

Project Name: WDEQ VPR - Site Characterization - Former Lobell Refinery - Casper, Wyoming

Borehole Location: Refer to Site Map

Borehole Number: BH-3 Driller: Marty Hernandez Logger: Joe Scott

Drilling Equipment: CME-55 Borehole Diameter (in.): 8.25 Date Started: 2-24-10 Date Finished: 2-24-10

Elevation and Datum: Ground: Existing Grade Casing:

DEPTH (ft)	OPERATION	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE	STANDARD PENETRATION RESISTANCE SPT	FIELD SCREENING RESULTS			
							PID HEADSPACE (ppm)	FID HEADSPACE (ppm)	ODOR	STAINING
0.80			Fine to coarse grained SAND and fine grained GRAVEL, tan.	0.80	X	44-28-26		350	Hydro-carbon	
1.50			Silty, clayey SAND, black, hydrocarbon odor.	1.50	X					
3.00			Black to 3 ft.							
5.00			Thin brown clay layer at 3 ft, then tan brown sand.	5.00						
6.50			Fine to coarse grained SAND and fine to coarse grained GRAVEL, dry to moist, 12 in. recovery.	6.50	X	8-22-28		2		
7.50			Gray sand and gravel at 7.5 ft.							
8.00			Very gravelly from 8 to 9 ft.							
10.00			Railroad spike brought to surface in cuttings.	10.00						
11.50			Fine to coarse grained SAND, tan, dry to moist.	11.50	X	8-13-16		0		
12.00			Some gravel from 12 to 13 ft.							
15.00				15.00						
16.50			Fine to coarse grained SAND, tan, dry to moist.	16.50	X	8-13-30		0		
17.00			Gravel at 17 ft.							
20.00				20.00						
21.50			Fine to coarse grained SAND and fine to coarse grained GRAVEL, tan moist, 3 in. recovery.	21.50	X	28-39-42		0		
25.00				25.00						
26.50			Fine to coarse grained SAND, saturated. Gray, hydrocarbon odor 1 in. thick layer at 25.5 ft.	26.50	X	11-23-30		10	Hydro-carbon	

Bottom of Boring at 26.5 ft

<b>Sampler Types:</b> Split Spoon Shelby Penetrometer Vane Shear Bulk Sample California Grab Sample Headspace Continuous Sampling Test Pit	<b>Operation Types:</b> Auger Air Rotary Core Barrel Drive Casing Hand Auger Continuous Sampling	<b>WATER LEVEL OBSERVATIONS</b> While Drilling $\nabla$ Dry ft Upon Completion of Drilling $\nabla$ ft Time After Drilling _____ Depth To Water (ft) _____ Remarks: _____
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114-510205



LOG OF EXPLORATORY BORING BH-3

510205 LOGS.GPJ 4-9-10 CASPER ENVIRO NO FIG # TT library 1-10 (MAT)

Project Name: WDEQ VPR - Site Characterization - Former Lobell Refinery - Casper, Wyoming

Borehole Location: Refer to Site Map

Borehole Number: BH-4 Driller: Marty Hernandez Logger: Joe Scott

Drilling Equipment: CME-55 Borehole Diameter (in.): 8.25 Date Started: 2-25-10 Date Finished: 2-25-10

Elevation and Datum: Ground: Existing Grade Casing:

DEPTH (ft)	OPERATION	GRAPHIC LOG	Notes:	DEPTH (ft)	SAMPLE	STANDARD PENETRATION RESISTANCE SPT	FIELD SCREENING RESULTS			
							PID HEADSPACE (ppm)	FID HEADSPACE (ppm)	ODOR	STAINING
0.30			ASPHALTIC PAVEMENT, (4 in. thick).	0.30	X	50-17-8		4		
0.80			ROAD BASE, old concrete, (6 in. thick).	0.80	X					
1.50			Medium to fine grained SAND, tan, dry, brown at 1.5 ft.	1.50	X					
5.00			No recovery. Coarse to fine grained SAND and fine grained GRAVEL, tan to brown, moist.	5.00	X	5-15-17				
10.00			3 in. recovery. Coarse to fine grained SAND and fine grained GRAVEL, tan to brown, moist.	10.00	X			9		
15.00			Coarse to fine grained SAND and coarse to fine grained GRAVEL, tan, moist.	15.00	X	30-50/0.4		0		
20.00			Coarse to fine grained SAND and some coarse to fine grained GRAVEL, tan to orange, moist.	20.00	X	17-19-38		0		
25.00			Coarse to fine grained SAND with little coarse grained GRAVEL, tan, saturated.	25.00	X	7-28-49		0		
26.50			Bottom of Boring at 26.5 ft	26.50	X					

510205 LOGS.GPJ 4-9-10 CASPER ENVIRO NO FIG # 1-10 (MAT)

<b>Sampler Types:</b> Continuous Sampling Test Pit Split Spoon Shelby Bulk Sample Grab Sample Penetrometer Vane Shear California Headspace	<b>Operation Types:</b> Auger Air Rotary Core Barrel Drive Casing Hand Auger Continuous Sampling
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WATER LEVEL OBSERVATIONS			
While Drilling	▽	Dry ft	Upon Completion of Drilling
Time After Drilling	_____	_____	_____
Depth To Water (ft)	_____	_____	_____
Remarks:	_____		

Project Name: WDEQ VPR - Site Characterization - Former Lobell Refinery - Casper, Wyoming

Borehole Location: Refer to Site Map

Borehole Number: MW-1 Driller: Marty Hernandez Logger: Joe Scott

Drilling Equipment: CME-55 Borehole Diameter (in.): 8.25 Date Started: 2-23-10 Date Finished: 2-23-10

Elevation and Datum: Ground: Existing Grade Casing:

DEPTH (ft)	OPERATION	GRAPHIC LOG	Notes:	DEPTH (ft)	SAMPLE	STANDARD PENETRATION RESISTANCE SPT	FIELD SCREENING RESULTS			
							PID HEADSPACE (ppm)	FID HEADSPACE (ppm)	ODOR	STAINING
0.25			ASPHALTIC PAVEMENT, (3 in. thick). 12 in. recovery, sand and gravel, 3 in. wood.	0.25	X	17-5-4				
1.50			Clayey SAND, gray, moist.	1.50	X					
2.00			Silty clayey SAND, tan, moist.	2.00	X					
4.00			12 in. recovery. Coarse to fine grained SAND and coarse to fine grained GRAVEL, tan to brown, moist, slightly silty and clayey.	4.00	X	7-21-25		2		
5.00			Thin dark layer at 7.5 ft.	5.00	X					
6.50			Coarse to medium grained SAND, tan, one large coarse gravel in bottom, moist.	6.50	X	4-9-18				
10.00				10.00	X					
11.50			Coarse to fine grained SAND, trace of fine grained gravel, tan, moist, more coarse to fine grained gravel in bottom 4 in..	11.50	X	12-32-50/0.3				
15.00				15.00	X					
16.50				16.50	X					
20.00			Coarse to fine grained SAND and coarse to fine grained GRAVEL, tan to brown, moist.	20.00	X	22-50/0.4		2		
21.50				21.50	X					
25.00			Coarse to fine grained SAND with little small gravel, gray, saturated.	25.00	X	12-25-22		98	Hydro-carbon	
26.50				26.50	X					

Bottom of Boring at 26.5 ft

<b>Sampler Types:</b> Continuous Sampling Test Pit Split Spoon Shelby Bulk Sample Grab Sample Penetrometer Vane Shear California Headspace	<b>Operation Types:</b> Auger Air Rotary Core Barrel Drive Casing Hand Auger Continuous Sampling	<b>WATER LEVEL OBSERVATIONS</b>			
		While Drilling $\nabla$ Dry ft Upon Completion of Drilling $\nabla$ _____ ft Time After Drilling _____ Depth To Water (ft) _____ Remarks: _____			

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LOG OF EXPLORATORY BORING MW-1

510205 LOGS.GPJ 4-9-10 CASPER ENVIRO NO FIG # TT library 1-10 (MAT)

Project Name: WDEQ VPR - Site Characterization - Former Lobell Refinery - Casper, Wyoming

Borehole Location: Refer to Site Map

Borehole Number: MW-2 Driller: Marty Hernandez Logger: Joe Scott

Drilling Equipment: CME-55 Borehole Diameter (in.): 8.25 Date Started: 2-25-10 Date Finished: 2-25-10

Elevation and Datum: Ground: Existing Grade Casing:

DEPTH (ft)	OPERATION	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (ft)	SAMPLE	STANDARD PENETRATION RESISTANCE SPT	FIELD SCREENING RESULTS			
							PID HEADSPACE (ppm)	FID HEADSPACE (ppm)	ODOR	STAINING
0.00			CONCRETE PAVEMENT, (8 in. thick).	0.80	X	4-6-8		0		
1.50			Clayey SAND, (2 in. thick).	1.50	X					
			Medium to fine grained SAND, tan to brown, moist.							
5.00				5.00	X					
6.50			Coarse to fine grained SAND and coarse to fine grained GRAVEL, tan, dry.	6.50	X	10-20-21		0		
10.00				10.00	X					
11.50			Coarse to fine grained SAND and coarse to fine grained GRAVEL, tan to orange, moist. More brown layer, (3 in. thick) at 11 ft.	11.50	X	12-15-39		0		
15.00				15.00	X					
16.50			Coarse to fine grained SAND and coarse to fine grained GRAVEL, tan, moist.	16.50	X	17-29-50/0.4		0		
20.00				20.00	X					
21.50			Medium to fine grained SAND with trace coarse grained gravel, tan to orange, moist.	21.50	X	14-24-27		0		
25.00				25.00	X					
26.50			Coarse to fine grained SAND, gray, saturated.	26.50	X	5-13-35		0		

Bottom of Boring at 26.5 ft

<b>Sampler Types:</b> Split Spoon Shelby Continuous Sampling Test Pit Penetrometer Vane Shear California Headspace	<b>Operation Types:</b> Auger Air Rotary Core Barrel Drive Casing Hand Auger Continuous Sampling
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WATER LEVEL OBSERVATIONS			
While Drilling	∇	Dry ft	Upon Completion of Drilling
Time After Drilling			∇
Depth To Water (ft)			∇
Remarks:			

510205 LOGS.GPJ 4-9-10 CASPER ENVIRO NO FIG # TT library 1-10 (MAT)

Project Name: WDEQ VPR - Site Characterization - Former Lobell Refinery - Casper, Wyoming

Borehole Location: Refer to Site Map

Borehole Number: MW-3 Driller: Marty Hernandez Logger: Joe Scott

Drilling Equipment: CME-55 Borehole Diameter (in.): 8.25 Date Started: 2-25-10 Date Finished: 2-25-10

Elevation and Datum: Ground: Existing Grade Casing:

DEPTH (ft)	OPERATION	GRAPHIC LOG	Notes:	DEPTH (ft)	SAMPLE	STANDARD PENETRATION RESISTANCE SPT	FIELD SCREENING RESULTS			
							PID HEADSPACE (ppm)	FID HEADSPACE (ppm)	ODOR	STAINING
0.50			CONCRETE PAVEMENT, (6 in. thick). Silty, clayey SAND, brown, moist.	0.50	X	4-1-5		0		
1.50				1.50	X					
5.00			Medium to fine grained SAND, tan, moist, (4 in. thick). Sandy CLAY, brown, moist, (4 in. thick).	5.00	X	6-6-5		0		
6.50			Coarse grained SAND and fine grained GRAVEL, (4 in. thick). Fe stained SAND, (1 in. thick). Sandy CLAY, brown, moist, (5 in. thick).	6.50	X					
10.00			Coarse to fine grained SAND and coarse to fine grained GRAVEL, tan to brown, moist.	10.00	X	13-18-30		0		
11.50				11.50	X					
15.00			No recovery. Coarse to fine grained SAND and coarse to fine grained GRAVEL, tan to brown.	15.00	X	28-49-50/0.4		0		
16.50				16.50	X					
20.00			Coarse to fine grained SAND with little fine grained gravel, tan, moist.	20.00	X	13-24-30		0		
21.50				21.50	X					
24.00			Coarse to fine grained SAND and coarse to fine grained GRAVEL, tan to gray, saturated.	24.00	X	54/0.4				
26.50			Sandy CLAY at 26.25 ft.	26.50	X	60-39-20		0		

Bottom of Boring at 26.5 ft

<b>Sampler Types:</b> Split Spoon Shelby Penetrometer Vane Shear Bulk Sample California Grab Sample Headspace Continuous Sampling Test Pit	<b>Operation Types:</b> Auger Air Rotary Core Barrel Drive Casing Hand Auger Continuous Sampling
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WATER LEVEL OBSERVATIONS			
While Drilling	<u>  </u> ft	Dry	ft
Upon Completion of Drilling	<u>  </u> ft		
Time After Drilling	<u>  </u> ft		
Depth To Water (ft)	<u>  </u> ft		
Remarks:			

510205 LOGS.GPJ 4-9-10 CASPER ENVIRO NO FIG # TT library 1-10 (MAT)

Project Name: WDEQ VPR - Site Characterization - Former Lobell Refinery - Casper, Wyoming

Borehole Location: Refer to Site Map

Borehole Number: MW-4 Driller: Marty Hernandez Logger: Joe Scott

Drilling Equipment: CME-55 Borehole Diameter (in.): 8.25 Date Started: 2-23-10 Date Finished: 2-23-10

Elevation and Datum: Ground: Existing Grade Casing:

DEPTH (ft)	OPERATION	GRAPHIC LOG	Notes:	DEPTH (ft)	SAMPLE	STANDARD PENETRATION RESISTANCE SPT	FIELD SCREENING RESULTS			
							PID HEADSPACE (ppm)	FID HEADSPACE (ppm)	ODOR	STAINING
0.25			ASPHALTIC PAVEMENT, (3 in. thick).	0.25	X	29-15-9		0		
1.00			Coarse to fine grained SAND and coarse to fine grained GRAVEL, tan, moist, slightly silty and clayey.	1.00	X					
1.50			Silty, clayey SAND with trace gravel, brown to black, moist, frozen.	1.50	X					
5.00			2 in. recovery. Coarse to fine grained SAND and coarse to fine grained GRAVEL, moist.	5.00	X	18-14-10		0		
6.50			Thin dark layer at 8 ft.	6.50	X					
10.00			Coarse to fine grained SAND and coarse to fine grained GRAVEL, tan, moist.	10.00	X	3-11-29		0		
11.50			Clayey sand layer, (2 in. thick) at 11 ft.	11.50	X					
15.00			More gravelly.	15.00	X					
15.00			Coarse to fine grained SAND and coarse to fine grained GRAVEL, tan, moist.	15.00	X	13-30-34		0		
16.50				16.50	X					
20.00			Coarse to fine grained SAND and coarse to fine grained GRAVEL, tan, moist.	20.00	X	48-50/0.25		0		
21.50				21.50	X					
25.00			Coarse to fine grained SAND and coarse to fine grained GRAVEL, tan, saturated.	25.00	X			0		
26.50			Bottom of Boring at 26.5 ft	26.50	X					

510205 LOGS.GPJ 4-9-10 CASPER ENVIRO NO FIG # 1-10 (MAT)

<b>Sampler Types:</b> Continuous Sampling Test Pit Split Spoon Shelby Bulk Sample Grab Sample Penetrometer Vane Shear California Headspace	<b>Operation Types:</b> Auger Air Rotary Hand Auger Continuous Sampling Core Barrel Drive Casing	<b>WATER LEVEL OBSERVATIONS</b> While Drilling $\nabla$ Dry ft Upon Completion of Drilling $\nabla$ ft Time After Drilling _____ Depth To Water (ft) _____ Remarks: _____
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Project Name: WDEQ VPR - Site Characterization - Former Lobell Refinery - Casper, Wyoming

Borehole Location: Refer to Site Map

Borehole Number: BH-2 (MW-5) Driller: Marty Hernandez Logger: Joe Scott

Drilling Equipment: CME-55 Borehole Diameter (in.): 8.25 Date Started: 2-24-10 Date Finished: 2-24-10

Elevation and Datum: Ground: Existing Grade Casing:

DEPTH (ft)	OPERATION	GRAPHIC LOG	Notes:	DEPTH (ft)	SAMPLE	STANDARD PENETRATION RESISTANCE SPT	FIELD SCREENING RESULTS			
							PID HEADSPACE (ppm)	FID HEADSPACE (ppm)	ODOR	STAINING
0.25			ASPHALTIC PAVEMENT, (3 in. thick).	0.25	X	18-25-22		17	Sewer	
1.50			Silty, clayey SAND, brown, moist. Coal layer 3 in. thick at 1 ft, black, oily at 1.5 ft.	1.50	X					
4.00			Black to 4 ft.	4.00						
5.00			Fine to coarse grained SAND and fine grained GRAVEL, moist giving to dry.	5.00	X	7-7-8		4		
6.50			Fine to coarse grained SAND, little fine grained gravel, dry.	6.50	X					
10.00			Fine to coarse grained SAND, tan, moist, Fe staining, gray layer 1/2 in. thick layer, with hydrocarbon odor at 11 ft.	10.00	X	10-18-23		10	Hydro-carbon	
11.50			Fine to coarse grained SAND and fine grained gravel, tan, moist to wet.	11.50	X					
15.00			Fine to coarse grained SAND and fine to coarse grained GRAVEL, gray, moist to wet.	15.00	X	32-50/0.4		85		
16.00				16.00	X					
20.00			Fine to coarse grained SAND and fine grained GRAVEL with trace coarse grained gravel.	20.00	X	23-40-50/0.25		155		
21.50			Dark to light gray, 1/2 in. thick black layer at 21 ft.	21.50	X					
25.00			Fine to coarse grained SAND, gray to 25.25 ft, tan to 26.5, one coarse grained gravel, free oily tan product in spoon.	25.00	X	11-19-17		620	Hydro-carbon	
26.50				26.50	X					

Bottom of Boring at 26.5 ft

<b>Sampler Types:</b> Split Spoon Shelby Penetrometer Vane Shear Bulk Sample California Grab Sample Headspace Continuous Sampling Test Pit	<b>Operation Types:</b> Auger Air Rotary Core Barrel Drive Casing Hand Auger Continuous Sampling	<b>WATER LEVEL OBSERVATIONS</b>	
		While Drilling $\nabla$ Dry ft Upon Completion of Drilling $\nabla$ ft Time After Drilling _____ Depth To Water (ft) _____ Remarks: _____	

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LOG OF EXPLORATORY BORING BH-2 (MW-5)

510205 LOGS.GPJ 4-9-10 CASPER ENVIRO NO FIG # 1-10 (MAT)

Project Name: WDEQ VPR - Site Characterization - Former Lobell Refinery - Casper, Wyoming

Borehole Location: Refer to Site Map

Borehole Number: MW-6 Driller: Marty Hernandez Logger: Joe Scott

Drilling Equipment: CME-55 Borehole Diameter (in.): 8.25 Date Started: 2-26-10 Date Finished: 2-26-10

Elevation and Datum: Ground: Existing Grade Casing:

DEPTH (ft)	OPERATION	GRAPHIC LOG	Notes:	DEPTH (ft)	SAMPLE	STANDARD PENETRATION RESISTANCE SPT	FIELD SCREENING RESULTS			
							PID HEADSPACE (ppm)	FID HEADSPACE (ppm)	ODOR	STAINING
0.50			CONCRETE PAVEMENT, (6 in. thick).	0.50	X	12-12-7		0		
1.00			Coarse to fine grained SAND and coarse to fine grained GRAVEL.	1.00	X					
1.50			Silty, clayey SAND, black.	1.50	X					
2.00			Sandy CLAY, Fe staining.	2.00	X					
4.00			Silty, clayey SAND, black.	4.00	X					
5.00			Medium to fine grained SAND, tan, moist.	5.00	X	4-5-9		0		
6.00			Coarse to fine grained SAND and coarse to fine grained GRAVEL, tan, moist.	6.00	X					
6.50			Coarse to fine grained SAND and coarse to fine grained GRAVEL, tan, moist.	6.50	X					
10.00			12 in. recovery. Coarse to fine grained SAND with little coarse to fine grained gravel, tan to orange, moist.	10.00	X	4-6-12		0		
11.50			Coarse to fine grained SAND and coarse to fine grained GRAVEL, tan, moist.	11.50	X					
15.00			Coarse to fine grained SAND and fine grained GRAVEL, tan, moist.	15.00	X	12-24-32		2		
16.50			Coarse to fine grained SAND and fine grained GRAVEL, tan, moist.	16.50	X					
20.00			6 in. recovery. Coarse to fine grained SAND and coarse to fine grained GRAVEL, tan, moist.	20.00	X	38-50/0.25		0		
21.50			Coarse to fine grained SAND and coarse to fine grained GRAVEL, tan, moist.	21.50	X					
25.00			Coarse to fine grained SAND, tan, wet. Saturated at about 25.5 ft.	25.00	X	20-32-32		0		
26.50			Coarse to fine grained SAND, tan, wet. Saturated at about 25.5 ft.	26.50	X					

Bottom of Boring at 26.5 ft

<b>Sampler Types:</b> Continuous Sampling Test Pit Split Spoon Shelby Bulk Sample Grab Sample Penetrometer Vane Shear California Headspace	<b>Operation Types:</b> Auger Air Rotary Core Barrel Drive Casing Hand Auger Continuous Sampling	<b>WATER LEVEL OBSERVATIONS</b>			
		While Drilling $\nabla$ Dry ft Upon Completion of Drilling $\nabla$ _____ ft Time After Drilling _____ Depth To Water (ft) _____ Remarks: _____			

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LOG OF EXPLORATORY BORING MW-6

510205 LOGS.GPJ 4-9-10 CASPER ENVIRO NO FIG # 1-10 (MAT)