

Sample Volume: _____

QA/QC Sample ID: _____

QA/QC Sample Time: _____

Field Duplicate: _____ Equipment Blank: ____ MS/MSD: ____

Comments: _____

GROUNDWATER PURGING AND SAMPLING FORM

GENERAL INFORMATION

Project Name: UPRR Freeman

Date: 09-12-17

Well ID: LANG

Field Team: L. Baumann, J. Brown

Time Arrived at Well: 1055

Weather Conditions: Sunny 75°

PURGE INFORMATION

Initial DTW (ft btc): _____

Time Begin Purging: _____

Purge Method: _____

Time	DTW (ft btc)	Purge Volume (gal)	pH	Sp. Cond. (µS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temp (°C)	ORP (mV)	TDS (mg/L)	Comm. (color, odor)
1058		1.5	6.20	0.337	6.1	11.20	16.52	196		no odor, tan

Sample Identification: LANG-GW-091217

Sample Time: 1100

Analysis: _____

Sample Volume: _____

QA/QC Sample ID: _____

QA/QC Sample Time: _____

Field Duplicate: _____ Equipment Blank: ____ MS/MSD: ____

Comments: _____