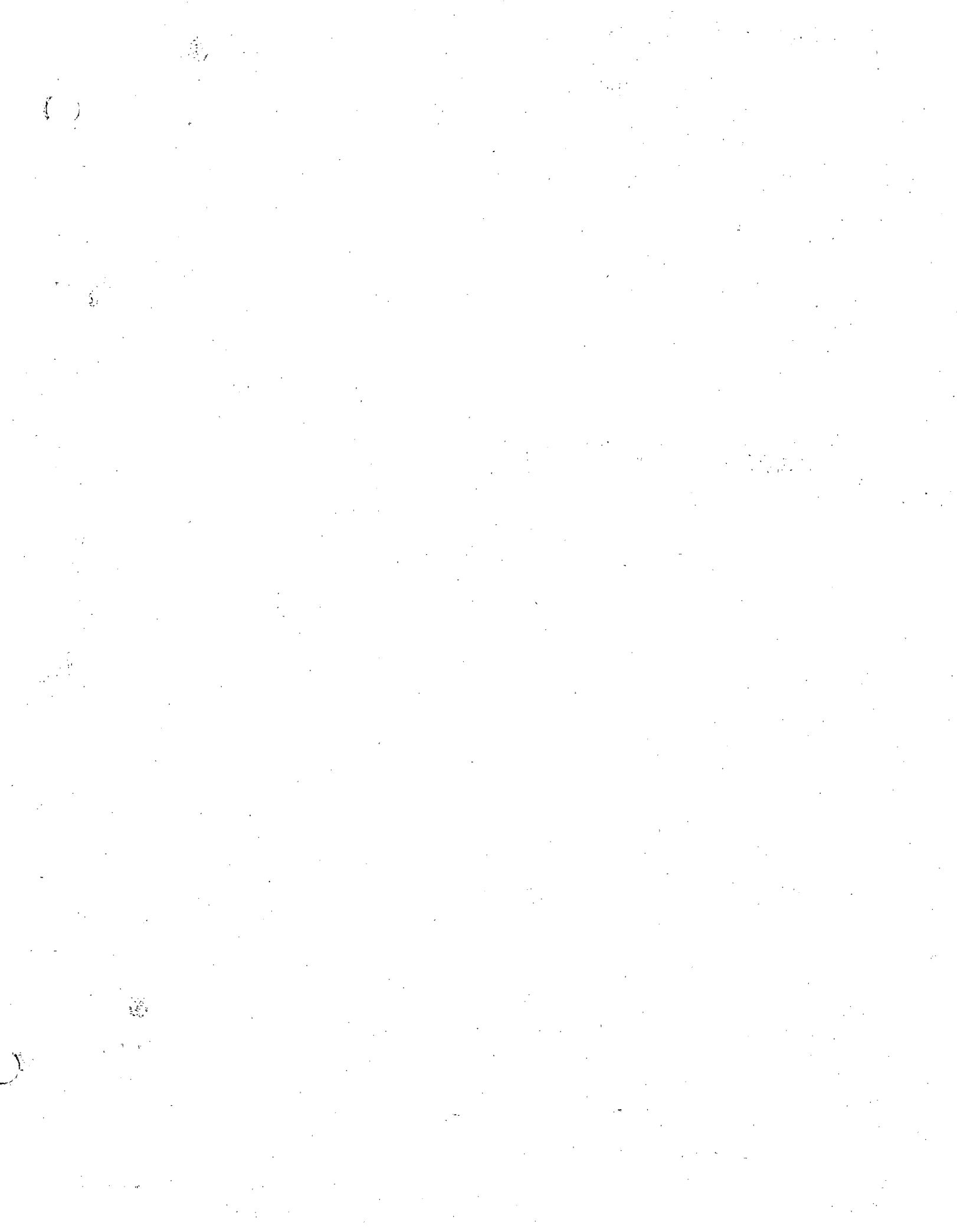


WELL HISTORY REPORT

PAN AM-HOME-SIGNAL-CSP A-1 KOTANEELEE Y (P50)  
Unit P Section 50 Grid 60°10'N, 124°00'W.

YUKON TERRITORIES



WELL HISTORY REPORT

PAN AM-HOME-SIGNAL-CSP A-1 KOTANEELEE YTP-50

UNIT P SECTION 50 GRID 60°10' N, 124°00' W.

YUKON TERRITORIES

PAN AMERICAN PETROLEUM CORPORATION  
Calgary, Alberta  
February, 1964

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ENCLOSURES

LOGS (See complete List on Page 70)

Induction Electrical Log

Gamma Ray Neutron

Sonic Log with Gamma Ray and Caliper

Caliper

Depth Determination

DRILLSTEM TEST CHARTS

D. S. T. #1

ANALYSIS

Water Analysis

WELL HISTORY REPORT

SECTION I

Summary of Well Data

(a) Well Name and Number

Pan Am-Home-Signal-CSP A-1 KotaneeleeYTP-50

(b) Permittee

Pan American Petroleum Corporation	25%
Canada Southern Petroleum Limited	50%
Dome Petroleum Ltd.	12-1/2%
Kern County Land Company	2-1/2%
Home Oil Company Limited	10%

(c) Name of Operator

Pan American Petroleum Corporation  
Bentall Building  
Calgary, Alberta

(d) Location

Unit P Section 50 Grid 60°10' N, 124°00' W.  
Latitude 60°09'46.83" N; Longitude 124°07'53.95" W.

(e) Co-Ordinates

S. 1336.9' and W. 1212.0' of N.E. Corner of Unit P.

(f) Permit Number

#1007

(g) Drilling Contractor

Peter Bawden Drilling Company  
Rig No. 18  
Type Oilwell "96"

(h) Drilling Authority

#110  
February 14, 1962.

(i) Classification

Exploratory

(j) Elevation

K.B. 1490'  
Ground 1475.25'

(k) Spudded

<sup>16</sup>  
March 15, 1962

(l) Completed Drilling

<sup>23</sup>  
August 27, 1963

(m) Total Depth and Plugged Back Total Depth

14,470' Middle Devonian Nahanni Dolomite  
11,799' (P.B.D.) Upper Devonian Shale

(n) Well Status

Suspended

(o) Rig Released

~~August 23, 1963~~  
~~January 24, 1964~~

*Jan. 24 / 64*

(p) Hole Size

17 1/2"	hole	0'	-	417'
12-1/4"	hole	417'	-	4,411'
8-5/8"	hole	4,411'	-	11,560'
6-1/4"	hole	11,560'	-	14,470'

(q) Casing

13-3/8" at 417' cemented with 400 saxes plus 2% CaCl<sub>2</sub>

9-5/8" at 4411' cemented with 1000 saxes Oilwell and 4% Gel plus 270 saxes Neat

7" at 11,560' cemented with 715 saxes Oilwell plus 1.65% HR 12 retarder.

SECTION II

Geological Summary

(a) Formation Tops

<u>Sample Tops</u> <i>1340 Miss. shale?</i>	<u>Depth</u>	<u>Subsea</u>
Miss. Lime-shale unit	5500'	- 4010
Miss. Shale	7905'	- 6415
Devonian Shale	9800'	- 8310
Second Black Shale		
Nahanni Dolomite	14407'	-12917

E-Log Tops

Miss. Lime-shale unit	5482	- 3992
Miss. Shale	7910	- 6420
Devonian Shale	9792	- 8302
Second Black Shale	13280	-11790
Nahanni Dolomite	14407	-12917

(b) Cored Intervals

Core #1	9903- 9947	Upper Devonian Shale	Cut 44'	Recovered 44'
Core #2	11077-11081	Upper Devonian Shale	Cut 4'	Recovered 2'

(c) Core Description

Core #1 9903-9947

Shale, dominantly dark grey to black, moderately hard, splintery to sub fissile, non siliceous, fractured and infilled with secondary white dolomite, trace pyrite crystals.

Bedding planes dip at 35°, hole deviation 6.5° S.E., thus range of dips possible from core with dip of 35°, with the indicated hole deviation is 28.5° S.E. to 41.5° N.W.

Core #2 11077-11081

Shale, black, hard, commonly siliceous, slightly dolomitic.

Bedding planes dip at 48°, hole deviation 7.5° S.E. thus range of dips possible with indicated dip and hole deviation is 41.5° S.E. to 55.5° N.W.

Core Drilling Rates

Core #1 9903-9947

9903-9904	23 minutes	9925-9926	37 minutes
9904-9905	24 minutes	9926-9927	38 minutes
9905-9906	24 minutes	9927-9928	27 minutes
9906-9907	25 minutes	9928-9929	29 minutes
9907-9908	39 minutes	9929-9930	33 minutes
9908-9909	25 minutes	9930-9931	20 minutes
9909-9910	29 minutes	9931-9932	25 minutes
9910-9911	29 minutes	9932-9933	29 minutes
9911-9912	16 minutes	9933-9934	30 minutes
9912-9913	24 minutes	9934-9935	26 minutes
9913-9914	29 minutes	9935-9936	28 minutes
9914-9915	30 minutes	9936-9937	30 minutes
9915-9916	25 minutes	9937-9938	32 minutes
9916-9917	21 minutes	9938-9939	26 minutes
9917-9918	33 minutes	9939-9940	31 minutes
9918-9919	32 minutes	9940-9941	36 minutes
9919-9920	32 minutes	9941-9942	37 minutes
9920-9921	33 minutes	9942-9943	35 minutes
9921-9922	36 minutes	9943-9944	29 minutes
9922-9923	33 minutes	9944-9945	29 minutes
9923-9924	23 minutes	9945-9946	29 minutes
9924-9925	33 minutes	9946-9947	37 minutes

Core #2 11077-11081

11077-11078	40 minutes
11078-11079	42 minutes
11079-11080	47 minutes
11080-11081	56 minutes

Special Note Regarding Original Surface Hole

- (a) Spud Date  
March 16, 1962. Rig skidded 20 feet and respudded April 8, 1962.
- (b) Total Depth  
1340' Mississippian shale
- (c) Hole Size  
17 $\frac{1}{2}$ " 0-1054'  
12 $\frac{1}{4}$ " 1054-1340'
- (d) Casing Record  
March 13 3/8" x 54.5 J55 ST&C at 1047' cemented with 1150 sacks  
+ 2% CaCl<sub>2</sub>.  
  
Casing parted on March 31 and portion fell down hole. Top of fish  
at 1114'. Casing cut 3' below ground and welded on plate.
- (e) Plug Record  
Plug #1 1090-908 cemented with 75 sacks.  
Plug #2 Surface plug cemented with 8 sacks.

(d) Sample Descriptions

- 0 - 50 Quartzitic, sandstone, quartz, chert.
- 50 - 130 Very minor trace shale, dark grey to black.
- 130 - 170 Quartzitic, pebbles, medium to coarse.
- 170 - 270 Trace shale, dark grey to black.
- 270 - 300 Shale, dark grey to black, blocky, hard, silty, mica, slightly bituminous
- 300 - 320 Shale dark grey to black, blocky, hard, silty, mica, slightly bituminous.
- 320 - 340 Dolomite, light to medium brown, very fine crystalline, hard, brittle, dense (cavings?)
- 340 - 390 Lost circulation - no samples.
- 390 - 500 Shale, dark grey to black, medium hard, silty, mica.
- 500 - 520 Shale, dark grey to black, blocky to fissile, soft, slightly silty, mica.
- 520 - 600 slightly silty in part.
- 600 - 710 Shale, dark grey to black, blocky to fissile, soft, slightly silty in part, mica.
- 710 - 760 as above.
- 760 - 800 pyrite, trace quartz filled fractures.
- 800 - 810 Shale, dark grey to black, blocky, medium hard mica pyrite, with trace quartzitic sandstone.
- 810 - 830 increase in sandstone, trace quartzitic filled fractures.
- 830 - 900 Abundant unconsolidated quartzitic grains and quartzitic sandstone, very micaceous in part (caving?).
- 
- 900 - 950 Shale, dark grey to black, blocky, soft, micaceous, pyrite, trace quartzitic filled fractures.
- 950 - 990 trace quartzitic filled fractures.
- 990 - 1000 pyrite veining.
- 1000 - 1100 Shale, dark grey to black, blocky to platy, soft to medium hard, micaceous, pyritic.
- 1100 - 1180 Shale, dark grey to black, blocky, soft, slightly silty, micaceous, pyritic.

- 1180 - 1190 Shale, as above, siltstone to very fine grained sandstone, medium brownish grey, well sorted, medium, hard, tight, micaceous.
- 1190 - 1200 Dominantly siltstone to very fine grained sandstone, as above.
- 1200 - 1270 Shale, dark grey to black, blocky, soft, slightly silty, micaceous, pyritic.
- 1270 - 1290 Shale, as above, siltstone, to very fine grained sandstone, medium to dark brownish grey.
- 1290 - 1300 Increase in siltstone.
- 1300 - 1310 Shale, very dark grey, blocky to subangular, fissile, micaceous, carbonaceous? occasionally silty and siltstone, greenish grey (5%) vein calcite.
- 1310 - 1320 as above, with slickensides; trace pyrite, trace chert on slickensides.
- 1320 - 1330 as above, more siltstone, ~~dirty, greenish grey,~~ greasy, very slightly dolomitic in part, grading, very argillaceous.
- 1330 - 1340 as above, no vein calcite, fine to medium grain crystalline, white.
- 1340 - 1360 as above, trace siltstone, pyritic.
- 1360 - 1370 Shale, as above, pyrite, occasionally slickenside.
- 1370 - 1380 as above, with vein calcite and dolomite, fine to medium grain crystalline, white.
- 1380 - 1390 as above, with fossils.
- 1390 - 1400 as above, with trace vein calcite.
- 1400 - 1410 as above, trace chert on slickensides
- 1410 - 1430 as above, trace vein calcite and dolomite, fine to medium grain crystalline, white.
- 1430 - 1440 as above, very pyritic, very dark to black.
- 1440 - 1450 as above, with shale, very dark grey to black, subangular, fissile, micaceous to micromicaceous, pyritic.
- 1450 - 1460 Shale, very dark grey to black, subangular, fissile, micaceous to micromicaceous, pyritic, trace vein dolomite and calcite, fine to medium grain crystalline, white.

- 1460 - 1470 Shale, as above, very micaceous, blocky, laminated, silty, very slightly dolomite and occasionally laminated, siltstone, dark grey, very argillaceous.
- 1470 - 1480 as above, no pyrite.
- 1480 - 1490 as above, with vein calcite and dolomite, medium grain crystalline, white.
- 1490 - 1500 as above, pyrite.
- 1500 - 1520 as above, slightly less siltstone.
- 1520 - 1530 Shale, very dark grey, blocky, to subangular, fissile, micaceous, carbonaceous? occasionally slightly silty, trace vein calcite; pyrite, very occasional slickenside.
- 1530 - 1560 as above, with vein dolomite, coarse crystalline, white.
- 1560 - 1600 as above, trace to no siltstone, no vein carbonate; trace pyrite.
- 1600 - 1670 as above, micaceous to micromica. no siltstone, no vein carbonate; trace pyrite.
- 1670 - 1690 as above, micaceous to micromicaceous, predominately subangular, fissile in part, trace pyrite.
- 1690 - 1760 as above, pyrite.
- 1760 - 1810 as above, occasional micaceous.
- 1810 - 1850 as above, more fissile.
- 1850 - 1880 Shale, very dark grey, blocky and subangular, fissile, micaceous to micromicaceous to micaceous carbonates? very slightly pyritic, very occasionally slickenside.
- 1880 - 1890 as above, in part black, with coarse white crystalline, vein calcite.
- 1890 - 1900 as above, with vein calcite, white coarse crystalline.
- 1900 - 1920 as above, calcite, abundant.
- 1920 - 1940 as above, trace calcite.
- 1940 - 1950 as above, abundant pyrite.
- 1950 - 1960 as above, abundant pyrite, very occasional vein calcite, white medium grain crystalline.

- 1960 - 1970 Shale, as above, with pyritic worm tubes.
- 1970 - 1990 as above, abundant pyrite.
- 1990 - 2000 very poor sample - stuck in hole.
- 2000 - 2010 as above, abundant slickensides; occasional secondary calcite.
- 2010 - 2030 as above, occasional vein calcite, white crystalline.
- 2030 - 2060 as above, more fissile.
- 2060 - 2090 as above, with vein dolomite and trace vein calcite.
- 2090 - 2110 as above, darker, more fissile in part, more micaceous fine grain crystalline, very occasional to trace vein dolomite and calcite, coarse crystalline, white.
- 2110 - 2120 as above, very occasional vein dolomite and calcite, white, coarse crystalline.
- 2120 - 2130 as above, more dolomite.
- 2130 - 2140 as above, more fissile, darker.
- 2140 - 2180 as above, trace pyrite.
- 2180 - 2190 as above, more blocky, trace to no vein carbonates.
- 2190 - 2210 as above, very occasional lamina, silty, calcarenite, quartzitic.
- 2210 - 2240 as above, darker, more vein dolomite and calcite, trace silt.
- 2240 - 2290 as above, no pyrite to trace; trace vein calcite.
- 2290 - 2330 as above, darker.
- 2330 - 2340 as above, more pyrite, micaceous, occasional fine grain to very fine grain crystalline.
- 2340 - 2350 as above, softer, very micaceous.
- 2350 - 2370 as above, very micaceous, very slightly silty, slightly to very slightly dolomite.
- 2370 - 2390 Shale, very dark grey, blocky, very micaceous, very fine grain, carbonaceous?
- 2390 - 2400 as above, with shale, very dark grey, micaceous to micro-micaceous, subangular, fissile to blocky, as above.

- 2400 - 2410 Shale, as above, very occasionally laminated, siltstone, dark, slightly greenish grey, quartzitic, argillaceous, slightly dolomitic, bedding, very fine grain, lamellar.
- 2410 - 2420 as above, less silty.
- 2420 - 2430 as above, pyrite.
- 2430 - 2440 as above, less silty to trace silty, less dolomite.
- 2440 - 2450 Shale, very dark grey, micromicaceous, subfissile, carbonaceous? silty, shale, as above, vein dolomite, coarse crystalline, white and calcite, occasionally pyritic.
- 2440 - 2480 as above, occasionally fissile, no shale, silty.
- 2480 - 2490 no sample.
- 2490 - 2500 as above,
- 2500 - 2510 as above.
- 2510 - 2520 as above, trace worm tube pyrite.
- 2520 - 2530 as above, more fissile, darker.
- 2530 - 2550 as above, occasionally slickenside.
- 2550 - 2590 as above, occasionally slickenside.
- 2590 - 2630 as above, with trace pyrite and vein calcite and dolomite.
- 2630 - 2640 as above, pyrite.
- 2640 - 2660 as above, pyrite, trip sample.
- 2660 - 2670 as above, pyrite.
- 2670 - 2680 as above, pyrite and calcite.
- 2680 - 2690 as above, with vein calcite, blocky in part.
- 2690 - 2700 as above, trace vein anhydrite.
- 2700 - 2710 as above, with trace pyrite; trace vein dolomite and calcite.
- 2710 - 2720 as above, no vein min. no pyrite.
- 2720 - 2740 as above, with calcite and trace anhydrite, laminae, with fine light grain sandstone, quartzitic, very fine grained, pyritic.

- 2740 - 2750 Shale, as above, trace sandy, very fine grained to grey wacke, pyrite, trace vein quartzitic, coarse crystalline.
- 2750 - 2760 as above, trace sandy, very occasionally blocky, very hard, slightly brownish shale, siliceous? occasional calcite and dolomite, as above, pyrite.
- 2760 - 2770 as above, occasionally grey wacke as above, with sandstone, grey, very fine to fine grained, quartzitic, subangular to angular, poor sorting, argillaceous, cement, friable.
- 2770 - 2780 as above, sandstone, grain, friable, quartzitic, slightly greasy, green shale from sandstone or grey wacke.
- 2780 - 2790 Sandstone, greenish grey, dirty, quartzitic, subrounded to rounded, angular, predominately fine grain and occasionally very fine grained, friable, fair sorting, very hard, argillaceous and pyritic; in part grading, grey wacke, (as above vein calcite).
- 2790 - 2800 as above, grading, very siliceous, slightly dolomitic; chert, very light grey, mottled dark grey, in part sandy, occasional dolomitic, sponge spic.
- 2800 - 2810 Chert, light grey to white, mottled and speckled, dark grey, argillaceous? scattered, sandy, fine grain, in part dolomite; sponge spic white, pyrite.
- 2810 - 2820 as above, granular, very fine grain, subrounded to rounded? poor sorting, fine grain, slightly sandy, quartzitic and lithographic, relict pel. limestone.
- 2820 - 2830 as above, in part very dolomitic, very sandy to sandstone, grey dolomite, quartzitic, angular, fine grain, fair sorting, siliceous, tight.
- 2830 - 2840 as above, occasional sandstone, dolomite, in part dark grey, argillaceous, shale, dark grey, micromicaceous sub fissile to blocky, scattered pyrite, sponge spic.
- 2840 - 2850 Siltstone, dark grey quartzitic, very slightly dolomitic, argillaceous to very argillaceous, shale, very dark grey, micromicaceous to micaceous, sub fissile to blocky, silty in part, trace chert, as above.
- 2850 - 2860 as above, less shale, siltstone, slightly sandy in part, trace pyrite.

- 2860 - 2870 Siltstone, as above, shale, very dark grey, predominately; in part very sandy with floating fine grain quartz, subangular grading, grey wacke.
- 2870 - 2880 Shale, very dark grey, micromicaceous to occasional micaceous, subfissile, very occasionally laminae, siltstone, as above, very occasional shale, brownish grey, very siliceous with sponge.
- 2880 - 2920 Shale, as above, no siltstone, no shale, siliceous, slight medium trace vein, min.
- 2920 - 2930 as above, trace slickensides.
- 2930 - 2940 as above, very occasionally silty to trace siltstone, very argillaceous, very poor sorting.
- 2940 - 2950 as above, occasional to very occasional brown shale, very hard, slightly dolomitic, siliceous, (or phosphate?).
- 2950 - 2960 as above, trace silty, trace siliceous, as above.
- 2960 - 2970 as above, trace siliceous.
- 2970 - 2980 as above, trace pyrite.
- 2980 - 2990 as above, with very occasional shale, blocky, very hard, siliceous.
- 2990 - 3000 as above, trace siliceous.
- 3000 - 3010 as above, with chert, dirty brownish grey, calcareous to very calcareous, relict, medium grain calcarenite with white worm tubes, occasionally sandy to very sandy fine grained quartzite, subangular pyrite.
- 3010 - 3020 Chert, as above, grey to dark grey, argillaceous, very calcareous to less dark, slightly brown medium grey argillaceous, very siliceous, dirty argillaceous, scattered medium grained pellets, worm tubes? very fine grained, very white, slightly squashed.
- 3020 - 3030 as above, very argillaceous, pyrite, silty, shale very dark grey micromicaceous to micaceous, subfissile, occasional carbonates, occasional silty.
- 3030 - 3040 Shale very dark grey, occasionally black, subfissile, micromicaceous abundant, silty to very silty occasionally calcareous and silty or siliceous, pyrite.
- 3040 - 3050 Shale as above, occasional slickensides, no silt.
- 3050 - 3060 as above very dark to black, trace hard blocky silt, dolomitic, siliceous.

- 3060 - 3070 as above, very occasionally silty, trace pyrite.
- 3070 - 3080 as above, trace pyrite.
- 3080 - 3090 as above, trace pyrite, trace brown shale, siliceous  
as above, trace vein calcite, very dark to black.
- 3090 - 3100 as above, very occasional laminae, silty, trace vein  
dolomite, white coarse crystalline, very dark to  
black.
- 3100 - 3110 Shale, very dark grey to black, subfissile, occasionally  
fissile, micromicaceous, carbonaceous? vein calcite and  
dolomite, trace pyrite, very occasional slickensides.
- 3110 - 3120 as above, pyrite, trace vein anhydrite.
- 3120 - 3130 as above, with trace shale, brown shale, grey very  
hard, siliceous (and/or phosphorous) more slickensides.
- 3130 - 3140 as above.
- 3140 - 3150 as above, pyrite, abundant brown shale, blocky,  
siliceous, less fissile, very occasionally slightly  
silty.
- 3150 - 3160 as above, micromicaceous to micaceous, very slightly  
silty in part, very occasionally siliceous as above.
- 3160 - 3170 as above, trace vein dolomite.
- 3170 - 3180 as above with very occasional vein dolomite, coarse  
white crystalline, trace pyrite, sponge spic, softer  
less dark pyrite.
- 3180 - 3190 Shale, very dark grey, micromicaceous, subfissile to  
blocky, very occasionally black, pyrite, slightly  
softer, small trace brownish siliceous (septarian  
nodules?)
- 3190 - 3200 as above, occasionally black, trace pyrite, trace brown  
siliceous, cut by many grains of crystalline dolomite.
- 3200 - 3210 as above.
- 3210 - 3220 as above more siliceous and with very occasionally  
shale, brown, soft, blocky, dolomite.
- 3200 - 3230 as above abundance of brownish blocky siliceous, very  
slightly dolomite, pyrite.
- 3230 - 3240 as above, trace pyrite.

- 3240 - 3250 as above, very occasional siliceous, as above, very slightly silty, very dark to black, occasional vein of dolomite and anhydrite.
- 3250 - 3260 as above, very occasionally siliceous, as above.
- 3260 - 3270 as above, micromicaceous to micaceous, very slightly silty.
- 3270 - 3280 as above, occasionally blocky.
- 3280 - 3290 as above, occasionally blocky, laminae siltstone, grey, argillaceous quartzite, poor sorting.
- 3290 - 3300 as above, occasionally blocky with vein dolomite and anhydrite, occasional pyrite.
- 3300 - 3310 as above, very occasional dolomite and anhydrite, trace silty laminae.
- 3310 - 3320 as above, anhydrite predominates over dolomite.
- 3320 - 3330 as above, with shale, brownish, blocky, siliceous, slightly dolomitic, very hard (septarian nodules?).
- 3330 - 3340 as above.
- 3340 - 3350 as above, laminae, silty, siliceous.
- 3350 - 3360 as above, with chert, very light grey, mottled dark grey spots, very slightly dolomitic, trace sandy? trace pyrite, massive.
- 3360 - 3370 Quartzite, fine grained, good sorting, subangular to angular, orthoquartzitic, light in parts, massive, very occasionally grey, slightly argillaceous, trace dolomite, trace calcarinate, trace pyrite.
- 3370 - 3380 as above, light redish brownish grey with trace fractures porosity and trace gils.
- 3380 - 3390 Shale very dark grey, as above, shale dark grey, micromicaceous, blocky, very hard, siliceous to very siliceous and silty, trace quartzite, as above, anhydrite as above.
- 3390 - 3400 Sandstone, white with occasional black fleck, carbonaceous, very fine grained quartzite, very siliceous, white camstone, good sorting and abundant camstone, very occasionally quartzitic to chert as above.
- 3400 - 3410 as above, grading very siliceous to quartzite to chert, light blue grey amorphous with light grey specs, traces of mica.

- 3410 - 3420 Chert, white to grey, slightly sandy to quartzitic in some parts laminae, argillaceous, grey, abundant mottled, argillaceous in parts, dolomitic pyrite.
- 3420 - 3430 Chert. as above, grading siltstone, light grey to dark grey, dolomitic, siliceous, quartzite to various sortings in part, argillaceous to very argillaceous, shale as above.
- DEVONIAN 3440
- 3430 - 3440 Sandstone, very fine grained to siltstone, light grey to dark grey, dolomitic, quartzitic angular, friable, very thin bedded with abundant laminae, very argillaceous and shale dark grey, micromicaceous, sub-fissile, pyrite.
- 3440 - 3450 Shale, very dark grey, micromicaceous, sub-fissile to blocky, occasionally micaceous, very occasionally brownish, siliceous, pyrite, sandstone as above.
- 3450 - 3460 as above, grading to black, more fissile, very occasionally laminae, siltstone to sandstone, as above.
- 3460 - 3470 As above, black predominating, in parts carbonaceous.
- 3470 - 3480 Shale, very dark grey to occasional black micromicaceous, sub-fissile, occasionally carbonaceous, scattered micaceous, very fine grained.
- 3480 - 3490 As above.
- 3490 - 3500 As above.
- 3500 - 3510 As above, trace pyrite.
- 3510 - 3520 As above, scattered laminae, very slightly silty, with occasional trace coal, trace pyrite, trace anhydrite.
- 3520 - 3530 As above, very occasionally brownish siliceous, hard to dolomite, soft.
- 3530 - 3540 As above, abundant black in parts brownish, siliceous, very hard, blocky, trace resin, limy, siliceous.
- 3540 - 3550 Limestone, grey, resinous, very fine grained crystalline, very siliceous, argillaceous, scattered, fine grained floating quartzite, very abundant, worm tubes, white (as at 3004) or crystalline sponge spic, abundant, laminae, very argillaceous, bedding lamellar.
- 3550 - 3560 As above in part, resinous, fine grained, crystalline, very sandy, fine grained, sub-angular quartzite, in part crypto-crystalline, argillaceous, fossils, silty in part, very argillaceous to slightly limy, lamellar bedding, shale as above.

- 3560 - 3570 Shale, very dark grey, micromicaceous, subfissile, occasionally black, pyrite, siltstone, brown to dark grey, slightly limy, sucrosic grading, very argillaceous, very dolomitic.
- 3570 - 3580 as above, trace siltstone, occasionally to very occasional pyrite, scattered micaceous, very fine grained siltstone grading dolomite silty in part.
- 3580 - 3590 Shale, very dark grey, micromicaceous, subfissile, occasionally black, occasionally fissile, scattered to trace micaceous, pyrite to trace pyrite.
- 3590 - 3600 as above, black fissile predominating, trace shale, brownish grey, blocky siliceous, very hard, dolomitic to very dolomitic.
- 3600 - 3610 as above, slightly less black, less fissile.
- 3610 - 3620 as above.
- 3620 - 3630 as above, trace of a vein of calcite.
- 3630 - 3640 as above, trace pyrite, more shale, siliceous, brownish as above, (septarian nodules?).
- 3640 - 3650 as above, occasionally laminae, silty to siltstone, shale, limy, very argillaceous in part.
- 3650 - 3660 as above, very dark to black, very occasionally scattered, silty, trace pyrite, trace brownish grey, blocky, siliceous, as above.
- 3660 - 3670 as above.
- 3670 - 3680 as above, trace vein quartzite, trace vein calcite.
- 3680 - 3690 as above, scattered coaly shale to coal vitreous.
- 3690 - 3700 as above, very thin silty laminae, slightly calcareous.
- 3700 - 3710 as above, very occasionally black, trace pyrite, trace shale, brownish, blocky, siliceous, and dolomitic.
- 3710 - 3720 as above, grading calcareous to shale, dark grey, very calcareous, very siliceous to less dark grey cryptocrystalline, very siliceous, silty, very argillaceous to argillaceous.
- 3720 - 3730 Shale, as above, in part calcareous, very occasionally less as above, trace shale, black, subfissile, carbonaceous to very carbonaceous, trace sponge spic.
- 3730 - 3740 Shale, as above, with slightly darker grey, blocky to subfissile, very calcareous, slightly silty and/or siliceous, shale, black, subfissile, carbonaceous, pyrite.

- 3740 - 3750 Shale, dark grey, blocky to sub-fissile, very calcareous, very slightly granular, silty or? siliceous, pyrite, trace sponge spic, fragments of shale, black.
- 3750 - 3760 As above, less calcareous to non-calcareous, shale, black, blocky, very carbonaceous.
- 3760 - 3770 As above, less calcareous to non-calcareous predominant, crinoid.
- 3770 - 3780 As above, very occasionally micaceous.
- 3780 - 3790 As above, with shale, very dark grey to black, sub-fissile and blocky, carbonaceous, thin bedded, non-calcareous.
- 3790 - 3800 As above, less calcareous, less silty.
- 3800 - 3810 Shale, dark grey, micromicaceous, sub-fissile, very slightly calcareous to occasionally calcareous, occasionally black, carbonaceous, non-calcareous.
- 3810 - 3820 As above.
- 3820 - 3830 As above.
- 3830 - 3840 As above, very calcareous, silty and siliceous, slightly spec, white pyrite.
- 3840 - 3850 As above, in part very calcareous, silty and siliceous.
- 3850 - 3860 As above, very occasionally vein of chert, white coarse crystalline.
- 3860 - 3870 As above, in part darker, non-calcareous.
- 3870 - 3880 Shale, very dark grey, micro-micaceous, sub-fissile, occasionally very fine grained, micaceous, in part calcareous to trace calcareous as above, trace pyrite, trace brownish siliceous, slightly dolomitic or sideritic.
- 3880 - 3890 As above, grading very calcareous and very siliceous, limestone, dirty, grey, crypto-crystalline to very fine grained crystalline, siliceous, sandy, fine grained, argillaceous to very argillaceous, worm and sponge.
- 3890 - 3900 As above.
- 3900 - 3910 Shale, very dark grey, micro-micaceous, sub-fissile, occasionally very fine grained, micaceous, trace vein anhydrite, shale, brownish grey siliceous, silty, very dolomitic and sideritic.
- 3910 - 3920 Shale, dark grey, micro-micaceous, sub-fissile to blocky, calcareous, micaceous, very fine grained, crystalline limestone in parts, very argillaceous, silty and siliceous, trace fossil fragments.

- 3920 - 3930 as above, with dolomite cryptocrystalline, silty, sandy, very siliceous with chert, argillaceous to very argillaceous, pyrite, slightly limy scattered fine grained quartzite.
- 3930 - 3940 Shale, very dark grey micromicaceous, subfissile, slightly carbonaceous, slightly pyritic, trace vein anhydrites.
- 3940 - 3950 as above.
- 3950 - 3960 as above, occasionally black.
- 3960 - 3970 as above.
- 3970 - 3980 as above, very occasionally silty to scattered vein dolomite, fine to coarse white crystalline.
- 3980 - 3990 as above, vein calcite, white, coarse crystalline, very occasionally laminae, siltstone, limy and? dolomitic.
- 3990 - 4000 Siltstone, grey, dirty, coarse to sandstone, very fine grained, quartzite, subangular good sorting slightly limy and dolomitic, laminae, irregular shaley partings, micaceous.
- 4000 - 4010 as above in part, grading dark grey argillaceous and in parts non calcareous, very slightly dolomite with shale, very dark as above, pyrite.
- 4010 - 4020 as above, more shale, very dark grey to black, micromicaceous to micaceous, slightly carbonaceous, subfissile to blocky.
- 4020 - 4030 as above, more siltstone, very occasionally siltstone white clean quartzite.
- 4030 - 4040 as above, no shale in part, light grey, non argillaceous, vein calcite and dolomite.
- 4040 - 4050 as above, grading very dark grey to black argillaceous, very slightly dolomitic, shale very dark grey to black, subfissile, micromicaceous to micaceous carbonate.
- 4050 - 4060 Shale, very dark grey, micromicaceous, subfissile, occasionally micaceous in parts, black carbonate, silty in parts and dolomitic, silty, dolomitic as above, trace ironstone.
- 4060 - 4070 Shale, very dark grey, as above, trace calcareous and anhydrite filled veins.
- 4070 - 4080 Shale, as above, becoming slightly calcareous in parts.

- 4080 - 4090 Shale, as above, dark grey, slightly micro-micaceous, blocky, trace pyrite.
- 4090 - 4100 Shale, dark grey, slightly silty and dolomitic in part.
- 4100 - 4110 Shale, medium to dark grey, platy to blocky, slightly silty and dolomitic in part, trace anhydrite vein, slightly micro-micaceous, trace pyrite.
- 4110 - 4140 Shale as above, trace very dark grey, carbonaceous shale.
- 4140 - 4160 Shale as above, trace siltstone, medium brown.
- 4160 - 4180 Shale, medium to dark grey, slightly dolomitic, very slightly silty, trace pyrite, trace secondary calcite.
- 4180 - 4230 Shale, medium to dark grey, siliceous, dolomitic, blocky, trace silt with rare dolomite stringer, medium grey, very fine grained, very argillaceous, slightly silty; pyritic, trace dolomite veining.
- 4230 - 4240 Shale, medium to dark grey, as above.
- 4240 - 4260 Shale as above; trace less, very fine grained, brown, silty, hard, firm, dense.
- 4260 - 4270 Shale, medium to dark grey, as above.
- 4270 - 4310 Shale, medium to dark grey, limy in part, trace calcite veining, pyritic.
- 4310 - 4330 Shale, medium to dark grey as above.
- 4330 - 4350 Shale, trace anhydrite veining.
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- 4350 - 4380 Shale, medium grey to brown, very limy, silty, hard; with siltstone, medium grey, very argillaceous, calcareous, dense, firm, trace limestone, medium grey, very fine grained, silty, argillaceous, hard, dense, pyritic.
- 4380 - 4400 Siltstone, medium brown to grey, limy to dolomitic, hard, dense, trace limestone, medium grey, very silty, very argillaceous, dense with trace dolomite, medium grey, silty, argillaceous, hard, dense.
- 4400 - 4430 Siltstone, medium grey, hard, very argillaceous, limy, slightly pyritic, with limestone, medium grey, silty, argillaceous, trace shale, medium grey, silty, calcareous, hard, firm.
- 4430 - 4460 Shale, medium grey, silty, firm, hard, calcareous cement, with minor siltstone, medium grey as above, trace calcite veining.

- 4460 - 4480 Siltstone, medium grey, very calcareous, hard, dense, argillaceous, with minor shale and limestone as above.
- 4480 - 4500 Siltstone, medium grey to grey-brown, very argillaceous, calcareous, slightly pyritic and micaceous; trace limestone, medium brown-grey, argillaceous, silty in part, slightly dolomitic, hard, dense.
- 4500 - 4540 Siltstone, medium grey to grey-brown, as above, with 20% limestone, light to medium grey-brown, argillaceous, silty, hard, trace pyrite, slightly fractured and calcite infilled, trace chert, light to medium grey-brown, number sponge spicules.
- 4540 - 4560 Siltstone, medium grey to brown-grey, as above, with trace limestone, argillaceous, minor shale, medium to dark grey, slightly calcareous, silty, firm, hard.
- 4560 - 4570 Trace chert, light-medium brown, abundant sponge spicules,  
gas cut mud.
- 4570 - 4590 Shale, medium to dark grey, silty, calcareous, slightly pyritic and micro-micaceous, firm; trace siltstone and limestone as above; gas cut mud--gas reading vary 30-132 unit on indicator.
- 4590 - 4610 Shale, as above, with siltstone, as above.
- 4610-4640 Shale, medium to dark grey, as above, with trace siltstone and limestone, minor chert with sponge spicules.
- 4640 - 4670 Shale, medium to dark grey, silty, slightly carbonaceous, very slightly pyritic, firm, hard, slightly micro-micaceous, blocky, trace fractures and calcite infilled.
- 4670 - 4710 Shale, light-medium grey, very slightly calcareous, trace silt, trace pyrite, sub-fissile to blocky, micro-micaceous, trace fractures and calcite infilled.
- 4710 - 4730 Shale, light-medium grey, in part slightly calcareous, rare trace pyrite, sub-fissile, soft.
- 4730 - 4760 Shale, light-medium grey as above, slightly dolomitic in part.
- 4760 - 4780 Shale, light-medium grey as above, with trace shale, medium grey, very slightly calcareous, slightly silty, trace pyrite, blocky.
- 4780 - 4810 Shale, light-medium grey in part, slightly dolomitic, sub-fissile, soft with shale, medium grey, slightly dolomitic, pyritic in part, silty, blocky to sub-fissile.

- 4810 - 4860 Shale medium grey, slightly dolomitic, in part slightly silty, pyritic, blocky to subfissile, slightly micromicaceous, slightly fractured and infilled with secondary white calcite.
- 4860 - 4890 Shale, medium to dark grey, as above, trace shale, light medium grey, in part slightly dolomitic, soft, subfissile (may be cave), trace fracturing and secondary white calcite and dolomite infilled.
- 4890 - 4930 Shale, medium to dark grey, slightly dolomitic to limy, trace silt, slightly pyritic, appears harder, micromicaceous, blocky to slightly splintery, trace fracturing and secondary white dolomite infilled.
- 4930 - 4950 Shale, dark grey, dolomitic in part, micromicaceous, blocky rare splintery, with trace dolomitic streaks, medium dark brown to grey very fine crystalline very argillaceous, pyrite more abundant, trace pyrite crinoid, gypsum rosettes, fractures abundant.
- 4950 - 4990 Shale, dark grey, as above; with trace dolomite, as above.
- 4990 - 5010 Shale, dark grey, as above; with dolomite, dark brown grey, very fine crystalline, very argillaceous, hard, tite, trace open fractures, dolomite -- 30% 4990 to 5000; 15% 5000 to 5010; fractured and calcite infilled.
- 5010 - 5030 Shale, dark grey, as above; rare trace slightly siliceous dark grey shale, hard, blocky, very pyritic; trace open fractures; trace dolomite, as above; trace anhydrite.
- 5030 - 5050 Shale, as above; with dolomite, medium brown, very fine crystalline, very argillaceous, trace silt, pyrite tite, dolomite - 20%; rare trace anhydrite.
- 5050 - 5060 Shale, dark grey, as above, trace dolomitic streaks as above.
- 5060 - 5070 Shale, dark grey, as above, trace fracturing and secondary white calcite infilled.
- 5070 - 5100 Shale, dark grey, slightly dolomitic in part, trace silt, hard, slightly micromicaceous, blocky to splintery, pyrite, trace anhydrite.
- 5100 - 5120 Shale, dark grey, as above, fractured slightly and infilled with secondary white calcite.
- 5120 - 5130 Shale, dark grey, as above, trace dolomite, dark brown/grey, very fine crystalline, very argillaceous, tite, hard,
- 5130 - 5140 Shale, dark grey, as above.

- 5140 - 5170 Shale, dark grey, as above, rare trace dolomite, very fine crystalline, hard dense, pyrite, blocky, trace fracturing; with trace shale, medium to dark grey, slightly siliceous, hard, dense, very pyritic.
- 5170 - 5180 Shale, dark grey, as above; with shale, dark grey, slightly siliceous.
- 5180 - 5190 Shale, dark grey, as above, with shale, dark grey, very limy to slightly limy, firm, hard, pyrite; trace less, medium brown to grey; trace siltstone.
- 5190 - 5210 Shale, dark grey, slightly limy to dolomitic, in part hard, pyrite more abundant, slightly micromicaceous, with trace floating sand grains; rare siltstone, dark grey, very dolomitic, hard, pyrite.
- 5210 - 5240 Shale, dark grey, as above, trace shale, very dark grey, hard, firm pyrite, slightly dolomitic, fracturing more common.
- 5240 - 5250 trace floating quartzite (sand) grains.
- 5250 - 5290 Shale, dark grey, slightly dolomitic, very slightly pyritic to non pyritic, firm, blocky to subfissile with rare trace shale, very dark grey, very slightly siliceous, hard, very firm, pyritic to non pyritic; trace fracturing and calcite infilled.
- 5290 - 5300 Shale, dark grey, as above; with shale, very dark grey, very slightly dolomitic, slightly siliceous, hard, blocky - 1% of sample.
- 5300 - 5340 Shale, dark grey to very dark grey, dolomitic in part, very slightly pyritic to non pyritic, subfissile to splintery; with trace shale, very dark grey, very slightly dolomitic, hard, firm, very slightly pyritic, slightly siliceous, fractured and infilled with secondary white calcite, quartzite; trace floating sand grains.
- 5340 - 5360 Shale, dark to very dark grey, as above, fractured and infilled with calcite and quartzite.
- 5360 - 5400 Shale, dark to very dark grey, as above, with shale, very dark grey to black, very slightly dolomitic, hard, pyritic to very pyritic, blocky (1-2% of sample).
- 5400 - 5410 Shale, dark to very dark grey, as above, shale, very dark grey to black, as above.
- 5410 - 5430 Shale, dark to very dark grey, very slightly dolomitic, as above, fractured and infilled with secondary white calcite.
- 5430 - 5460 Shale, as above; trace shale, very dark grey to black, pyritic to very pyritic, hard, blocky, (1-2% of sample), fractured and infilled as above.

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- 5460 - 5500 Shale, very dark grey to dark grey, slightly dolomitic in part; very slightly pyritic to non pyritic; firm, splintery to subfissile; badly fractured and infilled with secondary white calcite.
- 5500 - 5510 Shale, dark to very dark grey, as above; shale, dark grey to brown, very limy, slightly pyritic, hard, silty; trace limestone, dark brown, very fine grained, very argillaceous, silty, tight.
- 5510 - 5520 Dolomitic, dark brown, very argillaceous, very fine grained, hard, tight, fractured, minor calcite inclusions; shale dark grey to brown, limy as above.
- 5520 - 5530 Siltstone, dark grey, very limy, very argillaceous, hard, pyritic, blocky; shale, very dark grey, limy to dolomitic, hard, very silty, micromicaceous, pyritic; trace limestone, light to medium brown, very fine grained, silty, argillaceous.
- 5530 - 5540 Siltstone, as above, with limestone, light medium brown, as above, with shale, very dark grey to black, slightly dolomitic to limy, in part silty, hard, dense, pyritic to very slightly pyritic.
- 5540 - 5550 Shale, dark grey, slightly dolomitic, hard, slightly silty, trace white secondary calcite; limestone, medium brown, very fine grained, very silty, argillaceous, hard, tight.
- 5550 - 5560 Shale, as above, minor limestone, as above.
- 5560 - 5570 Shale, dark grey, very slightly micromicaceous, very slightly dolomitic, soft, platy, slightly silty in part, trace white secondary calcite.
- 5570 - 5580 Shale, as above, with limestone, dark grey to brown, microcrystalline, very silty, argillaceous, dense, hard.
- 5580 - 5590 Shale, very dark grey to black, slightly dolomitic, very silty in part, increased white secondary calcite, minor limestone as above.
- 5590 - 5600 Shale, dark grey, platy, slightly blocky in part, very slightly dolomitic, very slightly micromicaceous.
- 5600 - 5620 Shale, as above, becoming limy in parts, trace white secondary calcite.
- 5620 - 5640 Shale, dark grey, blocky, very limy, limestone, dark grey brown, microcrystalline to slightly granular, very argillaceous, slightly silty, hard, tight, trace white secondary calcite, trace pyrite.
- 5640 - 5650 Shale, as above, minor limestone, as above.

- 5650 - 5670 as above, increased limestone.
- 5670 - 5680 Shale, as above, becoming slightly to very limy in part, trace limestone, as above.
- 5680 - 5690 Shale, as above, with limestone, dark grey brown, siliceous, slightly argillaceous, trace dark brown chert with pyrite; trace white secondary calcite.
- 5690 - 5700 as above, abundant dark brown chert.
- 5700 - 5710 Shale, dark grey, platy to blocky, non calcareous, resinous, trace pyrite and white secondary calcite.
- 5710 - 5770 Shale, as above, trace limestone, dark grey brown, slightly to very siliceous; trace dark brown chert; trace pyrite and secondary calcite.
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- 5770 - 5780 as above, abundant white secondary calcite.
- 5780 - 5800 Limestone, as above, becoming light to medium brown, mottled in part, decreasing calcite, trace sponge spic.
- 5800 - 5820 Limestone, dark grey brown, as above, chert, pyrite and calcite, as above.
- 5820 - 5830 Limestone, as above, mottled, light to medium brown in part.
- 5830 - 5870 Limestone, as above; shale dark grey brown, platy to blocky, very limy, very slightly silty, numerous veins or fractures with white secondary calcite.
- 5870 - 5890 Shale, dark grey brown, very limy, blocky, hard, scattered veins or fractures filled with white secondary calcite.
- 5890 - 5950 as above, trace white secondary calcite.
- 5950 - 5970 Shale, as above, trace pyrite.
- 5970 - 5980 Shale, dark grey brown, very limy, blocky, hard.
- 5980 - 5990 Shale, as above, trace white secondary calcite; trace shale, dark grey to black, slightly dolomitic.
- 5990 - 6010 Shale, dark grey to black, platy, medium soft, slightly bituminous in part, slightly dolomitic, abundant white secondary calcite.
- 6010 - 6020 Shale, as above, becoming blocky and harder, trace very fine disseminated pyrite in parts.
- 6020 - 6030 Shale, as above, becoming slightly to very dolomitic, very slightly silty in parts.

- 6030 - 6040 Shale, as above; siltstone, dark grey brown, very dolomitic, very slightly argillaceous; dolomitic, dark grey brown, microcrystalline, slightly silty and argillaceous, tight.
- 6040 - 6050 Shale, dark grey to black, platy to blocky, medium soft and slightly bituminous in part; scattered calcite veins.
- 6050 - 6060 Shale, as above, becoming slightly siliceous in part, trace pyrite; siltstone, dark grey to brown, very dolomitic and argillaceous; with dolomite as above.
- 6060 - 6070 Shale, as above; siltstone, as above.
- 6070 - 6080 Shale, dark grey to black, very dolomitic, slightly to very silty, slightly siliceous, trace pyrite, scattered calcite veins.
- 6080 - 6090 Shale, dark grey to black, limy to very dolomitic, hard, slightly pyritic, blocky; fractured and calcite infilled, numerous slickensides.
- 6090 - 6110 Shale, as above; badly fractured and infilled with secondary calcite; trace metaquartzite grains.
- 6110 - 6120 with trace dolomite stringers, medium brown, very fine crystalline, pyritic, hard, tight.
- 6120 - 6130 Shale, very dark grey to black, dolomitic to very dolomitic, hard, silty, in part siliceous, pyritic; minor fracturing.
- 6130 - 6150 Shale, very dark brown grey, very dolomitic, hard, blocky; grading dolomitic, dark grey brown, very argillaceous, very fine crystalline, tight, fractured and calcite infilled, approximately 40% dolomite.
- 6150 - 6190 Shale, very dark grey to black, silty to very silty, in part siliceous, slightly dolomitic, hard, pyrite common (nodules, streaks, finely disseminated); with trace chert, dark grey, pyritic; fractured and calcite, dolomite and minor secondary quartzite infilled; trace chert, pyrites common, minor fracturing and calcite infilled.
- 6190 - 6200 Shale, very dark grey to black, as above; pyrite common.
- 6200 - 6210 Shale, very dark grey to black, as above; pyrite common.
- 6210 - 6220 Shale, very dark grey, slightly dolomitic, softer, earthy, non silty, slightly pyritic, blocky to sub fissile; slightly fractured.
- 6220 - 6230 Shale, very dark grey, as above; with shale, dark brown to grey, very limy, pyritic, silty, blocky; grading occasional limestone, medium brown, very argillaceous, silty, very fine crystalline, pyritic.

- 6230 - 6240 Shale, very dark grey, as above; with shale, dark brown to grey, as above; with siltstone, medium brown, very limy, argillaceous, hard; trace brown chert.
- 6240 - 6250 with shale, dark grey, as above; with limestone, as above; trace brown chert; fracturing and calcite infilled.
- 6250 - 6260 Shale, dark grey to black, very slightly limy, dolomitic; with shale, dark brown to grey, as above; with limestone as above.
- 6260 - 6270 Shale, dark grey to dark brown to grey, limy, silty, moderately hard, pyritic, slightly micromicaceous; with limestone, dark brown.
- 6270 - 6280 very argillaceous, pyritic, hard, micro to very fine crystalline, tight; fractured and calcite infilled.
- 6280 - 6290 as above; with trace of brown chert; 120 unit gas kick on detector.
- 6290 - 6300 as above; rare fracturing and calcite infilled.
- 6300 - 6320 Shale, dark grey to dark brown grey, limy, silty, medium hard, pyritic; with limestone medium to dark brown, very argillaceous, very silty, pyritic, micro to very fine crystalline; minor fracturing and calcite infilled.
- 6320 - 6330 as above; badly fractured and calcite infilled; trace crinoid and solitary coral.
- 6330 - 6350 Shale, dark grey, very limy, as above, with siltstone, medium to dark brown, very limy, argillaceous; with limestone, medium to dark brown, very silty, very argillaceous, tight; fractured and infilled with calcite; trace open fractures.
- 6350 - 6360 as above, fracturing less common.
- 6360 - 6370 Shale, dark grey, very limy, silty, hard, pyritic, earthy appearance, blocky to subfissile; with limestone, dark grey, very argillaceous, silty, tight; minor fracturing.
- 6370 - 6380 Shale, dark grey, as above, earthy appearance; with trace limestone as above; minor fracturing and calcite infilled.
- 6380 - 6400 Shale, dark grey, slightly limy to very limy, silty, pyritic, moderately hard, blocky to subfissile; with rare trace limestone, dark brown to grey, as above; minor fracturing and calcite infilled.
- 6400 - 6410 Shale, dark grey, limy to very limy, slightly pyritic, silty, blocky to subfissile; shale dark grey to black, very slightly dolomitic, pyritic; trace limestone, dark grey, microcrystalline.

- 6410 - 6420 Rare fracturing and calcite infilled; trace floating quartzite grains.
- 6420 - 6430 Shale, dark grey, limy as above; with trace limestone, dark grey, micro to very fine crystalline, very argillaceous, silty, tight; minor fracturing and calcite infilled.
- 6430 - 6440 Trace limestone as above, rare crinoid ossicles; minor fracturing and calcite infilled.
- 6450 - 6460 No sample - lost 245 barrels mud at 6460, drilling rate 10-15 minutes per foot.
- 6460 - 6470 Shale, dark grey, non-limy to limy, slightly silty, soft to moderately hard, pyritic, filtering sand grains, fissile; with trace limestone, dark grey as above.
- 6470 - 6480 Shale, dark grey as above, with limestone, medium brown to dark grey, micro to very fine crystalline, pyritic, appearance dense, abundant floating sand grains; trace brown chert.
- 6480 - 6490 Shale, dark grey as above; with shale, medium grey, very slightly limy to limy, soft, slightly pyritic, fissile; with limestone, as above, trace chert.
- 6490 - 6500 With shale, medium grey as above; minor limestone as above; trace chert and floating sand grains; fractured.
- 6500 - 6510 Shale, dark grey as above, with shale, medium grey, generally non-limy, slightly pyritic, soft, fissile; with trace limestone as above; floating sand grains, fractured.
- 6510 - 6520 Shale, medium grey as above; with shale, dark grey, as above; trace brown chert (-1%); pyrite less common, trace limestone, medium brown to dark grey as above.
- 6520 - 6530 Shale, dark grey as above; trace brown chert; trace limestone as above (-1%).
- 6530 - 6540 Shale, dark grey as above; minor fracturing and calcite infilled.
- 6540 - 6550 Shale, dark grey as above; trace limestone as above; trace fracturing and calcite infilled.
- 6550 - 6560 Shale, dark grey as above; trace limestone, medium brown to dark grey, micro to very fine crystalline, as above.

- 6560 - 6580 Shale, dark grey, limy, slightly micro-micaceous, trace silt, moderately hard, blocky to sub-fissile, slightly pyritic (fine crystals); trace shale, medium grey as above; trace limestone, medium brown as above; fracturing minor.
- 6580 - 6590 Limestone, light to medium brownish grey, crypto to very fine crystalline, very argillaceous, non-silty to slightly silty, tight, slightly pyritic, numerous secondary calcite stringers; trace shale, dark grey as above.
- 6590 - 6600 Shale, dark grey, very limy, silty, hard, slightly micro-micaceous, trace pyrite, blocky; trace brachiopods, solitary coral; fractured.
- 6600 - 6610 Rare crinoid; trace brown chert; with minor shale, dark grey as above.
- 6610 - 6620 Shale, dark grey, minor fracturing and calcite infilled.
- 6620 - 6630 Shale, dark grey as above; minor fracturing and calcite infilled.
- 6630 - 6640 Limestone, light to dark brown, crypto to very fine crystalline in part, very argillaceous, siliceous, trace worm tubes; with chert, medium to dark brown, worm tubes.
- 6640 - 6650 Shale, dark grey, non-limy to limy, silty, in parts very pyritic, blocky/ with trace limestone, as above; minor fracturing; abundant lenticular skeletal remains, completely replaced by calcite.
- 6650 - 6660 Shale; medium to dark grey, slightly limy, silty, hard, slightly pyritic, splintery to blocky; trace limestone and chert as above; minor fracturing.
- 6660 - 6670 Shale, very dark grey, slightly limy, silty, hard to very hard, in parts slightly siliceous, pyritic, blocky; minor siltstone, dark grey, argillaceous, limy, very hard, pyritic, blocky; fractured.
- 6670 - 6680 Shale, very dark grey as above, with limestone (20%) as above; rare nautiloid; minor shale, medium grey, very slightly limy, soft; trace chert; abundant lenticular skeletal remains.
- 6680 - 6690 Shale, dark grey, limy, as above; with limestone, light to dark brown, very argillaceous, crypto-crystalline, slightly siliceous, trace coral, crinoid and nderite burnt shale; minor brown chert.
- 6690 - 6700 Shale, dark grey as above; with limestone, as above; few crinoid nautiloids? and indeterminate skeletal remains; minor fracturing and calcite infilled; trace brown chert.

- 6700 - 6720 Shale, dark grey to dark brown grey, very limy, hard, silty, rarely siliceous, rarely pyritic; trace limestone, medium brown to grey, very argillaceous, silty, rarely siliceous; trace brown chert; rare crinoid ossicles; trace fracturing and calcite infilled.
- 6720 - 6740 Shale, dark grey, in part limy, slightly micromicaceous, moderately hard, pyritic--minor, as thin laminae and some crystals, subfissile to blocky, with shale, medium grey, non limy, soft, fissile, fractured and calcite infilled.
- 6740 - 6750 Shale, dark grey, in part limy, slightly micromicaceous, trace pyrite, as above; trace limestone, light to medium brown, as above; 125-140 unit gas at 6744-46.
- 6750 - 6760 Shale, dark grey to dark brown grey, very limy, ossicles slightly siliceous, hard, blocky; trace shale, very dark grey to black, pyritic, blocky, hard; rare trace limestone, as above, slightly siliceous.
- 6760 - 6810 Shale, dark brownish grey, generally very limy, very slightly pyritic in part, ossicles slightly siliceous, hard, blocky; grading limestone, light to medium brown, crypto to very fine crystalline, very argillaceous, in part slightly pyritic, rarely slightly siliceous; trace shale, very dark grey, inert to very slightly dolomitic, hard, commonly siliceous, slightly pyritic; blocky to subfissile; minor fracturing and calcite, rare secondary white dolomite infilled.
- 6810 - 6830 Limestone, light to medium brown, crypto to very fine crystalline, silty, pyritic with some crystals, slightly siliceous; minor shale, dark brown to grey, very limy, in part siliceous, silty; questionable crinoid and other inderite skeletal remains; minor fracturing.
- 6830 - 6840 Shale, dark brown grey, as above; with shale, medium to dark grey, inert to slightly dolomitic, soft, fissile; trace limestone as above.
- 6840 - 6850 Shale, dark grey, inert to dolomitic, soft, fissile; with shale, dark grey, limy, silty, blocky; with siltstone, medium grey, limy, hard, pyritic.
- 6850 - 6860 Shale, medium to dark grey, very limy, soft, fissile, very slightly pyritic; shale, dark grey, limy, silty as above; shale dark grey, blocky, hard, siliceous.
- 6860 - 6890 Shale, medium to dark grey, inert to slightly limy, very slightly pyritic with fine crystals and rare thin laminae, slightly micromicaceous, soft, fissile to subblocky; minor fracturing and calcite infilled.

- 6890 - 6930 Shale, medium to dark grey, inert to slightly limy, very slightly pyritic, slightly micro-micaceous, soft, fissile to sub-blocky; minor fracturing and calcite infilled; minor clay ironstone concretions; minor fracturing and calcite, rare quartz infilled; trace open fractures.
- 6930 - 6950 Shale, medium to dark grey as above; with trace limestone, light to medium grey-brown, very fine crystalline, very pyritic (10 - 20%), slightly siliceous, trace indeterminate skeletal remains, gastropod, coral?, minor fracturing and calcite infilled.
- 6950 - 6970 Shale, medium to dark grey as above; minor fracturing and calcite infilled.
- 6970 - 6980 Shale, dark grey, inert to limy, slightly pyritic, green, soft, fissile to sub-blocky; trace fracturing and calcite infilled.
- 6980 - 7000 Shale, medium to dark grey, slightly micro-micaceous, as above; trace fracturing and calcite infilled.
- 7000 - 7020 Rare crinoid ossicle.
- 7020 - 7040 Shale, dark grey as above; rare limestone stringer, dark brown, argillaceous, crypto-crystalline, tite, pyritic, trace fracturing and calcite infilled, dark to medium grey, calcite and slightly pyritic, hard, blocky to sub-fissile fracture.
- 7040 - 7060 Dark grey, slightly dolomitic, blocky, glossy luster with light brown, very fine grained, argillaceous limestone.
- 7060 - 7080 Black, fissile, hard, non-calcareous, with fine to coarse crystalline, sparry calcite in fractures, with dark grey, hard, blocky shale, dull. Very few fractures.
- 7080 - 7090 As above, 60% dark grey, 40% black.
- 7090 - 7100 As above, with calcite infilled fracture.
- 7100 - 7120 Black, hard, non-calcareous, slightly bituminous, sub-fissile, with pyrite and small rugose coral.
- 7120 - 7130 Dull to glossy luster.
- 7130 - 7150 As above, with calcite infilled fracture.
- 7150 - 7160 Dull luster.
- 7160 - 7170 Interbedded, medium grey, blocky, hard, calcareous, granular shale and dark grey to black, non-calcareous.

- 7170 - 7180 as above, with trace disseminated pyrite and calcite infill in fractures.
- 7180 - 7200 with 90% of sample, medium gray, noncalcareous shale.
- 7200 - 7210 dark gray and black noncalcareous, bituminous in part, with medium gray calcareous shale.
- 7210 - 7230 medium to dark gray calcareous. Dull to glossy to granular.
- 7230 - 7250 dark gray to black, noncalcareous, blocky to subfissile, trace chalcedony (Fault Zone?).
- 7250 - 7270 as above, medium gray, very calcareous, siltstone.
- 7270 - 7300 Siltstone, medium brown gray, calcareous, friable, with dark gray, noncalcareous, subfissile, shale.
- 7300 - 7320 Shale, dark gray, calcareous, with siltstone, as above, crinoidal ossicle.
- 7320 - 7340 dark gray, blocky, hard, dull, noncalcareous, with soft siltstone, as above.
- 7340 - 7350 with medium gray, blocky, dull calcareous, shale.
- 7350 - 7360 Siltstone and shale, as above. (70% of sample calcareous)
- 7360 - 7390 <sup>no</sup> Shale, dark gray, dull, subfissile, noncalcareous, with calcareous siltstone and shale.
- 7390 - 7400 dark gray, blocky to subfissile, dull, calcareous in part.
- 7400 - 7440 dull to sparkling luster.
- 7440 - 7460 Shale, as above, with light and medium gray, brown, argillaceous, very fine crystalline to cryptocrystalline.
- 7460 - 7500 no limestone.
- 7500 - 7510 medium to dark gray, subfissile, slightly calcareous in part, dull, hard.
- 7510 - 7520 slickensides.
- 7520 - 7530 with medium brown gray, very calcareous, friable, siltstone.
- 7530 - 7540 dark gray, very calcareous, blocky, shale, with siltstone, as above, and fine disseminated pyrite.
- 7540 - 7560 with dark gray, fissile, noncalcareous, shale.
- 7560 - 7580 Siltstone, medium gray, calcite, friable and medium gray calcareous, blocky, shale.

- 7580 - 7600 Shale, dark gray, and black, hard, blocky, dull luster, noncalcareous.
- 7600 - 7610 medium to dark gray, very slightly dolomitic, with fine disseminated pyrite.
- 7610 - 7620 medium gray, subfissile, to blocky, dull, calcareous in part.
- 7620 - 7640 dark gray to black, with dolomite infill in fracture.
- 7640 - 7650 medium to dark gray, dull to sparkle, hard.
- 7650 - 7670 with dark gray, brown, dolomitic, siltstone and calcite infill in fractures.
- 7670 - 7690 trace of siltstone.
- 7690 - 7700 medium and dark gray, shale, medium gray to subfissile, hard, dark gray to calcareous in part.
- 7700 - 7710 trace of siltstone, as above.
- 7710 - 7720 with light to dark gray, brown, very fine crystalline, limestone, argillaceous.
- 7720 - 7730 medium to dark gray, blocky, noncalcareous, hard, dull, with dark gray, brown, very fine crystalline, limestone.
- 7730 - 7750 with black bituminous shale, no limestone.
- 7750 - 7760 calcareous in part, blocky to subfissile.
- 7760 - 7770 more calcareous.
- 7770 - 7780 with fine disseminated pyrite and slickensides.
- 7780 - 7790 dark gray, subfissile to blocky, calcareous in part, graphitic luster.
- 7790 - 7800 with calcite infill of fractures.
- 7800 - 7810 noncalcareous, with black, bituminous, dull, hard, blocky, shale.
- 7810 - 7820 very slightly dolomitic, ? in part, highly fracture, with slickensides.
- 7820 - 7830 coarse, calcite, crystals in fracture, show strain elongation.
- 7830 - 7840 calcareous in part.
- 7840 - 7850 no bituminous, shale.
- 7850 - 7870 dark gray and black, subfissile to blocky, calcareous in part, bituminous in part.

- 7870 - 7880 with slickensides.  
*not, 26 63 micaceous fragments in sand.*
- 7880 - 7890 Siltstone, slightly quartzitic, very dolomitic, with abundant soft black material (gilsonite?).
- 7890 - 7910 with calcite, quartzite and gypsum crystals in fractures and very poor intergranular porosity, and fine fracture porosity. Gas blew mud over BOP's.
- 7910 - 7950 dark gray and black, fissile, bituminous, noncalcareous, dull, soft, with fine disseminated pyrite.
- 7950 - 7980 Calcite and gypsum crystals, infill in fractures.
- 7980 - 7990 Slaty texture in part.
- 7990 - 8000 medium to dark gray to black, noncalcareous, black to bituminous, fissile, dull.
- 8000 - 8020 medium to dark gray to blocky, hard, dull to glossy.
- 8020 - 8040 medium gray, shale, calcareous in part.
- 8040 - 8050 slickensides.
- 8050 - 8080 dark gray and black, blocky to subfissile, dull, calcareous in part.
- 8080 - 8100 dark gray and black, blocky, hard, noncalcareous, with calcite and gypsumiferous crystals in fractures.
- 8100 - 8120 with abundant pyrite to both fine disseminated and blebs.
- 8120 - 8130 with dark, gray to brown, very dolomitic, slightly quartzitic, siltstone, Mainly soft black material.
- 8130 - 8140 black, blocky, calcareous in part, dull, hard, granular texture in part.
- 8140 - 8150 Shale, as above, no siltstone.
- 8150 - 8170 with abundant fine crystalline, disseminated pyrite.
- 8170 - 8180 dark gray and black, splintery, dull, noncalcareous, with pyritic blebs and slickensides.
- 8180 - 8190 with medium gray calcite, blocky, micromicaceous, shale.
- 8190 - 8200 dark gray and black, splintery, dull, noncalcareous.
- 8200 - 8220 dolomite, medium brown, fine to medium crystalline, tite, vitreous with fine disseminated pyrite, no fractures.
- 8220 - 8240 Shale, dark gray and black, bituminous, noncalcareous, subfissile, soft.
- 8240 - 8290 calcareous in part, blocky to subfissile.

- Dirty, speckled - x-ray*
- 8290 - 8300 Siltstone, dark gray to brown, dolomite, quartzitic, vitreous with disseminated pyrite.
- 8300 - 8340 Shale, dark gray and black, dull subfissile, slightly calcareous in part.
- 8340 - 8360 medium gray and black, splintery, noncalcareous, dull, with disseminated pyrite.
- 8360 - 8370 blocky to subfissile, calcareous in part.
- 8370 - 8380 no sample.
- 8380 - 8390 medium gray and black, medium gray, blocky, dull, calcareous in part, black to fissile.
- 8390 - 8400 with limestone, medium and dark brown to gray, calcisitite, argillaceous, tite, with crinoids and trilobites (?)
- 8400 - 8410 dark gray and black, splintery, noncalcareous, dull, with limestone, as above.
- 8410 - 8420 trace limestone.
- 8420 - 8430 Shale, dark gray, black, pyrite, splintery.
- 8430 - 8440 as above, with limestone, dark gray, brown, argillaceous, dense, silty.
- 8440 - 8450 as above.
- 8450 - 8460 as above, in part silty, slightly calcareous, rare trace of calcite fill fracture.
- 8460 - 8470 Shale, dark gray, black, pyritic, splintery, rare trace crinoids.
- 8470 - 8480 as above, trace calcite inclusions.
- 8480 - 8490 as above.
- 8490 - 8500 as above, dolomite, dark brown, silty, dense.
- 8500 - 8510 Shale, dark gray, black, fissile, pyritic, rare trace calcite fill fracture.
- 8510 - 8520 as above.
- 8520 - 8530 as above.
- 8530 - 8540 trace calcite fill fractures.
- 8540 - 8550 as above, with dolomite, dark brown, gray, very fine crystalline, silty, with secondary white dolomite crystals inclusions. Trace of quartzitic crystals.

- 8550 - 8560 dolomite, as above, with shale as above.
- 8560 - 8670 Shale, as above.
- 8570 - 8580 Shale, as above, with dolomite, dark brown, gray, very fine crystalline, silty, with secondary white fracture filled dolomite, trace quartzitic inclusions common.
- 8580 - 8590 Shale, as above, with dolomite, dark brown, gray, very fine to fine crystalline, with secondary white dolomite and quartzite filled fracture, common.
- 8590 - 8600 Shale, as above, with trace dolomite, as above, quartzitic inclusions common.
- 8600 - 8610 Shale, as above, with trace dolomite, as above.
- 8610 - 8630 Shale, dark gray, black, fissile, pyritic, trace calcite infill fracture.
- 8630 - 8640 as above, with dolomite, dark brown, very fine crystalline, slightly silty, dense.
- 8640 - 8650 Shale, as above.
- 8650 - 8660 Shale, as above.
- 8660 - 8670 as above, with trace dolomitic stringer.
- 8670 - 8680 Shale, black, with some dark gray, shale, as above, pyritic.
- 8680 - 8700 Shale, black, fissile, hard, pyritic.
- 8700 - 8710 Shale, black, dark gray, pyritic, fissile, trace sphalerite.
- 8710 - 8720 Shale, black, slightly to pyritic, hard, slightly silty, blocky.
- 8720 - 8730 as above, with trace euhedral quartzitic crystals, trace white fracture filled dolomite.
- 8730 - 8750 Shale, black, fissile, splintery, pyritic, trace calcite filled fracture.
- 8750 - 8760 Shale, black, dark gray, fissile, pyritic.
- 8760 - 8770 Shale, black, dark gray, fissile, slightly pyritic, slightly siliceous in part, trace fractures with euhedral quartzite and dolomitic crystals. (drilling break 4' per hour to 7' per hour)
- 8770 - 8780 Shale, black, trace crinoids, stem, dark gray, fissile, slightly pyritic, slightly siliceous.
- 8780 - 8790 Shale, black, dark gray, slightly pyritic, fissile, with trace of white secondary dolomite and calcite fill fracture.
- 8790 - 8810 as above, with trace of quartzitic fill fractures.

- 8810 - 8820 Shale, gray, black, in part waxy, fissile.
- 8820 - 8830 Shale, as above.
- 8830 - 8840 Shale, black, blocky, slightly pyritic, slightly siliceous, Shale, dark gray, fissile, trace of white dolomitic and quartzitic inclusions.
- 8840 - 8850 Shale, black, fissile, waxy, bituminous like, with secondary white dolomitic and quartzitic infill fracture.
- 8850 - 8860 as above, dolomite, brown, very fine crystalline, pyritic, with secondary white dolomite and quartzite. Some euhedral crystals.
- 8860 - 8870 Shale, black, dark gray, fissile, pyritic, trace of anhydrite? trace secondary quartzite.
- 8870 - 8890 Shale, black, dark gray, fissile, pyritic, trace secondary white dolomitic and quartzitic inclusions.
- 8890 - 8900 Shale, black, dark gray, fissile, slightly pyritic.
- 8900 - 8910 as above, with secondary white dolomite crystals.
- 8910 - 8920 as above, with secondary white dolomite and quartzite crystals, and trace mica fill fracture (muscovite)
- 8920 - 8940 as above, trace galena. (not seen)
- 8940 - 8950 as above, trace dolomite, brown, very fine crystalline, pyritic, with secondary white dolomite, and quartzite infilled fracture.
- 8950 - 8960 Shale, black, gray, fissile, slightly pyritic.
- 8960 - 8980 Shale, gray, black, fissile, waxy.
- 8980 - 9030 as above, with secondary quartzite.
- 9030 - 9040 as above, trace pyrite, trace gypsum.
- 9040 - 9050 as above, trace dolomite, brown, very fine crystalline.
- 9050 - 9060 Shale, gray, dark gray, black, fissile, in part waxy.
- 9060 - 9070 as above, slightly pyritic, trace gypsum, trace secondary calcite, and quartzite, trace brown, very fine crystalline, dolomite.
- 9070 - 9080 as above, with secondary quartzite common, trace secondary white dolomite.
- 9080 - 9090 as above.
- 9090 - 9100 Shale, gray, dark gray, black, fissile, in part waxy, in part, slightly pyritic, trace secondary quartzite, dolomite and gypsum.

- 9100 - 9110 as above, trace secondary calcite.
- 9110 - 9120 as above.
- 9120 - 9140 Shale, gray, dark gray, black, fissile, in part waxy, trace secondary quartz trace gypsum.
- 9140 - 9160 as above, trace pyrite, trace crinoid stem.<sup>?</sup>
- 9160 - 9170 as above, trace brown, very fine, crystalline, dolomite.
- 9170 - 9180 as above, trace crinoid.<sup>?</sup>
- 9180 - 9190 as above, trace secondary calcite, trace pyrite.
- 9190 - 9200 Shale, gray, dark gray, black, fissile, slightly waxy in part, slightly pyritic.
- 9200 - 9210 as above.
- 9210 - 9230 as above, black shale is slightly siliceous.
- 9230 - 9260 as above, trace secondary quartz and dolomite.
- 9260 - 9270 as above, trace secondary quartz and dolomite and gypsum, trace crinoid.<sup>?</sup>
- 9270 - 9280 as above, trace fossile?
- 9280 - 9300 as above, trace crinoid, trace dolomite, brown, very fine crystalline, dense.
- 9300 - 9310 as above, trace dolomite, brown, very fine crystalline, dense, hard.
- 9310 - 9330 as above, the black shale is in part slightly dolomitic.
- 9330 - 9350 as above, trace secondary quartzite.
- 9350 - 9360 as above, trace dolomite, brown, very fine crystalline, dense.
- 9360 - 9380 as above, trace gypsum fill fracture.
- 9380 - 9390 as above, trace secondary quartz crystals.
- 9390 - 9400 as above, trace secondary quartz and dolomite.
- 9400 - 9410 as above, with secondary white dolomite and quartz common.
- 9410 - 9430 as above, trace brachiopod.
- 9430 - 9450 as above, trace secondary quartz trace secondary white dolomite.

- 9450 - 9470 as above, trace crinoid stem.
- 9470 - 9480 as above, trace secondary quartz and dolomite.
- 9480 - 9490 as above, gypsum common.
- 9490 - 9600 as above, trace secondary quartz dolomite and gypsum.
- 9600 - 9610 Shale, gray, dark gray, black, fissile, in part waxy, slightly pyritic, slightly splintery.
- 9610 - 9640 as above, trace secondary quartz and dolomite.
- 9640 - 9700 as above, in part slightly dolomite.
- 9700 - 9730 as above, trace secondary white dolomite.
- 9730 - 9740 as above, in part slightly dolomitic, trace black shale, slightly siliceous.
- 9740 - 9810 as above.
- 9810 - 9830 as above, trace dolomite, brown, very fine crystalline, dense.
- 9830 - 9850 Shale, black, dark gray, fissile, splintery, firm.
- 9850 - 9870 as above, trace secondary quartz
- 9870 - 9880 as above, trace secondary white dolomite and quartz
- 9880 - 9900 as above, with dolomite, dark brown, gray, very fine crystalline, dense.
- 9900 - 9910 Shale, dominant dark gray to black, medium hard, splintery to fissile, dominant non-siliceous fracture.
- 9910 - 9920 Shale, dominant medium to dark gray, trace pyrite, trace secondary dolomite veins.
- 9920 - 9930 dominant, medium to dark gray, non-siliceous, trace pyrite.
- 9930 - 9940 slightly dolomitic in part, trace pyrite.
- 9940 - 9950 no samples.
- 9950 - 9960 medium to dark gray, non-siliceous, slightly dolomitic in part, soft to medium hard, trace pyrite, splintery to fissile.
- 9960 - 9970 dolomitic, medium gray, soft, trace pyrite.
- 9970 - 9980 medium to dark gray, trace secondary dolomite vein, trace pyrite.

- 9980 - 9990 slightly siliceous in part, pyritic.
- 9990 - 10000 dominant medium gray, very slightly dolomitic in part, trace pyrite.
- 10000 - 10010 no sample.
- 10010 - 10020 Shale, medium to dark gray, soft to medium hard, slightly siliceous in part, trace secondary dolomite vein, pyritic, dominant splintery fissile in part.
- 10020 - 10030 medium gray to black, slightly dolomitic in part, slightly siliceous in part.
- 10030 - 10040 trace secondary dolomite vein.
- 10040 - 10050 increase in black shale, siliceous in part, soft to medium hard, trace secondary dolomite and quartz veins, pyritic.
- 10050 - 10060 dominant medium to dark gray, dolomitic in part, trace secondary dolomite infilled fracture, pyritic.
- 10060 - 10070 medium gray to black, dolomitic in part, siliceous in part, trace secondary dolomite vein, pyritic.
- 10070 - 10080 increase in black shale, non-siliceous.
- 10080 - 10090 slightly siliceous in part, trace secondary dolomite vein, trace crinoid.
- 10090 - 10100 dominant medium to dark gray, slightly dolomitic in part, trace secondary dolomitic veins, trace gypsum.
- 10100 - 10110 Shale, medium to dark gray, soft to medium hard, splintery, fissile and waxy in part, pyritic, trace gypsum.
- 10110 - 10120 dominant, medium to dark gray, splintery, fissile and waxy in part, pyritic.
- 10120 - 10130 (Sample after trip) trace black shale, soft to medium hard.
- 10130 - 10140 slightly dolocastic in part, trace secondary dolomite vein, trace gypsum vein?
- 10140 - 10150 splintery to fissile, waxy.
- 10150 - 10160 no sample.
- 10160 - 10170 medium gray to black, slightly siliceous in part, secondary dolomite veins.
- 10170 - 10180 Shale, medium dark gray, pyritic, trace very fine calcite veins. (Sample after twist-off 10,173')

- 10180 - 10190 Medium to medium dark grey, pyritic, trace quartz and calcite veins; trace black, bituminous shale, with brown streak.
- 10190 - 10200 Medium dark grey, laminated in part, rare calcite and quartz veins.
- 10200 - 10210 Medium to medium dark grey, slightly doloclastic in part, slightly pyritic, with rare siltstone, medium grey, pyritic, doloclastic.
- 10210 - 10220 With rare quartzite and gypsum.
- 10220 - 10230 Medium dark grey, slightly doloclastic in part; with mineral, black, shiny, soft coal (bituminous).
- 10230 - 10240 Medium dark grey, slightly doloclastic in part; trace calcite and quartz veins; reddish dark brown, granular (very fine) dolomite.
- 10240 - 10250 Medium to dark grey, slightly doloclastic in part, rare pyritic, laminated in part, quartz veining common, trace white arenaceous anhydrite (cavings?).
- 10250 - 10260 Medium to dark grey, slightly doloclastic in part, rare pyritic, with trace white arenaceous anhydrite and black, shiny, soft bituminous.
- 10260 - 10270 Medium grey, pyritic, slightly doloclastic in part, blocky and shale, dark grey, pyritic, trace medium brownish grey, very fine grained dolomite.
- 10270 - 10280 Medium grey, pyritic, laminated in part, blocky; with rare white calcite veining.
- 10280 - 10290 No sample.
- 10290 - 10300 Medium to medium dark grey, slightly doloclastic in part, pyritic, with rare calcite veins; reddish brown, very fine grained, slightly pyritic dolomite.
- 10300 - 10310 Medium to medium dark grey, slightly doloclastic in part, pyritic.
- 10310 - 10340 No samples.
- 10340 - 10350 Rare white calcite crystals.
- 10350 - 10360 Medium dark grey, slightly doloclastic in part, pyritic; with mineral, black, soft, shiny bituminous.
- 10360 - 10370 Medium dark grey, slightly dolomitic in part, pyritic; rare fish scale (?)
- 10370 - 10390 No samples.
- 10390 - 10400 With rare calcite and dolomite veins (with shale breccia in dolomite vein).

- 10400 - 10410 Medium dark grey, slightly pyritic, slightly dolomitic, in part, laminated in part, blocky, with rare white calcite and quartz veins.
- 10410 - 10420 Medium dark grey, pyritic in part, dolomitic, laminated and blocky
- 10420 - 10430 With rare silty, argillaceous dolomite, medium brown, grey, siliceous.
- 10430 - 10440 No sample.
- 10440 - 10450 Medium dark grey, pyritic, slightly dolomitic in part.
- 10450 - 10460 Shale, medium dark grey, pyritic, slightly dolomitic in part.
- 10460 - 10470 With rare white calcite veining.
- 10470 - 10480 With rare white calcite and quartz veining.
- 10480 - 10490 With rare white calcite veining.
- 10490 - 10500 Medium dark grey, slightly pyritic, slightly dolomitic in part; with rare medium gray, doloclastic, siltstone and rare calcite veining.
- 10500 - 10510 Medium dark grey, slightly pyritic, slightly dolomitic in part, with rare, medium brownish grey, very fine grained dolomite, slightly pyritic.
- 10510 - 10520 Medium dark grey, pyritic, slightly dolomitic in part, with rare white calcite veining, with rare medium grey, very fine, silty, dolomite.
- 10520 - 10530 Dark grey, pyritic, slightly dolomitic in part, earthy, with trace medium brownish grey, very fine, silty dolomite. pyritic.
- 10530 - 10560 No samples.
- 10560 - 10570 Dark grey, pyritic, slightly dolomitic in part, earthy; with mineral interbedded dolomite, brownish grey, very fine grained, slightly silty, very pyritic, siliceous.
- 10570 - 10580 With rare white calcite veining.
- 10580 - 10590 No samples.
- 10590 - 10600 Medium dark grey, slightly pyritic, slightly dolomitic in part, laminated in part with mineral, medium dark grey, silty dolomite.
- 10600 - 10610 Dark grey, slightly pyritic, slightly dolomitic in part, earthy; with trace dolomite as above and light brownish grey, very fine grained, dolomitic limestone.

- 10610 - 10620 Dark grey, slightly pyritic, slightly dolomitic in part, earthy; with trace light brownish grey, silty, very fine to fine grained, doloclastic limestone, pyritic.
- 10620 - 10630 No sample.
- 10630 - 10640 Medium dark grey, slightly pyritic, slightly dolomitic in part, with trace light brownish grey, silty, very fine grained dolomite.
- 10640 - 10650 Medium dark grey, slightly pyritic, slightly dolomitic in part, with trace white calcite veining.
- 10650 - 10660 Shale, dark grey, black, fissile, slightly pyritic in part, slightly dolomitic.
- 10660 - 10690 As above. Trace secondary white dolomite inclusions.
- 10690 - 10710 As above. Slightly siliceous in part.
- 10710 - 10720 As above. Trace secondary quartz inclusions.
- 10720 - 10730 As above, slightly siliceous in part, trace secondary white dolomite.
- 10730 - 10740 As above, trace chert, black.
- 10740 - 10770 As above, slightly siliceous in part.
- 10770 - 10780 As above, siliceous in part.
- 10780 - 10790 Shale, dark grey, black, slightly dolomitic in part, slightly pyritic, slightly siliceous in part.
- 10790 - 10810 As above.
- 10810 - 10850 As above, trace vein calcite.
- 10850 - 10860 As above, black, siliceous shale common.
- 10860 - 10920 Shale, black, dark grey, siliceous, pyritic, hard.
- 10920 - 10930 As above, with shale, dark grey-grey, fissile.
- 10930 - 10970 Shale, black, siliceous, pyritic, hard.
- 10970 - 10990 As above, with shale, light grey, brown, waxy, pyritic, soft.
- 10990 - 11000 As above, trace chert, black.
- 11000 - 11010 Shale, black, siliceous, pyritic, hard, with some dark grey-grey shale, interbedded, pyritic, slightly dolomitic.

- 11010 - 11030 Shale, black, siliceous, pyritic, hard.
- 11030 - 11040 as above, with trace shale, gray, waxy, pyritic.
- 11040 - 11050 as above, trace shale, black, dolomitic.
- 11050 - 11060 as above, trace shale, black, dolomitic, with trace of dark brown, very fine crystalline, dolomite.
- 11060 - 11070 as above, trace black, dolomitic, shale and dolomite stringers.
- 11070 - 11080 Core #2 (11077 - 11081) Recovered 2'. Shale, black, siliceous, hard, slightly dolomitic in part.
- 11080 - 11090 Shale, black, very siliceous, hard, slightly pyritic, Shale, dark gray, black, slightly siliceous in part.
- 11090 - 11110 as above, with shale, gray, dark gray, hard, in part dolomitic.
- 11110 - 11120 Shale, black, siliceous, hard, pyritic, trace dolomite, dark brown, very fine crystalline, dense, trace shale, dark gray, gray.
- 11120 - 11150 as above, in part slightly dolomitic.
- 11150 - 11180 Shale, black, siliceous, pyritic, shale, gray, dark gray, firm, slightly waxy in part.
- 11180 - 11190 as above, in part dolomitic.
- 11190 - 11200 no samples.
- 11200 - 11220 Shale, black, very slightly dolomitic, hard, compact, slightly siliceous, generally blocky; minor pyrite @ thin laminae; trace fracturing and secondary white dolomite infilled.
- 11220 - 11230 as above, becoming more siliceous.
- 11230 - 11240 Shale, black, as above; trace pyrite, rarely fractured.
- 11240 - 11250 Shale, black, inert to dolomitic, as above; with minor shale, brown to black, limey, very pyritic, slightly bituminous; firm, hard, blocky.
- 11250 - 11260 with shale, medium gray, inert to slightly dolomitic to, or limey, moderately hard, fissile to blocky.
- 11260 - 11280 Shale, black, inert, dolomitic, as above, with shale, medium gray, as above, trace fracturing, and infilled with secondary white dolomite; pyrite common @ small crystals and occasional nodule.
- 11280 - 11290 trace gas after trip @ 11,282' - 65 units.
- 11290 - 11300 no samples.

- 11300 - 11310 Shale, black, as above; with dolomite stringers, medium to dark gray, silty, argillaceous, very pyritic; good gas reading +150 after logging.
- 11310 - 11320 Shale, black, as above, trace siltstone, medium gray, dolomitic, hard, pyritic, with shale, medium gray, slightly limey to inert, silky lustre; fracturing and dolomite and quartzite infilled.
- 11320 - 11370 Shale, medium gray, inert to slightly dolomitic, rarely slightly limey, moderately hard, rarely pyritic, lumpy to blocky; with shale black (20 - 40%), inert to slightly dolomitic, pyrite rare to common @ fine crystals and thin laminae; minor fracturing and quartzite or calcite infilled, trip gas +150.
- 11370 - 11380 Shale, black, inert to slightly dolomitic, as above; with shale, medium gray, as above (30%) +150 trip gas.
- 11380 - 11390 Shale, black, as above, with shale, medium gray, as above, (50%), no trip gas; rarely fractured.
- 11390 - 11400 Shale, medium to dark gray, inert to slightly dolomitic, moderately hard, rare pyrite, subfissile to blocky.
- 11400 - 11420 with minor black shale (25%) as above, trace dolomite, medium brown with gray, very argillaceous, tite, fractured and infilled with secondary dolomite and quartzite.
- 11420 - 11430 Shale, medium to dark gray, as above, fractured and infilled with secondary calcite and quartzite.
- 11430 - 11440 trace open fractures.
- 11440 - 11450 with black shale, (10 - 20%) in part siliceous, hard, blocky.
- 11450 - 11460 Shale, medium to dark gray, as above; with shale, black (10 - 20%) as above.
- 11460 - 11480 no samples.
- 11480 - 11490 Shale, dark gray to black, inert to slightly dolomitic, hard, rare pyrite, blocky, with shale, medium gray (20%) as above, minor fracturing.
- 11490 - 11500 Shale, dark gray to black, as above, minor shale, medium gray, as above.
- 11500 - 11520 Shale, dark gray to black, pyrite, hard, slightly dolomitic in part, with medium gray, shale interbeds; very quartz and calcite, filled fractures.
- 11520 - 11530 no samples.
- 11530 - 11540 as above, siliceous.

- 11540 - 11550 no samples.
- 11550 - 11560 Note: Casing shoe drilled out at 11,552'.
- 11560 - 11570 Shale, dark gray to black, firm to hard, bands of fine disseminated pyrite, trace very quartzitic.
- 11570 - 11580 no samples.
- 11580 - 11590 as above, with some medium to dark gray shale, lumpy, dolomite, trace very calcite.
- 11590 - 11600 medium gray, shale, as above.
- 11600 - 11610 as above, with minor interbeds of black pyritic shale.
- 11610 - 11620 no samples.
- 11620 - 11630 Shale, black, pyritic, thin laminated, firm to hard, siliceous in part.
- 11630 - 11640 no samples.
- 11640 - 11650 very dark gray to black, as above, very dolomitic (50 units on gas detector)
- 11650 - 11660 Shale, dark gray to black, as above.
- 11660 - 11670 no samples.
- 11670 - 11680 as above, no sign of fracturing, pyritic, siliceous, hard, lumpy.
- 11680 - 11710 no samples.
- 11710 - 11720 as above, in part very pyritic with medium gray (steel) color.
- 11720 - 11730 Shale, dark gray to black, as above, trace shale, light to medium gray, dolomitic, hard lumpy, very quartzite (60 units gas).
- 11730 - 11740 as above, very siliceous.
- 11740 - 11750 Shale, dark gray, medium in part, hard, siliceous, pyrite bands, slightly dolomitic in part.
- 11750 - 11760 Shale, very dark gray, very siliceous, pyritic, very slight dolomite, very hard, trace very calcite.
- 11760 - 11770 as above, dolomite content as very fine doloblasts in shale matrix, (trip gas < 150 units)
- 11770 - 11780 inert, very calcareous.
- 11780 - 11790 as above, less pyritic, hackley to waxy lustre.

- 11790 - 11820 no samples.
- 11820 - 11840 Shale, dark steel gray, slightly pyritic, slightly dolomitic, as above, hackley, hard, very calcareous and quartzitic.
- 11840 - 11850 as above, with the doloblastic shale being light to medium gray.
- 11850 - 11870 no samples.
- 11870 - 11880 as above, abundant, very calcareous at 11,876' to 11,878', trace very quartzitic, minor soft gray shale.
- 11880 - 11890 Shale, very dark steel gray, as before.
- 11890 - 11900 as above, with some evidence of shale breccia in the quartzite veins.
- 11900 - 11930 no samples.
- 11930 - 11940 more siliceous, pyrite, rare, fewer doloblasts.
- 11940 - 11950 no samples.
- 11950 - 11960 Shale, as above, not dolomitic, very siliceous, minor, very calcareous, abundant, very quartzitic.
- 11960 - 12010 no samples.
- 12010 - 12020 as above, not as much vein material, as above, siliceous, very firm, medium to hard.
- 12020 - 12030 Shale, dark steel gray, trace dolomitic shale, medium gray due to dolomite content.
- 12030 - 12040 as above, not as siliceous.
- 12040 - 12060 as above, with medium gray doloblastic streaks.
- 12060 - 12070 as above, pyrite rare.
- 12070 - 12080 no samples.
- 12080 - 12090 slightly, softer; lower dolomite content, trace paper thin, light tan, calcite.
- 12090 - 12100 as above, in part, medium gray, with limey white specks, very soft.
- 12100 - 12110 as above, pyrite in dark steel gray, shale only, lower dolomite content.
- 12110 - 12130 no samples.
- 12130 - 12140 Shale, steel gray, slightly dolomitic in part, very firm, trace very fine calcite, trace calcareous shale, as above.

- 12140 - 12160 No samples.
- 12160 - 12170 As above, non-calcareous, trace quartz.
- 12170 - 12180 No samples.
- 12180 - 12190 As above, slightly calcareous.
- 12190 - 12200 No samples.
- 12200 - 12210 As above, with trace very light grey limy shale, soft,  
trace of light tan, calcareous, siltstone.
- 12210 - 12220 Shale, dark steel grey, slightly dolomitic in part, minor  
shale and siltstone as above.
- 12220 - 12230 Shale, dark steel grey as above; Shale, medium grey, slightly  
dolomite to dolomitic, siliceous in part with sub-vitreous  
lustre, very firm to hard.
- 12230 - 12260 No samples.
- 12260 - 12270 As above, dark grey shale, not dolomite.
- 12270 - 12330 No samples.
- 12330 - 12380 Shale, dark grey, black, dolomitic in part, slightly  
siliceous in part, brittle, slightly pyritic, trace of  
secondary white calcite, dolomite and quartz, wilty in  
part.
- 12380 - 12470 Shale, as above with interbedded grey, dark grey, slightly  
dolomitic siltstone stringers, with pyrite.
- 12470 - 12480 Shale, dark grey, black, slightly siliceous in part, brittle,  
slightly pyritic with trace of secondary quartz and calcite.
- 12480 - 12490 As above, trace black chert.
- 12490 - 12510 As above, slightly dolomitic in part.
- 12510 - 12520 As above, trace black chert.
- 12520 - 12530 Shale, black, dark grey, siliceous in part, slightly pyritic,  
trace chert, trace secondary quartz
- 12530 - 12540 Shale, black, dark grey, siliceous in part, slightly pyritic,  
trace secondary quartz.
- 12540 - 12570 As above, slightly dolomitic in part.
- 12570 - 12600 As above, slightly silty in part.
- 12600 - 12630 Shale, black, dark grey, slightly siliceous in part, slightly  
pyritic, brittle, trace secondary quartz and calcite.

- 12630 - 12640 as above, slightly waxy in part.
- 12640 - 12650 as above, slightly dolomitic in part.
- 12650 - 12670 Shale, gray, dark gray, black, slightly siliceous in part, slightly pyritic, trace secondary quartz
- 12670 - 12730 as above with interbedded light gray, dolomite, siltstone stringers.
- 12730 - 12770 as above, slightly dolomitic in part.
- 12770 - 12850 as above, slightly dolomitic in part.
- 12850 - 12860 as above, trace secondary calcite.
- 12860 - 12920 as above, trace dolomite, siltstone stringers.
- 12920 - 12930 as above, trace secondary white calcite.
- 12930 - 12940 Shale, gray, dark gray, black, slightly waxy in part, slightly pyritic, trace secondary quartz
- 12940 - 12970 as above, trace secondary calcite.
- 12970 - 13020 as above, trace dolomite, siltstone.
- 13020 - 13050 as above, slightly dolomitic in part.
- 13050 - 13150 as above, trace calcite.
- 13150 - 13180 Shale, gray, dark gray, black, slightly waxy in part, slightly pyritic, trace secondary quartz
- 13180 - 13190 as above, trace dolomite, siltstone stringers.
- 13190 - 13220 as above, trace secondary white calcite.
- 13220 - 13240 as above, trace dolomite, siltstone stringers.
- 13240 - 13250 Shale, gray, dark gray, black, slightly siliceous in part, slightly pyritic, trace secondary quartz
- 13250 - 13280 as above, trace secondary calcite.
- 13280 - 13290 as above, trace dolomite, siltstone stringers.
- 13290 - 13310 as above, trace secondary white dolomite.
- 13310 - 13350 as above, trace dolomite, siltstone stringers.
- 13350 - 13360 as above, trace chert black.
- 13360 - 13370 Shale, dark gray to black, slightly siliceous in part, trace pyrite in part, hard.
- 13370 - 13380 as above, trace white secondary calcite.

13380 - 13400	no samples.
13400 - 13410	as above, trace siltstone, medium gray, dolomitic.
13410 - 13420	as above, trace secondary quartzite.
13420 - 13430	Shale, as above.
13430 - 13450	no samples.
13450 - 13460	Shale, as above, trace siltstone, medium gray, dolomite.
13460 - 13470	Shale, as above.
13470 - 13700	no samples.
13700 - 13710	Shale, dark gray to black, slightly siliceous in part, hard, slightly pyritic in part, trace white secondary calcite.
13710 - 13720	no samples.
13720 - 13730	Shale, as above, trace secondary quartz
13730 - 13770	no samples.
13770 - 13780	Shale, as above, decreasing calcite and quartz
13780 - 13830	no samples.
13830 - 13850	Shale, as above, in part slightly dolomitic and silty, very slight trace calcite and quartzite, as above, trace siltstone, very dark to medium gray, dolomite, well cement, argillaceous, pyrite.
13850 - 13860	very pyritic in part, mainly inert, no trace calcite and quartz as above.
13860 - 13880	no samples.
13880 - 13890	Shale, as above, slight trace calcite and quartz as above, siltstone, as above.
13890 - 13900	no samples.
13900 - 13910	siltstone, slightly more abundant.
13910 - 13920	no samples.
13920 - 13930	trace quartzite, as above, no calcite.
13930 - 13970	no samples.
13970 - 13980	very pyritic in part.
13980 - 14000	no samples.
14000 - 14010	calcareous, as above, more prominent.

13990 Blue quartz

- 14010 - 14020 no samples.
- 14020 - 14030 Shale, in part very silty, abundant siltstone, as above.
- 14030 - 14040 Shale, as above, slightly dolomitic.
- 14040 - 14050 no samples.
- 14050 - 14060 Shale and siltstone, as above, with abundant shale, medium gray, fairly soft and waxy, inert, very slightly pyritic in part, fissile. <sup>14047</sup>
- 14060 - 14090 no samples.
- 14090 - 14100 Shale, dark gray with black, as above, with shale and siltstone, as above, trace orange quartz
- 14100 - 14220 no samples.
- 14220 - 14230 quartzite and calcite, as above, slightly more abundant.
- 14230 - 14250 no samples.
- 14250 - 14270 Shale, dark gray to black, inert with very slight dolomite, very slight to very silty, with shale, medium to dark gray, as above, waxy, greasy, firm, slightly dolomitic, very slightly silty. Siltstone, as above, slight trace of siltstone, light to medium gray, dolomite, siliceous, hard, well cement, pyritic at 14,260'.
- 14270 - 14280 Siltstone content.
- 14280 - 14290 dark gray to black shale and siltstone, as above, decrease, trace shale, dark gray brown, blocky, tough, dolomite, very slight trace.
- 14290 - 14300 light to medium gray siltstone, as above.
- 14300 - 14310 no samples.
- 14310 - 14320 Shale, as above, appear slightly more brittle, very pyritic in part, abundant shale, medium gray, very hard, slightly dolomitic, very siliceous.
- 14320 - 14330 dark gray with black shale, more abundant.
- 14330 - 14340 medium gray, waxy, shale more abundant.
- 14340 - 14350 Shale, dark gray to black, blocky, hard, siliceous, calcareous, slightly silty, very slightly pyritic, very slight trace siltstone, as above.
- 14350 - 14360 very slight trace siltstone; light gray brown, very calcareous.
- 14360 - 14370 no samples.

- 14370 - 14380 minor interbeds shale, medium gray, waxy, greasy, as above.
- 14380 - 14390 10' - 15' 6 samples, well, quartzite, siltstone, red and yellow quartzite, clear chert pebbles, mica, chalky.
- 14390 - 14400 material, dark brown, lithographic dolomite, at 14,398' trace dolomite, light to medium gray, slightly argillaceous, vitreous, very compact.  
*Note*
- 14400 - 14410 Shale, as above, at 14,407' - Dolomite, light to medium gray, very fine to fine crystalline, crystals very compact, vitreous, slightly pyritic, trace argillaceous.
- 14410 - 14440 material adhering to crystals (gilsonite?) very slight trace white dolomite, appears tight, at 14,420'. Dolomite is dark gray in part and argillaceous, argillaceous partings, more abundant, fine to medium crystalline, white dolomite present, appears tight, probably some very poor fracture and vuggy porosity, at 14,430' white dolomite, very abundant.
- 14440 - 14450 white dolomite, as above, very abundant, coarse crystalline in part, fairly abundant clear quartzite.
- 14450 - 14460 no samples.
- 14460 - 14470 abundant pyrite.

SECTION III

Engineering Summary

(a) Report of Drillstem Tests

(1) DST 11560-14470 Tool open 289 minutes; shut in 268 minutes; Tool open with good air blow; Gas to surface in 40 minutes; too weak to measure. Recovered 1500' gas cut mud.

Analyses were made on water extracted from mud. The water was dark wine colored and is a filtrate. Salinity of middle sample 23,300 ppm Cl-, bottom sample 19,200 ppm Cl-.

(b) Casing Record

13-3/8" - weight 54.5 - amount 417 - saxes cement 400 plus 2% CaCl2  
2 plugs

9-5/8" - weight 40 and 43.5 - amount 4411 - saxes cement 1000 saxes  
Oilwell plus 4% Gel plus 270 saxes Neat.  
2 plugs

7" - weight 23, 26, 29 - amount 11,560 - saxes cement 715 saxes  
Oilwell plus 1.65% HR 12 Retarder.  
2 plugs.

(c) Bit Record

<u>No.</u>	<u>Size</u>	<u>Make</u>	<u>Type</u>	<u>Depth Out</u>	<u>Feet</u>	<u>Hours</u>
1A	12-1/4	SEC	S3	150	150	12
2A	12-1/4	SEC	S4	297	147	8-1/2
3A	12-1/4	HTC	OWV	522	225	13-1/2
4A	12-1/4	HTC	OSC	838	316	16
1B	17-1/2	Smith	Reaming	440	440	16-1/2
2B	17-1/2	Reed	Reaming	615	175	8
5A	12-1/4	HTC	OWV	884	46	9
1C	9	Reed	YTIA	985	101	16-1/2
2C	9	Reed	YSI	1054	69	3
10	12-1/4	Smith	Pilot	1054	170	9-3/4
2B	17-1/2	Reed	Reaming	1047	167	5-1/4
	12-1/4	HTC	OWV	1070	Drill float shoe	16' 6-1/4 hrs.
	12-1/4	HTC	OSC	1077	7	2
1	12-1/4	Smith	K2P	1132	29	6-1/4
2	12-1/4	HTC	OSC	1340	208	19-3/4
3	12-1/4	HTC	OSC	Drill on Iron		
4	12-1/4	HTC	W7	Drill on Iron		
5	12-1/4	HTC	W7	Drill on Iron		
6	12-1/4	HTC	W7R	Drill on Iron		

<u>No.</u>	<u>Size</u>	<u>Make</u>	<u>Type</u>	<u>Depth</u> <u>Out</u>	<u>Feet</u>	<u>Hours</u>
R.R.	12-1/4	HTC	OSC3	50	50	1-1/2
1B	17-1/2	Reed	Pilot	50	50	2
2B	24	HTC	OSQZ	50	50	2
1	12-1/4	HTC	OSC	138	88	8-1/4
2	12-1/4	HTC	OSC	423	285	10-3/4
3	12-1/4	HTC	OSC-3	894	471	16-1/2
4	12-1/4	HTC	OSC-3	1253	359	19
1B	17-1/2	Reed	Pilot	417	367	14
5	12-1/4	Smith	DT	1524	271	18
6	12-1/4	Smith	DT	1881	357	23-1/2
7	12-1/4	Smith	K2P	2000	119	15
3C	4-3/4	HTC	OW	1415	20	2-1/2
4C	4-3/4	HTC	OSC	Ream	105	5-1/2
5	4-3/4	HTC	OSC-3			1-1/2
	12-1/4	Smith	K2P	2085	85	6
8	12-1/4	HTC	OSC-3	2650	565	26-1/4
9	12-1/4	HTC	OSC-3	2788	138	6-1/2
10	12-1/4	HTC	W7	2809	21	5-1/2
11	12-1/4	HTC	W7R	2838	29	4-1/2
12	12-1/4	HTC	W7R	2926	88	14-1/4
13	12-1/4	HTC	OSCIE	3050	124	11-1/2
14	12-1/4	HTC	OSC	3155	105	16-1/4
15	12-1/4	HTC	OSCIE	3360	205	11-1/4
16	12-1/4	HTC	W7R	3378	18	6
17	12-1/4	Reed	YHW	3392	14	6
18	12-1/4	SEC	H7W	3412	20	5
19	12-1/4	Smith	4W4	3416	4	2
20	12-1/4	HTC	RC-2BJ	3425	9	6
21	12-1/4	HTC	W7R	3531	106	12-3/4
22	12-1/4	HTC	OSCIE	3699	168	17-3/4
23	12-1/4	HTC	OWV	3771	72	13-1/2
24	12-1/4	SEC	S6	3869	98	13-1/2
25	12-1/4	SEC	S6	3972	103	14-1/4
26	12-1/4	Reed	YTI	4022	50	8-3/4
27	12-1/4	HTC	OWV	4073	51	9
28	12-1/4	SEC	M4N	4183	110	16-1/2
29	12-1/4	HTC	OSCIE	4288	105	19-1/2
30	12-1/4	HTC	OSCIE	4347	59	10-3/4
31	12-1/4	Smith	DT	4369	22	5-1/2
32	12-1/4	HTC	OSC	4384	15	4-3/4
33	12-1/4	SEC	M4N	4410	26	12
34	12-1/4	HTC	OWC	4440	40	15-1/4
35	12-1/4	HTC	OWC	4470	20	6-1/2
36	12-1/4	Smith	HWI	4474	4	4
37	12-1/4	C.P.	EH-3	4484	10	4-1/2
38	12-1/4	HTC	RG-2BJ	4565	41	24
39	12-1/4	Reed	YHWE	4617	52	14-3/4
40	12-1/4	SEC	M4N	4733	116	20
41	12-1/4	HTC	OSCIG	4841	108	12-1/4
42	12-1/4	Smith	DT2G	4901	60	12-1/2
43	12-1/4	CP	ES2	4951	50	14

<u>No.</u>	<u>Size</u>	<u>Make</u>	<u>Type</u>	<u>Depth Out</u>	<u>Feet</u>	<u>Hours</u>
44	12-1/4	HTC	OSC			
45	12-1/4	HTC	OSC	5051	59	12-1/4
46	12-1/4	Smith	K2P	5106	55	14
47	12-1/4	CP	ES2	5164	58	18
48	12-1/4	Reed	YTL	5187	23	11
49	12-1/4	HTC	OWV	5286	99	13-1/2
50	12-1/4	HTC	OWV	5357	71	18-1/2
51	12-1/4	Reed	YSI	5411	54	18-3/4
52	12-1/4	HTC	OWV	5475	64	21-1/2
53	12-1/4	HTC	OWV	5517	42	14-1/2
54	12-1/4	Smith	SV2	5527	10	7-1/2
55	12-1/4	HTC	W7	5545	18	8-1/2
56	12-1/4	HTC	OWC	5546	1	1/4
57	8-1/2	HTC	W7	5546	Circulate and fishing	
58	12-1/4	HTC	OSC-3	5546	Clean out only	
59	8-1/2	Reed	YSI		Clean out only	
60	12-1/4	Reed	YSI		Clean out only	
61	12-1/4	Reed	YSI		Clean out only	
62	12-1/4	Reed	YM		Clean out only	
63	12-1/4	Reed	YM		Clean out only	
64	12-1/4	C.P.	EMIC	2820	Clean out only	
65	8-1/2	Reed	YH	2836	16	8-1/4
66	8-1/2	Reed	YH	2851	15	3-1/2
67	12-1/2	Smith	K2P	2895	44	13-1/2
68		Smith	DT2G	3004	109	16-1/4
69		Smith	DT2G	3109	105	22-1/4
70		Reed	YSI	3184	75	20-1/4
71		Smith	SUZ	3351	167	25-3/4
72		Reed	YHW	3373	22	6-3/4
73	12-1/4	CP	EH3	3388	15	8-1/2
74	12-1/4	Reed	YM	3404	16	6-1/4
75	12-1/4	Reed	YHW	3427	23	12
76	12-1/4	Reed	YH	3544	117	20
77	12-1/4	Smith	SU2	3643	99	20-1/4
78	12-1/4	Smith	DT	3686	43	9-1/2
79	12-1/4	HTC	OWV	3723	34	17
80	12-1/4	CP	ES2J	3784	61	16-3/4
81	12-1/4	CP	EMIV	3848	64	17-1/4
82	12-1/4	CP	EMIV	3888	40	15-1/2
83	12-1/4	HTC	OWC	3972	84	21-1/2
84	12-1/4	Smith	SU2	4022	50	13-3/4
85	12-1/4	Smith	T-2	4092	70	21
86	12-1/4	Smith	T-2	4171	79	19
87	12-1/4	Smith	SU2	4271	100	19
88	12-1/4	Smith	K2P	4352	81	18-1/2
89	12-1/4	Reed	YSI	4364	11	11-1/2
90	12-1/4	HTC	OWV	4379	15	16-1/2
91	12-1/4	Smith	C-4	4400	21	21-1/2
92	12-1/4	SEC	M4L	4411	11	15-1/2
93	8-1/2	Reed	YH	4413	2	1-1/4
94	8-1/2	HTC	W7R-2	4422	9	8-1/4

<u>No.</u>	<u>Size</u>	<u>Make</u>	<u>Type</u>	<u>Depth</u> <u>Out</u>	<u>Feet</u>	<u>Hours</u>
95	8-1/2	HTC	OWC	4450	28	10
96	8-1/2	HTC	OSC	Drill out plug only. Ream to 12-1/4 with RR 12-1/4" bits and hole openers. Run 4411 feet of 9-5/8" casing.		
97	8-1/2	HTC	OWC	4461	11	12
98	8-1/2	SEC	M4L	4469	8	11-1/2
99	8-1/2	Reed	YH	4483	14	12-1/4
100	8-1/2	Reed	YH	4494	11	7-1/2
101	8-1/2	HTC	W7	4504	10	9-1/2
102	8-1/2	HTC	W7	4520	16	10-3/4
103	8-1/2	HTC	W7	4533	13	7-1/2
104	8-1/2	HTC	W7R2	4548	15	9-1/4
105	8-1/2	HTC	W7R2	4572	24	13
106	8-1/2	CP	EMIC	4650	78	15-1/2
107	8-1/2	Reed	YSI	4749	99	14-3/4
108	8-1/2	Reed	YSI	4815	66	14-1/4
109	8-1/2	Reed	YSI	4906	91	21
110	8-1/2	HTC	OSCIE	4966	60	15-3/4
111	8-1/2	SEC	M4N	4984	18	14
112	8-1/2	SEC	S6	5026	42	18
113	8-1/2	HTC	OSCIE	5065	39	18
114	8-1/2	HTC	OWV	5098	33	16
115	8-1/2	Smith	K2P	5137	39	19
116	8-1/2	SEC	M4N	5172	35	16-1/2
117	8-1/2	Smith	SU2J	5207	35	17
118	8-1/2	Reed	YSI	5253	46	17-3/4
119	8-1/2	SEC	M4N	5312	59	18-1/2
120	8-1/2	Reed	YSI	5349	37	16-1/2
121	8-1/2	SEC	M4N	5396	47	17-3/4
123	8-1/2	SEC	M4N	5427	31	15-3/4
124	8-1/2	Reed	YSI	5478	52	17-3/4
125	8-1/2	Reed	YSI	5501	22	10-1/4
126	8-1/2	SEC	M4L	5520	19	11
127	8-1/2	Reed	YM	5549	29	11
128	8-1/2	Reed	YM	5571	22	9-1/2
129	8-1/2	HTC	W7	5615	44	17
130	8-1/2	Reed	YM	5660	45	15-1/4
131	8-1/2	SEC	M4L	5696	36	10-3/4
132	8-1/2	HTC	OWC	5713	17	9
133	8-1/2	HTC	W7	5725	12	10
134	8-1/2	HTC	W7R	5746	21	8-3/4
135	8-1/2	HTC	W7R-2	5766	20	13-1/4
136	8-1/2	HTC	W7R-2	5785	19	11-3/4
137	8-1/2	HTC	W7R-2	5800	15	11-3/4
138	8-1/2	HTC	RELJ	5849	49	25
139	8-1/2	HTC	W7	5862	13	9-1/2
140	8-1/2	HTC	OWV	5880	18	12-3/4
141	8-1/2	Reed	YM	5911	31	14-3/4
142	8-1/2	Smith	SU2	5947	36	16-1/2

<u>No.</u>	<u>Size</u>	<u>Make</u>	<u>Type</u>	<u>Depth</u> <u>Out</u>	<u>Feet</u>	<u>Hours</u>
143	8-1/2	Smith	SU2	5977	30	14-3/4
144	8-1/2	HTC	OWV	6011	34	12
145	8-1/2	HTC	OWV	6021	10	5-1/2
146	8-1/2	HTC	W7R-2	6032	11	6-3/4
147	8-1/2	HTC	W7R-2	6054	22	12-1/4
148	8-1/2	HTC	W7R-2	6072	18	12-1/4
149	8-1/2	HTC	W7R-2	6077	5	3-1/2
150	8-1/2	Reed	YCEJ	6122	45	23-3/4
151	8-1/2	Reed	YHW-2	6136	14	10
152	8-1/2	HTC	W7R-2	6158	22	12-1/4
153	8-1/2	Reed	YM	6184	26	12-1/4
154	8-1/2	Reed	YH	6210	26	14-3/4
155	8-1/2	Reed	YH	6241	33	11-1/4
156	8-1/2	Reed	YH	6264	23	10
157	8-1/2	HTC	W7	6286	22	11
158	8-1/2	Reed	YH	6307	21	11-3/4
159	8-1/2	HTC	W7	6329	22	11-1/2
160	8-1/2	HTC	W7	6358	29	13-3/4
161	8-1/2	Reed	YH	6388	30	15-1/2
162	8-1/2	HTC	OWC	6406	18	9-1/2
163	8-1/2	SEC	H7	6433	27	12-1/2
164	8-1/2	Reed	YHR	6477	44	18-1/4
165	8-1/2	HTC	OWC	6539	62	18
166	8-1/2	Reed	YSI	6594	55	16-3/4
167	8-1/2	Reed	YM	6623	29	14-1/4
168	8-1/2	Reed	YHR	6657	34	13
169	8-1/2	HTC	W7	6680	23	9-1/2
170	8-1/2	Reed	YHW-2	6698	18	7
171	8-1/2	HTC	W7R-2	6720	22	10-1/4
172	8-1/2	Reed	YM	6761	41	10-1/2
173	8-1/2	Reed	YM	6786	25	12
174	8-1/2	HTC	W7	6819	33	14-1/4
175	8-1/2	HTC	W7	6875	56	18-3/4
176	8-1/2	Reed	YM	6951	76	16
177	8-1/2	Reed	YM	7002	51	17-1/2
178	8-1/2	HTC	OWV	7058	56	15
179	8-1/2	Reed	YSI	7115	57	16-3/4
180	8-1/2	HTC	OWV	7175	60	16-1/2
181	8-1/2	Reed	YSI	7255	80	18-1/4
182	8-1/2	HTC	OWV	7340	85	18-3/4
183	8-1/2	CP	ES2	7403	63	14-1/2
184	8-1/2	Reed	YSI	7528	125	20-1/4
185	8-1/2	Reed	YSI	7608	80	18
186	8-1/2	HTC	OWV	7667	59	12-1/2
187	8-1/2	HTC	OWV	7740	23	15-1/2
188	8-1/2	Reed	YM	7817	77	19-1/2
189	8-1/2	HTC	OWV	7855	38	10
190	8-1/2	HTC	OWC	7890	35	9
191	8-1/2	SEC	M4L	7948	58	18
192	8-1/2	Reed	YSI	8033	85	17-1/2

<u>No.</u>	<u>Size</u>	<u>Make</u>	<u>Type</u>	<u>Depth Out</u>	<u>Feet</u>	<u>Hours</u>
193	8-1/2	Reed	YSI	8109	76	16-1/4
194	8-1/2	Reed	YSI	8205	96	20-1/4
195	8-1/2	Reed	YSI	8289	84	17
196	8-1/2	Reed	YSI	8344	55	16
197	8-1/2	Reed	YSI	8423	79	18-3/4
198	8-1/2	HTC	OWV	8523	100	21-1/4
199	8-1/2	HTC	OWV	8598	75	17-3/4
200	8-1/2	HTC	OWV	8694	96	19-3/4
201	8-1/2	Reed	YSI	8763	69	19-3/4
202	8-1/2	HTC	OWV	8891	128	22-1/4
203	8-1/2	HTC	OWV	9012	121	18-3/4
204	8-1/2	HTC	OWV	9144	132	22-1/4
205	8-1/2	Reed	YSI	9246	102	19
206	8-1/2	Reed	YSI	9334	88	16-1/4
207	8-1/2	HTC	OWV	9454	120	20-1/4
208	8-1/2	HTC	OWV	9573	119	20-1/2
209	8-1/2	HTC	OWV	9682	109	20-1/2
210	8-1/2	HTC	OWV	9802	120	20-3/4
211	8-1/2	Reed	YSI-R	9903	101	18
212	6-1/8	Smith	Diamond	9947	44	22-1/4
213	8-1/2	HTC	OWC	10010	60	18
214	8-1/2	HTC	OWV	10129	119	17-1/2
215	8-1/2	HTC	OWV	10173	44	7-1/2
216	8-1/2	Reed	YSI-R	10173	0	0
217	8-1/2	HTC	OWV		0	0
218	8-1/2	HTC	OWV	10176	3	1-1/2
219	8-1/2	Reed	YSI-R	10134	58	19-1/4
220	8-1/2	Reed	YSI-R	10297	63	18
221	8-1/2	HTC	OSC	10352	55	14-3/4
222	8-1/2	HTC	OWV	10404	52	19-3/4
223	8-1/2	HTC	OWV	10465	59	19-3/4
224	8-1/2	HTC	OSC-IG	10516	53	16-3/4
225	8-1/2	Smith	SV2	10554	38	15
226	8-1/2	HTC	OWC	10590	36	19
227	8-1/2	Reed	YSI-R	10656	66	18-1/2
228	8-1/2	Reed	YSI-R	10687	31	21-3/4
229	8-1/2	Reed	YSI-R	10719	32	14-1/2
230	8-1/2	HTC	OWC	10746	27	16-1/2
231	8-1/2	HTC	OWC	10772	26	16-1/2
232	8-1/2	HTC	W7	10795	23	16-1/4
233	8-1/2	HTC	W7	10834	39	16-1/2
234	8-1/2	Reed	YH	10863	29	12-3/4
235	8-1/2	HTC	W7	10893	30	15
236	8-1/2	HTC	W7R	10926	33	14-1/2
237	8-1/2	HTC	W7R	10955	29	13-1/2
238	8-1/2	HTC	W7R	10976	21	11-3/4
239	8-1/2	HTC	W7R	11004	28	11
240	8-1/2	HTC	W7R	11041	37	12-3/4
241	8-1/2	HTC	W7R	11077	36	13
242	6-1/8		Diamond	11081	2	2-3/4

<u>No.</u>	<u>Size</u>	<u>Make</u>	<u>Type</u>	<u>Depth Out</u>	<u>Feet</u>	<u>Hours</u>
243	8-1/2	HTC	W7R	11112	31	12-3/4
244	8-1/2	Reed	YHWGR	11150	38	13
245	8-1/2	HTC	W7R	11192	42	15
246	8-1/2	HTC	W7R	11220	28	12
247	8-1/2	Reed	YHWG	11240	20	11-1/2
248	8-1/2	HTC	W7R	11262	22	10-1/2
249	8-1/2	HTC	W7R	11282	20	11-1/4
250	8-1/2	HTC	W7R	11304	22	9
251	8-1/2	Reed	YHWG	11321	17	9-3/4
252	8-1/2	Reed	YHWG	11354	33	14
253	8-1/2	HTC	W7	11382	28	12-1/4
254	8-1/2	HTC	W7R	11420	38	15-1/2
255	8-1/2	Reed	YHWG	11452	32	14
256	8-1/2	HTC	W7R-2	11486	34	15
257	8-1/2	HTC	W7R-2	11515	29	15-1/4
258	8-1/2	HTC	W7R-2	11515	0	12-1/4
259	8-1/2	HTC	W7R	11515	0	24-3/4
260	8-1/2	HTC	W7R	11515	0	23-1/4
261	8-1/2	HTC	W7R	11527	12	4-1/4
262	8-1/2	SEC	H7W	11536	9	6
263	8-1/2	SEC	H7W	11557	21	8-1/4
264	8-1/2	Reed	YHWC	11561	4	1-1/2
265	6	SEC	M4N	11598	37	7
266	6	SEC	H7	11661	63	9-3/4
267	6	SEC	H7	11712	51	9-1/4
268	6	HTC	W7R	11743	33	7-3/4
269	6	HTC	W7R	11757	12	4-3/4
270	6	HTC	W7R	11764	7	4-1/4
271	6	HTC	RGIJ	11810	46	12-3/4
272	6	HTC	RGIJ	11862	52	14-3/4
273	6	HTC	RGIJ	11920	58	18
274	6	HTC	RGIJ	12017	97	20
275	6	HTC	RGIJ	12082	65	17-3/4
276	6	HTC	RGIJ	12163	81	18
277	6	HTC	RGIJ	12217	54	14-1/4
278	6	HTC	W7R	12260	43	10-1/2
279	6	HTC	W7R	12299	39	9-3/4
280	6	HTC	W7R	12323	24	8
281	6	HTC	RGIJ	12338	15	10-3/4
282	6	Reed	YH	12346	8	4-1/2
283	6	HTC	W7R	12368	22	10
284	5-31/32	Chris	Diamond	12612	244	67-1/4
285	6	Reed	YHW	12647	35	10
286	6	Reed	YHW	12683	36	10-3/4
287	5-31/32	Chris	Diamond	13016	358	108-3/4
288	5-31/32	Chris	Diamond	13368	327	120
289	5-31/32	Chris	Diamond	13773	405	156-1/4
290	5-31/32	Chris	Diamond	13831	58	20-1/2
291	6	SEC	M4N	13832	1	1/4
292	5-31/32	Chris	Diamond	14026	252	78
293	5-31/32	Chris	Diamond	14251	236	84-3/4

<u>No.</u>	<u>Size</u>	<u>Make</u>	<u>Type</u>	<u>Depth Out</u>	<u>Feet</u>	<u>Hours</u>
294	5-31/32	Chris	Diamond	14314	63	24-1/4
295	5-31/32	Chris	Diamond	14331	17	13
296	6	HW	W7R	14337	6	3-1/2
297	6	HW	RGIJ	14375	38	19
298	5-3/16	Chris	Diamond	14470	95	35-1/4
299	6	Reed	YHW	14470	0	0
300	6	HW	W7R	14470	0	0
301	6	HW	W7R	14470	0	0
302	6	Reed	YHW	14470	0	0
303	5-3/4	Servco	Milling bit on iron			
304	5-7/8	SEC	Cross Section			
305	6	HW	W7R	13337	1107	23
306	6	HW	W7R			
307	6	HW	W7R		767	17-1/4
308	6	Smith	4 cone			14-1/2
309	6	Smith	4 cone			16
310	6	Smith	4 cone	Stuck in hole		
311	6	Smith	4 cone			
312	6	Smith	4 cone			
313	6	Smith	4 cone			
314	6	Smith	4 cone	12453	78	7-1/2
315	5-15/16		Diamond	12541		
316	6	Smith	4 cone	12542	1	1/4
317	6	Reed	H7W	11799 circulate only		
318	6	Reed	H7W			
319	6	Reed	YHW	11799 stuck in hole		
320	6	Reed	H7W	circulate to test July 24/63		
321	6	Reed	H7W )	fishing to August 9/63		
322	6		4W4 )			
323	6	SEC	H7 )	Fishing - no hole made		
324	6	SEC	H7 )			
325	6	SEC	H7 )			

(d) Mud Record

Gel Chemical  
Gyp Base  
Salt Surfactant  
Air Drilling

10,263 - 100 lb. bags	Aquagel
21,220 - 100 lb. bags	Baroid
15 - 100 lb. bags	Bicarbonate
1,305 - 50 lb. bags	Carbonox
900 - 100 lb. drums	Caustic
7 - 100 lb. bags	Driscose Hi Vis
1,895 - 50 lb. bags	Plaster of Paris
2,254 - 50 lb. bags	Q-Broxin
120 bags	Cellophane
122 - 50 lb. bags	Tuff Plug "F"
89 - 50 lb. bags	Tuff Plug "M"
150 - 50 lb. bags	Tuff Plug "C"
70 - 55 gal. drum	O.M.S.
50 - 40 lb. bags	Pluggit
36 - 100 lb. bags	Calcium Chloride Powder
9 - 80 lb. bags	Calcium Chloride Flake
824 - 50 lb. bags	Soltex
615 - 50 lb. bags	Dextrid
103 - 50 lb. bags	Cellex H.V.
1,000 - 100 lb. bags	Salt
80 - 65 lb. bags	Sodium Bichromates
51 - 50 lb. bags	Walnut
17 - 50 lb. bags	Aluminum Stereate
90 - 100 lb. bags	Soda Ash
125 - 100 lb. bags	Zeogel
10 - 80 lb. bags	Salt water gel
1 - 55 gal. drum	Armomist
3 - 55 gal. drum	O.K. Liquid

(e) Deviation Record

<u>Depth</u>	<u>Deviation</u>
76'	1/2°
110'	1/8°
190'	1/2°
245'	0 °
330'	1/2°
459'	1/2°
520'	1/4°
640'	1/2°
710'	1 °
838'	1-1/8°
949'	1-7/8°
979'	1-7/8°

<u>Depth</u>	<u>Deviation</u>
1010'	2 °
1044'	2-1/8°
1054'	2 °
1077'	2-1/4°
1090'	1-3/4°
1131'	2 °
1160'	1-3/4°
1190'	2 °
1220'	1-3/4°
1250'	2 °
Skid rig 20' West.	
40'	1/4°
90'	1/4°
160'	1/2°
190'	1/2°
250'	1/4°
310'	1/8°
440'	1/8°
520'	1/8°
670'	1/8°
804'	1/4°
920'	1 °
950'	1 °
1010'	3/4°
1090'	1-1/2°
1120'	1-3/4°
1185'	1-1/4°
1253'	1 °
1305'	1 °
1433'	1 °
1470'	1 °
1493'	1 °
1500'	1 °
1593'	1 °
1656'	1-1/2°
1707'	1-3/4°
1767'	1-3/4°
1820'	2 °
1880'	1-7/8°
1990'	2-1/4°
2085'	2-1/2°
2145'	2-1/8°
2205'	1-3/4°
2350'	1 °
2530'	1-3/4°
2710'	1-3/4°
2800'	1-1/2°
3002'	2-1/8°
3092'	2-1/2°
3125'	1-3/4°

<u>Depth</u>	<u>Deviation</u>
3335'	7/8°
3360'	1 °
3412'	1-1/8°
3495'	1-5/8°
3570'	2-1/4°
3610'	2-1/8°
3735'	3 °
3770'	4 °
3794'	3-1/2°
3825'	3 °
3855'	3-1/4°
3899'	3 °
3950'	3 °
3972'	3-1/4°
4019'	3-3/4°
4040'	3-5/8°
4070'	3-1/8°
4110'	4 °
4164'	4 °
4183'	4 °
4226'	3-1/2°
4278'	4 °
4287'	4 °
4318'	4-1/2°
4346'	4-1/4°
4368'	4-1/8°
4417'	4 °
4450'	4-1/2°
4470'	4-1/2°
4480'	4-1/2°
4490'	4-1/2°
4524'	4 °
4549'	4 °
4564'	4-1/4°
4670'	4-1/2°
4735'	5-3/4°
4768'	6 °
4789'	6 °
4829'	6-1/4°
4841'	6-1/4°
4860'	6-1/4°
4890'	6 °
4901'	6-1/4°
4950'	6 °
4980'	6 °
5027'	6-3/4°
5050'	7 °
5077'	7-1/8°
5123'	6-3/4°
5164'	7-1/4°

<u>Depth</u>	<u>Deviation</u>	
5305'	7-1/4°	
5335'	7-1/8°	
5357'	7 °	
5400'	7 °	
5430'	6-1/2°	
5460'	6-1/2°	
5490	6-3/4°	
Mechanical problem encountered P.B. Depth 2760		
2815'	1-1/4°	
2940'	3-1/2°	
2969'	4 °	N 25° E
2990'	4-1/4°	N 26° E
3026'	4-1/2°	N 21° E
3028'	4-1/2°	N 21° E
3058'	4-1/2°	N 25° E
3088'	5 °	N 40° E
3109'	5 °	N 43° E
3140'	5 °	N 44° E
3180'	4 °	N 54° E
3211'	3-3/4°	N 72° E
3238'	3-3/4°	N 16° E
3269'	3-1/2°	N 17° E
3300'	3-1/2°	N 17° E
3300'	3-3/4°	N 47° E
3330'	3 °	N 38° E
3351'	3-1/2°	N 41° E
3373'	3-1/2°	N 38° E
3404'	4 °	N 41° E
3467'	3-1/2°	N 57° E
3522'	5-1/2°	N 60° E
3544'	5-1/4°	N 60° E
3569'	5 °	N 58° E
3598'	5-1/2°	N 70° E
3628'	5-1/4°	N 65° E
3643'	5-1/4°	N 66° E
3720'	5 °	N 75° E
3751'	4-1/4°	N 70° E
3781'	4-3/4°	N 79° E
3817'	4-1/4°	N 66° E
3847'	5 °	N 79° E
3877'	4-3/4°	N 79° E
3910'	4-1/2°	N 82° E
3940'	4-1/2°	N 83° E
3970'	4 °	N 84° E
4000'	4-1/2°	N 77° E
4022'	4-3/4°	N 82° E
4057'	4 °	N 80° E
4092'	4-1/2°	N 84° E

<u>Depth</u>	<u>Deviation</u>	
4119'	4-1/4°	N 86° E
4148'	4-1/4°	N 84° E
4171'	4-1/4°	N 83° E
4208'	4-1/2°	N 83° E
4235'	4-1/4°	N 84° E
4271'	4-3/4°	N 85° E
4298'	4-3/4°	N 84° E
4329'	5 °	N 86° E
4352'	5-1/4°	N 83° E
4364'	5 °	N 85° E
4379'	5-1/4°	N 84° E
4400'	5-1/4°	N 87° E
4411'	5 °	N 85° E
4422'	5 °	N 85° E
4450'	5 °	N 84° E
4504'	4-1/2°	
4520'	4-1/2°	
4532'	4-1/2°	
4548'	4-1/2°	
4572'	4-1/2°	
4596'	4-1/4°	
4626'	4-3/4°	
4686'	5 °	
4715'	5-1/2°	
4749'	6 °	
4762'	5 °	
4793'	5 °	
4815'	5 °	
4835'	5-3/4°	
4851'	5-3/4°	
4880'	6 °	
4906'	6-1/8°	
4940'	6-3/8°	
4974'	6-3/4°	
4989'	7 °	
5004'	7-1/4°	
5065'	7 °	
5105'	7 °	
5070'	7-1/2°	
5110'	7 °	
5125'	7-1/2°	
5137'	7 °	
5152'	7-1/4°	
5167'	7-1/4°	
5173'	7-1/4°	
5187'	7-1/4°	
5207'	7-3/4°	
5227'	7-1/4°	
5232'	7 °	
5248'	7 °	

<u>Depth</u>	<u>Deviation</u>	
5262'	7 °	
5285'	7-1/8°	
5298'	7-1/4°	
5312'	7-1/4°	
5327'	7-1/4°	
5427'	7-3/4°	
5457'	7-3/4°	
5478'	7-3/4°	
5501'	7-3/4°	
5520'	8 °	
5558'	8 °	
5571'	8-1/8°	
5604'	8 °	
5625'	8-1/8°	
5646'	8-1/2°	
5660'	9 °	
5689'	9 °	
5713'	9 °	
5746'	9 °	
5800'	8-3/4°	
5813'	9 °	
5766'	8-3/4°	N 90° E
5785'	9 °	
5842'	9 °	
5862'	9 °	
5880'	9 °	
5911'	9 °	
5947'	9-1/2°	
5978'	9-1/4°	N 91° E
6011'	9-1/2°	
6021'	9-1/2°	
6054'	9 °	
6117'	8-1/2°	
6136'	8-3/4°	
6158'	8-1/4°	
6184'	8-1/4°	
6210'	8-1/2°	
6241'	8-1/2°	
6281'	8-3/4°	
6307'	8-1/4°	
6329'	8-1/2°	
6358'	8 °	N 90° E
6388'	8 °	
6433'	8 °	
6516'	8-1/2°	
6539'	8-1/4 °	
6565'	8-1/4 °	
6657'	8 °	
6680'	8-1/2 °	
6698'	8-1/2 °	

<u>Depth</u>	<u>Deviation</u>	
6720	8-1/4°	
6738	8-1/2°	
6761	8-1/2°	
6786	8 °	
6819	8-1/2°	
6849	8-1/2°	
6875	8-1/2°	
6905	9 °	
6932	8-1/4°	
6951	8-1/2°	N 87° E
7002	8 °	
7032	8-1/4°	
7088	8-1/2°	
7115	8-1/2°	
7145	8-1/4°	
7175	7-3/4°	N 94° E
7205	8 °	
7234	8 °	
7263	8 °	
7298	8 °	
7328	8 °	
7370	8 °	
7403	8-1/4°	
7433	8-1/4°	
7480	8-1/2°	
7578	8-1/4°	
7608	8-1/2°	
7653	8-3/4°	
7667	8-1/2°	N 96° E
7698	8-1/2°	
7740	9 °	
7782	8-1/2°	
7764	8-3/4°	
7817	9 °	
7848	8-1/2°	
7855	8 °	S 79° E
7885	8-1/2°	
7948	8-1/2°	
8158	8-1/4°	
8265	9-3/4°	
8289	9 °	
8313	9-1/2°	
8344	10 °	
8374	9-1/2°	
8408	10 °	
8423	9-3/4°	S 64° E
8453	10 °	
8486	10 °	
8523	10 °	
8555	10 °	

<u>Depth</u>	<u>Deviation</u>	
8584	10 °	
8644	10 °	
8677	10-1/4°	
8724	10-1/4°	
8763	9-3/4°	S 57° E
8838	10 °	
8896	10 °	
9033	10 °	
9063	9-1/2°	
9144	9 °	S 62° E
9334	9-1/2°	
9380	9 °	
9454	8-1/2°	
9517	8-1/2°	
9573	8 °	
9620	7-3/4°	
9682	7-3/4°	S 61° E
9734	7-1/4°	
9802	7-1/2°	
10353	7 °	
10463	7 °	
10554	7 °	
10590	7-1/4°	
10746	6 °	
10772	6 °	
10926	6-1/2°	
10976	6-1/2°	
11041	6-1/4°	
11077	7-1/2°	S 72° E
11112	7 °	
11192	7-1/2°	S 73° E
11220	8 °	
11240	8-1/2°	
11262	8-1/2°	
11282	8-3/4°	S 79° E
11382	9 °	
11420	9-1/2°	
11452	9 °	
11486	7 °	
11515	6 °	
11487	7-1/2°	
11515	6 °	
11527	6 °	
11536	6 °	
11712	3 °	
11764	2-1/4°	
11810	2-1/2°	
11920	2-1/2°	
12035	2-1/2°	
12080	2-1/4°	

<u>Depth</u>	<u>Deviation</u>	
12310	4	deg.
12386	6-1/2	deg.
12469	7-3/4	deg.
12612	9	deg.
13775	2	deg. (Misrun)
13832	32	deg.
14010	33	deg.
14310	26	deg.

(f) Abandonment Plugs

July 10, 1962 - Plug #1 3141 - 2990 175 sax Felt at 3021  
 July 11, 1962 - Plug #2 3021 - 2850 196 sax Felt at 2852  
 July 11, 1962 - Plug #3 2852 - 2760 82 sax plug 20% sand, felt at 2754

Plugs set over top of 9-5/8" casing in abandoned portion of hole.

June 24, 1963 - Plug #4 13,780 - 13880 25 sax Not felt.  
 June 24, 1963 - Plug #5 12750- 12600 130 sax Not felt.  
 June 24, 1963 - Plug #6 12600 - 12400 130 sax Felt at 12518.

Cement plugs over fish in hole, top of fish at 13881'.  
 Drilled cement from 12518 to 12536. No cement from  
 12536 to 12699'. Rerun cement plugs.

June 27, 1963 - Plug #7 12700-12575 150 sax Not felt.  
 June 27, 1963 - Plug #8 12575-12450 100 sax + 25 sax sand, felt at 12375.

Drilled out cement plug to 12542'.

July 3, 1963 - Plug #9 12480-12280 125 sax + 25 sax sand, felt at 12225'.

Plug over fish, top of fish at 12480.

July 4, 1963 - Plug #10 12020-11700 125 sax cement + 18 sax sand, felt plug at  
 11707'.

Plug #10 to set whipstock on, in attempt to control deviation and subsequently  
 drilled off to 11,799.

July 24, 1963 - Plug #11 4000-3660 30 sax Felt at 3930  
 July 25, 1963 - Plug #12 3930-3790 30 sax cement + 2% CaCl<sub>2</sub> Felt at 3835.

Plugs 11 & 12 set to prevent any tools from going down the hole, while  
 repairing 7" casing. Plugs 11 & 12 drilled out after casing repaired.

August 21, 1963 - Plug #13 Set a Baker Model "K" retainer "Bridge Plug" at 11,490'  
 dumped 3 sax cement on top with dump bailer.

For suspension of well and casing head with valve secures the top of the well and  
 top 30' filled with diesel oil both inside 7" casing and between 7" and 9 5/8"  
 casing.

(g) Lost Circulation Zones

<u>Interval</u>	<u>Formation</u>	<u>Amount of Lost Material</u>
6460-6462	Mississippian	245 bbls. mud 100 sax sawdust

Lost circulation between 6460-6462, mixed mud and approximately 100 saxs sawdust. Regained full circulation and proceeded to drill ahead.

(h) Report of Blowouts

No blowouts encountered during the drilling of this exploratory test.

SECTION IV

Logs

<u>Type of Log</u>	<u>Run</u>	<u>Interval</u>	<u>Date</u>
Electric Log	1	1021- 1145	
Gamma Ray Neutron	1	100- 4737	6-1-62
Sonic Gamma Ray Caliper	1	419- 5434	6-25-62
Microlog Caliper	1	419- 5441	6-25-62
Continuous Dipmeter	1	419- 5427	6-25-62
Directional Log	1	419- 5427	6-25-62
Sonic Amplitude	1	419- 5423	6-25-62
Induction Electrical Log	1	419- 5460	6-25-62
Sonic Gamma Ray Caliper	2	5250- 7656	11-14-62
Sonic log Gamma Ray Caliper	3	4411- 9955	12-21-62
Induction Electrical log	3	4411-10003	12-20-62
Continuous Dipmeter	2	4411- 9990	12-21-62
Directional log	2	4411- 9980	12-21-62
Sonic log Gamma Ray Caliper	4	9500-11315	2-8-63
Induction Electrical log	4	9500-11291	2-7-63
Continuous Dipmeter	3	9500-11292	2-7-63
Directional log	3	9900-11292	2-7-63
Sonic log Gamma Ray Caliper	5	11548-13332	4-12-63
Induction Electrical log	5	11548-13367	4-12-63
Continuous Dipmeter	4	11548-13365	4-13-63
Directional log	4	11548-13365	4-13-63
Sonic log Gamma Ray Caliper	6	13046-14460	5-19-63
Induction Electrical log	6	13367-14470	5-18-63
Completion Record		11350-11506	8-20-63
<i>Exp'd Determination</i>	1	3238-3343	7-7-62
<i>Caliper</i>	1	11544-13863	6-23-63
<i>Geophysical</i>	1,3,4,5,6	419-14460	6-25-62 to 5-19-63

Note: No run number two for Induction Electrical log.

SECTION V

Analysis

(a) Core Analysis

None

(b) Water Analysis

DST #1

(c) Gas Analysis

None

(d) Oil Analysis

None

SECTION VI

Completion Summary

(a) Tubing

None

(b) Perforation Record

None

(c) Cementation Record

None

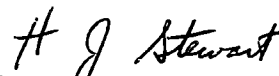
(d) Acidization and Fracturing Record

None

(e) Back Pressure and Production Tests

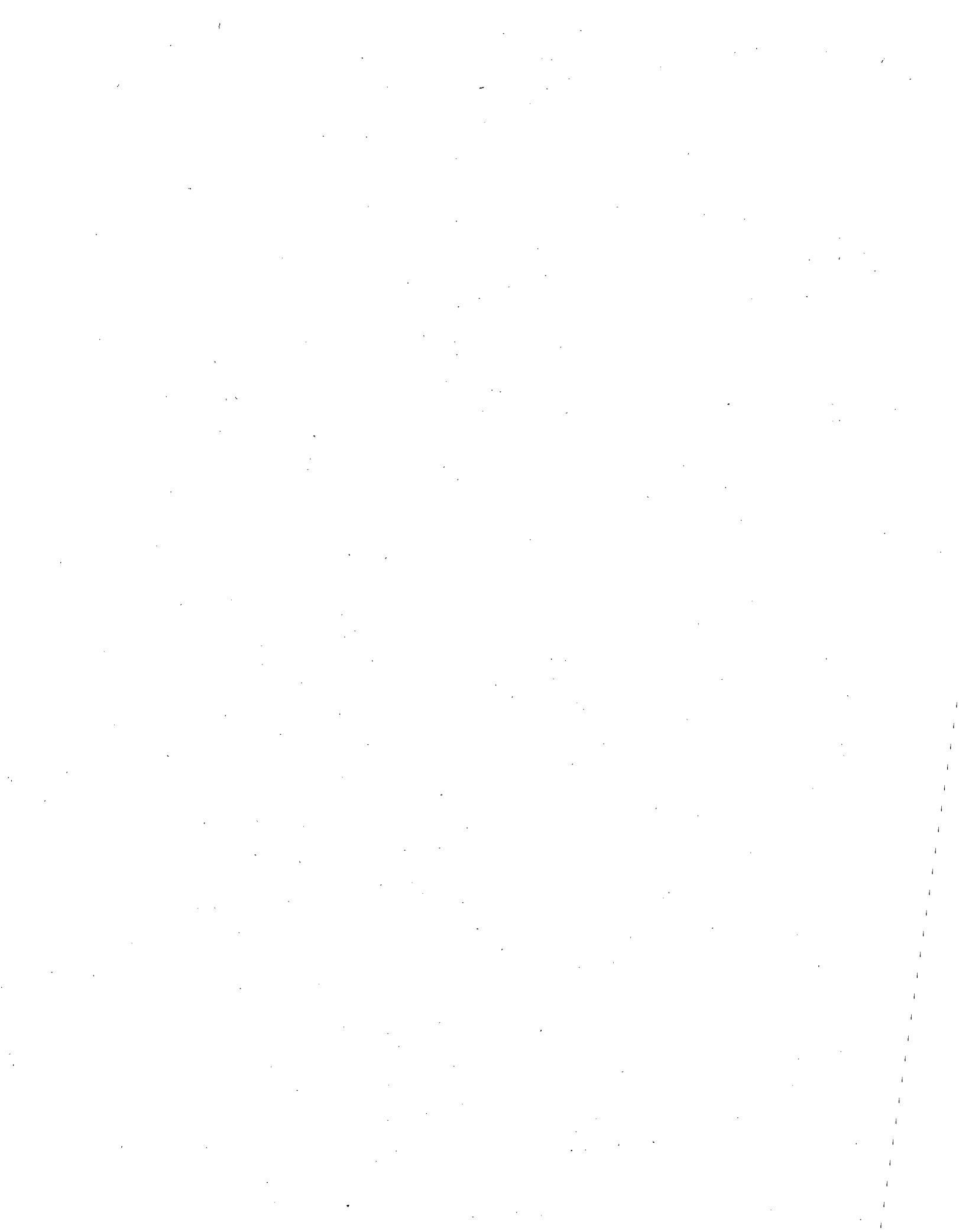
None

SUBMITTED BY:

  
\_\_\_\_\_  
H. J. STEWART

APPROVED BY:

  
\_\_\_\_\_  
Ronald W. Baker, Prof. Emer.

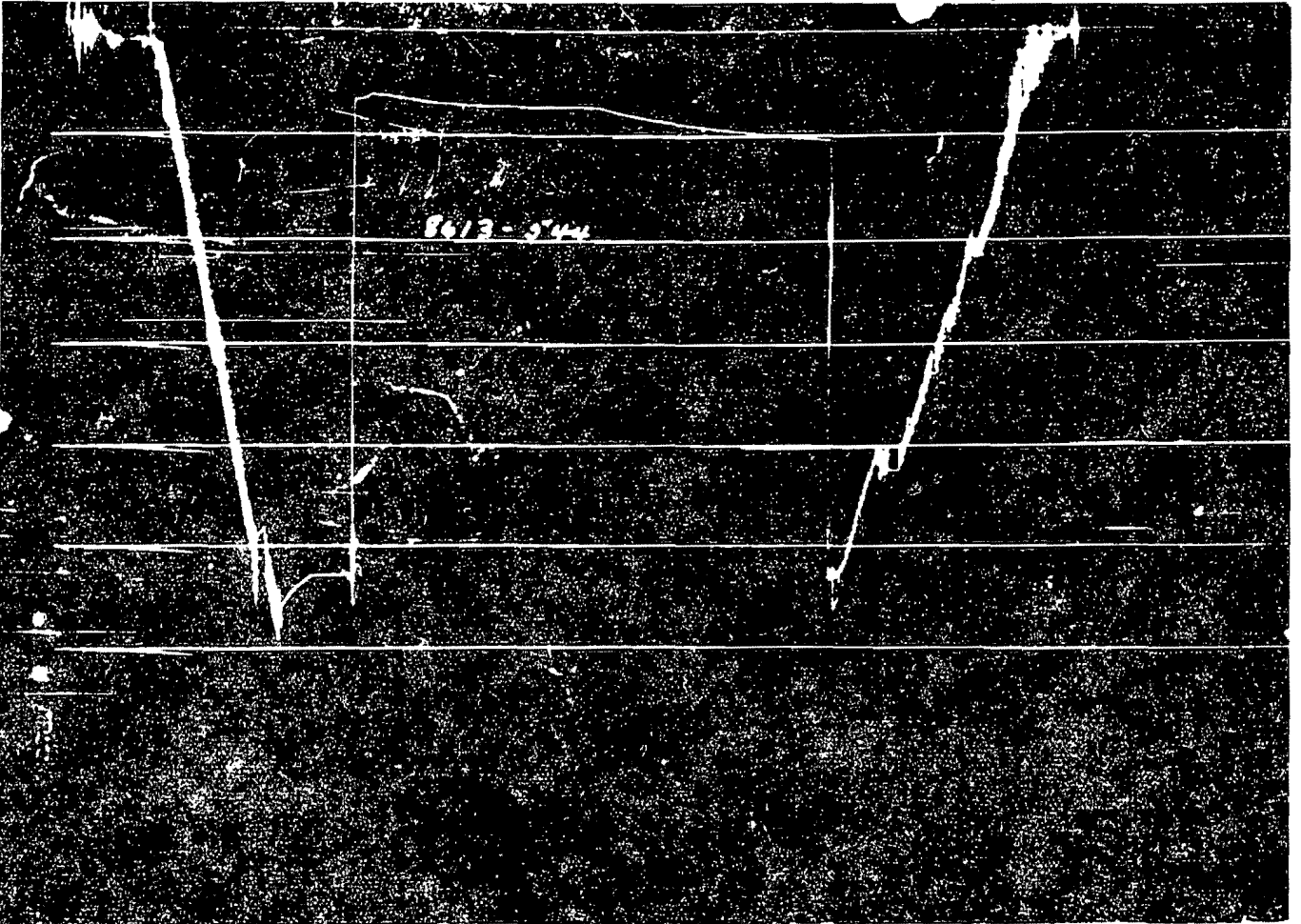
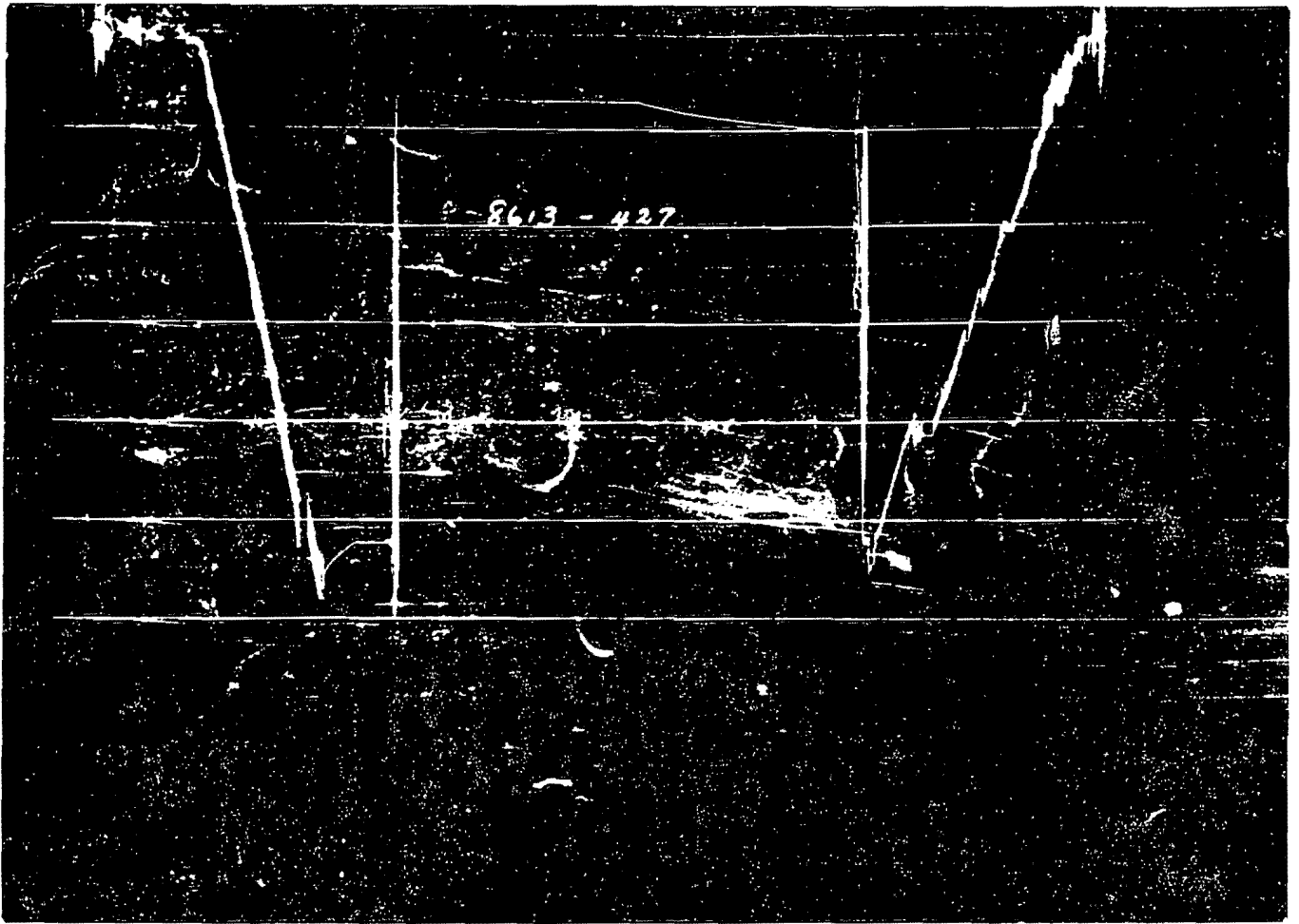


MALLIBURTON TICKET No.

Depth Top Gauge	11290 Ft.	Blanked Off	No	Date	May 20, 1963	Ticket No.	T 8613
BT P.R.D. No.	427	24 Hr. Clock		Kind of Job	Hookwall	HOWCO District	Edmonton
Pressure Readings	Field	Office Corrected		Tester	D. Jewitt	Witness	E. Watson
Initial Hydro Mud Pressure		5218		Contractor	Bawden #18		
Initial Closed in Pressure				K B Elevation	1475	Top Packer Depth	Bottom Packer Depth 11,300
Initial Flow Pressure		638		Total Depth	14,470	Casing Perforations	Top Bottom
Final Flow Pressure		700		Interval Tested	11,560 - 14,470	Formation Tested	Devonian
Final Closed in Pressure		1013		Casing or Hole Size	7" / 6"	Liner or Rathole Size	
Final Hydro Mud Pressure		5218		Size Surface Choke	3/4"	Size Bottom Choke	1/2" Size and Type Wall Packer 7" RTTS
Depth Centre Gauge	Ft.	Blanked Off		Size Drill Pipe	3 1/2" I.F.	ID and Length Drill Collars	2" x 180'
BT P.R.D. No.		24 Hr. Clock		Anchor I.D.	4"	Amount-Type of Cushion	
Pressure Readings	Field	Office Corrected		Gauge Depth	300+	*F meas. Mud Weight	9.3 Mud Viscosity 52
Initial Hydro Mud Pressure				All Depths Measured From	K.B.	No. Folders Reproduced	14
Initial Closed in Pressure				Time Periods (Minutes)			
Initial Flow Pressure				1st Flow	289	Initial CIP	268 2nd Flow Final CIP
Final Flow Pressure				Recovered	1500	Feet of	gas-cut mud
Final Closed in Pressure				Recovered		Feet of	
Final Hydro Mud Pressure				Recovered		Feet of	
Depth Bottom Gauge	11,310 Ft.	Blanked Off	Yes	Oil Recovery Degrees API		Water Recovery Specific Gravity	
BT P.R.D. No.	544	24 Hr. Clock		REMARKS: Tool open with good air blow.			
Pressure Readings	Field	Office Corrected		Gas to surface in 40 minutes. Too weak to			
Initial Hydro Mud Pressure	5250	5276		measure.			
Initial Closed in Pressure				No special readings due to nature of C.I.P.			
Initial Flow Pressure	635	643		curve.			
Final Flow Pressure	710	724					
Final Closed in Pressure	1025	1036					
Final Hydro Mud Pressure	5370	5276					

LEGAL DESCRIPTION 60010N - 12400W  
 FIELD OR AREA WILDCAT  
 PROVINCE YUKON

PAN AM HOME SIGNAL C.S.P.  
 Lease Name  
 A-1  
 Well No.  
 1  
 Test No.  
 EDMONTON  
 Owner's District  
 PAN AMERICAN PETROLEUM CORPORATION  
 Lease Owner



# CHEMICAL & GEOLOGICAL LABORATORIES LTD.

Edmonton

Fort St. John

Calgary

## WATER ANALYSIS REPORT

Field ..... Well No. Kotanealee A-1 Y.T. P-50  
 Operator Pan American Petroleum Corporation Date Received May 21, 1963  
 Formation Mid. Devonian Carbonate Depths 14,407' - 14,470'  
 Other pertinent data D.S.T. #1. Middle sample. DST #1 Middle Sample  
11300-14470 Hook wall packer inside 7" CSA 11560 TO 4 hrs. 49 min. Shut-in  
4 hrs 28 min. IHP 5276 psi, ISIP NA, IFP 643 psi, FFP 724 psi, FSIP 1036 psi,  
FHP 5276 psi. Gas to surface 40 min. TSTM Date Sampled: Not Known Lab. No. E21663-1  
rec. 1500 gas cut mud

### PARTS PER MILLION (MILLIGRAMS PER LITER)

Na + K	Ca	Mg	Fe	SO <sub>4</sub>	Cl	CO <sub>2</sub>	HCO <sub>3</sub>	OH	H <sub>2</sub> S
26979	159	21	present	8979	23300	1870	16900		

### MILLIGRAM EQUIVALENTS

1173.59	7.93	1.73		186.76	657.06	62.27	277.16		
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### MILLIGRAM EQUIVALENTS IN PERCENT

49.59	0.34	0.07		7.89	27.77	2.63	11.71		
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#### Total Solids in Parts per Million

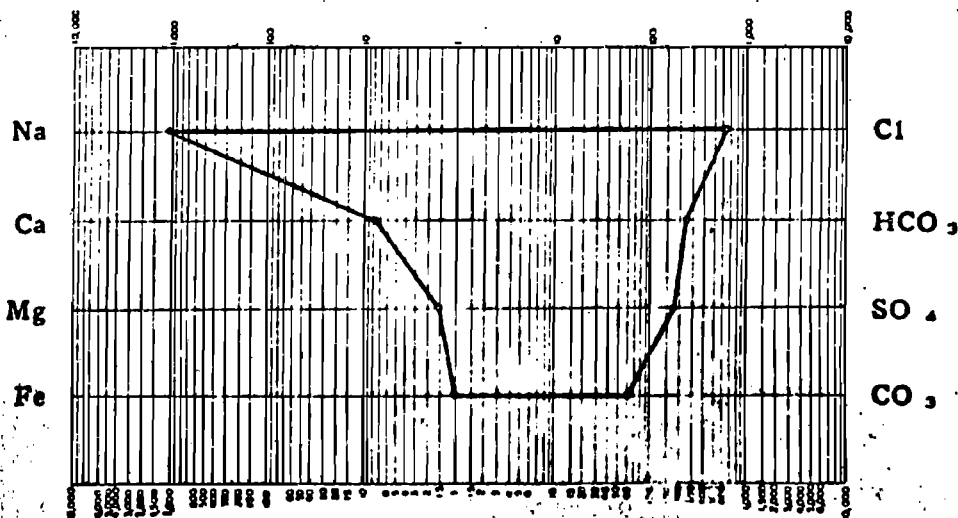
By evaporation ..... **98,700**  
 After ignition ..... **49,100**  
 Calculated ..... **69,631**  
 Specific Gravity ..... **1.058**  
 Observed pH ..... **8.8** ✓  
 Resistivity **0.216** ohm meters @ 68° F.

#### Properties of Reaction in Percent

Primary salinity ..... **71.32**  
 Secondary salinity ..... **----**  
 Primary alkalinity ..... **27.86**  
 Secondary alkalinity ..... **0.82**  
 Chloride salinity ..... **77.87**  
 Sulfate salinity ..... **22.13**

Remarks and conclusions Extremely large amount of organic matter present in total solids. The analyses were made on water extracted from mud. The water was dark wine colored and is a filtrate. ✓

#### LOGARITHMIC PATTERN MEQ per unit



# CHEMICAL & GEOLOGICAL LABORATORIES LTD.

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## WATER ANALYSIS REPORT

Field ..... Well No. Kotaneeslee A-1 Y.T. P. 50  
 Operator Pan American Petroleum Corporation Date Received May 23, 1963  
 Formation ..... Depths 14,407' - 14,470'  
 Other pertinent data D.S.T. #1. Bottom Sample.

Date Sampled: Not Known Lab. No. E21663-2

### PARTS PER MILLION (MILLIGRAMS PER LITER)

Na & K	Ca	Mg	Fe	SO <sub>4</sub>	Cl	CO <sub>2</sub>	HCO <sub>3</sub>	OH	H <sub>2</sub> S
23591	146	18	present	8238	19200	1255	17100		

### MILLIGRAM EQUIVALENTS

1026.25	7.29	1.48		171.35	541.44	41.79	280.44		
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### MILLIGRAM EQUIVALENTS IN PERCENT

49.58	0.35	0.07		8.28	26.15	2.02	13.55		
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#### Total Solids in Parts per Million

By evaporation ..... 96,800  
 After ignition ..... 47,520  
 Calculated ..... 60,870  
 Specific Gravity ..... 1.054  
 Observed pH ..... 8.7  
 Resistivity 0.228 ohm meters @ 68° F.

#### Properties of Reaction in Percent

Primary salinity ..... 68.86  
 Secondary salinity ..... ---  
 Primary alkalinity ..... 30.30  
 Secondary alkalinity ..... 0.84  
 Chloride salinity ..... 75.95  
 Sulfate salinity ..... 24.05

Remarks and conclusions ..... Extremely large amount of organic matter present in total solids. The analyses were made on water extracted from mud. The water was dark wine colored and is a filtrate.

LOGARITHMIC PATTERN  
MEQ per unit

