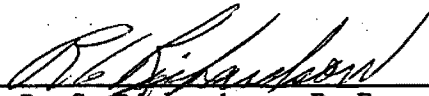


WELL HISTORY REPORT

SOBC WM E PORCUPINE YT I-13

MAY 27, 1971



R. C. Richardson, P. Eng.
Project Manager

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SECTION I - SUMMARY OF WELL DATA

(a) Well Name and Number

SOBC WM E Porcupine YT I-13

(b) Permittee, Licensee or Lessee

Western Minerals Ltd.

(c) Name of Operator

Chevron Standard Limited
400 Fifth Avenue S.W.
Calgary 1, Alberta

(d) Location

Unit I, Section 13, Grid: 66° 10' N 137° 45' W

(e) Co-ordinates

Latitude: 66° 02' 35" N; Longitude: 137° 46' 58" W

Universal Well Location Reference: Lat. 66.04305°N., Long. 137.78278°W.

(f) Permit or Lease Number Unique Well Identifier: 300I136610137450

Permit No. 3362

(g) Drilling Contractor

G. P. Drilling Ltd., Rotary Rig No. Fourteen

(h) Drilling Authority

No. 498 Issued January 27, 1971

(i) Classification

Wildcat

(j) Elevations

Ground Elevation: 1645' KB Elevation: 1665'

(k) Spudded

0330 Hours February 10, 1971

(l) Completed Drilling

0730 Hours April 19, 1971

(m) T.D. and P.B.T.D.

T.D. 8004' P.B.T.D. Surface Logger's T. D. 8003'

(n) Well Status

Dry and Abandoned

(o) Rig Release Date

2400 Hours May 2, 1971

(p) Hole Sizes to Total Depth

30" Hole from Surface to 45' K.B.

24" Hole from 45' to 64'

17½" Hole from 64' to 804'

12½" Hole from 804' to 825'

8-3/4" Hole from 825' to 8004'

(q) Casing

19" O.D. Conductor Pipe Set at 64' K.B.

13-3/8" J-55, 54.5# Casing Set at 798.86' K.B.

SECTION II - GEOLOGICAL SUMMARY

(a) Formation Tops

<u>Formation</u>	<u>Depth</u>		<u>Elevation</u>
	<u>Samples</u>	<u>Logs</u>	<u>K.B. 1666</u>
Eagle Plain	Surface		
Blackie Sandstone	3630	3629	-1963
Permo-Penn Sandstone	5985	5980	-4314
Chance Sd. equivalent		7526	-5860
Fault		7840	-6174

T.D. 8004 (-6338)

(b) Cored Intervals

<u>Core #</u>	<u>Interval</u>	<u>Formation</u>	<u>Recovery</u>
1.	3658-3717	Blackie Sand	57.3
2.	6002-6020	Permo-Penn. Sand	16.7
3.	6020-6040	Permo-Penn. Sand	13.6
4.	6130-6153	Permo-Penn.	22.6

(c) Core Descriptions

<u>Core #1</u>	3658 - 3717			Cored 59'			Rec. 57.3'			
Coring Times:	9	13	13	10	10	15	10	11	28	19
	15	19	12	19	18	25	18	10	10	18
	11	7	13	8	10	10	13	10	17	18
	16	22	18	20	24	17	33	27	7	10
	7	5	6	12	12	14	16	10	15	13
	15	11	13	13	14	23	24	21	25	

3658-3665.5
7.5

Sandstone, grey, fine grained, well sorted sub-angular and angular quartz grains, few chert grains, trace of glauconite. Fine lamination and current bedding, bitumen partings.

Poor, very fine intergranular porosity, in part bitumen-filled.

Questionable fluorescence and cut.

3665.5-3666.8
1.3

Shale, dark grey to black, micro-micaceous, sub-bituminous. Scattered grey silty streaks.

3666.8-3667.7
0.9

Sandstone, grey, fine grained, non-calcareous, siliceous, tight. No stain.

3667.7-3669.7
2.0

Shale, dark grey to black, sub-fissile, micro-micaceous, non-calcareous, sl. bituminous.

- 3669.7-3670.7
1.0 Sandstone, grey, very fine grained, trace glauconitic. Finely laminated and current bedded. Tight.
- 3670.7-3671.5
0.8 Shale, dark grey, sub-fissile to blocky, slightly bituminous, micro-micaceous.
- 3671.5-3671.8
0.3 Sandstone, grey, very fine grained, argillaceous, siliceous, tight.
- 3671.8-3674.1
2.3 Shale, dark grey, micro-micaceous, sub-fissile, non-calcareous. Lower 0.5 ft. silty.
- 3674.1-3675.6
1.5 Sandstone, grey, very fine grained to fine grained, few laminae of coarse grains; argillaceous, non-calcareous, trace glauconitic. Nucaceous, argillaceous partings, bituminous. Trace of very fine porosity. Questionable fluorescence and cut.
- 3675.6-3690.0
14.4 Sandstone, grey, fine to medium grained; fairly well sorted sub-angular to angular quartz grains, minor black chert grains, trace of glauconite. Non-calcareous, silty, siliceous. Laminated, current bedded in part. Traces to fair intergranular porosity. No stain, indistinct cut or fluorescence. Conglomerate band, black, grey and brown chert pebbles up to 5 MM, in sandstone matrix 3676.1 - 3676.3.
- 3690.0-3695.0
5.0 Shale; dark grey, micro-micaceous, non-calcareous, sub-fissile. Much lenses and laminae of grey siltstone and very fine grained sandstone.
- 3697.0-3712.6
17.6 Sandstone, grey, medium grained; sub-angular well sorted quartz grains, few black chert grains, trace of glauconite, in a siliceous matrix. Finely laminated and current bedded, micaceous, bituminous partings. Laminae dip at 20° to core axis. Upper contact irregular, dip at 30°. Brown oil bleeding in lower 7 feet of core. Porosity, poor to fair, intergranular. Some clogging of porosity by bitumen. Questionable fluorescence and cut in upper 10 feet of core, above oil-bleeding zone.
- Thin bituminous shale band (0.1 ft.) at 3706'.
- 3712.6-3713.6
1.0 Shale, dark grey to black, micro-micaceous, sub-fissile to blocky, few silty streaks.

3713.6-3714.3 Siltstone, very fine grained sandstone, grey, siliceous,
1.7 trace glauconitic. Few bituminous partings and laminae.

3714.3-3717 Core not recovered.
2.7

<u>Core #2</u>	6002 - 6020					Rec. 16.7'				
Coring Times:	18	37	18	22	20	20	25	23	18	29
	30	20	23	37	37	30	30	60		

Core jammed.

6002-6005.5 2 ft. of rubble at top.
3.5 Sandstone, grey brown, medium to coarse grained, sub-
angular quartz grains, fairly well sorted, very limey
(20%) matrix.
Abundant coarse chert and chert grit, rounded, to sub-
rounded, in sandstone matrix.
Trace of glauconite, pyrite. Tight.

6005.5-6006.5 Sandstone, grey-brown, medium grained quartz grains,
1.0 fairly well sorted, sub-angular, in limey matrix.
Much coarse chert "grit." Trace of glauconite, pyrite.
Fractures.
Scattered large pelecypod shells.

6006.5-6007.0 Sandstone, grey-brown, fine to medium grained,
0.5 argillaceous, very calcareous. Scattered coarse,
rounded chert grains.
Trace of glauconite and pyrite.

6007-6008.7 Sandstone, brown-grey, medium to coarse grained, sub-
1.7 angular to sub-rounded. Much rounded, coarse chert
and chert grit. Traces of glauconite, pyrite, fossil
fragments. Calcareous - tight.

6008.7-6010.9 Sandstone, brown-grey, medium grained, very calcareous;
2.2 scattered coarse chert "grit." Trace of glauconite,
pyrite. Tight.

6010.9-6018.5 Sandstone, grey-brown, fine to medium grained, scattered
7.6 coarse chert grains. Very calcareous. Scattered large
pelecypod shells, few bands of coarse sandstone.
Vertical fractures. Trace of glauconite, pyrite and
chert.

6018.5-6018.7
0.2
Sandstone, light brownish-grey, medium to coarse grained, sub-angular quartz, coarse rounded and sub-rounded chert grains and chert grit.
Very calcareous, tight.
Trace of glauconite, pyrite.

Core #3

6020 - 6040

Rec. 13.6 ft.

Coring Times:	15	25	20	35	32	33	25	26	30	30
	45	40	32	28	30	28	35	42	43	29

Core jammed.

6020-6024.1
4.1
Sandstone, grey-brown, fine to medium grained, very calcareous, tight.
Trace of pyrite, glauconite, fossils.
Much scattered coarse quartz and chert grains.

6024.1-6025.1
1.0
Sandstone, brown-grey, coarse chert grit, well-rounded, in matrix of brown-grey, medium grained very calcareous sandstone, as above. Trace of glauconite, pyrite, fossil fragments.

6025.1-6030.1
5.0
Sandstone, fine grained, grey, hard, very calcareous, in part a sandy limestone. Well sorted, sub-angular quartz grains. Vertical fractures.
Trace of glauconite, pyrite. Traces of fossils.

6030.1-6031
0.9
Shale, green, soft, fissile, faintly calcareous. Grading in lower part through very pyritic argillaceous limestone and calcareous sand, to limey sandstone.

6031-6033.6
2.6
Sandstone, fine grained, grey-brown, calcareous, grading in part to sandy limestone. Well sorted, sub-angular quartz grains.
Trace of glauconite, pyrite. Traces of fossils.

Trace of porosity - very fine intergranular,
6032 - 6033.6, oil stain, cut and fluorescence.

6033.6-6040 Core not recovered.
6.4

<u>Core #4</u>	6130 - 6153					Rec. 22.6				
Coring Times:	10	15	10	8	10	7	7	5	8	5
	5	8	12	25	18	27	25	20	15	15
	10	13	17							

6130-6132.9 Shale, dark brown-grey, micro-micaceous, blocky non-
2.9 calcareous. Scattered fossil shells. Trace of pyrite.
Silty and sandy in lower part.

6132.9-6142.8 Sandstone, grey, fine to medium grained, very
2.9 calcareous. Trace of pyrite, glauconite. Scattered
coarse chert grains.
Scattered spicules and fossil shell fragments.
Upper contact gradational from shale, pyritic,
argillaceous at base.
Traces of oil staining, cut and fluorescence
6135.6 - 6142.8.

6142.8-6150.3 Shale, dark brown-grey, splintery to blocky, non-
7.5 calcareous, pyritic, scattered fossil shells. Lower
1 ft. becomes sandy, grading to underlying sandstone.

6150.3-6152.6 Sandstone, grey, fine to medium grained, very
2.3 calcareous, pyritic, trace of glauconite. Scattered
fossil shells, tight.

6152.6-6153 Core not recovered.
0.4

(d) Sample Description

- 150 Shale, dark grey, blocky, micro-micaceous, non-calcareous. Interbedded grey silty streaks, traces of dark grey S & P fine grained sandstone. Trace of rusty spotted shale - weathered pyrite?
- 180 Shale, as above, silty streaks. Sandstone, grey, argillaceous, medium grained, micaceous in part, non-calcareous. Minor grey-green shale, brown-grey shale. Trace of ironstone.
- 210 Shale, grey, grey-green, brown, blocky, non-calcareous, trace of iron staining. Trace of carbonized plant fragments. Minor to traces of interbedded grey, argillaceous fine to medium grained sandstone and siltstone.
- 220-240 Shale, grey and dark grey, blocky, non-calcareous, minor brown-grey shale. Trace of silty and sandy streaks. Trace of grey-green shale, trace rusty colored mottling.
- 240-250 Shale, grey, dark grey, micro-micaceous, blocky, non-calcareous. Trace of brown, siliceous, hard, blocky shale. Minor sandstone, grey, fine grained, argillaceous, non-calcareous, trace of ostracod? pockets. Trace of ironstone.
- 250-260 Claystone, light grey, lumpy, blocky, non-calcareous, few silty streaks.
- 260-280 Shale, grey and dark grey, sub-fissile, micaceous, non-calcareous, much nodular and blocky claystone, as above. Minor grey, argillaceous, non-calcareous sandstone.
- 280-290 Claystone, grey-green and grey, sandy in part, lumpy and blocky, non-calcareous. Minor sandstone, grey, argillaceous.

- 290-300 Siltstone and very fine grained sandstone, grey, non-calcareous, slightly argillaceous. Pyrite. Much shale, as above.
- 300 - 310 Shale, grey and dark grey, sub-fissile, non-calcareous, micro-micaceous. Minor silty and sandy streaks. Trace of carbonized plant remains.
- 310-320 N.S.
- 320-330 Shale, grey, nodular and blocky, non-calcareous, (claystone). Much dark grey micro-micaceous shale, as above.
- 330-350 N.S.
- 350-370 Siltstone, grey, argillaceous, non-calcareous, grading to streaks of fine grained grey quartz-chert sandstone, argillaceous, tight. Much dark grey micro-micaceous shale and grey, green-grey nodular, blocky claystone.
- 370-380 Interbedded claystone, shale, minor siltstone, as above.
- 380-390 Siltstone and fine grained sandstone, grey, argillaceous, non-calcareous. Much interbedded dark grey micro-micaceous, non-calcareous, sub-fissile shale.
- 390-400 Shale, dark grey, sub-fissile, micro-micaceous, non-calcareous, minor grey-green blocky claystone. Traces of silty and sandy streaks.
- 400-420 Claystone, grey-green, iron stained mottling, blocky, nodular, non-calcareous, much brown claystone. Minor dark grey sub-fissile shale.
- 420-430 Claystone, shale, as above. Siltstone and fine grained sandstone 20%, grey, argillaceous, non-calcareous.
- 430-440 Sandstone, medium grained, grey, S & P, sub-angular quartz and chert grains, shale flecks. Non-calcareous, argillaceous. Trace of porosity, no stain visible (Note - samples washed in diesel oil).

- 440-450 Shale, dark grey, silty, non-calcareous, grading to argillaceous siltstone; micro-micaceous, sub-fissile.
- 450-470 Shale, dark grey, sub-fissile, non-calcareous, claystone, grey-green, brown mottled, nodular. Much grey fine grained argillaceous quartz-chert sandstone and grey siltstone. Trace of pyrite.
- 470-490 Sandstone, grey, S & P, medium grained, silty argillaceous, non to faintly calcareous, sub-angular quartz, chert and black shale? flecks.
Trace of pyrite.
Trace of intergranular porosity.
- 490-500 Siltstone, grey, argillaceous, non-calcareous, micaceous in part, grading to very fine sandstone. Interbedded dark grey micaceous, sub-fissile shale.
- 500-520 Claystone, grey-brown and green-brown, blocky, nodular, non-calcareous. Minor interbedded grey argillaceous siltstone.
- 520-530 Sandstone, grey, S & P, fine grained, silty, argillaceous, sub-rounded quartz, chert grains, angular black chert grains. Tight.
- 530-540 Shale, dark grey, silty in part, micro-micaceous, sub-fissile, non-calcareous.
Sandstone, grey, S & P, fine grained grading to siltstone, argillaceous, non-calcareous, trace micaceous.
- 540-550 Siltstone, grey, argillaceous, non-calcareous, grading to silty shale.
Shale, dark grey, micro-micaceous, non-calcareous, fossils. Much grey, blocky, nodular claystone.
- 550-560 Sandstone, grey, S & P, fine to medium grained sub-angular quartz, grey and black chert grains, in silty, non-calcareous matrix.
Trace kaolinitic, micaceous. Much loose grains.
Trace of intergranular porosity.

- 560-570 Shale, dark grey, sub-fissile to blocky, non-calcareous. Much grey-green nodular blocky claystone, minor sandstone, as above.
- 570-590 Siltstone, grey, argillaceous, non-calcareous. Minor dark grey and grey shale.
- 590-600 Siltstone, grey shale, as above. Trace of brown, medium grained calcareous sandstone. Trace of coarse, grey, S & P sandstone, kaolinitic, trace of intergranular porosity.
- 600-610 Shale, dark grey, micro-micaceous, silty in part, non-calcareous; sub-fissile. Claystone, grey and greenish-grey, blocky, nodular. Minor grey, S & P, non-calcareous fine to medium grained sandstone.
- 610-630 Sandstone, grey, S & P, medium to coarse grained, non-calcareous. Sub-angular quartz and chert grains, non-calcareous, trace of intergranular porosity. Much shale, as above.
- 630-680 Shale, dark grey, blocky to sub-fissile, non-calcareous. Much grey and grey-green nodular claystone, minor grey silty shale. Minor grey, S & P, very fine grained, argillaceous sandstone, grading to argillaceous siltstone.
- 680-690 Shale, as above, minor nodular claystone. Minor grey argillaceous, very fine grained sandstone, trace of grey, medium grained sandstone, faintly calcareous.
- 690-710 Sandstone, 40% grey, S & P, fine to medium grained, non-calcareous, trace faintly calcareous streaks. Sub-angular quartz and light grey and black chert grains, fair sorting. Trace of intergranular porosity. Shale, as above. 60%.
- 710-730 Shale, grey, blocky, non-calcareous, silty, micro-micaceous. Much micro-micaceous sub-fissile shale; grey-green claystone.

- 730-750 Shale and claystone, as above.
Minor sandstone, fine to medium grained, grey, S & P, argillaceous, trace of intergranular porosity.
- 750-790 Shale, dark grey, sub-fissile, micro-micaceous, silty streaks.
Claystone, grey and green-grey, nodular, soft, minor brown and brown-grey claystone.
Trace of medium to coarse grained quartz-chert sandstone, trace of good intergranular porosity.
- 790-800 Shale, dark grey, sub-fissile, micro-micaceous, non-calcareous. Trace silty streaks.
Claystone, grey, grey-green, brownish-grey, nodular, massive, non-calcareous.
- 840-870 Shale, dark grey, sub-fissile as above. Trace of silty streaks.
- 870-900 Sandstone and siltstone, fine to medium grained grey. Slightly calcareous with poor to fair porosity (0-12%) and poor permeability.
- 900-950 Shale, micro-micaceous, dark grey sub-fissile. Trace of glauconite, arkosic. Some interbedded siltstones.
- 950-980 Siltstone and sandstone, fine to very fine grained grey, subrounded and medium sorted. Slightly calcareous (0-12% porosity).
- 980-1010 Shale as above, dark grey, with interbedded siltstones.
- 1010-1040 Sandstone and siltstones as above, fine to very fine grained, sub-angular and medium sorted. Poor to fair porosity and poor permeability.
- 1040-1050 Sandstone, grey, S & P, fine grained, streaks of medium grained slightly calcareous sandstone, argillaceous. Sub-angular quartz, chert grains, silty, siliceous matrix. Tight.

- 1050-1060 Shale, dark grey, sub-fissile to blocky, non-calcareous, micro-micaceous.
Minor coal. Trace of pyrite.
- 1060-1070 Shale, dark grey, blocky, non-calcareous, scattered silty streaks, minor sandy streaks.
- 1070-1080 Sandstone, 50%, grey, S & P, fine to medium grained, non-calcareous, silty, argillaceous.
Shale, as above, 50%.
- 1080-1100 Shale and sandstone, as above. Trace slightly calcareous, medium grained sandstone.
Traces of coaly fragments. Trace of pyrite.
- 1100-1110 Sandstone, grey, S & P, medium grained, sub-angular quartz and chert grains, silty, siliceous, faintly calcareous matrix.
- 1110-1120 Coal. 5 ft. bed.
Shale, dark grey, blocky, non-calcareous.
- 1120-1160 Shale, dark grey, blocky, non-calcareous.
Scattered silty streaks.
Coaly streaks 1140-1150.
- 1160-1180 Shale, as above; 50%.
Sandstone, 50%, grey, S & P, silty, argillaceous, non-calcareous. Fine grained quartz, chert grains, poor to fair sorting, sub-angular. Tight.
- 1180-1230 Shale, dark grey, blocky, silty streaks, non-calcareous.
Minor interbedded grey, fine grained sandstone.
Traces of coaly streaks.
- 1230-1240 Shale, dark grey, blocky, silty, non-calcareous, micro-micaceous.
- 1240-1250 Shale, as above, interbedded grey, very argillaceous siltstone, very fine to fine grained sandstone.
- 1250-1270 Sandstone, grey, S & P, very fine to fine grained, argillaceous, non-calcareous; 50%.
Shale, as above. 50%.

- 1270-1280 Shale, dark grey, sub-fissile to blocky, silty, non-calcareous.
- 1280-1290 Sandstone, grey, S & P, very fine to fine grained, argillaceous, silty, non-calcareous, micaceous.
- 1290-1320 Sandstone, grey, S & P, medium grained, faintly calcareous. Fair sorting, sub-angular quartz and chert grains, silty matrix, traces of plant remains. Fair to good intergranular porosity. No fluorescence.
- 1320-1340 Sandstone, as above. 50%.
Shale, dark grey, blocky, non-calcareous, micro-micaceous. 50%.
- 1340-1350 Shale, dark grey, sub-fissile to blocky, silty, non-calcareous, micro-micaceous, interbedded grey, argillaceous siltstone.
- 1350-1370 Sandstone, 50% grey, S & P, fine grained, argillaceous, silty, non-calcareous.
Shale, 50%, as above. Trace of coal fragments.
- 1370-1430 Shale, dark grey, blocky to sub-fissile, few silty streaks, micro-micaceous in part, non-calcareous. Coal fragments. Traces of light grey, slightly calcareous, blocky claystone.
- 1430-1460 Sandstone, grey, S & P, very fine grained to fine grained argillaceous, non-calcareous. 50%.
Shale, as above, 50%. Trace of pyrite.
Traces of coal fragments.
- 1460-1510 Shale, dark grey, blocky to sub-fissile, non-calcareous, micro-micaceous in part, trace coaly partings.
Minor brown-grey blocky shale.
- 1510-1540 Shale, as above. Trace coal fragments.
Much interbedded grey, argillaceous, blocky siltstone.
- 1540-1570 Shale, dark grey, sub-fissile to blocky, non-calcareous, micro-micaceous. Trace of coaly partings. Trace of blue-green-grey silty, blocky shale. Minor silty streaks.

- 1570-1610 Shale, dark grey, blocky to sub-fissile, micro-micaceous, non-calcareous.
Minor grey-brown blocky shale. Trace of grey-green shale.
- 1610-1620 Shale, as above, 60%.
Sandstone, 40%, grey, fine to medium grained, argillaceous, non-calcareous, tight. Quartz grains, black chert and traces of rusty red chert grains, poor to fair sorting, sub-angular.
- 1620-1630 Shale, dark grey, blocky to fissile, non-calcareous, micro-micaceous. Trace of blocky grey-green shale.
- 1630-1670 Shale, as above. 50%.
Sandstone, 50%, grey and light grey, S & P, very fine to fine grained, argillaceous, slightly calcareous, tight, micro-micaceous.
- 1670-1680 Shale, as above, 50%, trace of pyritized Ostracods.
Siltstone 50%, grey, argillaceous, non-calcareous, micro-micaceous, traces of fine grained sandstone.
- 1680-1700 Sandstone, grey and light grey, fine to medium grained, non-calcareous, sub-angular quartz and chert grains, siliceous, silty matrix, trace micaceous. Fairly well sorted.
- 1700-1730 Sandstone, as above, coarser grained, calcareous.
Trace of glauconite ?
Trace of poor, intergranular porosity. No fluorescence.
- 1730-1770 Shale, dark grey, silty, non-calcareous, blocky, micro-micaceous.
- 1770-1790 Sandstone, grey and light grey, S & P, medium grained, fair sorting, sub-angular quartz and chert grains, non-calcareous. Few coarse sandstone streaks.
Trace to fair intergranular porosity; no fluorescence.
- 1790-1800 Shale, grey, silty, grading to grey argillaceous siltstone, non-calcareous.
Much sandstone, as above.
- 1800-1810 As above. Much grey-green blocky, silty shale.

- 1810-1850 Sandstone, grey, S & P, fine-medium to coarse grained, silty, argillaceous, non-calcareous. Trace of intergranular porosity in coarser fractions; no fluorescence. Much dark grey, micro-micaceous shale. Trace of glauconite.
- 1850-1860 Sandstone, 70%, as above. Trace of porosity, as above. Shale, 30%, as above. Trace of grey-green silty shale and reddish brown blocky shale.
- 1860-1870 Shale, dark grey, micro-micaceous, non-calcareous, blocky to sub-fissile, silty streaks.
- 1870-1880 Sandstone, light grey, S & P, fine to medium grained, fair sorting, sub-angular quartz and chert grains in argillaceous, silty, non-calcareous matrix. Trace of porosity in coarser streaks. No stain.
- 1880-1930 Shale, dark grey, blocky, micro-micaceous, non-calcareous, silty streaks.
- 1930-1950 Siltstone, very fine grained sandstone, grey, argillaceous, non-calcareous, micaceous. Pyrite.
- 1950-1960 Sandstone, grey, S & P, fine grained, silty, non-calcareous, tight. Streaks of medium grained sandstone, trace of porosity, no stain. Minor grey, grey-green and light grey shale.
- 1960-1970 As above. Minor coal.
- 1970-1990 Shale, grey, blocky, non-calcareous. Much interbedded grey siltstone and very fine grained sandstone.
- 1990-2030 Shale, dark grey, blocky, micro-micaceous, few silty streaks. Trace of pyrite.
- 2030-2100 Sandstone, light grey and grey, S & P, medium grained quartz and chert grains, sub-angular, non-calcareous. Trace of fair intergranular porosity. Trace of coarse sandstone. Scattered greenish chert grains, red and pink chert. No stain, fluorescence or cut.

- 2100-2120 Sandstone, as above, 50%.
Shale, dark grey, blocky, non-calcareous, 50%.
- 2120-2140 Shale, dark grey, blocky, non-calcareous, micro-micaceous.
Trace of grey and green-grey shale.
Minor sandstone, as above - cvg. ?
- 2140-2170 Shale, dark grey, blocky, non-calcareous, micro-micaceous.
- 2170-2230 Shale, as above. Minor silty streaks.
- 2230-2270 Sandstone, light grey, S & P, medium to fine grained, sub-angular quartz, chert grains, silty, argillaceous. Fair porosity in coarse sands. No stain. Good porosity 2250-2270.
- 2270-2300 Shale, dark grey, blocky, non-calcareous, micro-micaceous. Trace of grey-green blocky shale. Much sandstone, as above - cvg. ?
- 2300-2320 Shale, as above.
Minor interbedded siltstone and very fine grained grey, argillaceous sandstone.
- 2320-2330 Shale, dark grey, blocky, non-calcareous, micro-micaceous. Silty streaks.
- 2330-2340 Shale, as above. Trace coaly partings.
Sandstone, fine grained, grey, argillaceous, non-calcareous, tight.
- 2340-2420 Shale, dark grey, blocky, micro-micaceous, non-calcareous, few silty, sandy streaks.
Trace of light grey and green-grey shale.
- 2420-2460 Shale, as above. Trace light grey shale. Much interbedded grey fine grained argillaceous silty sandstone, grading in part to medium grained sandstone, sub-angular quartz and chert grains, trace of porosity. No stain.
- 2460-2480 Shale, dark grey, blocky, silty, micro-micaceous, non-calcareous.
Minor medium grained and fine grained sandstone, as above - cvg. ?

- 2480-2500 Sandstone, very fine grained to fine grained, grey, argillaceous, slightly calcareous, silty.
- 2500-2560 Sandstone, light grey, S & P, medium grained sub-angular quartz and chert grains, silty in part, non-calcareous. Trace of porosity, no stain. Good porosity, friable sand, 2520-2560. Trace of staining, fluorescence and cut. Spotty. Trace of intergranular gilsonite.
- 2560-2570 Sandstone, as above, 40%. Fair porosity, trace of staining, cut, fluorescence, as above. Shale, dark grey, silty, sandy in part, non-calcareous, micaceous in part. 60%.
- 2570-2590 Shale, as above. Much dark grey-green blocky shale.
- 2590-2690 Shale, dark grey, silty, non-calcareous, blocky, micro-micaceous. Minor light grey blocky shale, trace of dark grey-green shale.
- 2690-2700 Shale and silty shale, as above. Much coal fragments. Pyrite.
- 2700-2720 Shale, dark grey, blocky, non-calcareous, silty streaks. Traces dark brown-grey, blocky shale.
- 2720-2730 Shale, as above. Minor (30%) sandstone, fine grained, grey, silty, non-calcareous, tight. Traces coaly fragments.
- 2730-2770 Shale, dark grey, blocky, silty streaks, non-calcareous, trace plant fragments. Trace of brown, blocky shale, 2750-2760.
- 2770-2790 Sandstone, very fine to fine grained, grey, siliceous, silty, tight. Trace of glauconite.
- 2790-2800 Shale, dark grey, blocky, micro-micaceous, non-calcareous, silty streaks. Traces of grey-brown shale, green blocky shale. Minor sandstone, as above - cvg. ?

- 2800-2910 Shale, as above. Interbedded grey, very fine grained sandstone.
Traces coaly fragments.
Trace of grey-green and brown, blocky shale.
- 2910-2930 Shale, as above, 50%. Trace of ironstone, pyrite.
Sandstone, 50%, grey, S & P, fine grained, non-calcareous, silty, siliceous, tight.
- 2930-2940 As above. Much ironstone, pyrite.
- 2940-2960 Shale, dark grey, blocky to sub-fissile, micro-micaceous, non-calcareous. Minor brown-grey shale, grey and green-grey shale. Silty, micaceous streaks.
Trace of plant remains.
- 2960-2970 Shale, 50%, as above. Trace ironstone.
Siltstone 50%, brown-grey, argillaceous, non-calcareous, hard, micro-micaceous, grading to silty shale.
- 2970-3000 Shale, dark grey, sub-fissile to blocky, non-calcareous, micro-micaceous, silty streaks.
Traces of brownish-grey silty shale. Pyrite, coaly partings. Much black, sub-bituminous shale.
- 3000-3040 Shale, as above, 40%; much black, sub-bituminous shale.
Sandstone, 60%; very fine grained, light grey, S & P, silty, argillaceous, non-calcareous, micaceous.
Trace of ironstone.
- 3040-3050 Sandstone, grey, S & P, fine grained, hard siliceous, silty, argillaceous. Angular and sub-angular quartz and chert grains, poor to fair sorting. Trace of glauconite, gilsonite. Tight.
- 3050-3060 Sandstone, as above, 50%.
Shale, dark grey, blocky; non-calcareous, 50%.
- 3060-3080 Shale, dark grey, blocky, silty, micro-micaceous, trace of plant remains.
- 3080-3090 Shale, as above, much black, sub-bituminous coaly shale.
Sandstone, grey, S & P, very fine to fine grained, argillaceous, silty, non-calcareous, trace of glauconite.

- 3090-3100 Shale, dark grey, silty, blocky, micro-micaceous. Much black coaly shale, sub-bituminous, blocky. Trace of coaly fragments, silty streaks, faintly calcareous.
- 3100-3110 Shale, as above.
Siltstone, brown-grey, faintly calcareous, argillaceous, hard.
- 3110-3130 Shale, dark grey, blocky to sub-fissile, non-calcareous, micro-micaceous in part, silty streaks.
Trace to minor brown-grey silty shale.
- 3130-3140 Shale, as above. Much light grey, hard, siliceous, silty, blocky shale, grey, massive shale, trace pyrite. Traces of very light grey claystone.
- 3140-3160 Siltstone, very fine grained sandstone, light grey and grey, trace micaceous, argillaceous, trace glauconite.
Trace of porosity - no stain, fluorescence or cut.
- 3160-3170 Sandstone, light grey, S & P, fine grained, siliceous, silty, argillaceous, trace glauconitic.
Sub-angular, fairly well sorted quartz and minor chert grains. Tight.
- 3170-3180 Sandstone, medium grained, grey, S & P, non-calcareous to faintly calcareous. Sub-angular, fairly well sorted quartz and chert grains, silty, siliceous matrix.
Carbonized flecks, traces of pyro-bitumen, glauconite.
Trace? of porosity - no stain, fluorescence or cut.
Trace of coal.
- 3180-3190 Sandstone, as above, 50%.
Shale, dark grey, blocky, silty in part, traces of grey shale, brown-grey silty shale, 50%.
- 3190-3220 Shale, as above, few silty streaks, trace of coaly partings, coal fragments, ironstone.
- 3220-3230 Shale, dark grey blocky, trace of grey, hard; siliceous shale, grey blocky claystone. Traces of dark grey-brown silty shale. Trace plant remains, pyrite.

- 3230-3250 Siltstone, brown, argillaceous, faintly calcareous, trace micro-micaceous, trace finely laminated.
- 3250-3260 Siltstone, as above. Trace of pyro-bitumen, 60%.
Shale, dark grey, blocky, micro-micaceous, minor grey and green shale, trace of slickensides; 40%.
- 3260-3270 Shale, as above, silty streaks. Trace of ironstone.
Minor siltstone, as above - cvg. ?
- 3270-3310 Shale, as above. Minor dark grey-brown siltstone, traces coal, pyrite, faintly calcareous.
- 3310-3320 Shale, dark grey, blocky, non-calcareous, micro-micaceous in part.
Trace of coaly partings. Minor brown-grey siltstone.
- 3320-3330 Shale, as above, 60%. Trace of coal fragments.
Siltstone, 40%, dark grey-brown, argillaceous, faintly calcareous, blocky. Trace of ironstone.
- 3330-3340 N.S.
- 3340-3380 Siltstone, 60%, dark brown-grey, argillaceous, siliceous, faintly calcareous. Trace of pyrite, ironstone.
Shale, as above, 40%.
- 3380-3390 Shale, minor siltstone, as above.
Much ironstone.
- 3390-3450 Shale, dark grey, micro-micaceous in part, non-calcareous; minor grey blocky shale, brown, hard shale - ironstone.
Trace of pyrite.
- 3450-3470 Siltstone, very fine sandstone, grey and brown-grey, siliceous, argillaceous, hard, faintly calcareous, 60%.
Shale, as above, 40%. Trace of fractures.
- 3470-3530 Shale, 70%, dark grey, blocky, non-calcareous, coaly flecks. Siltstone, 30%, brown-grey, argillaceous, micro-micaceous, faintly calcareous, trace of pyrite.
- 3530-3550 Shale, dark grey, grey, minor light grey and brown shale, trace of ironstone, coaly flecks.
Traces silty, micaceous shale. Minor silty streaks.

- 3550-3560 Shale, dark grey, blocky to sub-fissile, non-calcareous, minor silty, micaceous shale. Trace to minor light grey, argillaceous, siliceous dense siltstone.
- 3560-3590 Siltstone, light grey and grey, very argillaceous, siliceous, hard. 30%. Trace of glauconite, pyrite. Much shale, as above - 70%.
- 3590-3610 Shale, dark grey, micro-micaceous, sub-fissile, non-calcareous, traces of coal flecks. 50%.
Siltstone, dark grey-brown, argillaceous, non-calcareous, siliceous, hard. 50%, trace glauconite.
- 3610-3630 Siltstone, as above; grading to very fine grained brown, quartz sand, fair to good sorting, trace of glauconite, siliceous. Tight.
Much dark grey and brown shale, traces ironstone and pyrite.
- 3630-3658 Sandstone, light grey, fine to medium grained, quartz grains, well sorted, sub-round to sub-angular, scattered black chert grains, trace of glauconite. Good intergranular porosity, no cut or fluorescence.
Mud logging unit indicates gas show.
Some lamination of bituminous material.
- 3658-3717 Core #1 59' Rec. 56.3 ft.
- 3717-3755 Sandstone, light grey, fine grained, vitreous; sub-angular to angular; well sorted quartz grains, few black chert grains, siliceous cement, trace glauconite.
Scattered bituminous flecks and partings.
Trace to poor intergranular porosity, streaks of fair porosity.
No staining.
Much dark grey blocky to sub-fissile shale.
- 3755-3785 Shale, dark grey, sub-fissile to blocky, trace of carbonized plant remains. Trace of bituminous shale.
Minor sandstone, as above - cvg. ?

- 3785-3795 Sandstone, pale grey, fine to medium grained, well sorted, sub-angular to sub-rounded quartz, minor chert grains, trace of glauconite, siliceous cement. Much bitumen - intergranular, and as fine laminae. Poor to fair intergranular porosity, no stain. Questionable cut and fluorescence.
- 3795-3805 Sandstone, as above. Questionable cut, fluorescence. Increase in shale content, minor grey silty streaks.
- 3805-3814 Sandstone, pale grey, fine to medium grained, well sorted, sub-angular to sub-rounded quartz, minor chert, trace of glauconite, siliceous cement. Scattered intergranular bitumen. Poor to fair intergranular porosity, no stain, faint cut, fluorescence?
- 3814-3830 Sandstone, fine grained to very fine grained, grey, non-calcareous, slightly argillaceous, silty. Well sorted, sub-angular quartz grains, siliceous cement. Trace micaceous, pyrite, glauconite. Bituminous flecks and partings. Tight.
- 3830-3840 Sandstone, as above, 50%.
Shale, dark grey, silty, micro-micaceous in part, sub-fissile, non-calcareous, 50%.
Trace of pyrite.
- 3840-3875 Sandstone, as above; 70%. Trace of glauconite.
Shale, as above; 30%.
- 3875-3880 Sandstone, as above. Increase in bitumen content. 70%.
Shale, as above; 30%.
Trace of pyrite.
- 3880-3885 Sandstone, light grey, fine grained, sub-angular quartz, well sorted, siliceous, silty, hard, tight.
Minor grey, argillaceous sandstone.
Trace of lamination. Trace of pyrite.
- 3885-3905 Sandstone, pale grey, fine grained, vitreous; sub-angular, well sorted quartz grains, silty, siliceous matrix. Trace of glauconite. Scattered black chert grains. Minor grey, argillaceous sandstone.
Trace of intergranular porosity, no stain, cut or fluorescence.

- 3905-3925 Sandstone, as above; 60%. Much dark grey arg. sst. Shale, dark grey and black, micro-micaceous, slightly bituminous, fissile, 40%. Trace of fractures, pyrite, ironstone. Trace of intergranular porosity. Trace of cut and fluorescence.
- 3925-3955 Shale, dark grey to black, sub-fissile to blocky, sl. bituminous, micro-micaceous, non-calcareous, silty in part. Much sandstone, as above - cvg. in part.
- 3955-4010 Shale, as above. Trace of pyrite, ironstone. Trace of fractures. Minor interbedded dark grey silty shale, argillaceous siltstone.
- 4010-4080 Shale, dark grey and grey, blocky to sub-fissile, micro-micaceous, non-calcareous, silty streaks. Trace of pyrite. Trace of very argillaceous dark grey-brown, laminated siltstone.
- 4080-4180 Shale, dark grey, blocky to sub-fissile, micro-micaceous, non-calcareous. Trace of pyrite. Siltstone, dark brown-grey, argillaceous, siliceous, hard.
- 4180-4200 N.S.
- 4200-4280 Shale, dark grey to black, blocky to sub-fissile, sl. bituminous, micro-micaceous. Trace of pyrite. Siltstone, dark brown-grey, argillaceous, siliceous, hard. Trace micaceous, glauconitic, grading in part to very fine grained sandstone.
- 4280-4425 Shale, as above. Trace of silty streaks, trace of brown, very fine grained argillaceous sandstone. Trace of pyrite.
- 4425-4440 Shale, as above. Siltstone, dark brown-grey, argillaceous, siliceous, hard, grading to silty shale.
- 4440-4450 Shale, dark grey and black, sub-fissile to blocky, non-calcareous, micro-micaceous. Trace of silty shale. Trace of pyrite. Trace of anhydrite and pyrite fracture filling 4440-4450.

- 4450-4480 Shale, as above. Trace to minor interbedded silty shale, argillaceous siltstone.
- 4480-4620 Shale, dark grey and black, blocky to sub-fissile, micro-micaceous. Trace of pyrite.
Trace of chert pebbles. 4560-4580.
- 4620-4650 Shale, as above. Trace of grey silt laminae.
Trace of pyrite.
Trace of grey, micaceous, sandy claystone, 4630-4640.
- 4650-4730 Shale, dark grey to black, sub-fissile, micro-micaceous, non-calcareous.
- 4730-4770 Shale, as above.
Minor grey-brown silty shale, trace of ironstone.
- 4770-4800 Shale, dark grey, micro-micaceous, blocky to sub-fissile, trace silty shale, sl. bituminous. Much sideritic, glauconitic dark grey-brown shale.
Trace of pyrite, ironstone.
- 4800-4820 Shale, as above, slightly bituminous, silty.
Trace of sideritic and glauconitic shale. Pyrite.
- 4820-4850 Shale, dark grey to black, micro-micaceous, sl. bituminous, minor silty shale, much ironstone, trace pyrite, glauconite.
Trace of fractures.
- 4850-4860 Shale, dark grey, micro-micaceous, sub-fissile to blocky, silty in part, trace bituminous.
Trace of ironstone, trace of pyrite.
Trace of grey, very argillaceous, dense limestone.
- 4860-4930 Shale, as above. Traces of dark brown-grey silty shale.
Trace of glauconite, pyrite, ironstone.
Trace of green, waxy shale.
- 4930-5020 Siltstone, grey and dark brown-grey, very argillaceous, grading to very silty shale.
Trace micro-micaceous. Trace of pyrite.
Trace of ironstone, waxy green shale, glauconite.
Much glauconitic siltstone, ironstone 4980-5020.
Trace of pale grey calcareous siltstone, ironstone.

- 5020-5080 Siltstone, as above. Trace glauconitic, pyritic.
Trace of light grey, calcareous siltstone, ironstone.
Trace of light grey micaceous, very fissile, soft shale.
- 5080-5100 Siltstone, as above. Trace glauconitic, trace calcareous
siltstone. Trace of light green, waxy shale. Increase
in black, sub-fissile shale. Pyrite.
Trace of calcite filled fractures.
- 5100-5190 Shale, dark grey, silty, blocky, minor black fissile
shale. Trace glauconite, pyrite, ironstone.
- 5190-5240 Shale, dark grey to black, sub-fissile to blocky, micro-
micaceous, few silty streaks.
Trace of pyrite, ironstone.
- 5240-5330 Shale, dark grey to black, sub-fissile to fissile, micro-
micaceous. Trace of silty shale.
Trace of pyrite, much ironstone.
- 5330-5370 Shale, as above. Trace of pyrite, ironstone.
- 5370-5390 Shale, dark grey and black, micro-micaceous, sub-fissile
to blocky, traces silty streaks.
Much brown ironstone, trace of pyrite.
- 5390-5520 Shale, dark grey and black, micro-micaceous, sub-fissile
to fissile. Trace of plant remains.
Trace of pyrite, ironstone.
Trace of brown, argillaceous limestone 5440-5450.
Trace of glauconite.
- 5520-5590 Shale, as above, trace glauconitic shale.
Trace of ironstone, pyrite. Trace of silty shale.
Trace of chert fragments and pebbles.
Trace of dark green blocky shale.
Trace of grey-brown, dense, argillaceous limestone,
5550-5560.
- 5590-5670 Shale, dark grey, blocky to sub-fissile, micro-micaceous.
Trace of pyrite. Much ironstone.
Trace of fractures.
Trace of chert pebbles, 5640-5670.
- 5670-5680 N.S.

- 5680-5700 Shale, as above. Trace of silty streaks.
Much brown ironstone.
Traces to minor grey and brown-grey, dense, argillaceous limestone. Trace of chert pebbles.
- 5700-5740 Shale, dark grey to black, sub-fissile and fissile, micro-micaceous, slightly bituminous in part. Trace of glauconitic shale. Trace of silty shale.
Trace of pyrite, ironstone. Trace of chert fragments.
- 5740-5760 As above. Minor (traces +) pale grey-green waxy - bentonite.
Trace of dark grey very argillaceous limestone.
- 5760-5770 Shale, dark grey and black, sub-fissile to fissile, micro-micaceous, trace pyritic.
Trace of interbedded silty shale and light grey siltstone.
Trace of dark brown-grey argillaceous limestone.
Trace of glauconite.
- 5770-5790 Shale, as above. Trace pyritic, trace of glauconite.
Trace of brown, dense argillaceous limestone, as above.
Trace of pale grey waxy bentonite, trace of ironstone.
- 5790-5800 Shale, as above. Minor silty, sandy streaks; 30%.
Trace of grey siltstone. Trace of limestone, as above.
Traces of ironstone, pyrite, as above.
- 5800-5830 Siltstone, grey and dark grey, siliceous, argillaceous, grading to silty shale. Much shale, as above.
Trace of glauconitic sandy shale, trace of limestone.
Trace of bentonite, pyrite.
- 5830-5860 Siltstone, grey, argillaceous, finely laminated in part, non-calcareous to faintly calcareous. Tight.
Trace of grey v.f.g. sandstone, trace glauconitic.
Trace of brown oil staining, fluorescence, cut, 5840-50.
Trace of light brown dense limestone.
Trace of bentonite, ironstone.
- 5860-5900 Shale, dark grey and black, micro-micaceous, much silty shale.
Trace of pyrite, bentonite.
Trace of light brown, dense limestone.

- 5900-5940 Shale, dark grey and black, micro-micaceous, blocky, silty in part, fairly glauconitic.
Trace of pyrite.
Trace of dark brown argillaceous limestone.
- 5940-5960 Shale, as above.
Much brown, very glauconitic, calcareous siltstone.
Trace of pyrite, trace of brown, dense limestone.
- 5960-5980 As above. Decrease in brown glauconitic siltstone.
- 5980-5990 Shale, as above.
Sandstone, pale grey, medium grained sub-angular to sub-rounded, fairly well sorted quartz, minor chert grains, silica cement, trace glauconitic.
Abundant coarse chert grit.
Traces to fair porosity, no stain or cut.
- 5990-6002 Sandstone, pale grey, medium grained, sub-rounded fairly well sorted quartz, minor pale grey chert grains, siliceous, trace of glauconite.
Much grey and pale grey chert grit.
Fair to good intergranular porosity.
No stain, cut or fluorescence.
- 6002-6020 Core #2 Rec. 16.7'
- 6020-6040 Core #3 Rec. 13.6'
- 6040-6050 Sandstone, light grey and brown-grey, medium to fine grained, very calcareous, in part a sandy limestone.
Sub-angular fairly well sorted quartz grains. Trace of glauconite, pyrite.
Abundant coarse dark grey and grey rounded chert grains.
Traces of fossil fragments.
- 6050-6060 Sandstone, as above.
Trace of poor; very fine intergranular porosity.
Oil stain, cut, fluorescence.
- 6060-6070 Sandstone, as above. Much cavings - shale.

- 6070-6090 Chert, brown and dark brown, minor light grey chert, massive. Trace of limey chert and sandy textured limey chert - siliceous sandy limestone - glauconitic. Much pale grey sandy, glauconitic marl. Trace of fractures, pyrite. Trace of fossil remains. Trace of chert grit, intergranular porosity, cut, fluorescence. Much dark brown, bituminous blocky, non-calcareous shale.
- 6090-6100 Sandstone, light grey-brown, very calcareous, fine to medium grained, sub-angular quartz and chert grains, grading to sandy limestone. Siliceous in part. Trace of fossil shell fragments. Glauconite. Scattered coarse chert grit in calcareous sandy matrix. Minor dark brown, blocky non-calcareous shale. Trace of poor, intergranular porosity. Stain, cut, fluorescence.
- 6100-6120 Sandstone, light grey-brown, fine grained to medium grained, calcareous, siliceous. Fairly well sorted sub-angular quartz, chert grains, traces to fairly glauconitic, trace kaolinitic. Trace of poor intergranular porosity, oil stain, cut, fluorescence. Limestone, pale, grey, sandy, glauconitic, much coarse limestone and fossil fragments, chalky in part, siliceous. Matrix to coarse dark grey chert grit.
- 6120-6130 Sandstone, fine to medium grained, grey-brown, fairly well sorted sub-angular quartz, minor chert, siliceous, slightly calcareous, trace kaolinite, glauconitic. Traces of poor intergranular porosity, stain, cut, fluor. Much pale grey, very calcareous medium grained sandstone, glauconitic, grading in part to sandy limestone. Fossil remains - spicules, shells. Matrix to scattered chert grit. Minor brown, blocky non-calc. shale.
- 6130-6153 Core #4 Rec. 22.6

- 6153-6160 Sandstone, pale grey, fine to medium grained, very calcareous. Trace of fossil fragments - spicules. Fairly well sorted sub-angular to sub-rounded quartz, minor chert grains, in limestone matrix - 30%. Trace coarse grains. Trace of pyrite. Tight.
- 6160-6170 Shale, dark grey to black, sub-fissile to blocky non-calcareous, slightly bituminous. Trace of silty streaks. Pyrite.
- 6170-6180 Sandstone, fine grained, pale grey, trace glauconitic, calcareous. Matrix and cement - 10%. Fairly well sorted sub-round quartz grains, few coarser, well rounded chert and quartz grains, trace of chert "grit." Pyrite. Trace of fossil fragments, trace of sandy limestone.
- 6180-6220 Shale, dark grey and black, sub-fissile to blocky, non-calcareous, trace of pyrite; slightly bituminous. Trace of ironstone, argillaceous limestone streaks. Fossil shell fragments.
- 6220-6290 Shale, dark grey, blocky, slightly calcareous, silty texture. Streaks of grey-brown argillaceous limestone, trace of fossil fragments. Trace of pyrite.
- 6290-6310 Sandstone, pale brown-grey, medium grained, much coarse grains. Poorly sorted, sub-angular to sub-round quartz, minor chert grains, much glauconite. Lime matrix - 30%. Fossil shell fragments.
- 6310-6450 Shale, dark grey and brownish grey, calcareous, fossiliferous, non-calcareous streaks. Blocky, slightly bituminous. Argillaceous limestone streaks. Minor limey sandstone, as above. Trace of crinoids.
- 6350-6370 Shale, dark grey and dark brown, non-calcareous, blocky, slightly bituminous. Minor calcareous shale, limestone streaks. Trace of fossil fragments, crinoids.

- 6370-6450 Shale, dark grey and brown-grey, calcareous, few non-calcareous streaks. Blocky to sub-fissile. Fossil shell fragments, argillaceous limestone streaks. Trace of pyrite. Trace of crinoids, ostracods, spicules. Much fossiliferous limestone, 6410-6420.
- 6450-6470 Shale, dark grey, calcareous, blocky to sub-fissile, interbedded minor dark brown argillaceous limestone, micritic to micro-crystalline. Traces of fossil fragments.
- 6470-6490 Shale, dark grey and brown-grey, calcareous, blocky to sub-fissile, trace of pyrite. Much limestone, brown, micritic to micro-crystalline; scattered fossil fragments.
- 6490-6550 Shale, dark grey and dark brown, calcareous, blocky. Few non-calcareous shale beds. Few streaks of dark brown, argillaceous micritic to micro-crystalline limestone, trace of fossil fragments, pyrite. Gastropod - 6530-6540 sample.
- 6550-6620 Shale, as above. Calcareous in part. Minor limestone, interbeds, as above. Traces of silty, calcareous shale. Pyrite. Trace of ostracods 6560-6570.
- 6620-6660 Siltstone, grey and brownish grey, calcareous, siliceous in part, argillaceous.
- 6660-6720 Siltstone, very fine grained sandstone, pale grey, very calcareous, siliceous in part, grading to silty limestone.
- 6720-6740 Sandstone, light grey, medium grained, very calcareous (25%) matrix. Sub-rounded quartz and chert grains, poor to fair sorting, slightly siliceous cement. Scattered coarse grains and chert "grit." Trace of bitumen infilled porosity.
- 6740-6760 Limestone, dark brown and brown, argillaceous, grading to very calcareous shale and silty shale. Fossil fragments. Much pale grey calcareous siltstone and very fine grained calcareous sandstone. Pyrite.

- 6760-6820 Shale, dark brown, very calcareous, much fine fossil fragments.
Minor, interbedded brown argillaceous limestone.
Coarse shell fragments, spicules.
Much fossiliferous limestone, 6810-6820.
- 6820-6850 Siltstone, very fine grained sandstone, argillaceous, very calcareous; siliceous in part, grading to calcareous, silty shale, brown and dark brown, much pale grey siltstone.
Trace of fossil fragments, pyrite.
- 6850-6870 Shale, brown and dark brown, calcareous, minor non-calcareous streaks, blocky. Much interbedded brown, argillaceous "silty" shale; fossiliferous limestone.
- 6870-6890 Shale, grey and dark grey, non-calcareous, blocky, trace micro-micaceous, silty streaks.
- 6890-6900 Shale, as above.
Much limestone, light brown, fossiliferous, and brown, argillaceous, dense limestone.
- 6900-6940 Shale, grey and dark grey, blocky, calcareous, minor fissile, non-calcareous shale.
Minor, interbedded fossiliferous, very fine crystalline argillaceous limestone. Trace of crinoids, spicules.
- 6940-6960 Shale, as above. Traces of fossil shells.
Much interbedded fossiliferous limestone, pale brown very fine crystalline slightly argillaceous limestone, silty.
- 6960-6980 Shale, dark grey and dark brown, calcareous, blocky, matrix to fine fossil debris.
Interbedded dark brown argillaceous, fossiliferous limestone stringers.
- 6980-7020 Shale, as above. Much brown, argillaceous limestone and very calcareous, silty shale.

- 7020-7150 Siltstone, light brown, very calcareous, siliceous in part, grading to silty limestone. Much brown and dark brown slightly argillaceous micritic limestone, siliceous - grading to dark brown chert, 7030-7040. Trace of fossil fragments.
- 7150-7220 Limestone, brown and dark brown, micritic, argillaceous, siliceous in part. Much dark brown and brown silty, siliceous limestone, grading to very calcareous siltstone. Trace of brown chert, 7210-7220.
- 7220-7250 Limestone, brown and light brown, micritic to micro-crystalline (bit shattered), slightly argillaceous, siliceous in part. Much light brown and brown chert. (30% - 40%).
- 7250-7300 Limestone, brown, argillaceous, micritic, silty in part siliceous, grading to very calcareous siliceous shale. Traces of brown and brown-grey chert.
- 7300-7340 Limestone, brown, argillaceous, micritic to micro-crystalline, siliceous in part, silty.
- 7340-7350 Shale, brown, very calcareous, siliceous in part. Much silty, argillaceous, siliceous limestone, as above.
- 7350-7390 Limestone, brown, micritic to micro-crystalline, argillaceous, siliceous, silty in part, grading in part to very calcareous, siliceous shale. Traces of fossil fragments, spicules. Trace of chert. Pyrite.
- 7390-7430 Shale, dark grey and dark brown, calcareous, blocky to splintery, grading in part to dark brown, argillaceous dense limestone.
- 7430-7440 N.S.
- 7440-7550 Shale, dark brown, very calcareous, splintery, grading in part to dark brown argillaceous limestone.

- 7550-7580 Shale, dark grey and dark brown, calcareous; blocky, splintery.
Scattered fine fossil debris, fossiliferous limestone streaks, trace of chert pebbles.
Trace of spicules, ostracods.
- 7580-7600 Shale, dark grey and dark brown, non-calcareous and calcareous, blocky to sub-fissile.
Trace of fossil shells, crinoids, spicules.
- 7600-7690 Shale, as above.
Interbedded brown, very argillaceous limestone.
- 7690-7800 Shale, as above.
Much brown and dark brown, argillaceous, dense limestone, siliceous in part.
- 7800-7820 N.S.
- 7820-7850 Limestone, dark brown and brown, argillaceous, dense.
Much dark brown calcareous shale, as above.
- 7850-7870 Shale, dark brown, sub-fissile and blocky, calcareous.
Minor brown, argillaceous limestone, scattered fine fossil fragments.
- 7870-7930 Shale, dark brown, blocky, calcareous; trace silty.
Minor interbeds of dark brown, dense, argillaceous limestone, siliceous in part.
- 7930-7970 Shale, dark brown and black, blocky, calcareous, silty, speckled by abundant scattered very fine fossil fragments.
Trace of black, non-calcareous, fissile shale.
Traces of minor interbedded fossiliferous limestone.
- 7970-8004 Limestone, lt. brown and dark brown, silty, sandy, siliceous in part, argillaceous.
T.D.
Much dark brown, calcareous shale, as above.

SECTION III - ENGINEERING SUMMARY

(a) Report of Drillstem Tests

Field Pressures Reported

DST #1 3620 - 3658

Zone: Cretaceous

Times: Preflow 8 mins.
ISI 30 mins.
VO 65 mins.
FSI 65 mins.

Pressures: IHP 1779 psi FHP 1779 psi
ISIP 567 psi FSIP 405 psi
IFP 283 psi FFP 270 psi
Preflow 283 psi

Recovery: Recovered 455 feet of slightly watery mud

Remarks: Test satisfactory

DST #2 3639 - 3813

Zone: Cretaceous

Times: Preflow 8 mins.
ISI 30 mins.
VO 60 mins.
FSI 90 mins.

Pressures: IHP 1753 psi FHP 1753 psi
ISIP 1645 psi FSIP 1524 psi
IFP 1631 psi FFP 1618 psi
Preflow 310 psi

Recovery: 1085 feet of drilling mud

Remarks: Test a misrum

DST #3 3629 - 3813

Zone: Cretaceous

Times: Preflow 10 mins.
ISI 30 mins.
VO 60 mins.
FSI 60 mins.

Pressures: IHP 1771 psi FHP 1771 psi
ISIP 790 psi FSIP 1099 psi
IFP 386 psi FFP 924 psi
Prewflow 388 psi

Recovery: 595 feet of drilling mud

Remarks: Test a misrun

DST #4 5977 - 6053

Zone: Permo-Penn

Times: Prewflow 3 mins.
ISI 30 mins.
VO 5 mins.
FSI 30 mins.

Pressures: IHP 3200 psi FHP 2880 psi
ISIP N/A FSIP N/A
IFP 360 psi FFP N/A
Prewflow 200 psi

Recovery: 1290 feet of drilling mud

Remarks: Test a misrun

DST #5 7800 - 8004

Zone: Chance Sand Equivalent

Times: Prewflow 3 mins.
ISI 30 mins.
VO 90 mins.
FSI 120 mins.

Pressures: IHP 4477 psi FHP 4376 psi
ISIP 1348 psi FSIP 2386 psi
IFP 70 psi FFP 120 psi
Prewflow 120 psi

Recovery: Strong air blow on preflow
Gas to surface in 5 min. at 51 Mcf/Day
186' black sulphurous drilling mud recovered

Remarks: Test satisfactory

DST #6 2487 - 2565

Zone: Cretaceous

Times: Preflow 5 mins.
ISI 30 mins.
VO 120 mins.
FSI 120 mins.

Pressures: IHP 1368 psi FHP 1308 psi
ISIP 645 psi FSIP 947 psi
IFP 342 psi FFP 665 psi
Preflow 282 psi

Recovery: 558 feet of drilling mud

Remarks: Test a misrun

DST #7 5982 - 6060

Zone: Permo-Penn

Times: Preflow 3 mins.
ISI 30 mins.
VO 120 mins.
FSI 120 mins.

Pressures: IHP 3892 psi FHP 3414 psi
ISIP 2410 psi FSIP 2334 psi
IFP 462 psi FFP 1144 psi
Preflow 608 psi

Recovery: Good air blow on preflow
Gas to surface in 10 mins. at 13 Mcf/Day
190' gas cut mud
2320' salt water

Remarks: Test satisfactory

DST #8 2487 - 2565

Zone: Cretaceous

Times: Preflow 3 mins.
ISI 30 mins.
VO 90 mins.
FSI 90 mins.

Pressures: IHP 1393 psi FHP 1344 psi
ISIP 1344 psi FSIP 1330 psi
IFP 750 psi FFP 1282 psi
Preflow 527 psi

Recovery: 125 feet gas cut mud

Remarks: Test a misrun

DST #9 2486 - 2548

Zone: Cretaceous

Times: Preflow 5 mins.
ISI 30 mins.
VO 120 mins.
FSI 120 mins.

Pressures: IHP 1393 psi FHP 1380 psi
ISIP 955 psi FSIP 1017 psi
IFP 109 psi FFP 121 psi
Preflow 97 psi

Recovery: Good air blow on preflow
Fair to strong air blow on flow period
150' drilling mud watery near base

Remarks: Test satisfactory

(b) Casing Record

22 feet of 23" O.D. insulated conductor pipe from surface to 22 feet, complete with 3/4" cooling coils.

28 feet of 19" O.D. 3/16" pipe set at 50 feet below ground or 64 feet K.B.

Conductor pipe cemented with 210 sax permafrost cement.

Ran 25 joints (813.77') of 13-3/8" 54.5#, J-55, 8-round, new seamless casing landed at 798.86' K.B. Cemented casing with 1320 sax construction cement plus 3% CaCl₂. CIP 1320 Hours February 16, 1971.

(c) Bit Record

See attached sheets for bit record.

(d) Mud Report

Surface Hole - Surface hole was drilled using a stable foam. (Combination of air water and sulfotex sal.) At T.D. surface the hole was displaced to a gel water system to permit logging of the 17½" hole. The following materials were used on surface:

Sulfotex Sal	10 Drums
Gel	108 Sax
Caustic	4 Sax
Aluminum Stearate	1 Sax
Sawdust	25 Sax

Main Hole - The main hole was drilled using an XC polymer mud system. Mud up was immediately below the surface casing. The following materials were used on the main hole:

Gel	854 Sax
Caustic	84 Sax
Kelzan "AL"	124 Sax
Bicarbonate of Soda	6 Sax
CMC	3 Sax
Aluminum Stearate	3 Sax
Redwood Fiber	15 Sax
Weight Material	808 Sax
Dowicide "B"	4 Sax
Plaster of Paris	9 Sax
Ammonium Nitrate	3 Sax
Chrome Alum	1 Sax
Spersene	41 Sax
Sawdust	567 Sax

(e) Deviation Record

Surface Hole

110	-	1°	445	-	1°
140	-	1°	510	-	1/2°
202	-	1-1/8°	570	-	1/2°
254	-	1°	633	-	1°
285	-	1°	690	-	3/4°
315	-	7/8°	757	-	1/4°
385	-	7/8°			

Main Hole

901	-	1°	4305	-	1/2°
963	-	1°	4463	-	1°
1027	-	1°	4557	-	1°
1059	-	1°	4652	-	1°
1090	-	1°	4739	-	1°
1147	-	7/8°	4834	-	3/4°
1174	-	1°	4960	-	3/4°
1211	-	1°	5117	-	1-1/8°
1258	-	1°	5212	-	1-1/2°
1342	-	1°	5275	-	1-7/8°
1437	-	1°	5337	-	1-3/4°
1500	-	1°	5405	-	1-1/3°
1610	-	1°	5502	-	1-7/8°
1690	-	1°	5554	-	1-3/4°
1780	-	1°	5615	-	1-1/2°
1879	-	1°	5677	-	1-1/2°
2015	-	3/4°	5775	-	1-3/4°
2100	-	1/2°	5838	-	1-1/2°
2258	-	1/2°	5930	-	2°
2415	-	1°	6002	-	2°
2600	-	1/2°	6064	-	1-3/4°
2760	-	3/4°	6130	-	2°
3045	-	1/2°	6163	-	2°
2920	-	7/8°	6275	-	1-1/2°
3236	-	1°	6464	-	3-1/4°
3420	-	1-1/2°	6558	-	3-2/3°
3490	-	1-1/4°	6636	-	3-1/4°
3550	-	1-1/2°	6776	-	3-7/8°
3610	-	1-1/8°	6880	-	4°
3740	-	1°	7030	-	4-1/4°
3834	-	1°	7116	-	4-1/2°
3929	-	1°	7217	-	4-1/2°
4022	-	1/2°	7470	-	4-7/8°
4178	-	1/4°	7536	-	4-1/2°
			7633	-	5-1/4°
			7895	-	5-1/4°
			(T.D.) 8004	-	5°

(f) Abandonment Plugs

Plug #1 (8004 - 7800) 120 Sax Construction Cement + 0.4% Spersene
 Plug #2 (6100 - 5900) 140 Sax Construction Cement + 0.4% Spersene
 Plug #3 (3800 - 3550) 170 Sax Construction Cement. Felt @ 3500'.
 Plug #4 (2600 - 2450) 100 Sax Construction Cement. Felt @ 2430'.
 Plug #5 (850 - 750) 130 Sax Construction Cement + 3% CaCl₂. Felt @ 715'.
 Surface Plug - 5 Sax Construction Cement.

(g) Lost Circulation Zones

No lost circulation

(h) Report of Blowouts

No blowouts

SECTION IV - LOGS

The following Schlumberger logs were run on surface hole on February 15, 1971:

- I - ES (787' - 70')
- BHC/Sonic/G R (779' - 70')
- Microlog Caliper (786' - 70')

The following logs were run on main hole on April 20, 1971:

- BHC/Sonic/Gamma Ray/Caliper (8001' - 797')
- SNP/Gamma Ray/Caliper (7998' - 5800') & (4000' - 3600')
- Dual Induction Laterolog (7998' - 797')
- FDC/Gamma Ray/Caliper (7998' - 5800') & (4000' - 3600')

Ran a velocity survey on April 19, 1971 with check shots at the following levels: 115, 215, 315, 415, 515, 810, 1400, 2000, 2550, 3140, 3630, 4430, 5200, 5980, 6620, 7015, 7525, 7975, 7080.

Also ran a Depth Determination for Core Slicer Log.
Total depth loggers at 8003 feet K.B.

SECTION V - ANALYSIS

(a) Core Analysis

Core analysis enclosed in back folder

(b) Water Analysis

Water analysis enclosed in back folder

(c) Gas Analysis

Gas analysis enclosed in back folder

(d) Oil Analysis

No oil analysis

SECTION VI - COMPLETION SUMMARY

(a) Tubing Record

No tubing run

(b) Perforation Record

No perforations shot

(c) Cementation Record

Abandonment Plug #1: (8004' - 7800') Upper Mississippian?
Cemented with 120 sax construction cement plus 0.4%
spersene. Cement in place 0415 hours May 1, 1971.
No feel on plug #1.

Abandonment Plug #2: (6100' - 5900') Permo-Penn
Cemented with 140 sax construction cement plus 0.4%
spersene. Cement in place 0600 hours May 1, 1971.
Tagged plug #2 after 8 hours W.O.C. at 5840'.

Abandonment Plug #3: (3800' - 3550') Blackie Sand
Cemented with 170 sax construction cement. Cement
in place 1700 hours May 1, 1971. Tagged plug #3 after
8 hours W.O.C. at 3500'.

Abandonment Plug #4: (2600' - 2450') Eagle Plain Formation Sand
Cemented with 100 sax construction cement. Cement
in place 0130 hours May 2, 1971. Tagged plug #4
after 8 hours W.O.C. at 2430'.

Abandonment Plug #5: (850' - 750') Cretaceous/Surface Casing
Cemented with 130 sax construction cement plus 3%
CaCl₂. Cement in place 1030 hours May 2, 1971.
Tagged plug #5 after 8 hours W.O.C. at 715'.

Surface Plug: Cut off casing below ground level, cemented
casing with a 5 sax surface plug and welded on steel
plate. A well sign with well name and location was
then welded to the casing plate.

(d) Acidization and Fracturing Record

No acidizing or fracturing

(e) Back Pressure and Production Tests

No back pressure or production tests

