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Geological Report

for

Oil Company
Company et al Foothills 06-06-060-06W6

Well Reached Total Depth of 4312.77 metres MD

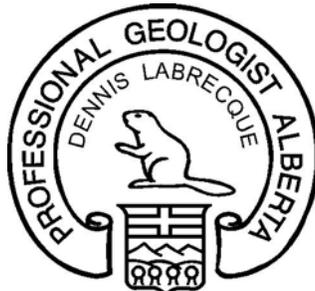
on

March 13th, 2012 @ 03:20 hours

Prepared for: **Geologist , P.Geol.**
Oil Company

Day Geologist: **Geologist, B.Sc.**
Wellsite Geologists Inc.

Approved by:



Dennis Labrecque

Dennis Labrecque, P.Geol.
Wellsite Geologists Inc.

Permit to Practice in AB: P07053

Oil Company
UWI 100/06-06-060-06W6/0
License # AB-License

Company et al Foothills (06-06)
06-06-060-06W6

Rig Photograph



Oil Company
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Company et al Foothills (06-06)
(05-05) 06-06-060-06W6
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Strip-Log-V-MD (1:240 scale)	Back sleeve
Strip-Log-V-TVD (1:240 scale)	Back sleeve
Strip-Log-H-MD (1:240 scale)	Back sleeve
TVD-Formation tops (1:240 scale)	Back sleeve
CD with Digital Reports, Striplogs, Photos, & Logs	Back cover slip

Geological Summary

Company et al Foothills 06-06-060-06W6 is a horizontal well was drilled from the 06-06 surface location. This well was spudded at 16:30hrs January 20, 2060. Surface hole is 311mm with 244.5mm Surface casing landed at 605.0 meters. The 222mm Intermediate build section was drilled from 605.0m to 2934.0m. ICP was reached on February 24, 2060 at 20:40hr.

A RIG SAT Gas detector from was run from 2280m to total depth. Sample collection began at 2280m MD to a total depth of 4312.77 MD. One set of samples were collected for Paramount. Weatherford Wireline Loggers logged gamma ray-neutron in the cased hole for build and vertical section. No logging was called for on the horizontal section.

The primary objective is **Dunvegan C Channel** sandstone. The **Dunvegan C Channel** came in at 2995.0mMD, 2889.5mTVD, (- 1597.4mSS)



The **Dunvegan C Channel** comprises of Sandstone and minor amounts of Siltstone. The Sandstone was light gray to clear, with a light brown overtone. It was predominantly upper fine to lower medium grained consolidated quartz. The Dunvegan C1 Sandstone ranged from being loosely cemented to well cemented in various sections of the lateral. In the samples most of the grains were disaggregated due to drilling. The quartz grains ranged from sub rounded to sub angular allowing for siliceous and very minor amounts of calcite cementing. Traces of glauconite appeared in the consolidated sandstone fragments with light and dark chert grains scattered throughout. Some sections of the lateral contained off white phosphate nodules but were attributed to shale and siltstone zones. The porosity was predominately fair and ranged from (4% to 7%) in the best sand. Occasional light brown to medium gray siliceous siltstone stringers were well consolidated. The Gas Average for the horizontal section was 454 units but often exceeded 1000 units in the

section with great sand. The average ROP for the lateral was 8.5 meters an hour which also includes sliding time.

Conclusion: Company et al Foothills 06-06-060-06W6 is a successful horizontal well with gas bearing in the Dunvegan C Channel

Well Data Summary

WELL NAME: Company et al Foothills 06-06-060-06W6
OPERATOR: Oil Company
SURFACE LOCATION: 06-06-060-06W6
SURFACE COORDINATES: 82.13m South & 458.8 East of NW corner Sec. 06
ICP COORDINATES: 60.15m North & 586.62 East of SW corner Sec. 06
BOTTOM COORDINATES: 252.79m South & 801.8m East of NW corner of Sec. 06
UNIQUE IDENTIFIER: 100/06-06-060-06W6/00
FIELD: Foothills
PROVINCE: ALBERTA
LICENSE NO.: AB-License
AFE NO.: 00A000000
GROUND ELEVATION: 1286.60m
K.B. ELEVATION: 1292.10m
SPUD DATE: 16:30 HRS on January 20, 2060
TOTAL DEPTH: 4312.77 MD
T.D. DATE: 2012-03-13
LOGGING COMPANY: Logging Company
LOGS: GR-ND
GEOLOGICAL SUPERVISION: Wellsite Geologist
SAMPLE REQUIREMENTS: 2280.0 m to 4312.77 m TD
GAS DETECTION: 2280.0 m to 4312.77 TD
OBJECTIVE FORMATION: Primary: Dunvegan C Channel
WELL STATUS: Gas

DRILLING SUPERVISOR: *Drilling Company*

CONTRACTOR: Drilling Company

HOLE SIZE: Surface 311 mm, Intermediate 222mm, Main 156 mm

CASING SIZE: Surface 244.5 mm, Intermediate 177.8mm, Main 114.3 mm (To be installed)

CASING DEPTH: Surface 605.0m, Intermediate 2931.35m, Main 4312.77m

CORING: None

DRILL STEM TESTS: None

MUD SERVICE: N/A

MUD RECORD: Water gel base from Surface to 605.0m MD, Invert Mud used from 605.0m to 4312.77 MD TD

CEMENT: Cementers

DIRECTIONAL SERVICES: Directional Services

GAS DETECTION EQUIPMENT: Rig Sat

COMMENTS: Well Cased with a Packers Plus Stack Frac Stimulation Liner.

Bit Record & Casing Summary

BIT No.	SIZE mm	MAKE	TYPE	DEPTH IN m	DEPTH OUT m	METERS CUT	HOURS
1	311	J&L	TC11P	0	201.0	201.0	14.0
2	311	BAKER HUGHES	Q506	201.0	605.0	404.0	26.0
3	222	SMITH	MASI513	605.0	1066.0	461.0	18.75
4	222	KINGDREAM	HA137G	Cmt plug	Cmt plug	200.0	10.0
3 RR1	222	SMITH	MASI513	1066.0	1103.0	37.0	3.75
3 RR2	222	SMITH	MASI513	1103.0	1672.0	569.0	34.0
4 RR1	222	KINGDREAM	HA137G	1672.0	1678.0	6.0	2.25
3 RR3	222	SMITH	MASI513	1678.0	1796.0	118.0	9.75
3 RR4	222	SMITH	MASI513	Cmt plug	Cmt Plug	1051	40.0
3 RR5	222	SMITH	MASI513	960.0	2041.0	1062.0	61.5
5	222	SMITH	MASI513	2041.0	2545.0	504.0	33.75
6	222	REED	R28AMDH2	2545.0	2934.0	389.0	78.25
7	156	SMITH	MSI513VOBPX	2934.0	2979.0	45.0	20.0
8	156	SMITH	XR20WPS	2979.0	3058.0	79.0	20.0
7RR1	156	SMITH	MSI513VOBPX	3058.0	3124.0	66.0	17.0
7RR2	156	SMITH	MSI513VOBPX	3124.0	3678.0	554.0	58.0
9	156	SMITH	STX20	3124.0	3124.0	Reamer	9.75
10	156	SECURITY	FX54R	3678.0	4312.0	634	67.75

Casing Summary

Type	Size mm	Weight (KG/M)	Depth Landed	Total Joints	Remarks
Surface	244.5	53.57	605.0	49	Not available
Intermediate	177.8 177.8	34.20 38.70	1944.67 972.13	141 75	Not available
Production	TBA	TBA	TBA	TBA	Not available

Directional Surveys

Vertical Section calculated along Azimuth plane bearing 359.65 degrees

Measured	Incl	Drift	True	Vertical	Dogleg	Vertical	Dog Leg
Depth	Angle	Direction	Vertical	N-S	E-W	Section	Severity
Meters	Deg	Deg	Depth	Meters	Meters	Meters	Deg/30
50	0	0	50	0	0	0	0
113.09	0.4	218.3	113.09	-0.17	-0.14	-0.2	0.19
191.99	0.9	215.2	191.98	-0.9	-0.66	-1.02	0.19
221.01	1.1	229.2	221	-1.26	-1.01	-1.45	0.32
251.16	1.6	227.5	251.14	-1.74	-1.54	-2.03	0.5
281.01	1.6	236.3	280.98	-2.25	-2.19	-2.67	0.25
310.14	1.1	239.8	310.1	-2.62	-2.77	-3.16	0.52
337.56	0.9	241.9	337.52	-2.85	-3.19	-3.48	0.22
365.51	0.7	256.7	365.46	-2.99	-3.55	-3.7	0.31
395.14	0.9	253.5	395.09	-3.1	-3.95	-3.89	0.21
421.77	1.1	262.6	421.72	-3.19	-4.4	-4.08	0.29
449.75	1.2	267.2	449.69	-3.24	-4.96	-4.25	0.15
477.86	1.1	261.2	477.8	-3.3	-5.52	-4.42	0.17
506.07	0.9	244.7	506	-3.43	-5.99	-4.66	0.37
534.6	0.5	219	534.53	-3.63	-6.27	-4.91	0.52
565.52	0.5	181.4	565.45	-3.87	-6.36	-5.16	0.31
588	0.9	175.8	587.93	-4.14	-6.35	-5.43	0.54
614.58	0.9	186	614.5	-4.56	-6.35	-5.83	0.18
661.81	0.9	192	661.73	-5.29	-6.47	-6.57	0.06
709.02	0.9	192.7	708.93	-6.01	-6.63	-7.32	0.01
756.28	1.1	182.8	756.19	-6.83	-6.73	-8.13	0.17
803.6	1.2	128.3	803.5	-7.59	-6.36	-8.8	0.67
860.58	0.4	198.3	860.47	-8.15	-5.96	-9.25	0.59
908.02	0.5	223.6	907.91	-8.45	-6.15	-9.59	0.14
955.41	1.1	224.3	955.3	-8.93	-6.61	-10.16	0.38
973.82	0.9	185.5	973.7	-9.2	-6.75	-10.45	1.13
1059.21	1.2	3.4	1059.09	-8.97	-6.76	-10.24	0.74
1068.69	1.2	3.4	1068.57	-8.78	-6.75	-10.04	0
1087.89	0.9	325.8	1087.76	-8.45	-6.82	-9.74	1.15
1116.34	1.2	277.7	1116.21	-8.23	-7.24	-9.61	0.95

Measured	Incl	Drift	True	Vertical	Dogleg	Vertical	Dog Leg
Depth	Angle	Direction	Vertical	N-S	E-W	Section	Severity
Meters	Deg	Deg	Depth	Meters	Meters	Meters	Deg/30
1144.68	1.6	314.6	1144.54	-7.91	-7.82	-9.43	1.02
1173.1	0.9	340.9	1172.95	-7.42	-8.18	-9.03	0.94
1201.49	0.7	353.6	1201.34	-7.04	-8.27	-8.67	0.28
1230.03	0.5	340.2	1229.88	-6.75	-8.33	-8.4	0.26
1258.45	0.4	318.4	1258.3	-6.55	-8.44	-8.24	0.21
1286.89	0.4	269.6	1286.74	-6.48	-8.6	-8.2	0.35
1315.19	0.5	59	1315.04	-6.42	-8.6	-8.14	0.92
1343.6	0.4	86.8	1343.45	-6.35	-8.39	-8.03	0.25
1372.02	0.4	112.1	1371.87	-6.38	-8.2	-8.02	0.18
1400.42	0.2	145.5	1400.27	-6.46	-8.08	-8.07	0.27
1428.85	0.2	157.4	1428.7	-6.55	-8.03	-8.14	0.04
1457.34	0	0	1457.19	-6.59	-8.01	-8.18	0.21
1485.73	0.2	225.6	1485.58	-6.63	-8.05	-8.23	0.21
1513.76	0.4	253.8	1513.61	-6.69	-8.18	-8.31	0.26
1542.14	0.9	321.6	1541.98	-6.54	-8.41	-8.22	0.88
1570.4	1.1	334.6	1570.24	-6.12	-8.67	-7.87	0.32
1598.84	0.9	328.6	1598.67	-5.68	-8.9	-7.49	0.24
1627.28	0.9	320.5	1627.11	-5.32	-9.16	-7.19	0.13
1655.82	0.9	317.5	1655.65	-4.98	-9.45	-6.93	0.05
1684.2	0.9	314.6	1684.02	-4.66	-9.76	-6.68	0.05
1712.65	0.7	309.6	1712.47	-4.39	-10.05	-6.49	0.22
1741.14	0.9	307.9	1740.96	-4.15	-10.36	-6.31	0.21
1769.48	1.1	5.5	1769.3	-3.74	-10.51	-5.95	1.04
1798	0.9	7.7	1797.81	-3.24	-10.46	-5.45	0.21
1826.35	0.7	44.9	1826.16	-2.9	-10.31	-5.08	0.58
1854.75	0.5	93.8	1854.56	-2.79	-10.06	-4.92	0.56
1883.18	0.5	144.4	1882.99	-2.89	-9.86	-4.98	0.45
1911.62	0.7	95.5	1911.42	-3.01	-9.62	-5.04	0.56
1939.94	0.5	132.8	1939.74	-3.11	-9.36	-5.08	0.45
1968.36	0.5	225.6	1968.16	-3.28	-9.35	-5.25	0.76
1996.79	0.9	243.6	1996.59	-3.47	-9.64	-5.49	0.48
2025.21	0.4	149.7	2025.01	-3.65	-9.79	-5.71	1.07
2054.77	0.5	250.2	2054.57	-3.79	-9.86	-5.85	0.71
2073.07	0.7	263.6	2072.87	-3.83	-10.05	-5.93	0.4

2092.01	0.9	271	2091.81	-3.84	-10.31	-6	0.36
Measured	Incl	Drift	True	Vertical	Dogleg	Vertical	Dog Leg
Depth	Angle	Direction	Vertical	N-S	E-W	Section	Severity
Meters	Deg	Deg	Depth	Meters	Meters	Meters	Deg/30
2111.2	0.9	275.5	2110.99	-3.82	-10.61	-6.05	0.11
2130.15	0.9	284	2129.94	-3.77	-10.9	-6.06	0.21
2149.04	0.7	293.8	2148.83	-3.69	-11.15	-6.04	0.38
2168.01	0.7	292.8	2167.8	-3.6	-11.37	-5.99	0.02
2187	0.5	299.1	2186.79	-3.51	-11.55	-5.95	0.33
2205.94	0.5	297.3	2205.73	-3.43	-11.69	-5.91	0.02
2224.93	0.5	306.8	2224.71	-3.35	-11.83	-5.85	0.13
2243.97	0.9	356.4	2243.75	-3.15	-11.91	-5.67	1.09
2262.94	1.2	37.9	2262.72	-2.84	-11.79	-5.35	1.26
2281.89	1.4	32.3	2281.67	-2.49	-11.55	-4.95	0.37
2300.77	1.6	24.9	2300.54	-2.05	-11.31	-4.48	0.44
2319.76	1.4	19.3	2319.52	-1.59	-11.13	-3.99	0.39
2338.65	1.8	41.1	2338.41	-1.15	-10.85	-3.5	1.15
2357.63	2.1	52.7	2357.37	-0.72	-10.38	-2.97	0.78
2376.61	1.9	50.2	2376.34	-0.31	-9.86	-2.46	0.34
2395.56	1.9	45.6	2395.28	0.11	-9.4	-1.94	0.24
2414.56	1.8	46.3	2414.27	0.54	-8.96	-1.43	0.16
2433.37	1.6	46.3	2433.07	0.93	-8.55	-0.97	0.32
2452.19	1.6	44.2	2451.89	1.3	-8.18	-0.52	0.09
2481.34	1.4	44.6	2481.03	1.84	-7.65	0.13	0.21
2500.33	1.4	40.7	2500.01	2.18	-7.33	0.53	0.15
2519.35	1.4	37.9	2519.03	2.54	-7.04	0.94	0.11
2528.84	1.2	37.2	2528.51	2.71	-6.91	1.14	0.63
2542.53	1.6	38.2	2542.2	2.98	-6.7	1.44	0.88
2551.99	3.3	45.6	2551.65	3.27	-6.43	1.79	5.47
2561.49	4.9	52	2561.13	3.71	-5.91	2.33	5.25
2571	6.2	53.7	2570.59	4.27	-5.18	3.03	4.13
2580.48	7.9	48.4	2580	5	-4.28	3.95	5.75
2589.99	9.7	46.3	2589.4	5.99	-3.21	5.14	5.77
2599.52	10.7	47	2598.78	7.15	-1.98	6.54	3.17
2609.01	11.3	46.3	2608.09	8.39	-0.67	8.04	1.94
2619.15	12.1	47	2618.02	9.8	0.83	9.75	2.4
2628.64	12.1	49.5	2627.3	11.13	2.31	11.36	1.66

2638.12	12.5	48.1	2636.56	12.46	3.83	12.99	1.58
2647.57	12.8	44.9	2645.78	13.88	5.33	14.71	2.42
Measured	Incl	Drift	True	Vertical	Dogleg	Vertical	Dog Leg
Depth	Angle	Direction	Vertical	N-S	E-W	Section	Severity
Meters	Deg	Deg	Depth	Meters	Meters	Meters	Deg/30
2657.01	13.7	43.2	2654.97	15.44	6.84	16.56	3.12
2666.51	15.7	42.8	2664.16	17.2	8.48	18.64	6.32
2675.96	17.8	43.2	2673.21	19.19	10.34	20.99	6.68
2685.46	19.5	43.2	2682.21	21.41	12.42	23.6	5.37
2694.91	21.8	44.6	2691.05	23.81	14.73	26.45	7.47
2704.4	24.5	43.9	2699.78	26.48	17.33	29.63	8.58
2713.89	26.9	43.2	2708.33	29.46	20.17	33.16	7.65
2723.3	29.7	41.8	2716.61	32.75	23.18	37.03	9.17
2732.8	32	41.8	2724.77	36.38	26.42	41.28	7.26
2742.27	34	42.5	2732.71	40.23	29.86	45.79	6.61
2751.71	35.7	44.6	2740.46	44.14	33.58	50.41	6.61
2761.2	37.5	45.3	2748.07	48.14	37.58	55.19	5.84
2770.68	38.7	44.6	2755.53	52.28	41.71	60.14	4.04
2780.17	39.8	44.6	2762.88	56.56	45.92	65.23	3.48
2789.67	41	43.9	2770.12	60.97	50.22	70.47	4.05
2799.08	42.9	42.5	2777.12	65.55	54.52	75.89	6.75
2808.59	44.2	41.1	2784.01	70.44	58.89	81.61	5.11
2817.9	45.6	41.4	2790.6	75.38	63.22	87.38	4.56
2827.39	46.8	41.8	2797.17	80.5	67.77	93.37	3.9
2836.87	48	42.8	2803.59	85.66	72.47	99.43	4.45
2846.39	50	43.5	2809.83	90.9	77.38	105.62	6.52
2855.83	51	45.3	2815.84	96.11	82.48	111.81	5.44
2865.32	52.4	44.9	2821.72	101.36	87.75	118.1	4.54
2874.71	53.7	44.6	2827.36	106.69	93.04	124.45	4.22
2884.21	54.7	43.9	2832.92	112.21	98.41	131.01	3.63
2893.68	56.5	43.9	2838.27	117.84	103.83	137.69	5.7
2917	58.8	44.6	2850.67	131.99	117.61	154.51	2.09
2931	58.11	44.26	2857.99	140.51	125.97	164.65	1.61
2945.31	57.4	43.9	2865.63	149.2	134.38	174.97	1.61
2954.9	59.1	43.2	2870.68	155.11	140	181.97	5.63
2964.4	59.5	43.9	2875.53	161.03	145.63	188.98	2.28
2972.5	59.5	43.9	2879.64	166.06	150.47	194.94	0

2982.01	62.3	43.2	2884.26	172.08	156.19	202.07	9.04
2991.52	67	42.8	2888.33	178.37	162.05	209.48	14.87
3000.93	72.7	41.8	2891.57	184.9	168	217.16	18.42
Measured	Incl	Drift	True	Vertical	Dogleg	Vertical	Dog Leg
Depth	Angle	Direction	Vertical	N-S	E-W	Section	Severity
Meters	Deg	Deg	Depth	Meters	Meters	Meters	Deg/30
3010.33	78.5	43.2	2893.91	191.6	174.15	225.05	19.01
3019.85	82.3	44.2	2895.5	198.39	180.63	233.08	12.37
3029.3	82.2	43.9	2896.78	205.12	187.14	241.08	1
3038.79	85	43.9	2897.83	211.91	193.68	249.14	8.85
3049.62	89	43.9	2898.4	219.71	201.18	258.38	11.08
3059.08	90.1	43.5	2898.47	226.55	207.71	266.48	3.71
3068.48	91	43.2	2898.38	233.38	214.16	274.56	3.03
3077.96	91.8	42.5	2898.15	240.33	220.61	282.75	3.36
3087.43	93.1	41.1	2897.74	247.38	226.91	291.01	6.05
3096.88	93.3	40	2897.22	254.55	233.05	299.35	3.54
3106.19	92.6	38.6	2896.74	261.75	238.94	307.66	5.04
3113.61	91.3	37.5	2896.48	267.59	243.51	314.35	6.88
3122.92	91.3	35.8	2896.27	275.05	249.06	322.86	5.48
3132.35	90.4	34.4	2896.13	282.77	254.48	331.57	5.29
3141.81	90.3	32.6	2896.08	290.66	259.71	340.41	5.72
3151.95	91.1	31.9	2895.95	299.23	265.12	349.96	3.14
3161.42	91.7	31.6	2895.72	307.28	270.1	358.9	2.12
3170.8	91	30.5	2895.5	315.31	274.93	367.8	4.17
3180.41	91	28.8	2895.33	323.66	279.69	376.99	5.31
3190.04	89.9	27	2895.26	332.17	284.19	386.28	6.57
3199.57	89.2	25.2	2895.33	340.73	288.39	395.54	6.08
3209.07	89.2	23.5	2895.46	349.39	292.3	404.84	5.37
3218.57	90.1	22.1	2895.52	358.14	295.98	414.19	5.26
3228.03	89.6	20	2895.55	366.97	299.38	423.55	6.85
3237.49	89.6	17.5	2895.61	375.93	302.42	432.96	7.93
3246.86	90.1	15.7	2895.64	384.91	305.1	442.3	5.98
3256.36	90.6	14.3	2895.58	394.08	307.56	451.8	4.69
3265.85	90.6	13.6	2895.48	403.29	309.84	461.28	2.21
3275.32	90.6	12.2	2895.38	412.52	311.96	470.75	4.43
3284.78	89.7	11.5	2895.36	421.78	313.9	480.21	3.62
3294.26	89.4	10.8	2895.43	431.08	315.73	489.69	2.41

3303.78	90.1	9.4	2895.47	440.45	317.4	499.2	4.93
3313.27	89.4	7.7	2895.51	449.84	318.81	508.66	5.81
3322.77	90.3	6.6	2895.54	459.26	320	518.12	4.49
Measured	Incl	Drift	True	Vertical	Dogleg	Vertical	Dog Leg
Depth	Angle	Direction	Vertical	N-S	E-W	Section	Severity
Meters	Deg	Deg	Depth	Meters	Meters	Meters	Deg/30
3332.17	90.8	5.5	2895.45	468.61	320.99	527.46	3.86
3341.69	91.1	4.8	2895.29	478.09	321.84	536.89	2.4
3351.24	91.1	2.7	2895.11	487.62	322.47	546.33	6.6
3360.74	91.1	1.3	2894.92	497.11	322.8	555.66	4.42
3370.07	91.1	1.3	2894.74	506.44	323.01	564.81	0
3379.57	91	1.7	2894.57	515.93	323.26	574.13	1.3
3388.97	90.8	1.7	2894.42	525.33	323.54	583.36	0.64
3398.51	91.1	2.7	2894.26	534.86	323.9	592.74	3.28
3407.99	90.4	1.7	2894.14	544.33	324.27	602.06	3.86
3417.44	90.6	0.6	2894.06	553.78	324.46	611.32	3.55
3426.94	91.1	0.6	2893.92	563.28	324.56	620.61	1.58
3436.44	91.7	359.9	2893.68	572.77	324.6	629.89	2.91
3445.91	91.7	359.6	2893.4	582.24	324.56	639.11	0.95
3455.4	91.7	0.3	2893.12	591.72	324.55	648.37	2.21
3464.9	91.8	359.9	2892.83	601.22	324.56	657.64	1.3
3474.29	91.7	1	2892.55	610.6	324.64	666.81	3.53
3483.78	91.7	1.3	2892.26	620.09	324.83	676.11	0.95
3493.28	91.7	1	2891.98	629.58	325.02	685.41	0.95
3502.73	90.1	0.3	2891.83	639.03	325.13	694.66	5.54
3512.2	89.2	0.6	2891.89	648.5	325.2	703.91	3.01
3521.67	88.7	0.3	2892.07	657.97	325.28	713.17	1.85
3531.12	89.7	359.6	2892.2	667.42	325.27	722.39	3.87
3540.66	90.3	359.2	2892.2	676.96	325.17	731.67	2.27
3550.13	90.6	358.9	2892.12	686.42	325.01	740.88	1.34
3559.61	91.7	358.9	2891.93	695.9	324.83	750.09	3.48
3569.07	91.7	359.2	2891.65	705.36	324.67	759.28	0.95
3578.52	91.7	358.2	2891.37	714.8	324.46	768.45	3.17
3588.02	91.3	358.2	2891.12	724.29	324.16	777.64	1.26
3597.53	91.1	358.9	2890.92	733.8	323.92	786.87	2.3
3606.98	91.1	359.2	2890.74	743.24	323.76	796.05	0.95

3616.45	91.1	358.5	2890.56	752.71	323.57	805.24	2.22
3625.92	91.5	359.6	2890.35	762.17	323.41	814.45	3.71
3635.36	91.5	359.6	2890.1	771.61	323.35	823.64	0
3644.87	90.3	359.6	2889.95	781.12	323.28	832.91	3.79
3654.35	90.3	0.3	2889.9	790.6	323.27	842.15	2.22
Measured	Incl	Drift	True	Vertical	Dogleg	Vertical	Dog Leg
Depth	Angle	Direction	Vertical	N-S	E-W	Section	Severity
Meters	Deg	Deg	Depth	Meters	Meters	Meters	Deg/30
3663.84	90.3	0.3	2889.85	800.09	323.32	851.42	0
3673.26	89.7	0.3	2889.85	809.51	323.37	860.63	1.91
3682.72	89	359.6	2889.96	818.97	323.36	869.86	3.14
3692.22	90.3	358.9	2890.02	828.47	323.24	879.1	4.66
3701.72	91.7	358.2	2889.85	837.96	323	888.31	4.94
3711.2	91.5	358.2	2889.58	847.43	322.7	897.49	0.63
3720.68	91.3	358.2	2889.35	856.91	322.4	906.67	0.63
3730.15	91	358.2	2889.16	866.37	322.11	915.84	0.95
3739.63	90.6	358.2	2889.03	875.84	321.81	925.02	1.27
3749.13	90.3	358.2	2888.96	885.34	321.51	934.22	0.95
3758.65	90.4	358.2	2888.9	894.85	321.21	943.44	0.32
3768.08	90.3	357.5	2888.84	904.28	320.86	952.55	2.25
3777.56	90.1	357.8	2888.81	913.75	320.47	961.71	1.14
3787.08	91	358.5	2888.72	923.26	320.16	970.93	3.59
3796.57	92.2	359.2	2888.45	932.75	319.97	980.14	4.39
3806.07	92.6	359.6	2888.05	942.24	319.87	989.38	1.79
3815.55	91.7	359.2	2887.7	951.71	319.77	998.6	3.12
3825	91.7	359.2	2887.42	961.16	319.64	1007.79	0
3834.52	89.6	358.9	2887.31	970.67	319.48	1017.04	6.68
3844.03	89.6	359.2	2887.38	980.18	319.33	1026.29	0.95
3853.52	90.6	359.6	2887.36	989.67	319.23	1035.52	3.4
3862.97	90.4	0.3	2887.28	999.12	319.22	1044.74	2.31
3872.46	90.3	359.6	2887.22	1008.61	319.21	1054	2.24
3881.94	90.4	0.6	2887.16	1018.09	319.23	1063.26	3.18
3891.41	90.3	0.6	2887.1	1027.56	319.33	1072.52	0.32
3900.9	91.5	1.3	2886.95	1037.05	319.48	1081.81	4.39
3910.35	93.3	2.7	2886.56	1046.48	319.81	1091.09	7.24
3919.75	93.4	2.7	2886.01	1055.86	320.25	1100.33	0.32
3929.19	93.4	2.7	2885.45	1065.27	320.7	1109.61	0
3938.7	92.6	2.4	2884.95	1074.76	321.12	1118.96	2.69

3948.22	91.8	3.4	2884.59	1084.26	321.6	1128.34	4.03
3957.66	91.1	3.1	2884.35	1093.68	322.14	1137.65	2.42
3967.16	90.3	2.7	2884.23	1103.17	322.62	1147.01	2.82
3976.65	89.7	1.7	2884.23	1112.65	322.98	1156.35	3.69
3986.14	89.6	2.4	2884.29	1122.13	323.32	1165.68	2.24
Measured	Incl	Drift	True	Vertical	Dogleg	Vertical	Dog Leg
Depth	Angle	Direction	Vertical	N-S	E-W	Section	Severity
Meters	Deg	Deg	Depth	Meters	Meters	Meters	Deg/30
3995.54	89.6	1.7	2884.35	1131.53	323.66	1174.92	2.23
4005.04	90.6	2.7	2884.34	1141.02	324.02	1184.26	4.47
4014.53	90.4	3.1	2884.25	1150.5	324.5	1193.61	1.41
4023.97	90.1	3.1	2884.21	1159.92	325.01	1202.92	0.95
4033.47	90.6	3.1	2884.16	1169.41	325.53	1212.29	1.58
4042.94	91.8	3.8	2883.96	1178.86	326.1	1221.64	4.4
4052.43	91.8	4.1	2883.66	1188.32	326.75	1231.01	0.95
4061.82	92	4.5	2883.35	1197.68	327.45	1240.3	1.43
4071.32	92	4.8	2883.02	1207.14	328.22	1249.7	0.95
4080.81	91.5	4.5	2882.73	1216.6	328.99	1259.09	1.84
4090.21	91.1	4.1	2882.51	1225.97	329.7	1268.39	1.81
4099.72	91.1	3.4	2882.33	1235.46	330.32	1277.79	2.21
4109.17	91.5	4.1	2882.12	1244.88	330.94	1287.12	2.56
4118.65	91.5	4.1	2881.87	1254.34	331.61	1296.49	0
4128.13	90.8	2.4	2881.68	1263.8	332.15	1305.84	5.82
4137.62	90.6	2	2881.56	1273.28	332.52	1315.18	1.41
4147.14	90.8	1.7	2881.45	1282.8	332.82	1324.53	1.14
4156.62	90.6	2.4	2881.33	1292.27	333.16	1333.85	2.3
4166.11	89.6	2	2881.31	1301.75	333.53	1343.18	3.4
4175.61	89.4	2	2881.4	1311.25	333.86	1352.52	0.63
4185.06	89.2	2	2881.51	1320.69	334.19	1361.8	0.63
4195.52	88.9	1.7	2881.68	1331.14	334.53	1372.08	1.22
4204.01	89.6	2.7	2881.8	1339.62	334.85	1380.43	4.31
4213.54	90.3	3.8	2881.8	1349.14	335.4	1389.83	4.1
4223.01	91.3	4.1	2881.67	1358.59	336.05	1399.19	3.31
4232.47	91.5	4.8	2881.44	1368.01	336.78	1408.55	2.31
4241.92	91.3	4.8	2881.21	1377.43	337.57	1417.91	0.63
4251.41	91	4.8	2881.02	1386.88	338.37	1427.31	0.95
4270.29	90.6	4.5	2880.75	1405.7	339.9	1446	0.79

4289.29	90.4	4.1	2880.59	1424.64	341.32	1464.8	0.71
4298	89.7	4.1	2880.58	1433.33	341.95	1473.42	2.41
4312	88.57	4.1	2880.79	1447.29	342.95	1487.26	2.42

Daily Drilling Summary

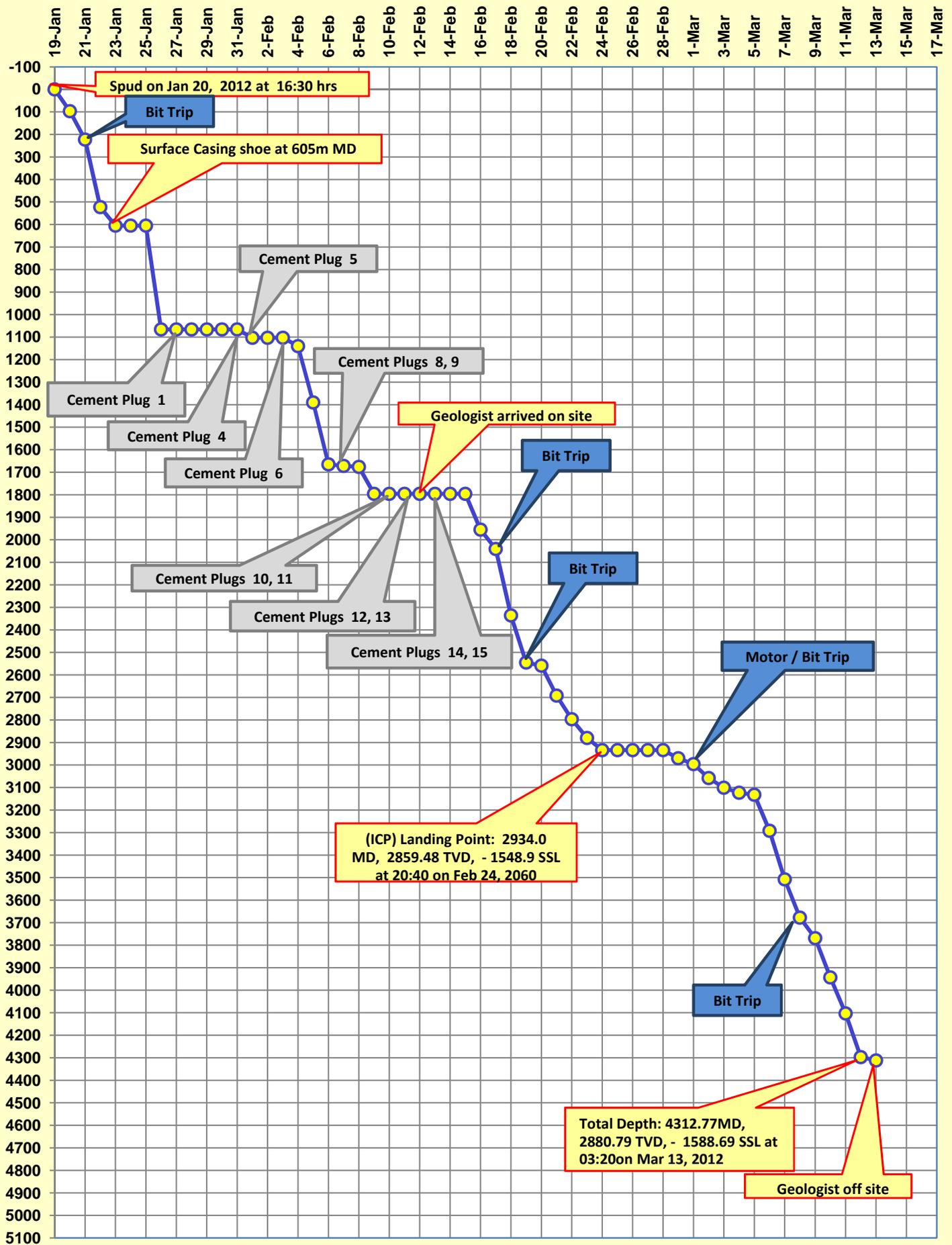
DATE/ Year	DAY	MD 24:00 HRS	PROG- RESS	DRILL HOURS	OPERATIONS
01/20/12	1	97m	97m	5.0	Spud and drill 311mm surface from 0m to 97m MD.
01/21/12	2	223m	126m	8.0	Drill 311mm surface hole from 97m to 201m MD, circulate hole, POOH, Lay 8" DC, break bit and make up bit # 2, Pick up directional tools, RIH, drill 311mm hole from 201m to 223m MD.
01/22/12	3	523m	300m	18.25	Drill 311mm surface hole from 223m to 401m MD, wiper trip to 195m MD, RIH, continue drilling 311mm hole from 401m to 523m MD.
01/23/12	4	605m	82m	6.0	Drill 311mm surface hole from 523m to 599m MD, Wiper trip to surface, continue drilling 311mm hole from 599m to 605m MD, POOH, Lay down tools, Rig up to run surface casing. Run casing, and set at 605m MD.
01/24/12	5	605m	0m	0.0	Condition mud and circulate, Rig up cementers with Baker Hughes, pump surface casing cement, wait on cement, cut conductor & casing weld on bowl, nipple up BOP's.
01/25/12	6	605m	0m	0.0	Continue nipple up of BOP's, Clean tanks, Pressure test BOP Valves, all tests successful, install wear bushing, Pick up Directional tools, make up bit # 3, RIH to 582m, displace to oil base mud-Invert, drill out cement float and shoe.
01/26/12	7	1066m	461m	18.75	Drill 222mm hole from 605m to 994m MD, Condition mud and circulate due to lost circulation. Drill 222mm hole from 994m to 1066m MD.
01/27/12	8	1066m	0m	0.0	POOH, Lay down tools, break off bit, wait on cementers, pump cement plug (1) for lost circulation @ 1066, wait on cementers.
01/28/12	9	1066m	0m	0.0	Wait on cement, RIH open end, tag cement @ 935m MD, circulate, POOH, Pick up tools, with bit # 3, RIH to 930m MD, circulate mud, lost circulation, POOH to run cement plug, wait on cementers.
01/29/12	10	1066m	0m	0.0	Wait on cementers, RIH to 917m MD, pump cement plug (2) for lost circulation @ 930m MD, condition mud & circulate, trip back to shoe, wait on cement, RIH, tag cement @ 795m, condition mud & circulate, pump cement plug (3) for lost circulation @ 795m MD, POOH open ended.
01/30/12	11	1066m	0m	10.0	Wait on cement, make up new BHA, RIH, Drill cement from 645m to 845m MD, POOH, Install new BHA with bit # 4, RIH.
01/31/12	12	1066m	0m	6.0	Continue to RIH, Drill cement from 775m to 981m MD, condition and circulate mud, lost circulation, POOH, Lay down tools, trip in hole to 797m fill pipe and watch for losses, waiting on cementers, pump cement plug (4) for lost circulation @ 975m MD, circulate, wait on cement,

					POOH and make up Directional tools.
02/01/12	13	1103m	37m	3.75	Wait on cement, RIH, tag cement @ 849m, drill cement from 849m to 1066m, drill 222mm hole from 1066m to 1103m MD, lost circulation, POOH to run cement plugs, RIH open ended, pump cement plug (5) for lost circulation @ 1103m MD, circulate hole.
02/02/12	14	1103m	0m	2.5	POOH, make up directional tools, RIH, tag cement @ 936m MD, drill cement from 936m to 978m MD, POOH, break bit # 3 RR2, wait on cement, RIH open ended to 976m, pump cement plug (6) for lost circulation @ 978m.
02/03/12	15	1103m	0m	0.0	Pump cement plug (6), pull 8 stands, squeeze cement 3 stages @ 745m, RIH tag cement @ 880m MD, circulate hole clean @ 890m MD, POOH, wait on cement, monitor hole, RIH, ream cement from 890m to 900m, condition & circulate, POOH with flow checks, RIH open ended, pump cement plug (7) for lost circulation interval from 900-700m, pull out to 663m and squeeze cement, circulate, POOH with 10min flow checks, RIH with 10min flow checks, wait on cement integrity test.
02/04/12	16	1140m	37m	2.0	Wait on cement, RIH slick, tag cement @ 678m MD, drill cement from 678m to 1103m MD, Drill 222mm hole from 1103m to 1140m MD.
02/05/12	17	1390m	250m	11.75	Circulate hole clean, POOH with 10min flow checks, Directional work, RIH with bit # 3 RR3, 10min flow checks, Drill 222mm hole from 1140m to 1390m MD.
02/06/12	18	1665m	275m	19.25	Drill 222mm hole from 1390m to 1665m MD.
02/07/12	19	1672m	7m	1.0	Drill 222mm hole from 1665m to 1672m MD. Lost circulation, POOH with 10min flow checks, RIH open ended to 1672m, pump cement plug (8), for lost circulation @ 1672m MD, pull 9 stands, squeeze cement in 2 m3 stages, RIH to 1655 & circulate, Rig in cementers, pump cement plug (9) for lost circulation interval 1655-1455m, wait on cement.
02/08/12	20	1676m	4m	0.75	Waiting on cement, POOH with 10min flow checks, make up bit # 4 RR1, RIH, tag cement @ 1513m MD, drill cement from 1513m to 1672m MD, drill 222mm hole from 1672m to 1676m MD.
02/09/12	21	1796m	120m	9.0	Drill 222mm hole from 1676m to 1678m MD, POOH, pick up directional tools, RIH with bit # 3 RR3, 10min flow checks, Drill 222mm hole from 1678m to 1796m MD, circulate.
02/10/12	22	1796m	0m	0.0	Trip out of hole, Lay down directional tools, break bit, RIH open ended, pump cement plug (10) for lost circulation interval 1791-1496m MD, pull 12 stands out of cement plug and squeeze cement in 2 m3 stages, RIH, tag cement @ 1522m MD, trips out to 1024m, pump cement plug (11), pull out 9 stands, wait on cement.
02/11/12	23	1796m	0m	0.0	Waiting on cement, POOH, RIH with 3 rd party packer to 582, set packer, pressure test surface casing, POOH lay down packer, RIH open ended with 10min flow checks,

					tag cement @ 1392m MD, Circulate mud, lost circulation, POOH with 10min flow checks, RIH with tooth bit, 10min flow checks, RIH to 1286, wash to bottom from 1286m to 1536m MD, condition mud & circulate.
02/12/12	24	1796m	0m	0.0	Trip out of hole, Break bit & sub, RIH open ended to 1522m MD, circulate bottoms up, pump cement plug (12) for lost circulation interval 1534-1239m MD, circulate, wait on cement, pump cement plug (13) for lost circulation interval 1250-955m MD, circulate bottoms up @ 994m, small amount of cement back, wait on cement bulker.
02/13/12	25	1796m	0m	3.5	Pump cement plug (14) for lost circulation interval 995-700m, trips pull 9 stands, pump more cement, wait on cement, RIH and tag cement @ 917m MD, circulate, pump cement plug (15) for lost circulation interval 911-711m, wait on cement, circulate bottoms up @ 710m MD, POOH with 10min flow checks, Directional work, RIH to 591m with flow checks, continu trip in to 745m MD, Drill cement from 745m to 847m MD.
02/14/12	26	1796m	0m	16.5	Drill cement plug from 847m to 1285m MD.
02/15/12	27	1796m	0m	19.25	Drill cement plug from 1285m to 1614m MD.
02/16/12	28	1955m	159m	19.25	Drill cement from 1614m to 1796m MD, Continue to drill 222mm hole from 1796m to 1955m MD
02/17/12	29	2041m	86m	6.0	Drill 222mm hole from 1955m to 2041m MD, circulate, POOH, Directional work, RIH with bit #5
02/18/12	30	2336m	295m	17.75	RIH, Drill 222mm hole from 2041m to 2336m MD, with accumulated surveys and connection times.
02/19/12	31	2545m	209m	15.0	Drill 222mm hole from 2336m to 2545m MD, circulate, bottoms up, POOH, directional work.
02/20/12	32	2559m	14m	2.75	Directional work, pick up tools, RIH with gamma tool, bit #6 and new BHA, trip in hole, circulate gas out through choke, directional drill 222mm build section hole from 2245m to 2559m MD.
02/21/12	33	2692m	133m	20.0	Directional drill 222mm build section hole from 2259m to 2692m MD, with accumulated surveys and connection times.
02/22/12	34	2797m	105m	19.0	Directional drill 222mm build section hole from 2692m to 2797m MD, with accumulated surveys and connection times.
02/23/12	35	2880m	83m	20.0	Directional drill 222mm build section hole from 2797m to 2880m MD, with accumulated surveys and connection times.
02/24/12	36	2934m	54m	16.50	Directional drill 222mm build section hole from 2880m to 2934m MD, with accumulated surveys and connection times. Circulate bottoms up, REACHED ICP
02/25/12	37	2934m	0m	0	POOH with 10min flow checks, Directional work, RIH slick for reamer run, was hole clean and ream tight sections, circulate bottoms up.
02/26/12	38	2934m	0m	0	POOH with 10min flow checks, Rig up tongs for 7" inch casing, run casing,

02/27/12	39	2934m	0m	0	Continue to run 7" casing, circulate without cementers and wait, Rig in cementers and pump cement, pressure test casing, rig out cementers, install pack off assembly.
02/28/12	40	2934m	0m	0	Change out annular, unable to pressure test no cup, Rig up wireline loggers, caes hole log to 2913m MD, pressure test BOP's install wear bushing, pick up new BHA, directional work, RIH, slip and cut drill line.
02/29/12	41	2965m	31m	15.50	RIHfill pipe, tag cement @2916, drill float and shoe, tag float @ 2921mMD, tag shoe @ 2930.5, directional drill 156mm build hole from 2934m to 2965m MD.
03/01/12	42	2995m	30m	7.75	Directional drill 156mm build hole from 2965m to 2979m MD. Circulate, trip out of hole, directional work, RIH, Drill 156mm hole from 2979m to 2995m MD.
03/02/12	43	3058m	63m	16.75	Directional drill 156mm build hole from 2995m to 3058m MD. Land to 90 degrees, accumulate gamma logs, and directional surveys, circulate bottoms up, trip out of hole.
03/03/12	44	3102m	44m	10.0	Continue trip out of hole, directional work, RIH, Directional drill 156mm lateral hole from 3058m to 3102m MD.
03/04/12	45	3124m	22m	7.0	Directional drill 156mm lateral hole from 3102m to 3124m MD. Circulate bottoms up, POOH with 10min flow checks, Surface work, RIH, ream open hole with packers plus reamer from 2923m to 3026m MD.
03/05/12	46	3132m	8m	1.5	Continue reaming open hole, POOH to 2923m, re ream to 3122m MD, POOH, directional work, RIH, Directional drill 156mm main lateral hole from 3124m to 3132m MD
03/06/12	47	3292m	160m	20.75	Directional drill 156mm lateral hole from 3132m to 3292m MD with accumulated surveys and connection times.
03/07/12	48	3507m	215m	21.25	Directional drill 156mm lateral hole from 3292m to 3507m MD with accumulated surveys and connection times.
03/08/12	49	3678m	171m	16.25	Directional drill 156mm lateral hole from 3507m to 3678m MD with accumulated surveys and connection times, trips out of hole.
03/09/12	50	3772m	94m	6.50	Continue POOH, break bit, lay down directional tools, pick new MWD and scribe bit, RIH, trip out for pipe screen, run back in hole, Directional drill 156mm lateral hole from 3678m to 3772m MD.
03/10/12	51	3943m	171m	20.25	Directional drill 156mm lateral hole from 3772m to 3943m MD with accumulated surveys and connection times.
03/11/12	52	4113m	170m	19.0	Directional drill 156mm lateral hole from 3943m to 4113m MD with accumulated surveys and connection times.
03/12/12	53	4297m	184m	20.0	Directional drill 156mm lateral hole from 4113m to 4297m MD with accumulated surveys and connection times.
03/13/12	54	4312m	15m	3.0	Directional drill 156mm lateral hole from 4297m to 4312m MD with accumulated surveys and connection times. TD reached at 03:20hrs, Geologist off site

Daily Dr g Progres - # 7 - W6



Wireline Logging Summary

Vertical and Build Section Cased Hole Log

Date: February 28, 2060
Logging Co: Logging Company
Mud Properties: Drilled using invert mud system
Hole Size: 222mm in vertical and build section
Surface Casing 226.60mm (ID) set @ 605.0MD, 53.6kg/m
Total Depth: 2913.00m MD
Hole Condition Generally good hole conditions
Wiper Trips: Numerous trips throughout the entire well

LOGGING SEQUENCE

Run #1: Gamma Ray-Neutron Log (MD & TVD)
Interval: 605.0m– 2913m MD
Rig up wireline: February 28, 2059
RIH with wireline: February 28, 2059
Finish log run: February 28, 2059

REMARKS: Tool ran problem free

Horizontal Section Log

REMARKS:

No horizontal logging done

Formation Top Summary

G.L. Elev.: 1286.60m

K.B. Elev.: 1292.10m

FORMATION	PROGNOSIS			SAMPLE			High	WIRELINE LOGS		High
	MD	TVD	SSL	MD	TVD	SSL	Low	TVD	SSL	Low
Badheart Sst (Sample point)	2284.1	2284.1	-992.0	2293.0	2293.0	-1000.9	-8.9	2298.0	-1005.9	-5.0
Muskiski	2310.1	2301.1	-1018.0	2310.0	2310.0	-1017.9	0.1	2328.0	-1035.9	-18.0
Cardium Zone	2366.1	2366.1	-1074.0	2381.0	2381.0	-1088.9	-14.9	2380.0	-1087.9	1.0
Cardium Sst	2398.1	2398.1	-1106.0	2399.0	2399.0	-1106.9	-0.9	2412.0	-1119.9	-13.0
Kaskapau (KOP)	2421.1	2421.1	-1129.0	2431.0	2431.0	-1138.9	-9.9	2435.0	-1142.9	-4.0
Doe Creek Marker	2859.7	2823.1	-1531.0	2863.0	2820.0	-1527.9	3.1	2820.0	-1527.9	0.0
Doe Creek	2896.3	2845.1	-1553.0	2898.5	2841.0	-1548.9	4.1	N/A	N/A	N/A
Dnvegan A	2977.6	2882.1	-1590.0	2968.5	2877.5	-1585.4	4.6	N/A	N/A	N/A
Dunvegan B	2992.9	2887.1	-1595.0	2975.0	2881.0	-1588.9	6.1	N/A	N/A	N/A
Dunvegan B1	3006.8	2891.1	-1599.0	2985.0	2885.5	-1593.4	5.6	N/A	N/A	N/A
Dunvegan C1 *Target top	3027.9	2896.1	-1604.0	2995.0	2889.5	-1597.4	6.6	N/A	N/A	N/A
Heel ICP	3104.6	2903.6	-1611.5	3058.0	2898.5	-1606.4	5.1	N/A	N/A	N/A
End Turn	3362.9	2899.6	-1607.5	3360.7	2894.9	-1602.8	4.5	N/A	N/A	N/A
Toe TD	4349.2	2883.1	-1591.0	4312.80	2880.8	-1588.7	2.3	N/A	N/A	N/A

SAMPLE DESCRIPTIONS

START SAMPLE LOGGING at 2280MD

(2280 to 2290) SHALE(100%) medium to dark gray, blocky to sub fissile, micromicaceous, firm to hard, in part silty, scattered light gray soft argillaceous material.

Badheart at 2293.0mMD, 2293.0mTVD, -1000.9m SSL

(2290 to 2300) SHALE(80%) medium to dark gray, blocky to sub fissile, medium to hard micromicaceous, in part silty, SANDSTONE(20%) light gray to white, clear, medium grain quartz, sub angular to sub rounded, well sorted, unconsolidated, minor silica cement, trace calcite, trace pyrite.

(2300 to 2305) SANDSTONE(50%) clear to white, medium to coarse grain, sub angular to sub rounded, moderately sorted, predominantly unconsolidated, scattered dark to clear lower chert grains, scattered pyrite nodules, intgranular porosity, SHALE(50%) medium to dark gray, blocky to sub fissile, micromicaceous, firm.

(2305 to 2315) SHALE(100%) medium to dark gray, blocky to sub fissile, micromicaceous, firm, slightly silty, soft gray argillaceous material, trace pyrite.

Muskiski at 2310.0mMD, 2310.0mTVD, -1017.9m SSL

(2315 to 2325) SHALE(80%) medium to dark gray, blocky to sub fissile, micromicaceous, firm, in part silty, soft gray argillaceous material, SANDSTONE(20%) clear to white, medium to coarse grain, sub angular to sub rounded, moderately sorted, predominantly unconsolidated, scattered dark to clear lower chert grains, scattered pyrite nodules, intgranular porosity.

(2325 to 2335) SHALE(100%) medium to dark gray, blocky to sub fissile, micromicaceous, predominantly firm, in part hard, slightly silty, rare soft gray argillaceous material, trace pyrite.

(2335 to 2345) SHALE(100%) medium to dark gray, blocky to sub fissile, micromicaceous, hard siltstone stringers, sandstone stringers, rare calcite, trace pyrite.

(2345 to 2355) SHALE(100%) medium to dark gray, blocky to sub fissile, micromicaceous, hard siltstone stringers, rare calcite, trace pyrite.

(2355 to 2365) SHALE(100%) medium to dark gray, blocky to sub fissile, micromicaceous, occasional siltstone stringers, in part slightly sandy, trace off white phosphate nodules, rare

calcite, trace pyrite.

(2365 to 2375) SHALE(100%) medium to dark gray, blocky to sub fissile, micromicaceous, occasional siltstone stringers, in part slightly sandy, trace off white phosphate nodules, rare calcite, trace pyrite.

(2375 to 2380) SHALE(100%) medium to dark gray, blocky to sub fissile, micromicaceous, occasional siltstone stringers, in part slightly sandy, rare calcite, trace pyrite.

Cardium Zone at 2381.0.0mMD, 2381.0.0mTVD, -1088.9m SSL

(2380 to 2390) SHALE(70%) medium to dark gray, blocky to sub fissile, medium to hard micromicaceous, in part silty, SANDSTONE(40%) light gray to clear, in part brown, upper fine to lower medium grain quartz, sub angular to sub rounded, well sorted, consolidated, scattered clear to dark chert grains, silty in part, silica cement, trace calcite, trace pyrite poor porosity.

(2390 to 2399) SHALE(80%) medium to dark gray, blocky to sub fissile, medium to hard micromicaceous, in part silty, SANDSTONE(20%) light gray to clear, in part brown, upper fine to lower medium grain quartz, sub angular to sub rounded, well sorted, consolidated, scattered clear to dark chert grains, silty in part, silica cement, trace calcite, trace py poor porosity.

Cardium Sand at 2399.0mMD, 2399.0mTVD, -1106.9m SSL

(2399 to 2410) SANDSTONE(80%) light gray to white, in part light brown, upper fine to lower medium grain salt and pepper quartz, sub angular to sub rounded, well sorted, consolidated, in part unconsolidated, scattered clear to dark chert grains, rare silt fragment, silica cement, trace calcite, poor porosity, SHALE(20%) medium to dark gray, blocky to sub fissile, medium to hard micromicaceous, in part silty.

(2410 to 2420) SANDSTONE(90%) light gray to white, in part light brown, upper fine to lower medium grain salt and pepper quartz, sub angular to sub rounded, well sorted, consolidated, in part unconsolidated, scattered clear to dark chert grains, rare silt fragment, silica cement, trace calcite, poor porosity, SHALE(10%) medium to dark gray, blocky to sub fissile, medium to hard micromicaceous, in part silty.

(2420 to 2430) SANDSTONE(50%) light gray to white, in part light brown, upper fine grain salt and pepper quartz, sub angular to sub rounded, well sorted, consolidated, in part unconsolidated, scattered clear to dark chert grains, rare becoming very silty, silica cement, trace calcite, poor porosity, SHALE(50%) medium to dark gray, blocky to sub fissile, medium to hard micromicaceous, in part silty.

Kaskapau at 2431.0mMD, 2431.0mTVD, -1138.9m SSL

- (2430 to 2440) SHALE(100%) light to medium gray, blocky to sub fissile, micromicaceous, firm to hard, abundant siltstone stringers, trace sandstone, trace pyrite, rare calcite.
- (2440 to 2450) SHALE(100%) light to medium gray, blocky to sub fissile, micromicaceous, firm to hard, occasional siltstone stringers, trace sandstone, trace pyrite.
- (2450 to 2460) SHALE(100%) light to medium gray, blocky to sub fissile, micromicaceous, firm, trace light brown to light gray sandstone, trace pyrite, trace hard siltstone stringers.
- (2460 to 2470) SHALE(100%) medium to dark gray, blocky to sub fissile, micromicaceous, hard, trace light grain chert, occasional medium grain quartz, trace pyrite, trace hard siltstone stringers.
- (2470 to 2480) SHALE(100%) light to medium gray, blocky to sub fissile, micromicaceous, firm, trace light gray sandstone, trace pyrite, trace hard siltstone stringers.
- (2480 to 2490) SHALE(100%) light to medium gray, blocky to sub fissile, micromicaceous, firm to hard, trace salt and pepper sandstone, trace pyrite, hard siltstone stringers, minor soft gray argillaceous material.
- (2490 to 2500) SHALE(100%) light to medium gray, blocky to sub fissile, micromicaceous, firm to hard, trace salt and pepper sandstone, trace pyrite, hard siltstone stringers, minor soft gray argillaceous material, trace calcite, rare organic material, trace fossil, rare coal fragment.
- (2500 to 2510) SHALE(100%) light to medium gray, predominantly blocky, in part sub fissile, micromicaceous, firm to hard, trace salt and pepper sandstone, trace pyrite, hard siltstone stringers, minor soft gray argillaceous material, trace calcite.
- (2510 to 2520) SHALE(100%) light to medium gray, predominantly blocky, in part sub fissile, micromicaceous, firm to hard, trace salt and pepper sandstone, trace pyrite, hard siltstone stringers, minor soft gray argillaceous material, trace calcite.
- (2520 to 2530) SHALE(100%) light to medium gray, predominantly blocky, in part sub fissile, micromicaceous, firm to hard, trace salt and pepper sandstone, hard light gray to light brown siltstone stringers, minor soft gray argillaceous material, trace calcite, trace pyrite.
- (2530 to 2545) SHALE(100%) light to medium gray, blocky to sub fissile, micromicaceous, firm to hard, trace salt and pepper sandstone, hard light gray to light brown siltstone stringers, rare soft gray argillaceous material, minor calcite, trace pyrite.
- (2545 to 2560) SHALE(100%) light to medium gray, blocky to sub fissile, micromicaceous, firm to hard, in part sandy, occasional siltstone stringers, rare soft gray argillaceous material, minor calcite, trace pyrite.

(KOP 2560m MD)

- (2560 to 2570) SHALE(100%) light to medium gray, blocky to sub fissile, micromicaceous, firm to hard, slightly sandy, in part silty, occasional soft gray argillaceous material,

becoming calcareous, trace pyrite, trace kaolinite.

- (2570 to 2580) SHALE(100%) light to medium gray, blocky to sub fissile, micromicaceous, firm to hard, slightly sandy, in part silty, occasional soft gray argillaceous material, becoming calcareous, trace pyrite, trace off white phosphate nodules, trace kaolinite.
- (2580 to 2590) SHALE(100%) light gray, blocky to sub fissile, micromicaceous, firm, slightly silty, occasional soft gray argillaceous material, rare calcite, trace pyrite.
- (2590 to 2600) SHALE(100%) light to medium gray, blocky to sub fissile, micromicaceous, firm to hard, trace sandstone, in part silty, soft gray argillaceous material, trace pyrite, trace kaolinite.
- (2600 to 2610) SHALE(100%) light gray, blocky to sub fissile, micromicaceous, firm, slightly silty, occasional soft gray argillaceous material, rare calcite, trace pyrite.
- (2610 to 2620) SHALE(100%) light gray, blocky to sub fissile, micromicaceous, firm to hard, slightly silty, rare sandstone, argillaceous, trace calcite, scattered pyrite.
- (2620 to 2630) SHALE(100%) light gray, predominantly blocky, in part sub fissile, micromicaceous, becoming soft, slightly silty, in part sandy, argillaceous, minor calcite, rare pyrite, trace kaolinite.
- (2630 to 2640) SHALE(100%) light gray, blocky to sub fissile, micromicaceous, medium to firm, slightly silty, rare sandstone, argillaceous, in part calcareous, trace pyrite.
- (2640 to 2650) SHALE(100%) light gray, predominantly blocky, in part sub fissile, micromicaceous, becoming soft, slightly silty, in part sandy, argillaceous, in part calcareous, trace pyrite, trace kaolinite.
- (2650 to 2660) SHALE(100%) light gray, predominantly blocky, in part sub fissile, micromicaceous, soft to medium, slightly silty, in part sandy, very argillaceous, becoming calcareous, trace pyrite, trace kaolinite.
- (2660 to 2670) SHALE(100%) light gray, in part medium gray, predominantly blocky, in part sub fissile, micromicaceous, soft to medium, in part silty, slightly sandy, very argillaceous, scattered medium grained calcite, trace pyrite, rare off white phosphate nodules, trace kaolinite.
- (270 to 2680) SHALE(100%) light gray, in part medium gray, predominantly blocky, in part sub fissile, micromicaceous, soft to medium, in part silty, slightly sandy, very argillaceous, abundant medium grained calcite scattered throughout, very calcareous, trace pyrite, rare off white phosphate nodules, trace kaolinite.
- (2680 to 2690) SHALE(100%) light gray, in part medium gray, blocky to sub fissile, micromicaceous, soft to medium, in part silty, minor trace sandstone, rare medium grained calcite, trace pyrite, trace kaolinite.
- (2690 to 2700) SHALE(100%) light gray, in part medium gray, blocky to sub fissile, micromicaceous, soft to firm, slightly silty, trace sandstone, in part calcite, trace pyrite, very

argillaceous, trace kaolinite.

- (2700 to 2710) SHALE(100%) light gray to medium gray, blocky to sub fissile, micromicaceous, predominantly soft, in part firm, slightly silty, minor sandstone, calcareous, trace pyrite, very argillaceous.
- (2710 to 2720) SHALE(100%) light gray to medium gray, blocky to sub fissile, micromicaceous, predominantly soft, in part firm, slightly silty, minor sandstone, calcareous, trace pyrite, trace kaolinite, very argillaceous.
- (2720 to 2730) SHALE(100%) light gray to medium gray, predominantly blocky, in part sub fissile, micromicaceous, predominantly soft, in part medium to firm, slightly silty, calcareous fragments, minor trace pyrite, trace kaolinite, very argillaceous.
- (2730 to 2740) SHALE(100%) light gray to medium gray, predominantly blocky, in part sub fissile, micromicaceous, predominantly soft, in part medium to firm, slightly silty, scattered calcareous fragments, trace pyrite, minor trace kaolinite, very argillaceous.
- (2740 to 2750) SHALE(100%) light gray, predominantly blocky, in part sub fissile, micromicaceous, predominantly soft, in part medium to firm, slightly silty, minor trace calcareous, trace pyrite, trace kaolinite, very argillaceous.
- (2750 to 2760) SHALE(100%) light gray, predominantly blocky, in part sub fissile, micromicaceous, predominantly soft, in part medium to firm, slightly silty, minor trace calcareous, minor trace sandstone, trace pyrite, trace kaolinite, very argillaceous.
- (2760 to 2770) SHALE(100%) light gray, predominantly blocky, in part sub fissile, micromicaceous, predominantly soft, in part medium to firm, trace light brown siltstone stringers, minor trace calcareous, minor trace sandstone, trace pyrite, trace kaolinite, very argillaceous.
- (2770 to 2780) SHALE(100%) light gray, predominantly blocky, in part sub fissile, micromicaceous, predominantly soft, in part medium to firm, siltstone stringers, trace off white phosphate nodules, trace calcite, minor trace sandstone, trace pyrite, trace kaolinite, very argillaceous
- (2780 to 2790) SHALE(100%) light gray, predominantly blocky, in part sub fissile, micromicaceous, predominantly soft, in part medium, in part silty, trace off white phosphate nodules, in part calcareous, minor trace sandstone, trace pyrite, trace kaolinite, very argillaceous
- (2790 to 2800) SHALE(100%) light gray, predominantly blocky to sub fissile, micromicaceous, predominantly soft, in part medium, slightly silty, in part calcareous, trace sandstone, trace pyrite, trace kaolinite, very argillaceous
- (2800 to 2810) SHALE(100%) light gray, predominantly blocky to sub fissile, micromicaceous, predominantly soft, slightly silty, medium grained calcite fragment scattered throughout, trace sandstone, trace pyrite, trace kaolinite, light brown argillaceous material.

- (2810 to 2820) SHALE(100%) light gray, predominantly blocky to sub fissile, micromicaceous, predominantly soft, slightly silty, minor trace sandstone, trace pyrite, trace kaolinite, light brown argillaceous material.
- (2820 to 2830) SHALE(100%) light gray, predominantly blocky to sub fissile, micromicaceous, predominantly soft, slightly silty, medium grained calcite fragment scattered throughout, trace sandstone, minor trace pyrite, rare kaolinite, light brown argillaceous material.
- (2830 to 2840) SHALE(100%) light gray, predominantly blocky to sub fissile, micromicaceous, predominantly soft, slightly silty, medium grained calcite fragment scattered throughout, trace sandstone, trace pyrite, minor kaolinite, light brown argillaceous material.
- (2840 to 2850) SHALE(100%) light to medium gray, blocky to sub fissile, micromicaceous, soft to medium, slightly silty, medium grained calcite fragment scattered throughout, trace sandstone, trace pyrite, minor kaolinite, light brown argillaceous material, trace off white phosphate nodules.
- (2850 to 2860) SHALE(100%) light to medium gray, blocky to sub fissile, micromicaceous, soft, in part medium, in part silty, medium grained calcite fragment scattered throughout, in part sandy, trace pyrite, minor kaolinite, light brown argillaceous material.

Doe Creek Marker at 2863.0mMD, 2820.0mTVD, -1527.9m SSL

- (2860 to 2870) SHALE(100%) light to medium gray, blocky to sub fissile, micromicaceous, soft, in part medium, in part silty, abundant medium grained calcite, very calcareous, slightly sandy, scattered upper fine quartz grains, trace pyrite, minor kaolinite, light brown argillaceous material.
- (2870 to 2880) SHALE(100%) light to medium gray, blocky to sub fissile, micromicaceous, soft, in part medium, in part silty, scattered medium grained calcite, very calcareous, slightly sandy, occasional upper fine quartz grains, trace pyrite, trace kaolinite, in part very argillaceous.
- (2880 to 2890) SHALE(100%) light to medium gray, blocky to sub fissile, micromicaceous, soft, in part medium, in part silty, abundant medium grained calcite, very calcareous, scattered upper fine quartz grains, trace pyrite, trace kaolinite, in part very argillaceous.
- (2890 to 2900) SHALE(100%) light to medium gray, blocky to sub fissile, micromicaceous, soft, in part medium, slightly silty, scattered medium grained calcite, very calcareous, occasional upper fine quartz grains, trace pyrite, trace kaolinite, very argillaceous.

Doe Creek at 2898.5mMD, 2841.0mTVD to 1548.9m SSL

(2900 to 2910) SHALE(50%) light to medium gray, blocky to sub fissile, micromicaceous, soft, in part medium, in part calcareous, trace pyrite, trace kaolinite, very argillaceous, SILTSTONE(50%) light to medium gray, predominantly very fine quartz grains, very argillaceous, loose consolidated, becoming siliceous

(2910 to 2920) SHALE(60%) light to medium gray, blocky to sub fissile, micromicaceous, soft, in part medium, in part very calcareous, trace pyrite, very argillaceous, SILTSTONE(40%) light to medium gray, predominantly very fine quartz grains, very argillaceous, loose consolidated, siliceous.

(2920 to 2934) SHALE(50%) light to medium gray, blocky to sub fissile, micromicaceous, soft, in part medium, trace pyrite, trace kaolinite, argillaceous, SILTSTONE(50%) light to medium gray, in part dark brown, predominantly very fine quartz grains, very argillaceous, loose consolidated, siliceous.

ICP @ 2934.0mMD, 2859.48mTVD, to 1548.9 SSL at 20:40 on Feb 24, 2012

Intermediate Casing Set at 2931.35mMD, 2858.00mTVD, to 1565.9 SSL

Drill Out (ICP) on Feb 29, 2012 at 03:45hr

(2934 to 2950) SHALE(50%) light to medium gray, blocky to sub fissile, micromicaceous, hard, trace pyrite, trace off white phosphate, argillaceous, SILTSTONE(50%) light to medium gray, in part dark brown, predominantly very fine quartz grains, very argillaceous, in part calcareous, well consolidated, siliceous, scattered clear coarse grained chert, scattered fine to medium grained angular clear quartz grains.

(2950 to 2965) SILTSTONE(65%) light to medium gray, in part dark brown, predominantly very fine quartz grains, very argillaceous, in part calcareous, well consolidated, siliceous, scattered clear coarse grained chert, scattered upper fine to lower medium grained angular clear to trans quartz, SHALE(35%) light to medium gray, blocky to sub fissile, micromicaceous, firm to hard, trace pyrite, trace off white phosphate, argillaceous.

(2965 to 2975) SILTSTONE(70%) light to medium gray, in part dark brown, predominantly very fine quartz grains, very argillaceous, in part calcareous, well consolidated, siliceous, scattered clear coarse grained chert, scattered upper fine to lower medium grained angular clear to trans quartz, SHALE(30%) light to medium gray, blocky to sub fissile, micromicaceous, firm to hard, trace pyrite, trace off white phosphate nodules, in part very argillaceous.

Dunvegan A at 2968.5mMD, 2877.5mTVD, -1585.4 SSL

Dunvegan B at 2975.0mMD, 2881.0mTVD, -1588.9 SSL

(2975 to 2985) SHALE(80%) light to medium gray, sub fissile, in part blocky, very silty, micromicaceous, trace pyrite, firm siltstone stringers, SANDSTONE(20%) light to medium gray, fine to upper fine grained, predominantly unconsolidated quartz grains, minor lithic grains, sub rounded to sub angular, moderately well sorted, in part calcareous, intergranular porosity, poor.

Dunvegan B1 at 2985.0mMD, 2885.5mTVD, -1593.4 SSL

(2985 to 2995) SHALE(60%) light to medium gray, sub fissile, in part blocky, very silty, micromicaceous, trace pyrite, firm siltstone stringers, SANDSTONE(20%) light to medium gray, fine to upper fine grained, predominantly unconsolidated quartz grains, minor lithic grains, sub rounded to sub angular, moderately well sorted, in part calcareous, poor porosity, SILTSTONE(20%) light to medium gray, in part dark brown, predominantly very fine quartz grains, very argillaceous, in part calcareous, well consolidated, siliceous.

Dunvegan C1 at 2995.0mMD, 2889.5mTVD, -1597.4 SSL

(2995 to 3000) SANDSTONE(80%) light to medium gray, in part light brown, occasional clear, fine to upper fine grained, predominantly unconsolidated quartz grains, minor lithic grains, sub rounded to sub angular, moderately well sorted, in part calcareous, intergranular porosity, poor to fair SHALE(20%) light to medium gray, sub fissile, in part blocky, very silty, micromicaceous, trace pyrite, firm siltstone stringers.

(3000 to 3010) SANDSTONE(100%) light to medium gray, in part light brown, occasional clear, fine to upper fine grained, trace medium grain, predominantly unconsolidated quartz, minor lithic grains, in part argillaceous, slightly silty, sub rounded to sub angular, moderately well sorted, in part calcareous, intergranular porosity, poor to fair (3 to 6%).

(3010 to 3020) SANDSTONE(100%) light to medium gray, in part light brown, occasional clear, fine to upper fine grained, trace medium grain, predominantly unconsolidated quartz, minor lithic grains, in part argillaceous, slightly silty, sub rounded to sub angular, moderately well sorted, occasional light and dark chert grains, in part calcareous, intergranular porosity, poor to fair (3 to 6%).

(3020 to 3030) SANDSTONE(100%) light to medium gray, in part light brown, occasional clear, fine to upper fine grained, trace medium grain, predominantly unconsolidated quartz, minor lithic grains, in part argillaceous, slightly silty, sub rounded to sub angular, moderately well sorted, occasional light and dark chert grains, slightly calcareous, intergranular porosity, poor to fair (4 to 7%).

(3030 to 3040) SANDSTONE(100%) light to medium gray, in part light to medium brown, occasional clear, fine to upper fine grained, trace medium grain, predominantly unconsolidated quartz, minor lithic grains, in part argillaceous, silty in part, sub rounded to sub angular, moderately well sorted, light and dark chert grains, in part very calcareous,

intergranular porosity, poor to fair (3 to 6%).

- (3040 to 3050) SANDSTONE(100%) light to medium gray, in part light brown, occasional clear, fine to upper fine grained, trace medium grain, predominantly unconsolidated quartz, lithic grains, becoming argillaceous, very silty in part, sub rounded to sub angular, moderately well sorted, occasional light and dark chert grains, becoming very calcareous, intergranular porosity, poor to fair (2 to 5%).)
- (3050 to 3070) SANDSTONE(100%) light to medium gray, in part light brown, occasional clear, fine to upper fine grained, trace medium grain, predominantly unconsolidated quartz, lithic grains, abundant off white to light brown argillaceous material, very silty in part, sub rounded to sub angular, moderately well sorted, light and dark chert grains, very calcareous, trace limestone stringers, intergranular porosity, poor to fair (2 to 5%)
- (3070 to 3090) SANDSTONE(100%) light to medium gray, in part light brown, scattered clear grains, fine to upper fine grained, scattered medium grain throughout, predominantly unconsolidated quartz, occasional lithic grains, abundant off white to light brown argillaceous material, silty in part, sub rounded to sub angular, moderately well sorted, trace light and dark chert grains, very calcareous, in part limy, intergranular porosity, poor to fair (3 to 5%)
- (3090 to 3100) SANDSTONE(100%) light to medium gray, in part light brown, scattered clear grains, fine to upper fine grained, scattered medium grain throughout, predominantly unconsolidated quartz, occasional lithic grains, abundant off white to light brown argillaceous material, silty in part, sub rounded to sub angular, moderately well sorted, trace light and dark chert grains, very calcareous, in part limy, intergranular porosity, poor to fair (3 to 6%)
- (3100 to 3120) SANDSTONE(100%) light to medium gray, rare light brown, occasional clear, fine to upper fine grained, trace medium grain throughout, predominantly unconsolidated, in part loose consolidated quartz, occasional lithic grains, scattered off white phosphate nodules, becoming silty, in part argillaceous, silica, sub rounded to sub angular, moderately well sorted, trace light and dark chert grains, very calcareous, slightly limy, intergranular porosity, poor to fair (2 to 5%)
- (3120 to 3140) SANDSTONE(100%) light gray, in part light brown, occasional clear, fine to upper fine grained, minor trace medium grain throughout, predominantly unconsolidated, in part consolidated quartz with calcite cement, occasional lithic grains, rare off white phosphate nodules, in part silty, slightly argillaceous, in part siliceous, sub rounded to sub angular, moderately well sorted, trace light and dark chert grains, very calcareous, intergranular porosity, poor to fair (3 to 5%)
- (3140 to 3150) SANDSTONE(100%) light gray, in part light brown, occasional clear, fine to upper fine grained, minor trace medium grain throughout, predominantly unconsolidated, in part consolidated quartz with calcite cement, occasional lithic grains, rare off white phosphate nodules, in part silty, slightly argillaceous, in part siliceous, sub rounded to sub angular, moderately well sorted, trace light and dark chert grains, very calcareous, intergranular porosity, poor to fair (3 to 5%)

- (3150 to 3160) SANDSTONE(100%) light to medium gray, occasional clear, in part salt and pepper fine to upper fine grained, minor trace medium grain throughout, predominantly consolidated to loose consolidated quartz with silica cement, occasional lithic grains, minor silty, minor argillaceous, sub rounded to sub angular, moderately well sorted, trace light and dark chert grains, trace glauconitic, minor calcite, intergranular porosity, poor to fair (3 to 6%)
- (3160 to 3180) SANDSTONE(100%) light to medium gray, occasional clear, in part brown upper fine to lower medium grained, predominantly consolidated to loose consolidated quartz with silica cement, in part unconsolidated, occasional lithic grains, brownish gray siltstone stringers, in part argillaceous, sub rounded to sub angular, moderately well sorted, trace light and dark chert grains, trace glauconitic, abundant off white phosphate nodules, minor trace calcite, intergranular porosity, poor to fair (3 to 6%)
- (3180 to 3200) SANDSTONE(100%) light to medium gray, in part clear to translucent, in part light brown upper fine to lower medium grained, predominantly consolidated to loose consolidated quartz with silica cement, in part unconsolidated, occasional lithic grains, occasional brownish gray siltstone stringers, in part argillaceous, sub rounded to sub angular, moderately well sorted, trace light and dark chert grains, trace glauconitic, scattered off white phosphate nodules, minor trace calcite, intergranular porosity, poor to fair (3 to 6%)
- (3200 to 3220) SANDSTONE(100%) light to medium gray, in part clear, in part light brown upper fine to lower medium grained, predominantly consolidated to loose consolidated quartz with silica cement, in part unconsolidated, occasional lithic grains, minor brownish gray siltstone stringers, in part argillaceous, sub rounded to sub angular, moderately well sorted, trace light and dark chert grains, trace glauconitic, rare phosphate nodules, minor trace calcite, intergranular porosity, poor to fair (3 to 6%)
- (3220 to 3230) SANDSTONE(100%) light to medium gray, in part clear, in part light brown upper fine to lower medium grained, predominantly consolidated to loose consolidated quartz with silica cement, in part unconsolidated, occasional lithic grains, minor brownish gray siltstone stringers, in part argillaceous, sub rounded to sub angular, moderately well sorted, trace light and dark chert grains, trace glauconitic, rare phosphate nodules, abundant shale stringers, minor trace calcite, intergranular porosity, poor to fair (3 to 5%)
- (3230 to 3250) SANDSTONE(70%) light to medium gray, in part clear to translucent, in part light brown upper fine to lower medium grained, predominantly consolidated to loose consolidated quartz with silica cement, in part unconsolidated, occasional lithic grains, occasional brownish gray siltstone stringers, in part argillaceous, sub rounded to sub angular, moderately well sorted, trace light and dark chert grains, trace glauconitic, scattered off white phosphate nodules, minor trace calcite, intergranular porosity, poor to fair (2 to 4%), SHALE(30%) medium gray, sub fissile, in part blocky, very silty, micromicaceous, soft to medium, very argillaceous, siliceous.
- (3250 to 3260) SANDSTONE(80%) light to medium gray, clear to trans, in part light brown upper fine to lower medium grained, predominantly consolidated, occasional loose consolidated quartz with silica cement, in part unconsolidated, occasional lithic grains, occasional

brownish gray siltstone stringers, very argillaceous, sub rounded to sub angular, moderately well sorted, trace light and dark chert grains, trace pyrite, abundant off white phosphate nodules, minor trace calcite, intergranular porosity, poor to fair (2 to 5%), SHALE(20%) medium gray, sub fissile, in part blocky, very silty, micromicaceous, soft to medium, very argillaceous, siliceous.

(3260 to 3270) SANDSTONE(90%) clear to translucent, in part consolidated salt and pepper, upper fine to lower medium grained quartz, predominantly loose consolidated with silica cement, abundant unconsolidated grains, sub rounded to sub angular, moderately well sorted, occasional lithic grains, slightly silty, minor argillaceous material, , trace light and dark chert grains, trace pyrite, trace off white phosphate nodules, minor trace calcite, intergranular porosity, poor to fair (3 to 5%), SHALE(10%) medium gray, sub fissile, in part blocky, very silty, micromicaceous, soft to medium, very argillaceous, siliceous.

(3270 to 3290) SANDSTONE(100%) clear to translucent, light gray to light brown, in part consolidated salt and pepper, upper fine to lower medium grained quartz, loose consolidated with silica cement, predominantly unconsolidated grains, sub rounded to sub angular, well sorted, slightly silty, minor argillaceous material, trace light and dark chert grains, trace pyrite, rare off white phosphate nodules, trace glauconitic, minor trace calcite, intergranular porosity, poor to fair (3 to 6%)

(3290 to 3300) SANDSTONE(100%) clear to translucent, light gray to light brown, in part consolidated salt and pepper, upper fine to lower medium grained quartz, loose consolidated with silica cement, predominantly unconsolidated grains, sub rounded to sub angular, well sorted, slightly silty, minor argillaceous material, trace light and dark chert grains, trace pyrite, trace glauconitic, minor trace calcite, intergranular porosity, poor to fair (3 to 6%)

(3300 to 3320) SANDSTONE(100%) clear to translucent, light gray to light brown, in part consolidated salt and pepper, upper fine to lower medium grained quartz, loose consolidated with silica cement, predominantly unconsolidated grains, sub rounded to sub angular, well sorted, minor silt, minor argillaceous material, trace light and dark chert grains, trace pyrite, trace glauconitic, minor trace calcite, intergranular porosity, poor to fair (4 to 6%)

(3320 to 3340) SANDSTONE(100%) clear to translucent, light gray to light brown, in part consolidated salt and pepper, upper fine to lower medium grained quartz, loose consolidated with silica cement, predominantly unconsolidated grains, sub rounded to sub angular, well sorted, minor silt, minor light gray argillaceous material, trace light and dark chert grains, siliceous, trace pyrite, trace glauconitic, rare calcite, intergranular porosity, poor to fair (3 to 5%)

(3340 to 3350) SANDSTONE(100%) clear to translucent, light gray to light brown, in part consolidated salt and pepper, upper fine to lower medium grained quartz, loose consolidated with silica cement, predominantly unconsolidated grains, sub rounded to sub angular, well sorted, minor silt, minor light gray argillaceous material, trace light and dark chert grains, siliceous, trace pyrite, trace glauconitic, rare calcite, intergranular porosity, poor to fair (3 to 5%)

- (3350 to 3370) SANDSTONE(80%) light gray to light brown, in part consolidated clear to translucent salt and pepper quartz, upper fine to lower medium grained, occasional consolidated fragments with silica cement, predominantly scattered unconsolidated grains, sub rounded to sub angular, well sorted, abundant silica silt, very argillaceous in part, trace light and dark chert grains, trace pyrite, trace glauconitic, rare calcite, intergranular porosity, poor (2 to 4%) SHALE(20%) light grayish brown, sub fissile, in part blocky, very silty, minor micromicaceous, soft to medium, very argillaceous.
- (3370 to 3380) SANDSTONE(100%) light gray to light brown, in part consolidated clear to translucent salt and pepper quartz, upper fine to lower medium grained, occasional consolidated fragments with silica cement, predominantly scattered unconsolidated grains, sub rounded to sub angular, well sorted, minor siliceous siltstone stringers, argillaceous in part, trace light and dark chert grains, trace pyrite, trace glauconitic, rare calcite, intergranular porosity, poor to fair (3 to 5%)
- (3380 to 3400) SANDSTONE(90%) medium gray to medium brown, in part consolidated, upper fine to lower medium grained, occasional consolidated fragments with silica cement, predominantly scattered unconsolidated grains, sub rounded to sub angular, well sorted, abundant amount argillaceous material, increasing amounts very fine silica grains, trace light and dark chert grains, trace pyrite, trace glauconitic, rare calcite, intergranular porosity, poor to fair (2 to 5%) SHALE(10%) light grayish brown, sub fissile, in part blocky, very silty, minor micromicaceous, soft to medium, very argillaceous.
- (3400 to 3420) SANDSTONE(90%) light to medium gray in part brown, upper fine to lower medium grained quartz, occasional consolidated fragments with silica cement, predominantly scattered unconsolidated grains, sub rounded to sub angular, well sorted, trace light and dark chert grains, siltstone stringers, minor trace pyrite, trace glauconitic, rare calcite, intergranular porosity, poor to fair (2 to 4%) SHALE(10%) light grayish brown, sub fissile, in part blocky, very silty, minor micromicaceous, soft to medium, very argillaceous.
- (3420 to 3430) SANDSTONE(90%) light to medium gray in part brown, upper fine to lower medium grained quartz, occasional consolidated fragments with silica cement, predominantly scattered unconsolidated grains, sub rounded to sub angular, well sorted, scattered argillaceous material, trace light and dark chert grains, trace pyrite, trace glauconitic, rare calcite, intergranular porosity, poor to fair (3 to 5%) SHALE(10%) light grayish brown, sub fissile, in part blocky, very silty, minor micromicaceous, soft to medium, very argillaceous.
- (3430 to 3450) SANDSTONE(100%) light to medium gray, in part brown and clear to translucent upper fine to lower medium grained quartz, occasional consolidated fragments with silica cement, predominantly scattered unconsolidated grains, sub rounded to sub angular, well sorted, silty in part, trace light and dark chert grains, trace pyrite, trace glauconitic, rare calcite, intergranular porosity, poor to fair (3 to 6%)
- (3450 to 3460) SANDSTONE(95%) light to medium gray, in part brown and clear to translucent upper fine to lower medium grained quartz, occasional consolidated fragments with silica cement, predominantly scattered unconsolidated grains, sub rounded to sub angular, well sorted, trace light and dark chert grains, trace pyrite, trace glauconitic, rare

calcite, intergranular porosity, poor to fair (3 to 6%) SHALE(5%) light grayish brown, sub fissile, in part blocky, very silty, minor micromicaceous, soft to medium, very argillaceous.

(3460 to 3480) SANDSTONE(100%) light to medium gray, in part light brown and clear to translucent upper fine to lower medium grained quartz, increasing amounts of consolidated fragments with silica cement, abundant unconsolidated grains, sub rounded to sub angular, well sorted, dark grayish brown siltstone stringers, trace light and dark chert grains, light to medium gray siltstone stringers, in part very argillaceous, trace pyrite, trace glauconitic, rare calcite, intergranular porosity, poor to fair (3 to 6%)

(3480 to 3500) SANDSTONE(100%) light to medium grayish brown upper fine to lower medium grained quartz, abundant amounts of consolidated fragments with silica cement, scattered unconsolidated grains, sub rounded to sub angular, well sorted, medium grayish brown siltstone stringers, trace light and dark chert grains, minor trace pyrite, trace glauconitic, rare calcite, slightly argillaceous in part, intergranular porosity, poor to fair (3 to 6%)

(3500 to 3520) SANDSTONE(85%) light to medium grayish brown upper fine to lower medium grained quartz, occasional consolidated fragments with silica cement, predominantly scattered unconsolidated grains, sub rounded to sub angular, well sorted, trace light and dark chert grains, trace pyrite, trace glauconitic, rare calcite, intergranular porosity, poor (2 to 5%) SHALE(15%) light grayish brown, sub fissile, in part blocky, very silty, minor micromicaceous, soft to medium, very argillaceous.

(3520 to 3540) SANDSTONE(80%) medium grayish brown upper fine to lower medium grained quartz, occasional consolidated fragments with silica cement, predominantly scattered unconsolidated grains, sub rounded to sub angular, well sorted, trace light and dark chert grains, becoming very argillaceous, trace pyrite, trace glauconitic, rare calcite, intergranular porosity, poor (2 to 4%) SHALE(20%) light to medium grayish brown, sub fissile, slightly blocky, very silty, soft to medium, very argillaceous.

(3540 to 3560) SANDSTONE(90%) light to medium grayish brown upper fine to lower medium grained quartz, occasional consolidated fragments with silica cement, predominantly scattered unconsolidated grains, sub rounded to sub angular, well sorted, trace light and dark chert grains, in part very argillaceous, trace pyrite, trace glauconitic, rare calcite, intergranular porosity, poor (2 to 5%) SHALE(10%) light to medium grayish brown, sub fissile, slightly blocky, very silty, soft to medium, very argillaceous.

(3560 to 3580) SANDSTONE(95%) light grayish brown upper fine to lower medium grained quartz, occasional consolidated fragments with silica cement, predominantly scattered unconsolidated grains, sub rounded to sub angular, well sorted, trace light and dark chert grains, in part argillaceous, trace pyrite, trace glauconitic, rare calcite, intergranular porosity, poor (3 to 5%) SHALE(5%) light grayish brown, sub fissile, slightly blocky, very silty, soft to medium, very argillaceous.

(3580 to 3600) SANDSTONE(100%) light gray to light brown upper fine to lower medium grained quartz, occasional consolidated fragments with silica cement, predominantly scattered unconsolidated grains, sub rounded to sub angular, well sorted, trace light and dark chert grains, slightly argillaceous, silty in part, trace pyrite, trace glauconitic,

rare calcite, intergranular porosity, poor to fair (3 to 6%)

- (3600 to 3620) SANDSTONE(100%) light gray to light brown upper fine to lower medium grained quartz, occasional consolidated fragments with silica cement, predominantly scattered unconsolidated grains, sub rounded to sub angular, well sorted, trace light and dark chert grains, minor argillaceous material, rare siltstone fragments, rare pyrite, trace glauconitic, very rare calcite, intergranular porosity, poor to fair (4 to 7%)
- (3620 to 3640) SANDSTONE(100%) light gray to light brown upper fine to lower medium grained quartz, occasional consolidated fragments with silica cement, predominantly scattered unconsolidated grains, sub rounded to sub angular, well sorted, trace light and dark chert grains, minor argillaceous material, rare siltstone fragments, rare pyrite, trace glauconitic, very rare calcite, intergranular porosity, poor to fair (4 to 7%)
- (3640 to 3660) SANDSTONE(100%) light gray to light brown, in part clear upper fine to lower medium grained quartz, abundant consolidated fragments with silica contact cement, predominantly unconsolidated grains, sub rounded to sub angular, well sorted, trace light and dark chert grains, minor dark argillaceous material, silty in part, rare pyrite, trace glauconitic, rare calcite, intergranular porosity, poor to fair (4 to 7%)
- (3960 to 3980) SANDSTONE(70%) light to medium grayish brown upper fine to lower medium grained salt and pepper quartz, predominantly consolidated fragments with silica cement, scattered unconsolidated grains, sub rounded to sub angular, well sorted, trace light and dark chert grains, in part argillaceous, minor traces pyrite, trace glauconitic, in part calcareous, shale stringers, intergranular porosity, poor to fair (2 to 4%), SHALE(30%) light to medium gray, micromicaceous, sub fissile, slightly blocky, trace kaolinite, very silty, soft to medium, very argillaceous.
- (3980 to 3990) SANDSTONE(80%) light to medium grayish brown upper fine to lower medium grained salt and pepper quartz, predominantly consolidated fragments with silica cement, scattered unconsolidated grains, sub rounded to sub angular, well sorted, trace light and dark chert grains, in part argillaceous, minor traces pyrite, trace glauconitic, in part calcareous, shale stringers, intergranular porosity, poor to fair (2 to 4%), SHALE(20%) light to medium gray, micromicaceous, sub fissile, slightly blocky, trace kaolinite, very silty, soft to medium, very argillaceous.
- (3990 to 4000) SANDSTONE(95%) light to medium grayish brown upper fine to lower medium grained salt and pepper quartz, predominantly consolidated fragments with silica cement, scattered unconsolidated grains, sub rounded to sub angular, well sorted, trace light and dark chert grains, in part argillaceous, minor traces pyrite, trace glauconitic, in part calcareous, shale stringers, intergranular porosity, poor to fair (3 to 6%), SHALE(5%) light to medium gray, micromicaceous, sub fissile, slightly blocky, trace kaolinite, very silty, soft to medium, very argillaceous.
- (4000 to 4020) SANDSTONE(100%) light grayish brown upper fine to lower medium grained salt and pepper quartz, minor consolidated fragments with silica cement, predominantly unconsolidated grains, sub rounded to sub angular, well sorted, trace light and dark chert grains, slightly argillaceous, slightly silty, minor traces pyrite, trace glauconitic, in part calcareous, intergranular porosity, fair (5 to 8%)

- (4020 to 4040) SANDSTONE(95%) light grayish brown upper fine to lower medium grained salt and pepper quartz, minor consolidated fragments with silica cement, predominantly unconsolidated grains, sub rounded to sub angular, well sorted, trace light and dark chert grains, slightly argillaceous, slightly silty, minor traces pyrite, trace glauconitic, in part calcareous, intergranular porosity, fair (5 to 8%), SHALE(5%) light to medium gray, micromicaceous, sub fissile, slightly blocky, trace kaolinite, very silty, soft to medium, very argillaceous.
- (4040 to 4060) SANDSTONE(100%) light grayish brown upper fine to lower medium grained salt and pepper quartz, predominantly consolidated fragments with silica cement, abundant unconsolidated grains, sub rounded to sub angular, well sorted, traces light and dark chert grains, slightly argillaceous, slightly silty, minor traces pyrite, traces glauconitic, slightly calcareous, intergranular porosity, fair (4 to 7%)
- (4060 to 4080) SANDSTONE(100%) light grayish brown upper fine to lower medium grained salt and pepper quartz, occasional consolidated fragments with silica cement, abundant unconsolidated grains, sub rounded to sub angular, well sorted, traces light and dark chert grains, slightly argillaceous, slightly silty, minor traces pyrite, traces glauconitic, slightly calcareous, intergranular porosity, fair (5 to 8%)
- (4080 to 4090) SANDSTONE(90%) light grayish brown upper fine to lower medium grained clear to translucent quartz, occasional consolidated fragments with silica cement, predominantly unconsolidated grains, sub rounded to sub angular, well sorted, traces light and dark chert grains, increasing argillaceous material, slightly silty, minor traces pyrite, siliceous, minor traces glauconitic, increasing amount of calcite, intergranular porosity, fair (5 to 8%) SHALE(10%) light to medium gray, micromicaceous, sub fissile, slightly blocky, trace kaolinite, very silty, soft to medium, very argillaceous.
- (4090 to 4110) SANDSTONE(100%) light grayish brown upper fine to lower medium grained clear to translucent quartz, occasional consolidated fragments with silica cement, predominantly unconsolidated grains, sub rounded to sub angular, well sorted, traces light and dark chert grains, off white argillaceous material, siltstone stringers, minor traces pyrite, minor traces glauconitic, in part calcareous, siliceous, intergranular porosity, fair (4 to 7%)
- (4010 to 4020) SANDSTONE(85%) light grayish brown upper fine to lower medium grained clear to translucent quartz, occasional consolidated fragments with silica cement, predominantly unconsolidated grains, sub rounded to sub angular, well sorted, traces light and dark chert grains, increasing argillaceous material, slightly silty, minor traces pyrite, siliceous, minor traces glauconitic, increasing amount of calcite, intergranular porosity, fair (5 to 8%) SHALE(15%) light to medium gray, micromicaceous, sub fissile, slightly blocky, trace kaolinite, very silty, soft to medium, very argillaceous.
- (4120 to 4140) SANDSTONE(100%) light grayish brown upper fine to lower medium grained clear to translucent quartz, predominantly consolidated fragments with calcite cement, occasional unconsolidated grains, sub rounded to sub angular, well sorted, traces light and dark chert grains, off white argillaceous material, siltstone stringers, siliceous, minor traces pyrite, minor traces glauconitic, increasing amount

calcareous, intergranular porosity, fair (2 to 5%)

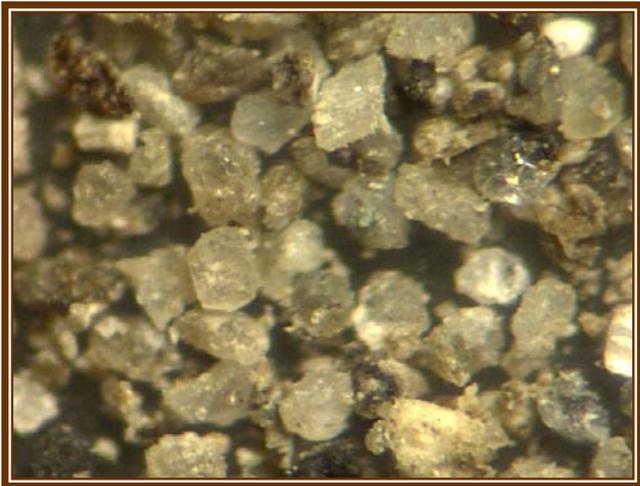
- (4140 to 4160) SANDSTONE(100%) light grayish brown to off white, upper fine to lower medium grained clear to translucent quartz, occasional consolidated fragments with calcite cement, predominantly unconsolidated grains, sub rounded to sub angular, well sorted, traces light and dark chert grains, off white argillaceous material, siltstone stringers, siliceous, minor traces pyrite, minor traces glauconitic, icrg amnt calcareous, abundant shale stringers, intergranular porosity, fair (3 to 6%)
- (4160 to 4180) SANDSTONE(100%) light grayish brown, upper fine to lower medium grained clear to translucent quartz, predominantly consolidated fragments with siliceous cement, abundant unconsolidated grains, sub rounded to sub angular, well sorted, traces light and dark chert grains, siltstone stringers, minor traces pyrite, minor traces glauconitic, in part calcareous, intergranular porosity, fair (4 to 7%)
- (4180 to 4200) SANDSTONE(100%) light grayish brown, upper fine to lower medium grained clear to translucent quartz, predominantly consolidated fragments with siliceous cement, abundant unconsolidated grains, sub rounded to sub angular, well sorted, traces light and dark chert grains, siltstone stringers, minor traces pyrite, minor traces glauconitic, in part calcareous, intergranular porosity, fair (4 to 7%)
- (4200 to 4220) SANDSTONE(100%) light gray to light brown, upper fine to lower medium grained clear to translucent quartz, predominantly consolidated with siliceous cement minor calcareous cement, abundant unconsolidated grains, sub rounded to sub angular, well sorted, traces light and dark chert grains, minor siltstone stringers, minor trace pyrite, traces glauconitic, minor traces calcareous, intergranular porosity, fair (5 to 7%)
- (4220 to 4240) SANDSTONE(100%) light gray to light brown, upper fine to lower medium grained clear to translucent quartz, predominantly consolidated with siliceous cement minor calcareous cement, abundant unconsolidated grains, sub rounded to sub angular, well sorted, traces light and dark chert grains, minor siltstone stringers, minor trace pyrite, traces glauconitic, minor traces calcareous, intergranular porosity, fair (5 to 8%)
- (4240 to 4260) SANDSTONE(100%) light gray to light brown, upper fine to lower medium grained clear to translucent quartz, predominantly consolidated with siliceous cement minor calcareous cement, abundant unconsolidated grains, sub rounded to sub angular, well sorted, traces light and dark chert grains, minor siltstone stringers, minor argillaceous grains, siliceous, minor trace pyrite, traces glauconitic, minor traces calcareous, intergranular porosity, fair (5 to 7%)
- (4260 to 4280) SANDSTONE(100%) light gray to light brown, upper fine to lower medium grained clear to translucent quartz, occasional consolidated with siliceous cement minor calcareous cement, predominantly unconsolidated grains, sub rounded to sub angular, well sorted, traces light and dark chert grains, minor siltstone stringers, minor argillaceous grains, siliceous, minor trace pyrite, traces glauconitic, minor traces calcareous, intergranular porosity, fair (5 to 8%)

(4280 to 4300) SANDSTONE(100%) light gray to light brown, upper fine to lower medium grained clear to translucent quartz, occasional consolidated with siliceous cement minor calcareous cement, predominantly unconsolidated grains, sub rounded to sub angular, well sorted, traces light and dark chert grains, minor siltstone stringers, minor argillaceous grains, siliceous, minor trace pyrite, traces glauconitic, minor traces calcareous, intergranular porosity, fair (5 to 8%)

(4300 to 4312) SANDSTONE(100%) light gray to light brown, upper fine to lower medium grained clear to translucent quartz, occasional consolidated with siliceous cement minor calcareous cement, predominantly unconsolidated grains, sub rounded to sub angular, well sorted, traces light and dark chert grains, minor siltstone stringers, minor argillaceous grains, siliceous, minor trace pyrite, traces glauconitic, minor traces calcareous, intergranular porosity, fair (5 to 8%)

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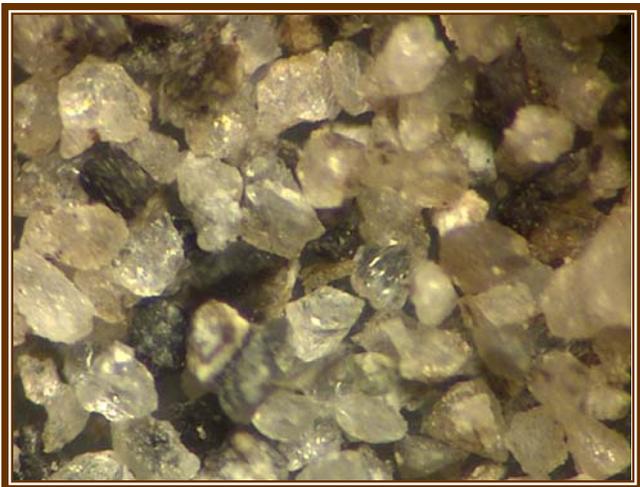
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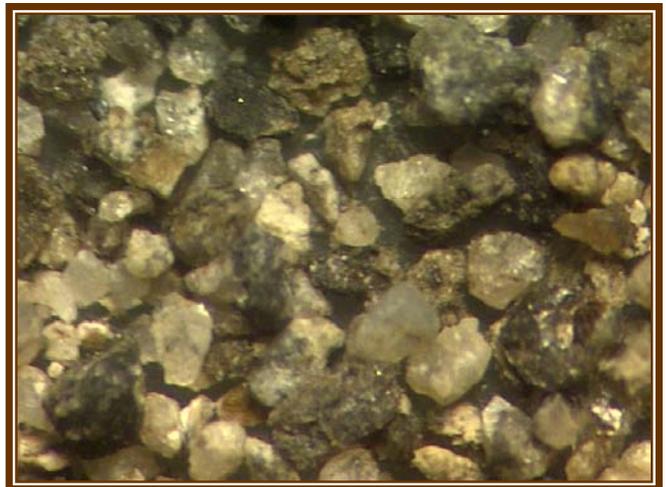
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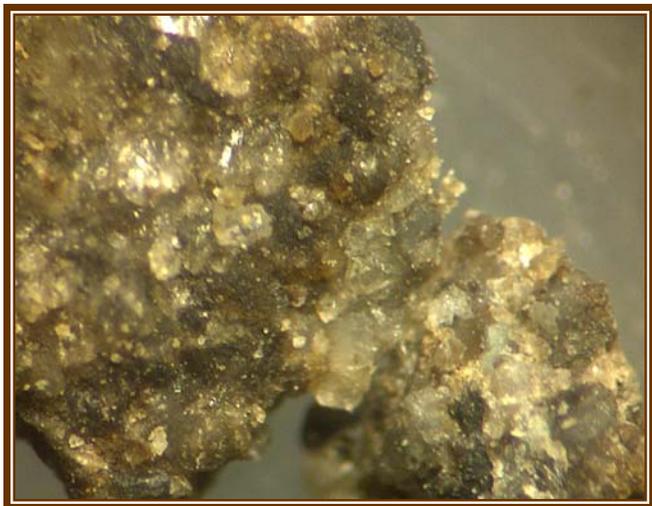
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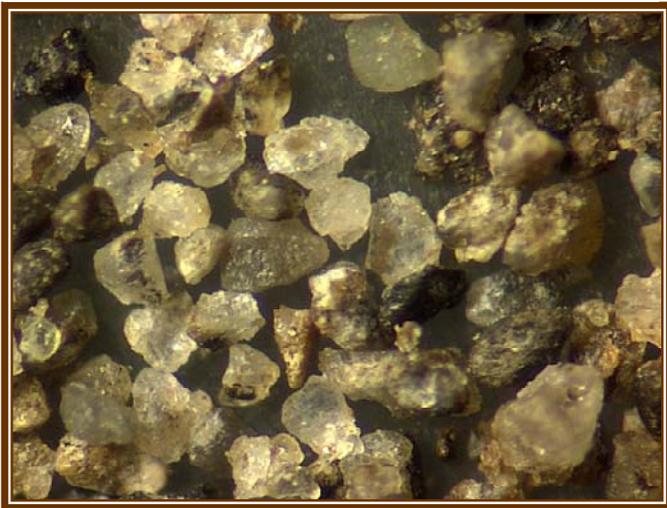
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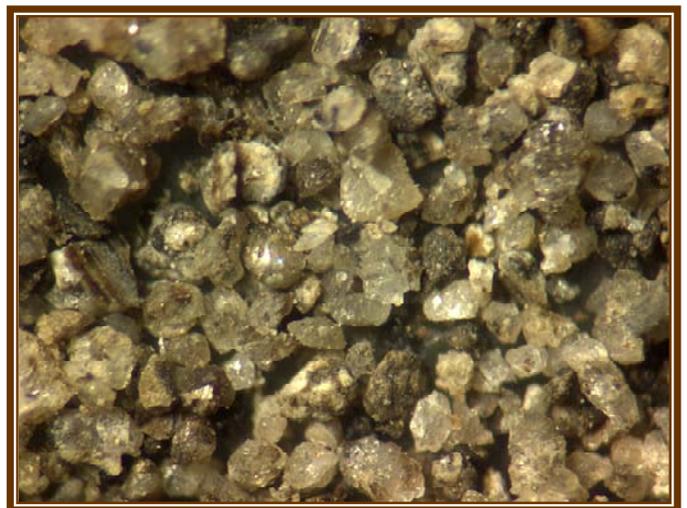
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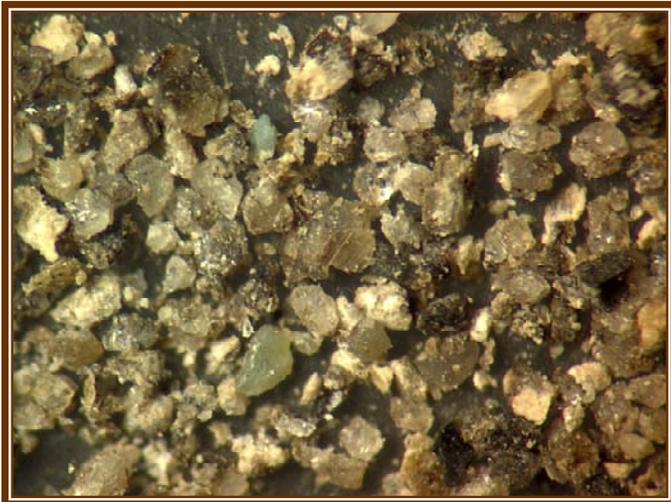
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3950 m



4010 m



4100 m



4200 m

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