WELL HISTORY REPORT

Gulf et al West Beaver Crow YT O-15

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Gulf et al West Beaver Crow YT O-15

60° 04' 58.983" North Latitude

125° 17' 43.959" West Longitude

GULF OIL CANADA LIMITED

Calgary, Alberta

July, 1970

CONFIDENTIAL

APPROVED:

Hjalmar B. Holmberg
for Area Production Manager

July 13, 1970

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WELL HISTORY REPORT

SECTION I

(a) Well Name and Number: Gulf et al West Beaver Crow YT O-15

(b) Permittee, Licencee: Canadian Homestead Oils Ltd., (1233).

(c) Name of Operator: Gulf Oil Canada Limited
P.O. Box 130, Calgary, Alberta
Operator's Licence No. 1243

(d) Location:

O-15-60-10-125-15	Grid
60° 04' 58.983" N	Latitude
125° 17' 43.959" W	Longitude
60.08306° N 125.29555° W	Universal W.L.R.
3000156010125150	Unique Well Identifier

(e) Co-ordinates: 1094' South, 238.5' East of the Northwest corner of Unit O (surface)

(f) Permit Number: 5463

(g) Drilling Contractor: Commonwealth Drilling (Western) Limited
Rig No. 34C, Cardwell Model "H"

(h) Drilling Authority: No. 402 dated 19th January, 1970.

(i) Classification: New Field Wildcat

(j) Elevations: Ground - 3756'; K.B. - 3766'

(k) Spud Date: February 3, 1970

(l) Drilling Completion Date: May 16, 1970

(m) Total Depth: 5667'

(n) Well Status: Suspended

(o) Rig released: June 1, 1970

(p) Hole Sizes:

13¾"	from 0'	to 23'	K.B.
8¾"	from 23'	to 658'	K.B.
6¼"	from 658'	to 5667'	K.B.

(q) Casing: Conductor, 10¾" x 13'
16 joints of 7" O.D. 23# 8RT K-55 Class A surface casing set at 653' K.B. Net Tally 643'

WELL HISTORY REPORT

SUPPLEMENT

SECTION I

(n.) Abandoned

Beavercrow
YT 0-15

SECTION II

(a) Formation Tops:

Formation	Log Tops	Sample Tops
Overburden	-	Surface
Mattson	-	55'
Etanda	-	1859'
Yohin	-	2044'
Besa	-	4228'?
Total Depth Logger:	3650'	
Total Depth Driller:		5667'

(b) Cored Intervals: nil

(c) Core Description: nil

(d) Sample Descriptions: See Appendix

(e) Palaeontological Determinations: (Preliminary)

Trace crinoid ossicles at 680', 710', 740', 770', 970', 1150' and 1170'. Brachiopod pod imprint at 1480'
Trace bryozoa fragments from 1540' to 1570' and 1680'.
Trace crinoidal fragments at 1610', 1620', 1630', 1730', 1780', 2160 and 2470'.
Possible fossil fragments at 5490'

SECTION III

(a) Report of Drill Stem Tests:

No Drill Stem Tests were run

(b) Casing Record: February 3, 1970. Conductor pipe 10¾" x 15' cemented with 10 sx. cement

February 13, 1970. Ran 16 joints of 7" O.D. 23# 8 RT K-55 Class A casing set at 653' K.B. Ran 2 centralizers. Cemented by Howco with 200 sacks Construction cement plus 0.5% CFR-2. Pumped plug to 620'. Plug down at 2:15 a.m. 2-14-70. Average slurry weight 15.0#/gal. Average displacement rate 2 bbls./min. Witnessed by Fercho for contractor and Ramsay for Gulf.

(c) Bit Record:

No.	Size	Type	Depth In In	Depth Out	Footage	Hours	Cumulative Hours
1A	8¾"	M4LGJ	0	48'	48'	13½	13½
2A	8¾"	H7UGJ	48'	63'	15'	16½	30
3A	8¾"	H7UGJ	63'	93'	30'	14¾	44¾
4A	8¾"	H7UGJ	93'	126'	33'	11¼	56
2ARR	8¾"	H7UGJ	126'	140'	14'	4	60
5A	8¾"	W4HJ	140'	180'	40'	10½	70½
6A	8¾"	W4HJ	180'	223'	43'	10¾	81¼
7A	8¾"	H7SUJ	223'	305'	82'	20½	101¾
8A	8¾"	YHWGJ	305'	344'	39'	12¾	114½
9A	8¾	YHWGJ	344'	491'	147'	20¼	134¾
10A	8¾	YHGJ	491'	658'	167'	22	156¾
1	6¼	C2J	658'	729'	71'	7	163¾
2	6¼	SS5J	729'	1089'	360	31¼	195
3	6¼	M88J	1089'	1148'	59'	16	211
4	6¼	SS5J	1148'	1410'	262'	30	241'
5	6¼	SS5J	1410'	1469'	59'	8	249'
6	6¼	H7J	1469'	1504'	35'	5½	254½
7	6¼	SS5J	1504'	1590'	86'	19¾	274¼
8	6¼	SS5J	1590'	1665'	75'	17	291¼
9	6¼	SS5J	1665'	1778'	113	27	318¼
10	6¼	SS5J	1778'	1888'	110'	31½	349¾
11	6¼	W4HJ	1888'	1917'	29'	7¾	357½
12	6¼	C2J	1917'	1955'	38'	7	364½
13	6¼	OSC3J	1955'	1983'	28'	2¾	367¼
14	6¼	H7J	1983'	2011'	28'	6½	373¾
15	6¼	YS1R	2011'	2044'	33	6¼	380
16	6¼	M4N	2044'	2111'	67'	15¼	395¼
17	6¼	OSC1GJ	2111'	2170'	59	15	410¼
18	6¼	OSC1GJ	2170'	2228'	58'	8¾	419
19	6¼	C2J	2228'	2244'	16'	2¾	421¾
20	6¼	M4LJ	2244'	2286'	42'	10½	432¼
21	6¼	M4LJ	2286'	2291'	5'	2¼	434½
22	6¼	SS5J	2291'	2447'	156'	46½	481
23	6¼	SS5J	2447'	2516'	69'	21¾	502¾
24	6¼	W4HJ	2516'	2550'	34'	10½	513¼
25	6¼	M4LJ	2550'	2589'	39'	8	521¼
26	6¼	YHR	2589'	2612'	23'	6¼	527½
27	6¼	M4N	2612'	2689'	77'	12	539½
28	6¼	OSC1GJ	2689'	2704'	15'	4½	544
29	6¼	H7J	2704'	2708'	4'	3	547
30	6¼	SS5J	2708'	2761'	53	15¼	562¼
31	6-7/32	Diamond	2761'	2824'	63'	20¼	582½
32	6¼	W4HJ	2824'	2826'	2'	¼	582¾
33	6¼	SS7J	2826'	2963'	137'	34¾	617½
34	6¼	L4HJ	2963'	3082'	119'	19	636½
35	6¼	DGJ	3082'	3110'	28'	5¼	641¾

No.	Size	Type	Depth In	Depth Out	Footage	Hours	Cumulative Hours
36	6¼	W4HJ	3110'	3119'	9'	3	644¾
37	6¼	YC4GJ	3119'	3211'	92'	25½	670¼
38	6¼	SS5J	3211'	3301'	90'	15	685¼
39	6¼	L4HJ	3301'	3359'	58'	13	698¼
40	6¼	SS5J	3359'	3464'	105'	32¼	730½
41	6¼	SS5J	3464'	3508'	44'	12	742½
42	6¼	L4HJ	3508'	3508'	0	1	743½
43	6¼	SS7J	3508'	3549'	41'	13¾	757¼
44	6¼	SS7J	3549'	3626'	77'	19	776¼
45	6¼	SS5J	3626'	3704'	78'	13	789¼
46	6¼	SS5J	3704'	3732'	28'	6¾	796
47	6¼	SS7J	3732'	3773'	41	13¼	809¾
48	6¼	SS5J	3773'	3795'	22'	7	816¼
49	6¼	SS7J	3795'	3804'	9'	4¾	821
50	6¼	M4LJ	3804'	3823'	19'	4¾	825¾
51	6¼	L4HJ	3823'	3832'	9'	3¾	829½
52	6¼	H88J	3832'	3873'	41'	12¼	841¾
53	6-7/32	Diamond	3873'	3873'	0'	0	841¾
54	6¼	H88J	3873'	3903'	30	7¼	849
55	6¼	SS5J	3903'	3922'	19	3¼	852¼
56	6¼	W4HJ	3922'	3935'	13'	5	857¼
57	6-7/32	Diamond	3935'	3939'	4'	2	859¼
58	6¼	YC5GJ	3939'	3972'	33	10½	869¾
59	6¼	SS5J	3972'	3998'	26'	8¼	878
60	6¼	SS5J	3998'	4041'	43'	12½	890½
61	6¼	SS5J	4041'	4043'	2'	¼	890¾
62	6¼	SS5J	4043'	4068'	25'	5¾	896½
63	6¼	SS5J	4068'	4085'	17'	6¾	903¼
64	6¼	RG2BJ	4085'	4106'	21'	12¼	915½
65	6¼	SS5J	4106'	4169'	63'	18½	934
66	6¼	SS5J	4169'	4229'	60	16½	950½
67	6¼	SS7J	4229'	4284'	55'	19¼	969¾
68	6¼	SS5J	4284'	4344'	60'	22¼	992
69	6¼	M4N	4344'	4408'	64'	10½	1002½
70	6¼	M4N	4408'	4521'	113	16	1018½
71	6¼	DGJ	4521'	4660'	139'	12¾	1031¼
72	6¼	DGJ	4660'	4702'	42'	7¼	1038½
73	6¼	YS1J	4702'	4737'	35'	6¼	1045
74	6¼	SS5J	4737'	4839'	102'	17½	1062½
75	6¼	SS5J	4839'	4896'	57'	9	1071½
76	6¼	M4N	4896'	4995'	99'	15¼	1086¾
77	6¼	M4N	4995'	5034'	39'	5½	1092¼
78	6¼	SS5J	5034'	5154'	120'	16¾	1109
79	6¼	V2J	5154'	5299'	145'	27¼	1136¼
80	6¼	OSC1GJ	5299'	5404'	105'	15	1151¼
81	6¼	OSC1GJ	5404'	5476'	72'	12¾	1164
82	6¼	V2J	5476'	5513'	37'	8¾	1172¾
83	6¼	L4HJ	5513'	5557'	44'	10¾	1183½

No.	Size	Type	Depth In	Depth Out	Footage	Hours	Cumulative Hours
84	6¼	SS5J	5557'	5570'	13'	5¼	1188¾
85	6¼	M4NJ	5570'	5635'	65'	14½	1203
86	6¼	YS1	5635'	5667'	32	8¾	1211¾
87	6¼	YS1	Cleaning to top of fish				
88	6¼	L4	Cleaning to top of fish				
89	6¼	H7J	Cleaning to top of fish				

(d) Mud Report: Surface Hole - Gel slurry system.
Mud weight 8.4 - 9.3 ppg.
Viscosity 31-80 sec./qt.

658'-5667' - Water-Gel-Benex system.
Mud weight 8.4 - 9.4 ppg.
Viscosity 28 - 104 sec./qt.

Materials Used:

Lime	150 pounds	Sawdust	8,920 pounds
Gel	106,400 "	Kwik Seal	12,440 "
Benex	258 "	Fibertex	1,480 "
Cellex	850 "	Walnut Hulls	5,700 "
Soda Ash	200 "	Scottfree	15 gals.
Pep Strech	13.5 gallons	EP Lube	91 gals.
Diesel	755 gallons	Q-Broxin	50 pounds

(e) Deviation Record:

Depth	Degrees Deviation	Depth	Degrees Deviation	Depth	Degrees Deviation
50'	¾	2575'	5	3350'	7½
90'	1	2612'	4¼	3410'	8
126'	1	2640'	4	3450'	8
180'	¾	2675'	4	3525'	10
270'	7/8	2700'	4¼	3626'	12
305'	½	2740'	4	3704'	14
344'	¾	2761'	3¾	3832'	18
481'	1¼	2824'	3¼	3873'	16½
588'	1	2902'	4-1/8	3935'	15¼
658'	1¼	2930'	4¼	4041'	13½
833'	1½	2960'	5	4060'	13½
1009'	1	2993'	4½	4150'	12
1300'	1½	3050'	5¼	4210'	11¾
1590'	1¼	3080'	6	4335'	11
1888'	1	3108'	6	4521'	11
2170'	1	3144'	6	4700'	16
2435'	3	3173'	6¾	4839'	16
2480'	4	3200'	6¾	5037'	17
2516'	4-7/8	3233'	7	5270'	17
2550'	5	3290'	7-1/8	5557'	13

(f) Abandonment Plugs:

Plug No.	Date	Position	Geological Formation	Sacks Cement	Additives	Hours W.O.C.	Depth Plug Felt
1	5-31-70	3668-3400'	Bsl. Mattson	110	-	-	-
2	5-31-70	2100-2000'	Mattson	40	3% $CaCl_2$	8	1985'
3	6-1-70	700-600'	Mattson	50	3% $CaCl_2$	8	615'

Well was capped with an 8" Series 600 flange, 3" valve and bull plug. Well name plate was erected on an 8 foot riser next to the wellhead.

(g) Lost Circulation Zones:

Depth	Zone	Bbls. Lost	Measures Taken
56'	Base overburden	5	30 sacks sawdust
890'	Mattson	34	25 sacks sawdust
980'	Mattson	37	15 sacks sawdust
1089'	Mattson	41	15 sacks sawdust
1128'	Mattson	43	3 - 50 bbl. gel-sawdust pills
1148-1220'	Mattson	Partial loss	Water
1220-1410'	Mattson	No returns	Drilling blind
1469'	Mattson	No returns	100 bbl. batch 12#/bbl. LCM 200 bbl. batch 20#/bbl. LCM
1600 (890?)	Mattson	Partial loss	20#/bbl. LCM
1665'(890?)	Mattson	30	18#/bbl. LCM
1983'(890?)	Etanda	30	2 - 30 bbl. 18#/bbl. LCM plug
2244'(890?)	Yohin	30	30 bbls. 20#/bbl. LCM plug
5667'	Shale	No returns	20 bbls. 9#/bbl. LCM and 40 bbls. 20#/bbl. LCM

(h) Report of Blowouts: Nil

SECTION IV

(a) Logs:

Date	Run No.	Interval	Type
5-30-70	1	657-3649'	Induction Electrical log
6-1-70	1	657-3632'	BHC Sonic Log

SECTION V

(a) Core Analysis: Nil

(b) Water Analysis: Lab. No. 076-70

WELL HISTORY REPORT

SUPPLEMENT

SECTION III

(f.) Delete: Well was capped with an 8" Series 600 flange, 3" valve and bull plug. Well name plate was erected on an 8 foot riser next to the wellhead.

Insert: Cut off 7" casing 3' below ground level, topped with 5 sacks cement, welded plate on top and erected 5' steel riser with full well name.

(c) Gas Analysis: Nil

(d) Oil Analysis: Nil

SECTION VI

(a) Tubing Record: No tubing was run

(b) Perforation Record: No perforating performed

(c) Cementation Record: No squeeze or plug back jobs were performed. Abandonment plugs were run as follows:

Plug No.	Date	Position	Geological Formation	Sacks Cement	Additives	Hours WOC	Depth Plug Felt
1	5-31-70	3668'-3400'	Bsl. Mattson	110	-	-	-
2	5-31-70	2100'-2000'	Mattson	40	3% $CaCl_2$	8	1985'
3	6-1-70	700'- 600'	Mattson	50	3% $CaCl_2$	8	615'

(d) Acidization and Fracturing Record: None performed

(e) Back Pressure and Production Tests: None performed

WELL HISTORY REPORT

SUPPLEMENT

SECTION VI

(c.) Add:

Plug No.	Date	Position	Geological Formation	Sacks Cement
4	11-25-70	3' - 0'	Surface	5

A P P E N D I X

P 13 (1/69)

70-153.

"TIGHT HOLE"

GULF OIL CANADA LIMITED
WATER ANALYSIS REPORT

LEASE Gulf et al West Beaver Crow LOCATION 60° 10'N 125°15'W 16-B FIELD _____ SAMPLE Field Sample #2

SAMPLE DATE February 25,1970 FORMATION Mattson @ 1500' INTERVAL DEPTH _____ FT. TO _____ FT. KBE 3,766 FT.

SAMPLE HEIGHT ABOVE TOOL 5' above Bit FT. _____ RECOVERY DATA _____

OTHER DATA _____

ION	MILLIGRAMS/LITRE CONCENTRATION	PER CENT MILLIGRAM EQUIVALENTS
SODIUM – NA	74	19.21
POTASSIUM – K		
CALCIUM – CA	77	22.91
MAGNESIUM – MG	16	7.88
SULPHATE – SO_4	10	1.25
CHLORIDE – CL	45	7.58
BROMIDE – BR		
IODIDE – I		
BICARBONATE – HCO_3	421	41.17
CARBONATE – CO_3		
HYDROXIDE – OH		
TOTAL		100.00

REMARKS AND CONCLUSIONS Sample received February 26, 1970, other sample information missing.

S. G. @ 60°F.	1.003
pH	6.77
H_2S	Positive
RESISTIVITY 12.7 OHM METERS AT	73 °F.

TOTAL DISSOLVED SOLIDS IN MILLIGRAMS/LITRE

AS NACL FROM RES.	
BY EVAPORATION	
AFTER IGNITION	

ANALYSED BY	D.J. Donnelly DJD
LAB. NO.	W-076-70

DATE RECEIVED		19
DATE ANALYSED		19
DATE DISTRIBUTED	April 29, 1	19 70

SAMPLE DESCRIPTION

Gulf et al West Beavercrow YT 0-15

0 - 55' Overburden - Block boulders and clay. 55 - 580 not examined.

590' Shale - dark grey, silty. 70%
Sandstone - light grey, very fine to silty, quartzose, argillaceous well sorted, sub angular to angular, slightly calcareous. 25%
Trace of very fine to fine orange (hematitic?) trace. sandstone.

600' Siltstone - dark grey, argillaceous grading to sandstone - 85 - 90% light grey brown, very fine - silty, partly argillaceous, quartzose, well sorted, sub-angular to angular, tight 10%
Shale - dark grey, silty - sandy, slightly dolomitic trace.

610' Shale - dark grey, silty in part - 75%
Sandstone - light grey to orange, silty - medium grained, quartzose, partly siliceous, sub angular to sub rounded, orange color may be hematite staining, mostly unconsolidated. 10%
Siltstone - argillaceous, dark grey grading to very fine sandstone - 15%.

620' Shale - dark grey, silty, slightly dolomitic. 80%
Sandstone - light grey brown to orange, very fine to fine grained, quartzose, sub angular, well sorted, part dolomitic cement, most of sample unconsolidated - 10%
Siltstone - dark grey, argillaceous, quartzose - 10%.

630' Shale - dark grey, argillaceous, slightly dolomitic - 60%
Sandstone - light grey to orange, very fine to fine grained medium sorted, sub angular - sub rounded, mostly unconsolidated (orange coloring probably hematitic stain) - 30%
Siltstone - dark grey, argillaceous - 10%

640' Sandstone - light grey, very fine to fine grained, quartzose, argillaceous, calcareous - dolomitic cement, sub-rounded to sub angular, well sorted, mostly unconsolidated in samples, part of sandstone - orange, very fine to medium grained, sub rounded to angular, medium sorted, hematitic dolomite - cal - careous cement - 50%

7" Surface Csg 653' 200 sacks. Bit 6¼"

650' No sample - Lost circulation material.

660' Shale, dark grey, part silty, slightly calcareous, trace light grey chert and grey brown chert -- 70%.
Agglomerate - pinky - orange argillaceous dolomitic matrix with quartz and dark grey to black rock fragments, fragments very fine to very coarse, rounded to angular -- 15-10%.
Sandstone, light grey, fine to very fine grained, sub angular to sub rounded, slightly calcareous, quartzose, trace pyrite - 5%.
Siltstone - light grey brown to dark grey, quartzose, slightly calcareous -- 5%.
Dolomite - dark brown, cryptocrystalline, dense - trace.

670' Siltstone - dark grey to light grey, argillaceous, slightly calcareous quartzose, siltstone grading to silty sandy shale--65%
Shale - dark grey, silty -- 20%.
Agglomerate - pink-orange - dolomitic, slightly argillaceous matrix, matrix micro-crystalline, fragments very fine to very coarse, well rounded to angular composed of quartz and rock fragments -- 15%
Trace blue grey to brown chert.
Trace fine grained light brown quartzose sandstone.

680' Shale - dark grey, silty, slightly dolomitic - calcareous, trace crinoid ossicles -- 50%.
Agglomerate - pink-orange matrix microcrystalline, slightly argillaceous dolomite, fragments of quartz, arkose? and rock fragments, angular sub well rounded, very fine to very coarse crystalline, poorly sorted, a few very coarse chert pebbles - light brown to black. -- 20%
Sandstone - very light grey brown, very fine to silty, quartzose sub angular to sub rounded, part quartzitic, dolomitic cement -- 10%.
Siltstone - dark grey, argillaceous, slightly calcareous, grading to very fine sandstone -- 10%.
Trace light grey brown chert and grey brown chert.
Trace micro crystalline brown dolomite.

690' Shale - dark grey, silty -- 70%.
Siltstone - dark grey, argillaceous, quartzose, slightly calcareous -- 20%.
Sandstone - light grey, very fine to silty, trace pyrite, tight -- trace.
Trace dark grey chert.

700' - Shale - dark grey, silty -- 90%.
Siltstone - dark grey, argillaceous, quartzose, slightly calcareous -- 10%.
Sandstone - light grey brown, very fine to silty, quartzose, dolomitic cement, partly siliceous, sub angular, trace pyrite.

710' Shale - dark grey, silty, dolomitic -- 70-75%.
Agglomerate - pink-orange, matrix slightly argillaceous dolomite, micro crystalline, fragments quartz and rock and arkose?, angular to well rounded, very fine to very coarse, poorly sorted -- 10-15%.
Siltstone - dark grey, argillaceous, slightly calcareous - 10%.
Sandstone - light grey to grey brown - pinkish, argillaceous in part, very fine grained -- up to 5%.
Trace crinoid ossicles, trace dark brown cryptocrystalline dense dolomite and dark brown chert.

720' Siltstone - dark grey, argillaceous and sandy, quartzose, trace pyrite -- 60%.
Sandstone - light grey brown, calcareous - dolomitic cement, part siliceous, very fine grained, well sorted, quartzose - ...
Some dark grey, [illegible] argillaceous to silty, trace pyrite, trace porosity -- 20%.
Shale - dark grey, silty and sandy -- 20%.
Trace black chert, trace pyrite, trace crinoid ossicles.
Trace light brown agglomerate.
Trace white calcite prisms, trace dark brown dense dolomite.

730' Sandstone - light grey brown - light brown, quartzose, very fine grained, calcareous cement, part siliceous, sub angular to sub rounded, tight -- 65%.
Sandstone - dark grey brown, argillaceous, very fine grained, sub angular, siliceous? -- 20%.
Siltstone - dark grey brown, argillaceous -- 5%.
Agglomerate - as above -- 5%.
Trace crinoid fragments and trace dolomite - dark brown, argillaceous, crypto siliceous -- trace.

740' Shale - dark grey, silty, hard. -- 60%.
Sandstone - grey to grey brown to pink, very fine grained - silty, slightly calcareous, quartzose, trace pyrite, tight, sub angular to sub rounded -- 20%.
Siltstone - dark grey brown, argillaceous, trace pyrite -- 20%.
Agglomerate - pink to orange, micro crystalline slightly argillaceous dolomitic matrix (hematite stain?), fragments quartz and rock fragments, very fine to very coarse, poorly sorted, angular to round -- up to 5%.
Dolomite - dark brown, crypto crystalline and limestone - dark grey brown -- trace.
Trace crinoid ossicles.

750' Siltstone - dark grey to dark grey brown, argillaceous, trace pyrite ~80%
Agglomerate - pink to orange matrix, microcrystalline, slightly argillaceous dolomite with fragments of quartz, arkose, and rock fragments, very fine to very coarse, angular, well rounded, poorly sorted (matrix hematite stain?) 20%.
Sandstone - light brown to light grey brown, very fine grained, silty, part argillaceous, slightly calcareous (cement), part siliceous? tight, trace dolomite to dark brown cryptocrystalline, dense, trace white to light grey chert ~5%.

760' Shale - dark brown, silty, calcareous --30%.
Sandstone - light grey to light grey brown to orange, very fine grained, sub angular, well sorted, calcareous cement and part siliceous? trace pyrite --50%.
Siltstone - dark grey, argillaceous, slightly calcareous, sandy 20%.
Dolomite - dark brown, cryptocrystalline, dense, trace light grey chert and trace agglomerate as above.

770' Shale - dark grey, silty, slighty calcareous/trace microfractures/ with calcite fill --40%.
Sandstone - light grey to grey brown, very fine-silty, slightly calcareous, well sorted, sub angular, trace pyrite --40%.
Siltstone - dark grey brown, argillaceous, trace pyrite, slightly calcareous --20%.
Dolomite - dark brown, crypto, dense/trace pyrite, a few scattered crinoid ossicles --trace.

780' Sandstone - light grey to light grey brown, very fine grained, slightly calcareous quartzose, well sorted, sub angular, dolomite-calcareous cement, tight, trace pyrite --80%.
Siltstone - dark brown to dark grey brown, very argillaceous, some sandy --10%.
Shale - dark grey, silty, slightly dolomitic-calcareous --5-10%.
Dolomite - dark brown, cryptocrystalline, dense, --trace.
Agglomerate - as above --trace.

790' Shale - dark grey, partly silty, slightly calcareous, trace pyrite, trace white calcite crystals --60%.
Sandstone - light grey to grey brown, very fine, quartzose, trace pyrite, argillaceous, slightly calcareous, part siliceous? sub angular, tight --30%.
Siltstone - dark grey brown, argillaceous, trace pyrite --10%.
Dolomite - dark brown, cryptocrystalline, dense --trace.

800' Shale - dark grey, silty, trace pyrite, slightly dolomitic --75%.
Sandstone - dark grey brown to light grey, argillaceous, silty, dolomitic cement, very fine grained, well sorted, sub angular --20%.
Siltstone - dark grey to dark grey brown, argillaceous --5%.

810' Shale - dark grey, silty, trace pyrite, slightly dolomitic --80%.
Sandstone - dark grey brown, argillaceous, silty, slightly dolomitic (cement), very fine, well sorted, sub angular, tight --5%.
Dolomite - dark brown to brown/pyrite and light grey chert nodules (small), siliceous?, silty --15%.

820' Shale - dark grey, silty to sandy --85-90%.
Sandstone - grey brown to dark brown, partly silty, argillaceous, very fine, sub angular, well sorted--also trace pinky to light brown sandstone, very fine, sub angular, well sorted, calcareous cement and siliceous --trace to 5%.
Dolomite - brown to dark brown, part silty, cryptocrystalline, siliceous/trace pyrite and small chert nodules --5%.

830' Shale - dark grey, silty, very slightly calcareous, part slightly fissile --80-85%.
Sandstone - grey to grey brown, argillaceous, silty, very fine grained, well sorted, sub angular, quartzose, calcareous cement 5%.
Dolomite - brown, cryptocrystalline, dense, siliceous --10-15%.

840' Shale - dark grey, non calcareous, very slightly calcareous, part slightly silty --90%.
Sandstone - dark grey, argillaceous, very fine to fine, silty, medium sorted, sub angular, tight --5%.
Dolomite - dark brown, cryptocrystalline-micro, siliceous - 5%.

850' Shale - dark grey, silty, slightly dolomitic --85%.
Siltstone - dark grey brown to dark grey, dolomitic? --10%.
Sandstone - light grey to grey brown, very fine grained, part argillaceous, silty, very fine grained, sub angular, well sorted tight, fossil imprint in shale—brachiopod.

860' Shale - dark grey, partly siliceous? slightly dolomitic scattered crinoid fragments --90%.
Sandstone - dark grey brown, very fine as above --trace to 5%.
Dolomite - dark brown, argillaceous --trace.

870' Shale - dark grey, part silty --70%.
Sandstone - dark grey to dark grey brown, very fine grained, silty, argillaceous, calcareous cement, quartzose, sub angular, well rounded --25%.
Dolomite - dark brown, micro-cryptocrystalline, dense, slightly argillaceous - 5%.

880' Shale - dark grey, part silty, slightly calcareous, trace crinoid fragments —85%.
Sandstone - dark grey, very fine - silty, argillaceous to clean very fine as above --5-10%.
Dolomite - dark brown, micro-cryptocrystalline, dense, slightly argillaceous - 5%.

890' Shale - dark grey, silty, slightly calcareous --90%.
Sandstone - dark grey to dark grey brown to light grey, part very argillaceous, very fine-silty, medium to well sorted, sub angular, calcareous cement, tight ± 5%.
Dolomite - dark brown, micro-cryptocrystalline, dense —5%.

900' Sandstone - dark grey brown to light brown, very argillaceous, very fine grained, sub angular, well sorted, calcareous cement, trace pyrite, tight 90%+
Shale - dark grey, silty and sandy --trace.

910' Sandstone - dark grey to dark grey brown to light grey brown, most very argillaceous, very fine grained, quartzose, calcareous cement, sub angular, well sorted, tight —90%.
Shale - dark grey, sandy to silty —10%.

920' Sandstone - dark grey brown to light grey brown, most very argillaceous, very fine grained, well sorted, sub angular, calcareous cement, tight, trace pyrite --90%.
Shale - dark grey, silty and sandy ≅ 10%.
Dolomite - dark brown, micro-cryptocrystalline, dense, trace clear white fine calcite crystals (fracture calcite?), trace pinky to orange very fine quartz sandstone.

930' Shale - dark grey, silty, pyrite — 50%
Sandstone - dark grey brown, argillaceous very fine grained, well sorted, trace pyrite —50%. Trace clear to white (fracture?) calcite prisms.

940' Shale - dark grey brown to dark grey, silty, trace pyrite and floating quartz crystals --80%.
Sandstone - siltstone dark grey brown quartzose, argillaceous sandstone fine to very fine to silty, very argillaceous, calcareous cement, medium sorted --20%.

950' Sandstone - grey brown, very fine to silty, argillaceous calcareous cement, quartzose, well sorted, trace pyrite --80%.
Shale - dark grey, silty and sandy, trace crinoid fragments, trace pyrite --20%.

960' Sandstone - grey, very fine to fine grained, argillaceous, silty, trace pyrite, well sorted 75%.
Shale - dark grey, silty and sandy 20%.
Dolomite - dark brown, dense, crypto-microcrystalline, trace clear to medium clear calcite crystals ≤ 5%.

970' Sandstone - dark grey to light brown to orange, very argillaceous, very fine, well sorted, tight 75-80%.
Shale - dark grey, silty, slightly calcareous 15-20%.
Trace crinoid fragments, trace dark brown dense dolomite, trace clear-white calcite crystals (fracture?) trace clear to white chert.

980' Shale - dark grey, calcareous, silty 90%.
Sandstone - dark grey to dark grey brown, quartzose, very argillaceous to clean light grey, very fine grained, well sorted, sub angular, tight ≈ 5%.
Dolomite - dark brown, slightly argillaceous, crypto-microcrystalline, dense ≈ 5%.

990' Shale - dark grey, silty, calcareous, sandy 80-85%.
Sandstone - grey brown, very fine grained, argillaceous-silty, well sorted, sub angular to angular, tight 15-20%.

1000' Shale - dark grey, silty to sandy, slightly calcareous, trace 90%+
Sandstone - grey, argillaceous, quartzose, very fine, sub angular, trace pyrite ≤ 5%.

1010' Sandstone - dark grey brown to grey, argillaceous, very fine grained, well sorted, trace pyrite 80%.
Shale - dark grey, silty, slightly calcareous 20%.
Dolomite - dark brown, argillaceous, micro-cryptocrystalline, trace pyrite trace.

1020' Shale - dark grey, partly silty and sandy, part calcareous, trace pyrite 90%.
Sandstone - dark grey brown to grey, argillaceous quartzose, very fine grained, well sorted. Trace.
Dolomite - dark brown, crypto-microcrystalline/small pyrite nodules ≈ 5%.

1030' Shale - dark grey, silty, trace pyrite 90%+.
Dolomite - dark brown, crypto-micro, dense ≈ 5%.
Sandstone - grey, very fine, quartzose. Trace.

1040' Shale - dark grey, silty, slightly calcareous 80%.
Sandstone - dark grey, argillaceous, silty, very fine grained, trace pyrite, quartzose 20%. Trace fossil fragments (calcite prisms, etc.), crinoidal debris.
Dolomite - dark brown, crypto-microcrystalline, slightly argillaceous/trace pyrite and small chert nodules. Trace.

1050' Sandstone - dark grey, argillaceous, silty, quartzose, very fine grained, sub rounded to sub angular, trace pyrite, calcareous cement 90%.
Shale - dark grey, sandy, silty ⇒10%.
Dolomite - dark brown, slightly argillaceous, crypto-micro, dense. Trace.

1060' Sandstone - dark grey to grey, argillaceous, very fine grained, silty, calcareous to dolomitic cement. 95%+.
Dolomite - dark brown, cryptocrystalline to microcrystalline dense, trace of white calcite crystals (fracture?) Trace.

1070' Sandstone - siltstone - dark grey, argillaceous, very fine grained-silty, calcareous cement, trace pyrite 90%.
Shale - dark grey, sandy and silty 10%.

1080' Sandstone - dark grey, argillaceous, silty, very fine grained, well sorted, sub angular to sub rounded, slightly calcareous (cement) 90%.
Dolomite - dark brown, crypto to microcrystalline, dense, slightly argillaceous, trace pyrite ⇒5%

1090' - (1089) Lost circulation.
Sandstone - dark grey brown, very argillaceous, very fine grained silty, calcareous cement, trace pyrite 95%.
Shale - dark grey, sandy, silty, trace clear fine to coarse calcite crystals--white 5%.

1100 Sandstone - dark grey to light grey brown, very fine grained, argillaceous, sub angular to well sorted, calcareous cement, quartzose, trace pyrite 85%.
Shale - dark grey, silty, sandy, slightly calcareous 15%.
Dolomite - dark brown to brown, crypto to microcrystalline, slightly argillaceous. Trace.

1110 Sandstone - grey to dark gray, argillaceous, very fine grained, well sorted, trace pyrite 80%.
Shale - dark grey, silty, sandy, slightly calcareous 15-20%.
Dolomite - dark brown, argillaceous, crypto to microcrystalline, dense. Trace.

1120 - 1150 No samples - lost circulation, drilling blind.

1150' Sandstone - light grey to dark grey, argillaceous, very fine grained, part calcareous cement and part siliceous cement, quartzose, well sorted, sub angular, trace pyrite, light grey to light grey brown sandstone, fine to very fine/trace intergranular porosity 95%+.
Shale - dark grey to dark grey brown, sandy, silty, slightly calcareous 5%. Scattered white and clear coarse calcite crystals (possibly fracture filling), trace earthy white to grey marly material, trace fossil fragments (crinoid?)

1160' Sandstone - dark grey, argillaceous, calcareous cement, very fine grained, sub angular, well sorted, trace pyrite, tight, trace very fine to fine light brown-orange quartzose sandstone-siliceous cement, well sorted 95%+.
Shale - dark grey, slightly sandy-silty, slightly calcareous, trace dark brown micro-cryptocrystalline, argillaceous dolomite, quite numerous scatter white to clear calcite crystals (fracture calcite?), fine to very coarse crystals, trace light grey to grey earthy marly material. 5%.

1170' Sandstone - dark grey, argillaceous, very fine grained, sub angular, well sorted, quartzose, trace calcareous cement, trace pyrite, tight 90-95%. Trace light grey brown-orange, very fine grained, siliceous
Shale - dark grey, sandy, silty, slightly calcareous 5-10%.
Dolomite - dark brown, argillaceous, microcrystalline, dense, scattered clear-white calcite crystals, very coarse, trace crinoid ossicles. Trace.

1180' Sandstone - light grey to dark grey brown, part clean, most very argillaceous to argillaceous, very fine grained, well sorted, calcareous cement, tight, trace porosity, trace pyrite light grey quartzose part siliceous sandstone-part calcareous and part siliceous cement 50%.
Shale - dark grey, sandy, silty, slightly calcareous 50% scattered-very coarse clear and white calcite crystals (possible fracture filling) 50%.
Trace dark brown argillaceous micro to cryptocrystalline dolomite, dense, (trace), trace earthy light grey-grey marly material.

1190' Sandstone - light grey to light grey brown to orange, part clean, and part very argillaceous, fine grained, well sorted, trace pyrite, tight, calcareous cement and siliceous 80%.
Shale - dark grey to silty and sandy, slightly calcareous, a few scattered clear-white calcite crystals coarse to very coarse, trace earthy light grey to grey marl.? 20%.
Sandstone - partly light grey brown, siliceous, very fine grained, quartzose.

1200' Sandstone - grey brown to clean to dark grey, very argillaceous, very fine grained, calcareous cement, part siliceous, well sorted, trace pyrite, part/siliceous cement. 50%.
Shale - dark grey, sandy, silty, slightly calcareous, scattered white to clear fine to very coarse calcite crystals (fractures?) trace light grey brown marly material 50%.

1210' Sandstone - light grey brown to smoky to dark brown grey, medium to very fine grained, well sorted to sub angular to angular, trace calcareous cement, tight, siliceous cement in light grey brown clean sandstone, trace pyrite 90%.
Shale - dark grey, very slightly calcareous 10%.
Trace light grey marly material, microcrystalline, earthy, trace white to clear fine to medium calcite crystals. Trace.
(sand ≈ 90% light grey brown).

1220' Sandstone - light grey brown, very fine to fine grained, clean, siliceous, angular to sub angular, well sorted quartzose, tight, numerous sharp angular very siliceous coarse quartz sandstone cemented fragments, trace pyrite 90%.
Shale - dark grey, trace pyrite, trace very fine orange pink quartzose sandstone, sub angular, tight (may be cavings) 10%.
Many coarse angular siliceous fragments of the light grey sandstone.
Trace light grey microcrystalline argillaceous marly material.
Sandstone partly argillaceous.
Trace white fine to coarse calcite crystals (some may line fractures?).
(In a few places observed attached to sandstone as if along small fractures).

1230-1300' No samples. Lost circulation with no surface returns.

1480 Regained circulation lost at 1221' and regain sample recovery. (No samples were recovered between 1221' and 1480' due to lost circulation).

1480 First sample after circulation regained (poor sample).
Sandstone, light grey, clean to grey brown and dark grey, very argillaceous, of quartzose, sub-angular, wellsorted, 95%
calcite cement, trace euhedral very fine pyrite
Shale, black-dark grey, slightly silty-sandy, poor and slightly calcite, trace crinoidal debris and other fossil fragments. 25%
trace dark brown, micro-cryptocrystalline shale, dense dolomite. Agglomerate-pink-orange matrix of slightly argillaceous dolomite fragments of very fine, varicolored quartz and rock fragments in places can be seen attached to very fine light brown-grey brown very fine quartzose sandstone fragments, sub-angular - angular (probably caving from zone encountered above. Trace
Trace clear calcite crystals
Scattered light brown-orange coarse fragments of walnut shell (lost circulation material)

1490 Sandstone-siltstone, dark grey-black, very fine grained - 10%
Silty, very argillaceous/calcite dolomite cement, quartzose, sub-angular, very hard, tite.
Shale, black, silty-sandy, trace pyrite, slightly calcite carbonaceous - 90%.
Trace light grey-light brown very fine quartzose sandstone, clean-slightly argillaceous, well sorted, sub-angular, coarse
Trace dark brown crypto-micro-crystalline, slightly argillaceous dense dolomite.
Scattered orange-orange brown walnut shells (lost circulation material).

1500 Shale - black, silty-sandy, slightly calcite - 95%
Sandstone - siltstone - dark grey, very argillaceous, calcite cement, trace very fine scattered euhedral pyrite, well-sorted sub-angular, tite, firm and hard.
Grey-greybrown, very fine calcite cement, well sorted, sub-angular quartzose, slightly argillaceous. Trace walnut shells

1510 Shale - black, silty and sandy, calcite (85-90%) micromicaceous, very hard, carbonaceous. Sandstone-siltstone-dark grey-black, very argillaceous calcite cement, very fine-fine silty, quartzose, sub-angular, well sorted, tite (10%)

Grey-brown, light grey brown, very fine, quartzose, medium, well sorted, sub-angular, sub-rounded (5%) calcite cement, partly siliceous, trace euhedral very fine pyrite, trace intergranular porosity-tite, trace blue-grey chert, trace coarse white calcite crystals, trace brown micro-crypto dolomite scattered tan-reddish orange walnut shells (lost circulation material)

1520 Sandstone - light grey brown-grey brown, very fine-fine, quartzose, well sorted, sub-angular, calcite cement, very slightly argillaceous (50%), trace integrated porosity, trace disseminated euhedral pyrite (very fine).
Dark brown-dark grey brown, very fine grain, argillaceous, quartzose (30%). Silty, well sorted, sub-angular, calcite cement, tite.
Trace minor white very fine micro white calcite filling small cracks
Shale - dark grey-black, silty, sandy, micromicaceous (20%) slightly calcite, trace clear white calcite along fractures.
Trace tan-light orange very fine grained quartzose sandstone.
Trace light-grey-bluish chert.

1530 Sandstone - light grey-grey brown, quartzose, calcite (30%) cement, silty very fine grain sub-angular well sorted, trace integrated porosity, part siliceous, tite, trace fossil fragments. Dark grey brown, very argillaceous, silty - very fine sandstone/trace very fine euhedral pyrite disseminated throughout, quartzose, well sorted, sub-angular.
Shale - black, silty, slightly calcite (20-15%). Trace blue-grey-brown chert. Trace orange dark brown walnut shell (lost circulation material).

1540 Sandstone - grey brown, clean slightly argillaceous very calcite cement, quartzose, sub-angular well sorted, very fine-silty, trace integrated porosity, trace fossil fragments (bryozoa in part) - 65-70%. Dark grey brown, very argillaceous, silty-very fine grain well sorted, sub-angular, calcite cement, tite (20%)
Shale - black, silty-sandy, slightly calcite micromicaceous (10-15%) trace very fine white calcite filling very small microfractures in sandstone.

1550 Sandstone - light grey-brown-grey brown, quartzose, (50%) very fine grain-silty, well sorted, sub-angular/calcite cement, trace integrated porosity, trace fossil fragments, bryozoa fragments, trace of euhedral pyrite. Grey brown-dark grey brown, argillaceous very fine grained (30%) silty, quartzose, well sorted, sub-angular trace disseminated euhedral pyrite, tite.

1610 Shale - black, silty-sandy, slightly calcite, micromicaceous (50%)
Sandstone - grey brown, clean-dark brown grey, argillaceous/ calcite cement, very fine-silty, sub-angular, well sorted, part (50%) siliceous - cherty, trace disseminated euhedral pyrite, quartzose, trace fossil fragments. Trace light brown-reddish orange quartzose sandstone, sub-angular, trace integrated porosity. Trace coarse white calcite crystals, trace fossil fragments (Crinoid?)

1620 Shale - black, silty-sandy, calcite, micromicaceous (70%)
Sandstone - grey brown-dark grey brown, quartzose, very fine grain, sub-angular-sub rounded, well sorted/calcite cement, partly siliceous/scattered euhedral (30%) very fine pyrite partly siliceous - cherty, trace integrated porosity - mostly tite, trace fossil fragments (crinoidal). Trace coasre white and clear calcite crystals. Trace sandstone - reddish-brown, very fine grain quartzose, sub-angular, well sorted hematite siliceous cement. Trace orange-brown walnut shells (lost circulation material)

1630 Shale - dark grey brown, very silty-sandy, calcite (85-90%).
Sandstone - grey brown, quartzose, very fine grain, well sorted, sub-angular/calcite cement, trace very fine (10-15%) disseminated pyrite, trace integrated porosity. Scattered fossil fragments (crinoidal)

1640 Shale - Dark grey brown-black, calcite -silty, trace fossil fragments (75%)
Sandstone - grey brown-dark grey brown, argillaceous very fine quartzose, sub-angular-sub rounded/calcite cement, (25%) part siliceous-cherty/glossy appearance, trace integrated porosity-mostly tite, scattered very fine euhedral-anhedral pyrite.

1650 Sandstone - grey brown - dark grey brown, clean - argillaceous (60%) quartzose/ciliceous and calcite cement, very fine-silty, sub-angular, well sorted, part siliceous - cherty light grey bluish, trace very fine euhedral pyrite.
Shale - black silty, calcite micromicaceous (40%)

1660 Sandstone - light grey brown-dark grey brown, partly argillaceous (40%) calcite cement, quartzose, sub-angular, well sorted trace very fine euhedral pyrite, trace fossil fragments. A few fragments very fine light grey-tan quartzose sandstone, well sorted, sub-angular/trace integrated porosity, trace brachiopod fragments.
Shale - black silty, calcite, micromicaceous, trace reddish-brown (60%) quartzose very fine sandstone-hematite & calcite cement, trace clear calcite crystals, trace creamy chert.

1670 Light grey brown-dark grey brown quartzose/calcite cement, very fine grained, well sorted, subangular-subrounded, clean- (80%) argillaceous/scattered very fine euhedral cubic pyrite, partly siliceous-cherty (light grey blue)
Shale - dark grey-black, slightly calcite, part silty-sandy, trace pyrite (15%).
Limestone - dark brown, argillaceous, microcrystalline.(trace)

1680 Sandstone - light grey-dark grey brown, quartzose/calcite cement, clean grading to very argillaceous, very fine grained (65-70%) well sorted, sub angular-sub rounded, partly siliceous-cherty, part dark brown very calcite grading to silty sandy limestone, argillaceous partings, trace fossil fragments (bryozoa?), trace very fine microcrystalline white calcite.
Shale - black, slightly calcite, slightly silty-sandy, micro-micaceous (15%).
Limestone - dark brown, argillaceous, microcrystalline, dense (15-20%).

1690 Sandstone - light grey brown-dark grey brown, quartzose/calcite cement, clean-slightly argillaceous very fine grained, well sorted, sub angular-sub rounded, partly siliceous, trace intergranular porosity (85-90%) trace dead oil, trace pyrite and trace fossil fragments, part vitreous-glossy-some quartz grains very clear-look black in reflected light.
Shale - dark grey-black, slightly calcite, partly sandy-silty, trace pyrite-argillaceous partings in sand.
Limestone - dark brown, argillaceous silty-sandy, micro-very fine crystals, tite (10-15%).

1700 Sandstone - light grey-dark grey brown, quartzose/calcite cement, clean-argillaceous silty-very fine grain, well sorted (75-80%) sub angular-sub rounded, partly siliceous-vitreous-glossy, argillaceous partings, trace very fine argillaceous lamination parting-part dark brown very calcite grading to silty, sandy limestone, scattered very fine clear quartz grains that appear black in reflected light.
Shale - black, calcite, silty-sandy/scattered shiny clear quartz crystals which appear black in reflected light (10-15%).
Limestone - dark brown, argillaceous microcrystalline, dense, trace very fine medium white calcite crystals (10%).

1710 Sandstone - light grey brown-dark grey brown, quartzose/calcite cement, very fine silty, well sorted sub angular, (80%) partly argillaceous, trace intergranular porosity, trace dead oil, part siliceous-vitreous-glossy, some shiny clear quartz grains which appear black in reflected light, trace pyrite. Part very argillaceous, very calcite dark brown very fine silty, well sorted sub angular-sub rounded grading to silty sandy limestone (minor) trace small fractures in sandstone/dead oil and white calcite crystals, trace fossil fragments.

1710 Shale - dark grey-black, calcite, silty-sandy/scattered shiny clear quartz grains, form argillaceous partings in sandstone (20%).
Limestone - dark brown, argillaceous microcrystalline-very fine (<5%)

1720 Sandstone - grey brown-dark grey brown, quartzose/calcite (70%) cement, very fine grained-silty, sub angular-subrounded, well sorted, partly siliceous, vitreous-glossy-trace minor light grey brown chert, trace intergranular porosity and dead oil, trace minor clear white fine-medium calcite along small fractures or partings, shiny clear quartz grains which appear black in reflected light.
Shale - dark grey - black, calcite, slightly sandy-silty/ very fine clear shiny quartz grains. Scattered needles of silica in sandstone. (30%)
Limestone - dark brown, argillaceous, microcrystalline, dense (trace)

1730 Sandstone - light grey, clean quartzose grading to very argillaceous dark grey brown/calcite cement, very fine grained well sorted, sub angular-sub rounded, partly siliceous-cherty (minor), trace intergranular porosity, trace dead oil, fair fine-medium white calcite along minor partings or fractures, trace crinoid fragments scattered shiny clear quartz grains--look black. (75%)
Shale - dark grey-black, calcite/scattered clear quartz sand grains and silt appearing shiny black (25%)
Part of sandstone-dark brown, very calcite grading to sandy-silty limestone-dark brown, argillaceous, microcrystaline. (trace)

1740 Sandstone - light greybrown-grey brown, quartzose/calcite (65%) cement, very fine, well sorted, sub angular-sub rounded, partly siliceous-glossy, trace intergranular porosity and dead oil, trace fossil fragments, minor very fine white calcite along small partings or fractures, argillaceous partings. Possible oil stain on light grey sandstone (questionable).
Shale - dark grey-black, calcite partly sandy, clear quartz (25%) grains shiny and appear black in reflected light.
Limestone - dark brown, argillaceous silty-sandy, microcrystalline, tite (10%).

1750 Shale - dark grey-black, calcite, slightly sandy-silty/shiny clear quartz crystals scattered about (25%)
Sandstone - light grey brown-dark grey brown, calcite cement quartzose, partly siliceous-chetty, very fine grained-silty partly argillaceous, well sorted, sub angular-sub rounded, trace intergranular porosity, trace dead oil, possible trace oil stain on light grey sandstone, trace very fine-fine white calcite along partings (sandstone) or minor fractures, trace fossil fragments. (65%)
Limestone - light grey brown-dark grey brown, argillaceous micro-crystalline very fine silty (10%).

1760 Sandstone - light grey brown-dark grey bronw, quartzose/ calcite cement, clean-argillaceous, very fine grained, well sorted, sub angular-sub rounded, very fine shiny clear quartz grains appear black in reflected light, partly siliceous trace intergranular porosity, trace dead oil, trace oil stain?, a few minor white calcite crystals.
Shale - dark grey-black, calcite, sandy-silty/trace pyrite, shiny clear quartz grains (25%)
Limestone - dark brown, argillaceous, microcrystalline-very fine, silty-sandy. (20%)

1770 Sandstone - light grey brown grading to very argillaceous dark grey brown quartzose/calcite cement, very fine silty, well sorted, sub angular-sub rounded, partly glossy-vitreous-siliceous? (60%) Possible trace oil stain?, very fine white calcite along partings or minor fractures, trace pyrite.
Limestone - dark brown, argillaceous, silty-sandy, very fine-microcrystalline (15%)
Shale - black, calcite, sandy-silty/clear quartz grains. (25%)

1780 Shale - dark grey-black, calcite, partly sandy-silty (40%)
Sandstone - light greybrown-dark greybrown, quartzose/calcite cement, sub angular-sub rounded, well sorted trace pyrite (50%) very fine euhedral scattered through sand, part clean, grading to argillaceous, trace crinoid fragments, minor part siliceous, tite, trace intergranular porosity.
Limestone - argillaceous dark brown grey microcrystalline, silty sandy (10%).

1790 Sandstone - light grey brown-dark grey brown, quartzose/ (65%) calcite cement, very fine grained, sub angular-sub rounded well sorted, trace intergranular porosity-tite, part glassy-slightly siliceous, trace pyrite-very fine scattered, clean very argillaceous. Trace fish? fragments.
Limestone - argillaceous dark brown, microcrystalline, silty-sandy (10%).
Shale - dark grey-black, calcite in part, part sandy-silty (25%)

1800 Sandstone - light grey brown clean-dark grey brown, very argillaceous quartzose/calcite cement, very fine grained sub angular, well sorted, scattered very fine subhedral pyrite (50%) partly siliceous-glassy, trace intergranular porosity and dead oil, minor white very fine calcite along minor partings.
Limestone - dark brown, argillaceous microcrystalline, tite (10%)
Shale - black, dark grey, calcite, partly silty-sandy (40%).

1810 Sandstone - light greybrown-clean-darkgrey brown (30%) very argillaceous quartzose/calcite cement, very fine grained, well sorted, sub angular, part glossy-siliceous, trace pyrite.
Shale - dark grey-black, slightly calcite, silty-sandy (50%) scattered fossil fragments.
Limestone - dark brown, argillaceous, microcrystalline, silty (20%)

1820 Shale - dark grey-black, slightly calcite, partly silty-sandy (60%).
Sandstone - light grey - dark grey brown, clean-very argillaceous quartzose/calcite cement, very fine grain, well sorted, sub angular, scattered very fine subhedral pyrite, partly glossy-siliceous, tite, trace intergranular porosity (30%).
Limestone - dark brown, argillaceous, silty, microcrystalline-very fine (10%).

1830 Shale - dark grey - black, calcite, sandy-silty (70%) grading to very argillaceous very fine silty sandstone, trace pyrite.
Sandstone - light grey brown to clean - dark grey brown very argillaceous, tite, part glossy-siliceous (25%).
Part very calcite grading to dark brown sandy.
Limestone - dark brown - very argillaceous silty-sandy, microcrystalline (trace).

1840 Shale - dark grey - black, calcite sandy-silty (75).
Sandstone - light grey - grey brown, quartzose/calcite cement, very fine-silty, sub angular, well sorted, trace fossil fragments, partly glossy (minor), tite (25%).
Limestone - dark brown, argillaceous microcrystalline-silty (trace).

1850 Shale - dark grey - black, slightly calcite sandy-silty (70%)
Sandstone - light grey - dark grey brown, quartzose/ calcite cement, fine-silty, sub angular, well sorted, minor partly siliceous, tite, partly clean - part argillaceous, silty, trace pyrite and light brown chert. (20%)
Limestone - dark grey brown, argillaceous microcrystalline dense (5%).

1860 Sandstone - grey - dark grey, quartzose/calcite cement, very fine-silty, clean argillaceous, partly siliceous-glossy, subangular, well sorted, siliceous part glossy, trace pyrite, tite (more siliceous than previously) (70%).
Shale - dark grey - black, silty and sandy, grading to very argillaceous sandstone (30%).

1870 Shale - dark grey - black, slightly calcite, partly sand and silty (70%).
Sandstone - light grey - grey brown, quartzose/calcite cement, clean to very argillaceous very fine-silty, well sorted, sub angular, trace pyrite blebs., tite (25%).
Limestone - dark brown, argillaceous silty, microcrystalline (<5%).

1880 Shale - black, calcite, sand-silty (60%).
Sandstone - white - dark grey brown, quartzose/calcite cement, clean-argillaceous very fine grained-silty, well sorted, trace pyrite, tite, partly glassy, trace white calcite (30%).
Limestone - dark grey microcrystalline, dense, argillaceous (10%).

1890 Lost circulation and regained.

1888 Shale - dark grey - black, part calcite, silty-sandy grading to very argillaceous silty sandstone (70%).
Sandstone - light grey clean - dark grey, very argillaceous quartzose, very fine-silty, calcite cement, sub angular, well sorted, part glassy. (15%)
Limestone - dark brown, sandy-silty, very argillaceous (~15%).

1900 Shale - dark grey - black, silty-sandy, slightly calcite grading to very fine silty sand. (85-90%)
Sandstone - light grey brown-clean, silty/calcite cement, very fine-silty, well sorted, sub angular (10-15%) sub rounded, trace scattered pyrite, partly siliceous-glassy, trace intergranular porosity, trace dead oil.
Limestone - dark brown, sandy, argillaceous very fine crystals-microcrystalline, trace pyrite, tite (trace).

1910 Shale - black, slightly calcite, silty-sandy (80%).
Sandstone - light grey - dark grey brown - clean - very argillaceous, silty quartzose/calcite cement, very fine, well sorted, partly glassy, trace intercrystalline porosity, trace pyrite (10%).
Limestone - dark brown, argillaceous silty-sandy (5-10%).

1920 Shale - dark grey - black, sandy-silty, partly calcite (80%).
Sandstone - light grey brown, clean - dark grey brown, very argillaceous, well sorted, sub angular - sub rounded, part glassy-vitreous? trace intergranular porosity/trace dead oil? trace pyrite, minor lst - dark brown sandy varigated. (10-15%) Trace of varicoloured calcite.

1930 Shale - dark grey-black, slightly calcite, partly sandy-silty (80%)
Sandstone - light grey brown, slightly argillaceous very fine grained, well sorted, sub angular-sub rounded, calcite cement quartzose (20%).
Limestone - dark brown, argillaceous, micro, dense (trace).

1940 Shale - black-dark grey brown, carbonaceous, slightly calcite micro-micaceous partly silty-sandy trace pyrite grade to very argillaceous, very fine sand (85%).
Sandstone - light grey brown-grey brown, quartzose, clean (15%) argillaceous, trace pyrite, sub angular - sub rounded, well sorted, trace intergranular porosity, trace dark brown limestone-very argillaceous microcrystalline silty-sandy, tite.

1950 Sandstone - dark grey - grey brown, silty, argillaceous slightly calcite very fine-silty, quartzose, sub angular-sub rounded, well sorted, trace intergranular porosity (10-15%).
Shale - black - dark grey, slightly calcite, sandy-silty, carbonaceous grading to trace dark grey - black microcrystalline limestone sandy siltstone-dense (85-90%).

1960 Sandstone - light grey brown - dark grey brown very argillaceous quartzose/calcite cement, sub angular-sub rounded, fair intergranular porosity, dead oil, trace very fine scattered euhedral pyrite, also very fine small spheroidal pyrite, very fine siliceous (very minor) 15-20%,
Shale - dark black very slightly calcite, trace pyrite (partings) part fissile (80-85%).
Limestone - dark grey brown microcrystalline-very fine, argillaceous trace intergranular porosity, trace coarse white calcite (<5%).

1970 Sandstone - light grey brown - dark grey brown, clean, very argillaceous-most argillaceous/calcite cement, quartzose, sub angular-very fine-silty, well sorted, trace-fair intergranular porosity, dead oil, partly siliceous (minor) (10-15%).
Shale - black, partly silty (85-90%).
Limestone - dark brown, microcrystalline, dense, argillaceous, trace dark brown chert/black chert/trace pyrite (5%).

1980 Sandstone - light grey clean-dark grey brown, very argillaceous quartzose/calcite cement, sub angular-sub rounded, very fine-silty, well sorted, fair-trace intergranular porosity, trace dead oil? partly siliceous (10%).
Shale - black, smooth, silty/trace pyrite (90%).

1990 Sandstone - grey brown - dark grey brown, clean to very argillaceous, quartzose,/calcite cement, very fine-silty, sub angular, trace pyrite (45-50%).
Shale - black, very slightly calcite, silty (50%).

2000 Sandstone - light grey brown - dark grey brown, argillaceous/calcite cement, quartzose, very fine-silty, well sorted, sub angular trace pyrite, trace intergranular porosity, trace dead oil? (75%).
Shale - black, slightly calcite, silty (15-20%).
Limestone - argillaceous dark brown, microcrystalline-very fine (5-10%).

2010 Shale - black, slightly calcite, part silty-sandy, part smooth trace pyrite (70%).
Sandstone - black, slightly calcite part silty and argillaceous, quartzose/calcite cement, well sorted, sub angular, trace pyrite
Limestone - grey brown, microcrystalline-very fine, trace intergranular porosity, trace dead oil.

2020 Shale - dark grey-black, slightly calcite part silty and sandy, part smooth, part grades too silty-very fine argillaceous sandstone, trace pyrite-trace black chert (80%). Sandstone - light grey - dark grey brown, clean argillaceous very fine-silty, well sorted, sub angular quartzose/calcite cement, trace euhedral cubic pyrite, partly siliceous, trace massive pyrite. Trace of porosity intergranular in unsilicified sandstone (20%).

2030 Shale - black - dark grey, slightly calcite, silty-sandy, part smooth ≃10% massive anhedral pyrite (80-85%). Sandstone - grey brown, quartzose/calcite cement, 15-20% partly argillaceous, trace intergranular porosity, well sorted, sub angular, partly siliceous.

2040 Shale - black - dark grey, smooth, slightly sandy-calcite (50%). Sandstone - light grey brown clean - dark grey brown, very argillaceous, quartzose/calcite cement, well sorted, very fine-silty, trace disseminated and massive pyrite (50%). Limestone - dark brown, argillaceous, microcrystalline (trace).

2050 Shale, dark grey/black, part slightly calcite, part silty /sandy, part fissile, trace very fine pyrite to massive pyrite blebs. (50%)
Sandstone, light grey/grey brown, quartzose/calcareous cement, argillaceous, partly siliceous, very fine grained, well sorted, sub-angular, trace intergranular porosity to tite. (50%)

2060 - Sandstone, grey brown, quartzose/calcite cement, siliceous cement, slightly argillaceous, very fine grained, sub-rounded/sub-angular, well sorted, mostly siliceous/ trace of intergranular porosity in non-silicified parts (60%)
Shale, black/dark grey, part fissile, partly calcareous and part dark brown soft non-calcareous. (40%)

2070 - Sandstone, grey/grey brown, quartzose, slightly argillaceous/calcareous cement, partly silicified, very fine grained, silty, well sorted, sub-angular, trace of intergranular porosity in parts not silicified. (75%)
Shale, black,dark grey, partly silty, part calcite and part silty, part slightly fissile, part dark brown, soft trace pyrite (very fine) along laminations. (25%)

2080 - Sandstone, grey brown, slightly argillaceous, quartzose/ calcite and silica cement, well sorted, very fine grained sub-angular, silty, trace intergranular porosity where not silicified, mostly tite, minor massive pyrite. (70%)
Shale, black, dark grey, partly fissile/very fine pyrite along laminations (minor), part calcareous. (30%)

2090 - Shale, black/dark grey, soft brown streak, part fissile, part silty and hard, partly calcite, trace pyrite. (75%)
Sandstone, light grey/grey brown, slightly argillaceous, quartzose/calcareous cement, very fine/silty, well sorted, sub-angular/sub-rounded, trace/fine intergranular porosity in unsilicified portion (minor), trace pyrite, mostly silicified, vitreous - glassy. (25%)
Limestone, dark brown, slightly argillaceous, micro-crystalline, dense, trace fine clear white calcite, trace pyrite. (trace)

2100 - Shale, black/dark grey, part calcite, dark shale fissile, part silty. (60%)
Sandstone, grey brown, slightly argillaceous, very fine grained, well sorted, sub-angular/calcite cement and siliceous cement, quartzose, siliceous part is glassy - vitreous, trace fossil fragments. (40%)
Limestone, argillaceous, dark brown, micro-crystalline, dense silty. (trace)

2110 - Shale, black/dark brown, soft, part silty, hard, very slightly calcareous. (70-75%)
Sandstone, grey brown, quartzose,/calcareous cement, very fine grained, well sorted, sub-angular, slightly argillaceous, part siliceous, glassy, vitreous, trace very fine scattered pyrite, trace intergranular porosity and oil stain?, trace light brown chert. (25-30%)
Limestone, dark brown, slightly argillaceous, micro-crystalline, tite. (trace)

2120 - Shale, black/dark grey brown, slight fissile, soft, part silty. (80%)
Sandstone, light grey brown/grey brown, slightly argillaceous, very fine grained/silty, well sorted, sub-angular, slightly argillaceous, part siliceous and part calcareous cement, siliceous part glassy - vitreous, trace pyrite. (20%)

2130 - Shale, black,/dark grey brown, part sandy and silty grading to argillaceous sandstone and siltstone, trace pyrite. (60%)
Sandstone, grey brown, argillaceous, quartzose,/calcareous cement, partly siliceous, very fine grained, well sorted, sub-angular (40%)
Limestone, dark grey brown, argillaceous, part silty. (Less than 5%)

2140 - Shale, dark grey,/black, part silty, calcareous/non-calcareous. (60%)
Sandstone, grey brown, quartzose, part calcareous cement and part siliceous cement, very fine/fine grained, well sorted, sub-angular, trace pyrite, trace/fine intergranular porosity in unsilicified portion, silicified portion - glassy - vitreous and tite, trace dark brown argillaceous limestone, micro-crystalline, dense. (40%)

2150 - Sandstone, grey brown, quartzose, slightly argillaceous/calcareous and siliceous cement, very fine/well sorted, sub-angular, trace/fine intergranular porosity where not silicified, cherty, siliceous, trace pyrite. (40%)
Shale, dark grey,/black, silty/sandy, part calcareous.
Trace limestone, dark brown, argillaceous, micro-crystalline, silty/sandy.

2160 - Shale, black/dark grey brown, silty/sandy grading to very argillaceous siltstone and very fine sandstone. (60%)
Sandstone, grey brown, quartzose/calcareous and siliceous cement, fine/very fine grained, well sorted, sub-angular/sub-rounded, trace crinoid fragments in shale. (40%)
Limestone, dark grey brown, argillaceous, microcrystalline, tite, silty/sandy. (trace)

2170 - Shale, dark grey/black, grading to siltstone and very fine sandstone, micromicaceous, trace pyrite. (80%)
Sandstone, grey brown, quartzose/calcareous cement and siliceous trace fine intergranular porosity where not siliceous, very fine grained - silty, well sorted, sub-angular, scattered pyrite, part argillaceous.

2180 - Shale, black/dark grey brown, partly silty and sandy, trace pyrite. (85%)
Sandstone, grey brown, quartzose, calcite and siliceous cement, trace dead oil, trace oil stain?, slightly argillaceous. (15%)
Limestone, dark brown, argillaceous, partly silty, sandy, micro-crystalline/fossil fragments - dead oil (good show). (trace)

2190 - Shale, black/dark grey, non-calcareous, slightly calcareous. (90-95%)
Sandstone, grey brown, slightly argillaceous, quartzose/siliceous and calcareous cement, very fine, well sorted, sub-angular, massive pyrite. (10-5%)
Trace dark brown, argillaceous, micro-crypto dolomite.
Trace clear white calcite crystals.

2200 - Shale, black, dark grey, soft, part fissile, non-calcareous, trace pyrite. (95+%)
Sandstone, grey brown, slightly argillaceous, clean, quartzose, very fine/silty, well sorted, sub-angular. (less than 5%)

2210 - Shale, black/dark grey, very slightly calcitic in part, part silty, trace pyrite, soft. (95%+)
Sandstone, grey brown/dark grey brown, argillaceous, quartzose, calcareous cement, trace intergranular porosity and dead oil, very fine/silty, well sorted, sub-angular, minor massive pyrite, trace clear white calcite crystals, trace dark brown, argillaceous, micro-crystalline limestone. (less than 5%)

2220 - Shale, black/dark grey, partly calcareous, part silty/sandy, part fissile, trace pyrite. (80-85%)
Sandstone, light grey/grey brown, quartzose, slightly argillaceous, calcareous/siliceous, very fine grained, well sorted, sub-angular, trace porosity intergranulated in unsilicified portion and dead oil. (15-20%)

2230 - Shale, black/dark grey, grading to silt and very fine sandstone, part black pyrite along laminations, micromicaceous. (70-80-85%)
Sandstone, light grey clean,/grey brown, argillaceous, quartzose/calcareous and siliceous cement, very fine/fine grained, well sorted, sub-angular/sub-rounded, trace very

2230 con'd -fine pyrite, trace dark grey brown argillaceous micro-crystalline limestone, partly silty, tite. (15-20-30%)
Trace brown/dark grey, argillaceous, micro-crystalline, dolomite, tite.
Dolomite, dark brown, argillaceous. (trace)

2240 - Shale, black, fissile grading to argillaceous siltstone and very fine sandstone. (85-90%)
Sandstone, light grey/(white)/grey brown, quartzose, very fine, well sorted, sub-angular, calcareous and siliceous cement, hard, trace intergranular porosity in unsilicified sand (minor). (15-10%)
Trace dark brown, argillaceous, micro-crypto dolomite.

2250 - Shale, black/dark grey, partly silty/sandy grading to very argillaceous, very fine sandstone and siltstone. (75%)
Sandstone, light grey/grey brown, quartzose/quartzitic, very fine/siliceous cement, and calcareous cement, slightly argillaceous, well sorted, sub-angular, tite. (25%)

2260 - Shale, dark grey/black, sandy/silty, trace massive pyrite grading to very argillaceous siltstone. (60%)
Sandstone, light grey/grey brown, quartzose-quartzitic, calcareous cement and siliceous cement, very fine/fine grained, trace intergranular porosity and trace dead oil. (40%)

2270 - Shale, dark grey brown/grey, part silty and sandy grading to argillaceous siltstone and calcareous argillaceous very fine sandstone, partly soft black. (70-75%)
Sandstone, light grey/creamy/grey brown, clean/slightly argillaceous, quartzose/quartzitic, part calcareous cement very fine grained/fine grained, mediu/well sorted, sub-angular/sub-rounded, trace intergranular porosity, trace dead oil, trace pyrite. (25-30%)
Dolomite, dark brown, argillaceous, micro-cryptocrytals, dense. (less than 5%)
Limestone, dark brown, argillaceous, silty/sandy.

2280 - Shale, black/grey, part slightly calcareous, part silty/sandy. (60%)
Sandstone, cream/grey brown, quartzose/quartzitic, slightly argillaceous, clean, part/calcareous cement, fine/very fine grained, well sorted, sub-angular, trace pyrite, trace medium grained. (40%)
Trace dark brown, argillaceous, micro-crypto dolomite.
Limestone, argillaceous, silty/sandy, very fine/micro-crystals. (trace)

2290 - Shale, black/grey, part silty/sandy grading to siltstone and very fine sandstone, part black, soft, fissile. (80%)
Sandstone, light grey/grey brown, clean/argillaceous, quartzose/calcareous cement and siliceous cement to quartzitic, veryfine/fine grained, well sorted, sub-rounded/sub-angular, tite, trace very fine/massive pyrite. (20%)

2300 - Sandstone, grey brown, quartzose/calcareous cement and quartzitic/siliceous cement, partly glossy, slightly argillaceous, silty, medium grained, medium sorted, sub-angular/sub-rounded, trace pyrite, tite. (50%)
Shale, grey/black, silty, part micromicaceous, part black soft, slightly fissile, non-calcareous grading to argillaceous calcitic siltstone. (40%)
Dolomite, dark brown, argillaceous, micro-crystalline, dense. (trace)

2310 - Shale, grey/dark grey, part slightly calcareous, part sandy/silty grading to argillaceous siltstone. (≃ 75%)
Sandstone, light grey/grey brown, quartzose/calcareous cement and quartzitic/glassy appearance, very fine/fine grained, well sorted, trace pyrite, tite. (≃ 25%)
Limestone, dark brown, slightly argillaceous, very fine/fine grained, trace pyrite, tite. (trace)

2320 - Shale, grey/dark grey, partly silty/sandy, trace pyrite grading to argillaceous siltstone. (50%)
Sandstone, light grey/grey brown, quartzose,/calcareous cement and quartzitic, partly glassy, silty/fine grained, well sorted/medium sorted, sub-angular, trace pyrite, tite. (50%)
Dolomite, dark brown, argillaceous, micro-crystalline. (trace)
Limestone, dark brown, argillaceous, very fine grained, silty/sandy. (trace)

2330 - Sandstone, light grey/dark grey brown, clean/argillaceous, quartzitic, glassy and quartzose/calcareous cement, very fine/fine grained, well sorted, sub-angular, trace pyrite. (≃ 55%)
Shale, grey/black, non-calcareous, partly silty/sandy. (≃ 45%)
Dolomite, dark brown/brown, argillaceous, micro-crystalline, dense. (less than 5%)

Lost circulation at 2244' but regained.

2340 - Shale, dark grey/grey, partly silty and sandy. (55%)
Sandstone, light grey,/dark grey, siliceous/quartzitic/quartzose/calcareous cement, very fine/medium grained, sub-angular/sub-rounded, medium sorted, part glassy, trace pyrite. (40%)
Limestone, dark brown, micro-crystalline, silty/sandy, argillaceous, tite. (trace)
Dolomite, dark brown, argillaceous, micro-crystalline, tite. (trace)

2350 - Sandstone, light grey/grey brown, siliceous, quartzitic, glassy, quartzose/calcareous cement, very fine/fine grained,

2350 well sorted, sub-rounded, trace pyrite, trace intergranular porosity. (50%)
Shale, grey/dark grey, partly calcareous, very fine pyrite along lamination. (50%)
Limestone, dark brown, argillaceous, micro-crystalline, very fine, tite. (trace)

2360 - Sandstone, light grey/grey brown siliceous, quartzitic, partly quartzose/calcareous cement, very fine/medium grained, medium sorted, sub-rounded/sub-angular. (50%)
Shale, dark grey/grey, silty/sandy grading to calcareous argillaceous siltstone, non-calcareous, trace pyrite. (40%)
Limestone, dark brown, argillaceous, silty/sandy, very fine/fine, tite. (trace)
Dolomite, dark brown, argillaceous, tite, micro-crystalline. (trace)

2370 - Shale, grey/dark grey, silty/sandy, partly calcareous, trace pyrite. (55%)
Sandstone, light grey/grey brown, quartzitic/quartzose/calcareous cement, clean/argillaceous, very fine/fine grained, well sorted, sub-angular. (40%)
Dolomite, dark brown, argillaceous, micro-crystalline, dense.
Limestone, dark brown, argillaceous, very fine/fine crystals, silty/sandy. 5%

2380 - Sandstone, light grey/dark grey brown, clean/argillaceous, quartzitic/quartzose/calcareous cement, part, very fine/medium grained, medium sorted, sub-angular, trace intergranular porosity, trace dead oil, trace pyrite. (60%)
Shale, black/grey, silty/sandy, slightly calcareous, grading to argillaceous siltstone. (30-35%)
Limestone, argillaceous, brown, sandy/silty, very fine grained, tite. (5-10%)
Dolomite, dark grey/brown, argillaceous, micro-crystalline, dense. (5-10%)

2390 - Shale, black/dark grey, silty and sandy grading to siltstone. (50%)
Sandstone, light grey/grey brown, quartzitic/quartzose, very fine/fine grained, well sorted, sub-angular/sub-rounded, trace intergranular porosity. (40%)
Dolomite, dark brown, argillaceous, micro-crystalline. (5%)
Limestone, dark brown, micro-crystalline, siliceous, silty/sandy. (5%)

2400 - Sandstone, light grey/grey brown, quartzitic/quartzose/calcareous cement, very fine/medium grained, medium sorted, sub-angular, trace intergranular porosity, trace dead oil, trace pyrite. (50%)
Shale, grey/black, non-calcareous, slightly calcareous, partly silty/sandy, grading to siltstone and very fine sandstone, trace pyrite. (45%)
Dolomite, dark brown, argillaceous, micro-crystalline. (5%)

2410 - Shale, dark grey/black, silty and sandy grading to argillaceous calcareous siltstone and very fine sandstone, part soft black/pyrite. (45%)
Sandstone, light grey/dark grey brown, very fine quartzose/calcareous cement, siliceous quartzitic, trace intergranular porosity, tite, trace pyrite. (40%)
Dolomite, dark grey brown, slightly argillaceous, micro-crystalline, dense. (15%)

2420 - Shale, dark grey/black, grading to argillaceous siltstone and sandstone. (40%)
Sandstone, light grey brown/grey brown, clean argillaceous medium sorted, very fine/medium grained, sub-angular, quartzitic/quartzose/calcareous cement, trace pyrite, trace intergranular porosity and dead oil. (60%)
Dolomite, argillaceous, dark grey brown, micro-crystalline. (trace)

2430 - Shale, grey/dark grey, partly silty and sandy. (60%)
Sandstone, light grey/grey brown, quartzitic/quartzose/ calcareous cement, very fine/fine grained, sub-angular, well sorted, fine/trace intergranular porosity, trace oil stain?? (40%)
Dolomite, dark brown, argillaceous, micro-crystalline. (trace)

2440 - Shale, dark grey/black, part sandy/silty. (75%)
Sandstone, light grey brown/grey brown, quartzose/calcitic cement/quartzitic, very fine/fine, well sorted, sub-angular, trace pyrite. (25%)
Dolomite, dark brown, argillaceous. (trace)

2450 - Shale, grey/dark grey grading to argillaceous siltstone, trace pyrite.
Sandstone, light grey brown/dark grey brown, quartzitic/ quartzose/ calcareous cement, very fine/medium grey, trace pyrite, trace intergranular porosity and dead oil.
Dolomite, trace dark grey, argillaceous, micro-crystalline.

2460 - Shale, dark grey to black, part slightly calcareous, part silty, trace pyrite — 60%.
Sandstone, light grey brown to dark grey brown, clean - argillaceous, very fine to fine grained, quartzose/calcareous cement, well sorted sub-angular, trace pyrite, trace of fair intergranular porosity, trace dead oil — 25%.
Dolomite - dark brown, argillaceous micro to cryptocrystalline, tight — 15%.

2470 - Shale - grey to dark grey, slightly argillaceous, part silty - sandy — siltstone — 60%.
Sandstone - light grey brown to dark grey brown, quartzose/ calcareous cement, clean - argillaceous, part siliceous, very fine to fine grained well sorted, sub rounded to sub angular. — 30%.
Trace of fair intergranular porosity, trace dead oil, pyrite - massive.
Dolomite - dark brown, argillaceous micro - cryptocrystalline, tight. Trace crinoidal fragments in shale.

2480 - Shale, dark grey to black, part slightly fissile, trace pyrite, part silty.
Sandstone - light grey to dark grey brown, quartzose/calcareous cement - quartzitic, very fine to fine grained, part argillaceous, well sorted, sub angular, trace pyrite.

2490 - Shale - grey to black, part fissile, part silty to sandy, part very soft, non calcareous — 60%.
Sandstone - light grey brown to grey brown, clean - slightly argillaceous quartzose/calcareous cement, part siliceous, very fine to fine grained, well sorted, sub angular, trace intergranular porosity and dead oil. — 30%.
Dolomite - dark brown, argillaceous micro - crypto, tight — 10%.
Trace light grey brown chert / sandstone.
Limestone - dark brown, sandy-silty-microcrystalline, tight—trace.

2500 - Shale - black, slightly calcareous, part fissile, part sandy - silty, trace massive pyrite — 90%.
Sandstone - light grey to grey brown, quartzose/calcareous cement, very fine to fine grained, well sorted, sub angular, trace intergranular porosity, trace possible oil stain — 10%.
Dolomite - dark brown, argillaceous crypto-micro, tight, trace.

2510 - Shale - dark grey, to black, partly fissile, part silty - sandy-- grading to siltstone and very fine sandstone — 50%.
Sandstone - light grey brown to dark grey brown, quartzose/ calcareous cement - quartzitic, part clean to argillaceous, very fine to fine grained well sorted, subangular, trace pyrite, trace intergranular porosity. Scattered and white calcite crystals — 40%.
Dolomite - dark grown, argillaceous crypto-microcrystalline, tight — 10%.

2520 - Shale - black to dark grey, part fissile, part silty, partly calcareous — 95%
Sandstone - light grey brown to dark grey brown, clean - argillaceous, very fine grained well sorted, sub-angular, tight, Trace very fine scattered pyrite, trace scattered coarse white calcite — 5%.
Dolomite - brown to dark brown, argillaceous, micro-crypto - trace.

2530 - Shale - dark grey to black, partly fissile, trace pyrite — 70-75%.
Sandstone - light grey brown, clean, dark grey brown argillaceous, quartzose/calcareous cement - quartzitic, very fine to fine grained, well sorted, sub-angular, trace pyrite — 25%-30%.
Dolomite - dark brown, argillaceous, crypto — trace.
Trace limestone - dark brown, sandy - silty, microcrystalline.

2540 - Shale - dark grey to black, partly fissile — 75-80%,
Sandstone - light grey brown to dark grey brown, quartzose/calcareous cement - quartzitic, very fine to medium grained, sub angular, medium sorted, trace pyrite, trace intergranular porosity and dead oil -
scattered coarse white calcite crystals — 15-20%.
Dolomite - brown to dark brown, argillaceous crypto, dense — 5%.

2550 - Shale, black to dark grey, partly fissile, part silty, slightly calcareous — 90%.
Sandstone - light grey brown to dark grey brown, clean — argillaceous very fine grained, well sorted, sub angular, quartzose/calcareous cement - quartzitic, tight — 10%.
Dolomite - brown to dark brown, argillaceous — trace.
Trace coarse white calcite crystals.

2560 - Shale - dark grey to black, trace pyrite, non-calcareous, part fissile, part silty to sandy grading to argillaceous siltstone — 90-95%.
Sandstone - light grey brown to grey brown, very fine quartzose/calcareous cement - quartzitic. — 5 - 10%.
Dolomite - argillaceous, dark brown, cryptocrystalline — trace.

2570 - Shale - dark grey to black, part fissile, non calcareous, part silty — 95%.
Sandstone - grey brown, quartzose/calcareous cement, very fine grained, well sorted, sub angular, tight —5%.
Trace coarse white calcite crystals and trace dark grey brown argillaceous dolomite, tight — trace.

2580 - Shale - dark grey to black, part slightly calcareous, part silty — 85 - 90%.
Sandstone - grey brown to dark grey brown, quartzose/calcareous cement, part siliceous - quartzitic, very fine grained well sorted, sub angular - trace intergranular porosity in unsilicified part., trace pyrite — 5-10%.
Dolomite - dark brown, argillaceous crypto-micro, tight—trace to 5%.

2590 - Shale - dark grey to black, part fissile, trace pyrite — 80-85%.
Sandstone - grey brown to dark grey brown, quartzose - quartzitic, very fine grained, well sorted, sub angular, trace fair intergranular porosity — 10-15%.
Dolomite - argillaceous, dark brown, crypto. — to 5%.

2600 - Shale - dark grey to black, partly fissile, non-calcareous, trace pyrite — 80%.
Sandstone - light grey brown to grey brown, quartzose/calcareous cement and partly siliceous - quartzitic, very fine grained well sorted, sub-angular, trace of fair intergranular porosity — 10-15%.
Dolomite - dark grey - argillaceous crypto — 5%.

2610 - Shale - dark grey to black, partly fissile, partly silty — 60%.
Sandstone - light grey brown to dark grey brown, quartzose - quartzitic, very fine to fine grained, well sorted, sub angular, trace intergranular porosity - tight, trace pyrite — 40%.

2620 - Shale - dark grey to black, part silty, trace pyrite — 80%.
Sandstone - light brown to grey brown, quartzose - clean - argillaceous, part/calcareous cement and part siliceous cement, very fine to fine grained, well sorted, trace pyrite, sub angular tight — 20%.
Dolomite - dark brown, argillaceous cryptocrystalline — trace.

2630 - Shale - dark grey to black, silty - grading to argillaceous, grey siltstone (minor), trace pyrite (laminations), part fissile — 90%.
Sandstone - light brown to grey brown, quartzose/calcareous cement, and siliceous cement grading to quartzitic, tight - trace intergranular porosity — 10%.
Dolomite - brown to dark brown, argillaceous, crypto, trace massive pyrite — trace.

2640 - Shale - dark grey to black, non calcareous to slightly calcareous, part fissile, silty-sandy-grading to argillaceous siltstone and sandstone, trace very fine pyrite — 85%
Sandstone - grey brown to dark grey brown, very fine quartzose/ partly calcareous cement and partly siliceous cement, mostly tight, trace intergranular porosity well sorted, sub angular—15%.
Dolomite - brown to dark grey brown, argillaceous crypto — trace.

2650 - Shale, dark grey to black, part silty, slightly calcareous, part fissile/trace very fine pyrite — 80%.
Sandstone - light brown to dark grey brown, clean - argillaceous, quartzose, very fine grained, well sorted, sub angular, cement mostly siliceous - quartzitic, some calcareous cement. — 20%.
Dolomite - dark brown, argillaceous crypto, tight — trace.

2660 - Shale - dark grey to black, partly silty, part fissile. Part grading to argillaceous siltstone and sandstone, trace pyrite (uf) — 85%.
Sandstone - light brown to dark grey brown, clean - argillaceous, quartzose - part/calcareous cement/trace intergranular porosity and part siliceous cement - quartzitic - tight, very fine grained, well sorted sub angular, trace dead oil in intergranular porosity. — 15%.
Dolomite - dark brown, argillaceous crypto, tight — trace.

2670 - Shale - dark grey to black, partly silty, calcareous — 85-90%.
Sandstone - light grey brown to dark grey brown - clean - argillaceous, quartzose/calcareous cement, partly siliceous, silty to very fine grained to fine grained well sorted sub angular, trace intergranular porosity, pyrite — 10-15%.
Trace coarse white calcite crystals.

2680 - Shale - dark grey to black, partly fissile, part silty, grading to minor argillaceous siltstone and sandstone — 90%.
Sandstone, light grey brown to grey. Quartzose/calcareous cement, partly siliceous, very fine, well sorted, sub angular, trace intergranular porosity - tight. — 10%.
Dolomite - dark brown, argillaceous, crypto-microcrystalline — trace.

2690 - Shale, dark grey to black, partly silty grading to grey siltstone — 90%.
Sandstone - light grey to grey brown, argillaceous very fine silty, quartzose, well sorted, sub angular — 10%.

2700 - Shale, dark grey to black, trace pyrite part silty — 85-90%.
Sandstone - light grey to grey brown, argillaceous grading to siltstone, - siltstone, quartzose/calcareous cement, well sorted, sub angular, very fine - silty, tight — 10-15%.

2708 - Shale, dark grey to black, slightly calcareous, partly fissile. — 70%.
Sandstone - light grey brown, very fine grained, quartzose, clean - slightly argillaceous, well sorted, sub angular — 10%.
Trace dark grey to grey brown dolomite - argillaceous - micro - crypto — trace.

2720 - Sandstone - light grey to grey brown, quartzose/siliceous cement, part quartzitic, trace intergranular porosity, trace dead oil, very fine to fine to silty grained, medium sorted, sub angular. Shale - dark grey to black, part soft and fissile, trace pyrite.
Trace coarse white calcite.
Trace very fine to micro crystalline dark brown limestone - tight.

2730 - Sandstone - light grey to light grey brown quartzose/siliceous cement and trace calcite, very fine to medium, medium sorted, sub angular/trace intergranular porosity, dead oil in interstices, part quartzitic — 85-80%.
Shale, black to dark grey - partly fissile, part slightly calcareous — 15-20%.

2740 - Shale - dark grey to black, partly silty, slightly calcareous — 60%
Sandstone - light grey to dark grey brown, quartzose - quartzitic. Mostly siliceous cement - trace calcareous cement, very fine to medium grained medium sorted, sub angular — 40%.

2750 - Shale - black to dark grey, part black soft and fissile, part silty, non-calcareous to slightly calcareous, grading to argillaceous siltstone and very fine sandstone — 60%.
Sandstone - light grey to light grey brown, quartzose—quartzitic siliceous cement, very fine grained, well sorted, sub angular— 40%.
Trace intergranular porosity - tight, trace dead oil in interstices.

2760 - Sandstone - white to light grey brown, quartzose--quartzite, clean to very slightly argillaceous, very fine grained, well sorted, sub angular trace intergranular porosity to tight, mostly tight siliceous - quartzitic — 95%.
Shale - black, fissile, soft — 5%.

2770 - (Trip sample - reamed in - lot of cavings). Shale - black to dark grey, part soft fissile, trace pyrite — 75%.
Sandstone - white to grey brown, quartzose, part/calcareous cement, mostly siliceous - quartzose - very fine to fine grained, tight, well sorted, sub angular — 25%.

2780 - Shale - grey to black, part soft, black, fissile, part silty, slightly calcareous and hard grading to siltstone, trace pyrite, trace gypsum along partings — 65-70%.
Sandstone - light grey to grey brown, quartzose, part/calcareous cement, mostly siliceous - quartzitic, slightly argillaceous, very fine to fine grained well sorted, sub angular, trace pyrite—30-35%.
Dolomite - dark brown, argillaceous micro - crypto — trace.

2790 - Sandstone - grey brown - quartzose/calcareous and siliceous cement/partly quartzitic, very fine to fine, well sorted, sub angular - trace brown sandstone/trace intergranular porosity—50%.
Shale - black, fissile, soft and grey silty grading to sandstone, trace coarse white calcite crystals — 50%.
Trace dark brown dolomite, as above.

2800 - Shale - dark grey to black, black part, soft, fissile, non-calcareous — 75%.
Sandstone - light grey to grey brown, quartzose/mainly siliceous cement, trace minor calcareous cement, trace intergranular porosity/trace dead oil in interstices - mostly tight, part of sand quartzitic, trace pyrite — 25%.
Part of sand/slickensides (possible faulting?), trace dark brown argillaceous dolomite - micro-cryptocrystals — Trace.

2810 - Shale - dark grey - black, non-calcareous to slightly calcareous. Black part soft, fissile, non-calcareous, trace very fine pyrite — 85%.
Sandstone - light grey to grey brown, quartzose/calcite and siliceous cement, part quartzitic - very fine to fine-grained, partly slightly argillaceous, trace pyrite, trace intergranular porosity - dead oil, mostly tight — 15%.

2820 - Shale - dark grey to black, soft, trace pyrite — 85%.
Sandstone - light grey to grey brown, quartzose, partly silica and partly calcareous cement, trace of fine grained, trace intergranular porosity,dead oil in interstices, mostly tight—15%.

2830 - Shale - dark grey to black - soft fissile, slightly calcareous. trace pyrite (part may be caving from reaming in) — 85%-90%.
Sandstone - grey to grey brown, quartzose - quartzitic, very fine - silty — 10-15%.
Trace coarse white calcite crystals, trace black chert, trace pyritic; trace grey brown argillaceous micro-crypto dolomite.

2840 - Shale - dark grey to black, part silty - sandy, slight calcareous—70%.
Sandstone - quartzose, grey brown to dark grey brown, argillaceous silty - very fine/calcareous cement grading to argillaceous arenaceous, very fine limestone and argillaceous calcite siltstone—30%.
Trace pyrite.

2850 - Shale - dark grey to black, part fissile, part silty, slightly calcareous, trace pyrite, grading to argillaceous calcareous siltstone — 70%.
Sandstone - quartzose, calcareous cement, very argillaceous dark grey brown, very fine - silty grading to argillaceous siltstone — 30%.

2860 - Shale - dark grey - black, silty, part fissile, slightly calcareous, part silty — 80%.
Sandstone - grey brown, argillaceous quartzose/calcareous cement, silty - very fine grained, well sorted sub-angular — 20%.
Trace pyrite.

2870 - Shale - dark grey - black, part slightly calcareous, trace pyrite, part slightly fissile —— 60%-70%.
Sandstone - gray brown, argillaceous quartzose/calcite cement very fine to silty, well sorted, sub angular grading to argillaceous calcareous siltstone —— 40%-30%.

2880 - Shale - dark grey - black, black partly soft, fissile, trace pyrite, part slightly silty - sandy, slightly calcareous, trace pyrite —— 90%+.
Sandstone - light grey - grey brown, slight argillaceous - clean, quartzose/calcareous cement, very fine to fine grained, well sorted, sub angular —— 10%.

2890 - Shale - black - dark grey - partly soft, fissile, partly silty - sandy, slightly calcareous —— 85 - 90%.
Sandstone - light grey - grey brown, clean - argillaceous quartzose/calcareous cement - silty - very fine —— 10%.

2900 - Shale - black - dark grey, partly silty - sandy, part slightly calcareous —— 70 -75%.
Sandstone - light grey brown - grey brown, argillaceous, quartzose/calcareous cement, very fine - silty, well sorted, sub angular —— 25%-30%.

2910 - Shale - black - dark grey, part fissile, part silty. —— 80%.
Sandstone - dark grey brown, quartzose, argillaceous/calcareous cement, silty - very fine grained, well sorted, sub angular grading to calcareous argillaceous siltstone. —— 20%.

2920 - Shale - black - dark grey, partly fissile, part silty—— 75%.
Sandstone - grey brown - quartzose/ calcareous cement, very fine to silty grading to argillaceous calcite siltstone —— 25%.

2930 - Shale - black - dark grey, part fissile and part silty —— 70%
Sandstone - grey brown, quartzose, argillaceous/ calcareous cement, silty grading to argillaceous calcareous siltstone —— 30%.

2940 - Shale - dark grey - black, part silty, slightly calcareous —— 60%.
Sandstone - grey brown, quartzose/calcareous cement, argillaceous silty, very fine grained well sorted, sub angular, grading to argillaceous calcareous siltstone —— 40%.

2950 - Shale - black - dark grey, partly silty —— 60%.
Sandstone - grey brown, quartzose/calcareous cement, argillaceous silty, very fine grained well sorted, sub angular - angular grading to argillaceous calcareous siltstone, trace very fine grained pyrite —— 40%.

2960 - Shale - black to dark grey, part fissile, part silty, very slightly calcareous——60%.
Sandstone - dark grey brown, argillaceous quartzose/calcareous cement, silty, very fine grained well sorted, sub-angular grading to siltstone, trace fine pyrite, trace intergranular porosity, trace coarse white calcite crystals.——40%

2970 - Shale - black to dark grey, part soft, fissile, slightly calcareous —— 90%.
Sandstone - grey brown quartzose, very fine grained to fine grained, trace pyrite, argillaceous, well sorted, sub angular—10%.

2980 - Shale - black to dark grey, silty, part soft, fissile, very slightly calcareous ——90%.
Sandstone, grey brown, quartzose, argillaceous calcareous cement, grading to siltstone, very fine grained well sorted sub angular 10%.

2990 - Shale - black, partly silty, part fissile, soft, partly silty to sandy, trace pyrite—— 90%.
Sandstone - grey brown, quartzose/calcareous cement, argillaceous grading to siltstone, very fine grained, well sorted, sub angular grading to arenaceous limestone - fine grained —— 10%

3000 - Shale - black - dark grey, part soft, fissile, very slightly calcareous —— 90%.
Sandstone - light grey - to grey brown, quartzose, trace pyrite, calcareous cement, grading to argillaceous arenaceous limestone, very fine grained well sorted, sub-angular. Trace black chert —— 10%.

3010 - Shale - black to dark grey, soft, part fissile, trace scattered very fine pyrite, very slightly calcareous. Trace sandstone light grey to grey brown, very fine well sorted, sub angular, quartzose/calcareous cement (part cavings). 95%+
Trace dolomite - dark brown, argillaceous micro-crypto, dense trace black chert.

3020 - Shale - dark grey to black, soft, part fissile, trace very fine pyrite, very slightly calcareous —— 95%+
Trace dark brown argillaceous dolomite.

3030 - Shale, dark grey to black, soft, fissile, trace pyrite, very slightly calcareous ——95%.
Trace dark brown dolomite—siliceous, argillaceous micro-crypto
Trace very fine grey brown sandstone (probably caving)
Trace coarse white calcite crystals.

3040 - Shale - dark grey - black, soft, fissile, trace very fine pyrite, slightly calcareous —— 95%.
Trace dolomite - dark brown, argillaceous siliceous.
Trace limestone - dark brown very fine micro, argillaceous trace pyrite, tight.

3050 - Shale - dark grey - black, soft, fissile, part slightly silty and calcareous —— 95%.
Trace very fine pyrite, part slightly calcareous.
Trace dark grey brown argillaceous micro dolomite.
Trace brown calcite crystals.

3060 - Shale - black - dark grey, soft - firm, slightly calcareous, trace pyrite —— 95%+.
Sandstone - trace - very fine quartzitic, grey brown, slightly argillaceous/trace calcareous cement, part siliceous. Trace brown calcite crystals.

3070 - Shale - black to dark grey, soft, part fissile, trace very fine pyrite —— 95%+
Sandstone - grey brown, quartzitic, trace.

3080 - Shale - dark grey - black, soft, fissile, very fine scattered pyrite, minor calcite along partings.

3090 - Shale, dark grey to black/trace very fine pyrite —— 95%+
Scattered trace very fine grey brown quartz sandstone/calcareous cement, well sorted, sub angular.

3100 - Shale - dark grey to black, part soft, fissile, 95%+
Trace very fine scattered pyrite.
Trace very fine grey brown quartzose sandstone/calcareous cement, part siliceous, well sorted, sub angular, tight.

3110 - Shale, dark grey to black, soft, fissile, trace very fine scattered pyrite, very slightly calcareous —— 95%
Sandstone - light grey to grey brown, quartzose, argillaceous silty/calcareous cement, siliceous, well sorted, subangular —— 5%

3120 - Shale - dark grey and black, soft, fissile —— 90%
Sandstone - white to grey, quartzose, calcareous and siliceous cement, partly glassy, well sorted, sub angular, tight —— 10%.

3130 - Shale - dark grey and black - soft, fissile, trace pyrite - grey part slightly calcareous —— 90%.
Sandstone - grey to grey brown, quartzose/calcareous and siliceous cement, part quartzitic, glassy, well sorted very fine silty, sub angular —— 10%-15%.

3140 - Shale - dark grey and black, soft, fissile, trace black chert and trace pyrite —— 70%.
Sandstone - light grey to grey, quartzose - quartzitic, slightly calcareous to silicious, very fine grained, well sorted, slightly argillaceous, tight ——— 30%.

3150 - Shale - black to dark grey, trace pyrite and black chert —— 70%.
Sandstone - light grey to grey, quartzose/calcareous cement, very fine grained, well sorted, angular, trace porosity intergranular, part siliceous —— 30%.

3160 - Shale - grey to black, soft, fissile, grey part slightly calcareous, trace very fine pyrite —— 65-70%.
Sandstone - grey brown, very fine grained/calcareous cement, quartzose, well sorted, sub angular ——35-40%.

3170 - Shale - dark grey and black, soft, fissile, trace pyrite - 70%
Sandstone - grey to grey brown, quartzose, very fine grained, calcareous cement - siliceous, well sorted, sub angular, trace pyrite, trace coarse white calcite crystals - 30%.

3180 - Shale - black, part fissile - soft, trace pyrite — 85-90%.
Sandstone - grey brown, very fine quartzose/calcareous and siliceous cement, part quartzitic, trace white calcite crystals 10 - 15%.

3190 - Shale - dark grey, part slightly silty, slightly calcareous, part black, soft partly fissile, trace pyrite — 85-90%.
Snadstone - light grey to grey, quartzose/calcite and siliceous cement part quartzitic, trace very fine pyrite, well sorted, sub angular to angular — 10-15%.

3200 - Shale - black, fissile, soft, part dark grey, pyrite — 90%
Sandstone - light grey brown to grey brown, quartzose/calcite and siliceous cement part quartzitic, very fine grained well sorted subangular —10%
Trace dark brown argillaceous dolomite - micro - cryptocrystalline.

3210 - Shale - black to dark grey, fissile — 85-90%
Sandstone - light grey brown to light grey, quartzose/ calcareous cement, part siliceous - quartzitic, very fine grained well sorted, sub angular, trace intergranular porosity and dead oil, mostly tight —10%-15%.

3220 Shale - black, soft, fissile, minor disseminated very fine pyrite (90%).
Sandstone - light grey to grey brown, quartzose/calcareous and siliceous cement, part quartzitic, very fine, well sorted, sub angular, trace dark brown argillaceous crypto-micro dolomite (10%).

3230 Shale - black to dark grey, most soft, fissile, trace very fine pyrite (95%).
Sandstone - light grey brown to grey quartzose, argillaceous/calcareous and siliceous cement, part quartzitic, glassy, very fine grain, well sorted, sub angular, tight (5%).

3240 Shale - black to dark grey, soft, fissile.
Sandstone - light grey to grey brown quartzose, very fine, well sorted, sub angular, calcareous cement and siliceous, trace pyrite (95% trace).

3250 Shale - black to dark grey, fissile (95%).
Sandstone - fine, quartzose, siliceous, trace pyrite (5%).

3260 Shale - black to dark grey, fissile (90%).
Sandstone - buff grey, fine grained, quartzose, siliceous (10%).

3270 Shale - as above. (90%)
Sandstone - white to grey, fine grained quartzose, siliceous, pyrite (10%).

3280 Shale - dark grey to black, more blocky (80%).
Sandstone - quartzose, siliceous to siltstone hard. Pyrite common as globular concretions (20%).

3290 Shale - grey to black (85%).
Sandstone and Siltstone as above. Pyrite (15%).

3300 Shale - grey to black, fissile (80%).
Siltstone - grey, calcareous, trace fine grained quartzose sandstone, trace pyrite (20%).

3310 Shale - grey to black fissile (95%).
Trace of pyrite and grey floating sandstone (5%).

3320 Shale - grey to black fissile (95%).
Trace pyrite and fine grained quartzose sandstone (5%).

3330 Shale - grey to black, fissile (90%).
Sandstone - grey fine grained, well sorted, calcareous in part, pyrite (10%).

3340 Shale - grey to black fissile (80%).
Sandstone - grey fine grained, calcareous.
Siltstone - grey, pyrite (20%).

3350 Shale - grey to black, fissile (75%).
Sandstone - dark grey, fine grained.
Siltstone - grey, pyrite (25%).

3360 Shale - grey to black, blocky in part, some thin calcite veins (70%).
Siltstone - grey, hard, some light grey fine grained siliceous quartz (30%)
Sand - abundant pyrite

3370 Shale - grey to black, silty and arenaceous in part (60%).
Sandstone - light grey to dark grey fine grained, quartzose, hard, slightly calcareous, rounded to sub angular, some larger rounded floating sand grains in finer sand matrix grading to dark grey siltstone in part, abundant large pyrite fragments, traces of dark brown chert or siliceous claystone (40%).

3380 Shale - grey black, silty to arenaceous in part. Calcite veins (95%).
Siltstone - grey with some pyrite (5%).

3390 Shale - grey black fissile, silty to arenaceous in part (100%).

3400 Shale - as described (100%).
Trace disseminated pyrite.

3410 Shale - dark grey, lustrous to waxy, soft, micaceous, some black organic shale soft, splintery (100%).

3420 Shale as above (100%).

3430 Shale - black to dark grey, silty and arenaceous in part (95%).
Sandstone - grey to dark grey, fine grained, quartzose siliceous, sub rounded well sorted grains, trace pyrite (5%).

3450 Shale as above (70%).
Siltstone - dark grey and sandstone grey fine grained, slightly calcareous, siliceous. Pyrite nodules more abundant (30%).

3460 Shale - dark grey to black, silty to arenaceous, calcite veins? (65%).
Interbeeded grey fine grained sandstone and grey siltstone, bedded pyrite and nodules (35%).

3470 Shale - dark grey to black fissile arenaceous in part (95%).
Sandstone - grey, fine grained, quartzose siliceous--trace pyrite (5%).

3480 Shale - dark grey to black, silty to arenaceous in part (90%).
Sandstone as above, some bituminous stain (10%).

3490 Sandstone - grey brown, fine grained, sub rounded grains, fairly well sorted, some larger clear floating grains in finer ground mass, bitumen stained (dead stain) traces of scattered poor intergranular porosity. (95%). Yohin sandstone
Shale - as above

3500 Sandstone - grey brown, fine grained, as above (95%) bitumen stain, traces of very poor isolated intergranular porosity, essentially tight.
Shale - grey to black, fissile (5%).

3510 (April 5/70) Sandstone - grey to dark grey, fine grained quartzose, less friable than above, hard, some has grey brown cast, grains are sub rounded to sub angular, tight (95%).
Shale - black fissile (5%).

3520 Sandstone - generally grey to dark grey (some grey brown) fine grained, quartzose hard, silliceous, bitumen stain, tight possibly fractured as indicated by white quartz filling on occasional sand fragment and white quartz gangue material in sample (95%).
Shale - black fissile (5%).

3530 Sandstone - as above but more grey brown in color appears to be less siliceous and more friable (95%) Some bituminous waxy shale partings, some large rounded floating clear quartz grains, some fragments show generally poorer sorting, resinous or vitrous appearance in part.
Shale - grey black fissile (5%).

3540 Sandstone - grey to dark grey fine grained, siliceous, resinous appearance, above (90%).
Shale - grey black fissile (10%).

3550 Sandstone - grey to grey brown, fine grained, some black bituminous, vitreous, quartzose (70%).
Shale - black fissile slightly pyrite, interlaminated with sandstone (caving after trip) (30%).

3560 Sandstone as above trace pyrite flecks inter laminated (50%).
Shale - grey to black fissile to slightly blocky (50%).

3570 Sandstone - grey brown, fine grained, slightly calcareous in part, quartzose, siliceous, sub rounded to sub angular grains, fairly well sorted some fragments appear bitumen stain imparting black color to pieces, some bituminous shale partings, tight, friable in part. (60%).
Shale - grey to black fissile (40%).

3580 Sandstone - grey brown, fine grained as above (60%).
Shale - grey to black fissile (40%).

3590 Sandstone - grey brown to dark grey, fine grained quartzose with bituminous shale partings (70%).
Shale - grey to black fissile (30%).

3600 Sandstone grey brown to dark grey as above fractured? (secondary quartz crystal growth) some fragments have quartz filled fractures, tight (80%)
Shale - dark grey to black fissile (20%).

3610 Sandstone - dark grey to grey brown, fine grained quartzose, vitreous in part, fractured, fractures filled with white quartz friable in part, bituminous partings, siliceous, tight (70%).
Shale - grey to black fissile (30%).

3620 Sandstone - grey to grey brown, fine grained, friable in part, quartzose, bitumen stained in part, trace poor scattered intergranular porosity (non-effective) bituminous shale partings (50%).
Shale - dark grey to black fissile (50%).

3630 Shale - dark grey to black fissile (90%).
Sandstone - fine grained as above (10%).

3640 Shale - grey to black fissile slightly pyrite (90%).
Sandstone as above slightly pyritic in part (10%).

3650 Shale - grey to black fissile (95%).
Sandstone - dark grey, fine grained quartzose (5%).

3660 Shale - grey to black fissile (90%).
Sandstone - dark grey to grey, fine grained quartzose, slightly pyritic (10%).

3670 Shale - dark grey to black fissile (90%).
Sandstone - grey to dark grey brown fine grained quartzose, hard (10%).

3680 Shale - dark grey to black fissile (90%).
Sandstone - as above (10%).

3690 Shale as above (80%).
Sandstone, brown to grey fine grained quartzose (20%).

3700 Shale - dark grey to black fissile (80%).
Sandstone - grey to brown grey, fine grained, quartzose, siliceous, hard, tight (20%).

3710 Sandstone - white to light grey, fine grained quartzose, sub rounded to sub angular, clear quartz grains, siliceous, traces of scattered very poor intergranular porosity, fractured infilled with quartz, bituminous partings (85%).
Shale - grey to black fissile (15%).

3720 Sandstone - white to light grey, fine grained, quartzose, traces of very poor scattered intergranular porosity (non-effective) bituminous partings, appears poorer sorted, hard (90%).
Shale - dark grey to black fissile (10%).

3730 Sandstone - white to light grey, fine grained, quartzose, sub rounded to sub angular grains, fairly well sorted, silicous, hard. Trace scattered very poor ineffective porosity. Fractured healed with secondary quartz, bituminous "smears" dead oil stain (90%).
Shale - dark grey to black fissile (10%).

3740 Shale - grey to black fissile slightly pyritic cavings (60%).
Sandstone - white to light grey, fine grained quartzose, hard tight, occuring as lenses (40%).

3750 Shale - grey to black fissile pyritic in part (60%).
Sandstone as above partially friable (40%).

3760 Sandstone - light grey to white fine grained quartzose, siliceous, hard, some amophorous white anhydrite, filling fractures (50%).
Shale - dark grey to black fissile (50%).

3770 Sandstone - as above with anhydrite (50%).
Shale as above slightly pyritic (50%).

3780 Sandstone - white to light grey fine grained quartzose, siliceous, trace of very poor scattered porosity (non-effective) trace of dead oil stain, anhydrite filled fractures (60%).
Shale - grey to black fissile (40%).

3790 Sandstone - light grey, fine grained, quartzose, sub rounded, to sub angular clear quartz grains, siliceous, fairly well sorted, trace of very poor scattered intergranular porosity (non-effective) trace dead oil stain, anhydrite or gypsum? fill fractures, bituminous partings (60%).
Shale as above (40%).

3800 Shale - dark grey to brown blocky in part, slightly calcareous and silty in part, lustrous (50%).
Sandstone - light to dark grey, fine grained quartzose, very siliceous, very hard, bitumen stained, tight, chalco pyrite (50%).

3810 Shale - dark grey to black splintery in part, lustrous (85%).
Sandstone - dark grey, fine grained, quartzose, very siliceous hard (15%).

3820 Shale - dark grey to brown less fissile more block in appearance, pyritic, calcareous in part (80%).
Sandstone - dark grey, fine grained, quartzose, very siliceous hard, pyritic, some pyrite nodules, calcareous in part (20%).

3830 Shale - dark grey, black, fissile to blocky pyritic, calcareous in part, (80%).
Sandstone as above, pyrite, trace grey siltstone, hard (20%).

3840 Sandstone - grey, fine grained, quartzose, very siliceous, hard pyrite, trace grey brown siliceous siltstone calcareous, quartzite (50%).
Shale - dark grey to black (50%).

3850 Intrusive rock? dark grey green with slight brownish cast, fine grained, ferro magnesian anorthosite? (50%).
Sandstone - light grey to dark grey, siliceous, quartzite? pyrite (35%).
Shale - dark grey to black (15%).

3860 Intrusive rock - dark grey green, with brownish cast, lustrous in part, mafic intrusive (30%).
Sandstone - grey, very siliceous, quartzite? very hard (65%).
Shale - dark grey to black (5%).

3870 Sandstone - light grey, fine grained quartzitic, very siliceous, hard, quartzite in part, friable in part (65%).
Intrusive rock? - dark grey green with brownish cast, has the texture of indurated siltstone, occasional elongated crystal laths (30%).
Shale - dark grey black (5%).

3880 Shale - dark grey to black fissile (90%).
Sandstone - light grey fine grained (10%), quartzitic, siliceous trace mafic rock (poor sample? after trip)

3890 Shale - dark grey to black fissile lustrous in part (85%).
Sandstone - light grey, quartzitic siliceous, trace mafic rock? pyrite (15%).

3900 Shale - dark grey to black fissile (75%).
Sandstone - light grey, quartzitic, siliceous, friable in part (25%).

3910 Shale - dark grey to black fissile lustrous (90%).
Sandstone - light grey as above (10%).

3920 Sandstone - grey, fine grained, quartzitic, siliceous, hard, vitreous in part, bituminous partings, friable in part, essentially tight. Trace pyrite (90%).
Shale - dark grey to black, fissile, trace pyrite (10%).

3930 Shale - dark grey to black, calcareous in part, more blocky, pyritic (90%).
Sandstone - as above, quartzitic (10%).

3940 Shale - dark brownish grey to black, pyritic, some with copper flecks (chalcopyrite?), bituminous, slightly silty in part, calcite veins? lustrous (80%).
Sandstone - grey, fine grained, very siliceous, quartzitic (quartzite) poorer sorted than previous, more angular quartz fragments, pyritic, fractured, healed with secondary quartz, some bituminous partings, dead oil and bitumen stained, nonporous, very hard (20%).

3950 Shale as above, some grey brown calcareous siltstone, shale are very bituminous in part (80%).
Sandstone - grey, very siliceous quartzitic with white granular anhydrite? material possibly filling fractures (20%).

3960 Shale - black to dark grey, finely laminated in part (varved), pyritic (60%).
Sandstone - grey, quartzitic, siliceous (quartzite) very hard, white granular anhydrite? (40%).

3970 Sandstone - grey, quartzitic, very siliceous, hard, vitreous, in part, with white anhydrous material, slightly pyritic (80%).
Shale - dark grey to black, fissile to blocky (20%).

3980 Sandstone - grey, fine grained quartzitic, very siliceous, hard, healed fractures (50%).
Shale - dark grey to black, fissile to blocky, pyritic in part, trace grey brown slightly calcareous siltstone (50%).

3990 Shale - dark grey to black, silty in part fissile to blocky, pyritic (90%).
Sandstone - grey to dark grey, quartzitic, siliceous, hard, slightly pyritic in part (10%).

4000 Shale - dark grey, hard, blocky, calcareous and silty in part, large pyrite nodules (90%).
Sandstone - grey, fine grained quartzitic, very siliceous, appears more fine grained, pyritic (10%).

4010 Sandstone - grey, fine grained quartzitic siliceous, hard, slightly pyritic in part, fractured, trace grey calcareous siltstone (50%).
Shale - dark grey to black, fissile, slightly pyritic in part (50%).

4020 Sandstone - grey to dark grey, fine grained quartzitic, siliceous, hard, trace pyrite (60%).
Shale - dark grey to black fissile trace of brown grey slightly calcareous siltstone (40%).

4030 Sandstone - grey, fine grained, quartzitic, slightly more friable, siliceous, fractured? (70%).
Shale - dark grey to black fissile (30%).

4040 Sandstone - grey to dark grey quartzitic (80%), siliceous, hard, bituminous partings.
Shale - dark grey to black fissile (20%).

4050 Sandstone - siliceous, bituminous, trace pyrite as above.(30%)
Shale - as above blocky --likely cavings (70%).

4060 Sandstone - medium dark grey, siliceous, quartzitic in part, pyrite cubes, fine grained, tight, bituminous, sub angular, well sorted (80%).
Shale - dark grey to black, blocky--splintery (20%).

4070 Sandstone - medium grey, siliceous, fine grained, bituminous, tight. Traces pyrite, sub angular, well sorted. Some white bituminous granular anhydrite grains, slightly siliceous, tight (60%).
Shale - dark grey to black, blocky (30%).

4080 Sandstone - siliceous, fine to very fine grained, medium grey traces of bitumen, angular, well sorted, some white micro-granular anhydrite cement and also loose white bituminous grains, tight *80%.
Shale - dark grey to black, trace pyrite (20%).

4090 Sandstone - siliceous, anhysritic, fine grained, light grey to medium grey, tight, slightly bituminous, sub angular, well sorted (70%).
Shale - dark grey,blocky (30%).

4100 Sandstone - medium to dark grey, fine grained, siliceous, pyritic, bituminous fractures, traces anhydrite cement, sub angular to sub rounded, medium sorted, tight (70%).
Shale - dark grey and blocky (30%).

4110 Sandstone - medium grey, fine grained, bituminous in patches, secondary quartz growths with quartz filled fractures, siliceous, sub angular, well sorted, tight (50%).
Shale - dark grey, blocky, brittle (50%).

4120 Sandstone - dark grey, very fine grained, quite bituminous, quite pyritic, siliceous, sub angular, well sorted, tight (40%).
Shale - dark grey to black, hard, blocky (60%).

4130 Sandstone - dark grey, fine to very fine grained, bituminous, possibly argillaceous, siliceous, sub angular, medium sorted, traces pyrite, tight (60%).
Shale - dark grey to black, traces carbonaceous material and pyrite, blocky, brittle (40%).

4140 Sandstone - as above, fine grained, medium grey, tight (70%).
Shale - mostly black, disseminated pyrite and pyrite cubes both, hard, brittle, very blocky.(30%).

4150 Sandstone - dark grey to black, fine grained, siliceous, bituminous, some grain very argillaceous, traces pyrite, tight, sub angular, medium sorted (50%).
Shale - dark grey to black with cubes and bands of disseminated pyrite, hard brittle splintery and blocky, slightly carbonaceous (50%).

4160 Shale - essentially black with loose pyrite cubes and disseminated pyrite bands, slightly carbonaceous (with leaf fossil imprints?) splintery--"platy" hard, brittle (60%).
Sandstone - medium to dark grey, fine grained traces pyrite, some sand grains in siltstone matrix, traces quartz filled fractures, tight, sub angular, medium sorted (60%).

4170 Shale - black with dark grey, traces of carbonaceous specks and disseminated pyrite, platy to splintery, hard and brittle (80%).
Sandstone - medium to dark grey, fine grained with a very dark grey silt matrix, tight, sub angular, medium sorted, some white quartz fracture fill. (20%).

4180 Sandstone - medium to grey (dark), fine grained with silt matrix (dark grey), traces of pyrite shale partings and quartz filled fractures, traces of anydrite?, tight, sub angular, medium sorted (50%).
Shale - black, blocky with quartz filled (50%).fractures, some grains have a greasy appearance--carbonaceous?, hard brittle.

4190 Shale - dark grey to black with some dark grey brown siltstone--carbonaceous streaks and disseminated pyrite bands; shale carbonaceous hard and brittle with pyrite bands; blocky and splintery (60%).
Sandstone - medium grey, fine grained, siliceous, slightly silty, traces of pyrite, and secondary quartz growths, sub rounded medium sorted, tight (40%).

4200 Sandstone - medium to dark grey, fine grained, argillaceous, slightly siliceous, trace pyrite, small quartz veinlets, trace bitumen in small fractures, tight, sub angular, medium sorted (60%).
Shale - dark grey, carbonaceous flecks, and patches of disseminated pyrite, splintery, hardbrittle (40%).

4210 Sandstone - medium to dark grey, fine grained, slightly argillaceous, quite fractured (quartz filled) also traces of bituminous fracture fill, slightly siliceous, sub angular, medium sorted, tight (60%).
Shale - dark grey, slightly carbonaceous with some quartz veinlets, hard, brittle splintery to flat chips, trace pyrite (40%).

4220 Sandstone - medium to dark grey, fine grained, slightly argillaceous, irregularly fractured with quartz infill, minute traces of pyrite and white to creamy anhydrite, loose white quartz from fractures, sub angular medium sorted, tight, siliceous. (80%).
Shale - as above with some silica grains in patches, disseminated pyrite bands (20%).

4229 Sandstone - dark grey, very fine grained, quite argillaceous, loose quartz from fractures also traces of quartz filled fractures, sub angular, medium sorted, tight, sandstone seem to grade to sandy shale (50%).
Shale - dark grey to black, with disseminated pyrite common as well as some cube clusters, some grains have fine sand grains common, hard, brittle, splintery to flat irregular chips (50%).

4240 Sandstone - light grey to dark grey, fine to medium grained, some grains silty and argillaceous, others are clean and siliceous, traces of bitumen, some pyrite filled fractures, sub rounded medium sorted, tight (60%).
Shale - (cavings?) dark grey to black, pyritic, splintery, hard, and brittle (40%).

4250 Sandstone - light to medium grey, fine grained, traces of pyrite, and white anhydrite grains, siliceous, sub rounded, well sorted, tight, traces of very pyrite, slightly argillaceous, trace of bitumen (60%).
Shale - as above (cavings?) 40%.

4260 Sandstone - light grey to medium grey, fine to medium grained, traces of dolomite fracture fill, quite siliceous, (minute traces of bituminous crypto-crystalline dolomite--grey brown), slightly bituminous, sub rounded, medium sorted, tight (60%).
Shale - essentially black with some white crypto-crystalline dolomite fracture fill, traces of disseminated pyrite and nodules splintery and hard (40%).

4270 Sandstone - medium grey, fine grained, siliceous, slightly dolomitic, trace pyrite, sub angular, medium sorted, tight. Some loose white crypto-crystalline dolomite grains--fracture fill? (70%)
Shale - black, hard, splintery, pyrite veinlets and white crypto-crystalline dolomite fracture fill (30%).

4280 Shale - black, splintery, fractured with quartz infill, pyrite, some coarse crystalline medium brown dolomite infill, disseminated pyrite bands, brittle, hard (80%).
Sandstone - light grey to medium grey, slightly dolomitic and siliceous with possible white crypto-crystalline calcite fracture fill, some white micro-granular anhydrite cement?, very fine grained, sub angular, medium sorted (20%).

4290 Shale - dark grey to black, splintery, fissile, medium to soft some gypsum? fracture fill (90%).
Siltstone - medium grey to medium grey brown, dolomitic.
Sandstone - white to medium grey, fine grained, angular to subrounded poorly sorted, tight, trace pyrite, slightly dolomitic and siliceous (10%).

4300 Shale - dark grey to black, trace pyrite, slightly silty, medium to hard, splintery to blocky (70%)
Siltstone - medium grey brown to dark grey slightly dolomitic.
Sandstone - medium grey brown, trace pyrite, slightly siliceous/dolomitic and argillaceous, angular to sub rounded, poorly sorted, tight (30%).

4310 Shale - dark grey to black, partly silty, medium to soft, fissile slightly, some fine crystalline brown dolomite fracture fill, quite dolomitic, blocky (90%).
Sandstone - medium grey, fine grained, slightly argillaceous, siliceous and dolomitic, sub angular, medium sorted, tight (10%).

4320 Shale - dark grey, medium to soft, blocky, gouges fairly easily, trace silt, traces of pyrite, slightly dolomitic, (90%) blocky, some brown siltstone (5%).
Sandstone - white to light grey, fine to medium grained, sub angular, well sorted, tight, siliceous (looks like from uphole) (<5%).

4330 Shale - dark grey to black, splintery, pyrite nodules, slightly silty to some light grey siltstone, medium hardness (65%).
Sandstone - medium grey, fine grained, dolomitic, slightly argillaceous and siliceous, sub angular, medium sorted, traces of pyritic, tight (35%).

4340 Shale - dark grey to black, splintery, traces of pyrite, soft to medium, fissile (90%).
Sandstone - medium to dark grey, sub angular medium sorted, slighcly argillaceous and dolomitic, tight, slightly siliceous (10%). Poor Sample.

4350 Shale - dark grey, splintery to irregular plats, medium hardness, traces of very fine pyrite cube clusters, very slightly dolomitic in part (100%).

4360 Shale - dark grey to black, splintery and blocky, traces of small dolomitic veinlets, slightly dolomitic, traces of disseminated pyrite, medium hardness (100%).

4370 Shale - dark grey to black, blocky, splintery and irregular plates, trace of pyrite in black shale (cavings), medium to soft, fissile.

4380 Shale - dark grey to very dark grey, pyrite nodules, mainly blocky and irregular plates, soft to medium, fissile (100%).

4390 Shale - dark grey to very dark grey, blocky with irregular plates, traces of pyrite nodules, fissile, soft to medium (100%).

4400 Shale - very dark grey, pyrite nodules block with irregular more or less flat chips. Occasional silt and occasional dark grey brown dolomitic silty grain.

4410 Shale - medium grey, mainly blocky, traces of disseminated pyrite and pyrite nodules, soft (95%).
Sandstone - fine to medium grained, medium grey brown, sub angular, medium sorted, traces bitumen, tight, slightly dolomitic (5%).

4420 Shale - dark grey to very dark grey essentially blocky with micro-nodular pyrite, carbonaceous leaft print, soft to medium hard (100%).

4430 Shale - as above with traces patchy disseminated pyrite and micro-veinlets pyritized, more splintery to irregular plates, occasional silty grain slightly dolomitic, soft (100%).

4440 Shale - dark grey, no silt, pyrite nodules (trace) more or less flat plates, medium hard (100%).

4450 As above, occasional dark grey brown silty grains, slightly dolomitic, pyritic patches and micro-nodules, soft, more splintery. (100%)

4460 As above, slightly pyritic.

4470 Shale - dark to very dark grey with traces of micro-dolomitic fractures, occasional silty, traces of pyritic cluster, medium hardness, splintery and platy (95%).
Sandstone - medium grey brown, medium grained, slightly dolomitic, pyritic and siliceous, tight, sub rounded, well sorted/trace of quartz filled fractures (≤5%).

4480 Shale - as above, disseminated pyrite (moderate, medium hard, blocky and platy) no silt (100%).

4490 Shale - as above, some siliceous grains, disseminated pyrite (traces) 100%.

4500 Shale - as above, no fractures, soft to medium hard, pyrite, as above (100%).

4510 Shale - as above, occasional silty grains, dark grey (100%).

4520 Shale- dark to very dark grey, splintery to platy, occasional silt, a trace of disseminated pyrite blebs. Soft to medium.

4530 Shale - dark grey, platy, soft to medium, patches of disseminated pyrite and micro nodules, atrace of microcrystalline medium brown dolomite fracture fill.

4540 Shale - dark to very dark grey, as above—no fracture traces.

4550 Shale - as above, mostly dark grey with pyrite.

4560 Shale - very dark grey, platy to splintery, occasional silty, very slightly dolomitic, trace of disseminated pyrite, medium hard.

4570 Shale - as above, a trace of crypto-crystalline dolomitized micro fractures. Very slightly dolomitic.

4580 Shale - dark grey to black, pyritic, occasional silt, platy to blocky, medium hard (Note: pyritic nodules and irregular bands).

4590 Shale - as above.

4600 Shale - as above, slightly more silty, pyritic and very slightly dolomitic occasionally.

4610 Shale - dark to very dark grey, platy to blocky, occasionally silty, micro fractures--dolomite filled (trace), silty, micro fractures, scattered minute traces of pyrite, medium hard to soft.

4620 Shale - as above.

4630 Shale - very dark grey, essentially blocky, micro fractures dolomite filled, pyrite clusters, medium hard, occasionally silty.

4640 Shale - as above with some dark grey siltstone (<5%) (argillaceous), slightly dolomitic, shale has dolomite filled micro fractures, moderately pyritic with clusters.

4650 Shale - as above with siltstone (<5%), as above, pyritic.

4660 Shale - dark to very dark grey, fractured, filled with quartz and some dolomite, some silty grains--quite dolomitic, pyrite nodules and irregular clusters. Some shale grains are very pitted and some are filled with soft buff, sugary material? fracturing very irregular, grains are mostly blocky, medium hard.

4670 Shale - as above, less pyrite (traces) clusters mostly.

4680 Shale - as above, more normal--less fracturing, moderately pyritic, blocky, no pitted grains.

4690 Shale - dark to very dark grey, occasionally silty, traces of fracturing--quartz filled, moderately pyritic with some chalco pyrite to very pyritic (pyrite in clusters, bands, nodules and as loose grains), blocky to slightly splintery medium hardness.

4700 Shale - as above, traces of pyrite filled fractures, loose pyrite grains.

4710 Shale - as above, traces of white speckled shale grains, white quartz fracture fill, disseminated pyrite bands and clusters, some nodular pyrite--moderate, shale grains blocky.

4720 Shale - dark grey to black, very pyritic (bands, nodules, clusters), trace chalco?, trace of silt, very slightly dolomitic where silty, medium hard, blocky.

4730 Shale - as above, very pyritic (have pyrite grains speckling the shale).

4740 Shale - as above scattered traces of pyrite occurring as above, 5% siltstone, very argillaceous, pyritic, dolomitic, dark grey brown, shale still blocky.

4750 Shale - as 4720, fossil imprint?, some white dolomite fracture, fill, pyrite speckled in shale as well as other occurances no chalco here. Scattered traces of dolomitic siltstone.

4760 Shale - very dark grey to black, mostly blocky, pyrite speckled, moderately abundant, siliceous micro crystalline dolomite fracture fill, occasional silty grains--pyritic and quite dolomitic, shale grains are medium hard to very hard, block.

4770 Shale - micro and macro dolomite (white) filled fractures, moderately pyritic (speckled & clusters), blocky, trace of buff dolomite grains mottled with white secondary dolomite, no obvious silt, grains are very hard to hard.

4780 Shale - as above, traces of fractures, moderately pyritic, no dolomite grains.
Sandstone - 5%, olive green to dark grey, very fine grained, partly dolomitic to calcareous, siliceous, angular, slightly argillaceous, poorly sorted (cavings?)

4790 Shale - (90%), dark grey (mainly) to very dark grey, blocky, traces of pyrite, dolomite filled micro fractures, hard to very hard, moderately silty, dolomitic to calcareous in places, Sandstone - (10%), dark grey to medium grey, fine to very fine, grained, slightly argillaceous, dolomitic and siliceous, tight, has some white dolomite speckling sub-angular, poor to medium sorted, some pale green calcareous infill (cavings?).

4800 Shale - (90%), dark grey to black, partly silty, dolomite filled micro fractures, traces of speckled pyritic shale and disseminated pyrite patches, some silty grains--slightly dolomitic, hard.
Sandstone - (10%), as above. One dolomite grain, medium grey, microcrystalline, with a dolomite (white) filled micro fracture, slightly argillaceous.

4810 Shale - very dark grey to black, partly silty, traces of dark brown, dolomite fill of very irregular micro fractures, traces of pyrite specks, disseminated pyrite patches and pyritic fractures, blocky, hard, trace of sandstone as above.

4820 Shale - medium grey brown to very dark grey, slightly silty, pyritic (speckled, clustered and as bands and fracture fill), some light grey brown silty dolomitic shale grades to siltstone (10%)--dolomitic, micro-micaceous, shale is more or less blocky with traces of white dolomite filled micro fractures, grains are medium hard to hard.

4830 Shale - As above, less siltstone (5%), shale more splintery and irregular plates, pyritic (moderately), patches, clusters and disseminated bands.

4840 Shale - Dark grey to black, slightly silty, blocky to irregular chips, traces of pyrite (disseminated) bands, traces of red brown ironstone patches and nodule, medium hard to hard.

4850 Shale - As above, silty, pyrite--speckled bands and disseminated nodules, shale medium hard to hard, more platy.

4860 Shale - Dark grey, blocky and plated, minute traces of pyrite and also ironstone, very hard to hard, traces of white dolomite micro fracture fill.

4870 Shale - As above, mostly platy, very scattered traces of pyrite cubes, slightly silt, hard.

4880 Shale - As above, trace of white calcite and dolomite patches, only trace of pyrite, medium hard to hard.

4890 Shale - As above, platy and blocky, traces of pyrite cubes, loose white and clear calcite grains and white speckled calcareous shale, medium hard, brittle.

4900 Shale - Dark grey to black, splintery and platy, occasional pyrite cube clusters and disseminated pyrite nodules, soft to hard, very slightly dolomite, slightly fissile.

4910 Shale - As above, platy, trace of pyrite and a red-brown iron nodule, dark grey,

4920 Shale - As above, trace of pyrite cubes and traces of clusters of disseminated pyrite--no iron nodules.

4930 Shale - dark grey, occasional loose pyrite, blocky and platy, medium hard, very slightly silty.

4940 Shale - No evidence of pyrite, medium hard, as above.

4950 Shale - Very dark grey to dark grey, silty, medium hard to hard, a trace of disseminated pyrite, blocky to very irregular plates.

4960 Shale - As above, slightly dolomitic.

4970 Shale - As above, traces of dark grey, argillaceous, micro-crystalline.
Limestone - (5%), shale non-dolomitic here.

4980 Shale - Very dark grey to dark grey, abundant micro fracturing white calcite filled, some bituminous, a trace of disseminated pyrite, platy and blocky, medium hard to hard, slightly silty,
Limestone - As above, (10%).

4990 Shale - Very dark grey, as above, traces of loose white calcite and calcite filled micro fractures, traces of disseminated pyrite bands, shale medium hard to very hard, some calcite filled macro fractures, blocky.

5000 Shale - Very dark grey, loose white calcite and calcite filled micro fracture, as above, pyrite, disseminated bands and clusters (cubes), hard to very hard, trace of light grey siltstone, trace bitumen in fractures.

5010 Shale - As above, some white speckled (calcite) shale, no silt, trace bitumen.

5020 Shale - As above, very slightly pyritic, hard, bitumen--trace.

5030 Shale - As above, no pyrite, loose calcite and calcareous fracture fill.

5040 Shale - Very dark grey to black, medium hard to hard, (~90%), white calcite filled fractures, a trace of pyrite--disseminated shale, blocky.
Dolomite - micro-crystalline, very argillaceous (40%), tight, mostly dark grey, a trace of calcite (white) filled fractures, moderately calcareous. (~10%).

5050 Shale - As above, calcite very abundant--very fractured shale (80%).
Dolomite - As above, quite calcareous, quite fractured--calcite filled (20%).

5060 Shale - Very dark grey to black, traces of calcite filled fractures, blocky, medium hard brittle, loose white and clear calcite crystals (90%).
Dolomite - As above, (5%).

5070 Shale - As above, black, hard, brittle, slightly calcareous.

5080 Shale - Black, blocky, hard, moderately, pyritic, loose grains of pyrite, traces of white calcite filled fractures, very slightly dolomitic.

5090 Shale - As above, some platy grains.

5100 Shale - As above, slightly silty, medium hard, trace only of calcite.

5110 Shale - As above.

5120 Shale - As above, calcite veinlets more abundant, still moderately pyritic (5%), dark grey dolomite, slightly argillaceous, micro-crystalline, dense.

5130 Shale - Black, blocky to platy, pyrite, disseminated pyrite bands and clusters, also some nodules, hard, traces of calcite filled fractures, very slightly silty.

5140 Shale - As above, less silty, slightly pyritic.

5150 Shale - Dark grey to black, traces of loose pyrite, very slightly dolomitic, blocky to platy, medium hard.

5160 Shale - As above, some loose white calcite.

5170 Shale - Dark grey to black, blocky with irregular plates, traces of loose pyrite, hard to medium hard, a trace of white calcite fracture fill.

5180 Shale - Dark grey, platy to blocky, traces of disseminated pyrite very slightly silty, hard, brittle.

5190 Shale - As above, trace of calcite fracture fill and pyrite cubes, no silt (50%) very dark grey shale.

5200 Shale - As above, traces to moderately pyritic.

5210 Shale - As above, trace of nodular pyrite, calcite fracture fill.

5220 Shale - As above, trace only of pyrite, blocky.

5230 Shale - As above.

5240 Shale - As above.

5250 Shale - Very dark grey to black, platy to blocky, pyrite speckled grains, traces, medium hard.

5260. Shale - As above, some loose pyrite.

5270 Shale - As above, very little pyrite, a trace of dark grey brown fine crystalline dolomite fracture fill--siliceous.

5280 Shale - As above, more pyrite.

5290 Shale - As above, quite pyritic.

5300 Shale - Dark grey, platy to blocky, medium hard, disseminated, pyrite bands--trace.

5310 Shale - As above, no apparent pyrite.

5320 Shale - As above, mostly platy, trace of pyrite.

5330 Shale - As above, trace of very light grey to white crypto crystalline dolomite, slightly siliceous, tight.

5340 Shale - Dark grey to very dark grey, blocky to irregular plates, trace pyrite, slightly silty, medium hard to hard, slightly dolomitic.

5350 Shale - As above, trace of silt, non-dolomitic, traces of black and white chert, slightly more pyritic.

5360 Shale - As above.

5370 Shale - Dark grey, very slightly silty, trace white chertand pyrite some white quartz and white dolomite fracture fill, blocky to platy, medium hard to hard.

5380 Shale - As above, no dolomite or quartz, moderately pyritic, no chert, slightly silty.

5390 Shale - As above, medium hard, platy to blocky, trace pyrite.

5400 Shale - Dark grey to very dark grey, moderately pyritic--cubes, slightly silty, medium hard to hard, irregular plates to blocky.

5410 Shale - Dark grey, platy (to blocky), an occasional dark grey brown dolomitic grain, no pyrite apparent, small traces loose white dolomite--fracture fill?, hard, very slightly silty.

5420 Shale - As above, no silt, trace only of pyrite in with white dolomite fracture fill.

5430 Shale - As above, very little white dolomite, no pyrite, trace of some light to medium green material--non-sedimentary origin <1/2%, (sample dirty due to poor washing water).

5440 Shale - Dark grey, slightly silty, blocky to irregular plates, trace only of white microcrystalline dolomite fracture fill, grains hard and brittle, no apparent pyrite.

5450 Shale - As above, trace only of silt and also pyrite and dolomite--buff here.

5460 Shale - As above, no silt, moderately pyritic--disseminated and cubes.

5470 Shale - As above, no silt, slightly pyritic, some grains slightly dolomitic, some loose clear quartz grains ≤1/2%.

5480 Shale - Dark grey to black, hard, irregular plates to blocky, traces of dolomite fill in fractures, trace, disseminated pyrite, minute traces of quartz fracture fill, shale could appear slightly siliceous.

5490 Shale - Dark grey to black, hard, variably pyritic, locally slightly calcareous, about 1% siltstone to very fine grained sandstone, generally calcareous, fairly commonly with some fine black material of possible carbonaceous, bituminous or? metallice nature; bit of quartzite or quartzose sandstone, fine grained, sub-angular, sub-rounded, moderately sorted, tight, calcite or quartz and calcite veinlets ?; a few possible fossil fragments?.

5500 Shale - Approximately as above.

5510 Shale - Approximately as above.

5520 (Corrected to 5519) Shale - Dark grey to black, pyritic, white calcite veinlet or infill, trace of siltstone, very fine grained sandstone and quartzite, somewhat calcareous, the latter two constituents may also show some blackish material which is possibly of bituminous nature.

5530 (Corrected to 5528) Shale - As above, white calcite as above, trace of microcrystalline medium grey dolomite, fine grained quartzose sandstone, quartzite and siltstone which is slightly calcareous dark brown and possibly somewhat bituminous.

5540 (Corrected to 5536) Shale - As above, white calcite as above, less than 1% quartzose sandstone, fine to very fine grained grading to siltstone, fairly well sorted, variably calcareous, in places with some bitumen-like material; trace of dolomite, dark brown, microcrystalline, tight.

5550 (Corrected to 5546) Shale - as Above, white calcite as above, trace of black chert, dolomite variably calcareous and argillaceous, dark brown, microcrystalline; trace of quartzose sandstone, fine to very fine grained, in places pyritic, grading to quartzite, locally with some blackish bitumen-like material.

5560 (Corrected to 5553) Shale - As above, white calcite as above, trace--less than 1% quartzose sandstone, fine grained sub-angular to subrounded, fairly well sorted, grading in places to quartzite, locally with some blackish bitumen-like material, trace to less than 1% dolomite, calacareous, argillaceous, microcrystalline, dark brown.

5570 Shale - Dark grey to black, pyritic, hard, white calcite and some white dolomite infill or veinlets; less than 1% quartzose sandstone, in places calcareous and pyritic, locally with a trace of a bitumen-like material, trace of quartzite, pyritic.

5580 Shale - As above, white calcite from veinlets, less than 1% quartzose sandstone, grading to quartzite, very fine grained, to fine grained, moderately sorted in places slightly calcareous, pyritic, locally with a trace of a bitumen-like material.

5590 Shale - Calcite and sandstone as above, trace of limestone, dark grey with a brownish tinge, very fine grained.

5600 As above.

5610 Shale - Dark grey to black, pyritic and hard; white calcite veinlets and quartz crystals of medium size, infill, less than 1% dolomite, somewhat calcareous and probably argillaceous, dark grey, microcrystalline to very fine crystalline trace of limestone, dark grey, microcrystalline, trace of sandstone, very fine to fine grained, in places pyritic.

5620 Shale - and calcite as above; less than 1% dolomite, calcareous grading partly into dolomitic limestone probably argillaceous, microcrystalline to very fine crystalline, trace of sandstone, very fine to fine grained, in places pyritic and locally showing a quartzitic tendency.

5630 As above, calcite occurs also in crystals of medium size.

5640 Shale - Dark grey to black, pyritic, fairly hard, some quartz and calcite crystals and some white calcite veinlets and infill, about 1% very fine grained sandstone or siltstone, ranging to

5640 contd fine grained sandstone, rather quartzose, locally with a quartzitic tendency, in places somewhat calcareous, pyritic and probably argillaceous; less than 1% dolomite, argillaceous, dark grey with a slight brownish tinge, somewhat calcareous in places and possibly grading to limestone.

5650 Shale - Dark grey to black, pyritic, fairly hard; white calcite veinlets and infill, less than 1% sandstone, very fine to fine grained, rather quartzose with a quartzitic tendency in places, locally calcareous and pyritic; trace of siltstone, calcareous and argillaceous, trace of limestone and probably dolomite, dark grey, probably argillaceous, very fine grained to microcrystalline.

5660 Shale - Dark grey to black, pyritic fairly hard, slightly calcareous in places, white calcite veinlets and infill, about 1% limestone, probably argillaceous, locally slightly to very pyritic, dark brown, microcrystalline, less than 1% sandstone as above.

5667 Shale - Dark grey to black, pyritic, fairly hard, locally slightly calcareous or dolomitic; white calcite veinlets and infill, less than 1% sandstone, commonly quartzose, very fine to fine grained, moderately sorted, in places with a quartitic tendency, locally a little pyritic; trace of siltstone, argillaceous, variably calcareous, medium grey, trace of limestone, dark grey with a brownish tinge, microcrystalline.

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GULF OIL CANADA LIMITED

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