

Borehole Logging Form

BOREHOLE ID: <u>BH01</u>		SITE NAME: <u>Booth 11, 12, 21, 22-31U & 31AU</u>		CLIENT NAME: <u>PDC ENERGY</u>	
Date Completed: <u>5/6/2019</u>		Location: <u>NE Tank battery</u>			
Drilling Company: <u>Site Services</u>		Surface Completion: <u>NA</u>		DTW: <u>NA</u>	TD: <u>43</u>
Type of Drill: <u>Hollow stem auger</u>		Geologist: <u>Brock Nelson</u>		Project Manager: <u>Christine Hamlin</u>	
Bit Size: <u>8"</u>		Logging Method: <u>Continuous split spoon</u>			

Well Const. Material: Diameter: NA			Screen: NA		Riser: NA			
Depth (feet)	Well Completion	Sample Type	% Recovery	PID (ppm)	Laboratory Sample	USCS	Description	
1			↑				Hydrovac - No Recovery	
2								
3								
4			0%					
5								
6			↓					
7			↑				SW	Lt br. sand, sm-med grain, moderately sorted
8			100%		0.0			↓
9			↑					↓
10					0.0			↓
11			100%				SP	Lt br. sand, fine gr, well sorted
12			↓					↓
13					0.0			↓
14			↑					↓
15					0.0			↓
16			60%				SW	Lt br. sand, fine-coarse grain, poorly sorted
17			↓		0.0			↓
18			↑					↓
19							SP	Lt br. sand, fine grain, well sorted
20			100%		3.5	BH01 @ 20-21 857		↓
21			↓					↓
22					7.9		SM	Lt br, silty sand, fine grain well sorted
23			↓					↓
24			↑					↓
25			100%		18.9			↓

Borehole Logging Form

BOREHOLE ID: BH01	SITE NAME: Booth 11, 12, 21, 22-31U & 31AU	CLIENT NAME: PDC ENERGY
Date Completed: 5/6/2019	Location: NE Tank Battery	
Drilling Company: Site Services	Surface Completion: NA	DTW: NA TD: 43
Type of Drill: Hollow stem auger	Geologist: Brock Nelson	Project Manager: Christine Hamlin
Bit Size: 8"	Logging Method: Continuous split spoon	

Well Const. Material: Diameter: NA		Screen: NA		Riser: NA			
Depth (feet)	Well Completion	Sample Type	% Recovery	PID (ppm)	Laboratory Sample	USCS	Description
26			100%			CL	Lt br, silty clay, med plast, some fine sand
27				24.1		SM	Lt br, silty sand, well sorted, fine grain
28							
29				12.4			
30			100%		BH01026-32 916	CL	Lt br, sandy clay, medium grain, low plast
31				9.8			
32							
33						SM	Lt br, silty sand, well sorted, fine grain
34				25.6			
35			100%		BH01035-36 933		
36				34.7			
37							
38				51.1		SM	Lt br, silty sand, poorly sorted, fine-coarse grain
39			80%				
40				36.2	BH01042-43 949		
41							
42							
43							
44							
45							
46							
47							
48							
49							
50							

Borehole Logging Form

BOREHOLE ID: BH02 SITE NAME: Booth 11, 12, 21, 22-31U & 31AU CLIENT NAME: PDC ENERGY

Date Completed: 5/6/2019 Location: NW Tank Battery

Drilling Company: Site Services Surface Completion: N/A DTW: N/A TD: 43

Type of Drill: Hollow stem auger Geologist: Brock Nelson Project Manager: Christine Hamlin

Bit Size: 8" Logging Method: Continuous split spoon

Well Const. Material: Diameter: NA Screen: NA Riser: NA

Depth (feet)	Well Completion	Sample Type	% Recovery	PID (ppm)	Laboratory Sample	USCS	Description
1			↑				Hydroc - No Recovery
2							
3			0%				
4			↓				
5							
6			↓				
7			↑			SW	Md br. sand, poorly sorted, fine-coarse grain
8			100%	14.6			↓
9			↑			SW	Lt br. sand, small-med grain moderately sorted
10				36.2			↓
11			70%				↓
12			↓	54.2			↓
13			↓			SP	Lt br. sand, well sorted, fine grain
14			↑				↓
15				42.5			↓
16			80%				↓
17			↓	51.9			↓
18			↑				↓
19				11.3			↓
20			↓				↓
21			70%		BH02@22-21 1049		Lt br. silty sand, well sorted fine grain
22			↓				↓
23			↑				↓
24			100%	0.8			↓
25						SC	Lt br. clayey sand fine gr. well sorted

Borehole Logging Form

BOREHOLE ID: BH02 SITE NAME: Booth 11, 12, 21, 22-31U & 31AU CLIENT NAME: PDC ENERGY

Date Completed: 5/6/2019 Location: NW Tank Battery

Drilling Company: Site Services Surface Completion: NA DTW: NA TD: 43

Type of Drill: Hollow stem auger Geologist: Brock Nelson Project Manager: Christine Hamlin

Bit Size: 8" Logging Method: Continuous split spoon

Well Const. Material: Diameter: NA Screen: NA Riser: NA

Depth (feet)	Well Completion	Sample Type	% Recovery	PID (ppm)	Laboratory Sample	USCS	Description
26						SC	Lt br, clayey sand, well sorted fine grain
27			100%	0.5			
28							
29				0.7			
30			80%	1.3	BH02026-32 1114	CL SC	Lt br, sandy clay, low plast fine gr
31							Lt br, clayey sand, well sorted, fine grain
32				4.1			
33							
34				17.4	BH02035-36 1125	SM	Lt br, silty sand, fine-med gr moderately sorted
35			70%				
36							
37				21.1			
38							
39				18.4			
40			100%				
41							
42				13.9	BH02042-43 1151		
43							
44							
45							
46							
47							
48							
49							
50							

Borehole Logging Form

BOREHOLE ID: BH03 SITE NAME: Booth 11, 12, 21, 22-31U & 31AU CLIENT NAME: PDC ENERGY

Date Completed: 5/6/2019 Location: E-SE Tank Battery

Drilling Company: Site Services Surface Completion: NA DTW: NA TD: 43

Type of Drill: Hollow stem auger Geologist: Brock Nelson Project Manager: Christine Hamlin

Bit Size: 8" Logging Method: Continuous split spoon

Well Const. Material: Diameter: NA Screen: NA Riser: NA

Depth (feet)	Well Completion	Sample Type	% Recovery	PID (ppm)	Laboratory Sample	USCS	Description
1							Hydro excavation - No Recovery
2							
3							
4			0%				
5							
6							
7			100%	0.0		SW	Med br, sand, poorly sorted
8							
9				0.0		SMI	Med br, silty sand, poorly sorted, fine - coarse grain
10							
11			50%				
12				0.0			
13							
14				0.0			
15							
16			60%			SP	Lt br, sand, well sorted, medium grain
17				0.0			
18							
19				0.0		SP	Lt br, sand fine grain well sorted
20							
21			100%		BH03@ 20-21 1244		
22				0.2		SC	Lt br, clayey sand, well sorted, fine grain
23							
24							
25			100%	0.7			

Borehole Logging Form

BOREHOLE ID: BH03 SITE NAME: Booth 11, 12, 21, 22-31U & 31AU CLIENT NAME: PDC ENERGY

Date Completed: 5/6/2019 Location: E-SE Tank Battery

Drilling Company: Site Services Surface Completion: NA DTW: NA TD: 43

Type of Drill: Hollow stem auger Geologist: Brock Nelson Project Manager: Christine Hamlin

Bit Size: 8" Logging Method: Continuous split spoon

Well Const. Material: Diameter: NA Screen: NA Riser: NA

Depth (feet)	Well Completion	Sample Type	% Recovery	PID (ppm)	Laboratory Sample	USCS	Description
26			↑			CL	↓ Lt br, sandy clay, low plast, fine grain
27			100%	2.1			
28			↓				
29			↑	1.1			↓
30					BH03@28-32' 1307	SM	Lt br, silty sand, fine grain, well sorted
31			70%				
32			↓	1.7			
33							
34			↑	8.3			↓
35					BH03@35-36' 1321		
36			100%	13.1		CL	Lt gr, silty clay, low plast
37			↓	12.7		SM	Lt br, silty sand, well sorted, fine grain
38							
39			↑	9.3			↓
40							
41			80%				
42			↓	5.2	BH03@42-45' 1351		
43							
44							
45							
46							
47							
48							
49							
50							

Borehole Logging Form

BOREHOLE ID: <u>BH04</u>	SITE NAME: <u>Booth 11, 12, 21, 22-31U & 31AU</u>	CLIENT NAME: <u>PDC ENERGY</u>
Date Completed: <u>5/7/2019</u>	Location: <u>S of produced water vessel</u>	
Drilling Company: <u>Site Services</u>	Surface Completion: <u>NA</u>	DTW: <u>NA</u> TD: <u>43</u>
Type of Drill: <u>Hollow stem auger</u>	Geologist: <u>Brock Nelson</u>	Project Manager: <u>Christine Hamlin</u>
Bit Size: <u>8"</u>	Logging Method: <u>Continuous split spoon</u>	

Well Const. Material: Diameter: NA			Screen: NA		Riser: NA		
Depth (feet)	Well Completion	Sample Type	% Recovery	PID (ppm)	Laboratory Sample	USCS	Description
1			↑				Hydrovac - No Recovery
2			↑				
3			0%				
4			↓				
5			↓				
6			↓				
7			↑	0.0		SM	Md br, silty sand, poorly sorted, fine - coarse grain w/ some gravel
8			↓				↓
9			↑				↓
10			↓	0.0		SW	Md br, sand, poorly sorted, fine - coarse grain
11			60%				↓
12			↓	0.0			↓
13			↓				↓
14			↑				↓
15			↓	0.0		SP	tan, sand, well sorted, fine grain
16			70%			SP	Lt br, sand, well sorted fine grain
17			↓				↓
18				0.0		SM	Lt br, silty sand, poorly sorted, fine - coarse grain
19			*				↓
20			↓	1.3			↓
21			90%	4.9	BH04@20-21 910	SP	tan/yellow - sand, well sorted, fine grain laminated red staining 42 mm
22			↓				↓
23				4.3		SM	Lt br, silty sand, well sorted, fine grain
24			*				↓
25			100%	10.9			↓

Borehole Logging Form

BOREHOLE ID: BH04	SITE NAME: Booth 11, 12, 21, 22-31U & 31AU	CLIENT NAME: PDC ENERGY
Date Completed: 5/7/2014	Location: South of produced water vessel	
Drilling Company: Site Services	Surface Completion: NA	DTW: NA TD: 43
Type of Drill: Hollow stem auger	Geologist: Brock Nelson	Project Manager: Christine Hamlin
Bit Size: 8"	Logging Method: Continuous split spoon	

Well Const. Material: Diameter: NA			Screen: NA		Riser: NA			
Depth (feet)	Well Completion	Sample Type	% Recovery	PID (ppm)	Laboratory Sample	USCS	Description	
26			↑ 100% ↓	17.7		CL	↓ Lt br, silty clay, low plast	
27							↓	
28							SM Lt br, silty sand, well sorted, fine gr.	
29			↑ 100% ↓	501	BH04026-32 923	SC	↓ Lt br, clayey sand, fine grain	
30							↓ tan, clayey sand, fine grain, slight	
31							142 odor SP Lt br, sand, well sorted, fine grain	
32							↓ SM Lt br, sand w/ salt, well sorted, fine grain	
33							grain	
34			↑ 80% ↓	206	BH04035-36 945			↓
35								
36								
37								
38			↑ 90% ↓	238				
39								
40								
41								
42								
43			87.3	BH04042-43 1014				
44								
45								
46								
47								
48								
49								
50								

Borehole Logging Form

BOREHOLE ID: BH05 SITE NAME: Booth 11, 12, 21, 22-31U & 31AU CLIENT NAME: PDC ENERGY

Date Completed: 5/7/2019 Location: SE of produced water vessel

Drilling Company: Site Services Surface Completion: NA DTW: N/A TD: 43

Type of Drill: Hollow stem auger Geologist: Brock Nelson Project Manager: Christine Hamlin

Bit Size: 8" Logging Method: Continuous split spoon

Well Const. Material: Diameter: NA Screen: NA Riser: NA

Depth (feet)	Well Completion	Sample Type	% Recovery	PID (ppm)	Laboratory Sample	USCS	Description
1			↑				
2							Hydrovac - No Recovery
3			0%				
4			↓				
5							
6			↓				
7			↑	1.0		SW	lt br, sand, poorly sorted, fine-coarse grain
8			↓				
9			↑	3.3			
10			↓			SP	Tan, sand, well sorted, fine grain
11			60%				
12			↓	4.9			
13			↓				
14			↑	14.4		SP	Yellow/tan, sand, well sorted, med grain
15			↓				
16			70%				
17			↓	25.8			
18			↓				
19			↑				
20			↓	40.2	BH0502021 1116	SM	Tan, silty sand, well sorted, fine grain
21			100%				
22			↓	41.4		SC	lt br, clayey sand, fine grain
23			↑				
24				44.3			
25			100%				

Borehole Logging Form

BOREHOLE ID: <u>BHGS</u>	SITE NAME: <u>Booth 11, 12, 21, 22-31U & 31AU</u>	CLIENT NAME: <u>PDC ENERGY</u>
Date Completed: <u>5/7/2019</u>	Location: <u>SE of produced water vessel</u>	
Drilling Company: <u>Site Services</u>	Surface Completion: <u>NA</u>	DTW: <u>NA</u> TD: <u>43</u>
Type of Drill: <u>Hollow stem auger</u>	Geologist: <u>Brock Nelson</u>	Project Manager: <u>Christine Hamlin</u>
Bit Size: <u>8"</u>	Logging Method: <u>Continuous split spoon</u>	

Well Const. Material: <u>Diameter: NA</u>	Screen: <u>NA</u>	Riser: <u>NA</u>
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Depth (feet)	Well Completion	Sample Type	% Recovery	PID (ppm)	Laboratory Sample	USCS	Description
26			↑				↓
27			100%	49.7		CL	Lt br, silty clay, med plast
28			↓				↓
29			↑	52.4	BHGS@28-32 1139	SM	Lt br, silty sand, fine grain, well sorted
30			↓				↓
31			100%				↓
32			↓	50.9			↓
33			↑				↓
34			↓	47.1			↓
35			↑	22.9	BHGS@35-36 1206	SC	Lt br, clayey sand, fine grain
36			60%				↓
37			↓	21.4			↓
38			↑				↓
39			↓	11.2			↓
40			↑			SP	Lt br, sand, fine grain, well sorted
41			100%				↓
42			↓		BHGS@42-43 1226	SC	Lt br, clayey sand, med grain
43			↓	5.9			↓
44							
45							
46							
47							
48							
49							
50							

Borehole Logging Form

BOREHOLE ID: B H06 SITE NAME: Booth 11/2, 21, 22-31U + 31AU CLIENT NAME: PDC ENERGY

Date Completed: 6/4/19 Location: Source of former excavation

Drilling Company: Site Services Surface Completion: N/A DTW: TD: 49'

Type of Drill: CME 55 H8A Geologist: B. Nelson Project Manager: C. Hamlin

Bit Size: 8" Logging Method: Continuous Split Spoon

Well Const. Material: Diameter: N/A Screen: N/A Riser: N/A

Depth (feet)	Well Completion	Sample Type	% Recovery	PID (ppm)	Laboratory Sample	USCS	Description
1			↑				↑ No Recovery - Hydrovac
2			↓				↓
3			0% ↓				↓
4			↓				↓
5			↓				↓
6			↓				↓
7			↑	↑		SM	Med gray silty sand, mod. sorting, fine-med, coarse, slight HC color
8			80% ↓	0.0 ↓		↓	↓
9			↓	↓		↓	↓
10			↑	↑		SM	↓
11			↓	0.0 ↓		↓	↓
12			70% ↓	↓		↓	↓
13			↓	0.0 ↓		↓	↓
14			↓	↓		↓	↓
15			↑	↑		↓	↓
16			↓	0.0 ↓		SM	Med brn silty sand, mod. sorting, fine-med. grain
17			50% ↓	↓		↓	↓
18			↓	0.0 ↓		↓	↓
19			↓	↓		↓	↓
20			↑	↑		SP	light brn sand, well sorted, fine grain
21			↓	0.0 ↓		↓	↓
22			80% ↓	↓		↓	↓
23			↓	↑	B H06Z1.5-24' 0921	↓	↓
24			↓	↓		SP	1" black stain interval, light brn sand, well sort, fine gr.
25			20% ↓	↓		SM	light brn silty sand, well sorted, fine gr.



TASMAN
GEOSCIENCES

Borehole Logging Form

BOREHOLE ID: B H06		SITE NAME: Booth 11, 12, 21, 22-314 314A		CLIENT NAME: PDC ENERGY	
Date Completed: 6/4/19		Location: Source of former excavation			
Drilling Company: Site Services		Surface Completion: N/A		DTW:	TD: 49
Type of Drill: CME 55 HSA		Geologist: B. Nelson		Project Manager: C. Hamlin	
Bit Size 8"		Logging Method: Continuous Split Spoon			
Well Const. Material: Diameter: N/A		Screen: N/A		Riser: N/A	

Depth (feet)	Well Completion	Sample Type	% Recovery	PID (ppm)	Laboratory Sample	USCS	Description
26			↑	393		SC	lt. brn clayey sand, fine gr, low plastic, w/some small intervals of caliche
27			70% ↓	↑			
28				342			
29			↓	↓		SM	lt. brn silty sand, well sort, fine gr.
30			↑	593	B H06 @ 27-32' 0932		
31			60% ↓	↓			
32				↑			
33			↓	605			
34				↓			
35			↑	708	B H06 35-36 0938		
36			80% ↓	X			
37				1040	B H06 36.5-39' 0945	SP	lt. brn sand, well sorted, fine gr.
38			↓	↓			
39			↑	↑			
40			90% ↓	893			
41				X			
42			↓	↓			
43				936			
44			↓	↓			
45			↑	853		SM	light brn silty sand, well sorted, fine gr.
46			90% ↓	↓			
47				674	B H06 46.5' - 49' 1020		
48			↓	↓			
49							
50							