WELL HISTORY REPORT

CANADA SOUTHERN ET AL N. BEAVER R.
YT I-27

Unit I, Section 27, Grid 124° 00' 00" W.,
60° 10' 00" N.,
Yukon Territory

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Unit I, Section 27, Grid 124° 00' 00" W., 60° 10' 00" N.

YUKON TERRITORY

Canada Southern Petroleum Ltd.,
Calgary, Alberta.
May 1964.

I N D E X

ENCLOSURES

(a) Drillstem Test Charts

D.S.T. #1

D.S.T. #2

D.S.T. #3

D.S.T. #4

D.S.T. #5

D.S.T. #7

D.S.T. #8

(b) Analyses

1. Core Analysis

2. Gas Analysis

3. Water Analysis

WELL HISTORY REPORT

SECTION I

Summary of Well Data

(a) Well Name and Number

Canada Southern et al N. Beaver R. YT I-27

(b) Permittee

Canada Southern Petroleum et al.

(c) Name of Operator

Canada Southern Petroleum Ltd.
502 - 505 - 8th Avenue West, Calgary, Alberta.

(d) Location

Unit I Section 27 Grid 124° 00' 00" W., 60° 10' 00" N.
Latitude 60° 06' 41.57" N. Longitude 124° 03' 52.66" W.

(e) Co-Ordinates

S. 348.3' and W. 388.2' of N.E. Corner of Unit I Section 27.

(f) Permit Number

#1007

(g) Drilling Contractor

Cascade Drilling Company Limited Rig #19 Type National 100

(h) Drilling Authority

#117 28th February 1963.

(i) Classification

Exploratory

(j) Elevation

K.B. 1446'
Ground 1429.35'

(k) Spudded

March 24th, 1963.

(l) Completed Drilling

March 26th, 1964.

(m) Total Depth:

14,495' Middle Devonian Dolomite

(n) Well Status

Suspended April ~~14th~~ 13th, 1964.

(o) Hole Size

17-1/2" hole	0' - 1,025'
12-1/4" hole	1,025' - 8,099'
8-1/2" hole	8,099' - 8,113'
8-3/8" hole	8,113' - 12,201'
5-7/8" hole	12,201' - 14,495'

(p) Casing

13-3/8" at 1,025' cemented with 1,000 saxs

9-5/8" at 8,099' cemented with 1,100 saxs

7" at 12,150' cemented with 400 saxs

5" at 13,798' cemented with 120 saxs.

SECTION II

Geological Summary

(a) Formation Tops

		Sample	E-Log	Subsea
Glacial Drift		Surface		+ 1,446
Cretaceous		-200'		+ 1,246
Triassic		1,272'	1,260'	+ 186
Permian Chert (Fantasque Fm)		2,331'	2,320'	- 874
Permo-Penn Shale Unit		2,728'	2,733'	- 1,287
Carboniferous Mattson	Upper	2,870'	2,898'	- 1,452
	Middle			
	Lower	4,996'	4,855'	- 3,409'
Mississippian	? Flett		5,990'	- 4,544
(Etanda)	? Clausen		7,372'	- 5,926
	? Yohin	8,145'	8,150'	- 6,704
? Upper Devonian Limestone & Shale		8,825'	8,835'	- 7,389
? Middle Devonian 1st Black Shale		10,645'	10,657'	- 9,211
Grey Shale			11,050'	- 9,604
2nd Black Shale		11,847'	11,869'	- 10,423
Arnica Dolomite		12,156'	12,160'	- 10,714
Total Depth (Driller)		14,495'		- 13,049

(b) Cored Intervals

Core #1 12,591' - 12,619' Middle Devonian Dolomite Cut 28' Recovered 28'

(c) Core Description

Core #1 12,591' - 12,619' - Dolomite; medium to dark grey, micro to medium crystalline, slightly argillaceous, slightly silty in part, some evidence of incipient brecciation, occasional stylolites and black shale partings, 5 - 40% white coarse crystalline dolomite, with minor calcite and quartz infilling fractures, vugs and occasional fossils. Mainly tight with some poor to fair vuggy and fracture porosity in part. Trace pyrobitumen.

(d) Sample Descriptions

Surface - 200'	Glacial Till and Weathered soil.
200' - 1,240'	Medium grey shale with occasional thin bands of silt and silty, very fine grained sandstone with poor intergranular porosity.
1,240' - 1,272'	Sandstone; light brown to nearly white, very fine grained, silty, shaly, poor porosity, friable. Dead oil stain, very slight cut.
1,272' - 1,680'	Interbedded shales, grey, green, maroon to rust, slightly dolomitic in part, grading to siltstone and sandstone, fine to very fine grained, silty, shaly, calcareous to dolomitic, tight.
1,680' - 1,760'	Sandstone; light brown grey, fine grained, sub angular, poor to medium sorting, quartzose, dark and light colored chert, siliceous and silty, dolomitic, shaly in bottom 30 feet, tight to poor porosity.
1,760' - 1,900'	Siltstone; rust and grey, arenaceous, shaly, calcareous in part, interbedded with shales, grey to maroon, silty, and Sandstones as in 1,680 - 1,760.
1,900' - 1,960'	Sandstone; fine to very fine grained, medium grey, slightly silty, calcareous, heavily oil-stained with good cut and fluorescence, interbedded with grey silty shales.
1,960' - 2,331'	Shale; grey to maroon and rust, dolomitic, silty with occasional interbeds of grey siltstone.
2,331' - 2,390'	Chert; dark grey to black with floating grains of silt, slightly shaly, glauconitic in bottom 10 feet.
2,390' - 2,470'	Chert; dark grey brown to black, crypto-crystalline.
2,470' - 2,480'	Chert as above with large amounts of glauconite.
2,480' - 2,510'	Chert; dark grey brown to black, crypto-crystalline.
2,510' - 2,520'	Chert; dark grey to black, grainy with shale and silt.
2,520' - 2,680'	Chert; crypto-crystalline as above, and also grainy as above.
2,680' - 2,730'	Chert matrix; black with dark grey to black shale and silt infill.
2,730' - 2,840'	Shale; dark grey to black, hard, some dark grey very fine sandstone and maroon shale.

Fantasy ?

(d) Sample Descriptions (Continued)

2,840' - 2,870'	Chert; black with white chalcedony (?) infillings.
2,870' - 2,894'	Shale; brown-black, slightly bituminous, faint fluorescence.
2,894' - 2,910'	Sandstone; medium to dark grey, silty to fine-grained, siliceous, very calcareous, limestone inclusions, tight.
2,910' - 3,020'	Sandstone; light tan grey, very fine grained, silty, very calcareous, tight.
3,020' - 3,060'	Sandstone; medium grey, fine to very fine grained, quartzose, well sorted, fairly hard, tough, fair porosity, slightly dolomitic.
3,060' - 3,085'	Sandstone; white to medium grey to dark grey, slightly to very dolomitic, fine grained, well sorted, quartzose, fair to good porosity, fairly hard.
3,085' - 3,093'	Dolomite; medium grey, very shaly, micro-crystalline, tight, slightly micro-micaceous.
3,093 - 3,128'	Limestone; black, very shaly, micro-crystalline, tight, calcite filled fractures, slightly chalky.
3,128' - 3,135'	Sandstone; light grey, very silty, dolomitic, poor porosity.
3,135' - 3,140'	Shale; black, very dolomitic, silty, trace maroon shale.
3,140' - 3,143'	Sandstone; light grey, very silty, dolomitic, tight.
3,143' - 3,165'	Siltstone; dark brown-black, very dolomitic, occasionally limy and shaly. Some interbedded grey and maroon shale.
3,165' - 3,175'	Sandstone; white to medium grey, quartzose, very fine grained to silty, poorly sorted, tight, dead oil stain.
3,175' - 3,179'	Shale; dark grey to black, moderately soft.
3,179' - 3,184'	Sandstone; white to medium grey, quartzose, very fine grained to silty, poorly sorted, tight.
3,184' - 3,220'	Siltstone; white to light grey, soft, dolomitic, very limy, shaly; slightly sandy grading to sandstone, medium grey, limy, chalky, tight, hard.
3,220' - 3,240'	Sandstone; medium grey, limy, chalky, moderately tight, hard, trace of maroon shale.

(d) Sample Descriptions (Continued)

3,240' - 3,250'	Sandstone; as above but darker in color, calcite filled fractures and bitumen in wavy "flow bands".
3,250' - 3,260'	Sandstone; as above.
3,260' - 3,270'	Sandstone; as above. Shale; dark grey to black, occasionally slightly silty and bituminous, trace of coal, trace of maroon shale.
3,270' - 3,280'	Shale; dark grey as above, interbedded with sandstone as above, but slightly darker in color, much coal, Shale, very bituminous.
3,280' - 3,290'	Shale; as above, interbedded with sandstone, as above but with occasional very glauconitic sandstone and medium grained sandstone with a very calcareous cement. Moderate amount of coal, shale, occasionally very bituminous. Sample is characterized by a high lime content.
3,290' - 3,300'	Sandstone; very fine grained to siltstone, white to medium grey, very limy. Occasionally appears to be a very silty white limestone. The porosity is poor to occasionally fair but the permeability is nil.
3,300' - 3,340'	Sandstone; light to medium grey, fine grained to silty, poor to fair porosity, slightly oil stained, small amount dark grey to black shale. Trace of Chert.
3,340' - 3,370'	Sandstone; light grey, fine grained, limy, poor porosity, with part fair, trace of green siltstone and trace of black cherty shale.
3,370' - 3,390'	Sandstone; as above, grading to silty sandstone, poor porosity, minor amounts of shale, reddish brown, and shaly siltstone, trace chert.
3,390' - 3,400'	Siltstone; dark grey, limy. Sandstone; as above grading to siltstone with rounded black chert grains, limy. Trace dark brown to black chert.
3,400' - 3,420'	Shale; grey green and maroon, in part silty, Siltstone; as above. Minor Sandstone as above. Trace argillaceous chert.
3,420' - 3,460'	Sandstone; light grey, fine grained, partly silty and limy, poor porosity, in part fair. Minor grey and maroon shale as above. Minor dark grey siltstone, Trace black cherty shale, grading to chert.
3,460' - 3,480'	Sandstone; light grey, fine to medium grained to silty, limy, poor porosity, minor maroon and grey shale, trace black cherty shale, grading to chert.

(d) Sample Descriptions (Continued)

3,480'	- 3,500'	Sandstone; less silty, more siliceous, very poor porosity, trace shale as above, trace black shale, trace dark grey siltstone. Trace pyrite.
3,500'	- 3,530'	Sandstone; light grey, fine grained, grading to silty sandstone, limy, in part siliceous, some pyrite, trace poor porosity, trace grey green shale and siltstone, trace black shale and chert.
3,530'	- 3,540'	Same as above, some dark grey sandstone, silty and very limy, tight, slightly more maroon and green shale than above.
3,540'	- 3,560'	Sandstone; some dark grey due to large amounts of pyrobitumen, poor porosity, trace pyrite, trace green silty shale, trace sandstone, light grey, very fine grained, dolomitic, tight, trace black cherty shale.
3,560'	- 3,580'	As above; minor amounts dolomite, dark grey, sub lithographic, very silty.
3,580'	- 3,590'	Sandstone; as above. Minor siltstone grading to sandstone, dark grey siliceous, dolomitic. Trace brown chert.
3,590'	- 3,630'	Siltstone; as above. Part very dolomitic, almost a silty dolomite in part. Trace Sandstone; as above. Trace chert. Trace pyrite.
3,630'	- 3,660'	Sandstone; white to light grey, fine to medium grained, calcareous, part silty, slightly siliceous. Trace poor porosity. Trace chert. Minor siltstone as above.
3,660'	- 3,670'	Siltstone; medium to dark grey, very dolomitic, slightly siliceous. Trace chert, white to blue grey, Minor sandstone as above.
3,670'	- 3,700'	Sandstone; light to medium grey, fine to medium grained, grading to white to light grey quartzite. Trace siltstone as above. Trace pyrobitumen. Trace chert.
3,700'	- 3,710'	Sandstone; medium to dark grey, fine to medium grained, calcareous, slightly siliceous. Some pyrobitumen, Minor chert. Minor siltstone.
3,710'	- 3,730'	Chert, light to medium grey. Sandstone, as above. Minor dark grey siltstone as above.
3,730'	- 3,770'	Sandstone; light to medium grey, very fine grained to silty, dolomitic, tight. Some pyrobitumen. Trace chert. Trace grey shale.

(d) Sample Descriptions (Continued)

3,770' - 3,790'	Sandstone; white to light grey, fine grained, slightly dolomitic, in part silty, some pyrobitumen, tight. Trace siltstone. Trace maroon and green grey shale.
3,790' - 3,800'	Sandstone; light grey, fine grained, dolomitic, silty, tight, trace chert, dark grey shale, pyrite.
3,800' - 3,810'	Limestone; very silty, grading to limy siltstone, sandy in part; tight, minor sandstone, white, fine grained, limy, tight, trace chert, light grey shale.
3,810' - 3,820'	Silty limestone as above.
3,820' - 3,880'	Sandstone; white to light grey, fine to very fine grained, limy, part silty. Trace poor porosity. Trace chert. Trace siltstone. Trace grey and maroon shales.
3,880' - 4,060'	Mainly Sandstone as above. Minor chert. Trace shale. Limestone, very silty at 3,930' - 3,940'. Dolomite, silty, grading to chert at 4,000' - 4,020'.
4,060' - 4,080'	Sandstone; as above, minor grey and maroon shale.
4,080' - 4,090'	As above;
4,090' - 4,110'	Sandstone; grey, fine grained, dolomitic, in part silty, trace poor porosity. Stringers of dark grey to black shale, in part bituminous. Trace black chert.
4,110' - 4,130'	Sandstone; as above. Minor medium grey, very dolomitic and silty Sandstone. Few shale stringers as above.
4,130' - 4,150'	Sandstone; white to light grey, fine grained, trace poor porosity, slightly limy. Trace dark grey to black shale, grading to chert.
4,150' - 4,170'	Sandstone; light to medium grey, very fine grained, grading to siltstone, very dolomitic. Tight. Trace shale stringers as above. Trace brown chert.
4,170' - 4,180'	Siltstone; dark grey, arenaceous, dolomitic, fair amount of maroon and medium grey shale. Minor dark grey shale, trace of chert.
4,180' - 4,190'	Siltstone; as above. Shale, as above, trace of coal and trace of pyrite.
4,190' - 4,220'	Sandstone; medium grey, fine to medium grained, part silty, part shaly, dolomitic, rounded chert and shale grains, pyritic, part has poor porosity. Minor medium to dark grey shale. Trace chert.

(d) Sample Descriptions (Continued)

4,220' - 4,250'	Sandstone; as above, trace poor porosity. Trace chert. Few stringers dark grey to black shale.
4,250' - 4,280'	Sandstone; light to medium grey, very fine grained, silty and argillaceous, trace poor porosity. Few stringers dark grey to black shale. Trace chert.
4,280' - 4,290'	Sandstone; as above, grading to Siltstone. Trace shale.
4,290' - 4,300'	As above with minor amount of dark grey to black shale.
4,300' - 4,310'	Siltstone; dark grey brown, grading to silty, siliceous dolomite, trace dark grey to black shale.
4,310' - 4,330'	Siltstone; as above, grading to very fine grained sandstone, tight. Fair amount of maroon and green grey shale and trace of black shale, also trace of coal.
4,330' - 4,340'	Sandstone; white to light grey, very fine grained with shale, medium to dark grey, part silty, grading to dark grey brown siltstone and minor medium grey shale.
4,340' - 4,350'	Shale; as above with trace of limestone. Some sandstone as above.
4,350' - 4,380'	Shale; maroon and green grey. Sandstone, as above, Shale as above. Trace of limestone.
4,380' - 4,390'	Same as above.
4,390' - 4,410'	Sandstone; light to medium grey, very fine grained to silty, trace poor porosity, minor medium to dark grey shale, minor maroon and green grey shale. Trace of coal, trace of chert.
4,410' - 4,420'	Shale; maroon and green grey. Sandstone as above, in part very pyritic, trace poor porosity. Minor dark grey to black shale. Trace chert.
4,420' - 4,430'	Shale; medium to dark grey. Sandstone; light to medium grey brown, grading to sandy dolomite. Trace maroon shale as above. Trace of chert.
4,430' - 4,440'	Sandstone; white to light grey, very fine grained, limy, tight, with Sandstone as above, minor amount of maroon shale.
4,440' - 4,450'	Sandstone; light to medium grey, brown, grading to very dolomitic siltstone, trace of dark grey shale.
4,450' - 4,460'	Shale; maroon and medium grey, minor sandstone and siltstone as above.

(d) Sample Descriptions (Continued)

4,460' - 4,470'	Shale; medium to dark grey, silty, minor maroon and green grey shale, Sandstone and Siltstone as above.
4,470' - 4,480'	Sandstone; white to medium grey, fine to medium grained, limy, tight. Trace shale as above.
4,480' - 4,490'	Sandstone; light to medium grey brown, fine grained, grading to siltstone, trace shale as above.
4,490' - 4,500'	Sandstone; as above with more shale.
4,500' - 4,520'	Siltstone; medium to dark grey brown, in part sandy and grading to sandstone, limy, tight. Trace dark grey silty shale.
4,520' - 4,530'	Sandstone; light to medium grey, very fine grained, part limy, trace poor porosity. Trace shale as above. Trace chert.
4,530' - 4,560'	Sandstone; white to light grey brown, very fine grained, part limy, trace poor porosity, trace of dark grey silty shale.
4,560' - 4,570'	Sandstone; as above becoming more silty, trace of poor porosity, trace dark grey brown limy siltstone, minor medium dark grey silty shale. Minor maroon and grey shale.
4,570' - 4,580'	Sandstone; light to medium grey brown, very fine grained to silty, tight, trace of limestone and trace of shale.
4,580' - 4,610'	Sandstone; white to light grey, very fine grained, some poor porosity with trace fair, trace of sandstone as above and trace of chert.
4,610' - 4,670'	Sandstone; white to light grey, very fine grained to fine grained, slightly silty, slightly dolomitic, trace of oil stains, poor porosity, trace of chert, trace of pyrite, trace of black shale stringers.
4,670' - 4,680'	Sandstone; as above, trace of limestone, trace of dark grey black silty shale.
4,680' - 4,690'	Siltstone; dark grey brown to black, very dolomitic, trace sandstone as above.
4,690' - 4,700'	Sandstone; white to light grey, very fine grained to medium grained, trace of shale, minor siltstone as above.
4,700' - 4,710'	Sandstone; light grey, fine grained, quartzose, siliceous matrix, trace shale partings, trace pyrite, angular to sub angular, uniform grained, tight.

(d) Sample Descriptions (Continued)

4,710' - 4,720' Sandstone; as above, grading to argillaceous siltstone, light grey to grey, angular to sub-angular, quartzose, some dead oil staining, with grey to dark grey silty shale. Trace dark grey and maroon non-silty shale. Trace light brown limestone. Sandstone; calcareous and dolomitic in part.

4,720' - 4,730' Sandstone; white to light grey, fine grained, quartzose, angular to sub-angular, some oil staining, tight, Trace light brown limestone; dolomitic, trace chert, some grey to medium grey shale, trace maroon shale.

4,730' - 4,740' As above, some grading to grey silty shale, also grey and variegated shale, (Cavings?).

4,740' - 4,750' Sandstone; white to light grey, fine grained, quartzose, angular to sub-angular, abundant brown oil stain, no visible porosity. Trace brown dolomite, some pyrite, thin band of coal and highly bituminous black shale, occasional chert also interbedded grey brown siltstone. Some maroon and grey shale.

4,750' - 4,770' Sandstone; as above, pyritic. Trace chert, grading to medium grey siltstone, Interbeds of black bituminous shale. Trace dolomite. Some dead oil staining.

4,770' - 4,780' Sandstone; as above with more brown siltstone and grey in part silty shale, trace chert, pyritic, minor black bituminous shale, rare oil stain.

4,780' - 4,790' Sandstone; fine grained, brown to light brown, angular to sub-angular, interbedded with siltstone and shale as above, some pyrite, slightly dolomitic, minor variegated shale.

4,790' - 4,800' Sandstone; grey brown, fine grained to very fine grained, silty calcareous matrix, argillaceous in part, occasional light brown silty limestone, sparsely pyritic, grading in part to grey to medium grey argillaceous siltstone, some dark grey to grey shale.

4,800' - 4,810' Sandstone; grey brown, as above, in part quartzitic, trace brown limestone, interbedded with grey calcareous siltstone, part argillaceous and black bituminous shale, sparsely pyritic.

4,810' - 4,820' Sandstone; as above, dolomitic, interbedded with medium grey argillaceous siltstone and medium grey, silty, splintery shale, pyrite common. Trace brown waxy shale.

(d) Sample Descriptions (Continued)

4,820' - 4,830'	Sandstone; white to light grey to brown grey, fine grained to very fine grained, quartzitic, sub-angular, calcareous, pyritic, interbedded with shales, silty in part, maroon to grey green to dark grey, abundant fossil fragments, some argillaceous limestone, medium grey, beds appear interlaminated.
4,830' - 4,840'	Sandstone; as above with brown oil stain, pyritic, interbedded with black highly bituminous shale, trace glauconite, calcareous.
4,840' - 4,850'	Sandstone; as above, scattered brown oil stain, tight, calcareous. Trace dark grey to black shale. Some argillaceous siltstone, pyritic, occasional stringers of brown arenaceous limestone.
4,850' - 4,860'	Siltstone; medium to dark grey, dolomitic, argillaceous, in part grading to very fine grained sandstone, pyritic, some grading to silty shale. Also Sandstone, light grey to grey brown as above, trace oil stain.
4,860' - 4,870'	Siltstone; argillaceous, as above. 35% fine grained calcareous as above.
4,870' - 4,880'	Siltstone; as above, interbedded with fine grained light grey to brown silty sandstone, oil stained, interbedded with black bituminous shale and coal.
4,880' - 4,890'	Sandstone; light grey, very fine grained to fine grained, sub-rounded, in part silty, calcareous matrix, in part arenaceous dolomite, trace shale and siltstone as above.
4,890' - 4,900'	As above, interbedded with grey brown siltstone, in part argillaceous, some dark grey silty shale, some arenaceous light grey dolomite.
4,900' - 4,930'	Sandstone; light grey to grey, very fine grained, sub-angular, silty, slightly argillaceous, calcareous matrix, pyritic, interbedded with grey argillaceous siltstone. Thin lenses of argillaceous dolomite. Trace dark grey silty shale.
4,930' - 4,950'	Sandstone; light grey, very fine grained to fine grained, sub-angular, calcareous, light, interbedded with brown grey siltstone and dark grey to black splintery shale, pyritic, trace chert, dolomite, some maroon and grey green shale.
4,950' - 4,970'	Sandstone and siltstone as above, pyritic, interbedded with dark grey to black splintery shale, in part carbonaceous, fossiliferous (Crinoid ossicle), trace chert. Trace calcite lenses.

(d) Sample Descriptions (Continued)

4,970' - 4,990'	Sandstone; light grey to grey brown, fine grained, dolomitic, sub-rounded, pyritic in part, quartzose, interbedded with dark grey to black splintery shale and grey aphanitic dolomite, trace crinoid fragments, occasional grey brown siltstone as above.
4,990' - 5,000'	Sandstone; light grey to grey brown, fine grained, sub-angular, well sorted, dolomitic, in part argillaceous, silty in part, tight, occasional pyrite, interbedded with siltstone and dark grey to black splintery shale, Shale sparsely carbonaceous. Trace grey green and maroon shale, trace brown fine crystalline dolomitic, rare fossil fragments.
5,000' - 5,070'	Shale, grey to dark grey to black, fissile to splintery or blocky, in part silty, calcareous, part pyritic, Trace siltstone. Trace sandstone as above. Trace black chert. Trace fossils (Crinoids and ammonites)..
5,070' - 5,080'	Sandstone;light grey to white, fine grained, quartzose, well sorted, hard, slightly calcareous, interbedded with dark grey to black splintery shale, some maroon and green shale, some siltstone, argillaceous and pyritic.
5,080' - 5,090'	Sandstone; light brown to light grey, fine grained, calcareous matrix, sub-angular, quartzose, very slightly argillaceous, tight, pyritic, trace siltstone.
5,090' - 5,100'	Dolomite; brown to dark brown, fine crystalline, arenaceous, in part argillaceous, grading to dolomitic argillaceous sandstone. Numerous calcified fossil fragments, interbedded with dark grey to black splintery shale, calcareous, rare vug in dolomite, some brachiopod fragments, Trace argillaceous limestone, Trace pyrite.
5,100' - 5,130'	Dolomite; as above, with more interbedded dark grey to grey shale, abundant fossil fragments - crinoid stems. Some grey green and maroon shale, some brown siltstone and light grey fine grained well sorted sandstone.
5,130' - 5,150'	Sandstone; light grey to grey brown, fine grained, sub-angular, well sorted, interbedded with brown dolomite as above and dark grey to black, splintery, in part calcareous shale. Abundant crinoid fragments. Trace pyrite. Trace maroon shale. Trace siltstone.
5,150' - 5,160'	Shale; dark grey to black, silty in part, hackly, calcareous in part, pyritic, crinoids, interbedded with argillaceous siltstone and grey brown fine grained sandstone. Trace maroon shale. Trace calcarenite.

(d) Sample Descriptions (Continued)

5,160' - 5,200'	Shale; as above, pyritic. Trace thin lenses of Sandstone and Siltstone as above. Trace maroon shale. Trace crinoids.
5,200' - 5,210'	Sandstone; grey brown, fine grained, silty in part, quartzose, slightly dolomitic, interbedded with dark grey to black splintery shale, maroon shale, and dark grey siltstone.
5,210' - 5,220'	Sandstone; light grey to grey brown, fine grained, well sorted, quartzose, tight, interbedded with dark grey shale, trace chert, trace grey siltstone and shale as above.
5,220' - 5,240'	Sandstone; light grey to white, fine grained, pyritic, some dark brown chert, some dark grey to black, silty, in part calcareous, shale.
5,240' - 5,280'	Sandstone; light grey to light brown grey, fine grained to very fine grained, quartzose, slightly dolomitic, well sorted, tight, sub-angular, occasional pyrite and dark grey siltstone.
5,280' - 5,290'	As above grading to very fine grained.
5,290' - 5,310'	Sandstone; as above, interbedded with grey to dark grey argillaceous siltstone, pyritic, slightly fossiliferous, calcareous in part, some dark grey silty shale. Trace maroon shale. Trace dolomite.
5,310' - 5,340'	As above. 50% dark grey to black splintery shale, calcareous in part, fossils (Crinoids and Brachiopods). Thin beds brown, fine crystalline dolomite, pyrite. Trace maroon and green shale. Some calcite veining. Some carbonaceous material.
5,340' - 5,350'	Sandstone; light brown to grey, fine grained, dolomitic, slightly argillaceous in part, interbedded with brown, fine crystalline, arenaceous dolomite and dark grey to black shale (60%). Silty in part. Trace fossil fragments. Trace pyrite. Trace chert. Trace maroon shale.
5,350' - 5,360'	Dolomite; grey brown, fine crystalline, dense, fossiliferous (Crinoids) arenaceous in part, interbedded with dark grey to black splintery shale as above. 30% sandstone as above.
5,360' - 5,370'	Sandstone; light grey to grey brown, fine grained, silty in part, interbedded with dolomite and shale as above.

(d) Sample Descriptions (Continued)

5,370' - 5,380'	As above, with crinoids, some grey brown calcarenite. 50% dolomite, grey brown, fine to micro-crystalline, silty, arenaceous in part, argillaceous in part, occasional calcite. Trace dark brown chert. Trace maroon shale. Occasional brown siltstone and pyrite. Trace pyrobitumen.
5,380' - 5,390'	Shale; dark grey to black, splintery, calcareous in part, silty in part, fossiliferous (Brachiopods and Crinoids) interbedded with brown, fine to micro-crystalline dolomite and light grey, fine grained sandstone, some pyrite and maroon shale, some carbonaceous material, trace porosity in sandstone. Trace stylolites.
5,390' - 5,400'	Shale; dark grey to black, hackly, calcareous in part, in part silty, crinoids, interbedded with grey brown dolomite and fine grained sandstone as above. Some pyrite, some maroon shale, some grey calcarenite, some argillaceous grey siltstone.
5,400' - 5,410'	Sandstone; light grey to brown, fine grained, quartzitic, some dead oil stain, interbedded with dark grey to black splintery shale, calcareous in part, some crinoids, some brown fine crystalline, silty in part dolomite, scattered pyrite, some carbonaceous shale, some pyrobitumen, Trace maroon shale. Occasional dark brown to grey siltstone.
5,410' - 5,420'	Shale; dark grey to black, splintery, silty and calcareous in part, thin interbeds of light grey to brown, fine grained sandstone, some fossil fragments, pyritic in part, occasional brown dolomite and calcite. Trace green and maroon shale.
5,420' - 5,440'	Shale; as above, hard, splintery, interbedded with grey brown dolomitic siltstone and light grey to light brown fine grained sandstone. Trace chert, some pyrite, Trace maroon shale. Trace fossils. Trace brown silty dolomite.
5,440' - 5,480'	Sandstone; light grey to grey brown, fine grained quartzitic, hard, interbedded with dark grey to black splintery shale, in part calcareous, in part silty, slightly fossiliferous, in part siliceous, some grey brown chert. Some brown, dolomitic argillaceous in part, siltstone. Trace pyrite. Trace pyrobitumen. Trace brown dolomite and maroon shale.
5,480' - 5,500'	Siltstone; medium grey, argillaceous in part, grading to very fine grained sandstone in part. Trace pyrite. Some dark grey to black splintery shale, slightly carbonaceous. Trace maroon shale. Trace grey and brown chert.

(d) Sample Descriptions (Continued)

5,500' - 5,530'	Sandstone; light grey brown, fine grained, well sorted quartzose, sub-angular, rare trace poor pin-point porosity, minor dark grey-black splintery shale.
5,530' - 5,540'	As above, becoming grey, some stylolites, slightly argillaceous in part, Trace pyrite.
5,540' - 5,560'	Sandstone; as above, interbedded with brown grey siltstone and dark grey to black, in part silty, splintery shale. Trace brown fine crystalline dolomite.
5,560' - 5,570'	Shale; dark grey to black, splintery, in part silty, interbedded with grey brown siltstone, in part dark grey, Trace pyrite. Some sandstone as above.
5,570' - 5,580'	Shale; as above, with siltstone and some sandstone as above, calcareous in part, Trace pyrite. Trace maroon shale.
5,580' - 5,600'	Shale; dark grey to black, splintery, hackly, micro-micaceous, silty in part, some brown argillaceous siltstone and light grey fine grained sandstone as above.
5,600' - 5,620'	Shale; dark grey to black, fissile, micro-micaceous, silty in part, pyritic in part, occasional thin lenses of brown siltstone and fine grained light grey sandstone. Trace dolomite.
5,620' - 5,630'	Sandstone; light grey, fine grained, quartzitic in part, in part slightly argillaceous, interbedded with grey brown siltstone and dark grey black splintery shale, silty in part, Trace brachiopods. Trace stylolites. Trace pyrite. Trace maroon shale.
5,630' - 5,640'	Sandstone; white to light grey to light brown, fine grained, well sorted, quartzitic, tight. Trace coal and carbonaceous shale. Some black splintery shale.
5,640' - 5,670'	Sandstone; light grey, fine grained, well sorted, quartzitic, tight. Minor black splintery shale. Trace crinoid, occasional stylolite, trace disseminated pyrite.
5,670' - 5,680'	As above, part grading to very fine grained.
5,680' - 5,690'	As above, interbedded with dark grey siltstone and some black silty shale, stylolitic.

(d) Sample Descriptions (Continued)

5,690' - 5,700' Sandstone; grey to medium dark grey, fine grained, quartzitic in part, silty, carbonaceous, Interbedded carbonaceous siltstone and black shale.

5,700' - 5,710' Siltstone; grey to dark grey, carbonaceous, argillaceous, interbedded with black, carbonaceous in part, silty in part, shale. Some sandstone as above.

5,710' - 5,720' Siltstone and Shale as above, interbedded with light grey, fine grained, slightly carbonaceous quartzitic sandstone.

5,720' - 5,740' Siltstone; medium grey to dark grey, argillaceous, grading to very fine grained sandstone, interbedded with dark grey to black, in part silty, shale and light grey fine grained sandstone, quartzitic, slightly dolomitic. Trace brown silty dolomite.

5,740' - 5,760' Siltstone; medium grey to dark grey, argillaceous, interbedded with dark grey to black silty shale. Trace pyrite. Trace grey, fine grained, argillaceous sandstone.

5,760' - 5,780' Shale; dark grey to black, silty in part, calcareous in part, splintery, interbedded with grey brown siltstone and brown fine grained sandstone. Trace pyrite. Trace crinoid. Sparsely scattered, maroon, green and dark brown shale, stylolitic. Trace brown crypto-crystalline limestone.

5,780' - 5,810' Shale; dark grey to black, fissile to splintery, silty in part, trace carbonaceous material, interbedded with light grey very fine grained sandstone and brown siltstone, occasional disseminated pyrite, trace crinoids.

5,810' - 5,820' Sandstone; light grey to grey, fine grained to very fine grained, quartzose, interbedded with dark grey to black, splintery shale, silty in part. Some grey siltstone.

5,820' - 5,830' Sandstone; light grey to grey brown, quartzose, fine grained, tight, dead oil stain, interbedded with black shale, carbonaceous in part, trace coal. Some grey siltstone. Trace pyrite.

5,830' - 5,840' Sandstone; grey, fine grained to very fine grained, well sorted, quartzitic in part with disseminated pyrite, some brown siltstone, minor black shale.

5,840' - 5,850' Sandstone; as above, stylolitic, pyritic in part, some interbeds of dark grey siltstone and dark grey to black shale. Some maroon shale and trace green grey shale.

(d) Sample Descriptions (Continued)

5,850' - 5,880'	Siltstone; medium grey, argillaceous in part, in part grading to argillaceous, very fine grained sandstone, interbedded with grey fine grained sandstone and dark grey black silty shale, some pyrite, trace crinoids and trace of maroon shale.
5,880' - 5,910'	Shale, dark grey to black to dark brown, silty, carbonaceous, traces of coal, interbedded with light grey to grey brown, fine grained sandstone, quartzose, brown oil stain common, tight, some dark brown siltstone. Trace pyrite. Occasional dark brown dolomite. Trace fossils.
5,910' - 5,920'	Shale; dark grey to black, silty in part, splintery, interbedded with light grey fine grained sandstone and brown grey siltstone, trace dolomite. Trace maroon and green shale. Occasional pyrite. Trace crinoids.
5,920' - 5,930'	Sandstone; light grey, fine grained, well sorted, tight, silty in part, quartzose, interbedded with brown siltstone and dark grey black, in part brown, part silty shale. Trace brown dolomite. Trace fossils.
5,930' - 5,940'	Siltstone; grey brown, slightly dolomitic. Trace brown dolomite. Interbeds of very fine grained, light grey brown, part silty sandstone and dark grey silty shale, trace maroon and grey green waxy shale. Some disseminated pyrite.
5,940' - 5,950'	Sandstone; light grey to grey, fine grained to very fine grained, quartzitic, carbonaceous in part, pyritic, trace coal, interbedded with dark grey carbonaceous siltstone and dark grey black splintery shale. Trace maroon shale. Trace chert.
5,950' - 5,960'	Sandstone; light grey to grey, very fine grained, silty in part, pyritic, slightly argillaceous, slightly carbonaceous in part, interbedded with grey brown siltstone and dark grey, in part silty, shale. Trace maroon shale.
5,960' - 5,980'	Sandstone; light grey to grey to grey brown, fine grained, quartzitic, carbonaceous, silty in part, interbedded with brown carbonaceous siltstone and dark grey to black, maroon and grey green shale. Trace coal, Trace pyrite.
5,980' - 5,990'	Siltstone;grey brown, grading to very fine grained sandstone, argillaceous in part, interbedded with grey to grey brown, fine grained quartzitic sandstone and dark grey to black, splintery shale. Some interbeds of maroon shale and green shale.

(d) Sample Descriptions (Continued)

5,990'	- 6,030'	Siltstone; grey brown to dark grey, argillaceous, sparsely pyritic, interbedded with dark grey to black part silty shale, slightly calcareous in part. Traces of green and maroon shale. Occasional thin interbeds of fine grained sandstone.
6,030'	- 6,050'	Shale; dark grey to black, splintery, in part silty, some dark brown and maroon shale. Interbedded with brown siltstone and some light grey fine grained quartzitic sandstone.
6,050'	- 6,080'	Shale; medium to dark grey, in part silty, minor stringers of siltstone, trace black shale.
6,080'	- 6,110'	Shale; as above, grading to siltstone, medium to dark grey brown, shaly, slightly dolomitic, trace black shale, pyrite, sandstone stringers.
6,110'	- 6,180'	Shale; medium to dark grey to black, part silty, part slightly dolomitic, micro-micaceous, fairly soft, minor siltstone and sandstone, trace pyrite.
6,180'	- 6,270'	Shale; as above, becoming less silty, trace siltstone and sandstone stringers as above.
6,270'	- 6,300'	Shale; as above, trace siltstone, as above, trace pyrite, trace calcite veins.
6,300'	- 6,320'	Shale; as above, trace sandstone stringers.
6,320'	- 6,340'	Shale; as above, with minor sandstone stringers, trace siltstone, pyrite, chert.
6,340'	- 6,350'	Shale; as above with trace calcite filled fractures.
6,350'	- 6,360'	As above.
6,360'	- 6,390'	Shale; medium dark grey to black, very slightly dolomitic in part, partly silty, micro-micaceous, fairly soft, splintery, trace siltstone stringers, trace pyrite.
6,390'	- 6,400'	As above.
6,400'	- 6,420'	Shale; as above, minor sandstone stringers, trace pyrite, fossils.
6,420'	- 6,430'	As above, trace light grey chert.
6,430'	- 6,450'	Shale; as above, sandstone, grading to chert and quartzite, in part dolomitic, very hard, tight, trace of pyrite.

(d) Sample Descriptions (Continued)

6,450' - 6,460'	Quartzite; white to light grey brown, grading to sandstone and chert, part dolomitic, very hard, tight, shale as above with trace of calcite veins.
6,460' - 6,470'	Sandstone; white to light grey brown, very fine grained, tight, grading to quartzite, trace shale.
6,470' - 6,490'	Shale; medium grey to black, micro-micaceous, silty in part, slightly dolomitic in part, fairly soft, minor sandstone as above.
6,490' - 6,510'	Shale; as above, trace dark grey shaly siltstone, trace pyrite.
6,510' - 6,560'	Shale; as above, a few siltstone stringers, trace pyrite.
6,560' - 6,580'	Shale; as above, trace siltstone as above, trace sandstone stringers, dark grey to brown, silty, limy, trace of pyrite.
6,580' - 6,590'	As above.
6,590' - 6,640'	Limestone; light grey to medium grey brown, micro-crystalline, very argillaceous, silty, slightly cherty, tight, interbedded with shale, dark grey to black, slightly silty, micro-micaceous, splintery, trace pyrite.
6,640' - 6,660'	As above with Limestone grading to calcareous siltstone.
6,660' - 6,690'	Shale; dark grey to black, in part silty, part micro-micaceous, slightly dolomitic, fairly soft. Trace limestone and calcareous siltstone as above. Trace pyrite.
6,690' - 6,710'	As above.
6,710' - 6,730'	Shale; as above, with limestone, grading to calcareous siltstone as above and in part calcareous shale.
6,730' - 6,750'	Limestone, medium to dark grey, micro-crystalline, very argillaceous, grading to calcareous shale, interbedded with shale as above.
6,750' - 6,760'	As above, limestone, becoming dolomitic and cherty.
6,760' - 6,800'	Shale; medium grey to black, part micro-micaceous, part silty, slightly dolomitic, minor stringers of dolomite, dark grey brown, very argillaceous and cherty, trace pyrite and fossils.
6,800' - 6,810'	Shale; as above, with minor stringers siltstone, medium grey brown, dolomitic, quartzitic, hard.

(d) Sample Descriptions (Continued)

6,810' - 6,840'	Siltstone; as above, interbedded with shale as above, Siltstone, grading to silty dolomite and limestone, minor amounts of quartzite, trace shale, medium grey, siliceous, trace sandstone stringers, pyrite and fossils.
6,840' - 6,950'	Shale; as above, a few stringers siltstone as above, occasional limestone stringers, trace calcite veining, trace pyrite, trace sandstone stringers.
6,950' - 6,960'	Siltstone; medium grey, dolomitic, argillaceous, interbedded with shale as above.
6,960' - 6,970'	Limestone; medium to dark grey, micro-crystalline, silty, argillaceous, minor shale as above, trace pyrite and fossils.
6,970' - 6,990'	Limestone; as above, grading to limy siltstone, very shaly, minor shale stringers as above.
6,990' - 7,020'	Shale; medium grey to black, part silty, micro-micaceous, slightly dolomitic, interbedded with limy siltstone as above and silty dolomitic shale.
7,020' - 7,070'	Shale; as above, minor siltstone stringers, trace pyrite, rare trace sandstone.
7,070' - 7,080'	Shale; as above, minor siltstone, medium grey brown argillaceous, limy, grading to limestone.
7,080' - 7,100'	Limestone; grading to limy siltstone as above, minor shale interbeds, trace calcite veins, pyrite.
7,100' - 7,120'	Shale; as above interbedded with limestone and siltstone as above.
7,120' - 7,150'	Shale; as above with occasional limestone and siltstone stringers, trace calcite veins, pyrite.
7,150' - 7,160'	Siltstone; limy, grading to limestone, minor shale as above.
7,160' - 7,170'	Shale as above, minor siltstone as above.
7,170' - 7,180'	Siltstone; light to medium dark grey, very calcareous, in part dolomitic, argillaceous, trace limestone, chert, shale, dark grey brown, slightly dolomitic, hard with pyrite.
7,180' - 7,190'	As above; Shale, black to medium brown grey, calcareous, slightly dolomitic, trace limestone.
7,190' - 7,200'	Limestone; very argillaceous, grading to very limy shale, mottled dark grey to brown, crypto-crystalline to fine grained, tight, brittle, shale, grey black with occasional trace fine pyrite, trace siltstone, black, slightly to moderately calcareous.

(d) Sample Descriptions (Continued)

7,200' - 7,210'	Limestone; very shaly as above, trace dolomite, mottled brown to light grey, fine to slightly medium grained, siltstone, white, fine grained, well sorted.
7,210' - 7,220'	Shale; silty, very limy, as 7,190' - 7,200', as above, trace sandstone, siltstone.
7,220' - 7,230'	Limestone; silty as above, some dolomite as above, Shale, dark grey to black, moderately soft. Trace sandstone, white as above.
7,230' - 7,240'	Limestone; shaly as above - 80%. Shale, as above grading to siltstone.
7,240' - 7,250'	Limestone; as above, part very chalky, less shaly, white to buff with some calcite filled fractures - 80 to 90%, some dark shale and siltstone as above.
7,250' - 7,260'	Shale; slightly silty to siltstone, shaly, dark grey to black, soft brittle, blocky, 70% limestone, shaly, mottled black and white, fine crystalline, tight, trace sandstone, light tan grey to white, very fine grained, calcareous, poor porosity.
7,260' - 7,270'	Shale; as above with occasional pyrite - 50%, Limestone, as above, becoming more chalky, more silty to sandy with occasional trace of pyrite.
7,270' - 7,280'	Limestone; mottled grey to black as above and limestone, very silty to sandy, hard sandstone, white, very fine grained, quartzose, sub rounded, calcite cement, tight.
7,280' - 7,290'	Limestone; grey as above, limestone, silty to sandy as above, - 50%, shale as above, trace sandstone as above.
7,290' - 7,300'	Limestone; brown grey to black, slightly dolomitic in part, silty and sandy becoming calcareous siltstone - 35%, shale as above, trace sandstone.
7,300' - 7,310'	Limestone; as above, becoming more sandy, Shale as above, trace sandstone, white, as above, becoming less calcareous and brown, possible fluorescence and very slightly cut.
7,310' - 7,320'	Shale; silty to siltstone, very shaly, dark grey to black, calcareous, soft and flaky, moderately brittle, 80%, limestone as above, some sandstone as above, but no fluorescence.
7,320' - 7,330'	Shale to siltstone as above but more calcareous, some calcite filled fractures.

(d) Sample Descriptions (Continued)

7,330' - 7,340'	Shale; Siltstone, very calcareous as above, Limestone, dark grey to black, very argillaceous, crypto-crystalline to fine grained, brittle 20%, Limestone, light cream grey, micro-crystalline and very argillaceous, 10%. Dense.
7,340' - 7,350'	Shale to Siltstone as above. Limestone, mottled brown grey to black, thinly laminated, brittle, micro-crystalline, argillaceous - 10%, Limestone, light cream grey as above - 5%.
7,350' - 7,360'	Shale to silty shale, very silty, hard, limestone, mottled grey and chalky as above. Trace limestone, light cream as above.
7,360' - 7,370'	Shale; non silty to very silty, soft to moderately hard, calcareous to dolomitic in part, fossiliferous, 1/8" coiled.gastropod.
7,370' - 7,380'	Siltstone; grey black, moderately calcareous and hard, interlaminated with shale, dark grey, soft, slightly calcareous and with some limestone, light cream grey, slightly chalky, micro-crystalline, dense.
7,380' - 7,390'	Interlaminated Siltstone and Shale as above, occasional limestone as above, trace calcite fracture fill.
7,390' - 7,400'	Shale and Siltstone as above, some limestone, light cream as above, trace sandstone and calcite fracture fill.
7,400' - 7,410'	Limestone; light to medium grey, very argillaceous.
7,410' - 7,420'	As above; 40% silty shale, trace sandstone, limestone as above, shale and siltstone, black to medium grey.
7,420' - 7,430'	Shale, Siltstone, Limestone as above - 15%.
7,430' - 7,440'	Shale, Siltstone, becoming more silty, Trace Limestone.
7,440' - 7,450'	Shale; Siltstone; as above.
7,450' - 7,460'	Shale; Siltstone; as above.
7,460' - 7,470'	Siltstone to Silty Shale; medium grey to black, very calcareous, occasional dolomite, trace of anhydrite, light tan grey, very fine crystalline.
7,470' - 7,480'	Silty Shale and Anhydrite as above.
7,480' - 7,490'	Shale to Siltstone; medium grey to black, slightly to moderately calcareous, limestone, medium to dark grey, micro-crystalline, slightly to moderately calcareous, trace anhydrite, trace sand, white, finely crystalline.

(d) Sample Descriptions (Continued)

7,490' - 7,500'	As above, slightly more anhydrite.
7,500' - 7,520'	As above, very slight trace of anhydrite, trace light grey sandstone.
7,520' - 7,530'	As above, no anhydrite.
7,530' - 7,540'	As above, trace limestone, light cream grey, more chalky.
7,540' - 7,550'	As above, shale, maroon, Limestone and some pyrite.
7,550' - 7,560'	Shale; trace Siltstone as above, Trace anhydrite.
7,560' - 7,570'	As above, no anhydrite, trace calcite filled fractures.
7,570' - 7,580'	As above, more silty, trace white quartz sandstone as above.
7,580' - 7,590'	Shale; moderately silty, dark grey, grading to soft, calcite filled fractures with well developed crystals, some anhydrite filled fractures.
7,590' - 7,600'	As above.
7,600' - 7,610'	As above, trace dolomite, light tan, finely crystalline, poor to fair porosity - 5%.
7,610' - 7,620'	As above, trace dolomite, medium grey, crypto-crystalline to micro-crystalline, very hard, dense.
7,620' - 7,630'	Shale; grey to Siltstone as above, trace dolomite as above.
7,630' - 7,640'	As above.
7,640' - 7,650'	Shale; moderately silty to siltstone, slightly shaly, grey black, slightly calcareous to very calcareous, argillaceous - 15-20% as above.
7,650' - 7,660'	Shale to Siltstone as above, calcite filled fractures with well developed crystals, trace coal, moderately hard, brittle.
7,660' - 7,670'	Shale to Siltstone as above, occasionally very pyritic.
7,670' - 7,680'	Shale, as above, trace Sandstone, white, very calcareous, very fine grained quartzose, to medium grey, moderately calcareous, poorly sorted, shaly, moderately soft.
7,680' - 7,690'	Shale to Siltstone, dark grey as above, trace sandstone as above.

(d) Sample Descriptions (Continued)

7,690' - 7,700'	Shale to Siltstone, dark grey to black, moderately calcareous to very calcareous, trace sandstone as before, trace calcite filled fractures and pyrite.
7,700' - 7,710'	Shale and Siltstone as above, slightly more calcareous.
7,710' - 7,720'	Shale and Siltstone as above.
7,720' - 7,730'	Shale and Siltstone as above, good trace sandstone as above.
7,730' - 7,740'	Shale to Siltstone as above, more Limestone, calcite with pyrite, crystalline as above - 5%.
7,740' - 7,750'	Shale to Siltstone as above, Limestone as above - 10% shaly.
7,750' - 7,770'	Shale; dark grey to black, occasionally maroon, interbedded with grey argillaceous siltstone, some brown argillaceous limestone, trace very fine grained sandstone.
7,770' - 7,800'	Shale; dark grey to black, splintery, calcareous in part, minor very fine grained, light grey sandstone, dark grey argillaceous siltstone, red maroon shale, some rare calcite lined fractures.
7,800' - 7,810'	As above, trace grey dark brown argillaceous limestone.
7,810' - 7,820'	Shale; dark grey, slightly silty and calcareous, minor very fine grained sandstone, trace brown limestone, occasional calcite linings.
7,820' - 7,870'	Shale; dark grey, splintery, slightly silty, calcareous in part with minor grey to light grey very fine grained quartzose, sandstone, trace calcite fracture lining, minor pyrite, trace dark grey argillaceous limestone, trace maroon shale.
7,870' - 7,880'	Shale; as above, in part carbonaceous, some coal, minor grey brown, very fine grained sandstone, bituminous in part, occasional calcite lined fractures, some fossil spores, trace siliceous dark brown shale with minute chert nodules, rare vugs.
7,880' - 7,890'	Shale; dark grey to black, silty in part, carbonaceous in part, slightly calcareous, trace interbedded brown siltstone with minor fine grained sandstone, trace pyrite, trace calcite.
7,890' - 7,900'	Shale; dark grey, silty in part, calcareous, splintery, with lenses of white to light grey, fine grained to very fine grained, well sorted quartzose sandstone, some brown siltstone.

(d) Sample Descriptions (Continued)

7,900' - 7,910'	As above, some calcite crystals and calcite filled fractures, trace green and maroon shale.
7,910' - 7,920'	Shale; dark grey to black, splintery, with interbedded sandstone lenses and brown crystalline limestone, calcite lined fractures, some siltstone.
7,920' - 7,930'	Shale; dark grey to black, splintery, silty in part, calcareous in part, interbedded with brown argillaceous siltstone and light grey fine grained sandstone, trace brown crystalline, limestone, some calcite veins. Trace stylolites.
7,930' - 7,940'	Shale as above, carbonaceous in part, calcareous in part, some very fine grained sandstone, some brown siltstone, some pyrite.
7,940' - 7,950'	Shale; dark grey to black, calcareous in part, in part silty, occasional calcite veining.
7,950' - 8,000'	Shale; as above, some lenses fine grained sandstone and siltstone, as above, occasional calcite veins, trace limestone.
8,000' - 8,010'	Shale as above, slightly carbonaceous, trace coal, fine stringers of fine grained, light grey sandstone, trace limestone, occasional siltstone, some calcite veining.
8,010' - 8,020'	Shale; dark grey to black, splintery, calcareous in part, slightly silty in part, occasional stringers of light grey sandstone and siltstone, some calcite veining.
8,020' - 8,030'	As above, with large calcite crystals.
8,030' - 8,040'	Shale; dark grey to black, splintery, calcareous, silty in part, occasional grey siltstone, fine grained light grey sandstone, some calcite veining.
8,040' - 8,060'	Shale; dark grey to black, medium hard, silty in part, interbedded with hard siltstone, some very fine grained sandstone, some disseminated pyrite and calcite veining.
8,060' - 8,070'	Shale; as above, interbedded with light grey calcareous, fine grained sandstone and medium grey fine crystalline silty limestone. Limestone - 40%.
8,070' - 8,080'	No sample.
8,080' - 8,090'	Shale; as above, some calcareous siltstone, 15 - 20% silty limestone.
8,090' - 8,113'	No Samples - Air Drilling.

(d) Sample Descriptions (Continued)

8,113' - 8,140'	Limestone; medium to dark grey, micro-crystalline, slightly silty, grading to dark grey, limy shale, Minor shale, dark grey to black, slightly silty, slightly calcareous, trace calcite, trace pyrite.
8,140' - 8,170'	Limestone; medium grey brown to dark grey, micro-crystalline, slightly silty, siliceous with chert, dark grey brown to black, slightly calcareous, minor shale, dark grey to black, in part cherty and hard. Trace calcite veins.
8,170' - 8,250'	Limestone; light to medium grey brown, micro-crystalline, siliceous, silty and in part grading to limy siltstone, minor beds of dark brown to black chert, trace black bituminous shale and black cherty shale stringers, some calcite veins and fracture fill.
8,250' - 8,270'	Shale; dark grey, limy, silty, fairly hard. Minor limestone and siltstone as above, trace grey brown chert, trace calcite.
8,270' - 8,280'	Limestone, dark grey, micro-crystalline, dolomitic, shaly, silty, grading to limy siltstone, trace pyrite, calcite, trace chert.
8,280' - 8,290'	Shale; dark grey, dolomitic, fairly hard.
8,290' - 8,300'	Limestone; light to medium grey brown, very silty, fossiliferous, interbedded with shale as above.
8,300' - 8,350'	Shale; medium to dark grey, slightly silty, limy in part, grading to shaly limestone, interbedded with limestone, light to medium brown grey, very silty and siliceous, trace black cherty shale, trace calcite veins, trace pyrite.
8,350' - 8,380'	Limestone; dark grey, micro-crystalline, silty, argillaceous in part, grading to silty, very calcareous shale, minor dark grey to black, slightly calcareous shale, trace calcite veins, fracture fill, trace pyrite.
8,380' - 8,390'	Shale; as above, grading to shaly limestone as above, trace pyrite.
8,390' - 8,450'	Shale; medium to dark grey, slightly silty, very calcareous and in part grading to shaly limestone, trace pyrite, minor amounts dark grey brown chert, trace calcite veins.
8,450' - 8,500'	Shale; medium to dark grey, slightly silty, slightly calcareous to very calcareous, in part shaly limestone, trace chert, trace pyrite.

(d) Sample Descriptions (Continued)

8,500' - 8,560'	Limestone; light to medium grey brown, in part cherty, shaly, silty and in part grading to limy siltstone, hard, interbedded with dark grey brown to black chert, minor beds of black cherty shale, some calcite veins.
8,560' - 8,580'	Shale; medium to dark grey, slightly silty, calcareous to very calcareous, Part shale, dark grey to black and only slightly calcareous, trace chert and limestone as above, trace calcite and clear quartz.
8,580' - 8,720'	Shale; medium to dark grey, slightly silty, calcareous, part slightly dolomitic, minor stringers limestone, medium to dark grey brown, micro-crystalline, slightly silty, very argillaceous in part, slightly siliceous, trace calcite veins and fracture fill, trace pyrite, trace dark grey brown chert.
8,720' - 8,820'	Shale; medium to dark grey, occasionally black, in part micro-micaceous, slightly silty, slightly calcareous to very calcareous, splintery in part, fairly soft, trace calcite veins, trace pyrite, trace crinoids and trace of dark grey brown chert.
8,820' - 8,880'	Limestone; medium to dark grey brown, part light grey brown, very silty, micro-crystalline, shaly to very shaly, silty, grades in part to a limy shale, trace pyrite, minor shale as above, trace pyrite, trace dark grey brown chert, trace calcite.
8,880' - 8,930'	Limestone; dark grey brown to dark grey, micro-crystalline, slightly dolomitic, silty to very silty, slightly siliceous, in part shaly and grading to a limy shale. Fossiliferous, minor interbeds of dark grey to black limy shale, trace chert, trace pyrite, trace calcite.
8,930' - 8,990'	Shale; medium to dark grey, slightly silty to very silty, in part slightly siliceous, calcareous, grading in part to shaly limestone as above, minor interbeds of dark grey to black, slightly calcareous shale, trace fossils, pyrite, calcite.
8,990' - 9,040'	Shale as above, minor dark grey brown limestone stringers, trace black chert, trace calcite and quartz veining and fracture fill. Trace pyrite.
9,040' - 9,070'	Shale; medium to dark grey, part black, in part silty, calcareous to very calcareous, trace black cherty shale, trace limestone stringers, trace dark grey to black non-calcareous shale.
9,070' - 9,130'	Shale; medium to dark grey, in part black, non-calcareous to slightly calcareous, few limy streaks, in part silty, micro-micaceous, some bituminous streaks, trace black chert, trace pyrite, trace calcite veins.

(d) Sample Descriptions (Continued)

9,130' - 9,200'	Shale; medium to dark grey, in part black, micro-micaceous, very soft, part sub-bituminous, non-calcareous with occasional limy streaks, in part pyritic, trace calcite veins, trace limestone stringers.
9,200' - 9,280'	Shale as above, trace calcite veins and crystals, trace quartz crystals, trace pyrite.
9,280' - 9,370'	Shale as above, trace calcite and quartz veins and fracture fill, trace pyrite, trace limestone stringers, rare trace black cherty shale.
9,370' - 9,380'	As above, minor shale, medium grey brown, resinous, siliceous, dolomitic and silty.
9,380' - 9,400'	Shale as above, stringers of grey brown, argillaceous limestone, trace quartz crystals, trace chert, minor pyrite, trace crinoids, trace siltstone, trace calcite.
9,400' - 9,420'	Shale; grey brown to grey black, siliceous, in part carbonaceous, trace quartz, trace brown chert, very fine grained sandstone and siltstone.
9,420' - 9,440'	Shale; medium grey to dark grey, siliceous, fairly soft, trace carbonaceous material, minor pyrite, trace limestone, slightly silty in part, trace calcite, some chert.
9,440' - 9,460'	Shale; medium grey to dark grey to black, siliceous, in part splintery, rare trace very fine grained sandstone and siltstone, trace carbonaceous material, trace calcite veins, minor pyrite, trace argillaceous limestone.
9,460' - 9,480'	Shale; medium grey to dark grey to black, trace calcite, trace limestone, minor pyrite, some very fine grained sandstone and siltstone, trace brown chert.
9,480' - 9,510'	Shale; dark grey to black, bituminous to carbonaceous in part, some fine, faint lines of coal, some thin lines of brown grey, fine grained sandstone, trace dolomite, some pyrite, occasional ironstone nodules, trace siltstone, some calcite veins.
9,510' - 9,540'	Shale as above, some thin lines of very fine grained sandstone and siltstone, some dolomite stringers, some dark brown to black chert, siliceous shale, occasional ironstone nodules, minor limestone, trace quartz.

(d) Sample Descriptions (Continued)

9,540' - 9,580'	Shale; medium to dark grey to black, splintery, slightly calcareous, minor amount of very fine grained sandstone with thin stringers of limestone, trace siltstone, calcite and pyrite, trace dark brown chert, trace quartz.
9,580' - 9,610'	Shale; medium grey to dark grey to black, splintery, calcareous in part, slightly silty in part, minor siltstone, trace of limestone, some calcite.
9,610' - 9,620'	Shale; dark grey to black, carbonaceous in part, bituminous, minor amount of very fine grained sandstone, siltstone, small stringers of silty argillaceous limestone, trace of crinoids, some calcite, trace chert.
9,620' - 9,660'	Shale; medium grey to dark grey to black, splintery, dolomitic in part, soft, occasional very thin dolomite beds, slightly silty in part, minor pyrite.
9,660' - 9,680'	As above, some calcite veining and trace of quartz.
9,680' - 9,700'	Shale as above, trace black bituminous shale and trace siltstone.
9,700' - 9,720'	Shale; medium grey to dark grey to black, fissile to blocky, trace calcite, trace silty limestone.
9,720' - 9,730'	Shale as above with carbonaceous and bituminous dark grey to brown shale, abundant coal fragments, trace brown very fine grained sandstone, trace quartz.
9,730' - 9,740'	Shale; dark grey to black, blocky, silty, in part calcareous, in part stringers of silty brown limestone, trace very fine grained sandstone and siltstone, trace dark brown chert, trace ironstone, trace rounded quartz.
9,740' - 9,760'	Shale as above, slightly bituminous in part, silty and calcareous, trace sandstone and siltstone, some dark brown chert, some brown bituminous staining, trace ironstone and some coal fragments.
9,760' - 9,770'	Shale; medium grey to dark grey to black, blocky, fissile, in part traces of limestone and very fine grained sandstone, trace black chert, interbedded with soft brown calcareous clay.
9,770' - 9,800'	Shale as above, slightly silty in part, in part calcareous, occasional stringers grey brown limestone, trace calcite and light grey, very fine grained sandstone and siltstone.
9,800' - 9,820'	Shale as above, some calcite, trace of quartz.

(d) Sample Descriptions (Continued)

9,820' - 9,840'	Shale as above, also bituminous and carbonaceous, in part abundant coal fragments, some stringers argillaceous limestone, trace ironstone, trace very fine grained sandstone, rare trace dark brown chert, trace quartz.
9,840' - 9,860'	Shale; medium grey to dark grey to black, fissile to blocky, soft, some thin stringers silty dolomite, some coal fragments, trace very fine grained sandstone, trace quartz, minor pyrite.
9,860' - 9,890'	Shale; dark grey to black, fissile to splintery, slightly dolomitic in part, trace calcite, trace brown dolomite.
9,890' - 9,900'	As above, rare trace dark brown chert.
9,900' - 9,920'	Shale; dark grey to black, fissile, soft, in part slightly calcareous, in part slightly bituminous, trace pyrite, trace calcite veins, some resinous medium grey shale, rare trace argillaceous dolomite.
9,920' - 9,940'	Shale; dark grey to black, fissile, soft in part, slightly calcareous in part, slightly bituminous, some grey shale and trace dolomite.
9,940' - 9,980'	Shale as above, dark grey to black, part bituminous, part carbonaceous with thin veins of coal seams, trace quartz, trace very fine grained sandstone.
9,980' - 10,010'	Shale; dark grey to black, fissile, splintery, in part slightly bituminous, in part calcareous, minor pyrite, trace rounded quartz, trace calcite veins.
10,010' - 10,020'	Shale, as above, some thin stringers light grey, very fine grained sandstone, some white dolomite crystals, some quartz, trace bituminous shale.
10,020' - 10,030'	Shale as above, some light grey chert and quartz, some calcite.
10,030' - 10,040'	Shale; dark grey to black, fissile, soft, in part splintery, slightly dolomitic in part.
10,040' - 10,070'	As above, some bituminous shale, trace siltstone.
10,070' - 10,180'	Shale; dark grey to black, fissile to blocky, calcareous in part, slightly bituminous in part.
10,180' - 10,230'	Shale; dark grey to black, fissile, slightly calcareous in part, resinous lustre in part, bituminous in part, trace calcite, rare trace chert, silty limestone.

(d) Sample Descriptions (Continued)

10,230' - 10,300'	Shale; medium grey to dark grey to black, blocky to fissile, in part calcareous, trace very fine grained sandstone, trace calcite veins.
10,300' - 10,370'	Shale; dark grey to black, fissile to blocky, in part bituminous, calcareous in part, in part resinous lustre, trace calcite, trace siltstone, minor pyrite.
10,370' - 10,410'	Shale; medium grey to dark grey to black, fissile, slightly calcareous in part, trace calcite, trace argillaceous limestone, minor pyrite.
10,410' - 10,420'	Shale; dark grey to black, fissile to blocky, in part calcareous, minor pyrite.
10,420' - 10,430'	Shale; as above, trace anhydrite, trace bituminous shale.
10,430' - 10,470'	Shale as above, trace argillaceous limestone stringers.
10,470' - 10,500'	Shale; medium grey to dark grey to black, fissile, calcareous in part, trace limestone, trace anhydrite and calcite.
10,500' - 10,530'	Shale; dark grey to black, in part calcareous, trace calcite.
10,530' - 10,570'	Shale; dark grey to black, blocky to fissile, calcareous in part, resinous lustre in part, trace calcite, trace pyrite, trace anhydrite veins.
10,570' - 10,620'	Shale; dark grey to black, fissile to splintery, slightly calcareous in part, pyritic in part, trace anhydrite, trace black sub-bituminous shale, trace brown dolomite, some disseminated pyrite.
10,620' - 10,630'	Shale; dark grey to black, splintery, medium hard to soft, slightly dolomitic in part, trace calcite, pyritic in part.
10,630' - 10,640'	Shale; as above, silty in part, in part siliceous, in part sub-bituminous.
10,640' - 10,650'	Shale; dark grey to black, hackly, slightly dolomitic in part, siliceous in part, bituminous in part, pyritic, trace anhydrite, some calcite veins, trace grey chert, some hard quartzitic siltstone, trace dolomite.
10,650' - 10,690'	Shale; dark grey to black, soft to medium hard, slightly dolomitic, in part siliceous, part sub-bituminous, abundant disseminated pyrite, some brown streaks.

(d) Sample Descriptions (Continued)

10,690' - 10,700'	Shale; dark grey to black, blocky, non-calcareous, in part bituminous, some brown streaks, trace pyrite, trace calcite.
10,700' - 10,810'	Shale; black to dark grey, hard in part, slightly dolomitic in part, siliceous in part, pyritic, bituminous in part, some calcite veins, trace quartzitic siltstone.
10,810' - 10,840'	Shale as above.
10,840' - 10,900'	Shale; black, hard, siliceous.
10,900' - 10,980'	Shale; black, hard, siliceous, hackly, trace dark grey soft shale, some pyrite, trace bituminous shale, trace calcite, trace quartz, trace quartzitic siltstone.
10,980' - 10,990'	Shale; dark grey, medium hard, trace bituminous shale, trace siliceous shale as above.
10,990' - 11,020'	Shale; black, hard, blocky, siliceous in part, bituminous in part, some pyrite, some calcite, some white dolomite crystals, trace dark grey medium hard shale with bituminous streak.
11,020' - 11,030'	Shale as above with some medium grey to dark grey medium hard shale, trace clear quartz, rare trace brown chert, slightly dolomitic in part, minor calcite veining.
11,030' - 11,040'	As above, part silty, pyritic in part, brown streaks in part.
11,040' - 11,050'	Shale; dark grey to black, medium hard to hard, blocky, part bituminous, part siliceous, slightly dolomitic in part, some hard dolomitic siltstone, pyritic, trace quartz, some granular silty dolomite, trace calcite, very fine grained sandstone.
11,050' - 11,060'	Shale; medium grey to dark grey to black, in part hard siliceous, in part bituminous, in part soft to medium hard, some pyrite, occasional quartz veins, trace calcite.
11,060' - 11,080'	Shale as above, trace white dolomite.
11,080' - 11,090'	As above, somewhat more grey to dark grey, medium hard shale.
11,090' - 11,100'	Shale; medium grey to dark grey, fissile to splintery, some disseminated pyrite, medium hard, trace siliceous shale as above.

(d) Sample Descriptions (Continued)

11,100' - 11,110'	Shale; medium grey to dark grey to black, medium hard to hard, part siliceous, some pyrite, trace quartz.
11,110' - 11,150'	Shale; medium grey to dark grey to black, medium hard to hard, trace argillaceous dolomite.
11,150' - 11,210'	Shale; medium grey to dark grey to black, soft to medium hard, trace sub-bituminous shale.
11,210' - 11,280'	Shale; dark grey to black, medium soft.
11,280' - 11,340'	Shale; dark grey to black, medium soft to hard.
11,340' - 11,365'	Shale; dark grey to black, medium hard to hard, part siliceous, part bituminous.
11,365' - 11,395'	Shale; black, hard, siliceous, bituminous, some dark grey, medium hard.
11,395' - 11,400'	Shale, dark grey to black, part siliceous, part bituminous, medium hard to hard.
11,400' - 11,420'	As above with dark grey brown shale, part argillaceous, dolomite stringers, some medium grey shale.
11,420' - 11,430'	Shale; medium grey to dark grey to black, medium hard to hard, in part black siliceous shale.
11,430' - 11,450'	Shale; dark grey to black, medium hard.
11,450' - 11,460'	Shale; medium grey to dark grey to black, blocky to fissile, soft to medium hard, minor pyrite, trace dolomite.
11,460' - 11,470'	Shale; dark grey to black, blocky, siliceous in part, medium hard to hard, some medium grey soft resinous shale, minor pyrite.
11,470' - 11,480'	Shale; dark grey to black, blocky, siliceous in part, medium hard to hard, micro-micaceous, some bituminous, some brown streaks, trace medium grey soft shale.
11,480' - 11,490'	Shale; medium grey to dark grey, medium hard to hard, 60% interbedded with shale, dark grey to black, pyritic, siliceous, 40%, trace chert.
11,490' - 11,500'	Shale as above - 40% and 20% respectively. Shale; dark grey, calcareous, hard, grading to silty dolomite, trace chert and pyrite.

(d) Sample Descriptions (Continued)

11,500' - 11,510'	Shale; medium grey to dark grey, medium hard to hard, slightly micro-micaceous - 50%. Shale; dark grey to black, pyritic, siliceous - 10%. Silty Dolomite; medium grey, medium hard, dense, crypto-crystalline- 40% with calcite fracture fillings.
11,510' - 11,520'	Shale; medium grey to dark grey, medium hard, slightly pyritic - 40%. Shale; dark grey to black, pyritic, siliceous - 5%. Silty Dolomite as above; grading to dolomitic shale, medium grey - 50%.
11,520' - 11,530'	Shale; medium grey to dark grey as above - 40%. Silty Dolomite to dolomitic siltstone, as above, pyritic - 40%, grading to Dolomitic Shale - 20%
11,530' - 11,538'	Shale; medium grey to dark grey as above - 40% Silty Dolomite as above - 60%
11,538'	Bottom hole circulating sample.
11,538' - 11,570'	Siltstone; medium to dark grey, hard, very dolomitic, in part grading to silty dolomite, argillaceous, in part slightly siliceous, trace pyrobitumen, in part pyritic, interbedded with shale, medium to dark grey, micro-micaceous, part silty, part dolomitic, fairly soft, occasional beds of shale, black, bituminous, siliceous, fairly hard, trace quartz, calcite veins, fracture fill, trace dark brown to black chert.
11,570' - 11,580'	Shale and dolomitic siltstone as above, minor amounts hard black siliceous shale. Trace pyrite, trace calcite veins.
11,580' - 11,600'	Shale; dark grey to black, micro-micaceous, moderately hard, in part siliceous, hard, minor dolomitic siltstone, trace pyrite.
11,600' - 11,610'	Shale; medium to dark grey, in part dolomitic, fairly soft, minor dark grey to black bituminous slightly siliceous shale, trace siltstone as above, trace calcite veins.
11,610' - 11,630'	Shale as above; trace siltstone as above, trace pyrite bands.
11,630' - 11,660'	Shale; medium to dark grey, part slightly dolomitic, micro-micaceous in part, trace black siliceous shale, rare stringers dolomite, medium grey, micro-crystalline, silty, argillaceous, trace pyrite, trace quartz, dolomite and calcite veins.
11,660' - 11,690'	Shale as above; minor interbeds of siltstone, medium to dark grey, argillaceous, very dolomitic, fairly hard. Trace of dolomite stringers, trace pyrite, clear quartz and dolomite veins.

(d) Sample Descriptions (Continued)

11,690' - 11,720'	Shale as above. Trace Siltstone stringers as above, Trace sandstone, light grey brown, fine grained, calcareous, trace pyrite, trace calcite.
11,720' - 11,740'	Shale; as above, trace siltstone, trace pyrite.
11,740' - 11,760'	Shale; medium to dark grey, part micro-micaceous, part dolomitic, soft to moderately hard, minor dark grey to black shale, part bituminous, part siliceous and hard, trace pyrite, trace silty limestone stringers, trace quartz veins, trace dolomitic siltstone.
11,760' - 11,790'	Shale; as above with less dark grey to black shale, trace pyrite, trace calcite veins.
11,790' - 11,830'	Shale, medium to dark grey, part dolomitic, slightly micro-micaceous, fairly soft, part shale, dark grey to black, in part bituminous, part pyritic, slightly siliceous, minor stringers dolomitic siltstone.
11,830' - 11,850'	Shale; medium to dark grey, in part black, slightly dolomitic, part black bituminous, some streaks with large amounts pyrite, splintery, moderately hard, trace dark grey to black siliceous shale, trace siltstone, medium to dark grey, very dolomitic, pyritic, trace quartz.
11,850' - 11,860'	As above with an increasing amount of black shale, siliceous and in part bituminous, hard.
11,860' - 11,870'	Shale as above, increasing amount of dark grey to black shale, minor dark grey silty, pyritic limestone.
11,870' - 11,880'	Shale; dark grey to black, slightly siliceous and bituminous to very siliceous, brittle, hard to very hard, slightly dolomitic, part with some disseminated pyrite, trace calcite veins,
11,880' - 11,900'	Shale as above.
11,900' - 11,920'	Shale; medium to dark grey, in part black, part slightly dolomitic, in part pyritic, fairly soft, minor dark grey to black bituminous and siliceous shale as above.
11,920' - 11,970'	Shale as above. (most of samples from 11,900 possibly cavings. Cutting from Diamond Bit may be too fine to be caught with samples.)
11,970' - 12,100'	Shale; dark grey to black, part bituminous, in part siliceous, fairly hard, part pyritic, minor dark grey dolomitic siltstone. Trace quartz. (Samples very fine with quite a bit of weight material, thus hard to read).

(d) Sample Descriptions (Continued)

12,100' - 12,120' Shale; dark grey to black, partly bituminous, partly siliceous, part slightly dolomitic, brittle, hard to very hard, trace dolomite, calcite and quartz veins, fair amount of pyrite.

12,120' - 12,150' Shale; dark grey to black, slightly siliceous and bituminous to very siliceous, slightly silty, slightly pyritic, brittle, hard to very hard, trace dolomite filled fractures, trace massive pyrite.

12,150' - 12,158' Dolomite; light to medium grey brown, micro-crystalline, grading to medium crystalline, slightly argillaceous to very argillaceous, silty, leaves black pyrobitumen residue when dissolved, part dark matrix with fossil fragments, no visible porosity but some quartz and dolomite crystals in a black matrix, possibly pyrobitumen, may be vug or fracture fill. Trace pyrite.

12,158' - 12,180' As above but badly contaminated with lost circulation material.

12,180' - 12,201' Dolomite; medium to dark grey, micro-to medium crystalline, part argillaceous, part silty, rare trace inter-crystalline porosity, part with vuggy porosity, white dolomite crystals, quartz crystals and pyrobitumen infill. Trace black shale partings.

12,201' - 12,210' Dolomite; light to medium grey, occasionally grey brown, fine to medium crystalline banding, slightly argillaceous, slightly silty to silty. Evidence of vugs and possible fractures. Infill of white dolomite and quartz and occasional pyrobitumen. Rare crystals of orange mineral in vugs (sulphide?)

12,210' - 12,240' Dolomite as above, less secondary dolomite and quartz, fewer vugs and fractures, trace brown chert. Much lost circulation material.

12,240' - 12,255' Dolomite; medium to dark grey, occasionally grey brown, fine to medium crystalline, part mottled, slightly argillaceous, slightly silty, some secondary white dolomite and quartz, filling vugs. Trace pyrobitumen, vuggy porosity probably very poor.

12,255' - 12,265' Dolomite as above.

12,265' - 12,275' Dolomite as above with increase in amount of secondary white dolomite and quartz to approximately 30%.

12,275' - 12,280' Dolomite as above, 10% secondary dolomite and quartz with minor amount of white calcite, secondary material probably from vugs.

(d) Sample Descriptions (Continued)

12,280' - 12,290' Dolomite as above, in part dolomite, micro to crypto-crystalline.

12,290' - 12,295' Dolomite; medium to dark grey, in part grey brown, crypto to micro-crystalline, slightly argillaceous, minor white dolomite and quartz, few vugs.

12,295' - 12,350' Dolomite; medium to dark grey, occasional grey brown, mottled, micro to medium crystalline, slightly argillaceous, slightly silty, 15-30% white dolomite, calcite and quartz as vug infill, trace pyrobitumen, rare trace poor inter-crystalline porosity, vuggy porosity probably poor.

12,350' - 12,400' Dolomite; medium to dark grey, in part mottled, micro to medium crystalline, slightly argillaceous, slightly silty, 10-30% white dolomite, calcite crystals and minor quartz vug fill, trace pyrobitumen, trace of very poor inter-crystalline porosity, vuggy porosity probably poor.

12,400' - 12,450' Dolomite as above, minor stringers of dark grey, very silty dolomite.

12,450' - 12,490' Dolomite as above.

12,490' - 12,590' Dolomite as above. More white dolomite from 12,570 - 12,590'

12,590' - 12,619' Dolomite; medium to dark grey, micro to medium crystalline, slightly argillaceous, slightly silty in part, 5-40% white crystalline dolomite, calcite and occasional quartz crystals infilling fractures, vugs and fossils, mainly tight with some poor to fair vuggy porosity est. 8' porous, poor permeability except in fractures, occasional stylolites and black shale partings.

12,619' - 12,630' Dolomite; medium grey to dark grey, fine to medium crystalline, slightly argillaceous and silty, 30-40% white dolomite, some clear quartz, trace pyrobitumen, trace inter-crystalline porosity, some evidence of vug and vug infill, some white dolomite veining, some thin shale partings, trace micro vuggy porosity.

12,630' - 12,680' Dolomite as above, 15-40% white dolomite infill and veining, no visible porosity.

12,680' - 12,740' Dolomite; medium grey to dark grey, fine to medium crystalline, argillaceous in part, mottled in part, with 30% medium to coarse crystalline white dolomite infill and veining, occasional clear quartz fragments, trace pyrobitumen, some thin black shale partings, no visible porosity, trace evidence of vugs - 12,720' - 12,740'.

(d) Sample Descriptions (Continued)

12,740' - 12,760'	Dolomite as above, with up to 50% medium to coarse crystalline white secondary dolomite, some euhedral to subhedral quartz crystals and quartz filled vugs.
12,760' - 12,765'	Dolomite; medium to dark grey to medium brown, fine to medium crystalline, in part argillaceous, and slightly silty, 15% white dolomite infill and veining, trace quartz, trace poor inter-crystalline porosity, trace of shale partings.
12,765' - 12,775'	Dolomite; medium to dark grey, fine to medium crystalline, part argillaceous, part mottled, 25 - 35% white dolomite infill and veining.
12,775' - 12,785'	Dolomite; as above, trace micro vuggy porosity, some quartz crystals.
12,785' - 12,810'	Dolomite; medium to dark grey, fine to medium crystalline, part argillaceous, part mottled, 30 - 45% white medium to coarse crystalline secondary dolomite infill and veining, appears dense but possibly vuggy.
12,810' - 12,840'	Dolomite as above, 20% white dolomite, no visible porosity.
12,840' - 12,850'	Dolomite; medium to dark grey, mottled in part, fine to medium crystalline, part argillaceous, slightly silty, 5-10% white dolomite infill and veining, trace pyrobitumen, some grey brown crypto-crystalline dolomite, some grey to dark grey shale partings.
12,850' - 12,865'	As above.
12,865' - 12,870'	Dolomite; medium grey to dark grey, mottled in part, fine to medium crystalline, slightly argillaceous and silty, 10 to 15% white medium to coarse crystalline dolomite infill and veining, dark grey to black shale partings, trace pyrobitumen, some trace calcite crystals - some evidence vugs.
12,870' - 12,875'	As above, trace micro vugs and poor inter-crystalline porosity.
12,875' - 12,880'	As above, some brown, slightly silty crypto to micro-crystalline dolomite, some clear quartz crystals, no visible porosity.
12,880' - 12,885'	Dolomite; grey to medium grey to dark grey, some brown grey, fine to micro-crystalline, partly argillaceous, part silty, 5% white medium to coarse crystalline dolomite infill and veining - appears dense.

(d) Sample Descriptions (Continued)

12,885' - 12,890'	Dolomite; as above, argillaceous, silty, trace secondary dolomite as above, dense with dark grey to black shale partings.
12,890' - 12,895'	Dolomite; grey to dark grey, fine to medium crystalline, part mottled, slightly argillaceous, slightly silty, 5% white dolomite infill and veining, trace shale partings - no visible porosity.
12,895' - 12,900'	Dolomite; as above, 10% white dolomite, trace micro vuggy porosity, trace clear quartz.
12,900' - 12,910'	As above, trace evidence vugs.
12,910' - 12,920'	As above.
12,920' - 12,930'	Dolomite; medium grey to dark grey, fine to medium crystalline, part mottled, part argillaceous, 5 - 10% white dolomite, trace of vugs.
12,930' - 12,935'	Dolomite as above, argillaceous, silty, minor white dolomite, infill, appears dense.
12,935' - 12,945'	Dolomite; medium grey to dark grey, fine to medium crystalline, part argillaceous, part silty, part mottled, 20% white, medium to coarse crystalline dolomite infill and veining, some evidence of vugs, trace quartz.
12,945' - 12,950'	Dolomite; as above, with 40% white dolomite.
12,950' - 12,965'	Dolomite; as above, 20 - 30% white dolomite as above, some brown crypto to micro-crystalline dolomite, some grey to black shale partings, trace pyrobitumen, trace possible vugs.
12,965' - 12,975'	Dolomite as above, 20 - 30% white dolomite as above, trace subhedral quartz crystals.
12,975' - 12,985'	Dolomite; grey to medium grey to dark grey, fine to medium crystalline, mottled, part argillaceous, part silty, 20 - 30% white secondary dolomite, medium to coarse crystalline infill and veining, appears dense, some thin black shale partings.
12,985' - 12,995'	As above, more silty, some indication of vugs, trace quartz.
12,995' - 13,000'	Dolomite; medium to dark grey, fine to micro-crystalline, argillaceous, silty, 10% white dolomite veins and infill, dense.
13,000' - 13,015'	Dolomite; as above, part mottled, part argillaceous, part silty, 25% white dolomite as above, trace shale partings and trace evidence of vugs.

(d) Sample Descriptions (Continued)

13,015' - 13,025'	As above.
13,025' - 13,030'	As above, traces inter-crystalline porosity
13,030' - 13,035'	As above, trace occasional vugs.
13,035' - 13,040'	As above, 10-15% white infill dolomite and traces inter-crystalline porosity.
13,040' - 13,055'	Dolomite as above, rare trace micro vuggy porosity.
13,055' - 13,075'	Dolomite as above, rare trace of inter-crystalline porosity and some indication of occasional vugs.
13,075' - 13,090'	Dolomite; medium grey to dark grey, fine to medium crystalline, part mottled, part argillaceous to silty, 15% - 20% white dolomite infill and veining, dark grey to black shale partings.
13,090' - 13,095'	Dolomite; grey to medium grey to dark grey, mottled, fine to medium crystalline, 25% white dolomite as above, trace of shale.
13,095' - 13,100'	Dolomite as above, 35% - 40% white dolomite.
13,100' - 13,105'	Dolomite as above, argillaceous and silty in part, 15% to 20% white dolomite, no visible porosity.
13,105' - 13,140'	Dolomite as above, 10 to 25% secondary dolomite, some indication of occasional fine vuggy porosity, 13,120' - 13,130'.
13,140' - 13,185'	Dolomite; medium to dark grey, fine to medium crystalline, slightly argillaceous, 5-10% white dolomite, trace pyrobitumen, trace clear quartz, trace very poor inter-crystalline porosity.
13,185' - 13,220'	Dolomite; light to medium grey to grey brown, crypto-crystalline to micro-crystalline, slightly silty to silty in part, trace disseminated pyrite, tight, minor amount of medium to dark grey dolomite as above, 5 - 10% white dolomite, trace calcite veins.
13,220' - 13,240'	Dolomite; medium to dark grey, micro to medium crystalline, slightly argillaceous, trace white dolomite, minor light to medium grey brown crypto-crystalline, dolomite as above, no visible porosity.
13,240' - 13,270'	Dolomite; cream to very light grey to grey brown, micro-crystalline, occasionally crypto-crystalline, trace of finely disseminated pyrite, tight, trace white dolomite as above.

(d) Sample Descriptions (Continued)

13,270' - 13,330' Dolomite; light to medium grey to grey brown, crypto to micro-crystalline, slightly silty, trace of pyrite, trace to 10% white dolomite infill, rare trace poor inter-crystalline porosity.

13,330' - 13,420' Dolomite as above, 5-20% white dolomite infilling vugs or fractures, trace poor inter-crystalline porosity, trace calcite and quartz, trace pyrite, trace pyrobitumen.

13,420' - 13,510' Dolomite; light to medium grey, fine to medium crystalline, part crypto-crystalline, light brown grey, slightly argillaceous, slightly silty, trace pyrite, trace pyrobitumen, 10-20% white dolomite infilling vugs or fractures, rare trace poor inter-crystalline porosity, trace calcite and quartz, trace dark grey to black shale.

13,510' - 13,540' Dolomite; medium to dark grey, micro to medium crystalline, slightly argillaceous, slightly silty, in part mottled, 15-20% white coarse dolomite crystals, trace quartz crystals, trace pyrobitumen, may be some poor vuggy or fracture porosity.

13,540' - 13,570' Dolomite as above, 10-20% white coarse crystalline dolomite infill.

13,570' - 13,640' Dolomite; as above, 10-15% coarse crystalline white dolomite infill, trace quartz crystals, trace pyrobitumen, minor dolomite, light grey brown to cream, crypto-crystalline, slightly silty, tight, trace dark grey to black shale.

13,640' - 13,660' Dolomite; as above, minor dolomite, cream to light grey, micro-crystalline, tight, 5-15% white dolomite infill, trace quartz crystals, trace pyrobitumen.

13,660' - 13,690' Dolomite; light to medium grey, part dark grey, part mottled, micro to medium crystalline, slightly argillaceous, slightly silty, 5-15% white coarse crystalline dolomite infilling vugs and fractures, trace quartz, trace dark grey to black shale partings.

13,690' - 13,720' Dolomite as above, minor dolomite, cream to light grey, crypto-to micro-crystalline, possibly some poor vuggy or fracture porosity.

13,720' - 13,740' Dolomite; cream to light grey, micro-crystalline, part crypto-crystalline, slightly silty, rare trace poor inter-crystalline porosity, minor medium to dark grey dolomite as above, 5-15% white coarse crystalline dolomite infill, trace quartz crystals.

13,740' - 13.810' As above.

(d) Sample Descriptions (Continued)

13,810' - 13,850'	Dolomite; light to medium grey, micro-crystalline, slightly argillaceous, trace disseminated pyrite, mostly tight with rare trace inter-crystalline porosity, 5-10% white coarse crystalline dolomite infilling vugs or fractures, trace quartz, trace pyrobitumen.
13,850' - 13,870'	Dolomite; medium to dark grey, micro to medium crystalline, part mottled, slightly argillaceous, part slightly silty, 10-20% white coarse crystalline dolomite infilling vugs or fractures, trace quartz, trace pyrobitumen, possibly some poor vuggy or fracture porosity.
13,870' - 13,890'	As above.
13,890' - 13,900'	Dolomite; cream to light grey, part medium grey, micro to crypto-crystalline, part slightly silty, trace disseminated pyrite, 5-15% vug or fracture fill, mostly white or clear quartz with some white coarse crystalline dolomite, trace of poor vuggy porosity, trace pyrobitumen.
13,900' - 13,920'	As above, part dolomite, medium to dark grey.
13,920' - 13,950'	Same as 13,890' to 13,900', rare trace of poor inter-crystalline porosity.
13,950' - 13,960'	As above.
13,960' - 14,000'	Dolomite; light to medium grey, micro-crystalline, trace medium crystalline, part very slightly silty, trace of white and clear quartz fracture fill, rare trace of poor inter-crystalline porosity.
14,000' - 14,040'	As above with minor cream to light grey crypto-crystalline dolomite, trace white coarse crystalline dolomite infilling fracture or vugs.
14,040' - 14,050'	Dolomite as above.
14,050' - 14,060'	Dolomite; medium to dark grey, micro-crystalline, part crypto-crystalline, part slightly silty, trace clear quartz fracture fill, trace white coarse crystalline dolomite infill, trace black shale partings.
14,060' - 14,080'	As above with part dolomite, cream to light grey, micro to medium crystalline, trace poor inter-crystalline porosity.
14,080' - 14,100'	Dolomite; cream to light grey, micro-crystalline, part crypto-crystalline, trace pyrite, rare trace poor inter-crystalline porosity, minor medium to dark grey dolomite as above, trace quartz and white coarse crystalline dolomite infill.

(d) Sample Descriptions (Continued)

14,100' - 14,110'	As above, more crypto-crystalline dolomite.
14,110' - 14,130'	Dolomite; medium to dark grey, micro-crystalline, slightly argillaceous in part, slightly silty in part, minor cream to light grey dolomite as above, trace white dolomite infill, trace quartz, trace pyrobitumen.
14,130' - 14,150'	As above.
14,150' 14,180'	Dolomite; cream to light grey micro-crystalline, part crypto-crystalline, slightly silty in part, minor medium to dark grey dolomite as above, trace quartz, trace dark grey to black shale partings.
14,180' - 14,220'	As above with part dolomite, medium grey, slightly argillaceous, trace disseminated pyrite, trace white coarse crystalline dolomite, trace dark grey to black shale.
14,220' - 14,260'	Dolomite; light to medium grey, part dark grey, micro-crystalline, part medium crystalline, slightly argillaceous in part, slightly silty in part, trace quartz, trace white dolomite infill, trace disseminated pyrite.
14,260' - 14,280'	As above with trace pyrobitumen, trace black bituminous shale.
14,280' - 14,330'	Dolomite; cream to light grey, part medium to dark grey, micro-crystalline, part medium crystalline, part slightly siliceous or quartzitic, part silty, trace white coarse crystalline dolomite, quartz and pyrobitumen infilling fractures or vugs, trace disseminated pyrite.
14,330' - 14,340'	Dolomite; medium to dark grey, micro-crystalline, part slightly silty, part slightly argillaceous, trace pyrobitumen, trace disseminated pyrite, minor light grey dolomite as above, 5% coarse white dolomite crystals, quartz crystals and pyrobitumen, trace subhedral crystals.
14,340' - 14,360'	As above.
14,360' - 14,400'	Dolomite; cream to light grey, micro-crystalline, part crypto-crystalline, part slightly silty, trace disseminated pyrite, slightly calcareous in part, minor medium to dark grey dolomite as above, trace white fine grained dolomitic sandstone, trace quartz, trace white dolomite.
14,400' - 14,420'	As above, rare trace poor inter-crystalline porosity.

(d) Sample Descriptions (Continued)

14,420' - 14,430'	Dolomite; light grey to light brown grey, part medium grey, fine to micro-crystalline, part arenaceous, trace poor inter-crystalline porosity trace quartz, minor black shale.
14,430' - 14,450'	Dolomite as above, appears dense, trace white coarse secondary dolomite crystals.
14,450' - 14,480'	Dolomite; light grey to light brown grey, part medium grey, crypto to micro to fine crystalline, part medium crystalline, part slightly argillaceous, part arenaceous, dense, trace white coarse secondary dolomite infill, trace quartz, trace black shale.
14,480' - 14,495'	Dolomite as above.

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SECTION III

Engineering Summary

(a) Report of Drillstem Tests

DST #1 ~~4,558'~~ 4458' - 4,616' (Carboniferous Mattson Formation) MISRUN
(Packer Rubber would not hold)

DST #2 4,486' - 4,616' (Carboniferous Mattson Formation)
11" Packer, Anchor type.
Tool Open 13 minutes, ISI 30 minutes,
F.P. 60 minutes, F.S.I. 60 minutes.
Strong blow first 10 minutes, decreasing to
weak throughout remainder of test - unmeasurable.
Recovered 500' drilling fluid.

ISIP 2311# IFP 146# IHP 2717#
FSIP 2315# FFP 309# FHP 2717# BHT 132° F.

DST #3 12,150'-12,226' (M.Devonian Dolomite,Arnica Fm.) Packer set
at 11,865' in casing. MISRUN (Tool plugged)

DST #4 12,150'-~~12,906'~~ 12506' (M.Devonian Dolomite,Arnica Fm.) Packer at
11,865' in casing. 3500' water cushion.
Tool Open 15 minutes, ISI 30 minutes,
F.P. 180 minutes, FSI 120 minutes.
Small air blow, increasing. Gas to surface in
50 minutes, too small to measure, 3' flare,
surging. Recovered 3,500' gassy fresh water
cushion, 3,500' muddy fresh water from water
pill, 4,500' gassy mud.

ISIP 5721# IFP 3966# IHP 7538#
FSIP 5435# FFP 4656# FHP 7510# BHT 318° F.

DST #5 12,630'-12,935' (M.Devonian Dolomite Arnica Fm.) MISRUN
(Seat failure)

(a) Report of Drillstem Tests (Continued)

DST #6 12,656' - 13,084' (M.Devonian Dolomite,Arnica Fm.) MISRUN (Hydraulic opening system failed to open tool).

DST #7 12,679' - 13,143' (M. Devonian Dolomite,Arnica Fm.) Used 5,000' water cushion. 1/2" choke, 3" riser.

Tool open 21 minutes, ISI 35 minutes
F.P. 180 minutes, FSI 120 minutes.
Good blow, increasing throughout test. Gas to surface 112 minutes, 7' flare. Too small to measure. 45 minutes after shut in water cushion began heading. Recovered 5,000' gassy water cushion.

ISIP 4382# IFP 2662# IHP 6903# 314°
FSIP 4158# FFP 2757# FHP 6879# BHT ~~340°~~ F.

DST #8 13,812' - 14,058' (M. Devonian Dolomite,Arnica Fm.) MISRUN (Seat failure)

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(b) Casing Record

13-3/8"	33 joints	48#	Landed at 1,025'K.B.	1,000 sax oilwell cement plus 2% $CaCl_2$
9-5/8"	229 joints	40-47#	Landed at 8,099'K.B.	1,100 sax oilwell cement plus 80 sax gel, plus .4% D-28 Retarder.
7"	350 joints	23-32#	Landed at ~~12,146~~ 12150'K.B.	300 sax oilwell cement plus 2% gel, plus .4% D-28 Retarder. Recemented 100 sax oilwell cement plus 3% D-28 Retarder

5" Hydril F.J. liner in 7" 32# Casing. 11,753'-13,798', ~~115~~ 130 sax oilwell cement plus 2600# D0 30 plus .6% D-28 Retarder.

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(c) Bit Record

No.	Size	Make	Type	Depth Out	Feet	Hours
Surface						
1A	12-1/4"	HTC	OSC-3	610	575	17
2A	12-1/4"	HTC	OSC-3	777	167	10-1/4
3A	12-1/4"	HTC	OSC-3	1,028	251	18-1/2
4A	12-1/4"	HTC	OSC-3	1,150	122	10-1/2
1B	17-1/2"	Reed	P.R.	846	846	23-1/4
2B	17-1/2"	C.P.	P.R.	1,025	179	7
Main Hole						
1	12-1/4"	HTC	OSC-1G	1,305	155	9-1/4
2	12-1/4"	HTC	OWC	1,318	13	4
3	12-1/4"	HTC	W7	1,341	23	7
4	12-1/4"	HTC	W7	1,369	28	4-1/2
5	12-1/4"	HTC	OSC	1,454	85	13-1/2
6	12-1/4"	HTC	OSC	1,473	19	6-3/4
7	12-1/4"	HTC	OWV	1,490	17	4-1/4
8	12-1/4"	HTC	OWC	1,512	22	8-3/4
9	8-1/2"	HTC	OSC-1G	1,537	25	8-3/4
1C	12-1/4"	C.P.	P.R.	1,536	24	4-1/2
10	12-1/4"	HTC	OWC	1,568	32	8-3/4
11	12-1/4"	HTC	OSC-1G	1,602	34	7-3/4
12	12-1/4"	HTC	OSC-1G	1,624	22	7-3/4
13	12-1/4"	HTC	OWV	1,682	58	9-1/4
14	12-1/4"	HTC	OSC-1G	1,748	66	13
15	12-1/4"	HTC	OSC-1G	1,772	24	5
16	12-1/4"	HTC	OWS	1,813	41	9-3/4
17	12-1/4"	HTC	OWS	1,852	39	10
18	12-1/4"	HTC	OSC	1,914	62	13-1/4
19	12-1/4"	HTC	OSC-1G	1,964	50	9-1/2
20	12-1/4"	HTC	OSC-1G	2,019	55	14-1/4
21	8-1/2"	HTC	OSC-1G	2,090	71	14
22	8-1/2"	HTC	OWV	2,178	88	12-3/4
2C	12-1/4"	C.P.	H.O.	Reamed 158'	in 10-1/4 hours.	
23	12-1/4"	HTC	LW3	2,312	134	24
24	12-1/4"	HTC	OSC-3	2,343	33	10-1/4
25	12-1/4"	HTC	OWC	2,357	14	6
26	12-1/4"	HTC	LW3	2,372	15	9-1/4
27	12-1/4"	HTC	RG2BJ	2,510	138	38
28	12-1/4"	HTC	RG2BJ	2,724	214	49-1/4
29	12-1/4"	HTC	RG2BJ	2,738	14	6
30	12-1/4"	HTC	OWC	2,762	23	9-3/4
31	12-1/4"	HTC	OWS	2,802	40	14-1/2
RR29	12-1/4"	HTC	RG2BJ	2,807	5	5-1/4
32	12-1/4"	HTC	OWS	2,824	17	12-3/4
33	12-1/4"	HTC	OWV	2,857	23	11-1/4
RR29	12-1/4"	HTC	RG2BJ	2,896	49	18-1/4
34	12-1/4"	HTC	OWV	2,909	13	11
35	12-1/4"	HTC	W7	2,928	19	13-1/2
RR29	12-1/4"	HTC	RG2BJ	2,971	43	29-3/4

(c) Bit Record (Continued)

No.	Size	Make	Type	Depth Out	Feet	Hours
36	12-1/4"	HTC	RG2BJ	3,056	85	59-1/2
37	12-1/4"	HTC	RG7J	3,140	84	43-3/4
38	12-1/4"	HTC	RG7J	3,216	76	49
39	12-1/4"	Reed	YCG	3,260	46	34-1/2
40	12-1/4"	Globe	H2C	3,264	4	5
41	12-1/4"	HTC	RG2BJ	3,328	62	54-1/2
42	12-1/4"	HTC	RG2BJ	3,404	76	49-1/2
43	12-1/4"	Reed	YC4G	3,455	51	28
44	12-1/4"	HTC	W7R	3,465	10	8-1/4
45	8-1/2"	HTC	RG1J	3,531	66	29-1/4
46	8-1/2"	HTC	RG1J	3,636	105	47-1/2
47	8-1/2"	HTC	RG1J	3,800	164	50-1/2
48	8-1/2"	HTC	RG7J	3,825	25	17
49	8-1/2"	HTC	W7R	3,845	20	10
50	8-1/2"	HTC	RG1XJ	4,064	219	52-1/2
RR27	12-1/4"	HTC	RG1J	Reamed	91	22-3/4
RR39	12-1/4"	Reed	YCG	Reamed	118	29-1/4
RR42	12-1/4"	HTC	RG2BJ	Reamed	114	20-1/2
RR41	12-1/4"	HTC	RG2BJ	Reamed	85	26-1/2
51	12-1/4"	HTC	RG2BJ	4,068	4	4
				(Reamed 191 in 34-3/4 hours)		
52	12-1/4"	HTC	RG2BJ	4,081	13	6-1/4
53	12-1/4"	HTC	W7R	4,087	6	7
RR52	12-1/4"	HTC	RG2BJ	4,175	88	58
54	12-1/4"	HTC	RG7J	4,233	58	36-1/4
55	12-1/4"	HTC	RG2BJ	4,318	85	45-1/2
56	12-1/4"	HTC	RG2BJ	4,354	36	31
57	12-1/4"	HTC	W7R	4,372	18	9-1/4
58	12-1/4"	HTC	W7R	4,384	12	6-3/4
59	12-1/4"	HTC	RG2BJ	4,416	32	21-3/4
60	12-1/4"	HTC	W7R	4,430	14	7-1/2
RR59	12-1/4"	HTC	RG2BJ	4,454	24	19-1/2
61	12-1/4"	HTC	W7	4,474	20	10-1/4
62	12-1/4"	HTC	W7	4,497	23	10-1/2
63	12-1/4"	HTC	W7	4,513	18	10-3/4
64	12-1/4"	Reed	YC4G	4,596	33	26-1/4
65	12-1/4"	Reed	YC4GJ	4,616	65	45-1/4
66	12-1/4"	HTC	OWC	4,621	5	4-3/4
67	12-1/4"	Reed	YC4GJ	4,695	79	39
68	12-1/4"	HTC	W7	4,716	21	11
69	12-1/4"	HTC	RG2BJ	4,763	47	32-1/2
70	12-1/4"	HTC	OW7	4,775	12	7-3/4
71	12-1/4"	HTC	RG7J	4,820	45	32-1/2
72	12-1/4"	HTC	W7	4,832	12	9
73	12-1/4"	HTC	RG7J	4,900	68	53-1/4
74	8-1/2"	HTC	RG1J	4,941	41	24-1/4
75	12-1/4"	HTC	RG7J	4,971	30	15-1/2
				(Reamed 41 in 18 hours)		
76	12-1/4"	HTC	RG2BJ	5,006	35	31-1/4
77	12-1/4"	HTC	OWC	5,071	65	16
78	12-1/4"	HTC	W7	5,077	6	4-3/4
RR76	12-1/4"	HTC	RG2BJ	5,107	30	20-1/4

(c) Bit Record (Continued)

No.	Size	Make	Type	Depth Out	Feet	Hours
79	12-1/4"	HTC	W7	5,145	38	12-3/4
80	12-1/4"	HTC	W7R	5,202	57	12-3/4
81	12-1/4"	HTC	W7R	5,212	10	5
82	12-1/4"	HTC	W7R	5,223	11	8-3/4
83	12-1/4"	HTC	RG1J	5,318	95	42-3/4
84	12-1/4"	HTC	W7R	5,385	67	23
85	12-1/4"	Sec.	M4L	5,417	32	13-1/2
86	12-1/4"	HTC	W7R	5,447	30	15-1/4
87	12-1/4"	HTC	W7R	5,477	30	14-1/4
88	12-1/4"	HTC	OWC	5,503	26	14
89	12-1/4"	HTC	RG7J	5,555	52	23
90	12-1/4"	HTC	W7R	5,624	69	20-1/2
91	12-1/4"	HTC	W7R	5,634	10	10-1/2
RR89	12-1/4"	HTC	RG7J	5,652	18	17-1/4
92	12-1/4"	HTC	W7R	5,662	10	6-3/4
93	12-1/4"	HTC	RG2BJ	5,711	49	26-1/4
94	12-1/4"	HTC	W7R	5,722	11	8-1/4
95	12-1/4"	HTC	OWC	5,767	45	13-3/4
96	12-1/4"	HTC	OWV	5,817	50	11
RR93	12-1/4"	HTC	RG2BJ	5,846	29	11-1/4
97	12-1/4"	Reed	YHW	5,887	41	13
98	12-1/4"	HTC	OWV	5,919	32	9-1/2
99	12-1/4"	HTC	OWC	5,947	28	12
100	12-1/4"	Reed	YCG	5,968	20	13-1/2
101	12-1/4"	Reed	YHW	5,990	22	12-1/4
102	12-1/4"	HTC	OWC	6,038	48	14
103	12-1/4"	HTC	OWC	6,101	63	16-1/2
104	12-1/4"	HTC	OWS	6,162	61	18-1/4
105	12-1/4"	HTC	OWV	6,281	119	29-3/4
106	12-1/4"	HTC	OSC	6,346	65	23-1/2
107	12-1/4"	HTC	OWV	6,360	14	12-1/2
108	12-1/4"	HTC	OSC-1G	6,432	78	24-1/2
109	12-1/4"	HTC	OWC	6,439	7	5
110	12-1/4"	HTC	W7R	6,457	18	11
RR100	12-1/4"	Reed	YCG	6,479	22	11-3/4
111	12-1/4"	HTC	OWC	6,557	78	22-3/4
112	12-1/4"	HTC	OSC	6,619	62	17-1/2
113	12-1/4"	HTC	OSC	6,696	77	25
114	12-1/4"	Reed	YSI	6,751	55	19
115	12-1/4"	Reed	YT1A	6,809	58	21
116	12-1/4"	HTC	OSC	6,823	14	7
117	12-1/4"	Reed	YM	6,931	108	36-3/4
118	12-1/4"	HTC	OWS	6,982	51	17-1/2
119	12-1/4"	Reed	YM	7,054	72	28
120	12-1/4"	HTC	OWV	7,171	117	34-1/2
121	12-1/4"	HTC	OWS	7,189	18	7-1/2
122	12-1/4"	HTC	W7	7,195	6	5-1/4
123	12-1/4"	HTC	OWV	7,212	17	11
124	12-1/4"	Reed	YHW	7,242	30	16-3/4
125	12-1/4"	HTC	OWC	7,277	35	13-1/4
126	12-1/4"	Reed	YM	7,288	11	6-1/2

(c) Bit Record (Continued)

No.	Size	Make	Type	Depth Out	Feet	Hours
127	12-1/4"	Reed	YC4G	7,319	31	23-3/4
128	12-1/4"	Reed	YM	7,341	22	11-3/4
129	12-1/4"	Reed	YM	7,413	72	26
130	12-1/4"	HTC	OWV	7,512	99	22
131	12-1/4"	HTC	OWV	7,621	108	29-1/2
132	12-1/4"	HTC	OWV	7,682	61	18-1/2
133	12-1/4"	HTC	OWV	7,715	33	11-3/4
134	12-1/4"	HTC	OWC	7,725	10	7
135	12-1/4"	Reed	YM	7,739	14	7
136	12-1/4"	HTC	OWS	7,760	21	14-1/2
137	12-1/4"	HTC	OWV	7,779	19	11-3/4
138	12-1/4"	HTC	OWV	7,836	57	25
139	12-1/4"	HTC	OWC	7,904	68	27-1/4
140	12-1/4"	Reed	YS1	7,978	74	27-3/4
141	12-1/4"	HTC	OWV	8,002	24	16-1/2
142	12-1/4"	HTC	OWC	8,060	58	21-1/4
143	12-1/4"	HTC	OSC-1G	8,082	22	14-1/4
144	12-1/4"	Reed	H7	8,090 (corrected to 8,099)	8	5-1/2
145	8-1/2"	Reed	YH	8,113	14	1/2
146	8-1/2"	HTC	OWV	Used when fishing		
147	8-3/8"	Reed	YHJ	Used when fishing		
148	8-3/8"	Reed	YHJ	Drilled on iron		
149	8-3/8"	HTC	W7	8,145	32	13-1/2
150	8-3/8"	HTC	OWC	8,162	17	9-1/4
151	8-3/8"	HTC	W7	8,177	15	9-1/4
152	8-3/8"	HTC	W7	8,193	16	9-3/4
153	8-3/8"	Reed	H7W	8,207	14	10-3/4
154	8-3/8"	Reed	YCG	8,308	101	41-1/4
155	8-3/8"	Reed	H7W	8,339	31	9
156	8-3/8"	Reed	YCG-J	8,347	8	4-1/2
157	8-3/8"	Reed	YM-J	8,411	64	22-1/4
158	8-3/8"	Reed	YSI-J	8,451	40	9-1/4
159	8-3/8"	HTC	OWC	8,478	27	10-1/4
160	8-3/8"	Reed	YM-J	8,514	36	12-1/4
RR156	8-3/8"	Reed	YCG-J	8,564	50	25
161	8-3/8"	Reed	YH-J	8,660	96	18-1/2
162	8-3/8"	Reed	YM-J	8,807	147	24-1/2
163	8-3/8"	Reed	YS1-J	8,857	50	9-3/4
164	8-3/8"	HTC	OWC	8,901	44	13-3/4
165	8-3/8"	Reed	YM-J	8,952	51	19
166	8-3/8"	HTC	OWV	9,018	66	19-3/4
167	8-3/8"	HTC	OWV	9,124	106	19-1/4
168	8-3/8"	HTC	OWC	9,210	86	15-1/4
169	8-3/8"	HTC	OWV	9,344	134	18
170	8-3/8"	HTC	OWV	9,431	87	15
171	8-3/8"	Reed	YT1AJ	9,552	121	17-1/4
172	8-3/8"	Reed	YT1AJ	9,687	135	18-1/2
173	8-3/8"	Reed	YT1AJ	9,817	130	17-3/4
174	8-3/8"	Reed	YT1AJ	9,931	114	16
175	8-3/8"	HTC	OSC-1G	10,031	100	14-3/4

(c) Bit Record (Continued)

No.	Size	Make	Type	Depth Out	Feet	Hours
176	8-3/8"	HTC	OSC-1G	10,198	167	19-1/4
177	8-3/8"	HTC	OSC-1G	10,285	87	11-3/4
178	8-3/8"	HTC	OSC-1G	10,390	105	13-1/4
179	8-3/8"	Reed	YT1A	10,512	122	18-1/2
180	8-3/8"	Reed	YT1A	10,597	85	16-3/4
181	8-3/8"	HTC	OSC-1G	10,652	55	11
182	8-3/8"	HTC	OWC	10,726	74	12
183	8-3/8"	HTC	OWC	10,784	58	12
184	8-3/8"	Reed	YH-J	10,820	36	11-1/4
185	8-3/8"	Reed	YCG-J	10,908	88	31-3/4
186	8-3/8"	HTC	RG1J	10,984	76	29-1/4
187	8-3/8"	HTC	RG1J	11,028	42	25-1/4
188	8-3/8"	HTC	W7R	11,069	41	15-3/4
189	8-3/8"	HTC	W7R	11,110	41	14-1/2
190	8-3/8"	HTC	W7R	11,154	44	12-3/4
191	8-3/8"	HTC	OWC	11,216	62	12-1/2
192	8-3/8"	Reed	YT1A	11,305	89	17-1/2
193	8-3/8"	Reed	YT1A	11,350	45	12
194	8-3/8"	Reed	YH-J	11,368	18	9
195	8-3/8"	HTC	RG1J	11,403	35	27-1/2
196	8-3/8"	HTC	W7	11,429	26	12-1/2
197	8-3/8"	HTC	W7	11,455	26	16-1/4
198	8-3/8"	Reed	YHJ	11,493	38	20-1/2
199	8-3/8"	HTC	OWC	11,537	44	15-1/4
200	8-3/8"	HTC	OWC	11,570	33	14-3/4
201	8-3/8"	Reed	YM	11,616	46	19-1/4
202	8-3/8"	Reed	YM	11,672	56	22-1/2
203	8-3/8"	HTC	OWV	11,720	48	19-1/2
204	8-3/8"	Reed	YM	11,800	80	28-1/2
205	8-3/8"	Reed	YM	11,850	50	19-1/2
206	8-3/8"	HTC	W7	11,873	23	14-3/4
207	8-3/8"	HTC	RG1J	11,904	31	27
208	8-3/8"	Christensen Diamond		12,111	207	83-1/4
209	8-3/8"	Reed	YHW-J	12,153	42	17-1/4
210	8-3/8"	HTC	RG1J	12,161	8	3-3/4
211	8-3/8"	HTC	W7	12,201	40	24-1/4
212	8-3/8"	Reed	YHW	Circulating in 7" Casing		
213	5-7/8"	Reed	YH	Drill out float etc.		
214	5-7/8"	Reed	YH	Drill out bridge and iron.		
215	5-7/8"	HTC	W7R	12,205	4	2-1/2
216	5-7/8"	Reed	YHW	12,213	8	4-1/2
217	5-7/8"	HTC	W7R	12,226	13	5
218	5-7/8"	Reed	YHW	12,242	16	7-1/2
219	5-7/8"	HTC	W7R	12,259	17	6-3/4
	5-15/16"	Homco Klusterite Mill		12,263	4	4
220	5-7/8"	Reed	YC2G	12,357	94	20-1/4
221	5-7/8"	Reed	YC2G	12,454	97	20
222	5-7/8"	Reed	YC2G (Cobra)	12,506	52	14

(c) Bit Record (Continued)

No.	Size	Make	Type	Depth Out	Feet	Hours
223	5-7/8"	HTC	RG1J	12,591	85	20-3/4
224	4-13/16"	Christensen Diamond	Core	12,619	28	5
225	5-7/8"	HTC	RG1J	Trip in, bit hit broken casing at 5,000', pinched one cone.		
226	5-7/8"	HTC	RG1J	12,691	72	18-1/2
227	5-7/8"	HTC	RG1J	12,771	80	19-1/2
228	5-7/8"	Reed	YC2G	12,848	77	17
229	5-7/8"	Reed	RB.YC2G	12,905	57	15-1/4
230	5-7/8"	HTC	RG1J	12,935	30	10
231	5-7/8"	Reed	YH	13,010	85	17-1/4
232	5-7/8"	HTC	W7R	13,084	74	16
233	5-7/8"	Reed	YHW	13,143	59	13-1/2
234	5-7/8"	Reed	YC2G	13,229	86	17-1/4
235	5-13/16"	Christensen Diamond	3864	13,672	443	64-1/4
236	5-13/16"	Christensen Diamond	3863	13,878	206	31-1/2
237	5-7/8"	Reed	YC2G	13,961	83	15-1/4
238	5-7/8"	Reed	YC2G	14,058	97	16-1/4
239	5-7/8"	Reed	YC2G	14,133	75	15-1/2
240	5-13/16"	Christensen Diamond	3864	14,362	219	65-1/4
241	5-7/8"	HTC	RB.RG1J	14,443	81	13
242	5-7/8"	HTC	RG1J	14,495	52	12

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(d) Deviation Record

Depth	Deviation
60'	1/2°
90'	1/2°
150'	1/4°
207'	1/4°
267'	1/4°
355'	1/4°
418'	1/2°
509'	3/4°
540'	3/4°
590'	1°
631'	1°
661'	1°
692'	1°
753'	1-1/4°
813'	1-1/8°
844'	1-1/2°
874'	1-1/8°
904'	1-1/8°
935'	1-1/8°
966'	1-1/8°
996'	1-1/8°
1,028'	1-1/8°
1,058'	1-1/8°
1,089'	1-1/4°
1,119'	1-1/4°
1,179'	1-1/8°
1,241'	1-3/4°
1,302'	1-3/4°
1,330'	2°
1,363'	1-7/8°
1,392'	1-7/8°
1,423'	2-1/4°
1,451'	2-1/2°
1,483'	2-1/4°
1,512'	2-1/2
1,537'	3°
Reamed hole to 1,537'	
(1,536'	2-1/8°)
1,552'	2-1/2°
1,568'	2-1/2°
1,600'	2-3/4°
1,612'	2-1/8°
1,642'	2-1/4°
1,663'	2-1/2°
1,704'	2-1/4°
1,735'	3°
1,765'	2-7/8°
1,796'	2-7/8°
1,827'	3°
1,848'	3°
1,880'	3°
1,914'	3-1/8°
1,940'	3°
1,964'	3-1/2°
1,970'	3-1/8°
2,000'	3-1/2°
2,055'	3-1/8°
2,076'	3-1/8°
2,107'	3-1/8°
2,140'	3°
2,178'	3-1/8°
2,190'	3-1/2°
2,226'	2-7/8°
2,255'	3-1/8°
2,276'	3-1/4°
2,310'	3°
2,342'	3-1/4°
2,372'	3-1/2°
2,420'	3-1/8°
2,450'	3°
2,480'	3-1/8°
2,510'	3-1/8°
2,533'	3-1/2°
2,560'	3-3/4°
2,560' (3)	3-1/2°
2,593'	3-3/8°
2,626'	3-3/8°
2,650'	3-1/8°
2,686'	3°
2,724'	3°
2,747'	3°
2,770'	3-1/8°
2,801'	3-1/2°
2,840'	4°
2,871'	3-1/2°
2,896'	3-1/2°
2,930'	3-1/2°
2,960'	3-3/4°
2,991'	4°
3,020'	3-1/2°
3,049'	4°
3,070'	3-3/4°
3,100'	3-3/4°
3,132'	3-3/4°
3,162'	3-3/4°
3,193'	3-3/4°
3,225'	3-3/4°
3,256'	4°
3,285'	4°
3,315'	3-7/8°
3,345'	3-3/4°
3,376'	3-3/4°
3,404'	3-3/4°
3,437'	4°

(d) Deviation Record (Continued)

Depth	Deviation
3,477'	4°
3,503'	4-1/2°
3,531'	4-1/4°
3,565'	4°
3,594'	4-1/8°
3,625'	4-3/4°
3,655'	4-1/2°
3,686'	4-3/4°
3,717'	4°
3,748'	4-1/8°
3,779'	4-3/4°
3,800'	4-3/4°
3,837'	4-1/4°
3,872'	4°
3,902'	4-1/4°
3,932'	4-3/8°
3,963'	4°
3,994'	4-1/2°
4,025'	4-1/2°
4,055'	4-1/2°
Reamed Hole to 4,055'	
(3,536'	4°)
(3,597'	4-3/4°)
(3,628'	4-3/4°)
(3,674'	5°)
(3,788'	4-3/4°)
(3,873'	4-3/4°)
(3,933'	4-1/2°)
4,068'	4-1/2°
4,086'	4-1/2°
4,108'	4-1/2°
4,138'	4°
4,168'	4°
4,198'	4-1/8°
4,227'	4-3/4°
4,256'	4-1/2°
4,290'	4-1/2°
4,321'	4°
4,351'	4°
4,354'	4°
4,382'	4-1/4°
4,413'	4-3/4°
4,443'	4-1/4°
4,473'	4°
4,496'	4-3/4°
4,559'	4-1/4°
4,649'	4°
4,710'	4-1/4°
4,775'	4-1/2°
4,832'	4-3/4°
4,900'	5-1/4°
4,940'	4-3/4°
4,971'	5-3/4°
4,986'	5°
5,046'	5°
5,107'	5-3/4°
5,138'	5°
5,211'	5°
5,276'	4-3/4°
5,318'	5°
5,385'	4-3/4°
5,416'	5-3/4°
5,447'	5-1/2°
5,547'	5-1/2°
5,620'	5-1/2°
5,662'	5°
5,711'	5-1/2°
5,767'	5-1/2°
5,817'	5-3/4°
5,880'	6-1/2°
5,887'	6-3/4°
5,916'	6-3/4°
5,947'	6-1/4°
5,968'	6-1/8°
6,038'	6-3/4°
6,101'	7°
6,160'	7°
6,222'	7°
6,281'	7-1/2°
6,314'	7-1/2°
6,344'	8°
6,362'	7-3/4°
6,400'	7°
6,431'	7-1/2°
6,457'	7-1/2°
6,479'	7-1/2°
6,522'	7-1/2°
6,557'	7-1/2°
6,583'	7-1/2°
6,619'	7-3/4°
6,644'	7-1/2°
6,696'	7-1/2°
6,735'	7-1/2°
6,798'	7-3/4°
6,823'	7-3/4°
6,859'	7-3/4°
6,919'	8°
6,982'	8°
7,040'	7-1/2°
7,134'	8°
7,171'	7-3/4°
7,195'	7-3/4°
7,242'	8°
7,277'	7-3/4°

(d) Deviation Record (Continued)

Depth	Deviation
7,318'	7-3/4°
7,385'	7-3/4°
7,413'	7-3/4°
7,512'	8-1/4°
7,621'	7-3/4°
7,682'	8-1/2°
7,715'	8-1/2°
7,760'	8-1/4°
7,835'	8°
7,978'	8°
8,060'	9°
8,090'	8-3/4°
8,145'	8°
8,193'	8°
8,308'	8°
8,411'	7-1/2°
8,478'	7-1/2°
8,514'	7-1/2°
8,564'	7°
8,660'	6°
8,807'	5-3/4°
8,901'	5°
8,950'	5-1/4°
9,018'	5-1/2°
9,120'	5°
9,343'	2-3/4°
9,431'	2°
9,552'	2°
9,687'	2°
9,817'	2-1/4°
9,931'	1°
10,031'	1-3/4°
10,198'	1-3/4°
10,285'	7/8°
10,390'	7/8°
10,512'	2°
10,569'	2°
10,597'	2°
10,652'	1-1/2°
10,726'	1-1/2°
10,784'	1-3/4°
10,820'	1-1/4°
10,900'	1-1/2°
10,908'	1-1/2°
10,984'	1-1/4°
11,028'	2°
11,069'	1-1/2°
11,100'	1°
11,154'	1°
11,216'	1/2°
11,305'	1/2°
11,403'	1-3/4°
11,455'	1-3/4°
11,537'	1-3/4°
11,610'	1°
11,720'	1°
11,800'	1°
11,850'	1°
11,890'	1-1/2°
12,111'	1-1/2°
12,357'	2°
12,771'	5-1/2°
13,010'	7-1/4°
13,229'	7-1/4°
13,878'	7-1/4°
14,058'	14°
14,134'	15°
14,362'	15°

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(e) Abandonment Plugs

None

(f) Lost Circulation Zones

Interval	Formation	Amount of Lost Material
0' - 298'	Glacial Till & Cretaceous	115 saxs cement lost when attempting to cement conductor pipe.
12,161' - 12,201'	Arnica Dolomite	Approximately 3,000 barrels mud, lost circulation material and cement.

(g) Report of Blowouts

No blowouts encountered

SECTION IV

Logs

Type of Log	Run	Interval	Date
Induction Electrical Log	#1	1,023' - 8,098'	7 September 1963
	#2	8,099' - 11,539'	3 December 1963
	#3	11,539' - 12,206'	26 December 1963
	#4	12,155' - 12,946'	3 March 1964
	#5	12,156' - 14,078'	18 March 1964
	#6	13,876' - 14,498'	27 March 1964
Sonic-Gamma Ray-Caliper Log	#1	1,023' - 8,091'	8 September 1963
	#2	8,099' - 11,564'	5 December 1963
	#3	11,526' - 12,204'	27 December 1963
	#4	12,155' - 12,929'	3 March 1964
Gamma Ray-Neutron Log	#1	12,156' - 14,077'	19 March 1964
Microlog-Caliper Log	#1	1,022' - 8,097'	8 September 1963
Laterolog	#1	12,156' - 14,074'	19 March 1964
Continuous Dipmeter Log	#1	8,099' - 11,615'	7 December 1963
	#2	11,613' - 12,204'	26 December 1963
Directional Log	#1	1,023' - 8,096'	7 September 1963
	#2	8,099' - 11,615'	7 December 1963
	#3	11,613' - 12,204'	26 December 1963
Cement Bond Log	#1	11,470' - 12,136'	14 January 1964
	#2	9,970' - 12,076'	23 January 1964
Completion Record	#1	11,500' - 13,807'	1 April 1964

****

SECTION V

Analyses

(a) Core Analysis

Core #1 - 12,591' - 12,619'

(b) Gas Analysis

Test	Analyst	Lab. Number	Sample Date
Flow Test	Core Lab.	GA-1127 (1)	Feb. 14, 1964.
		GA-1127 (2)	Feb. 14, 1964
DST #7	Core Lab.	GA-1170 (1)	March 9, 1964
		GA-1170 (2)	March 9, 1964.

(c) Water Analysis

Test	Analyst	Lab. Number	Sample Date
DST #4	Core Lab.	WA-2432	Feb. 4, 1964
Flow Test	Chemical & Geological Labs.	F-1812-1	
		F-1812-2	
DST #7	Chemical & Geological Labs.	F-1868	March 9, 1964
DST #7	Core Lab.	WA-2497-1	March 9, 1964
		WA-2497-2	March 9, 1964
		WA-2497-3	March 9, 1964
Flow Test	Chemical and Geological Labs.	F-1897	April 6, 1964
Flow Test	Chemical and Geological Labs.	F-1911-1	April 7, 1964
		F-1911-2	April 8, 1964
Flow Test	Core Lab.	WA-2544	April 9, 1964.

****

SECTION VI

Completion Summary

Perforations in 5" Liner

13,880' - 13,890'	5 perfs
13,740' - 13,744'	5 perfs
13,722' - 13,726'	5 perfs
13,551' - 13,556'	3 perfs
13,518' - 13,522'	3 perfs
13,391' - 13,400'	3 perfs
13,384' - 13,391'	4 perfs
13,339' - 13,347'	4 perfs
13,325' - 13,332'	4 perfs
13,260' - 13,268'	9 perfs
13,236' - 13,239'	4 perfs
13,212' - 13,219'	3 perfs
13,152' - 13,160'	8 perfs
13,129' - 13,141'	11 perfs
13,008' - 13,016'	5 perfs
12,999' - 13,006'	4 perfs
12,794' - 12,821'	10 perfs
12,747' - 12,786'	13 perfs
12,695' - 12,742'	16 perfs
12,684' - 12,690'	3 perfs
12,670' - 12,676'	2 perfs
12,640' - 12,646'	4 perfs
12,630' - 12,634'	3 perfs
12,574' - 12,591'	7 perfs
12,568' - 12,571'	2 perfs
12,502' - 12,512'	6 perfs
12,486' - 12,490'	3 perfs
12,464' - 12,470'	3 perfs
12,426' - 12,432'	3 perfs
12,310' - 12,370'	20 perfs
12,280' - 12,287'	3 perfs
12,194' - 12,204'	20 perfs
12,162' - 12,182'	40 perfs

****

JOHNSTON TESTERS

JTL.CO.4

TEST DATA

Formation	Lower Madsen	Zone Thickness		Ft.	
Interval	4458	To 4616	T.D. 4616		
Type of Test	Open Hole, Bottom Hole				
Time Started in Hole	1230 Hrs.	Tool Open	1415	Hrs.	
First Flow	Min.	Shut In		Min.	
Second Flow	Min.	Final Shut In		Min.	
Pulled Loose @	1445 Hrs.	Out of Hole	1630	Hrs.	
Wt. Set on Packer	70,000 #	Pulled Loose Wt.	10,000	#	

Remarks

Description of Blow During Test

Mis-run, seat failure.

GAS BLOW MEASUREMENTS

Measured with I.D. Riser or Est. ☐

Type of Instrument

Time	Sfce. Choke	Reading Inches	Cubic Feet/Day

FLUID RECOVERY

Was Test Reverse Circulated Yes ☐ No ☒

Fluid Recovered (Total) 900 Ft.

Description of Fluid Recovered 900' of drilling fluid.

Remarks

Mis-run, seat failure.

Co. Rep. A. Wright

Tester R. Thomas

Elevation	1500 Gr.				
Bottom Hole Chake Size	1/2"				
Fluid Cushion Type					
Amount					

TOOL SEQUENCE

Tool	Length	O.D.
D.P. Sub.	.71	5 1/2
SIT	6.04	4 1/2
Hyd. Tool	7.45	4 3/4
Safety Jt.	1.75	4 5/8
TC & Pkr.	7.22	4 3/4
TC & Pkr.	5.65	4 3/4
Total	28.82	
Stub,	1.55	4 3/4
Perf	4.98	4 1/2
Perf	4.95	4 1/2
Perf	4.98	4 1/2
Recorder	5.90	4 7/8
Perf	3.90	4 1/2
Recorder	5.90	4 7/8
Perf	5.02	4 1/2
Sub.	.87	6 1/4
D.C.	117.66	
Sub.	.84	6 1/4
Perf & B.N.	1.75	4 5/8
Total Intv.	158.30	
Total Length	187.12	

MUD AND HOLE DATA

Mud Type	Gel			W.L.	4.2
Filter Cake	2/32	Visc.	90	Wt.	11.7
Time Taken	June 18/63 @ 2000 hrs.				
Contractor	Cascade Drilling			Rig No.	19
Drill Pipe Size	4 1/2 IF				
Drill Collar Size	2 7/8 ID	Length	377'		
Main Hole Size	12 1/4"				
Rat Hole Size					

District Peace River Ticket No. B8061 Date June 18/63

Company Canada Southern Petroleum Ltd. Address 505-8 Avenue, West, Calgary, Alberta

Well Name Canada Southern et al N. Beaver Test No. 1 J.T.L. Test No. 1

Number #60°-06'-53"N-124°-04'-00"W Field Wildcat Province Yukon

Formation Lower Madsen-4458-4616 NUMBER: ~~Consultant~~ 60°-06'-53"N-124°-04'-00"W

~~and Interval~~-COMPLETE WELL NAME AND NUMBER-Canada Southern et al N. Beaver R. YT-1-27

Distribution of Reports 16-Calgary, c/o Dome Petroleum Limited-Attn: Mr. E.R. Tovell

G
A
TICKET #B-80611 REC #1-43

Ticket #: 8-8061 Rec'd 4-4-1955

JOHNSTON TESTERS

Pressure Data

Test Ticket No. B8061

JTL-CD-5

Recorder No.	T-43	T-4955			
Capacity (P.S.I.G.)	3000	3000			
Recorder Depth	4475	4484			
Pressure Gradient P.S.I./Ft.					
Well Temperature °F.	131°	131°			
A Initial Hydrostatic	2699#	2705#			
B First Initial Flow					
C Initial Shut-In-Pres	Mis-run, seat failure.				
D Flowing Pres					
E Final Flow					
F Final Shut-In					
G Final Hydrostatic	2699#	2705#			

Remarks

T-43 - Outside Recorder
T-4955- Outside Recorder

JOHNSTON TESTERS

TEST DATA

Formation	Lower Madsen		Zone Thickness		Ft.	Elevation	1500 Gr.
Interval	4486	To 4616	T.D.	4616		Bottom Hole Choke Size	1/2"
Type of Test	Open Hole, Bottom Hole					Fluid Cushion Type	
Time Started in Hole	1800	Hrs.	Tool Open	2000	Hrs.	Amount	
First Flow	13	Min.	Shut In	30	Min.		
Second Flow	60	Min.	Final Shut In	60	Min.		
Pulled Loose @	2243	Hrs.	Out of Hole	0100	Hrs.		
Wt. Set on Packer	50,000	#	Pulled Loose Wt.	15,000	#		

Remarks

Description of Blow During Test

Strong blow for 10 minutes, slowly decreasing to weak.

GAS BLOW MEASUREMENTS

Measured with I.D. Riser or Est. ☐

Type of Instrument

Time	Sfce. Choke	Reading Inches	Cubic Feet/Day

FLUID RECOVERY

Was Test Reverse Circulated Yes ☐ No ☒

Fluid Recovered (Total) 500 Ft.

Description of Fluid Recovered 500' of drilling fluid.

Remarks

Test Satisfactory.

Co. Rep. A. Wright

Tester R. Thomas

TOOL SEQUENCE

Tool	Length	O.D.
Sub.	.69	
PO Sub.	1.02	
Sub.	.82	
D.P. Sub.	.71	
SIT	6.04	
Hyd. Tool	7.45	
Safety Jt.	1.75	
TC & Pkr.	7.22	
TC & Pkr.	5.65	
Total	31.35	
Stub.	1.55	
Perf	4.98	
Perf	4.95	
Perf	4.98	
Recorder	5.90	
Perf	3.90	
Recorder	5.90	
Perf	5.02	
Sub.	.87	
D.C.	89.66	
Sub.	.87	
Perf & B.N.	1.75	
Total Intv.	129.83	
Total Length	161.18	

MUD AND HOLE DATA

Mud Type Gel W.L. 4.2

Filter Cake 2/32 Visc. 90 Wt. 11.7

Time Taken June 18/63 @ 2000 hrs.

Contractor Cascade Drilling Rig No. 19

Drill Pipe Size 4 1/2 IF

Drill Collar Size 2 7/8 ID Length 405'

Main Hole Size 12 1/4"

Rat Hole Size

District Peace River Ticket No. B8062 Date June 18/63

Company Canada Southern Petroleum Ltd. Address 505-8 Avenue, West, Calgary, Alberta

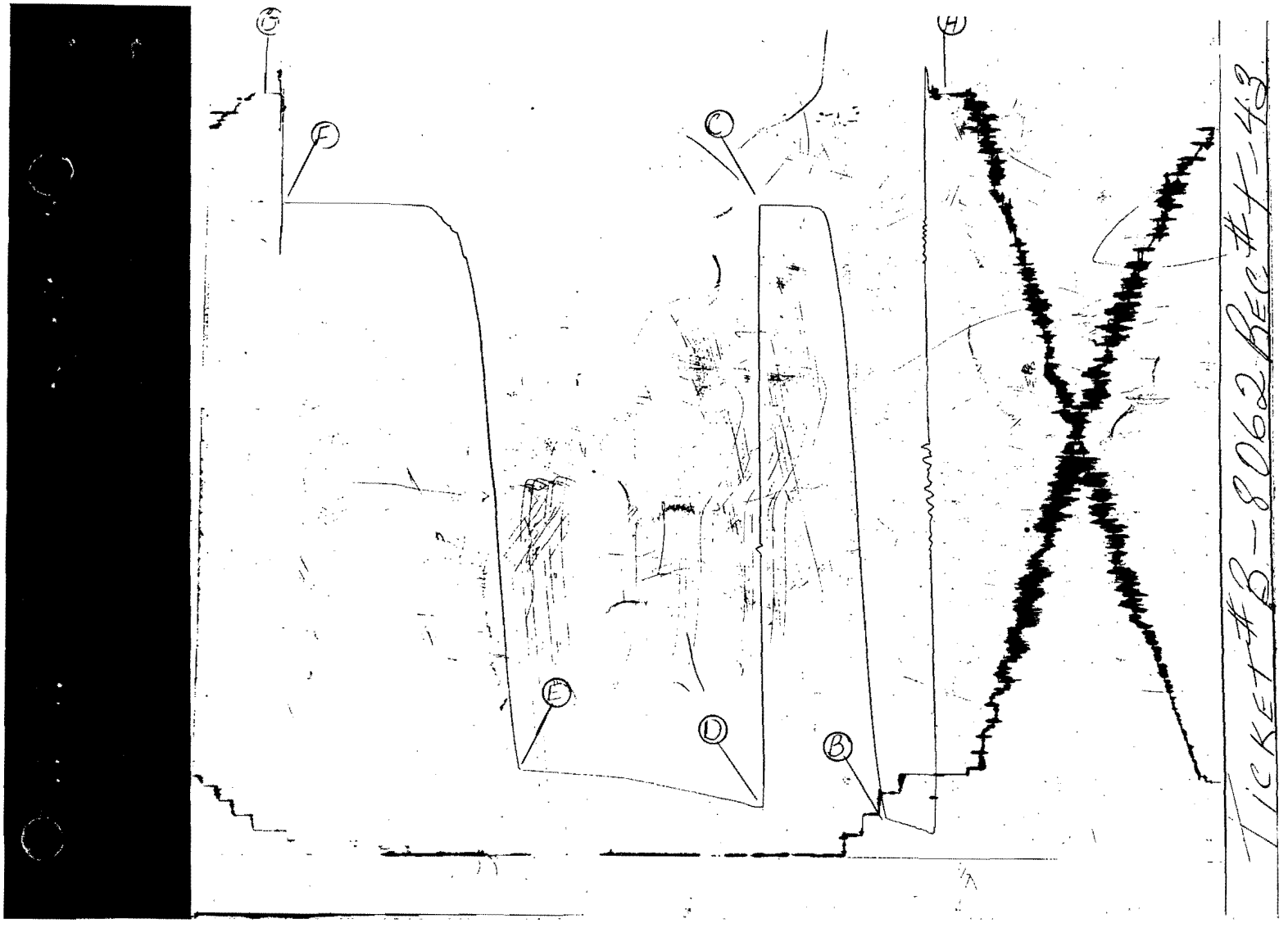
Well Name Canada Southern et al Test No. 2 J.T.L. Test No. 2

Number Beaver R. YT-1-27 Field Wildcat Province Yukon

Formation 60°-06'-53"N-124°-04'-00"W Consultant

and Interval Lower Madsen-4486-4616

Distribution of Reports 16- Calgary, c/o Dome Petroleum Limited, Mr. E.R. Tovell



TICKET #B-80628 REC #1-43

Ticket #B-8062 Reel #4955-

JOHNSTON TESTERS

Pressure Data

Test Ticket No. B8062

JTL-CO-S

Recorder No.	T-4955	T-43			
Capacity (P.S.I.G.)	3000	3000			
Recorder Depth	4503	4512			
Pressure Gradient P.S.I./Ft.					
Well Temperature °F.	132°	132°			
A Initial Hydrostatic	2729#	2717#			
B First Initial Flow	119#	146#			
C Initial Shut-In-Pres	2311#	2311#			
D Flowing Pres	166#	182#			
E Final Flow	285#	309#			
F Final Shut-In	2314#	2315#			
G Final Hydrostatic	2729#	2717#			

Remarks

T-4955 - Outside Recorder
T-43 - Outside Recorder

JTL.CD.4

JOHNSTON TESTERS

TEST DATA

Formation	Nahanni	Zone Thickness	Approx. 70 Ft.		
Interval	11,865 To	12,226 T.D.	12,226		
Type of Test	Casing				
Time Started in Hole	0230 Hrs.	Tool Open	0948 Hrs.		
First Flow	3 Min.	Shut In	37 Min.		
Second Flow	112 Min.	Final Shut In	85 Min.		
Pulled Loose @	1345 Hrs.	Out of Hole	2145 Hrs.		
Wt. Set on Packer	30,000	# Pulled Loose Wt.	54,000 #		

Remarks

Description of Blow During Test: Reset Tool at 1159. Strong blow throughout test.

GAS BLOW MEASUREMENTS

Measured with ____ I.D. Riser or Est. ☐

Type of Instrument ____

Time	Sfce. Choke	Reading Inches	Cubic Feet/Day

FLUID RECOVERY

Was Test Reverse Circulated Yes ☐ No ☒

Fluid Recovered (Total) 8589 Ft.

Description of Fluid Recovered: 3203' of drilling fluid. 5386' of water cushion.

Remarks: Mis-Run. Tool plugged.

Co. Rep. E. Tovell

Tester R. Thomas

Elevation ~~1500'~~ GL

Bottom Hole Choke Size 3/4"

Fluid Cushion Type Water

Amount 5386'

TOOL SEQUENCE

Tool	Length	O.D.
Sub.	.85	4 3/4
P.O. Sub.	.83	4 7/8
Sub.	.67	4 5/8
D.P. Sub.	.66	4 5/8
S.I.T.	6.03	4 3/4
Hyd. Tool	7.47	4 3/4
Trip Valve	1.82	4 5/8
Jars	4.12	4 3/4
Safety Jt.	1.73	4 5/8
Stub	2.00	4 5/8
Total	26.18	
Stub	3.92	5 13/16
Perf.	5.30	2 7/8
Recorder	6.18	4 7/8
Perf.	1.93	4 5/8
Recorder	5.90	4 7/8
Perf.	1.00	4 5/8
B. Nose	.55	4 7/16
Total Intv.	24.78	
Total Length	50.96	

MUD AND HOLE DATA

Mud Type Sodium Surfacant W.L. 4.0

Filter Cake 2/32 Visc. 64 Wt. 11.7

Time Taken Jan. 26/64 @ 1800 hrs.

Contractor Cascade Drilling Rig No. 19

Drill Pipe Size 3 1/2 IF

Drill Collar Size 2 1/4 ID Length 706'

Main Hole Size 6"

Rat Hole Size 5 7/8"

District Ft. St. John Ticket No. C 302 Date Jan. 27/64

Company Canada Southern Petroleum Ltd. Address 505-8 Avenue West, Calgary., Alberta

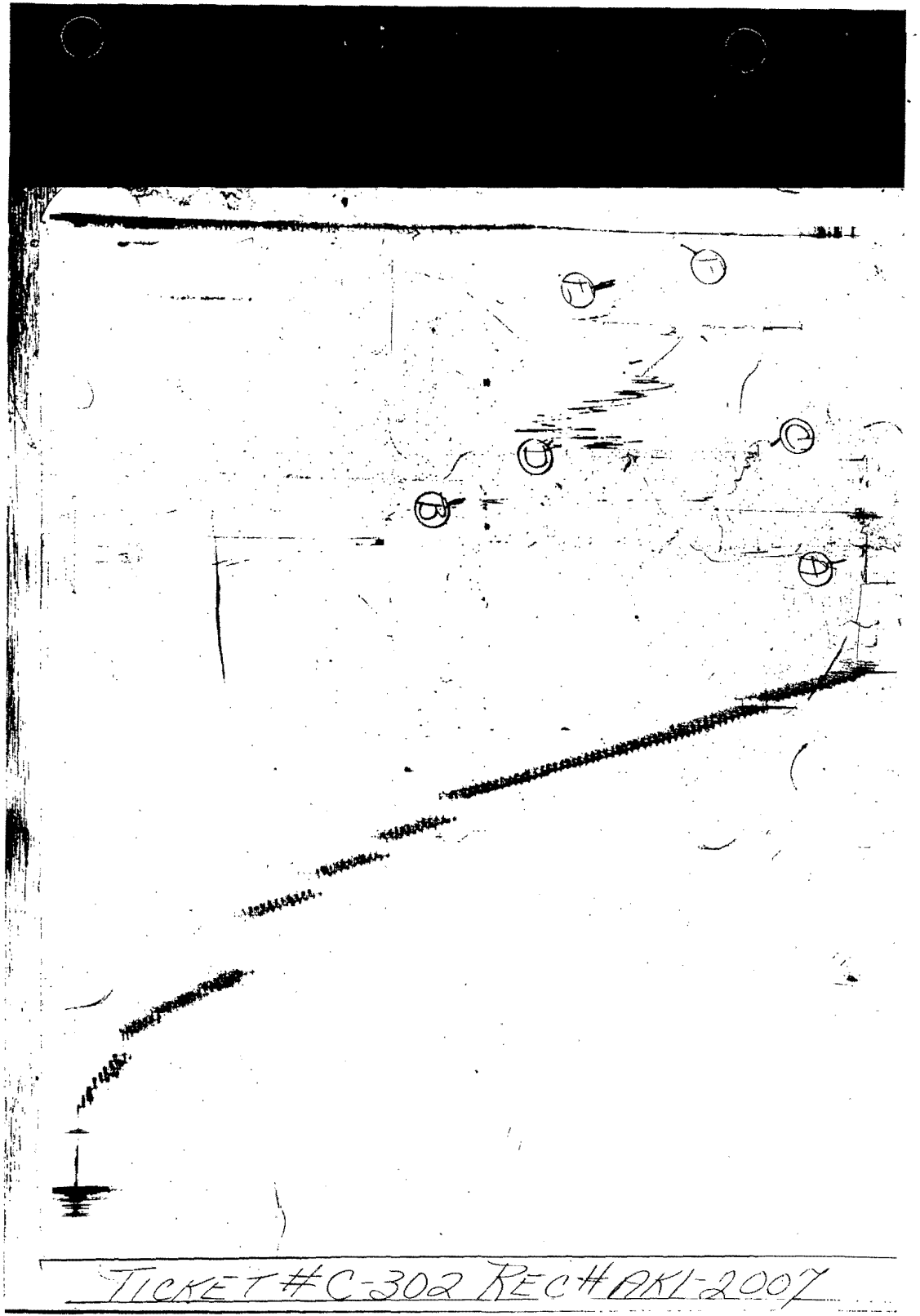
Well Name Canada Southern et al N. Beaver Test No. 3 J.T.L. Test No. 3

Number R. Yt-1-27-#60°-06'-53"N-124°- Field Wildcat Province Yukon

Formation 04'-00"W. Consultant

and Interval Nahanni -11,865-12,226

Distribution of Reports 16-Calgary, c/o Dome Petroleum Limited.



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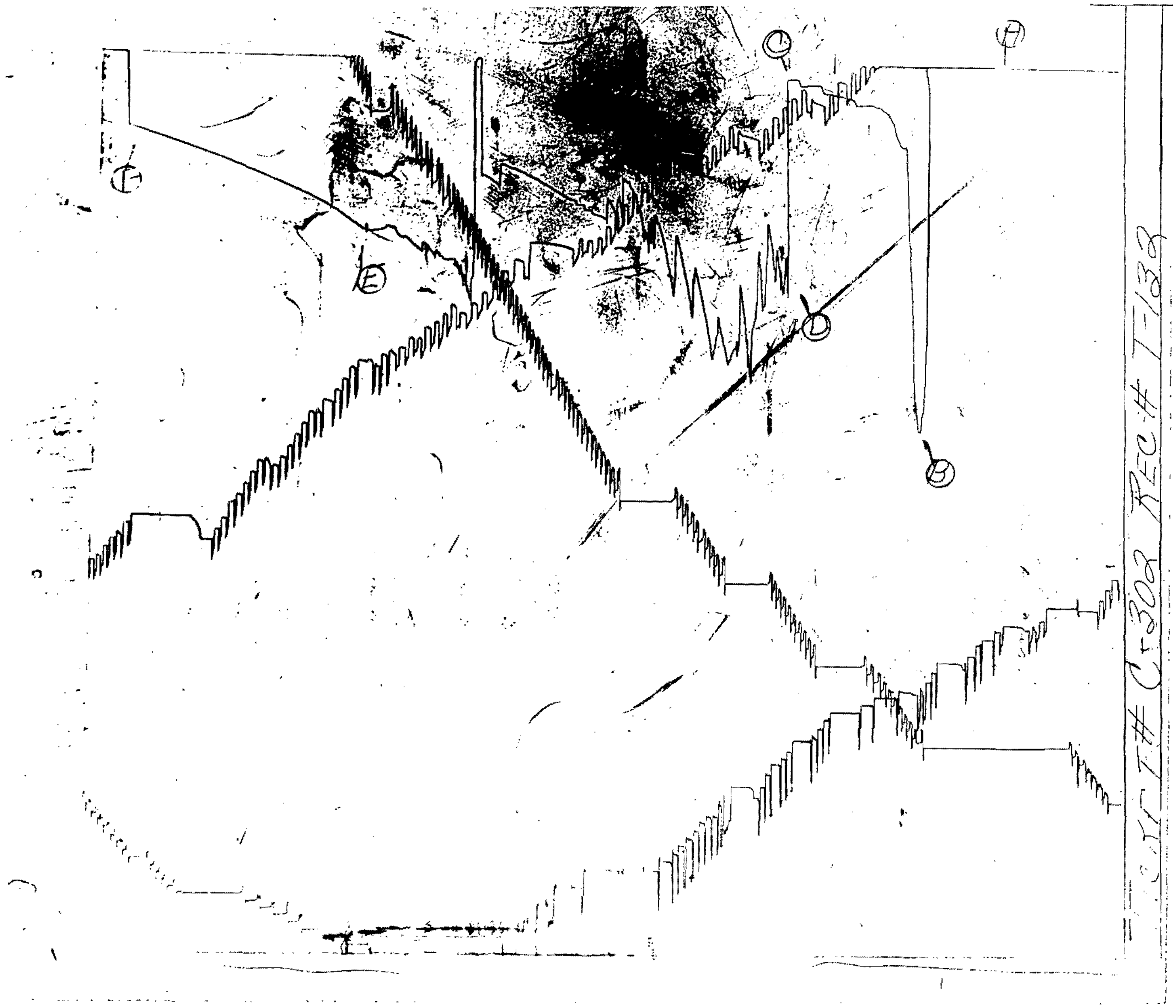

A
B
C
D
E
F
REC# T-132

JOHNSTON TESTERS

Pressure Data Test Ticket No. C 302

Recorder No.	AK1-2007	T-132			
Capacity (P.S.I.G.)	8300	7000			
Recorder Depth	11,875	11,882			
Pressure Gradient P.S.I./Ft.					
Well Temperature °F.	294°	294°			
A Initial Hydrostatic	7607#	Ran Over Capacity.			
B First Initial Flow	3903#	4210#			
C Initial Shut-In-Pres	6534#	7087#			
D Flowing Pres	4832#	5288#			
E Final Flow	5315#	5776#			
F Final Shut-In	5785#	6603#			
G Final Hydrostatic		Ran Over Capacity.			

Remarks AK1-2007-Outside Recorder Mis-Run.
T-132-Outside Recorder Tool plugged.

JOHNSTON TESTERS
A WORLD OF EXPERIENCE

JTL-CD-1

DRILL STEM TEST SPECIAL DATA ANALYSIS

February 6, 1964

Test Ticket No. C-303

Maximum Reservoir Pressure
Po 5955 P.S.I.G.

Effective Transmissibility
Kh or Kh / μB μ Z 4.6 Md-ft. / Cp.

Flow Rate
Q 50 Estimated MCF Day

Slope of Shut-in Curve
M 13746425 PSI² log cycle

Estimated Damage Ratio
EDR 0.2

Productivity Index
P.I. _____

Q _____

Potentiometric Surface
(Datum Plane, Sea Level)
PS 13750 ft Above Recorder

Q _____

This appears to be a good mechanical test. Although the data obtained does not appear to be adequate for reliable analysis. For future tests in this area and zone, it is recommended that the initial shut-in be left for a minimum of 60 minutes. This would permit the maximum reading to more nearly approach static formation pressure.

#1 WELL BORE DAMAGE

Well bore damage as calculated from the data obtained (0.2) is not present during this test.

#2 PERMEABILITY

The calculated transmissibility factor of 4.6 md-ft/cp. indicates the average effective permeability for the estimated 30' porous interval to be approximately .04 md. This value was calculated assuming that the product of the viscosity and compressibility factor for the reservoir fluid was .24525.

#3 GENERAL COMMENTS

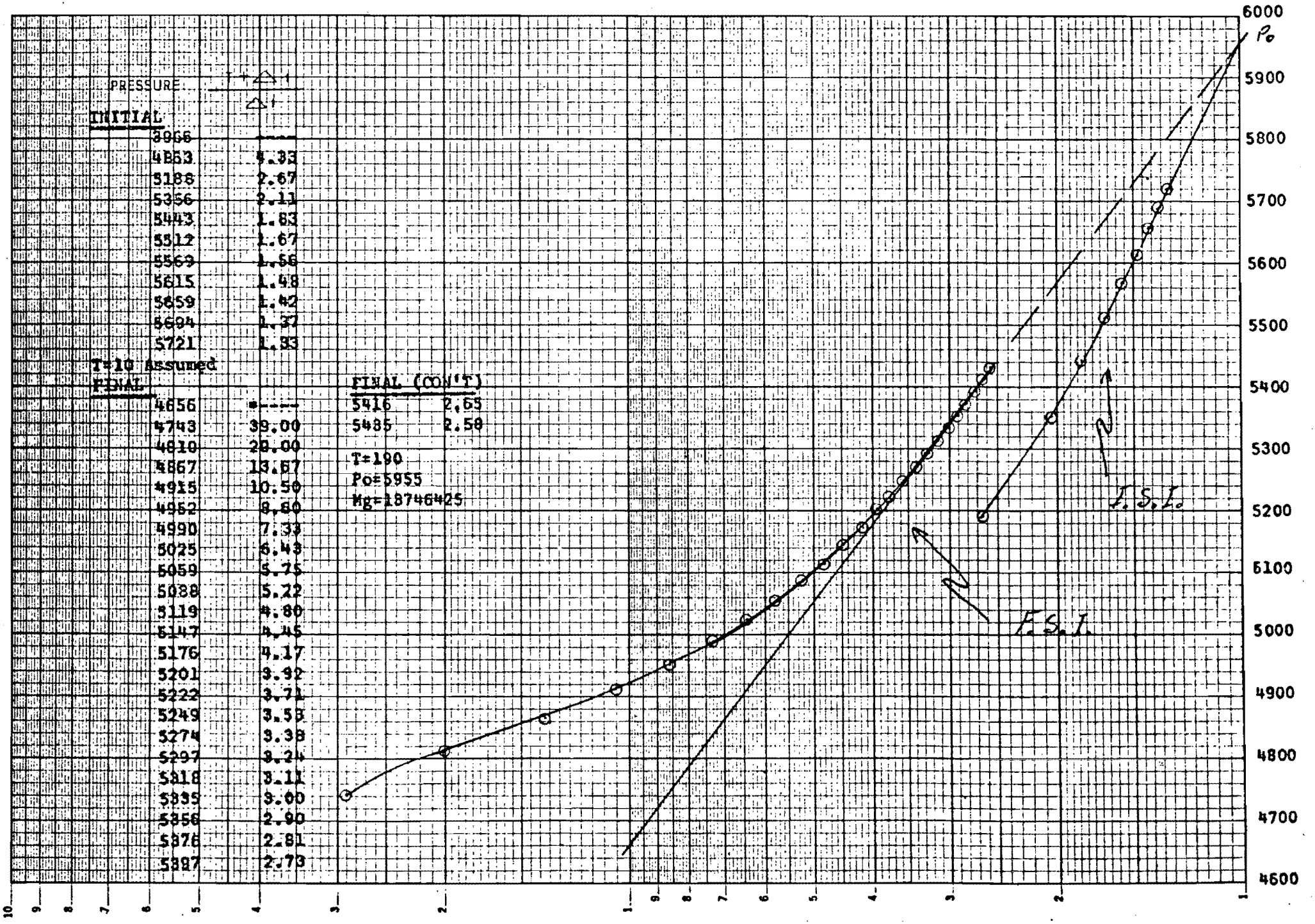
Both the initial and final shut-in pressure plots are incomplete and give us false values and inconclusive information for reliable analysis. Maximum reservoir pressure from the data obtained is indicated at 5955 P.S.I.G..

From these test data and empirical calculations it is indicated there is gas production from a low permeable zone, having no well bore damage present.

M.S. Twasiuk

INTERPRETATION AND EVALUATION SECTION.

Canada Southern Petroleums Ltd.
Canada Southern et al N. Beaver R.
YT-1-27 #60°-06'-53"N-124°-04'-00"W
Nahanni-11865-12506 DST #4


PRESSURE
INITIAL
3966
4853 4.33
5188 2.67
5356 2.11
5443 1.83
5512 1.67
5569 1.56
5615 1.48
5659 1.42
5694 1.37
5721 1.33
T=10 Assumed
FINAL
4656
4743 39.00
4810 20.00
4867 13.67
4915 10.50
4952 8.60
4990 7.33
5025 6.43
5059 5.75
5088 5.22
5119 4.80
5147 4.45
5176 4.17
5201 3.92
5222 3.71
5249 3.53
5274 3.38
5297 3.24
5318 3.11
5335 3.00
5356 2.90
5376 2.81
5387 2.73
FINAL (CON'T)
5416 2.65
5485 2.58
T=190
Po=5955
Mg=18746425
Po
I.S.I.
F.S.I.
6000
5900
5800
5700
5600
5500
5400
5300
5200
5100
5000
4900
4800
4700
4600

JTL-CD-4

JOHNSTON TESTERS

TEST DATA

Formation	Nahanni	Zone Thickness		Ft.	
Interval	11865	To 12506	T.D. 12506		
Type of Test	Hookwall, Casing				
Time Started in Hole	0100 Hrs.	Tool Open	0812	Hrs.	
First Flow	15 Min.	Shut In	30	Min.	
Second Flow	180 Min.	Final Shut In	120	Min.	
Pulled Loose @	1357 Hrs.	Out of Hole	2330	Hrs.	
Wt. Set on Packer	30,000	# Pulled Loose Wt.	40,000	#	

Remarks

Description of Blow During Test

Fair blow, gas to surface in 50 minutes.

GAS BLOW MEASUREMENTS

Measured with I.D. Riser or Est. ☐

Type of Instrument

Time	Sfce. Choke	Reading Inches	Cubic Feet/Day
			T.S.T.M.
			5' Flare.

FLUID RECOVERY

Was Test Reverse Circulated Yes ☐ No ☒

Fluid Recovered (Total) 11500' (including fluid cushion) Ft.

Description of Fluid Recovered 4500' of gassy drilling fluid.
3500' of gassy water cushion.
3500' of muddy fresh water.

Remarks Test Satisfactory.

Co. Rep. A. Wright & J. Binney

Tester R. Thomas

Elevation	1500'				
Bottom Hole Choke Size	3/4"				
Fluid Cushion Type	Water				
Amount	3517'				

TOOL SEQUENCE

Tool	Length	O.D.
Sub.	.85	
PO Sub.	.83	
Sub.	.67	
D.P. Sub.	.66	
SIT	6.05	
Recorder	5.90	
Hyd. Tool	7.48	
Jars	4.12	
Safety Jt.	1.73	
TC & Pkr.	2.00	
Total	30.29	
Stub.	4.73	
Perf.	10.00	
Recorder	6.22	
Perf	1.93	
Recorder	5.90	
Perf	1.00	
B.N.	.55	
Total Intv.	30.33	
Total Length	60.62	

MUD AND HOLE DATA

Mud Type Gel & Surfactant W.L. 1.6

Filter Cake 2/32 Visc. 46 Wt. 12.2

Time Taken Feb. 3/64 @ 1600 Hrs.

Contractor Cascade Drilling Rig No. 19

Drill Pipe Size 3 1/2 IF

Drill Collar Size 2 1/4 ID Length 706'

Main Hole Size 6" Casing I.D.

Rat Hole Size 5 7/8"

District Ft. St. John Ticket No. C-303 Date Feb. 4/64

Company Canada Southern Petroleums Ltd. Address 505-8 Avenue, West, Calgary, Alberta

Well Name Canada Southern et al N. Beaver Test No. 4 J.T.L. Test No. 4

Number R. YT-1-27 #60°-06'-53"N-124°-04'-00"W. Field Wildcat Province Yukon

Formation and Interval DST #4 Nahanni-11865-12506 Consultant

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JTL-CD-3

Assumptions made for Calculations for Gas Recoveries

1. Q is taken as steady state flow and unless stated otherwise at standard conditions 14.7 P.S.I. and 60° F.
2. P_f is formation flowing pressure at steady state flow.
3. Formation flow is taken as single phase flow. If liquid (condensate) is produced at surface, condensation is assumed to have occurred in drill pipe.
4. Radial flow is assumed.
5. Unless given, gas specific gravity is assumed to be 0.7 (air 1.0) and having critical temperature at 390° Rankin and critical pressure of 666 P.S.I.A.
6. Other standard radial flow, steady state assumptions.

Empirical Equations:

1. $EDR = \frac{1}{\log T + 2.65} \left[\frac{P_o^2 - P_f^2}{M_g}\right]$ Where $M_g = \frac{\Delta P^2}{\log \text{ cycle}}$
2. Transmissibility $\frac{Kh}{\mu Z} = \frac{1637\ {}^\circ T_f Q}{M_g}$
3. P.S. $= \left[P_o \times 2.309 \text{ ft./PSI}\right] - \left[\text{Recorder depth to sea level.}\right]$

Assumptions made for Calculations for Liquid Recoveries

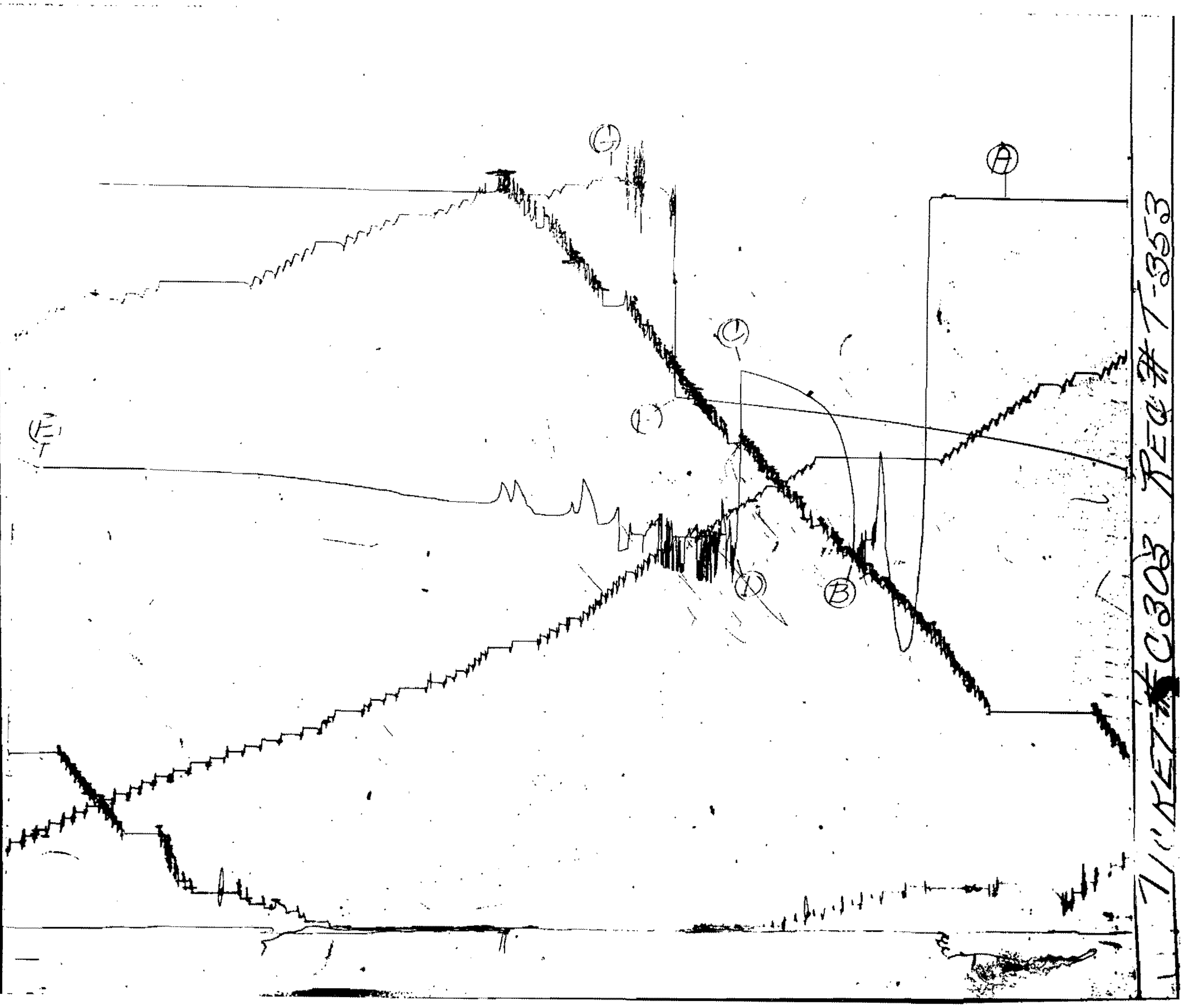
1. Q is taken as steady state flow.
2. P_f is formation flowing pressure at steady state flow.
3. Formation flow is taken as single phase flow. If gas is produced at surface, phase separation is assumed to have occurred in drill pipe.
4. Radial flow is assumed.
5. Where PVT data is not available then it is assumed that:
   Effective permeability, K, will fall between .1 to 200 md
   Formation porosity, f, will fall between .....0.1 to 0.3
   Fluid compressibility, c, will fall between ....10^{-6} to 10^{-4}
   Fluid viscosity, μ, will fall between .....0.05 to 50 cp.
   Well bore radius, r_w, will fall between ....3⅞" to 4⅜"
   Which gives an average value for the function $\log \frac{K}{f\mu c r_w^2}$ of 5.5
6. Other standard radial flow, steady state assumptions.

Empirical Equations:

1. $EDR = \frac{1}{\log T + 2.65} \left[\frac{P_o - P_f}{M}\right]$
2. Transmissibility $\frac{Kh}{\mu B} = \frac{162.6Q}{M}$
3. P.I. $= \frac{Q}{P_o - P_f}$
4. P.S. $= \left[P_o \times 2.309 \text{ ft./PSI}\right] - \left[\text{Recorder depth to sea level.}\right]$

Symbols		Dimensions
B	Formation volume factor	vol./vol.
c	Fluid compressibility	vol./vol./psi.
EDR	Estimated damage ratio	
f	Formation porosity	fractional
h	Producing interval	feet
J	Productivity index	Bbls./day/PSI
K	Permeability	Millidarcies
M	Slope of shut-in build up	PSI/log cycle
M_g	Slope of shut-in build up	PSI^2/log cycle
P_f	Final flowing pressure	PSI
P_{fst}	Final shut-in pressure at time t	PSI
P_{ist}	Initial shut-in pressure	PSI
P_o	Moximum reservoir pressure	PSI
P. S.	Potentiometric surface	ft.

Symbols		Dimensions
Q	Rate of flow during test	Bbls./day
Q_o	Rate of oil flow during test	Bbls./doy
Q_w	Rate of water flow during test	Bbls./doy
Q_g	Rate of gas flow during test	MCF/day
r_w	Well bore radius	inches
t	Final shut-in time period	minutes
Δt	Increment time of final shut-in time period	minutes
T	Open flow time period	minutes
$^\circ T_f$	Formation temperature	°Rankin
μ	Fluid viscosity	Centipoise
Z	Gas deviation factor (Compressibility factor)	
$\frac{Kh}{\mu B}$ or $\frac{Kh}{\mu Z}$	Transmissibility factor	$\frac{\text{Md.} - \text{ft.}}{\text{Cp.}}$


A
B
C
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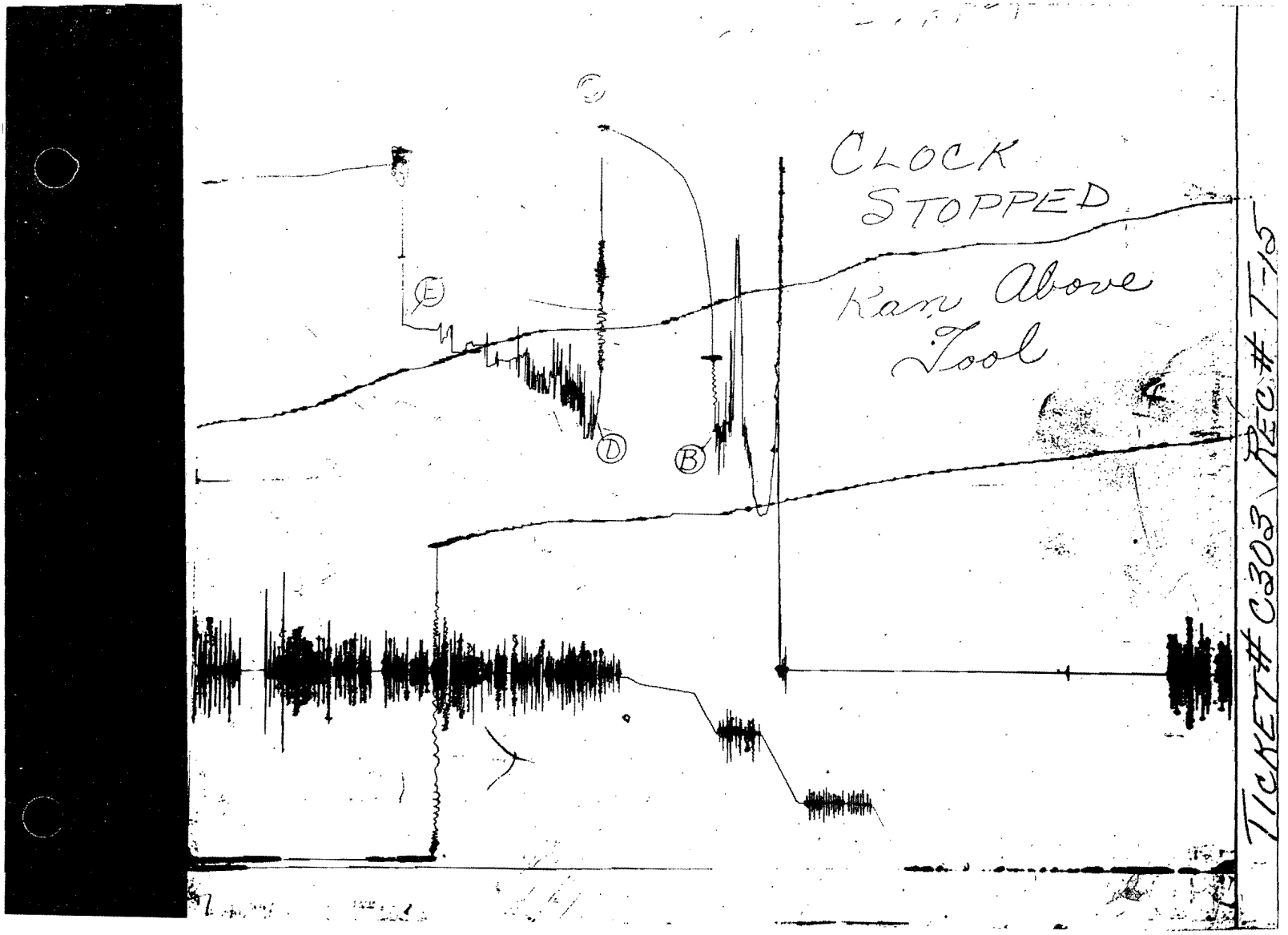
F
G
7/" RET# C303 REQ # T-353


CLOCK
STOPPED
Ran Above
Tool
E
D
B
TICKET# C3303 REC. # T-15

A
B
C
D
1
4
TICKET # 6303 PEO # T-435

JOHNSTON TESTERS

Pressure Data

Test Ticket No. C-303

JTL-CD-5

Recorder No.	T-15	T-353	T-435		
Capacity (P.S.I.G.)	7000	9000	10000		
Recorder Depth	11847	11880	11887		
Pressure Gradient P.S.I./Ft.					
Well Temperature °F.	318°	318°	318°		
A Initial Hydrostatic	Ran above tool	7534#	7538#		
B First Initial Flow	3183#	3841#	3966#		
C Initial Shut-In-Pres	5758#	5714#	5721#		
D Flowing Pres	3283#	3819#	3954#		
E Final Flow	4148#	4650#	4656#		
F Final Shut-In	Clock Stopped	5434#	5435#		
G Final Hydrostatic	Ran above tool	7503#	7510#		

Remarks

T-15 - Inside Recorder-Called in for recalibration.
T-353- Outside Recorder
T-435- Outside Recorder

JOHNSTON TESTERS

Pressure Breakdown Data

JTL-CD-6

Date February 4, 1964 Test Ticket No. C-303

Recorder No. T-435 Capacity 10,000 Recorder Depth 11887

Clock No. _____ Clock travel _____ inches per min. Well Temperature 318 °F.

Point		Pressure
A	Initial Hydrostatic	7538#
B	First Initial Flow	3966#
C	Initial Shut-In-Pres	5721#
D	Flowing Pres	3954#
E	Final Flow	46 56#
F	Final Shut-In	5435#
G	Final Hydrostatic	7510#

	Time Given	Time Computed
Opened Tool	0812 M.	
First Flow	15 Mins.	_____ Mins.
Initial Shut-In	30 Mins.	_____ Mins.
Flow	180 Mins.	_____ Mins
Final Shut-In	120 Mins.	_____ Mins.

Remarks: _____

PRESSURE INCREMENTS

Initial Shut-in

Breakdown: 10 increments of 3 mins. and a final increment of _____ mins.

Point Minutes	Pressure	$\frac{T + \Delta t}{\Delta t}$
0	3966	
3	4863	4.33
6	5188	2.67
9	5356	2.11
12	5443	1.83
15	5512	1.67
18	5569	1.56
21	5615	1.48
24	5659	1.42
27	5694	1.37
30	5721	1.33

Final Shut-in

Breakdown: 24 increments of 5 mins. and a final increment of _____ mins.

Point Minutes	Pressure	$\frac{T + \Delta t}{\Delta t}$
0	4656	
5	4743	39.00
10	4810	20.00
15	4867	13.67
20	4915	10.50
25	4952	8.60
30	4990	7.33
35	5025	6.43
40	5059	5.75
45	5088	5.22
50	5119	4.80
55	5147	4.45
60	5176	4.17
65	5201	3.92
70	5222	3.71
75	5249	3.53
80	5274	3.38
85	5297	3.24
90	5318	3.11
95	5335	3.00
100	5356	2.90
105	5376	2.81
110	5397	2.73
115	5416	2.65
120	5435	2.58

Breakdown: _____ increments of _____ mins. and a final increment of _____ mins

Point Minutes	Pressure	$\frac{T + \Delta t}{\Delta t}$

JTL.CD.8

GAS ZONE CALCULATIONS

Test No. 4 Ticket No. C-303

Company CANADA SOUTHERN PETROLEUMS LTD.

Well Name & No. CANADA SOUTHERN ET AL N. BEAVER Y.T. 1-27
60°-06'-53"N 124°-04'-00"W.

G = 50 MCF Day ESTIMATED

Transmissibility

$$\frac{Kh}{\mu z} = \frac{1637, Q\ ^{\circ}Tf}{Mg.} = \frac{1637 \times 50 \times 778 \times (\quad)}{13,746425} = \frac{4.6}{cp.} \text{ Md-Ft.}$$

Average Effective Permeability (h = 30 ft. TEST INTERVAL

$$\frac{K}{\mu z} = \frac{4.6}{30} = \frac{0.15}{c.p.} \text{ Md/ft.}$$

Estimated Damage Ratio

$$E.D.R. = \frac{1}{\text{Log } T + 2.65}\left\{\frac{Po^2 - Pf^2}{Mg}\right\} = \frac{1}{4.9288}\left\{\frac{13,783,689}{13,746,425}\right\} = (.2028)(1.0027) =$$

E.D.R. = 0.2

Potentiometric Surface

P.S. = (Po × 2.309 ft. PSI) − (Recorder Depth to Sea Level)

P.S. = (5955 × 2.309) − ( )

P.S. = 13,750 ft. ABOVE RECORDER

Estimated Potential with Damage Ratio Removed

E.D.R. × G = 0.2 × 50 = 50 MCF Day

μ = .0255
Z = 1.09
μz = .24525
Kh = 1.1 md.-ft.
K = .04 md.

JTL.CD.4

JOHNSTON TESTERS

TEST DATA

Formation	Nahanni	Zone Thickness		Ft.	
Interval	12,630	To	12,935	T.D.	12,935
Type of Test	Open Hole, Bottom Hole.				
Time Started in Hole	0900 Hrs.	Tool Open	1334	Hrs.	
First Flow	0 Min.	Shut In	0	Min.	
Second Flow	0 Min.	Final Shut In	0	Min.	
Pulled Loose @	1430 Hrs.	Out of Hole	2030	Hrs.	
Wt. Set on Packer	45,000	# Pulled Loose Wt.	75,000	#	

Remarks

Description of Blow During Test: Mis-Run. Seat failure.

GAS BLOW MEASUREMENTS

Measured with ____ I.D. Riser or Est. ☐

Type of Instrument ____

Time	Sfce. Choke	Reading Inches	Cubic Feet/Day

FLUID RECOVERY

Was Test Reverse Circulated Yes ☐ No ☒

Fluid Recovered (Total) 8510 Ft.

Description of Fluid Recovered: 5010' of drilling fluid. 3500' of water cushion

Remarks: Mis-Run. Seat failure.

Co. Rep. A. Wright

Tester R. Thomas

Elevation	1500' GL
Bottom Hole Choke Size	3/4"
Fluid Cushion Type	Water
Amount	3500'

TOOL SEQUENCE

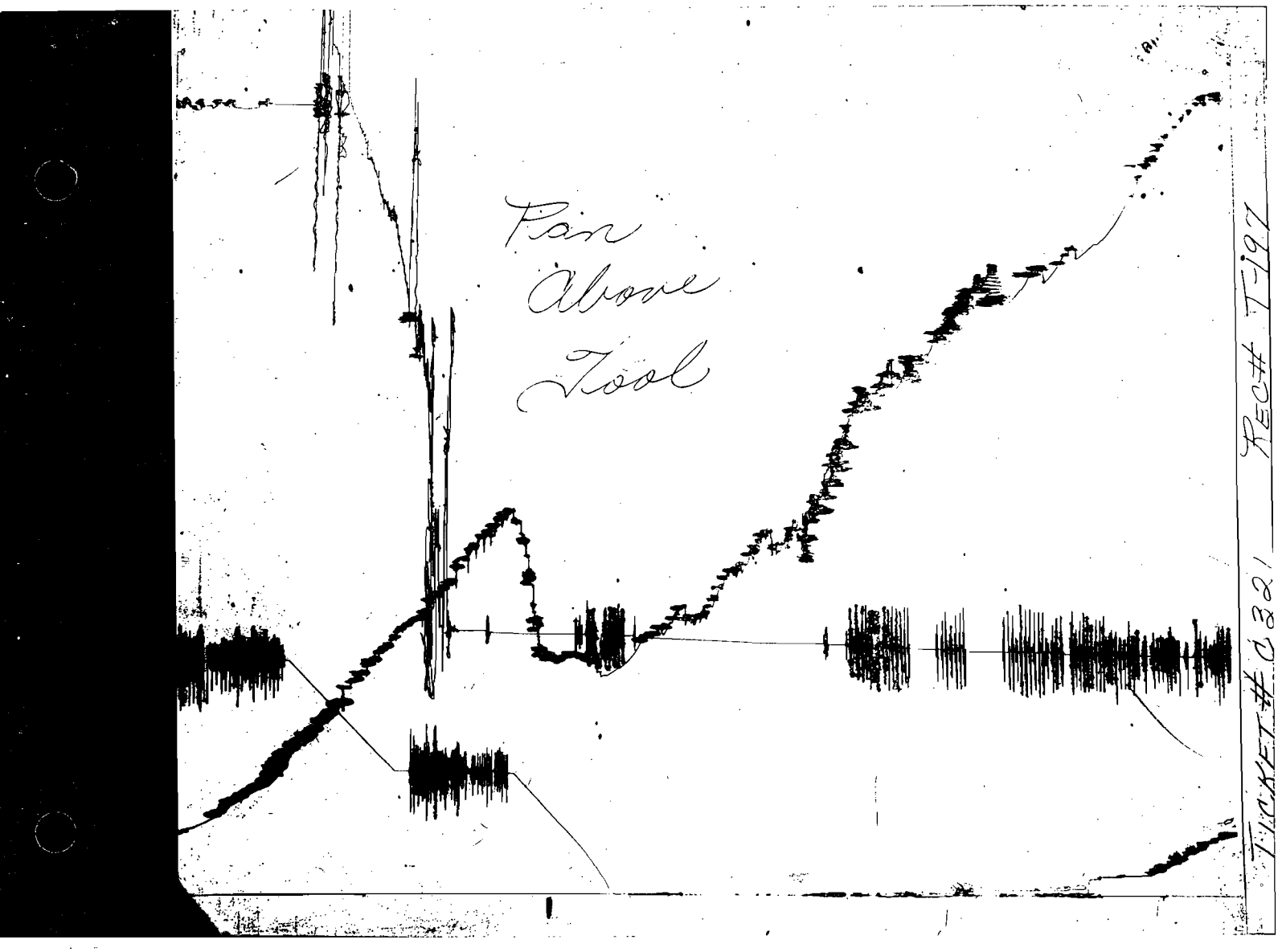
Tool	Length	O.D.
Sub.	.67	
P.O. Sub.	.68	
Sub.	.86	
D.P. Sub.	.67	
S.I.T.	6.07	
Recorder	5.90	
Hyd. Tool	7.45	
Jars	6.43	
Jars	4.12	
Safety Jt.	1.70	
T.C. & Pkr.	7.13	
T.C. & Pkr.	4.63	
Total	46.31	
Stub	1.00	
Perf.	15.00	
Recorder	5.93	
Perf.	4.00	
Sub.	.67	
Drill Collar's	265.02	
Sub.	.75	
Recorder	5.90	
Perf.	5.00	
Perf. & B. Nose	1.52	
Total Intv.	304.79	
Total Length	351.10	

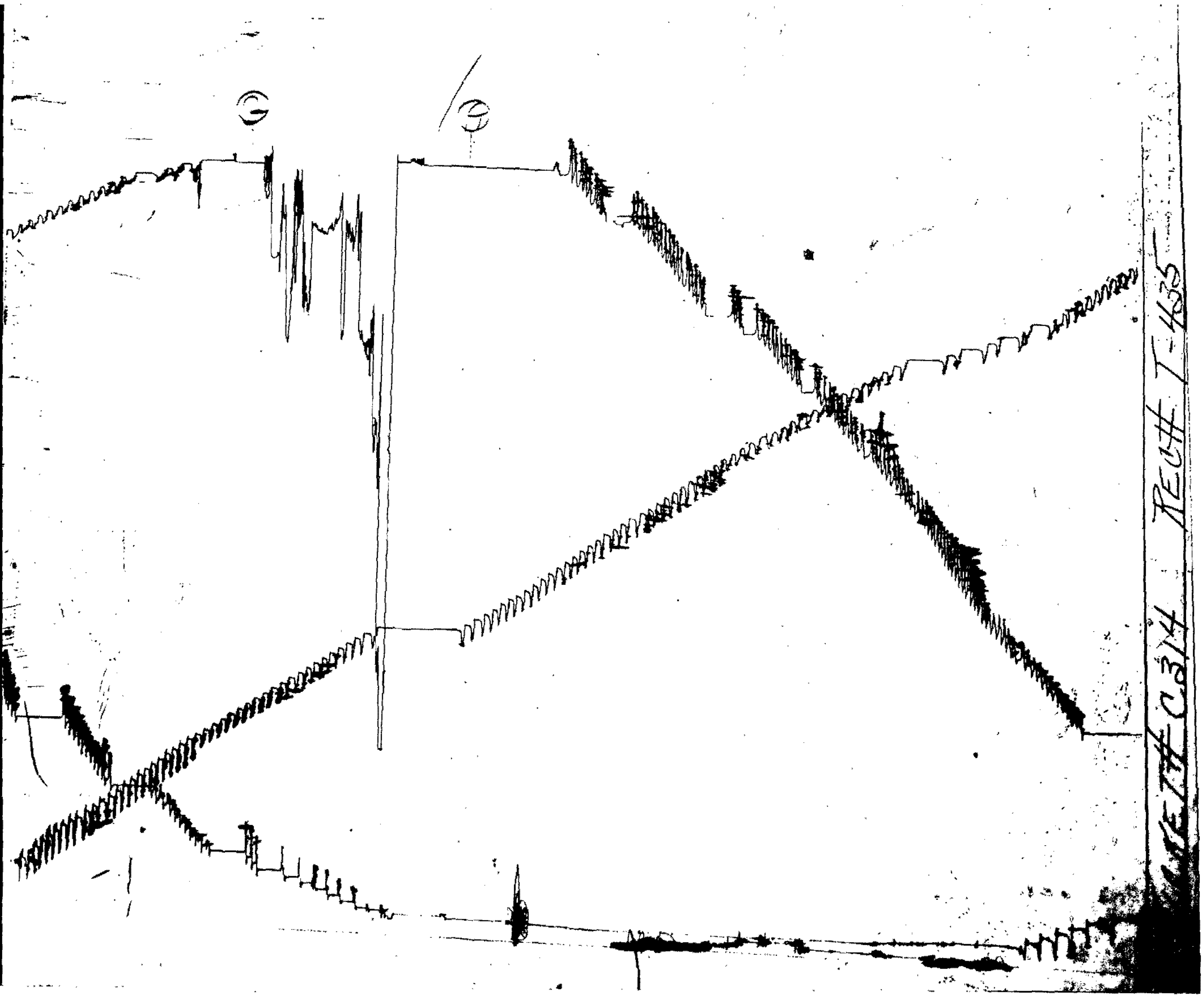
MUD AND HOLE DATA

Mud Type	Gel	W.L.	1.6
Filter Cake	2/32 Visc. 58	Wt.	11.7
Time Taken	March 3/64 @ 1400 hrs.		
Contractor	Cascade Drilling	Rig No.	19
Drill Pipe Size	3 1/2 IF		
Drill Collar Size	2 1/4 ID Length		
Main Hole Size	5 7/8"		
Rat Hole Size			

District	Ft. St. John	Ticket No.	C 314
Date	March 4/64		
Company	Canadian Southern Petroleums	Address	706-7 Avenue West, Calgary, Alberta
Well Name	Canada Southern et al N. Beaver R.	T.L. No.	5
J.T.L. Test No.	5		
Number	#YT-I-27-60°-06'-53"N-124°-04'-00"W.	Field	Wildcat
Province	Yukon Territories		
Formation and Interval	Nahanni -12,630-12,935	Consultant	

Distribution of Reports: 16-Calgary, c/o Dome Petroleum Limited.


Pair
Above
Tool
TICKET # 0321 REC# T-197


#C314 REC# I-435

Right T-3552

JOHNSTON TESTERS

Pressure Data

Test Ticket No. C 314

JTL-CO-S

Recorder No.	T-375	T-353	T-435		
Capacity (P.S.I.G.)	7000	9000	10,000		
Recorder Depth	12,593	12,647	12,925		
Pressure Gradient P.S.I./Ft.					
Well Temperature °F.	320°	320°	320°		
A Initial Hydrostatic	Ran Above Tool	7985#	8161#		
B First Initial Flow					
C Initial Shut-In-Pres					
D Flowing Pres		Mis-Run.			
E Final Flow		Seat			
F Final Shut-In		Failure.			
G Final Hydrostatic	Ran Above Tool	7985#	8161#		

Remarks T-375-Inside Recorder
T-353-Outside Recorder
T-435-Outside Recorder

JTL-CD-4

JOHNSTON TESTERS

TEST DATA

Formation	Nahanni	Zone Thickness			Ft.
Interval	12,679	To	13,143	T.D.	13,143
Type of Test	Open Hole, Bottom Hole,				
Time Started in Hole	0030	Hrs.	Tool Open	0637	Hrs.
First Flow	21	Min.	Shut In	35	Min.
Second Flow	180	Min.	Final Shut In	120	Min.
Pulled Loose @	1233	Hrs.	Out of Hole	1930	Hrs.
Wt. Set on Packer	30,000	#	Pulled Loose Wt.	50,000	#

Remarks

Description of Blow During Test: Good blow, increasing throughout test. Gas to surface in 112 minutes, 7' flare.

GAS BLOW MEASUREMENTS

Measured with I.D. Riser or Est. ☐

Type of Instrument

Time	Sfce. Choke	Reading Inches	Cubic Feet/Day
			T.S.T.M.

FLUID RECOVERY

Was Test Reverse Circulated Yes ☐ No ☒

Fluid Recovered (Total) 5000 Ft.

Description of Fluid Recovered: 5000' of water cushion. (gas pockets).

Remarks: Test Satisfactory. After 45 minutes of final shut-in, fluid came to surface momentarily (water cushion) continuing @ 80 minutes of the F.S.- blowing back water every few minutes.

Co. Rep. A. Wright

Tester R. Thomas

Elevation	1500' GL
Bottom Hole Choke Size	1/2"
Fluid Cushion Type	Water
Amount	5200'

TOOL SEQUENCE

Tool	Length	O.D.
Sub.	.67	
P.O. Sub.	.68	
Sub.	.86	
D.P. Sub.	.67	
S.I.T.	6.07	
Recorder	5.90	
Hyd. Tool	7.45	
Jars	6.42	
Jars	4.12	
Safety Jt.	1.70	
T.C. & Pkr.	7.03	
T.C. & Pkr.	5.67	
T.C. & Pkr.	5.20	
Total	52.44	
Stub	1.30	
Perf.	30.00	
Recorder	5.93	
Perf.	4.00	
Sub.	.67	
Drill Collar	408.72	
Sub.	.75	
Recorder	5.90	
Perf.	5.00	
Perf. & b. Nose	1.50	
Total Intv.	463.77	
Total Length	516.21	

MUD AND HOLE DATA

Mud Type Gel (sulfactant) W.L. 1.4

Filter Cake 1/32 Visc. 50 Wt. 10.3

Time Taken March 8/64 @ 1600 hrs.

Contractor Cascade Drilling Rig No. 19

Drill Pipe Size 3 1/2 IF

Drill Collar Size 2 1/4 ID Length 410'

Main Hole Size 5 7/8"

Rat Hole Size

District Ft. St. John Ticket No. C 316 Date Mar. 8/64

Company Canada Southern Petroleums Ltd. Address 706-7 Avenue West, Calgary, Alberta

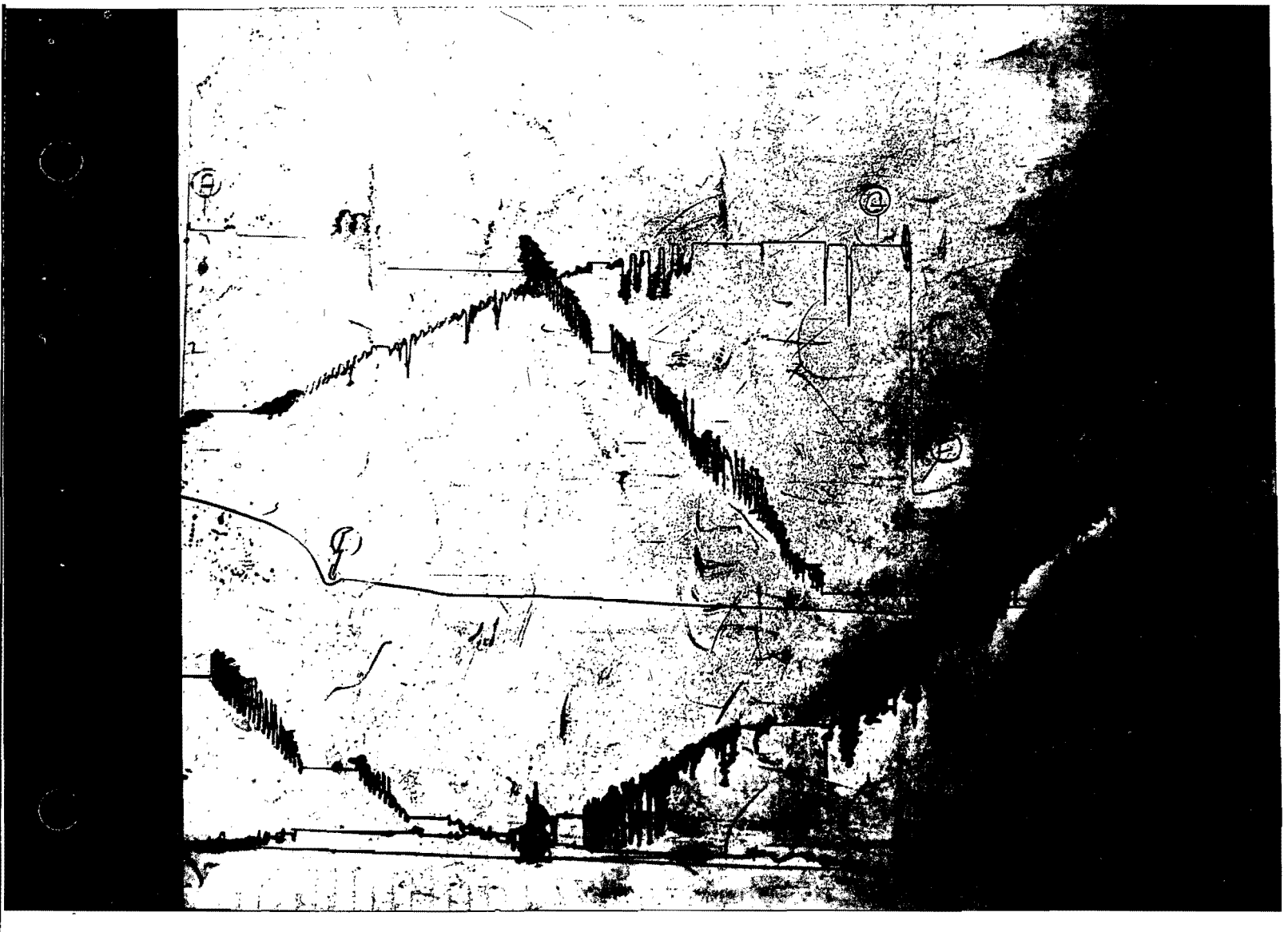
Well Name Canada Southern et al N. Beaver R. Test No. 7 J.T.L. Test No. 7

Number #YT-I-27-60°-06'-53"N-124°-04'-00"W. Wildcat Province Yukon Territories

Formation and Interval Nahanni -12,679-13,143 Consultant

Distribution of Reports 16-Calgary, c/o Dome Petroleum Limited.

TICKET #C316 [illegible] T-353


A
C
f

JOHNSTON TESTERS

Pressure Data

Test Ticket No. C 316

JTL-CD-5

Recorder No.	T-375	T-353	T-435		
Capacity (P.S.I.G.)	7000	9000	10,000		
Recorder Depth	12,636	12,711	13,132		
Pressure Gradient P.S.I./Ft.					
Well Temperature °F.	314°	314°	340°		
A Initial Hydrostatic	Ran Above Tool	6903#	7163#		
B First Initial Flow		2662#	2888#		
C Initial Shut-In-Pres	Clock	4382#	4620#		
D Flowing Pres.		2757#	2980#		
E Final Flow	Stopped.	2834#	3072#		
F Final Shut-In		4158#	4401#		
G Final Hydrostatic	Ran Above Tool	6879#	7102#		

Remarks T-375-Inside Recorder
T-353-Outside Recorder
T-435-Outside Recorder Called in for recalibration.

JTL CD-4

JOHNSTON TESTERS

TEST DATA

Formation: Nahanni — Zone Thickness: Ft.
Interval: 13,812 To 14,058 T.D. 14,058
Type of Test: Open Hole, Bottom Hole.
Time Started in Hole: 2045 Hrs. | Tool Open: 0325 Hrs.
First Flow: 0 Min. | Shut In: 0 Min.
Second Flow: 0 Min. | Final Shut In: 0 Min.
Pulled Loose @: 0345 Hrs. | Out of Hole: 1000 Hrs.
Wt. Set on Packer: 45,000 # Pulled Loose Wt.: 60,000 #
Remarks: Tool was chased 4' during test period.

Description of Blow During Test: Mis-Run.
Seat Failure.

GAS BLOW MEASUREMENTS

Measured with: I.D. Riser or Est. ☐
Type of Instrument:

Time	Sfce. Choke	Reading Inches	Cubic Feet/Day

FLUID RECOVERY

Was Test Reverse Circulated Yes ☐ No ☐
Fluid Recovered (Total): Not Reported. Ft.
Description of Fluid Recovered

Remarks

Mis-Run, Seat Failure.

Co. Rep. A. Wright
Tester R. Thomas

Elevation: 1500 ' GL
Bottom Hole Choke Size: 1/2"
Fluid Cushion Type: Water
Amount: 4000'

TOOL SEQUENCE

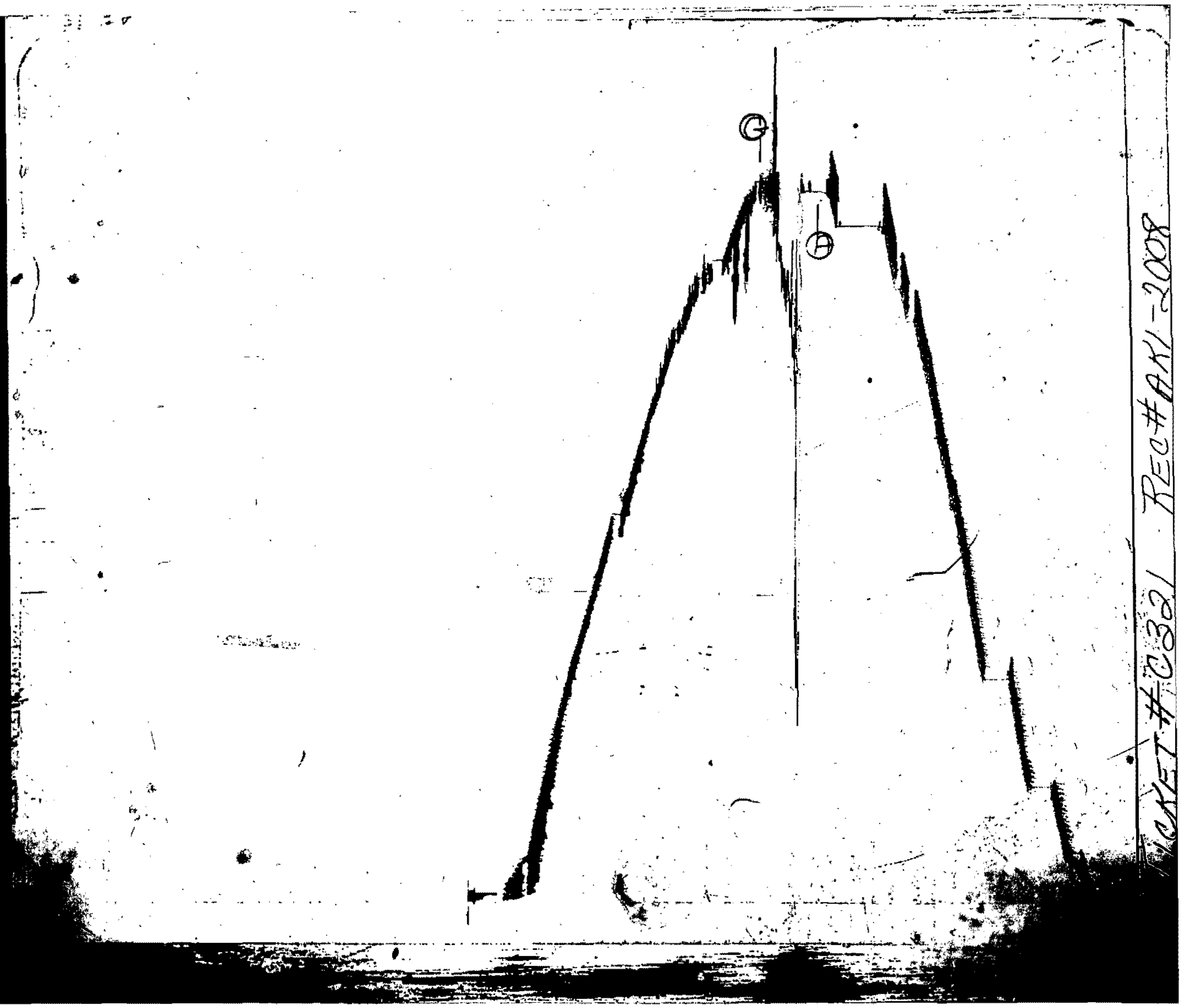
Tool	Length	O.D.
Sub.	.67	
P.O. Sub.	.72	
Sub.	.66	
D.P. Sub.	.67	
S.I.T.	6.07	
Recorder	5.90	
Hyd. Tool	7.45	
Bowen Jars	6.42	
Jars	4.12	
Safety Jt.	1.70	
T.C. & Pkr.	7.03	
T.C. & Pkr.	5.67	
T.C. &Pkr.	5.20	
Total	52.28	
Stub	1.30	
Perf.	15.00	
Recorder	5.90	
Perf.	5.00	
Sub.	.63	
Drill Collar's	204.02	
Sub.	.80	
Recorder	5.90	
Perf.	5.00	
Perf. & B. Nose	2.50	
Total Intv.	246.05	
Total Length	298.33	

MUD AND HOLE DATA

Mud Type: Na Surfactant W.L. 2.0
Filter Cake 1/32 Visc. 55 Wt. 9.9
Time Taken: March 18/64 @ 1400 hrs.
Contractor: Cascade Drilling Rig No. 19
Drill Pipe Size: 3 1/2 IF
Drill Collar Size: 2 1/4 ID Length 620'
Main Hole Size:
Rat Hole Size: 5 7/8"

District: Ft. St. John Ticket No.: C 321 Date: March 19/64
Company: Canada Southern Petroleums Ltd. Address: 706-7 Avenue West, Calgary, Alberta
Well Name: Canada Southern et al N. Beaver R. Test No.: 8 J.T.L. Test No.: 8
Number: #YT-I-27-60°-06'-53"N-124°-04'-00"W. Wildcat Province: Yukon
Formation: Nahanni -13,812-14,058 Consultant:
and Interval: DST #8
Distribution of Reports: 16-Calgary, c/o Dome Petroleum Limited.


Pan Above
Tool
Rec# T-375


G
D
CKET #C0321 REC#AKI-2008

G
A
Rec# T-399

JOHNSTON TESTERS

Pressure Data

Test Ticket No. C 321

JTL-CO-5

Recorder No.	T-197	AK1-2008	T-399		
Capacity (P.S.I.G.)	7000	8000	9000		
Recorder Depth	13,769	13,829	14,046		
Pressure Gradient P.S.I./Ft.					
Well Temperature °F.	360° EST	360° EST	360° EST		
A Initial Hydrostatic		6862#	7082#		
B First Initial Flow	Ran Above				
C Initial Shut-In-Pres	Tool	Mis-Run,			
D Flowing Pres		Seat			
E Final Flow		Failure.			
F Final Shut-In					
G Final Hydrostatic		6998#	7165#		

Remarks T-197-Inside Recorder
AK1-2008-Outside Recorder
T-399-Outside Recorder

C.G.L. 51

CHEMICAL & GEOLOGICAL LABORATORIES LTD.

Operator Canada Southern Petroleums Ltd. Interval Cored 12,591' To 12,619'

Well No. Canada Southern et al N. Beaver R. Coring Fluid Gel-Chemical Mud
Y.T. 1-27

Lab. No. C6265 Elevation 1446' K.B. Formation Nahanni

Comments Prior to analysis, the test samples were cleaned in a soxhlet-type solvent extractor for 13 hours and oven-dried for 6 hours at 220°F..

It may be noted that the horizontal permeabilities in samples 1, 8, 9, 12, 13, 16 and 17 are noteably higher primarily due to the vuggy channels in these samples which may or may not be extended under reservoir conditions.

Sample number 2 had an open fracture in conjunction with a vug which would afford an open horizontal permeability which made this sample unsuitable for test.

CGL 50

10568 - 114 St.

CHEMICAL & GEOLOGICAL LABORATORIES LTD.

EDMONTON, ALBERTA

PHONES: 25624
42562

FULL DIAMETER CORE STUDY

OPERATOR Canada Southern Petroleums Ltd. FIELD (Wildcat) WELL NO. Canada Southern et al N. Beaver R. Y.T. 1-27

LOCATION 60 06' 53" N. L. 124 04' 00" W. L. FORMATION Nahanni DEPTHS 12591'-12619' DATE Received: February 12, 1964 LAB NO. C6265

Footage of Nahanni formation cored	28.0'	No. of representative samples selected for analysis	18.
FEET OF CORE:			
Received at laboratory for analysis	31.4'	Compared (to tested samples)	---
Extra	3.4'	Dense sections not represented	8.4'
Represented by samples	23.0'	Badly fractured sections not represented	---

SUMMARY OF REPRESENTED SECTIONS:

(1) $\frac{\text{represented}}{\text{received}} = \frac{23.0'}{31.4'}$ (2) $\frac{\text{represented}}{\text{cored}} = \frac{23.0'}{28.0'}$

Weighted average porosity	2.6 %	Maximum porosity	6.3 %
Weighted average K_H permeability	7.6 md.	Minimum porosity	0.8 %
Weighted average K' permeability	0.65 md.	Maximum K_H permeability	95. md.
Weighted average vertical permeability	0.15 md.	Minimum K_H permeability	0.03 md.
Weighted average maximum permeability	--- md.	Maximum vertical permeability	0.75 md.
Porosity Feet	59.13	Minimum vertical permeability	0.03 md.

CORE WITH MAXIMUM PERMEABILITY:

	10.0 md. or greater	between 1.0 and 9.9 md. inclusive	less than 1.0 md.	(a)
Footage	---	---	21.8'	1.2'
Weighted average porosity	--- %	--- %	2.4 %	6.3 %
Weighted average K_H permeability	--- md.	--- md.	7.6 md.	(a) md.
Weighted average vertical permeability	--- md.	--- md.	0.15 md.	0.13 md.
Porosity feet	---	---	51.57	7.56

CGL 30

CHEMICAL & GEOLOGICAL LABORATORIES LTD.

Operator Canada Southern Petroleums Limited Well No. Canada Southern et al N. Beaver E. Y.T. 1-27 Lab. No. C6265 Date Received: February 12, 1964

Sample Number	Midpoint of Sample in Ft.	Representative of Feet	Footage Rep.	Permeability md. Vertical	K_H	K'	% Porosity	Porosity Feet	Description
Core Number 1		Interval Cored 12,591 to 12,619.		Received in lab. 31.4 Feet			Nahanni Formation		
No Sample		12591.0-12591.2	0.2	---	---	---	---	---	D Dol
1	12591.4	12591.2-12593.1	1.9—	0.03	1.8✓	1.8	3.0✓	5.70—	Dol NR SI A
2	12593.7	12593.1-12594.3	1.2—	0.13	(a)✓	(a)	6.3✓	7.56—	Dol OccV X NR OF A
3	12594.6	12594.3-12595.1	0.8	0.09	0.30	0.15	2.6	2.08	Dol OccV X NR A
4	12595.9	12595.1-12596.3	1.2	0.06	0.08	0.07	2.3	2.76	Dol OccV X NR A
5	12597.2	12596.3-12597.4	1.1	0.07	0.11	0.10	0.9	0.99	Dol SI NR A
6	12597.7	12597.4-12598.0	0.6	0.19	0.68	0.66	3.0	1.80	Dol OccV X NR A
7	12598.7	12598.0-12599.6	1.6	0.05	0.05	0.03	2.4	3.84	Dol OccPPV X NR A
No Sample		12599.6-12602.1	2.5	---	---	---	---	---	D Dol
8	12602.5	12602.1-12603.2	1.1—	0.15	13. ✓	1.6	2.1✓	2.31—	Dol OccPPV X NR A
No Sample		12603.2-12604.5	1.3	---	---	---	---	---	D Dol
9	12604.8	12604.5-12605.8	1.3—	0.15	1.6✓	0.04	4.2✓	5.46—	Dol OccV X NR A
10	12606.0	12605.8-12606.8	1.0	0.08	0.12	0.11	2.7	2.70	Dol OccV X NR A
11	12608.5	12606.8-12609.0	2.2	0.05	0.41	0.37	1.5	3.30	Dol SI NR A HC
12	12609.3	12609.0-12610.2	1.2	0.10	95.	0.21	0.8	0.96	Dol OccV X NR A
13	12610.8	12610.2-12612.0	1.8—	0.75	1.4✓	1.3	3.0✓	5.40—	Dol OccV X NR A
14	12612.5	12612.0-12612.8	0.8	0.03	0.07	0.05	1.4	1.12	Dol OccV X NR A
15	12613.1	12612.8-12614.2	1.4	0.09	0.68	0.58	2.9	4.06	Dol OccV X NR A
16	12614.8	12614.2-12616.1	1.9	0.06	11. ✓	1.4	2.4✓	4.56—	Dol SI NR A HC
No Sample		12616.1-12619.7	3.6—	---	---	---	---	---	D Dol
17	12620.1	12619.7-12620.7	1.0	0.41	4.6✓	1.0	3.0✓	3.00	Dol OccV X NR A
18	12621.2	12620.7-12621.6	0.9—	0.04	0.22	0.22	1.7	1.53—	Dol SI NR A
No Sample		12621.6-12622.4	0.8	---	---	---	---	---	D Dol

11.8' @ 2.76 % → 32.52 φ ft cutoff { K ≥ 1.0 md, φ → 20 %

CORE DESCRIPTION SYMBOLS

D	Dense	Dol	Dolomite
NR	Not reactive to cold 15% HCl	SI	Slightly Intergranular
A	Anhydrite	OccV	Occasional Vugs
X	Crystals	OF	Open Fracture
HC	Horizontal Crack	OccPPV	Occasional Pin Point Vugs
(a)	Unsuitable for test.	K_H	Maximum Horizontal Permeability measured.
K'	Taken 90° to K_H.		

NB. K_H and K' are transverse permeability measurements on full diameter samples.

CORE LABORATORIES-CANADA LTD.
PETROLEUM RESERVOIR ENGINEERING
CALGARY, ALBERTA

GAS ANALYSIS

Company Canada Southern Petroleum Ltd. Page 1 of 2
Well Can Southern et al N Beaver R-YT I-27 File CBH-2 GA-1127
Field Wildcat, Yukon Analysts DR
Location 124 04' 00" W.L., 60 25' 02" N.L. Date February 20, 1964

SAMPLING CONDITIONS
Formation Nahanni Depths 12,160' - 12,619'
Sampled from Flow Test By Antonenko and Wright
Date Sampled Feb. 14, 1964 Date Received Feb. 16, 1964 Date Analyzed Feb. 17, 1964
Pressure 240 psig Temperature - °F. Atmospheric Temp. - °F.

DST Recovery or Flowrate 1.5 MMCF/D
Method of Analysis Chromatograph

Pressure in Container 250 psig. @ 72° F when received in laboratory

COMPONENT	MOL %	U.S. Gal. at 14.696 and 60°F.	Imp. Gal. at 14.65 and 60°F.
NITROGEN	2.45		
CARBON DIOXIDE	9.97		
HYDROGEN SULFIDE	0.29		
METHANE	87.20		
ETHANE	0.09		
PROPANE	-	-	-
ISOBUTANE	-	-	-
N-BUTANE	-	-	-
ISOPENTANE	-	-	-
N-PENTANE	-	-	-
HEXANES	-	-	-
TOTAL	100.00	-	-
Actual Pentanes +		-	-

Vapor pressure (Calculated) of actual Pentanes + - Psia @ 100° F.

Hydrogen Sulphide—Grains per 100 cu. ft.	-	
Gross Heating Value B.T.U. per SCF	880.0 psia & 60°F at 14.696	883.3 psia & 60°F at 14.65

Specific Gravity--Measured - Calculated 0.662

REMARKS: Note: This sample was taken into a "Sweet Gas" container so the H_2S reported is probably low.

The above datum complies with requirements of the Alberta Oil and Gas Conservation Board.

CORE LABORATORIES-CANADA LTD.
PETROLEUM RESERVOIR ENGINEERING
CALGARY, ALBERTA

GAS ANALYSIS

Company: Canada Southern Petroleum Ltd. — Page: 2 of 2
Well: Can Southern et al N Beaver R YT I-27 — File: CBH-2 CA-1127
Field: Wildcat, Yukon — Analysts: DR
Location: 124 04' 00" W.L., 60 25' 02" N.L. — Date: February 20, 1964

SAMPLING CONDITIONS

Formation: Nahanni — Depths: 12,160' - 12,619'
Sampled from: Flow Test — By: Antonenko and of Wright
Date Sampled: Feb. 14, 1964 — Date Received: Feb. 16, 1964 — Date Analyzed: Feb. 18, 1964
Pressure: - psig Temperature: - °F. Atmospheric Temp.: - °F.

DST Recovery or Flowrate: 1.5 MMCF/D
Method of Analysis: Chromatograph

Pressure in Container: 200 psig. @ 72° F when received in laboratory

COMPONENT	MOL. %	U.S. Gal. at 14.696 and 60°F.	Imp. Gal. at 14.65 and 60°F.
NITROGEN	0.82		
CARBON DIOXIDE	1.78		
HYDROGEN SULFIDE	0.06		
METHANE	97.12		
ETHANE	0.22		
PROPANE	-	-	-
ISOBUTANE	-	-	-
N-BUTANE	-	-	-
ISOPENTANE	-	-	-
N-PENTANE	-	-	-
HEXANES	-	-	-
TOTAL	100.00	-	-
Actual Pentanes +		-	
Vapor pressure (Calculated) of actual Pentanes +		-	

Hydrogen Sulphide—Grains per 100 cu. ft.: -

Gross Heating Value B.T.U. per SCF: 987.7 psia & 60°F at 14.696 — 984.6 psia & 60°F at 14.65

Specific Gravity—Measured: — Calculated: 0.576

REMARKS: Note: This sample was taken into a "Sweet Gas" container so the H_2S reported is probably low.

The above datum complies with requirements of the Alberta Oil and Gas Conservation Board.

CORE LABORATORIES CANADA LTD
PETROLEUM RESERVOIR ENGINEERING
CALGARY, ALBERTA

GAS ANALYSIS

Company Canada Southern Petroleum Ltd. Page 1 of 2
Well Canada Southern et al N Beaver R YT-I-27 File CBH-2 GA-1170
Field Wildcat, Yukon Analysts DR
Location Grid: 124° 0' 60° 10' NE Sec 27 Unit I Date March 31, 1964

SAMPLING CONDITIONS

Formation Nahanni Depths 12,679' - 13,143'
Sampled from DST No. 7 Sample No. 1 By P. Antonenko of Canada Southern Petroleum Ltd.
Date Sampled March 9, 1964 Date Received March 24,1964 Date Analyzed March 25, 1964
Pressure 70 psig Temperature 15 °F. Atmospheric Temp. - °F.

DST Recovery or Flowrate GTS TSTM: Rec. 900' Gas Cut Mud; 5200' Water Cushion
Method of Analysis Chromatograph

COMPONENT	MOL %	Pressure in Container 76 psig. 70° F when received in laboratory	
		U.S. Gal. at 14.696 and 60°F.	Imp. Gal. at 14.65 and 60°F.
NITROGEN	3.67		
CARBON DIOXIDE	0.06		
HYDROGEN SULFIDE	-		
METHANE	96.24		
ETHANE	0.03		
PROPANE	-		
ISOBUTANE Plus	Trace		
N-BUTANE	-		
ISOPENTANE	-		
N-PENTANE	-		
HEXANES	-		
TOTAL	100.00	-	-

Actual Pentanes
Vapor pressure (Calculated) of Actual Pentanes

Hydrogen Sulphide Grains per 100 cu. ft.
Gross Heating Value B.T.U. per SCF 974.4 psia & 60°F at 14.696 | 971.4 psia & 60°F at 14.65

Specific Gravity - Measured Calculated 0.570

REMARKS:

The above datum complies with requirements of the Alberta Oil and Gas Conservation Board.

CORE LABORATORIES CANADA LTD.
PETROLEUM RESERVOIR ENGINEERING
CALGARY, ALBERTA

GAS ANALYSIS

Company Canada Southern Petroleum Ltd. Page 2 of 2
Well Canada Southern et al N Beaver R YT-I-27 File CBH-2 GA-1170
Field Wildcat, Yukon Analysts DR
Location Grid: 124° 0' 60° 10' NE Sec 27 Unit I Date March 31, 1964

SAMPLING CONDITIONS

Formation Nahanni Depths 12,679' - 13,143'
Sampled from DST No. 7 Sample No. 2 By P. Antonenko of Canada Southern Petroleum Ltd.
Date Sampled March 9, 1964 Date Received March 24, 1964 Date Analyzed March 24, 1964
Pressure 70 psig Temperature 15 °F Atmospheric Temp. - °F.

DST Recovery or Flowrate GTS TSTM; Rec. 900' Gas Cut Mud, 5200' Water Cushion
Method of Analysis Chromatograph

Pressure in Container 92 psig. @ 70° F when received in laboratory

COMPONENT	MOL %	U.S. Gal. at 14.696 and 60°F.	Imp. Gal. at 14.65 and 60°F.
NITROGEN	12.79		
CARBON DIOXIDE	0.05		
HYDROGEN SULFIDE	-		
METHANE	87.08		
ETHANE	0.03		
PROPANE	Trace		
ISOBUTANE	Trace		
N-BUTANE	Trace		
ISOPENTANE	0.01	0.004	0.003
N-PENTANE	0.01	0.004	0.003
HEXANES	0.01	0.004	0.003
Heptanes +	0.02	0.009	0.007
TOTAL	100.00	0.021	0.016
Actual Pentanes		0.021	0.016

Vapor pressure (Calculated) of actual Pentanes 8.4 Psia @ 100° F

Hydrogen Sulphide - Grains per 100 cu. ft.

Gross Heating Value B.T.U. per SCF 884.3 psia & 60°F at 14.696 | 881.6 psia & 60°F at 14.65

Specific Gravity - Measured Calculated 0.609

REMARKS:

The above datum complies with requirements of the Alberta Oil and Gas Conservation Board.

CORE LABORATORIES-CANADA LTD.
CALGARY ALBERTA
~~CRUDE~~ Water ANALYSIS

Company Dome Petroleum Limited Page 1 of 1

Well Can Southern et al N Beaver R YT 127 File CBH-2-WA-2432

Field Beaver River Area, Northwest Territories Date Feb. 11, 1964

Location 124 04' 00' W.L. Analysts WV.

SAMPLING CONDITIONS

Formation - Depths 11865' - 12506'

Sampled from DST No. 4 by Client

Date Sampled Feb. 4, 1964 Date Received Feb. 6, 1964 Date Analyzed Feb. 6, 1964

FEET ABOVE TOOL	PPM CHLORIDE
11,500	20
9,175	1,235
3,700	2,130
2,000	2,364
1,175	2,655
Just above	2,840
Mud Pit	1,718

CGL-6

CHEMICAL & GEOLOGICAL LABORATORIES LTD.

Edmonton — Fort St. John — Calgary

WATER ANALYSIS REPORT Beaver River YT-1-27

Field ..... Well No. Laprise A-82-H

Operator Dome Petroleum Limited ..... Date Received February 13, 1964

Formation ..... Depths .....

Other pertinent data Sample #1

Recovered during open flow test of upper part of pay

..... Date Sampled: Not Known Lab. No. F1812-1

PARTS PER MILLION (MILLIGRAMS PER LITER)

Na & K	Ca	Mg	Fe	SO_4	Cl	CO_3	HCO_3	OH	H_2S
2,641	300	24	Present	881	2,542		2,550		

MILLIGRAM EQUIVALENTS

114.88	14.97	1.97		18.32	71.68		41.82		

MILLIGRAM EQUIVALENTS IN PERCENT

43.57	5.68	0.75		6.95	27.19		15.86		

Total Solids in Parts per Million

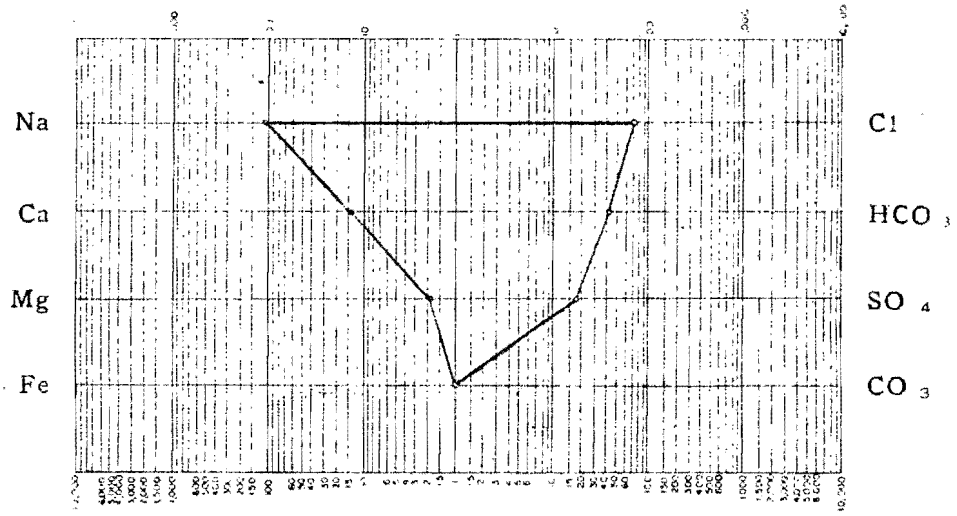
By evaporation	17,430
After ignition	7,470
Calculated	7,643
Specific Gravity	1.005
Observed pH	8.2
Resistivity	0.900 ohm meters @ 68° F.

Properties of Reaction in Percent

Primary salinity	68.28
Secondary salinity	---
Primary alkalinity	18.86
Secondary alkalinity	12.86
Chloride salinity	79.64
Sulfate salinity	20.36

Remarks and conclusions Heavy deposit of organic matter present in the total solids. This sample is mud filtrate.

LOGARITHMIC PATTERN
MEQ per unit



CGL-6

CHEMICAL GEOLOGICAL LABORATORIES LTD.

Edmonton — Fort St. John — Calgary

WATER ANALYSIS REPORT Beaver River YT-I-27

Field ..... Well No. ~~Leprice A-82-H~~

Operator Dome Petroleum Limited ..... Date Received February 13, 1964

Formation ..... Depths .....

Other pertinent data Sample #2

Recovered during open hole swab test of upper part of pay

Date Sampled: Not Known Lab. No. F1812-2

PARTS PER MILLION (MILLIGRAMS PER LITER)

Na & K	Ca	Mg	Fe	SO_4	Cl	CO_3	HCO_3	OH	H_2S
3,456	300	36		984	3,177		3,550		

MILLIGRAM EQUIVALENTS

150.35	14.97	2.96		20.47	89.59		58.22		

MILLIGRAM EQUIVALENTS IN PERCENT

44.67	4.45	0.88		6.08	26.62		17.30		

Total Solids in Parts per Million

By evaporation 19,340

After ignition 9,540

Calculated 9,700

Specific Gravity 1.008

Observed pH 8.4

Resistivity ..... 0.777 ohm meters @ 68° F.

Properties of Reaction in Percent

Primary salinity 65.40

Secondary salinity ..... ---

Primary alkalinity 23.94

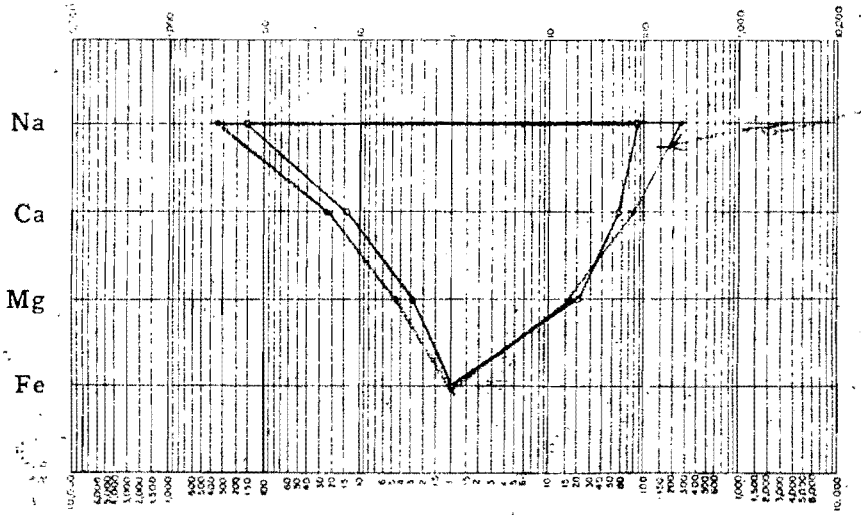
Secondary alkalinity 10.66

Chloride salinity 81.41

Sulfate salinity 18.59

Remarks and conclusions Heavy deposit of organic matter present in total solids. This sample is mud filtrate.

LOGARITHMIC PATTERN
MEQ per unit



CGL-6

CHEMICAL & GEOLOGICAL LABORATORIES LTD.

Edmonton — Fort St. John — Calgary

WATER ANALYSIS REPORT

Field (Wildcat), Yukon, N.W.T. Well No. C.S. et al WBR YT-I-27

Operator Dome Petroleum Limited Date Received March 12, 1964

Formation Depths 12,679' - 13,143'

Other pertinent data D.S.T. #7. Sampled 6 D.C. above tool.

Date Sampled: Not Known Lab. No. F1868

PARTS PER MILLION (MILLIGRAMS PER LITER)

Na & K	Ca	Mg	Fe	SO_4	Cl	CO_3	HCO_3	OH	H_2S
6,561	160	24		3,461	1,378	1,330	8,550		

MILLIGRAM EQUIVALENTS

285.41	7.98	1.97		71.99	38.86	44.29	140.22		

MILLIGRAM EQUIVALENTS IN PERCENT

48.32	1.35	0.33		12.19	6.58	7.50	23.73		

Total Solids in Parts per Million

By evaporation 22,390

After ignition 13,160

Calculated 17,125

Specific Gravity Insufficient Sample

Observed pH 8.6

Resistivity 0.503 ohm meters @ 68° F.

Properties of Reaction in Percent

Primary salinity 37.54

Secondary salinity ---

Primary alkalinity 59.10

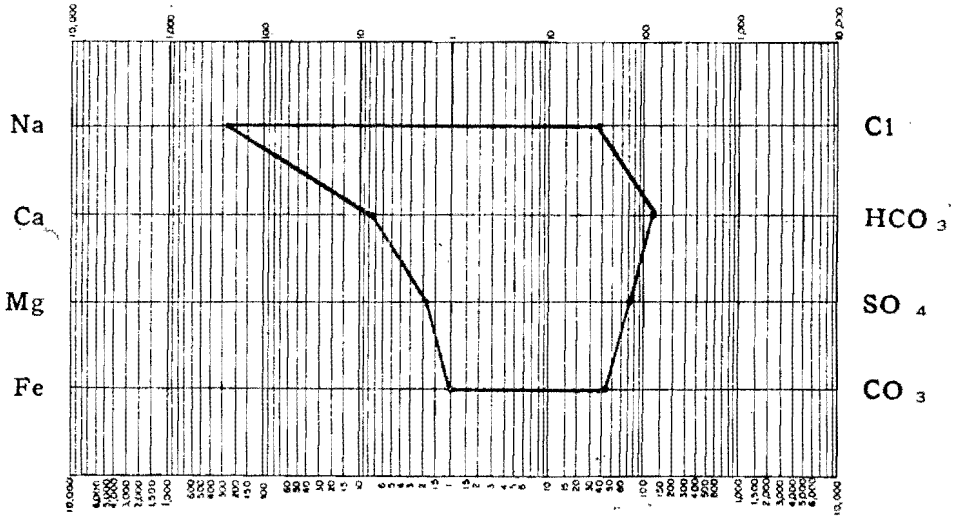
Secondary alkalinity 3.36

Chloride salinity 35.06

Sulfate salinity 64.94

Remarks and conclusions Heavy deposit of organic matter present in total solids. This sample appears to be mud filtrate.

LOGARITHMIC PATTERN
MEQ per unit



CORE LABORATORIES-CANADA LTD.

PETROLEUM RESERVOIR ENGINEERING

CALGARY, ALBERTA

WATER ANALYSIS

File CBH-2 WA-2497

Company Canada Southern Petroleum Ltd.

Well Name Can Southern et al Beaver R YT 127 Sample No. 1

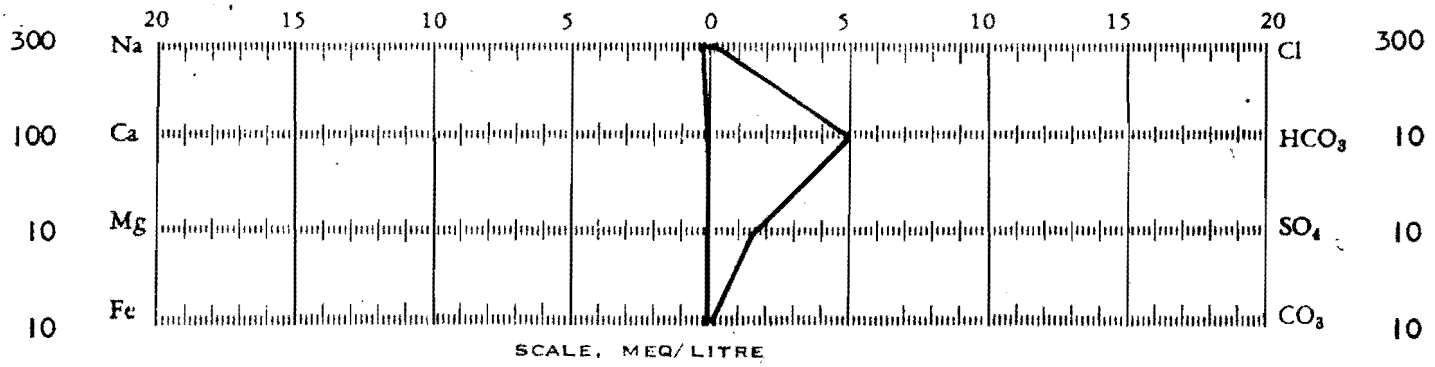
Formation Nahanni Depth 12679' - 13143' Sampled From 127 Standout DST #7

Location 124 04' 00" WL Field Beaver River Province Yukon

Date Sampled March 9, 1964 Date Analyzed March 26, 1964 Analyst BK

Recovery

Constituents		*Constituents*	Meq/L	ppm	*Constituents*	Meq/L	ppm
1. Total Solids	6588 ppm	6. Sodium	80.4	1849	11. Chloride	20.5	728
2. pH	8.3	7. Calcium	6.6	132	12. Bicarbonate	49.9	3040
3. Sp. gr	1.0035 @ 60 °F.	8. Magnesium	1.4	17	13. Sulfate	15.6	750
4. Resistivity	1.6 @ 72 °F. OHMS/M²M	9. Iron	Absent	-	14. Carbonate	2.4	72
		10. Barium	Absent	-	15. Hydroxide	Absent	-
5. Hydrogen Sulfide	Present						



CORE LABORATORIES-CANADA LTD.

PETROLEUM RESERVOIR ENGINEERING

CALGARY, ALBERTA

WATER ANALYSIS

File CBH-2 WA-2497

Company Canada Southern Petroleum Ltd.

Well Name Can Southern et al Beaver R YT 127 Sample No. 2

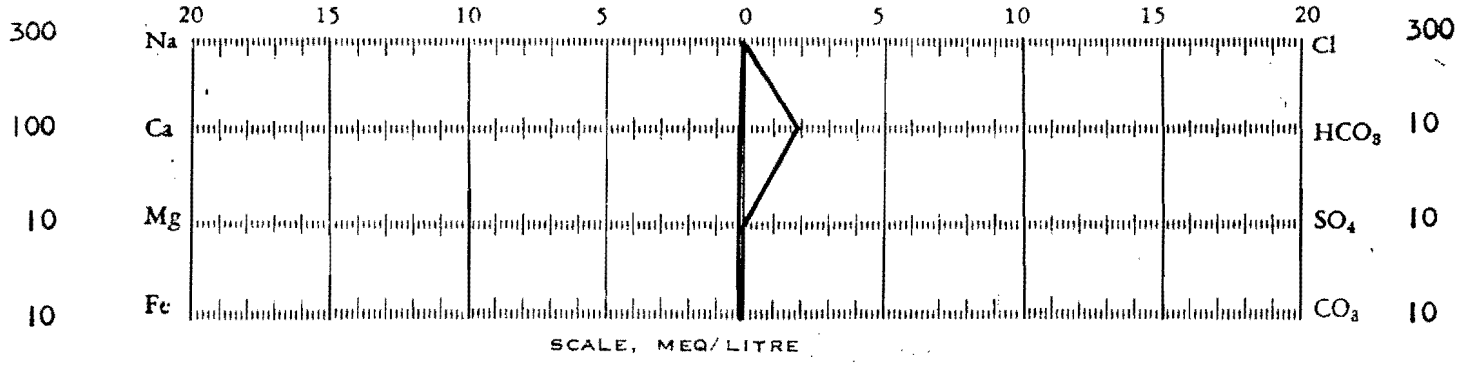
Formation Nahanni Depth 12679' - 13143' Sampled From 115 Stand out DST #7

Location 124 04' 00" WL Field Beaver River Province Yukon

Date Sampled March 9, 1964 Date Analyzed March 26, 1964 Analyst BK

Recovery

Constituents		*Constituents*	Meq/L	ppm	*Constituents*	Meq/L	ppm
1. Total Solids	1852 ppm	6. Sodium	6.2	143	11. Chloride	5.0	178
2. pH	6.3	7. Calcium	16.6	332	12. Bicarbonate	18.4	1120
3. Sp. gr	1.0007 @ 60 °F.	8. Magnesium	1.8	22	13. Sulfate	1.2	57
4. Resistivity	6.3 @ 72 °F. OHMS/M²M	9. Iron	Absent	-	14. Carbonate	Absent	-
		10. Barium	Absent	-	15. Hydroxide	Absent	-
5. Hydrogen Sulfide	Present						



CORE LABORATORIES-CANADA LTD.

PETROLEUM RESERVOIR ENGINEERING

CALGARY, ALBERTA

WATER ANALYSIS

File CBH-2 WA-2497

Company Canada Southern Petroleum Ltd.

Well Name Can Southern et al Beaver R YT 127 Sample No. 3

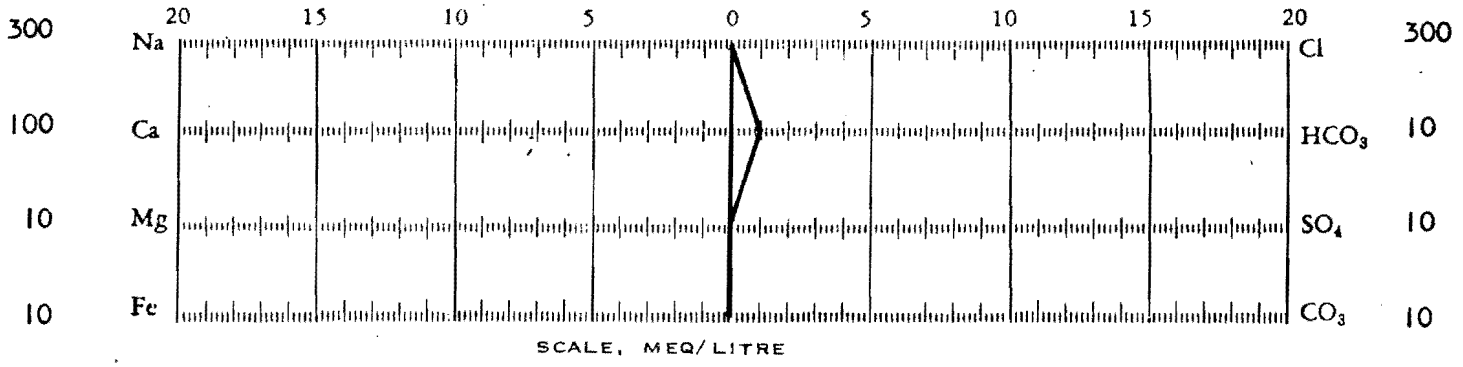
Formation Nahanni Depth 12679' - 13143' Sampled From 108 Stand out DST #7

Location 124 04' 00" WL Field Beaver River Province Yukon

Date Sampled March 9, 1964 Date Analyzed March 26, 1964 Analyst BK

Recovery

Constituents		*Constituents*	Meq/L	ppm	*Constituents*	Meq/L	ppm
1. Total Solids	1065 ppm	6. Sodium	2.4	55	11. Chloride	4.0	142
2. pH	7.4	7. Calcium	11.2	224	12. Bicarbonate	10.4	634
3. Sp. gr	1.0007 @ 60 °F	8. Magnesium	0.8	10	13. Sulfate	Trace	-
4. Resistivity	9.7 @ 72 °F. OHMS/M^2M	9. Iron	Absent	-	14. Carbonate	Absent	-
		10. Barium	Absent	-	15. Hydroxide	Absent	-
5. Hydrogen Sulfide	Present						



CHEMICAL & GEOLOGICAL LABORATORIES LTD.

EDMONTON — CALGARY — FORT ST. JOHN

Date Reported: April 8, 1964 Laboratory No.: F1897

DOME PETROLEUM LIMITED

N.Beaver R. YT I-27.

Well Name: ~~Boundary #6-2~~ Sample: Water

Date Received: April 6, 1964 Date Sampled: Not Known

CHLORIDE CONTENT: 50,880 ppm.

pH: 6.6

CGL-6

CHEMICAL & GEOLOGICAL LABORATORIES LTD.

Edmonton — Fort St. John — Calgary

WATER ANALYSIS REPORT

Field ..... Well No. Canada Southern et al N. Beaver R. YT-1-27

Operator Dome Petroleum Limited ..... Date Received April 8, 1964

Formation ..... Depths .....

Other pertinent data Sampled at 8:30 P.M.; 6500 LWR.

Date Sampled: April 7, 1964 Lab. No. F1911-1

PARTS PER MILLION (MILLIGRAMS PER LITER)

Na & K	Ca	Mg	Fe	SO_4	Cl	CO_3	HCO_3	OH	H_2S
21218	8010	1094		3	49820		465		

MILLIGRAM EQUIVALENTS

922.98	399.70	89.93		0.06	1404.92		7.63		

MILLIGRAM EQUIVALENTS IN PERCENT

32.67	14.15	3.18		0.00	49.73		0.27		

Total Solids in Parts per Million

By evaporation 85,020

After ignition 72,770

Calculated 80,374

Specific Gravity 1.055

Observed pH 6.1

Resistivity ..... 0.114 ohm meters @ 68° F.

Properties of Reaction in Percent

Primary salinity 65.34

Secondary salinity 34.12

Primary alkalinity ..... ---

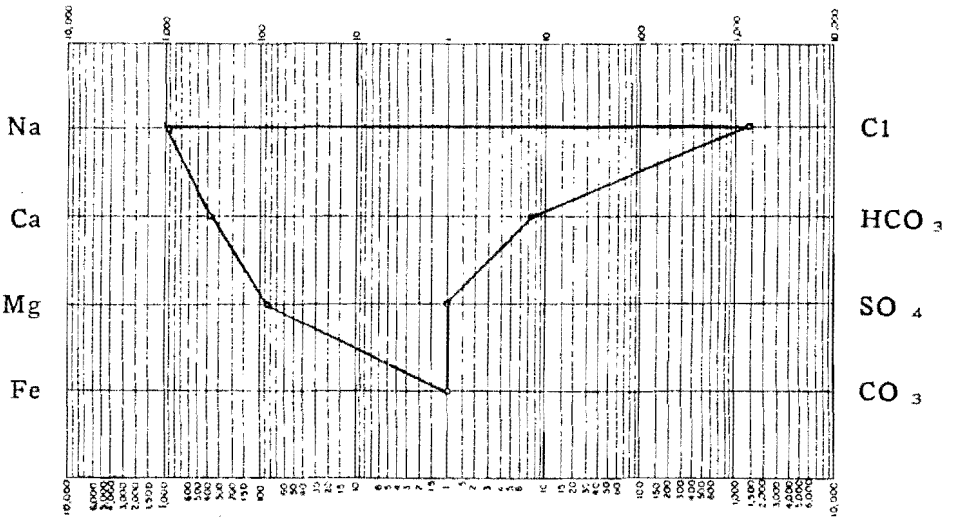
Secondary alkalinity 0.54

Chloride salinity 100.00

Sulfate salinity ..... ---

Remarks and conclusions .....

LOGARITHMIC PATTERN
MEQ per unit



CGL-6

CHEMICAL & GEOLOGICAL LABORATORIES LTD.

Edmonton — Fort St. John — Calgary

WATER ANALYSIS REPORT

Field ..... Well No. Canada Southern et al N. Beaver R. YT-1-27

Operator Dome Petroleum Limited ..... Date Received April 8, 1964

Formation ..... Depths .....

Other pertinent data Sampled at 1:00 P.M.; 12,858 - 13,770.

Date Sampled: April 8, 1964 Lab. No. F1911-2

PARTS PER MILLION (MILLIGRAMS PER LITER)

Na & K	Ca	Mg	Fe	SO_4	Cl	CO_3	HCO_3	OH	H_2S
16882	7209	972		20	41340		475		

MILLIGRAM EQUIVALENTS

734.37	359.73	79.90		0.42	1165.79		7.79		

MILLIGRAM EQUIVALENTS IN PERCENT

31.28	15.32	3.40		0.02	49.65		0.33		

Total Solids in Parts per Million

By evaporation 75,880

After ignition 59,510

Calculated 66,657

Specific Gravity 1.049

Observed pH 6.3

Resistivity ..... 0.132 ..... ohm meters @ 68° F.

Properties of Reaction in Percent

Primary salinity 62.56

Secondary salinity 36.78

Primary alkalinity ..... ---

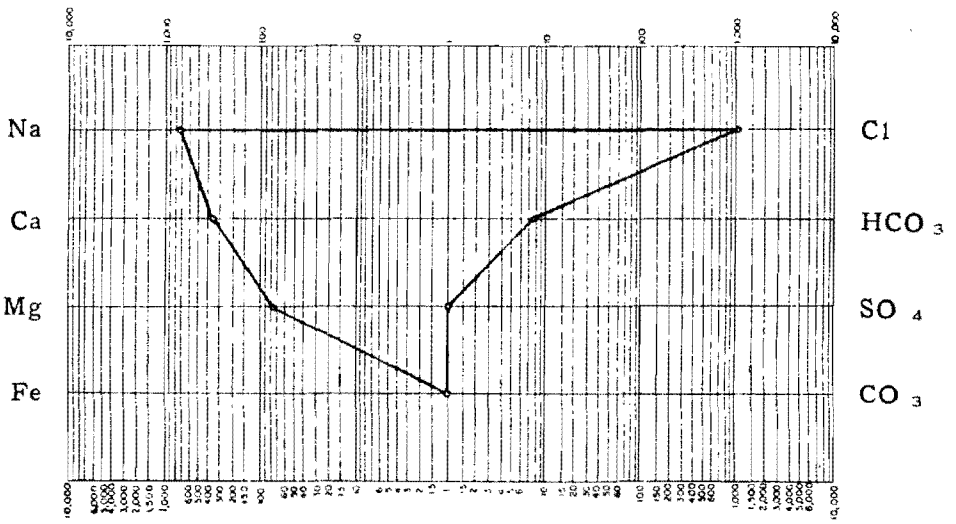
Secondary alkalinity 0.66

Chloride salinity 99.96

Sulfate salinity 0.04

Remarks and conclusions .....

LOGARITHMIC PATTERN
MEQ per unit



CORE LABORATORIES-CANADA LTD

PETROLEUM RESERVOIR ENGINEERING

CALGARY, ALBERTA

WATER ANALYSIS

File CBH-2 Wa-2544

Company Canada Southern Petroleum Ltd.

Well Name Can Southern et al Beaver R Yt 127 Sample No. 1

Formation - Depth 12,365' - 12,731' Sampled From Flow Test

Location 124 04' 00" WL Field Beaver River Province Yukon

Date Sampled April 9/64, @ 9:00A.M. Date Analyzed April 25, 1964 Analyst BK

Recovery

Constituents		*Constituents*	Meq/L	ppm	*Constituents*	Meq/L	ppm
1. Total Solids	47,121 ppm	6. Sodium	448	10,304	11. Chloride	831	29,465
2. pH	6.7	7. Calcium	269	5,400	12. Bicarbonate	7	420
3. Sp. gr	1.0368 @ 60 °F.	8. Magnesium	122	1,482	13. Sulfate	1	50
4. Resistivity	0.154 @ 73 °F. OHMS/M²M	9. Iron	Absent	-	14. Carbonate	Absent	-
		10. Barium	Absent	-	15. Hydroxide	Absent	-

5. Hydrogen Sulfide Absent